Legend

- Area of Concern (AOC) Boundary

Active NORCO Pipeline

- Above Ground
- Underground

Abandoned NORCO Pipeline

- Above Ground
- Underground

Outside Operations

- Gulf South Pipeline
- Boss Pipeline
- Gathering Line 2'
- Plains Marketing Pipeline

Source: National Agriculture Imagery Program (NAIP), 2009.

N

400 0 400

Feet

SITE MAP

FALCON REFINERY
INGELSIDE, SAN PATRICIO COUNTY, TEXAS

PROJECT NO.: 182978 | DATE: 5/11/2011

TRC
505 EAST HUNTLAND DRIVE
SUITE 250
AUSTIN, TEXAS 78752
512-329-6080

FIGURE 1

9558135

MSDS SUMMARY SHEET

Manufacturer:
Name: PHILLIPS PETROLEUM COMPANY
Address 1:
Address 2:
Address 3:
CSZ: BARTLESVILLE **State:** OK **Zipcode:** 74004
Emergency phone: (800) 424-9300
Business phone: 800-762-0942

Product:

Ferndale MSDS#: 1354 **Version # :** 6
Manufacturer MSDS#: 0041
Current? : 2002
Name:

NO. 2 DIESEL FUEL

Synonyms:

CARB **Diesel** TF3
CARB **Diesel**
CARB **Diesel** 10%
Diesel Fuel Oil
EPA Low Sulfur **Diesel** Fuel
EPA Low Sulfur **Diesel** Fuel – Dyed
EPA Off Road High Sulfur **Diesel –** Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 **Diesel** Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur **Diesel** – Dyed
No. 2 Low Sulfur **Diesel** - Dyed
No. 2 Low Sulfur **Diesel** - Undyed
Crude column 3rd IR
Crude column 3rd side cut
Atmospheric tower 3rd side cut
Ultra Low Sulfur **Diesel** No. 2
Finished **Diesel**
DHT Reactor Feed
Straight Run **Diesel**
Diesel
Middle Distillate

Product/Catalog Numbers:
MSDS Date: 01/01/2002 **(received:** 01/14/2002**)**

NFPA codes:
Health: 0 **Flammability:** 2 **Reactivity:** 0

Trial Version
www.nuance.com

MATERIAL SAFETY DATA SHEET
No. 2 Diesel Fuel

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: No. 2 Diesel Fuel
Product Code: Multiple
SAP Code:
Synonyms:
1354
CARB Diesel TF3
CARB Diesel
CARB Diesel 10%
Diesel Fuel Oil
EPA Low Sulfur Diesel Fuel
EPA Low Sulfur Diesel Fuel – Dyed
EPA Off Road High Sulfur Diesel – Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 Diesel Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur Diesel – Dyed
No. 2 Low Sulfur Diesel - Dyed
No. 2 Low Sulfur Diesel – Undyed
No. 2 Ultra Low Sulfur Diesel – Dyed
No. 2 Ultra Low Sulfur Diesel - Undyed
Intended Use: Fuel
Chemical Family:
Responsible Party: Phillip's Petroleum Company
Bartlesville, Oklahoma 74004
For Additional MSDSs: 800-762-0942
Technical Information:

The intended use of this product is indicated above. If any additional use is known, please contact us at the Technical Information number listed.

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:
Spill, Leak, Fire or Accident
Call CHEMTREC
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

California Poison Control System: 800-356-3120

Health Hazards/Precautionary Measures: Causes severe skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Wash thoroughly after handling.

Physical Hazards/Precautionary Measures: Flammable liquid and vapor. Keep away from heat, sparks, flames, static electricity or other sources of ignition.

Appearance: Straw-colored to dyed red
Physical Form: Liquid
Odor: Characteristic petroleum

Trial Version www.nuance.com

HFPA Hazard Class:
Health: 0 (Least)
Flammability: 2 (Moderate)
Reactivity: 0 (Least)

HMIS Hazard Class
Not Evaluated

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% VOLUME	Limits	EXPOSURE GUIDELINE Agency	Type
Diesel Fuel No. 2 CAS# 68476-34-6	100	100* mg/m3	ACGIH	TWA-SKIN
Naphthalene CAS# 91-20-3	<1	10ppm	ACGIH	TWA
		15ppm	ACGIH	STEL
		10ppm	OSHA	TWA
		250ppm	NIOSH	IDLH

All components are listed on the TSCA inventory

Tosco Low Sulfur No. 2 Diesel meets the specifications of 40 CFR 60.41 for low sulfur diesel fuel.

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

*Proposed ACGIH (1999)

3. HAZARDS IDENTIFICATION

Potential Health Effects:

Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Severe skin irritant. Contact may cause redness, itching, burning, and severe skin damage. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin, leading to dermatitis (inflammation). Not actually toxic by skin absorption, but prolonged or repeated skin contact may be harmful (see Section 11).

Inhalation (Breathing): No information available. Studies by other exposure routes suggest a low degree of toxicity by inhalation.

Ingestion (Swallowing): Low degree of toxicity by ingestion. ASPIRATION HAZARD – This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Signs and Symptoms: Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea, diarrhea and transient excitation followed by signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).

Cancer: Possible skin cancer hazard (see Sections 11 and 14).

Target Organs: There is limited evidence from animal studies that overexposure may cause injury to the kidney (see Section 11).

Developmental: Inadequate data available for this material.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin disorders and kidney disorders.

Trial Version www.nuance.com

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Immediately remove contaminated shoes, clothing, and constrictive jewelry and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek immediate medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek immediate medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard; Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

5. FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: >125°F/>52°
OSHA Flammability Class: Combustible liquid
LEL %: 0.3 / UEL %: 10.0
Autoignition Temperature: 500°F/260°C

Unusual Fire & Explosion Hazards: This material is flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

Trial Version www.iwarc.com

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Spilled material may be absorbed into an appropriate material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharged. The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practices.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing or high pressure hydraulic oil equipment.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSIZ49.1 and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentration below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

www.Fuelvalue.com

Personal Protective Equipment (PPE):

Respiratory: A NIOSH certified air purifying respirator with an organic vapor cartridge maybe used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrants a respirator's use.

Skin: The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation and skin damage (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.

Eyes/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse. It is recommended that impervious clothing be worn when skin contact is possible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1atm).

Appearance: Straw-colored to dyed red
Physical State: Liquid
Odor: Characteristic petroleum
pH: unavailable
Vapor Pressure (mm Hg): 0.40
Vapor Densisty (air=1):>3
Boiling Point/Range: 320-700°F /160-371°C
Freezing/Melting Point: No Data
Solubility in Water: Negligible
Specific Gravity: 0.81-0.88 @ 60°F
Percent Volatile: Negligible
Evaporation Rate (nBuAc=1): <1
Viscosity: 32.6-40.0 SUS @ 100°F
Bulk Density: 7.08 lbs/gal
Flash Point: >125°F / >52°C
Flammable/Expolsive Limits (%): LEL: 0.3 / UEL: 10.0

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Flammable liquid and vapor. Vapor can cause flash fire.

Conditions To Avoid: Avoid all possible sources of ignition (see Sections 5 and 7).

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc.

Final Version
www.nuance.com

Hazardous Decomposition Products: The use of hydrocarbon fuels in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels. ACGIH has included a TLV of 0.05 mg/m3 TWA for diesel exhaust particulate on its 1999 Notice of Intended Changes. See Section 11 for additional information on hazards of engine exhaust.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Diesel Fuel No. 2 (CAS# 68476-34-6)

Carcinogenicity: Chronic dermal application of certain middle distillate streams contained in diesel fuel No. 2 resulted in an increased incidence of skin tumors in mice. This material has not been identified as carcinogen by NTP, IARC, or OSHA. Diesel exhaust is a probable cancer hazard based on tests with laboratory animals.

Target Organ(s): Limited evidence of renal impairment has been noted from a few case reports involving excessive exposure to diesel fuel No. 2.

Naphthalene (CAS# 91-20-3)

Carcinogenicity: Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has not been identified as a carcinogen by IARC or OSHA.

12. ECOLOGICAL INFORMATION

Not evaluated at this time.

13. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001) and benzene (D018). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material, once it becomes a waste, is subject to the land disposal restrictions in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent then the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container ?insate? could be considered a RCRA hazardous waste and must be disposed of with care and in compliance with federal, state and local regulations. Large empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller containers, consult with state and local regulations and disposal authorities.

14. TRANSPORT INFORMATION

DOT Shipping Description: Diesel Fuel, NA1983
Non-Bulk Package Marking: Diesel Fuel, 3, NA 1993, III

Trial Version www.nuance.com

15. REGULATORY INFORMATION

EPA SARA 311/312 (Title III Hazard Categories):

Acute Health:	Yes
Chronic Health:	Yes
Fire Hazard:	Yes
Pressure Hazard:	No
Reactive Hazard:	No

SARA 313 and 40 CFR 372:
This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Component	CAS Number	Weight %
-- None known --		

California Proposition 65:
Warning: This material contains the following chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Component	Effect
Benzene	Cancer, Developmental and Reproductive Toxicant
Toluene	Developmental Toxicant

Diesel engine exhaust, while not a component of this material, is on the Proposition 65 list of chemicals known to the State of California to cause cancer.

Carcinogen Identification:
This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any. Diesel exhaust is a probable cancer hazard based on tests in laboratory animals. It has been identified as carcinogen by IARC.

EPA (CERCLA Reportable Quantity: None

16. OTHER INFORMATION

Issue Date: 01/01/02
Previous Issue Date: 05/15/01
Product Code: Multiple
Revised Sections: None
Previous Product Code: Multiple
MSDS Number: 0041

Disclaimer of Expressed and Implied Warranties:

The information presented in this Material Data Safety Sheet is based on data believed to be accurate as of the date this Material Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THE PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Trial Version
www.nuance.com

Tosco Refining Company ***Ferndale Refinery***

UltraLow Sulfur Diesel Product Specification

Ferndale Product Code:34380xx (5) Product Code: ULSD2

(COMETS)

Specification	Unit	Limit	Test Procedure	Typical
Appearance				
Water & Sediment	Vol %	0.05 Max	D 2709	
Color	Number	3.0 Max	D 1500	
Haze Rating	Rating	2 Max	D 4176	
Composition				
Carbon Residue (Ramsbottom)	Wt %	0.35 Max	D 524, D 189	
Volatility				
90% Recovered	Deg; F	540 Min	D 86	
	Deg; F	640 Min	D 86	
Flash Point	Deg; F	125 Min (1)	D 93	130 F
Gravity	API	30 Min	D 287, D4052	
Fluidity				
Pour Point	Deg; F	See Season Table (6)	D 97	
Cloud Point	Deg; F	See Season Table (6)	D 2500	10 F
Viscosity @ 104F	cSt	1.9 Min	D 445	
	cSt	4.1 Max	D 445	
Lubricity, SLBOCLE	grams	3100 Min	D 6078	3300gm
Lubricity, HFRR	mm	.45	D 6079	
Combustion				
Cetane Index or Cetane Number (3,4)	Number	40.0 Min	D 976, D613	47.0
Corrosion				
Copper Strip, 3hr @ 50 deg C	Number	3 Max (2)	D 130	
Aromatics (4)	Vol %	35 Max	D 1319	25 %
Contaminants				
Total Sulfur	PPM	30 Max	D 2622, D4294	15-20ppm
Water & Sediment	Vol %	0.05 Max	D 1796	
Ash	Wt %	0.01 Max	D 482	
Additives				
Cetane Improver	Lb/MBbl	675 Max		
Dye		Undyed		

1. Minimum release specification is 125 deg. F. The refinery should target 135 deg. F.
2. Test result reported as a number and letter (e.g. 1a). Any letter is allowable as long as the number meets the spec shown.
3. Either specification must be met.
4. Either cetane index minimum or aromatics maximum must be met.
5. Winter cloud and pour specifications may be relaxed to the summer specifications by agreement with the customer.
6. Season Table

Month	Product Code	Pour Point	Cloud Point
Jan, Feb, Nov, Dec	WI	0 max (5)	14 max (5)
Mar - Oct	SU	15 max	24 max

TrialVersion www.nuance.com

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
959 ROUTE 46 EAST
PARSIPPANY, NEW JERSEY 07054-0624

EMERGENCY CONTACT:
CHEMTREC 1-800-424-9300
INFORMATION CONTACT:
973-257-1100

SUBSTANCE: ETHYL BENZENE

TRADE NAMES/SYNONYMS:
MTG MSDS 185; BENZENE, ETHYL-; EB; PHENYLETHANE; ETHYLBENZENE; ETHYLBENZOL; ALPHA-METHYLTOLUENE; UN 1175; C8H10; MAT08780

CHEMICAL FAMILY: hydrocarbons, aromatic

CREATION DATE: Jan 24 1989
REVISION DATE: Jun 17 2004

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: ETHYL BENZENE
CAS NUMBER: 100-41-4
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=3 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: liquid
ODOR: aromatic odor
MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, aspiration hazard, central nervous system depression, suspect cancer hazard (in animals)
PHYSICAL HAZARDS: Flammable liquid and vapor. Vapor may cause flash fire.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation (possibly severe), chest pain, difficulty breathing, headache,

drowsiness, dizziness, loss of coordination, coma
LONG TERM EXPOSURE: irritation, headache, drowsiness, emotional disturbances, cancer
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation (possibly severe)
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation (possibly severe)
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: nausea, vomiting, stomach pain, aspiration hazard
LONG TERM EXPOSURE: no information on significant adverse effects

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing and shoes before reuse. Destroy contaminated shoes.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

NOTE TO PHYSICIAN: For inhalation, consider oxygen. For ingestion, consider gastric lavage and activated charcoal slurry.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool

containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

FLASH POINT: 59 F (15 C) (CC)
LOWER FLAMMABLE LIMIT: 0.8%
UPPER FLAMMABLE LIMIT: 6.7%
AUTOIGNITION: 810 F (432 C)
FLAMMABILITY CLASS (OSHA): IB

6. ACCIDENTAL RELEASE MEASURES

AIR RELEASE:
Reduce vapors with water spray. Stay upwind and keep out of low areas.

SOIL RELEASE:
Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

WATER RELEASE:
Cover with absorbent sheets, spill-control pads or pillows. Neutralize. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
ETHYL BENZENE:
100 ppm (435 mg/m3) OSHA TWA
125 ppm (543 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
100 ppm ACGIH TWA
125 ppm ACGIH STEL
100 ppm (435 mg/m3) NIOSH recommended TWA 10 hour(s)
125 ppm (545 mg/m3) NIOSH recommended STEL

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
800 ppm
Any chemical cartridge respirator with organic vapor cartridge(s).
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any powered, air-purifying respirator with organic vapor cartridge(s).
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid
COLOR: colorless
ODOR: aromatic odor
MOLECULAR WEIGHT: 106.17
MOLECULAR FORMULA: C-H3-C-H2-C6-H5

BOILING POINT: 277 F (136 C)
FREEZING POINT: -139 F (-95 C)
VAPOR PRESSURE: 7.1 mmHg @ 20 C
VAPOR DENSITY (air=1): 3.66
SPECIFIC GRAVITY (water=1): 0.8670
WATER SOLUBILITY: 0.015%
PH: Not available
VOLATILITY: 100%
ODOR THRESHOLD: 140 ppm
EVAPORATION RATE: <1 (butyl acetate=1)
VISCOSITY: 0.64 cP @ 25 C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: alcohol, ether, benzene, sulfur dioxide, carbon tetrachloride
Insoluble: ammonia

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

INCOMPATIBILITIES: acids, bases, oxidizing materials, combustible materials

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of carbon

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

ETHYL BENZENE:
IRRITATION DATA:
15 mg/24 hour(s) open skin-rabbit mild; 500 mg eyes-rabbit severe
TOXICITY DATA:
55000 mg/m3/2 hour(s) inhalation-rat LC50; 17800 ul/kg skin-rabbit LD50; 3500 mg/kg oral-rat LD50
CARCINOGEN STATUS: IARC: Human Inadequate Evidence, Animal Sufficient Evidence, Group 2B; ACGIH: A3 -Animal Carcinogen
LOCAL EFFECTS:
Irritant: inhalation, skin, eye
ACUTE TOXICITY LEVEL:
Moderately Toxic: ingestion
Slightly Toxic: inhalation, dermal absorption

TARGET ORGANS: central nervous system
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: kidney disorders, liver disorders, respiratory disorders, skin disorders and allergies
TUMORIGENIC DATA: Available.
MUTAGENIC DATA: Available.
REPRODUCTIVE EFFECTS DATA: Available.
ADDITIONAL DATA: May cross the placenta.

12. ECOLOGICAL INFORMATION

FATE AND TRANSPORT:
KOW: 154170.05 (log = 5.196) (estimated from water solubility)

KOC: 44668.36 (log = 4.657) (estimated from water solubility)

HENRY'S LAW CONSTANT: 6.6 E -3 atm-m3/mol

BIOCONCENTRATION: 36.39 (estimated from water solubility)

AQUATIC PROCESSES: 2.6730095 hours (River Model: 1 m deep, 1 m/s flow, 3 m/s wind)

ENVIRONMENTAL SUMMARY: Relatively non-persistent in the environment. Not expected to leach through the soil or the sediment. Accumulates very little in the bodies of living organisms. Highly volatile from water.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Ethylbenzene
ID NUMBER: UN1175
HAZARD CLASS OR DIVISION: 3
PACKING GROUP: II
LABELING REQUIREMENTS: 3

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Ethylbenzene
UN NUMBER: UN1175

CLASS: 3
PACKING GROUP/RISK GROUP: II

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
ETHYL BENZENE: 1000 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: Yes
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
ETHYL BENZENE

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65:
Known to the state of California to cause the following:
ETHYL BENZENE
Cancer (Jun 11, 2004)

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: B2.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

©Copyright 1984-2005 MDL Information Systems, Inc. All rights reserved.

MATHESON TRI-GAS, INC. MAKES NO EXPRESS OR IMPLIED WARRANTIES, GUARANTEES OR REPRESENTATIONS REGARDING THE PRODUCT OR THE INFORMATION HEREIN, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE. MATHESON TRI-GAS, INC. SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE, WHETHER COMPENSATORY, CONSEQUENTIAL, EXEMPLARY, OR OTHERWISE, RESULTING FROM ANY PUBLICATION, USE OR RELIANCE UPON THE INFORMATION HEREIN.

Material Safety Data Sheet

MSDS ID NO.: 0274MAR019
Revision date: 07/25/2006

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon Residual Fuel Oil
Synonym: Bunker C Fuel; Fuel Oil Residual; Slurry Blendstock; No. 6 Fuel Oil; No. 6 Residual Fuel Oil; Residual Fuel Oil
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street
Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION / INFORMATION ON INGREDIENTS

Heavy or Residual Fuel Oil is a complex mixture of high molecular weight hydrocarbons produced from high temperature treatment of heavy petroleum fractions.

This product was analyzed by MPC and found to contain 0.05-0.6% of the 22 3-7 ring polycyclic aromatic compounds identified as Persistent Bioaccumulative Toxic (PBT) Chemicals subject to reporting under EPA EPCRA Section 313 regulations.

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon Residual Fuel Oil	68476-33-5	100			

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Petroleum Residua	Mixture	0-100			
Catalytic Cracked Clarified Oil	64741-62-4	0-90			
Diesel Oil	68334-30-5	0-30	= 100 mg/m³ TWA vapor and aerosol, as total hydrocarbons skin - potential for cutaneous absorption (as total hydrocarbons)		
Sulfur Compounds	Mixture	0.5-4			
5-methylchrysene	3697-24-3	0.01-0.2			
Naphthalene	91-20-3	0.01-0.15	Skin - potential significant contribution to overall exposure by the cutaneous route = 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m³ TWA = 15 ppm STEL = 75 mg/m³ STEL	
Benzo(a)phenanthrene	218-01-9	0.01-0.1	= 0.2 mg/m³ TWA as benzene soluble aerosol	= 0.2 mg/m³ TWA benzene soluble fraction	
Hydrogen Sulfide	7783-06-4	0-0.01	= 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 14 mg/m³ TWA = 15 ppm STEL = 21 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

THIS PRODUCT IS A BROWN TO BLACK VISCOUS COLORED LIQUID. THIS PRODUCT IS CONSIDERED TO BE A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD AND SHOULD BE KEPT AWAY FROM HEAT, FLAME AND SOURCES OF IGNITION. LONG-TERM SKIN EXPOSURE TO COMPONENTS OF THIS PRODUCT HAS CAUSED CANCER IN LABORATORY ANIMALS AND HUMANS. REPEATED SKIN CONTACT TO SOME COMPONENTS OF THIS PRODUCT HAVE PRODUCED SYSTEMIC TOXICITY (INCLUDING LIVER DAMAGE) IN LABORATORY ANIMALS. WHEN HEATED THIS MATERIAL MAY VENT TOXIC LEVELS OF HYDROGEN SULFIDE (H2S) VAPORS THAT ACCUMULATE IN THE VAPOR SPACES OF STORAGE AND TRANSPORT COMPARTMENTS. H2S VAPORS CAN CAUSE EYE, SKIN, AND RESPIRATORY TRACT IRRITATION AND ASPHYXIATION.

OSHA WARNING LABEL:

DANGER!
LONG-TERM SKIN EXPOSURE TO COMPONENTS OF THIS PRODUCT HAS CAUSED SKIN CANCER IN LABORATORY ANIMALS AND HUMANS.
REPEATED SKIN CONTACT TO SOME COMPONENTS IN THIS PRODUCT HAS PRODUCED SYSTEMIC TOXICITY (INCLUDING LIVER DAMAGE) IN LABORATORY ANIMALS.
MAY VENT HARMFUL CONCENTRATIONS OF HYDROGEN SULFIDE (H2S) GAS WHICH CAN CAUSE RESPIRATORY IRRITATION AND ASPHYXIATION.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Exposure to vapor or mist may cause pulmonary irritation, dizziness, nausea and loss of consciousness. Significant concentrations of hydrogen sulfide gas can be present in the vapor space of storage tanks and bulk transport compartments (See Sections 7, 8 & 11).

Ingestion: Product would be expected to have a low order of acute toxicity. Significant ingestion of some components of this product may cause liver damage.

Skin contact: Prolonged and repeated liquid contact can cause dermatitis, folliculitis or oil acne. Components of this product may cause skin sensitization. Components of this product can cause liver damage if absorbed through the skin.

Eye contact: Liquid or vapor contact may result in slight eye irritation.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon Residual Fuel Oil 68476-33-5	NE			

Notes: The International Agency for Research on Cancer (IARC) has determined that there is sufficient evidence for the carcinogenicity of residual (heavy) fuel oil in animals.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:

Diesel Oil 68334-30-5	Monograph 45, 1989; (Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms)		A3 - Animal Carcinogen (as total hydrocarbons)	
5-methylchrysene 3697-24-3	Supplement 7, 1987; Monograph 32, 1983	Reasonably Anticipated To Be A Carcinogen (Listed under ``Polycyclic aromatic hydrocarbons``)		
Naphthalene 91-20-3	Monograph 82, 2002	Reasonably Anticipated To Be A Carcinogen Listed	A4 - Not Classifiable as a Human Carcinogen	Present
Benzo(a)phenanthrene 218-01-9	Supplement 7, 1987; Monograph 35, 1985	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) A3 - Animal Carcinogen	Present

Notes:

The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of diesel fuel/fuel oil in humans. IARC determined that there was limited evidence for the carcinogenicity of marine diesel fuel in animals. Distillate (light) diesel fuels were not classifiable as to their carcinogeniicty to humans (Group 3A)

The International Agency for Research on Cancer (IARC) has determined that there is sufficient evidence for the carcinogenicity of catalytically cracked clarified oil (carbonblack feedstock) in animals.

The International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP) have concluded that certain polycyclic aromatic hydrocarbons, i.e. (benzo(a)pyrene, benz(a)anthracene, benzo(a)phenanthrene, indeno(1,2,3-cd)pyrene, benzo(j)fluoranthene, benzo(j,k,fluorine, benzo(g,h,i)perylene, and 5-methylchrysene are probably carcinogenic to humans (Group 2A and B).

The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: Ingestion not likely. If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Preexisting skin conditions, respiratory disorders, and impaired liver function may be aggravated by exposure to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a combustible liquid per the OSHA Hazard Communication Standard and should be handled accordingly. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Use water spray to cool exposed surfaces from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 131 (Min) F
Autoignition temperature: No data available.
Flammable limits in air - lower (%): 1.0
Flammable limits in air - upper (%): 6.0

NFPA rating:
Health: 2
Flammability: 2
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 2
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return product to source.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues. The fuel oil contained in this product may flash if product temperature is >131 F.

Harmful concentrations of hydrogen sulfide (H2S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments. Stay upwind and vent open hatches before unloading.

Avoid skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water. Never siphon this product by mouth.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or when there is inadequate ventilation.

Respiratory protection: Not required under normal conditions and adequate ventilation. Use atmosphere supplying respirators in confined spaces or when vapors exceed permissible limits; otherwise, an organic vapor respirator with pre-filter for fumes can be used. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Impermeable gloves (e.g., nitrile, viton, tyvek/saranex 23) to prevent skin contact.

Eye protection: Goggles and faceshield when handling hot material.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof. Chemical resistant apron or other protective clothing may be needed to avoid skin contact.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Black Viscous Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Black
Odor:	Hydrocarbon
Molecular weight:	Not determined.
pH:	Neutral
Boiling point/range (5-95%):	400-1300 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	Not determined
Density:	7.3-8.3 lbs/gal
Bulk density:	No data available.
Vapor density:	No data available.
Vapor pressure:	1 mm Hg @ 160 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability: The material is stable at 70 F, 760 mm pressure.

Polymerization: Will not occur.

Hazardous decomposition products: Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.

Materials to avoid: Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid: Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon Residual Fuel Oil	68476-33-5	No data available	No data available	No data available

Lifetime skin painting studies in animals with products similar to Heavy catalytic cracked distillate, No. 6 fuel oil and/or its components have produced tumors in animals following prolonged and repeated skin contact. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies.

Summary of health effect data on residual fuel oil components:

This product contains diesel fuel (middle distillate) at a level of >1.0% Lifetime skin painting studies in animals with similar distillate fuels have produced weak to moderate carcinogenic activity following prolonged and repeated exposure. Similar middle distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies.

This product may contain >0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused lung tumors in female mice. Male mice with the same exposure did not develop tumors. Exposure to 10-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and respiratory tract in male and female rats. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

Catalytic cracked clarified oil (CCCO) may be present in concentrations up to 100% in this product. Lifetime skin painting studies in animals with CCCO have produced tumors in animals following prolonged and repeated skin contact. Repeated dermal application of CCCO (30 mg/kg/day for 13 weeks) in rats resulted in anemia, liver degeneration and injury to bone marrow and lymphoid tissues. 100% mortality was observed at 2,000 mg/kg/day within three weeks. Repeated dermal application (30 mg/kg/day) of CCCO to pregnant rats during gestation produced maternal and fetal toxicity, some deaths and systemic toxicity (liver, thymus and blood). The number of viable offspring decreased at doses of 30 mg/kg/day and above. Many of the developmental effects (anomalies, resorptions and growth inhibition) were observed at doses which produced maternal toxicity. In a separate developmental study CCCO produced decreases in body weights and food consumption at doses from 10-250 mg/kg/day. Although fertility and reproductive function were not affected, the no observable adverse effect level for CCCO administered dermally was 1 mg/kg/day.

This product contains >0.1% 3-7 ring polynuclear aromatic hydrocarbons (PAC's). Some PAH's such as benzo(a)phenanthrene and 5-methylchrysene have been shown to be carcinogenic in experimental animals. An increased risk of cancer has been observed in workers employed in the aluminum production, coal gasification, coal-tar pitch, coke production and iron and steel industries that had been occupationally exposed to polynuclear aromatic hydrocarbons (PAC). Since these kinds of PACs have been measured at high levels in air samples taken in these idustries, IARC has concluded that these PACs are probably carcinogenic to humans.

Hydrogen sulfide gas (H_2S) is toxic by inhalation. Prolonged breathing of 50-100 ppm H_2S vapors can produce eye and respiratory tract irritation. Higher concentrations (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of >1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H_2S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H_2S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H_2S, respectively. Over the years a number of acute cases of H_2S poisonings have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: Product can be toxic to fish and aquatic life. The 24 hour TLM of the water soluble fraction of bunker C fuel oil is 3-6 ppm in marine and estuarine crustaceans and fish.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This material as supplied and by itself, when discarded or disposed of, is not an EPA RCRA hazardous waste according to federal regulations. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Fuel Oil, No. 6
UN/Identification No: NA 1993
Hazard Class: 3
Packing group: III
DOT reportable quantity (lbs): Not applicable.

TDG (Canada):

Proper shipping name: Fuel Oil, No. 6
UN/Identification No: NA 1993
Hazard Class: 3
Packing group: III
Regulated substances: Not applicable.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Petroleum Residua	NA
Catalytic Cracked Clarified Oil	NA
Diesel Oil	NA
Sulfur Compounds	NA
5-methylchrysene	NA
Naphthalene	NA
Benzo(a)phenanthrene	NA
Hydrogen Sulfide	hydrogen sulfide

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Petroleum Residua	NA
Catalytic Cracked Clarified Oil	NA
Diesel Oil	NA
Sulfur Compounds	NA
5-methylchrysene	NA
Naphthalene	= 0.454 kg final RQ = 1 lb final RQ = 100 lb final RQ = 45.4 kg final RQ
Benzo(a)phenanthrene	= 0.454 kg final RQ = 0.454 kg statutory RQ = 1 lb final RQ = 1 lb statutory RQ = 100 lb final RQ = 45.4 kg final RQ
Hydrogen Sulfide	= 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Petroleum Residua	None
Catalytic Cracked Clarified Oil	None
Diesel Oil	None
Sulfur Compounds	None
5-methylchrysene	= 100 lb Reporting Threshold Chemical Category N590, PBT Chemicals = 100 lb Reporting Threshold Listed under ``Polycyclic aromatic compounds``, Chemical Category N590, PBT Chemicals
Naphthalene	= 0.1 % de minimis concentration
Benzo(a)phenanthrene	= 100 lb Reporting Threshold Chemical Category N590, PBT Chemicals = 100 lb Reporting Threshold Listed under ``Polycyclic aromatic compounds``, Chemical Category N590, PBT Chemicals
Hydrogen Sulfide	None

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Petroleum Residua

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Catalytic Cracked Clarified Oil

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Diesel Oil

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	[present]
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Sulfur Compounds

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed

Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

5-methylchrysene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 4/1/88
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	SN 3758 (Polycyclic aromatic compounds category); Category Code N590; report 500 lbs. in combination of any listed chemicals SN 3758; Category Code N590
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Listed
New Jersey Right-To-Know:	Listed
Pennsylvania Right-To-Know:	Listed
Massachusetts Right-To Know:	Listed
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Listed
Illinois - Toxic Air Contaminants	Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Listed

Benzo(a)phenanthrene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 1/1/90
New Jersey Right-To-Know:	sn 0441
Pennsylvania Right-To-Know:	environmental hazard special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous

California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	carcinogen
New Jersey - Environmental Hazardous Substances List:	SN 3758 (Polycyclic aromatic compounds category); Category Code N590; report 500 lbs. in combination of any listed chemicals SN 3758; Category Code N590
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 100 lbs Air RQ

Hydrogen Sulfide

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 1017
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - fourth degree
New Jersey - Environmental Hazardous Substances List:	SN 1017
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 100 lbs Air RQ = 100 lbs Land/Water RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Diesel Oil	B3; D2B	
5-methylchrysene		1% (English Item 1032, French Item 1124)
Naphthalene	B4, D2A	1 %
Benzo(a)phenanthrene	D2A Uncontrolled product according to WHMIS classification criteria.	0.1% (English Item 405, French Item 562) 0.1% (English Item 411, French Item 1721)
Hydrogen Sulfide	A; B1; D1A; D2B	1% (English Item 851, French Item 1550)

16. OTHER INFORMATION

Additional Information: The pronounced and easily-recognized rotten egg odor of hydrogen sulfide gas (H2S) can be detected at concentrations as low as 0.003-0.13 ppm. Since higher H2S concentrations (100-200 ppm) cause olfactory fatigue and other hydrocarbon odors can "mask" H2S, the sense of smell cannot be used as a reliable indicator of H2S exposure.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Material Safety Data Sheet

MSDS ID NO.: 0123MAR019
Revision date: 07/25/2006

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon Aviation Turbine Fuel Jet A 3000 ppm Sulfur Max
Synonym: Aviation Turbine Fuel Jet A; Jet A Aviation Fuel; AV Turbine Fuel - Jet A; Jet Fuel 500 ppm Sulfur Max; Jet Fuel (0.05% Sulfur Max); Jet Fuel, Non-Road Use, Undyed
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street
Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION / INFORMATION ON INGREDIENTS

Aviation Turbine Fuel Jet A is a complex mixture of paraffins, cycloparaffins, olefins and aromatic hydrocarbons having hydrocarbon chain lengths predominantly in the range of C9 through C16. May contain a trace amount of benzene (<0.01%).

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon Aviation Turbine Fuel Jet A	8008-20-6	100	= 200 mg/m³ TWA application restricted to conditions in which there are negligible aerosol exposures skin - potential for cutaneous absorption (as total hydrocarbon vapor)		

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Saturated Hydrocarbons	Mixture	70-80			
Aromatic Hydrocarbons	Mixture	17-20			
Unsaturated Hydrocarbons	Mixture	3-6			
Naphthalene	91-20-3	0.01-0.5	Skin - potential significant contribution to overall exposure by the cutaneous route = 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m³ TWA = 15 ppm STEL = 75 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

JET FUEL IS A CLEAR TO AMBER COLORED LIQUID. THIS PRODUCT IS CONSIDERED TO BE A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD AND SHOULD BE KEPT AWAY FROM HEAT, FLAME AND SOURCES OF IGNITION. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH. PROLONGED OR REPEATED SKIN CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN WHICH MAY PRODUCE SEVERE IRRITATION OR DERMATITIS.

OSHA WARNING LABEL:

WARNING.
COMBUSTIBLE LIQUID.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.
PRODUCES SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Exposure to high vapor concentrations may produce headache, giddiness, vertigo, and anesthetic stupor.

Ingestion: Ingestion may result in nausea, vomiting, diarrhea and restlessness. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Produces little or no irritation on direct contact with the eye.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon Aviation Turbine Fuel Jet A 8008-20-6	NE		A3 - Animal Carcinogen (as total hydrocarbon vapor)	

Notes: The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of jet fuel in humans.

IARC has determined that there is sufficient evidence for the carcinogenicity in experimental animals of diesel engine exhaust and extracts of diesel engine exhaust particles. IARC determined that there is only limited evidence for the carcinogenicity in humans of diesel engine exhaust. However, IARC's overall evaluation has resulted in the IARC designation of diesel engine exhaust as probably carcinogenic to humans (Group 2A) because of the presence of certain engine exhaust components.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Naphthalene 91-20-3	Monograph 82, 2002	Reasonably Anticipated To Be A Carcinogen Listed	A4 - Not Classifiable as a Human Carcinogen	Present

Notes: The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. If swallowed, immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions and respiratory disorders may be aggravated by exposures to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a combustible liquid per the OSHA Hazard Communication Standard and should be handled accordingly. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Keep surrounding area cool with water spray from a distance and prevent further ignition of combustible material. Keep run-off water out of sewers and water sources.

Flash point: 120-190 F
Autoignition temperature: 489 F
Flammable limits in air - lower (%): 0.7
Flammable limits in air - upper (%): 5.0

NFPA rating:
Health: 1
Flammability: 2
Reactivity: 1
Other: -

HMIS classification:
Health: 1
Flammability: 2
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Avoid repeated and prolonged skin contact. Never siphon this product by mouth. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required when using at elevated temperatures that generate vapors or mists.

Respiratory protection: Use approved organic vapor chemical cartridge or supplied air respirators when material produces vapors that exceed permissible limits or excessive vapors are generated. Observe respirator protection factor criteria cited in ANSI Z88.2. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride and polyurethane gloves to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: No special protective clothing is normally required. Select protective clothing depending on industrial operations. Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Clear to Amber Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Clear or Amber
Odor:	Slight Hydrocarbon
Molecular weight:	180
pH:	Neutral
Boiling point/range (5-95%):	360-550 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	Not determined
Density:	6.76 lbs/gal
Bulk density:	No data available.

Vapor density:	4-5
Vapor pressure:	1-10 mm Hg @ 100 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	10%
Viscosity:	1.3-2.1 @ 50 C

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
Materials to avoid:	Strong oxidizers such as nitrates, perchlorates, chlorine, fluorine.
Conditions to avoid:	Excessive heat, sources of igition and open flames.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon Aviation Turbine Fuel Jet A	8008-20-6	>2 mg/l for 4 hr [Rat]	>5 ml/kg [Rabbit]	9-16 ml/kg [Rat]

Lifetime skin painting studies in animals with similar distillate fuels have produced weak to moderate carcinogenic activity following prolonged and repeated exposure. Similar middle distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies. Some components of this product, have been shown to produce a species specific, sex hormonal dependent kidney lesion in male rats from repeated oral or inhalation exposure. Subsequent research has shown that the kidney damage develops via the formation of a alpha-2µ-globulin, a mechanism unique to the male rat. Humans do not form alpha-2µ-globulin, therefore, the kidney effects resulting from this mechanism are not relevant in humans. Some components of this product were found to be positive in a few mutagenicity tests while negative in the majority of others. The exact relationship between these results and human health is not known.

Summary of health effect data on distillate fuel components:

This product may contain >0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused lung tumors in female mice. Male mice with the same exposure did not develop tumors. Exposure to 10-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and respiratory tract in male and female rats. Oral administration of 133-267 mg/kg/day of naphthalene in mice for up to 90 days did not produce mortality, systemic toxicity, adversely affect organ or body weight or produce changes in blood. Repeated oral administration of naphthalene produced an anemia in dogs. Repeated intraperitoneal doses of naphthalene produced lung damage in mice. Repeated high doses of naphthalene has caused the formation of cataracts and retinotoxicity in the eyes of rats and rabbits due to accumulation of 1,2-naphthoquinone, a toxic metabolite. Effects in human eyes is uncertain and not well documented. Pregnant rats administered intraperitoneal doses of naphthalene during gestation gave birth to offspring that had delayed heart and bone development. Pregnant mice given near lethal doses of naphthalene showed no significant maternal toxicity and a reduction in the number of pups per litter, but no gross abnormalities in offspring. Suppressed spermatogenesis and progeny development have been reported in mice, rats and guinea pigs after exposure to high concentrations of naphthalene in their drinking water. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

Summary of health effect information on diesel engine exhaust:

Chronic inhalation studies of whole diesel engine exhaust in mice and rats produced a significant increase in lung tumors. Combustion of kerosine and/or diesel fuels produces gases and particulates which include carbon monoxide, carbon dioxide, oxides of nitrogen and/or sulfur and hydrocarbons. Significant exposure to carbon monoxide vapors decreases the oxygen carrying capacity of the blood and may cause tissue hypoxia via formation of carboxyhemoglobin.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects:

Product can be toxic to aquatic life and cause fouling of the shoreline at high concentrations. The 96 hour LL50 values for an accomadated fraction (WAF) of fuel oil ranged from 3.2 to 65 mg/l in fish and 2-210 mg/l in invertebrates. EL50 values for inhibition of algal growth ranged from 1.8 to 2.9 mg/l for No. 2 fuel oil and from 10 to 78 mg/l for diesel fuel. This product does not concentrate or accumulate in the food chain. If released to soil and water, this product is expected to biodegrade under both aerobic and anaerobic conditions.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations:

This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "characteristic" hazardous waste. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Fuel, Aviation, Turbine Engine
UN/Identification No: UN 1863
Hazard Class: 3
Packing group: III
DOT reportable quantity (lbs): Not applicable.

TDG (Canada):

Proper shipping name: Fuel, Aviation, Turbine Engine
UN/Identification No: UN 1863
Hazard Class: 3
Packing group: III
Regulated substances: Not applicable.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	= 0.454 kg final RQ = 1 lb final RQ = 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Fire Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Saturated Hydrocarbons	None
Aromatic Hydrocarbons	None
Unsaturated Hydrocarbons	None
Naphthalene	= 0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Saturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Aromatic Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Unsaturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.

Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Listed
New Jersey Right-To-Know:	Listed
Pennsylvania Right-To-Know:	Listed
Massachusetts Right-To Know:	Listed
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Listed
Illinois - Toxic Air Contaminants	Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Listed

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Naphthalene	B4, D2A	1 %

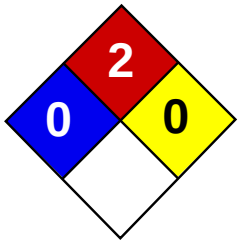
16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet



Health	2
Fire	2
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Kerosene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Kerosene

Catalog Codes: SLK1048

CAS#: 8008-20-6 or 64742-81-0

RTECS: OA5500000

TSCA: TSCA 8(b) inventory: Kerosene

CI#: Not available.

Synonym: Astral Oil; Coal Oil, Fuel Oil No. 5, Deobase, Astral Oil, Jet A Fuel; Jet Fuel JP-1; JP-5 Navy Fuel; Kerosine, petroleum; Range Oil; K1 Kerosene; Kerosene, hydrodesulfurized; Kerosine

Chemical Name: Kerosene

Chemical Formula: Not available.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**
Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Trial version
www.nuance.com

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Kerosene	8008-20-6 or 64742-81-0	100

Toxicological Data on Ingredients: Kerosene: ORAL (LD50): Acute: 15000 mg/kg [Rat]. 20000 mg/kg [Guinea pig]. 2835 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to the nervous system. The substance may be toxic to blood, kidneys, liver, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do NOT induce vomiting. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Trial Version
www.nuance.com

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 210°C (410°F)

Flash Points: CLOSED CUP: 38°C (100.4°F). (Tagliabue.)

Flammable Limits: LOWER: 0.7% UPPER: 5% - 7%

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Oily liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: Not available.

Color: Yellow. Clear (Light.)

pH (1% soln/water): Not applicable.

Boiling Point: 149°C (300.2°F) - 325 C

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: 0.775 - .840(Water = 1)

Vapor Pressure: 0.1 kPa (@ 20°C)

Vapor Density: 4.5 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Trial Version
www.nuance.com

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Miscible with other petroleum solvents

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (sparks, flames), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact.

Toxicity to Animals: Acute oral toxicity (LD50): 2835 mg/kg [Rabbit].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. Causes damage to the following organs: the nervous system. May cause damage to the following organs: blood, kidneys, liver, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant). Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes moderate to severe skin irritation. It can cause defatting dermatitis. Eyes: May cause eye irritation. Inhalation: May cause respiratory tract and mucous membrane irritation and a burning sensation in the chest. Because of its relatively low volatility, overexposure by inhalation is uncommon, but it can occur in poorly ventilated areas or by inhalation of mists or aerosols. Symptoms of inhalation overexposure include central nevous system (CNS) depression (transient euphora, headache, irritability, excitement, ringing in the ears, weakness, incoordination, confusion, disorientation, drowsiness, tremor, somnolence, hallucinations, seizures, coma, death). May affect the heart (cardiac arrythmias), liver, kidneys, and respiration(asphyxia, apnea, acute pulmonary edema, dyspnea, fibrosis, or cyanosis) Ingestion: Causes gastrointestinal tract irritation with burning sensation in mouth, esophagus, and stomach, a b d o m i n a l p a i n , n a u s e a , v o m i t i n g , h y p e r m o t i l i t y , d i a r r h e a , h e a d a c h e , m a l a i s e . M a y a f f e c t respiration/ trachea/bronchi through accidental pulmonary aspiration which can cause hypoxia, chemical pneumonitis, and noncardiogenic pulmonary edema, pulmonary hemmorrhage, coughing, breathing difficulty, acute or chronic pulmonary edema, emphysema, respiratory stimulation. It may also affect the heart (dysrrhythmias, myocardial depression, tachycardia), liver, endocrine system (pancreas - hypoglycemia), behavior/central nervous system (symptoms similar to that of inhalation). Chronic Potential Health Effects: Inhalation: Repeated or prolonged inhalation may cause respiratory tract irritation and affect behavior/central nervous system with symptoms similar to that of acute inhalation. It may also affect the blood (changes in white blood cell count, changes in serum compositon, pigmented or nucleated red blood cells, leukopenia, normocytic anemia) , cardiovascular

Trial Version
www.nuance.com

system, respiratory system (trachea, bronchi), and may cause kidney damage. Ingestion: Repeated or prolonged ingestion may affect the liver, endocrine system (adrenal gland, pancreas, spleen), and metabolism (weight loss), and blood. Skin: Repeated or prolonged skin contact may cause defatting dermatitis, erythema, and eczema-like skin lesions, drying and cracking of the skin, and possible burns.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: Not available.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Kerosene UNNA: 1223 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Kerosene Rhode Island RTK hazardous substances: Kerosene Pennsylvania RTK: Kerosene Massachusetts RTK: Kerosene Massachusetts spill list: Kerosene New Jersey: Kerosene TSCA 8(b) inventory: Kerosene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable. R65- Harmful: may cause lung damage if swallowed. S23- Do not breathe gas/fumes/vapour/spray S24- Avoid contact with skin. S62- If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Trial Version
www.nuance.com

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:54 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Trial Version
www.nuance.com

Material Safety Data Sheet

MSDS ID NO.: 0156MAR019
Revision date: 02/02/2004

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: MAPLLC Benzene
Synonyms: Benzene; Cyclohexatriene;
Chemical Family: Aromatic Hydrocarbon
Formula: C6H6

Supplier:
Marathon Ashland Petroleum LLC
539 SOUTH MAIN STREET
FINDLAY OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Benzene is an C6 aromatic petroleum hydrocarbon.

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
MAPLLC Benzene	71-43-2	100	= 0.5 ppm TWA = 2.5 ppm STEL skin - potential for cutaneous absorption	= 10 ppm TWA unless specified in 1910.1028 = 25 ppm Ceiling unless specified in 1910.1028 = 50 ppm STEL 10 min, unless specified in 1910.1028	OSHA Exposure Limit as specified in 1910.1028: =1.0 ppm TWA = 5 ppm STEL = 0.5 ppm Action Level

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Benzene	71-43-2	99-100	= 0.5 ppm TWA = 2.5 ppm STEL skin - potential for cutaneous absorption	= 10 ppm TWA unless specified in 1910.1028 = 25 ppm Ceiling unless specified in 1910.1028 = 50 ppm STEL 10 min, unless specified in 1910.1028	OSHA Exposure Limit as specified in 1910.1028: =1.0 ppm TWA = 5 ppm STEL = 0.5 ppm Action Level

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

BENZENE IS A COLORLESS LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. CONTAINS BENZENE WHICH MAY CAUSE CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH.

OSHA WARNING LABEL:

DANGER!
CONTAINS BENZENE.
CANCER HAZARD.
EXTREMELY FLAMMABLE.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Acute exposure to vapor concentrations of 50-150 ppm benzene can cause respiratory irritation, headache, dizziness and loss of coordination. Concentrations exceeding 500 ppm may cause central nervous system depression, loss of consciousness, coma and death resulting from respiratory failure. Excessive benzene exposure may cause cardiac sensitization.

Ingestion: Liquid ingestion causes severe gastrointestinal pain, abdominal cramps, nausea, vomiting, narcosis and central nervous system depression. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Eye irritation may result from contact with the liquid or exposure to the vapor at concentrations above the TLV.

Carcinogenic Evaluation:

Product information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
MAPLLC Benzene 71-43-2	Supplement 7, 1987; Monograph 29, 1982	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen	Present

Notes: Benzene is listed by the National Toxicology Program, the International Agency for Research on Cancer (IARC) and by OSHA as a chemical casually associated with certain forms of leukemia (cancer) in humans.

Component Information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Benzene 71-43-2	Supplement 7, 1987; Monograph 29, 1982	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen	Present

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions, respiratory disorders or impaired blood forming organ functions may be aggravated by exposure to this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Special protective equipment for firefighters: Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 12 F
Autoignition temperature: 1076 F
Flammable limits in air - lower (%): 1.3
Flammable limits in air - upper (%): 7.9

NFPA rating:
Health: 2
Flammability: 3
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 3
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Never siphon this product by mouth. Avoid skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in OSHA Benzene Standard (29 CFR 1910.1028). Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Viton gloves should be used to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Pure
Color:	Colorless
Odor:	Aromatic
Molecular weight:	78.1
pH:	Neutral
Boiling point/range:	176 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	0.88
Density:	7.32 lbs/gal
Bulk density:	No data available.
Vapor density:	2.8
Vapor pressure:	100 mm Hg @ 79 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability: The material is stable at 70 F, 760 mm pressure.

Polymerization: Will not occur.

Hazardous decomposition products: Carbon monoxide, benzene vapor

Materials to avoid: Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid: Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information

Name	CAS Number	Inhalation:	Dermal:	Oral:
MAPLLC Benzene	71-43-2	LC50 = 13,700 ppm for 4 hrs [Rat]	LD50 > 8260 mg/kg [Rabbit]	LD50 = 810 - 10,000 mg/kg [Rat]

Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in man. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: The 96 hour LC50 of benzene for stripped bass is 10-100 ppm. The 7 day No Observed Effect Concentration (NOEC) for benzene in daphnia is 3 mg/l. This product does not concentrate or accumulate in the food chain.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "ignitable" hazardous waste (D001). This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name:	Benzene
UN/Identification No:	UN 1114
Hazard Class:	3
Packing group:	II
DOT reportable quantity (lbs):	10 pounds.

TDG (Canada):

Proper shipping name:	Benzene
UN/Identification No:	UN 1114
Hazard Class:	3
Packing group:	II
Regulated substances:	10 pounds.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Benzene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Benzene	= 0.454 kg final RQ = 0.454 kg statutory RQ = 1 lb final RQ = 1 lb statutory RQ = 10 lb final RQ = 10 lb final RQ receives an adjustable RQ of 10 lbs based on potential carcinogenicity in August 14, 1989 final rule = 100 lb final RQ = 4.54 kg final RQ = 4.54 kg final RQ receives an adjustable RQ of 10 lbs based on potential carcinogenicity in August 14, 1989 final rule = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard.
Chronic Health Hazard.
Fire Hazard.

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Benzene	= 0.1 percent de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 2/27/87 developmental toxicity; initial date 12/26/97 male reproductive toxicity; initial date 12/26/97
New Jersey Right-To-Know:	sn 0197
Pennsylvania Right-To-Know:	environmental hazard; special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable, Carcinogen; skin
Michigan critical materials register list:	Annual usage threshold = 100 pounds
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	carcinogen; flammable - third degree; mutagen
New Jersey - Environmental Hazardous Substances List:	SN 0197
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 10 lbs Air RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Benzene	B2; D2A	0.1% (English Item 153, French Item 277)

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Ashland Petroleum LLC (MAPLLC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MAPLLC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Material Safety Data Sheet

MSDS ID NO.: 0157MAR019
Revision date: 02/02/2004

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: MAPLLC Toluene
Synonyms: Toluene; Toluol; Methyl Benzene
Chemical Family: Aromatic Hydrocarbon
Formula: C6H5(CH3)

Supplier:
Marathon Ashland Petroleum LLC
539 SOUTH MAIN STREET
FINDLAY OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Toluene is an C7 aromatic petroleum hydrocarbon. Contains trace amounts of xylene (<0.1%), paraffins, cycloparaffins and benzene (<50 ppm).

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
MAPLLC Toluene	108-88-3	100	= 50 ppm TWA skin - potential for cutaneous absorption	= 100 ppm TWA = 150 ppm STEL = 375 mg/m³ TWA = 560 mg/m³ STEL	

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Toluene	108-88-3	99-100	= 50 ppm TWA skin - potential for cutaneous absorption	= 100 ppm TWA = 150 ppm STEL = 375 mg/m³ TWA = 560 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

TOLUENE IS A COLORLESS LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH.

OSHA WARNING LABEL:

DANGER!
EXTREMELY FLAMMABLE.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Overexposure or prolonged exposure to lower concentrations can cause respiratory irritation. Gross overexposure can cause central nervous system depression, producing symptoms of headache, dizziness, narcosis, and muscular incoordination. Excessive product exposure may cause cardiac sensitization.

Ingestion: Liquid ingestion causes severe gastrointestinal pain, abdominal cramps, nausea, vomiting, narcosis and central nervous system depression. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Eye irritation may result from contact with the liquid or exposure to the vapor at concentrations above the TLV.

Carcinogenic Evaluation:

Product information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
MAPLLC Toluene 108-88-3	NE		A4 - Not Classifiable as a Human Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for the carcinogenicity of toluene in either humans or animals (Group 3).

Component Information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Toluene 108-88-3			A4 - Not Classifiable as a Human Carcinogen	

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions and respiratory disorders may be aggravated by exposures to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Special protective equipment for firefighters: Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 40 F
Autoignition temperature: 896 F
Flammable limits in air - lower (%): 1.2
Flammable limits in air - upper (%): 7.1

NFPA rating:
Health: 2
Flammability: 3
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 3
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Never siphon this product by mouth. Avoid repeated and prolonged skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in ANSI Z88.2. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Viton gloves should be used to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Pure
Color:	Colorless
Odor:	Aromatic
Molecular weight:	92.1
pH:	Neutral
Boiling point/range:	231 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	0.87 @ 60 F
Density:	7.3 lbs/gal @ 60 F
Bulk density:	No data available.
Vapor density:	3.1
Vapor pressure:	21 mm Hg @ 68 F
Evaporation rate:	No data available.
Solubility:	515 mg/l at 20 C
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability: The material is stable at 70 F, 760 mm pressure.

Polymerization: Will not occur.

Hazardous decomposition products: Carbon monoxide, toluene vapors

Materials to avoid: Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid: Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information

Name	CAS Number	Inhalation:	Dermal:	Oral:
MAPLLC Toluene	108-88-3	LC50 = 3388-8800 ppm for 4 hrs [Rats]	LD50 = 14.1 ml/kg [Rabbit]	LD50 = 5.5-7.5 gm/kg [Rat]

Toluene was not carcinogenic in mice and rats exposed in a 2 year inhalation study for 6 hours/day, 5 days/week at concentrations of 600 or 1200 ppm.

Exposure to pregnant rats and mice during gestation to toluene produced some maternal and development toxicity (decreased fetal weight and increased sleletal variations). Toluene produced a mid frequency hearing loss in rats subchronically exposed to high concentrations of toluene. Decreased learning capability and deficits in operant behavior have been observed in animals subjected to exposure regimens that generally exceed established exposure limits.

Deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney and brain damage and central nervous system effects (incoordination, lassitude and memory loss) in individuals abusing toluene for its euphoric effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: The 96 hour LC50 for toluene ranges from 5.4 to 26 mg/l in fathead minnow and salmon. The 48 hour ED50 for toluene is 11.5 mg/l in daphnia. The 96 hour No Observed Effect Concentration (NOEC) of toluene in algae is 10 mg/l. This product does not concentrate or accumulate in the food chain.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "ignitable" hazardous waste (D001). This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Toluene
UN/Identification No: UN 1294
Hazard Class: 3
Packing group: II
DOT reportable quantity (lbs): 1000 pounds.

TDG (Canada):

Proper shipping name: Toluene
UN/Identification No: UN 1294
Hazard Class: 3
Packing group: II
Regulated substances: 1000 pounds.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Toluene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Toluene	= 0.454 kg final RQ = 1 lb final RQ = 10 lb final RQ = 100 lb final RQ = 1000 lb final RQ = 4.54 kg final RQ = 45.4 kg final RQ = 454 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard.
Fire Hazard.

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Toluene	= 1.0 percent de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Toluene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	developmental toxicity; initial date 1/1/91
New Jersey Right-To-Know:	sn 1866
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable; skin
Michigan critical materials register list:	Annual usage threshold = 100 pounds
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 1866
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Toluene	B2; D2A	1% (English Item 1578, French Item 1622)

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Ashland Petroleum LLC (MAPLLC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MAPLLC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Material Safety Data Sheet

MSDS ID NO.: 0158MAR019
Revision date: 02/02/2004

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: MAPLLC Xylene
Synonyms: Xylene; Mixed Xylenes, Dimethyl Benzene; Methyl Toluene
Chemical Family: Aromatic Hydrocarbon
Formula: C6H4(CH3)2

Supplier:
Marathon Ashland Petroleum LLC
539 SOUTH MAIN STREET
FINDLAY OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Xylene is an mixture of C8 aromatic petroleum hydrocarbons composed of the three isomers of xylene (ortho, meta & para) and ethylbenzene. Contains trace amounts of toluene, C9 hydrocarbons and benzene (<50 ppm).

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
MAPLLC Xylene	1330-20-7	100	= 100 ppm TWA = 150 ppm STEL	= 100 ppm TWA = 150 ppm STEL = 435 mg/m³ TWA = 655 mg/m³ STEL	

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Xylene	1330-20-7	85	= 100 ppm TWA = 150 ppm STEL	= 100 ppm TWA = 150 ppm STEL = 435 mg/m³ TWA = 655 mg/m³ STEL	
Ethyl Benzene	100-41-4	15	= 100 ppm TWA = 125 ppm STEL	= 100 ppm TWA = 125 ppm STEL = 435 mg/m³ TWA = 545 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

XYLENE IS A COLORLESS LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. CONTAINS ETHYLBENZENE THAT HAS PRODUCED CANCER IN LABORATORY ANIMALS. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH. CONTACT MAY CAUSE EYE AND SKIN IRRITATION.

OSHA WARNING LABEL:

DANGER!
FLAMMABLE LIQUID.
MAY CAUSE EYE OR SKIN IRRITATION.
CONTAINS ETHYLBENZENE THAT HAS CAUSED CANCER IN LABORATORY ANIMALS.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Overexposure or prolonged exposure to lower concentrations can cause respiratory irritation. Gross overexposure can cause central nervous system depression, producing symptoms of headache, dizziness, narcosis, and muscular incoordination. Excessive product exposure may cause cardiac sensitization.

Ingestion: Liquid ingestion causes severe gastrointestinal pain, abdominal cramps, nausea, vomiting, narcosis and central nervous system depression. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Liquid contact will produce a burning sensation and irritation in the eye. Eye irritation, photophobia and reversible corneal vacuolization may occur from vapor exposure above the TLV.

Carcinogenic Evaluation:

Product information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
MAPLLC Xylene 1330-20-7	NE		A4 - Not Classifiable as a Human Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for the carcinogenicity of xylene in either humans or animals (Group 3).

Component Information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Xylene 1330-20-7			A4 - Not Classifiable as a Human Carcinogen	
Ethyl Benzene 100-41-4	Monograph 77, 2000		A3 - Animal Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has concluded that ethyl benzene is possibly carcinogenic to humans (Group 2B).

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Preexisting skin, eye and respiratory disorders may be aggravated by exposure to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Special protective equipment for firefighters: Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 86-93 F
Autoignition temperature: 867-984 F
Flammable limits in air - lower (%): 1.1
Flammable limits in air - upper (%): 7.0

NFPA rating:
Health: 2
Flammability: 3
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 3
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Never siphon this product by mouth. Avoid repeated and prolonged skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in ANSI Z88.2.

Skin and body protection: Viton gloves should be used to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Colorless
Odor:	Sweet Aromatic
Molecular weight:	106.1
pH:	Neutral
Boiling point/range:	280-291 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	0.86 @ 60 F
Density:	7.2 lbs/ gal
Bulk density:	No data available.
Vapor density:	3.7
Vapor pressure:	6-16 mm Hg @ 68 F

Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Carbon monoxide, xylene vapors
Materials to avoid:	Strong oxidizers such as nitrates, chlorates, peroxides.
Conditions to avoid:	Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information

Name	CAS Number	Inhalation:	Dermal:	Oral:
MAPLLC Xylene	1330-20-7	LC50 = 5,267-6,700 ppm 4-6 hrs [Rats/Mice]	LD50 > 4 gm/kg [Rabbits]	LD50 = 2.5 - 10 ml/kg [Rats]

Laboratory animals exposed to high doses of xylene showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylene produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations have shown impairment of performance abilities (behavioral tests) in animals and man. Xylene produced a mid frequency hearing loss in rats subchronically exposed to high concentrations of xylene.

Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances.

The product contains >1.0% ethyl benzene (EB). Rats and mice exposed to 750 ppm EB for 6 hours/day, 5 days/week for two years developed kidney tumors in male and femmale rats and lung tumors in male mice and liver tumor in female mice.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: The 96 hour LC50 for xylene isomers range from 2.6-28 mg/l in flathead minnow and rainbow trout. The 24 hour ED50 for xylene ranges from 1.0-3.6 mg/l in daphnia. The 192 hour EC50 for xylene ranges from 3.9-4.4 mg/l in algae. This product does not concentrate or accumulate in the food chain.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "ignitable" hazardous waste (D001). This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name:	Xylenes
UN/Identification No:	UN 1307
Hazard Class:	3
Packing group:	III
DOT reportable quantity (lbs):	1000 pounds.

TDG (Canada):

Proper shipping name:	Xylenes
UN/Identification No:	UN 1307
Hazard Class:	3
Packing group:	III
Regulated substances:	1000 pounds.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Xylene	NA
Ethyl Benzene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Xylene	= 100 lb final RQ = 45.4 kg final RQ
Ethyl Benzene	= 100 lb final RQ = 1000 lb final RQ = 45.4 kg final RQ = 454 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard.
Fire Hazard.
Chronic Health Hazard.

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Xylene	= 1.0 percent de minimis concentration
Ethyl Benzene	= 0.1 percent de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Xylene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 2014
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Annual usage threshold = 100 pounds (all isomers)
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 2014
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Ethyl Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 0851
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree

New Jersey - Environmental Hazardous Substances List:	SN 0851
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Xylene	B2; D2A; D2B	
Ethyl Benzene	B2; D2A; D2B	0.1% (English Item 697, French Item 854)

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Ashland Petroleum LLC (MAPLLC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MAPLLC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Health and Safety Plan

Falcon Refinery Superfund Site
Ingleside, San Patricio County, Texas

Prepared for:

National Oil Recovery Corporation
3717 Bowne Street
Flushing, NY 11354

Prepared by:

505 East Huntland Drive, Suite 250
Austin, Texas 78752

Stephen Halasz, Project Manager

May 2011

TABLE OF CONTENTS

Page

1.0 Introduction 1-1
1.1 HASP Development 1-1
1.2 HASP Acknowledgement 1-1
1.3 Facility Description 1-1
1.3.1 Areas of Concern 1-2
2.0 Personnel Roles and Responsibilities 2-1
2.1 Project Personnel Responsibilities 2-1
2.2 TRC Personnel Responsibilities 2-1
2.2.1 Responsibilities of TRC Project Manager 2-2
2.2.2 Responsibilities of TRC Site Safety Officer 2-2
2.2.3 Responsibilities of Environmental Oversight Officer 2-2
2.2.4 Responsibilities of TRC Field Team Members 2-3
3.0 Hazard Assessment 3-1
3.1 Physical Hazards 3-1
3.1.1 Excavations and Trenches 3-1
3.1.2 Equipment, Vehicles, and Tools 3-1
3.1.3 Noise 3-2
3.1.4 Thermal Stress 3-2
3.1.5 Weather 3-2
3.1.6 Utilities and Overhead Power Lines 3-2
3.1.7 Fire Hazards 3-3
3.1.8 Electrical Hazards 3-3
3.1.9 Slips, Trips, and Falls 3-3
3.1.10 Confined Spaces 3-3
3.1.11 Airborne Particulates (Dust) 3-4
3.1.12 Material Handling 3-4
3.1.13 Repetitive Motion 3-4
3.1.14 Moving Equipment 3-4
3.1.15 Water Safety 3-4
3.2 Biological Hazards 3-5
3.3 Chemical Hazards 3-5
3.3.1 Site Contaminants 3-5
3.3.2 Petroleum Compounds 3-5
3.3.3 Metals 3-6

3.3.4 Exposure Routes 3-6
3.4 Chemicals Potentially Used On-Site 3-6
4.0 Training 4-1
4.1 Project-Specific Orientation Training 4-1
4.2 Hazard Communication Training 4-1
4.3 Daily Safety Meetings 4-2
4.4 CPR/First Aid 4-2
4.5 Training Records 4-2
5.0 Personal Protective Equipment 5-1
5.1 Levels of Protection 5-1
5.1.1 Level D Protection 5-1
5.1.2 Level C Protection 5-2
5.1.3 Level A and B Protection 5-3
5.2 Decontamination of PPE 5-3
5.3 Inspection of PPE 5-4
6.0 Medical Surveillance and Certification 6-1
6.1 Medical Surveillance Program 6-1
6.2 Physician 6-1
6.3 Certification 6-1
7.0 Work Zones And Decontamination Procedures 7-1
7.1 Work Zones 7-1
7.1.1 Hot Zone 7-1
7.1.2 Warm Zone 7-1
7.1.3 Cold Zone 7-1
7.2 Decontamination Procedures 7-2
7.2.1 Personal Decontamination 7-2
7.2.2 Respirator Decontamination 7-2
7.2.3 Heavy Equipment and Vehicle Decontamination 7-2
7.2.4 Sampling Equipment Decontamination 7-3
7.2.5 Disposal of Decontamination Water and Solvents 7-3
8.0 Site Control 8-1
8.1 Site Entry and Exit 8-1
8.2 Site Communications 8-1
8.3 Buddy System 8-1
9.0 Exposure Monitoring 9-1
9.1 Air Monitoring 9-1

9.1.1 Air Monitoring Equipment Types 9-1
9.1.2 Equipment Calibration 9-1
9.1.3 Real-Time Monitoring Procedures 9-2
9.1.4 Background Readings 9-2
9.1.5 Organic Vapors 9-2
9.1.6 Combustible Gases 9-3
9.1.7 Oxygen 9-3
9.1.8 Airborne Particulates 9-3
9.1.9 Mercury Vapors 9-3
9.1.10 Hydrogen Fluoride 9-4
9.1.11 Personal Air Monitoring/Sampling 9-7
9.2 Confined Spaces 9-7
9.3 Heat Stress Monitoring 9-7
9.4 Cold Stress Monitoring 9-11
10.0 Emergency Response Procedures 10-1
10.1 Emergency Contact Numbers 10-1
10.2 Pre-Emergency Planning 10-4
10.3 Emergency Medical Response Procedures 10-4
10.4 Fire and Explosion Response Procedures 10-5
10.5 Evacuation Routes and Assembly Points 10-5
10.6 Operations Shutdown 10-5
10.7 Emergency Communications 10-6
10.8 Incident Investigation 10-6
11.0 Recordingkeeping 11-1
12.0 References 12-1

APPENDIX A HEATLH AND SAFETY PLAN REVIEW ACKNOWLEDGEMENT
APPENDIX B ILLINOIS REFINING DIVISION STANDARD OPERATING PROCEDURES
APPENDIX C PROJECT-SPECIFIC HASP
APPENDIX D MATERIAL SAFETY DATA SHEETS
APPENDIX E TRC SUPERVISOR'S REPORT OF ACCIDENT

LIST OF FIGURES

Page

Figure 1-1. Site Location Map 1-4

Figure 1-2. Refinery Plot Plan and Emergency Response Equipment Locations..... 1-5

Figure 10-1. Evacuation and Assembly Point Routes 10-2

Figure 10-2. Emergency Route to Medical Facility..... 10-3

LIST OF TABLES

Page

Table 9-1 Air Monitoring Action Levels 9-5

Table 9-2 Signs and Symptoms of Thermal Stress 9-9

Table 9-3 Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers[a] 9-10

Table 9-4 Wind-chill Index 9-13

1.0 INTRODUCTION

This Health and Safety Plan (HASP) outlines the health and safety requirements for on-site activities associated with soil and groundwater investigation activities within National Oil Recovery Corporation's (NORCO's) former Falcon Refinery located 1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road near Ingleside, San Patricio County, Texas (the Site). The Site is bordered by wetlands to the northeast and southeast, residential areas to the north and southwest, an abandoned refinery to the northwest, and a construction company to the southwest.

1.1 HASP Development

This HASP has been developed in conformance with the directives and requirements of the TRC *Health and Safety Policy and Procedure Manual*, June 2001, and 29 CFR 1910.120(i)(2). This HASP and any subsequent addenda will apply to all TRC personnel and subcontractors who are involved with on-site activities at the Site. By implementing this plan, TRC does not assume any liability for the health and safety of non-TRC personnel involved in the activities performed during this project.

TRC field personnel and TRC subcontracted field personnel must participate in medical monitoring, respirator fit testing, and hazardous waste training programs as specified by Occupational Safety and Health Administration (OSHA) regulations (per 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response [HAZWOPER]).

All work must be conducted in compliance with applicable OSHA regulations, including 29 CFR 1910 (General Industry Standards) and 29 CFR 1926 (Construction Industry Standards).

All on-site personnel must become thoroughly familiar with the health and safety considerations for each task in which they will be participating.

1.2 HASP Acknowledgement

All TRC personnel and TRC subcontractors must attend a "kick-off" health and safety meeting to review this document and sign a Health and Safety Acknowledgment Form located in Appendix A. By signing the acknowledgment form, TRC employees and TRC subcontractors certify they have reviewed the HASP and will comply with its contents. Furthermore, TRC field personnel and TRC subcontractors must participate in medical monitoring and hazardous waste training programs as specified by OSHA regulations (per 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response).

1.3 Facility Description

The Falcon Refinery site consists of a refinery which operated intermittently and is currently inactive. When in operation, the refinery had a capacity of 40,000 barrels per day and the primary products consisted of naphtha, jet fuel, kerosene, diesel, and fuel oil.

Figure 1-1 depicts the site location. Figure 1-2 is a scale drawing of the facility showing all buildings, roadways, areas where hazardous wastes are managed, fire control facilities, the Emergency Control Center (ECC), locations of decontamination equipment, locations of spill control equipment, locations of two-way radios, location of the radio antenna, and siren locations. The Refinery property occupies approximately 927 acres.

1.3.1 Areas of Concern

Seven areas of concern (AOC) have been identified as potential areas impacted by chemicals of potential concern (COPCs). Three AOCs are identified on-site and four are off-site. The AOCs are summarized in Table 1 and shown on Figure 2**.** Each AOC is discussed in detail in Section 2.2 of the FSP.

AOC-1 Former Operational Units

AOC-1 includes the entire North site, former operational units (OU) areas of the South site, a drum disposal area, and an area where metal waste was discarded. Preliminary COPCs to be screened at this AOC included metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides/herbicides. Potentially affected media include soil and groundwater.

AOC-2 On-Site Non-Operational Areas

Areas of the refinery not used for operations or storage and with no record of releases are included in AOC-2. Although no COPCs were anticipated in AOC-2, the screened COPCs included metals, VOCs, and SVOCs. Potentially affected media include soil and groundwater.

AOC-3 Wetlands

Included in AOC-3 are wetlands immediately adjacent to the site bordered by Bay Avenue, Bishop Road, and a dam on the upstream side; wetlands located between Bishop Road, Sunray Road, Bay Avenue, and residences along Thayer Avenue; and wetlands between Sunray Road, residences along FM 2725, Gulf Marine Fabricators, Offshore Specialty Fabricators, and the outlet of the wetlands into the intracoastal.

There is one active and several abandoned pipelines leading from the refinery to the current and former barge dock facilities. During June 2006, the abandoned pipelines were cut, the contents of the pipelines were removed, and plates were welded on the pipeline ends to seal them.

Wetland assessment activities will evaluate releases from the refinery, including any unpermitted wastewater effluent discharges, two known pipeline releases, and possible releases from pipelines leading from the refinery to the current and former barge dock facilities.

There have been documented spills of hydrocarbons, waste and volatile organics. As a result, the screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, and

herbicides/pesticides. Potentially affected media include sediment, soil, surface water and groundwater.

AOC-4 Current Barge Docking Facility

Included in AOC-4 is the current barge docking facility, which is approximately 0.5 acres and is located on the intracoastal waterway. The fenced facility, which is connected to the refinery by pipelines, is used to load and unload barges. At the time of this report, only crude oil passed through the docking facility. Historically, however, refined products were also loaded and unloaded at this docking facility.

There have been no reported releases nor is there evidence of spills associated with this AOC. The screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

AOC-5 Intracoastal Waterway

Sediments and surface water adjacent to the current and former barge dock facility are included in this AOC. The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include sediment and surface water.

AOC-6 Thayer Road

Included in this AOC is the neighborhood along Thayer Road, located across Bishop Road from the refinery. The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

AOC-7 Bishop Road

Included in this AOC is the neighborhood along Bishop Road, located across Bishop Road from the North site. The screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

Figure 1-1. Site Location Map

Figure 1-2. Refinery Plot Plan and Emergency Response Equipment Locations

2.0 PERSONNEL ROLES AND RESPONSIBILITIES

This section presents the health and safety roles and responsibilities for key project personnel, identifying specific actions and tasks for specific personnel. The TRC Project Manager (PM) and TRC Site Safety Operator (SSO) are responsible for formulating and enforcing health and safety requirements in accordance with this HASP and applicable federal, state, and site-specific regulations.

A list of TRC personnel involved in Site activities will be determined prior to beginning site activities.

2.1 Project Personnel Responsibilities

All TRC project personnel who perform work at the Falcon Refinery are responsible for the following:

- Understanding and complying with this document.
- Taking all reasonable precautions to prevent injury to themselves and to their fellow employees.
- Visually observing other personnel working at the same location for temperature stress.
- Field personnel are not allowed to work alone while in active project-specific work areas and must maintain visual, voice, or radio communication with other personnel.
- Ensure that all equipment and personal protective equipment are in good operating condition, and repairing and/or replacing unsafe items
- Performing only those tasks that they believe can be done safely and immediately, reporting any incidents and/or unsafe conditions to the TRC Site SSO.
- Notifying the TRC PM and SSO of any special medical problems or conditions that would limit the range of tasks to which that person could be assigned (e.g. pregnancy, allergies, diabetes, chemical sensitivity, or the use of prescription or non-prescription drugs).
- Observing and noting unsafe behavior and practices of subcontractor, as well as other TRC personnel, and advising them of perceived problems, reporting any observed problem to the TRC PM and SSO.
- Reporting near-misses and safety observations.
- A site safety meeting with all on-site project personnel is held before startup operations, at a minimum, and that a written record is maintained that notes the date, time, attendance, subjects discussed, and facilitator of the meeting.

2.2 TRC Personnel Responsibilities

2.2.1 Responsibilities of TRC Project Manager

The TRC Project Manager's responsibilities include the following:

- Budgeting project-specific health and safety, waste disposal, and/or environmental compliance costs
- Monitoring compliance with TRC's health and safety programs and this HASP
- Enforcing compliance with applicable regulations, corporate guidelines, Refinery safety procedures, and this HASP
- Providing information on known and suspected site hazards to all employees, TRC, subcontractors, and other on-site personnel
- Informing NORCO of any unsafe conditions or acts
- Ensuring the timely submission of environmental reports to the regulatory agencies

2.2.2 Responsibilities of TRC Site Safety Officer

The TRC SSO will monitor subcontractor compliance with this HASP. The TRC SSO will provide feedback, advice, and recommendations to NORCO to assist in correcting any observed problems. Additional responsibilities of the TRC SSO include the following:

- Providing project-specific training and conducting health and safety meetings for TRC field personnel, as necessary.
- Ensure that all on-site personnel have received appropriate site-specific training.
- Updating the HASP, as necessary.
- Ensuring that TRC personnel are aware of signs and symptoms of potential exposure to any physical (e.g., thermal stress) and/or chemical hazards.
- Ensure that all on-site project members have received the applicable OSHA-required health and safety training, including HAZWOPER 29 CFR1910.120 requirements regarding respirator training and fit testing for those on-site project members who wear respirators.
- Ensure that all on-site supervisors have received the OSHA-required, eight-hour HAZWOPER supervisory course in addition to the 40 hours of initial training and three days of supervised field experience.
- Ensure that all on-site personnel have enrolled in the appropriate medical monitoring program and have met the qualifications criteria for the site work.

2.2.3 Responsibilities of Environmental Oversight Officer

The TRC Environmental Oversight Officer's responsibilities include the following:

- Coordinating remedial activities
- Providing oversight to the activities performed by TRC
- Providing assistance to NORCO in preparing the required environmental reports

2.2.4 Responsibilities of TRC Field Team Members

The responsibilities of the TRC field team members include the following:

- Reading, understanding, and complying with this HASP
- Attending project health and safety meetings
- Performing work safely
- Reporting any unsafe condition to the immediate supervisor or the SSO
- Being aware of signs and symptoms of potential exposure to any physical (e.g., thermal stress) and/or chemical hazards

3.0 HAZARD ASSESSMENT

This section details the potential physical and chemical hazards associated with the site and project tasks.

3.1 Physical Hazards

Numerous hazards exist on and around the site and are inherent in field activities involving the operation of heavy equipment. Personnel working most directly on field activities have the greatest chance of encountering physical hazards at one time or another, during various, if not all, work activities. The following subsequent subsections identify a variety of physical hazards that may be encountered on site, related to physical and environmental conditions, and physical activities of site personnel.

3.1.1 Excavations and Trenches

Excavation safety is essential whenever trenching, excavating, or other earth-moving activities are planned. Prior to excavation, underground utilities (including NORCO's pipelines) must be located and protected from damage. The potential exists for accidentally damaging the below-grade piping.

Excavations must be inspected daily by a Competent Person throughout work shifts and after every rainstorm or hazard-increasing occurrence. The sides of all excavations must be properly sloped or benched, or proper shoring must be erected to ensure a safe working environment. If it is suspected that the excavation is unsafe, exposed workers must remove themselves from the area and all excavation work must be stopped until safe conditions are restored.

Excavations are considered confined spaces if they are four feet or more in depth. A confined space is defined as a space that is not intended for continuous occupancy with limited openings for entry and exit. Because of this confined nature, air flow in and out of the space is limited; therefore, the space may contain air contaminants in concentrations above established or recommended exposure limits even though none are detected outside the excavation. In addition, there is also the possibility of engulfment if any slope supports or the actual side slopes of the excavation give way.

Excavation design must consider diversion ditches or dikes to prevent water from accumulating. All excavations must have proper access and exit(s). OSHA 29 CFR Part 1926, Subpart P – Excavations, further describes the requirements for excavation safety. Employees must be trained per these standards. All excavations must meet the requirements of 40 CFR Part 1926, Subpart P. The following specific requirements must be considered in addition to any OSHA regulations: (1) access/egress, (2) tailings, (3) designation of Competent Person(s), (4) confined spaces, and (5) requirements for protective systems. A designated Competent Person is required to monitor the conditions of the excavation site.

3.1.2 Equipment, Vehicles, and Tools

Operation of heavy equipment, vehicles, and tools can be dangerous. Operational hazards can be minimized by ensuring all equipment and tools are inspected and maintained in good working order, that the operator is qualified and experienced, and that operation requirements are followed.

3.1.3 Noise

Working around mechanical equipment may result in exposure to noise levels, which can cause hearing loss and other physiological effects. The OSHA Action Level for exposure to noise is 85 decibels (dBA) and the Permissible Exposure Limit (PEL) is 90 dBA as a time-weighted average (TWA) for an eight-hour workday. If potential noise exposure is thought or determined to be at or above 85 dBA (e.g., you can't hear someone speaking to you in a normal tone of voice standing about three feet away), appropriate hearing protection must be donned or other appropriate measures must be taken to reduce the exposure.

3.1.4 Thermal Stress

Workers who wear protective clothing will be at increased risk of heat injury when personnel are wearing personal protective equipment (PPE), the ambient temperature exceeds 70° F, and/or personnel are under heavy workload. All on-site personnel must be familiar with the signs and symptoms of heat stress. The signs, symptoms, and methods of controlling heat injury are discussed in Section 7.

Conversely, prolonged exposure to excessive cold and wet conditions may cause excessive loss of body heat (hypothermia) and/or frostbite. Adequate insulting clothing must be worn by workers if performing work in equivalent chill temperatures below 40° F. Reduced body temperature will very likely result in reduced mental alertness, reduction in rational decision-making, or loss of consciousness. All on-site personnel must be familiar with the signs and symptoms of cold stress. The signs, symptoms, and methods of controlling cold injury are discussed in Section 7.

3.1.5 Weather

Site personnel must be aware of hazardous weather conditions while conducting work at the Refinery. Hazardous weather conditions include thunderstorms, lightning, high winds/tornados, and snow/blizzards. In wet, snowy, ice, and windy conditions, personnel are to be alerted to the changing conditions and take the proper precautions to avoid slipping, falling, or potential eye injuries from flying dirt/dust.

When lightning is observed, the TRC SSO will determine which outdoor work will be discontinued, such as confined space entries. Employees may resume work when lightning has not been observed for fifteen consecutive minutes.

3.1.6 Utilities and Overhead Power Lines

All personnel will make every attempt to locate underground and aboveground utilities prior to the commencement of ground disturbance activities or surface activities where there is a potential to come in contact with aboveground lines. Underground

utility lines include sanitary sewers, storm sewers, abandoned piping, telephone lines, electrical lines, gas lines, water lines, TV cables, and fiber optic lines. Overhead power lines present hazards to equipment operations and require that authorized clearance be maintained. If available, a review of facility drawings will be conducted to identify any potential buried utilities in the proposed work area.

The TRC SSO will be responsible for notifying the Illinois One Call system to obtain clearance from nearby utility owners. The Illinois One Call number is 1-800-892-0123. Information on the Illinois one call can be obtained on the internet at http://www.illinois1call.com/.

3.1.7 Fire Hazards

The risk of fire on-site may stem from the presence of vegetation, heat sources from construction equipment and site vehicles, or hydraulic lines on heavy equipment. The storage and use of flammable/combustible fuels and other chemicals contribute to fire dangers. Fire extinguishers are available on-site for immediate use. Real-time monitoring for combustible atmospheric conditions and oxygen concentrations must be performed will conducting work where an ignition source is present.

3.1.8 Electrical Hazards

Electrical shock could result from overhead or below-grade electrical lines, electrical machinery transferring electricity through wet ground, concrete, or stormy weather (lightning). All equipment must remain a minimum of 10 feet from energized sources unless insulating procedures have been performed and reviewed by NORCO. Portable air compressors, pumps, or generators must be grounded and run on a platform suitable for the purpose. In addition, ground-fault interrupters must be used. Underground utilities must be marked by stakes or flags prior to any excavation or drilling. Weather patterns must be observed at all times. Work must be stopped during the threat of electrical storms.

3.1.9 Slips, Trips, and Falls

Work site slip, trip, and fall accidents can result in serious injuries or fatalities. Slip, trip, and fall hazards are especially prevalent when walking on uneven terrain such as freshly excavated or backfilled soils and stockpile materials. Significant hazards also include walking on snow or ice-covered surfaces. Fall potential also exists from elevated work activities. Improper housekeeping of a work area can also increase the potential for slip, trip and fall hazards.

3.1.10 Confined Spaces

Confined spaces pose high hazard potentials due to their unique contents and/or configuration. Some confined spaces, for example, pose entrapment hazards for entrants, while others restrict air circulation so hazardous atmospheres may accumulate quickly. Confinement itself can increase the risk of injury or death by making personnel work closer to hazards than they would otherwise.

3.1.11 Airborne Particulates (Dust)

Traffic and excavating activities can increase airborne dust concentrations. The predominant hazard associated with exposure to high dust concentrations is eye injury during highly windy conditions. Inhalation is a secondary route of exposure from airborne particulates.

3.1.12 Material Handling

Many of the project work activities involve manual handling of equipment. Whenever possible, heavy or bulky objects should be moved or handled by mechanical means. Where site personnel must handle such objects, care must be taken to use proper lifting and handling techniques in order to prevent injuries.

3.1.13 Repetitive Motion

Musculoskeletal (ergonomic) injuries are more likely to occur while conducting work where repetitive motions are routinely completed. These injuries typically involve bones, muscles, joints, tendons, and nerves. Conducting certain repetitive tasks (i.e. well bailing and sampling activities) while the body is in an improper body position increases the chances of worker developing an ergonomic injury. Environmental and physical conditions can enhance the chances of developing these types of injuries. Examples of environmental conditions include work area setup, noise, vibration, and air temperature. Examples of physical conditions include personal fitness level, tool usage, certain syndromes, and pregnancy. Proper body position, awareness, as well as rest and stretching can decrease the chances of developing an ergonomic injury.

3.1.14 Moving Equipment

The hazards associated with moving equipment at the Falcon Refinery include heavy machinery operation and traffic. Workers must make their presence known to equipment operators and maintain a line of sight with the operator. This can be accomplished by wearing DOT-approved vests and observing traffic patterns to stay out of the vehicle paths.

Moving mechanical parts also present a type of physical hazard. Most tasks will involve the use of mechanical equipment. Personnel must be aware of rotating equipment and must not wear loose clothing or jewelry while working in the vicinity of this equipment.

3.1.15 Water Safety

Some activities at the remediation area, including draining and excavating, may involve working around a body of water within the excavations (due to precipitation and/or groundwater infiltration) and will be performed in accordance with 29 CFR 1926.126. Care must be taken to avoid slips, trips, and falls that could result in accidental immersion in the water. However, the selected subcontractor should expeditiously dewater/drain any water-filled excavations.

3.2 Biological Hazards

A number of biological hazards may be present on the site, including poisonous insects and biting inspects. Proper care must be taken to avoid and/or control these hazards by inspecting equipment prior to usage and wearing repellent as necessary.

3.3 Chemical Hazards

During the remediation, exposure to chemical substances in soils could occur during activities involving contact with contaminated soils. Chemical exposure hazards include the potential for these substances to be dermal contacted, inhaled, and/or incidentally ingested if volatiles and/or fugitive dusts are generated during remedial activities. Chemical hazards will be identified while completing the Project-Specific HASP (Appendix B). When there is a potential for exposure to chemical hazards, suitable chemical resistant PPE must by worn by site personnel.

All materials, including materials brought in by contractors, must be accompanied by a Material Safety Data Sheets (MSDS). MSDSs for chemicals that may be potentially encountered at the site are included in Appendix C.

3.3.1 Site Contaminants

Crude oil and its refined intermediate and final products are processed, stored and transported off-site during operations at the MPC Refinery. Raw, intermediate, and final hydrocarbon products compromise the majority of contaminants in soil and groundwater. Based upon site investigation information, chemical contaminants are known to exist in site work areas. Heavy-end hydrocarbons, VOCs, PAHs, and a number of heavy metals including lead, mercury, and arsenic have been detected in waste and soil.

3.3.2 Petroleum Compounds

There are no Permissible Exposure Limits (PELs) established for heavy-end hydrocarbons. The most likely symptoms associated with exposure would include irritation of the skin, eyes and mucous membranes.

Petroleum distillate fuels exhibit relatively low acute inhalation and dermal toxicity. Concentrations of 160 to 270 parts per million (ppm) gasoline vapors have been reported to cause eye, nose, and throat irritation and dizziness in one hour, and 2000 ppm produces a mild anesthesia in 15 minutes. Some workers involved in tank removal operations have reported headaches when exposed to 25 ppm or more of gasoline vapors measured with a photo-ionization detector (PID). Most fuels, particularly gasoline, kerosene, and jet fuels, are capable of causing skin irritation after several hours of contact with the skin.

Petroleum fuels exhibit moderate oral toxicity. Ingestion of 20 to 50 grams of gasoline may produce severe symptoms of poisoning. If liquid fuel is aspirated (passed into the lungs), gasoline and other petroleum distillate fuels may cause secondary pneumonia.

The refinery safety policies for Benzene are included in the MPC *SOP 10 Working with Hydrocarbons Containing Benzene* located in Appendix B.

3.3.3 Metals

Metals, particularly chromium, lead, mercury, and arsenic can produce toxic effects if a sufficient amount is allowed to enter the body. Areas of elevated concentrations of metals may be encountered during the course of a specific project. In order for an exposure to lead and chromium to occur, a substantial amount of dirt must be inhaled or swallowed. Inorganic chromium will not be absorbed through the skin. Arsenic, lead, and mercury all pose a skin absorption hazard, depending on their chemical form. Inhalation typically results in a high absorption of metals and ingestion. The inhalation of contaminated dust is the most likely route of exposure.

Exposure to inorganic lead is regulated by the OSHA (29 CFR 1910.1025) and "Lead in Construction" Standard (29 CFR 1926.62). These regulations specify the exposure monitoring, medical monitoring, and training provisions that apply to the work activities at the site.

3.3.4 Exposure Routes

The primary exposure pathways for the site materials include volatilization and transport on airborne dust. Airborne concentrations of volatile organics in the immediate vicinity of excavation and boring activities or inside confined spaces may exceed OSHA PELs for petroleum products (e.g., benzene). Exposure to any contaminants can be minimized through proper work practices, appropriate use of PPE in accordance with ambient air monitoring, and proper personal hygiene.

3.4 Chemicals Potentially Used On-Site

In addition to the Site contaminants, a number of other chemical products will used at the site. Chemicals that may be used in the course of normal operations include but are not limited to gasoline, bentonite, Portland cement, and decontamination fluids such as isopropyl alcohol and methanol. Other materials may be purchased and MSDSs for additional items must be obtained. Appropriate use and storage of these common chemicals is the relevant hazard issue. Samples collected for analysis may contain preservatives such as strong acids and bases (i.e., HCl and H_2SO_4, HNO_3, isopropyl alcohol, and methanol). MSDSs for all these additional items must be included in this HASP (Appendix C).

4.0 TRAINING

This section discusses the required training for all site personnel. To work at the refinery, all site personnel must undergo training consistent with the OSHA Hazardous Waste Operations (HAZWOPER) standard CFR 1910.120. Additionally, all personnel must complete Project-Specific Orientation prior to conducting any work at the Refinery. Additional training may be necessary depending on individual work activities.

4.1 Project-Specific Orientation Training

A project-specific orientation training session will be provided by the TRC SSO prior to startup of on-site activities. All affected on-site personnel, including subcontractors, will be required to attend this training. The training will cover, but not necessarily be limited to, the following topics:

- Health and Safety Plan (HASP)
- Organizational authority and responsibilities
- Site history and summary of work activities
- Site Layout
- Chemical hazards
- Physical hazards
- Work Zones
- Personnel protection levels
- Use and maintenance of PPE
- Decontamination procedures
- Near-miss incident and safety observation reporting
- Safe work practices and procedures
- Site safety rules and condition of employment
- Use of fire extinguishers
- Hazard Communication and MSDS location
- Air Monitoring

4.2 Hazard Communication Training

Hazard Communication training will be provided by the TRC SSO. Hazard Communication training includes but is not limited to:

- Review of MSDSs for site materials

- Location of MSDSs
- Safe Handling procedures for normal use of materials
- Protective equipment for use of site materials
- Hazard of unusual conditions for use of site materials (i.e., spills)
- Location of inventory of chemicals used on-site
- Protection measures and equipment for unusual conditions of use of site materials
- Reading and understanding chemical labeling
- Proper storage of materials

4.3 Daily Safety Meetings

A "tailgate" safety meeting will be conducted each day prior to initiating work activities and all site personnel must attend. Task-specific safety practices for each of the days planned activities will be discussed and recorded by the TRC SSO on the daily form located in Appendix X.

4.4 CPR/First Aid

At least one certified CPR/first aid trained person must be on site at all times. The TRC SSO must be current in First Aid/CPR. First aid training sponsored by the American Red Cross is acceptable and must be renewed every three years. CPR training must be renewed annually.

4.5 Training Records

TRC and subcontractors will maintain records for their respective personnel. Each subcontractor will ensure that training records are provided to the TRC SSO upon assignment of personnel to the Refinery. Personnel without appropriate training certification will not be permitted to work on-site until the certification is received by the TRC SSO.

5.0 PERSONAL PROTECTIVE EQUIPMENT

This section discusses the PPE to be worn during site activities. Engineering controls and work practice controls will always be used as a primary method of exposure abatement on-site. PPE shall be used to protect personnel from exposure to workplace contaminants or physical hazards that may be encountered when engineering or work practice controls are not feasible.

5.1 Levels of Protection

The individual components of clothing and equipment must be assembled into a full protective ensemble that protects the worker from project-specific hazards. These ensembles are referred to as "Levels of Protection." The designated protection levels for site work activities will be identified in the Project-Specific HASP (Appendix B).

5.1.1 Level D Protection

The refinery requires all persons entering the facility to wear Nomex clothing in all areas of the Refinery, unless a variance to this requirement is issued by the MPC SSO. Nomex is required in the refinery and normally as the outer-most layer. Rainsuits, tyvek coveralls, and other protective clothing are worn over the Nomex clothing. Nomex clothing must cover the person's trunk, arms, waist and legs. Coveralls and shirt sleeves must remain rolled down and buttoned/zipped up while working in the designated areas to protect the chest and arms.

In addition, all persons must wear a H_2S personal monitor with an audible and vibrating alarm. If H_2S is detected, all workers must be cleared from the affected area until the area has been cleared and work may resume as indicated by the MPC SSO. TRC and MPC require the following work clothing be worn by all field personnel and subcontractors while on-site:

- Fire Resistant Clothing (FRC) in all areas of the refinery
- Steel-toed boots which have a defined heel, are of the lace-up variety, and are ankle height or taller
- Hard hat (Class A)
- Safety glasses with permanently attached side shields that meet or exceed ANSI Z 87.1-1989
- Ear plugs when noise levels exceed 85 dBA (i.e., unable to communicate in a normal voice level at arm's length distance from another individual)

In addition to the standard uniform, chemical resistant clothing may be required by the MPC SSO and/or the MPC Environmental Officer.

Chemical hazard criteria have been developed to assist in deciding the need for respirators and chemical resistant clothing may become appropriate. Exposure to hydrocarbons at elevated levels presents potential health risks that need to be properly

controlled. Where elevated exposures persist, respiratory protection will be the primary control method to protect personnel from inhaling hydrocarbon vapors. Elevated levels of hydrocarbons in the air serve as presumptive evidence of elevated levels in soil or water, and the use of standard or chemically impervious suits, gloves, and booties or neoprene safety boots will be the primary control measures to protect personnel from dermal exposure to hydrocarbons.

The initial level of protection must be a modified Environmental Protection Agency (EPA) Level D. This consists of the following items:

- Hard hat (Class A)
- Safety glasses with permanently attached side shields that meet or exceed ANSI Z 87.1-1989
- Steel-toed safety boots
- Hearing protection if noise levels exceed 85 dBA
- Disposal chemical resistant gloves, e.g. nitrile
- Disposable chemical resistant coveralls and booties (if required)

Upgrading to modified Level D with the use of standard Tyvek or poly-coated Tyvek chemical resistant suits and neoprene safety toe boots will be required for tasks in which direct dermal contact with the remediation wastes occurs or during wet site conditions. However, the use of either type of chemical resistant suit is a viable option for facilitating personal decontamination. Information regarding project-specific PPE is described in the Project-Specific HASP (Appendix B).

5.1.2 Level C Protection

In the event that real-time ambient air monitoring or personnel monitoring efforts detect organic vapors at concentrations above exposure limits or if a significant amount of dust is observed in the air, the PPE must be upgraded from Level D to Level C to include respiratory protection. Level C protection consists of Level D protection with the following additions:

- Half-face APR or full-face APR with appropriate cartridges (e.g., organic vapor, acid gas, mercury vapor, and/or particulate cartridges)
- Disposable chemical resistant coveralls (e.g. Tyvek™ or polyethylene-coated Tyvek™) and neoprene safety toe boots in wet site conditions
- Disposal chemical resistant gloves (outer), e.g. neoprene or nitrile
- Disposal chemical resistant gloves (inner), e.g. nitrile

Respiratory protection guidelines for the Falcon Refinery are included in *SOP 21 Respiratory Protection*. Respirators cannot be used if an employee has a beard, long sideburns, or any other physical characteristics that may prevent a satisfactory facial seal.

5.1.3 Level A and B Protection

TRC does not expect to conduct any site activities where Level A or B protection levels are required. If site conditions warrant Level A or B protection, work activities will be shut-down until site conditions are appropriate for Level C or D protection. If conditions do not return to acceptable levels, additional engineering practices will be used to limit exposure levels. If engineering practices cannot limit exposure, a decision will be made to upgrade to a higher level of PPE.

5.2 Decontamination of PPE

Decontamination is to be performed in accordance with the Project-Specific Health and Safety Plan in Appendix B. Whenever possible, disposable PPE must be used on-site. Disposable PPE includes the following:

- Chemical resistant suits
- Chemical resistant gloves
- Chemical resistant boot covers

The following decontamination procedures must be followed for personnel decontamination for activities involving PPE:

- Field team must ensure that contamination does not remain on equipment/vehicles, on sample containers, or in contact with the body.
- SSO must monitor decontamination procedures.
- Small equipment must be taken to the equipment decontamination area. After tools have been decontaminated, a clean pair of gloves must be used to take them to the exit point.
- Disposable boot covers must be disposed of properly. If worn, rubber boots must be scrubbed in a decontamination solution of soapy water and rinsed at the clean water rinse station.
- Tape from rubber boots and gloves must be removed (if applicable)

After decontamination, all PPE must be disposed into labeled disposal containers. When respiratory protection equipment is used, the associated PPE must be decontaminated, cleaned, inspected, and stored properly. If the PPE cannot be cleaned or disinfected or is damaged it must be replaced. If the use of a respirator is required, each respirator must be cleaned daily by the individual to whom it has been assigned. No interchanging of respirators will be permitted. Respirators must be identified by employee initials inscribed with permanent ink markers. If respirators are used, respirator cartridges must be changed at least daily, or once every 30 minutes if monitoring and/or sampling data indicate that potential saturation concentrations exist, if warning signs are noted (e.g., odor), or if breathing becomes difficult.

5.3 Inspection of PPE

PPE must be inspected prior to, during and after each use according to the procedure outlined below.

1. Prior to use (Reusable and Disposable PPE):
   a. Review available literature and ensure that the PPE is adequate for the task
   b. Visually inspect for imperfect seams, non-uniform coatings, tears or holes, and malfunctioning closures
   c. Hold up to the light and check for pinholes (inflate gloves and check for leaks)
   d. Flex and check for cracks and shelf deterioration
   e. If previously used, check for discoloration, swelling, stiffness and cracking, and holes and tears

2. During use (Reusable and Disposable PPE), check for:
   a. Evidence of chemical attack
   b. Discoloration, swelling, stiffening, softening and/or cracking
   c. Tears
   d. Punctures
   e. Seam discontinuities

Note: Report any sense of breakthrough to the SSO. Medical monitoring may be necessary to confirm or determine the extent of exposure.

3. After use (Reusable PPE), check for:
   a. Malfunctioning parts
   b. Evidence of chemical attack
   c. Punctures
   d. Tears
   e. Cracks

6.0 MEDICAL SURVEILLANCE AND CERTIFICATION

The planned work for this project is expected to involve active physical work and potential exposure to the chemical and physical hazards listed in Section 3.0. The work will require people of reasonable health with normal vision (corrected), hearing acuity, and the ability to wear a respirator.

6.1 Medical Surveillance Program

All TRC and subcontractor personnel may potentially be included in the HAZWOPER Medical Surveillance Program if either of the following occurs:

- Workers who are or may be exposed to hazardous substances or health hazards at or above permissible exposure limits, without regard to the use of respirators, for 30 days or more per year
- All workers who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from a hazardous waste operation

If an individual is in the Medical Surveillance Program, an initial and annual exam will be conducted.

6.2 Physician

A licensed physician who is certified in Occupational Medicine by the American Board of Preventative Medicine must review all medical surveillance and examination results.

6.3 Certification

Employee participation in the medical surveillance program shall be a part of their permanent medical record.

7.0 WORK ZONES AND DECONTAMINATION PROCEDURES

This section describes the work zones and decontamination procedures to be established during Site activities.

7.1 Work Zones

Work zones will be properly identified by warning tape, barricades, and/or cones to ensure that:

- Personnel are properly protected against the potential hazard on the area they are working
- Work activities and potential contamination are limited to specific areas
- Personnel can be easily located and evacuated in an emergency

Work zones include the Hot Zone (HZ), Warm Zone (WZ), and Cold Zone (CZ). Each of these zones and the requirements for entering and exiting them are discussed below.

7.1.1 Hot Zone

For the HZ, an appropriate buffer must be delineated around the area to be excavated and staked with caution tape (or other barrier tape/fencing) or otherwise posted where it is not feasible to surround with a barrier. The combined area of the excavation and the buffer will constitute the HZ. This is the zone in which potentially hazardous airborne contaminants and physical hazards to workers must be contained. While chemical hazards may not pose a hazard at each excavation site, the HZ must be maintained to protect unsuspecting personnel or other Refinery workers from physical hazards (e.g., heavy equipment). As described in Section 5.0, PPE must be worn in this area at all times. The size and shape of the HZ may be changed to accommodate the site conditions and equipment and to ensure containment of contaminants.

7.1.2 Warm Zone

An appropriate buffer zone between the HZ and the CZ will be defined as the WZ. All decontamination activities will occur in the WZ along a designated corridor between the HZ and the CZ. Covered waste containers will be placed at the end of the corridor to hold contaminated materials for disposal. No personnel will be permitted in the WZ or the HZ unless they have reviewed and are in full compliance with this HASP.

7.1.3 Cold Zone

A CZ will be an uncontaminated area used to store support equipment, materials, and safety supplies. Normal work clothes are appropriate within this zone. The location of the zone depends on factors such as accessibility, wind direction (it will be located upwind), and resources (e.g., roads, utilities, shelter).

7.2 Decontamination Procedures

Decontamination of personnel, equipment, and vehicles will be required to ensure that contamination will not spread to unsuspecting people or clean areas. Contamination will not occur on the skin if the proper protection methods are used. Each field team member must follow guidelines to ensure that contamination does not remain on equipment and vehicles, on sample containers, or in contact with the body. The TRC SSO must monitor decontamination procedures to determine their effectiveness. If these procedures are found to be ineffective, appropriate steps will be taken to correct any deficiencies.

7.2.1 Personal Decontamination

Small equipment and any sample containers may be decontaminated in the designated decontamination corridor in the WZ. This must be done prior to personal decontamination while full PPE is still being worn. The following decontamination procedures must be followed for personnel decontamination, as appropriate, for activities involving PPE:

- Field team must ensure that contamination does not remain on equipment/vehicles, on sample containers, or in contact with the body.
- The TRC SSO must monitor decontamination procedures.
- Decontaminated water must be stored in portable containers and transported to the Refinery WWTP for ultimate disposal with MPC Environmental approval.
- Small equipment must be taken to the equipment decontamination area. After tools have been decontaminated, a clean pair of gloves must be used to take them to the exit point.
- Disposable boot covers must be disposed of at the WZ. If worn, rubber boots must be scrubbed in a decontamination solution of soapy water and rinsed at the clean water rinse station.
- Tape from rubber boots and gloves must be removed (if applicable)

7.2.2 Respirator Decontamination

If the use of a respirator is required, each respirator must be cleaned daily by the individual to whom it has been assigned. No interchanging of respirators will be permitted. If respirators are used, respirator cartridges must be changed at least daily, or once every 30 minutes if monitoring and/or sampling data indicate that potential saturation concentrations exist, if warning signs are noted (e.g., odor), or if breathing becomes difficult.

7.2.3 Heavy Equipment and Vehicle Decontamination

Heavy equipment and vehicles must be evaluated and, if necessary, decontaminated prior to leaving the work zone. A high-pressure water (or similar) wash

will be available for decontamination. At no time will remediation material be allowed to adhere to the exterior of or drip from heavy equipment or vehicles outside a work zone.

Face-shields, safety glasses with side shields, disposable rain suits, nitrile gloves, and rubber safety-toe boots must be worn during heavy equipment decontamination. High-pressure water should be used only on heavy equipment.

7.2.4 Sampling Equipment Decontamination

The following procedures must be followed to decontaminate all hand-held, non-disposable excavation and sampling equipment:

- Remove any solid particles from the equipment or material by brushing and rinsing with available potable water. This will remove gross contamination.
- Wash equipment with a brush and a phosphate-free detergent solution (e.g., Alconox or similar laboratory detergent).
- Rinse equipment thoroughly with potable water.
- Rinse with distilled water.
- Rinse with isopropyl alcohol.
- Rinse with distilled water.
- Allow equipment to air-dry thoroughly. If there is not enough time to air dry completely, the equipment must be rinsed with copious amounts of distilled water.
- Dispose of decontamination waste in drums provided for this purpose.

7.2.5 Disposal of Decontamination Water and Solvents

All personal and sampling equipment decontamination water (generated at locations other than the West LTF CAMU or East LTF) must be stored in portable containers. The portable container must be transported, as needed, to the Refinery WWTP for ultimate disposal. Decontamination water generated at the West LTF CAMU or East LTF may be discharged at the concrete decontamination pad.

8.0 SITE CONTROL

To control and record each employee entering/leaving the MPC Refinery, all personnel must check-in at the front entrance. Only personnel identified as *authorized* will be permitted to enter certain areas of the refinery (e.g. AOC2). A sticker on their hardhats will serve as identification. A master list of authorized personnel will be available to the MPC and TRC Project Manager. The list will only include personnel who have received the appropriate training and medical certification required by this HASP and OSHA requirements. Visitors may not enter the HZ or WZ unless they have received the appropriate training, reviewed this HASP, are included in a medical monitoring program, and are wearing the appropriate PPE.

8.1 Site Entry and Exit

All persons entering an established HZ will be required to wear the appropriate PPE specified in Section 5.0, according to current operations and air monitoring criteria. All individuals entering an established HZ and WZ will follow the following protocols:

- Don appropriate PPE before entering the WZ.
- Enter through the clean side of the WZ.

The following protocols must be followed when leaving an HZ and WZ:

- All personnel must exit through the designated exit points.
- All personnel must proceed through appropriate decontamination, as specified in Section 7 of this HASP.
- All PPE must be removed on the dirty side of the WZ.

8.2 Site Communications

Because most field activities at the Refinery are expected to occur in modified Level D PPE, communication among on-site personnel is not expected to be a problem. If conditions are such that Level C PPE becomes necessary, hand signal commands for communicating emergency situations must be arranged and agreed upon by all field personnel prior to commencing work under Level C protection.

8.3 Buddy System

All work in an HZ (with Level C PPE) must be scheduled so that no employee works alone in this zone at any time. Each worker must maintain visual contact with another specified worker at all times. The buddy system will ensure against an employee becoming stressed, injured, or getting into a hazardous situation without a co-worker being aware of her or his condition. Workers must watch out for each other while working close to potential chemical and physical hazards. The buddy system is not required for activities with modified Level D PPE.

9.0 EXPOSURE MONITORING

This section describes monitoring that will be performed to ensure site personnel are not over-exposed to potential hazards. Monitoring and air sampling programs will be conducted to evaluate worker exposure to potentially hazardous airborne materials. Perimeter air sampling and monitoring will be conducted to evaluate air conditions at the work area boundary. Monitoring of heat and cold stress and noise levels are also discussed.

9.1 Air Monitoring

Air sampling and monitoring will be performed for activities conducted on-site to:

- Assess worker exposure to hazardous materials with respect to the permissible exposure limits (PELs) for air contaminants (29 CFR 1910.1000 or 1936.55) or other published exposure levels
- Assess the adequacy of engineering controls and respiratory protection
- Delineate areas where controls or respiratory protection are needed

9.1.1 Air Monitoring Equipment Types

Five different types of field instruments may be used to perform chemical exposure monitoring:

- A photo-ionization detector (PID) or flame ionization detector (FID)
- Detector tubes for benzene and/or other COCs
- A combustible gas indicator, oxygen, carbon monoxide, and hydrogen sulfide meters/indicators
- Airborne particulate monitor
- Mercury vapor analyzer
- Personal sampling pumps

In the event that detectable levels of air contaminants are found above action levels, personnel will either don respiratory protection and/or site activities will cease and the area will be allowed to ventilate until concentrations drop below the action levels. The air monitoring response criteria for the hazardous constituents identified are discussed in the following text.

9.1.2 Equipment Calibration

Instrumentation to perform the air monitoring will be calibrated according to the manufacturer's specifications. Calibration should also be performed when inconsistent or erratic readings are obtained. If an instrument cannot be calibrated to specification, or becomes otherwise inoperable, all personnel work with cease until the instrument is

appropriately repaired or replaced. The calibration of each instrument will be recorded in the project field book indicating the calibration gas used and calibration reading result.

9.1.3 Real-Time Monitoring Procedures

Real-time monitoring of total hydrocarbon emissions will initially be performed every 30 minutes. If real-time monitoring every 30 minutes during the initial phases of a particular task indicates that no problem exists with hydrocarbon emissions, this schedule may be relaxed to real-time monitoring on a less frequent basis until there is an obvious change in the task (and potential exposure) or until the direct reading instrument indicates a potential problem. If real-time monitoring indicates organic vapors in excess of 1 ppm, the original schedule of direct instrument readings every 30 minutes will be resumed.

A log of the results of the direct-reading air monitoring, detector tube observations, and results of personnel monitoring will be made part of a permanent project file. A record of the time, date, type of detector tube (i.e., benzene 0.5 ppm), any observed color change, and the name of the individual taking the measurement will be kept with the project file. Direct-reading air monitoring results will be recorded in the Project-Specific HASP.

9.1.4 Background Readings

All direct-reading air monitoring instrument readings will be evaluated relative to background readings, not "zero." Prior to the start of work, and whenever there is a significant shift in wind direction, instrument readings will be obtained upwind of the site operating zone in order to determine the level of "background" readings from other local sources such as vehicle emissions, nearby facilities unrelated to the site, etc. Site readings will be evaluated against these background readings (i.e., if an action level is listed as 1 ppm, it is evaluated as 1 ppm above background).

9.1.5 Organic Vapors

Organic Vapors may consist of various individual VOCs, including benzene, toluene, ethylbenzene, and xylenes (BTEX), originating from residual hydrocarbon products in contaminated soil and groundwater. Of these organic vapors, benzene is the primary hazardous constituent of concern due to its greater volatility and known carcinogenic properties.

A PID equipped with either a 10.6 or 11.2 eV lamp or organic vapor analyzer-flame ionization detector (OVA-FID) will be used to screen for organic vapors. An UltraRae benzene monitor will be used to verify the presence and/or concentrations of benzene. At a minimum, the frequency of monitoring will be as described in Project-Specific HASP, to monitor activities such as drilling, groundwater sampling, and excavation of soil, etc. Readings will be taken at locations that reflect approximate concentrations of organic vapors in the breathing zone of project personnel. A list of the action levels for VOCs and benzene are included in Table 9-1. If necessary based on this listed action levels, the level of PPE used by the project personnel will be upgraded.

If the real-time air monitoring results indicate concentrations of organic vapors above the action level, the presence of benzene will be verified in the work zone using a benzene detector tube or UltraRae benzene monitor. A benzene detector tube is used by drawing a known volume of air into the tube and then following the manufacturer's instructions included with the detection tube to determine the concentration.

Measures shall be taken to control organic vapors when concentrations measured in the work zone and/or at the perimeter of the CZ exceed the action levels specified in the Project-Specific HASP. Contaminants may be controlled through the application if water or amended water solutions using water trucks or other adequate practices. Organic vapors may be controlled by slowing down work activities and/or using fans to disperse the vapors in the work area.

9.1.6 Combustible Gases

A direct reading real-time instrument capable of detecting combustible gases will be used while conducting activities in the MPC Refinery. Readings will be taken at locations that reflect approximate concentrations of combustible gases in the work areas and personnel breathing zones. A list of the action levels for combustible gases is included in Table 9-1. If combustible gases are detected during drilling activities, the use of a drilling mud may be used to control the gases from reaching the surface.

9.1.7 Oxygen

A direct-reading real-time instrument capable of detecting oxygen will be used while conducting activities in the MPC Refinery. Readings will be taken at locations that reflect approximate concentrations of combustible gases in the work areas and personnel breathing zones. A list of the action levels for oxygen is included in Table 9-1.

9.1.8 Airborne Particulates

Air monitoring for airborne particulates (dust) will be conducted using a MiniRam dust monitor or other equivalent instrument on a project-specific basis. The monitoring will occur on the downwind side of the project. If dust levels cannot be maintained at less than the action level with application of water alone, respiratory protection maybe necessary. A list of the action levels for airborne particulates is included in the Table 9-1.

9.1.9 Mercury Vapors

Air monitoring for mercury vapors will be performed using a Jerome 431x Mercury Vapor Analyzer (MVA). The Jerome 431x MVA can identify concentrations of mercury vapors between 0.003 and 0.999 milligrams per cubic meter (mg/m^3). At a minimum, the frequency of monitoring will be as described in Project-Specific HASP, to monitor activities such as drilling, excavation of soil, etc. Readings will be taken at locations that reflect approximate concentrations of mercury in the breathing zone of project personnel. A list of the action levels for mercury vapors is included in Table 9-1.

If necessary based on this listed action levels, the level of PPE used by the project personnel will be upgraded.

9.1.10 Hydrogen Fluoride

Air monitoring for hydrogen fluoride (HF) will be performed using detector tubes. A HF detector tube is used by drawing a known volume of air into the tube and then following the manufacturer's instructions included with the detection tube to determine the concentration.

Table 9-1
Air Monitoring Action Levels

Equipment Type		Monitoring, Action Levels, and PPE
ORGANIC VAPORS		
☒ ☐	PID FID	Reading > 10 ppm or "Background" sustained for 1 minute, upgrade to Level C with HF APR, Notify TRC SSO. Verify benzene concentration with detector tube. Reading > 100 ppm sustained for 1 minute, upgrade respiratory protection to FF APR, Notify TRC SSO. Reading > 500 ppm sustained for 1 minute, shutdown work activities, evacuate the area, move upwind, Notify the TRC SSO.
BENZENE VAPORS		
☒ ☐	PID (UltraRae) Detector Tube Type: benzene	Reading > 1 ppm or "Background" sustained for 1 minute, upgrade to Level C with half-face APR and notify SHSO. Reading > 10 ppm sustained for 1 minute, upgrade respiratory protection to full-face APR and notify SHSO. Reading > 50 ppm sustained for 1 minute, upgrade respiratory protection to supplied air respiratory equipment and notify the SHSO.
HYDROGEN SULFIDE		
☒	H_2S Meter	Reading > 10 ppm, instantaneous, shutdown work activities, evacuate area, move upwind, Notify the MPC and TRC SSO.
OXYGEN		
☒	Oxygen Meter	Reading <19.5 % sustained for 1 minute, shutdown work activities, evacuate area, move upwind, Notify the TRC SSO. Reading 19.5 – 23.5 %, continue normal work operations. Reading >23.5 % for 1 minute, shutdown work activities, evacuate area, move upwind, Notify the TRC SSO.
COMBUSTIBLE ATMOSPHERE		
☒	Combustible Gas Indicator	Reading > 5 % LEL, instantaneous, shutdown work activities, evacuate area, move upwind, Notify the MPC and TRC SSO.

Table 9-1
Air Monitoring Action Levels

Equipment Type		Monitoring, Action Levels, and PPE
AIRBORNE PARTICULATES		
☒	MiniRam	Dust concentration > ____ mg/m^3, shutdown work activities, evacuate area, move upwind, Notify the TRC SSO. The action level for airborne particulates is dependent on potential contaminants.
MERCURY VAPORS		
☒	Mercury Vapor Analyzer	Reading > 0.025 mg/m^3 or "Background" sustained for 1 minute, upgrade to Level C with half-face APR and notify SHSO. Verify with detector tube if necessary. Reading > 0.25 mg/m^3 sustained for 1 minute, upgrade respiratory protection to full-face APR and notify SHSO. Reading > 1.25 mg/m^3 sustained for 1 minute, upgrade respiratory protection to supplied air respiratory equipment and notify the SHSO.
HYDROGEN FLUORIDE		
☒	Detector Tube Type: Hydrogen Fluoride	Reading > 3 ppm or "Background" sustained for 1 minute, upgrade to Level C with half-face APR and notify SHSO. Reading > 30 ppm sustained for 1 minute, shutdown work activities, evacuate the area, move upwind and notify the MPC and the SHSO.

9.1.11 Personal Air Monitoring/Sampling

For certain operations including excavation, backfilling, and drilling, time-integrated personal air samples for specific air contaminants may be collected using personal sampling pumps or other appropriate sampling media. Personal monitoring may require the use of a variety of sampling media, such as charcoal tubes, silica gel tubes, other absorbent tubes, filters, etc. The sampling program, sampling types and frequency, and the specific NIOSH or OSHA sampling method(s) will be specified by in the Project-Specific HASP. Analysis of all air samples will be performed by an AIHA-accredited laboratory.

Personal and area monitoring will be based on the location, duration, job scope, and as directed by the field conditions. Monitoring will be conducted on those individuals (contractors and MPC personnel) that will be present in the hot zones. Representative sampling will be conducted for those job categories (i.e., laborers, carpenters, operators, etc.) in the abovementioned hot zone.

The logic monitoring strategy (for each chemical component) will be based on the Soil Sample Exceedances Drawings. These chemical components include, but are not limited to C_6BTX, OSHA 13 metals, ethylbenzene, benzo-a-anthracene, and benzo-a-pyrene. As the Contractor progresses into each of these areas, appropriate monitoring will be conducted for a two-day period in that area. The MPC SSO, TRC SSO, and the MPC Industrial Hygienist will work together and schedule monitoring proposed work activities. Whenever real-time monitoring indicates potential exceedances, the TRC/MPC SSO(s) must contact the MPC Industrial Hygiene so that additional personal/area monitoring is conducted. A quick turnaround will be required for laboratory analysis.

A final report will be submitted to the MPC SSO for all direct-reading, detection tube, and personnel monitoring results. This report will be submitted at the completion of the project.

9.2 Confined Spaces

Continuous or periodic air sampling contingent on the space hazards will be conducted with a PID, H_2S monitor, combustible gas indicator, and oxygen monitor prior to, and during all confined space entries in accordance with the confined space entry permit. Monitoring shall also be conducted each morning prior to permitting workers to enter confined spaces or excavations and prior to starting equipment in confined spaces.

9.3 Heat Stress Monitoring

Because the incidence of heat stress depends on a variety of factors, all workers, even those not wearing protective equipment, will be monitored per the conditions contained in Tables 9-2 and 9-3.

Initially, the frequency of physiological monitoring shall depend on the air temperature adjusted for solar radiation and the level of physical work (see Table 9-3).

The length of the work cycle will be governed by the frequency of physiological/visual monitoring.

Proper training and preventive measures will help avert serious illness and loss of worker productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat injuries. To avoid heat stress, the TRC SSO must take the following steps.

- Adjust work schedules:
  - Modify work/rest schedules according to monitoring requirements.
  - Mandate work slowdowns as needed.
- Provide shelter (air-conditioned if possible) or shaded areas to protect personnel during rest periods, and shield hot equipment.

Table 9-2
Signs and Symptoms of Thermal Stress

Stress Type	Cause and Description	Symptoms and Treatment
Heat Stress		
Heat rash	Continuous exposure to heat or humid air; excessive sweat plugging sweat ducts.	Red, itchy rash on the body. Rest in cool area; allow skin to dry.
Heat cramps	Heavy sweating; consuming large amounts of water with inadequate electrolyte replacement.	Muscle spasms; pain in the hands, feet, and abdomen. Administer liquids.
Heat collapse	Unacclimated persons standing immobile in the heat.	Recovery is prompt when lying down; notify your supervisor and seek medical attention.
Heat exhaustion	Excessive sweating and restricted water intake; increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration.	Pale, cool, moist (clammy) skin; heavy sweating; dizziness; nausea; fainting; possible headache; weakness or extreme fatigue. Administer liquids and notify your supervisor and seek medical attention.
Heat stroke	Temperature regulation fails and the body temperature rises to critical levels; the most serious form of heat stress, it constitutes a medical emergency; **immediate action must be taken to cool the body before serious injury and death occur; medical help <u>must</u> be obtained.**	Body temperature above 105ºF; red, hot, and usually *dry* skin; lack of or reduced perspiration; nausea; dizziness or confusion; strong and rapid pulse; coma. Rapidly cool the individual with cold water, and call an ambulance at 911. Then contact your supervisor.
Cold Stress		
General Body Coldness	Drop in the skin temperature.	Shivering, numbing in extremities, loss in manual dexterity and strength. Notify your supervisor.
Hypothermia	Drop in the deep body temperature; can be fatal if corrective procedures are not taken.	Uncontrollable shivering, slurred speech, memory lapses, irregular breathing, drowsiness, fatigue. Seek medical attention.
Frostbite	Inadequate circulation and/or insulation of body part; freezing of the fluids around cells.	Skin color change—white or grayish-yellow to reddish-violet to black when tissue dies; pain initially, followed by cold and numbness in the affected part. Seek medical attention.

Table 9-3
Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers[a]

Adjusted Temperature[b]	Normal Work Ensemble[c]	Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work.	After each 15 minutes of work.
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work.	After each 30 minutes of work.
82.5°-87.5°F (28.1°-30.8°C)	After each 90 minutes of work.	After each 60 minutes of work.
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work.	After each 90 minutes of work.
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work.	After each 120 minutes of work.

[a]For moderate or greater work levels (250 kilocalories/hour).

[b]Calculate the adjusted air temperature (ta adj) by using the following equation:

ta adj°F=ta°F+(13 x %sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent of the time the sun is not covered by clouds that are thick enough to produce a shadow (100% sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows).

[c]A normal work ensemble consists of nomex coveralls and standard Tyvek™.

Maintain workers' body fluids at normal levels. Daily fluid intake must be approximately equal to the amount of daily weight lost. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

- Maintain water temperature at 50º to 60ºF (10º to 15.6ºC).
- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes or at each monitoring break. A total of 1.0 to 1.6 gallons (4 to 6 liters) of fluid per day is recommended, but more may be necessary to maintain body weight. When consuming large amounts of water, replace electrolytes (sodium, potassium, calcium, magnesium, and chloride).
- Encourage workers to maintain an optimal level of physical fitness and become acclimated to working in heat.
- Encourage workers to apply sunscreen to exposed areas.
- Train workers to recognize and treat heat stress. As part of training, identify the signs and symptoms of heat stress.
- Use the buddy system.

9.4 Cold Stress Monitoring

Fatal exposure to cold among workers has almost always resulted from accidental exposures involving failure to escape from low air temperatures or from immersion in low-temperature water. The single most important aspect of life-threatening hypothermia is the decrease in the deep core temperature of the body. Employees will be protected from exposure to cold so that the deep core temperature does not fall below 96.8ºF (36ºC). Reduced body temperature will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences. All on-site personnel must be familiar with the signs and symptoms of cold stress (see Table 9-2 above).

The human body senses cold as a result of two factors— air temperature and wind velocity. Cooling of the flesh increases rapidly as wind velocity goes up. Frostbite can occur at relatively mild temperatures if the wind penetrates the body insulation. For example, when the air temperature is 40ºF and the wind velocity is 30 miles per hour, the exposed skin would perceive an equivalent still-air temperature of 13ºF. Table 9-4 illustrates wind chill indices and the associated hazards to exposed flesh. The wind chill index will be evaluated before fieldwork begins to allow the workers to dress appropriately for the temperatures to which they will be exposed.

Table 9-4 presents a wind chill index chart to aid in monitoring for cold stress. Proper training and preventative measures will help avert serious illness due to cold stress. Appropriate clothing must be worn on the basis of the exterior temperature, wind chill factor, and the level of work. Precautions must be taken to minimize exposed flesh

and layered clothing must be worn as appropriate. For exposed skin, continuous exposure is not to be permitted when the air speed and temperature result in an equivalent chill temperature of -26ºF (-32ºC). At temperatures of 36ºF (2ºC) or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately provided with a change of clothing and treated for hypothermia.

Special protection of the hands is required to maintain manual dexterity for the prevention of accidents. Special caution must be exercised when workers are exposed to vibration since blood circulation in extremities may already be impaired. Eye protection must be provided to workers employed out-of-doors in a snow and/or ice terrain.

Table 9-4
Wind-chill Index

Actual Thermometer Reading (ºF)										
Wind Speed (mph)	**50**	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**
Calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Over 40 (Little added effect)	LITTLE DANGER (For properly clothed person)				INCREASING DANGER			GREAT DANGER		
					(Danger from freezing of exposed flesh)					

Source: National Safety Council 1982

Trauma sustained in freezing or subzero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing first aid treatment.

Work Below 39ºF—Provisions for additional total body protection are required if work is performed at or below 39ºF (4ºC) as follows:

- Employees shall wear cold-protective clothing appropriate for the level of cold and physical activity.
- If the air velocity at the site is increased by wind or artificial ventilation, the cooling effect of the wind will be reduced by shielding the work area or by wearing a removable outer windbreak garment.
- If the clothing on the employee may become wet on the job site, the outer layer of the clothing must be water-repellent.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.

Work Below 10ºF—For work practices at or below 10ºF (-12ºC), the following provisions will apply:

- The worker shall be under constant protective observation (i.e., the buddy system).
- If work must be performed, rest periods must be taken in heated shelters and an opportunity to change into dry clothing will be provided.
- New employees should not be required to work full-time in the cold until they become accustomed to the working conditions and required protective clothing.
- The work shall be arranged in such a way that sitting or standing still for long periods is minimized.
- The workers must be instructed in health and safety procedures. The training program must include, as a minimum, instruction in:
  - Proper re-warming procedures and appropriate first aid treatment
  - Proper clothing practices
  - Proper eating and drinking habits
  - Recognition of impending frostbite
  - Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur
  - Safe work practices

10.0 EMERGENCY RESPONSE PROCEDURES

This section describes the emergency response plan contingency procedures to be implemented immediately in the event of injuries, illnesses, accidents, fires, and other incidents. This contingency plan provides guidelines for the proper response to emergency situations. In addition, Refinery emergency response procedures must be met. The emergency evacuation routes and assembly points are depicted in Figure 10-1 included in this HASP.

10.1 Emergency Contact Numbers

Local Services Emergency Telephone Numbers

Emergency Contact	Telephone Number
Ingleside Fire Department	**911** **(361) 776-7422**
Ingleside Police Department	**911** **(361) 776-2531**
San Patricio County Sheriff's Office	**(361) 364-2251**
San Patricio County Emergency Management	**911** **(361) 364-9650** **(361) 364-9653**
San Patricio County Department of Public Safety	**(361) 364-6232**
National Poison Control Center	**(800) 222-1222**
CHEMTREC	**(800) 424-9300**
National Response Center	**(800) 424-8802**
Texas Commission on Environmental Quality	**(800) 782-7860** **(217) 278-5800**
HOSPITAL	
Care Regional Medical Center **1711 West Wheeler Avenue** **Aransas Pass, TX 78336**	**(361) 758-8585**

Figure 10-1. Evacuation and Assembly Point Routes

Figure 10-2. Emergency Route to Medical Facility

Route to nearest Hospital, Crawford Memorial Hospital (See Figure 10-2) for emergency route to the nearest hospital):

1. Exit Former Falcon Refinery to Eaton Street
2. Travel North on Eaton Street to Route 33 (Main Street)
3. Turn left (West) on Main Street and continue heading West through Robinson
4. Turn Right (North) on North Allen Street and continue heading North to Hospital, the hospital will be on the left side of North Allen Street.

10.2 Pre-Emergency Planning

In addition to the guidance provided in this document, project-specific meeting will include emergency response preplanning specific to each task and work site. The training will include:

- Assembly points – more than one assembly point will be specified to ensure that as least one up-wind assembly point is accessible
- Evacuation routes – routes will be specified as needed
- Means of communication – this will include the means of alerting personnel to an emergency at all points of the Refinery and the means of communicating with emergency response personnel
- Emergency evacuation notification – designate a TRC field team member for role call of TRC personnel and subcontractors in the event of an evacuation

10.3 Emergency Medical Response Procedures

Medical problems that could occur on-site need to be handled competently and quickly. Each field team member must be aware of the instructions and information provided below:

- Post the emergency telephone numbers.
- Seek professional medical attention immediately for personnel who are bleeding severely, are having difficulty breathing, are experiencing intense pain, or are unconscious. Each member of the field team must know how to call for an ambulance (by calling 911).
- If anything gets in the eyes (e.g., chemicals or dust), flush them with a generous amount of water. The TRC SSO must be notified immediately of the problem.
- Do not remove objects that are implanted in the eye.
- Always seek medical attention for eye injuries.
- If a worker contacts remediation waste, wash the affected area with soap and water as soon as possible. If large amounts of remediation waste with elevated

levels of waste constituents come into contact with the body, take a full-body shower with soap immediately.

10.4 Fire and Explosion Response Procedures

On-site fires can be started by natural phenomena or by unsafe work activities. Each field team must have a multipurpose (A, B ,C) fire extinguisher on-hand at all times, and each piece of equipment with an ignition source must be accompanied by such an extinguisher. The procedure for using a fire extinguisher is to pull the safety pin, point the extinguisher at the base of the flames, and discharge the extinguisher by sweeping the flames from a distance of about six feet. The person using the extinguisher should move in as the flames diminish. The employee must not turn their back on a fire while attempting to extinguish it.

Other important fire-related instructions are as follows:

- Never use water on an electrical fire or a solvent fire. All extinguishers must be the dry chemical type and be labeled Class A, B, C.
- Keep decontamination solvents and engine fuels well away from any ignition sources.

In addition, flammable brush and grass must be cleared away from the site before activities begin.

10.5 Evacuation Routes and Assembly Points

The evacuation routes were chosen so that there is a means of safe egress from all points in the Refinery. On-site personnel are directed to evacuate to the nearest exit gate in a direction that is into or ninety degrees from the prevailing wind direction. There are twenty-one emergency exit gates. In order to unlock the gate, the glass in a nearby case will have to be broken for retrieval of the key.

There are seven assembly points around the Refinery's perimeter. These were chosen based on the locations of gates in the Refinery's fence, the probable locations of personnel, and to provide a safe location upwind of an incident regardless of the prevailing direction of the wind.

10.6 Operations Shutdown

Operations may be suspended for several reasons. These include the following:

- Each person has the right and responsibility to stop a job that is unsafe.
- The direct instrument readings indicate a potential exposure or concentrations exceeding maximum use limits of air-purifying respirators and cartridges.
- The TRC SSO observes flagrant noncompliance with the HSP.

When any of these conditions exist, work activities must stop and the site must be secured. All personnel must leave the work area until the TRC SSO has determined that

operations may resume. In addition, activities must stop during high winds or electrical storms.

10.7 Emergency Communications

To report an emergency, dial the West Pedestrian Gate (Extension 300 or 5300) on any Refinery telephone, call the West Pedestrian Gate by radio. In an emergency, the telephone system is reserved for emergency communications only. The Refinery's main telephone number is (618) 544-2121 and is available 24 hours per day. The guards will call on-site or community emergency responders. Should an emergency occur, both the MPC SSO and the TRC SSO must be notified.

Portable Radio System

West Pedestrian Gate security personnel monitor radio bands that are dedicated to maintenance, operations supervisor, product distribution units (PDU), and emergency departments at the Refinery. An emergency may be reported directly to the West Pedestrian Gate on any of these bands. The alert will be stated in the following manner:

- State, "Clear the air, I have an emergency"
- The person's name is given
- The exact location of the emergency is stated
- The message is repeated twice
- The person will remain on the radio until the West Pedestrian Gate security officer acknowledges the transmission

All multi-channel radios at the Refinery include an emergency band. This band is designated specifically for emergency communications. Additionally, a few radios include a command channel designated for communications between the ECC and the Incident Command Post.

During an emergency, an attempt will be made to keep radio communications to a minimum; however, all pertinent information will be relayed.

All fire and rescue personnel will communicate on the emergency band during an incident. The air monitoring team will communicate on the maintenance band during an emergency.

Radios are stored in emergency response vehicles. These radios are kept on the emergency band position while in storage.

10.8 Incident Investigation

It is important that all accidents and incidents that result in injury, illness, or medical treatment be reported immediately. Reporting consists of calling the Teleclaim Center and providing information on the injury. The Teleclaim Center will complete the first report of

injury and file it accordingly. Copies will be sent to the Safety Director. Supervisors are required to complete the Supervisor's Report of Accident included in this section. It is TRC's responsibility to investigate each incident, file appropriate paperwork and conduct a follow-up analysis of each incident.

Reporting Phone Numbers

Safety and Health Director:	1-860-298-6256
Hartford Insurance Teleclaim:	1-800-327-3636
Human Resources Director:	1-800-365-8254

Any work related injury or illnesses that require professional medical assistance should be reported immediately. Failure to promptly notify of a work related injury could make the claim questionable and subject to stricter review.

After medical attention has been administered, an incident investigation will be completed. The incident report will follow MPC guidelines included in *SOP 14 Incident Investigation* located in Appendix B. The TRC Project Manager will also complete the TRC *Supervisor's Report of Accident* form located in Appendix E.

11.0 RECORDINGKEEPING

The following records must be maintained. Each contractor involved with the field portion of the remediation tasks must keep these records for their employees:

- A copy of this (or applicable) HASP
- Health and safety training certification forms
- Written respiratory protection program certification
- Respirator training certification
- Any accident/illness report forms
- Documentation of each employee's medical ability to perform work and wear respirators

TRC and subcontractors must keep exposure records and medical records for at least the duration of employment plus 30 years. These records include medical examination or test records and medical questionnaires (which the employee completes at the time of examination). It is not required that first-aid records be retained for a specified period.

The TRC SSO must maintain a log of health-and-safety-related events occurring at the work site. The following information must be recorded in the log:

- Date when the work was performed and a work site identifier
- Names and employers of the persons working at the site
- Ambient temperature measurements and times when they were collected
- Modifications in levels of personal protection or decontamination procedures, along with the rationale for the modifications
- Modifications to the HASP along with the rationale for the modifications
- Air monitoring equipment calibration and maintenance
- Air quality monitoring results
- Any exposure episodes, including the time at which they occurred, the work activity being performed, and the types and levels of contaminants identified

Daily log entries must be made in ink in a bound logbook. Log entries must be maintained permanently in the project files. The TRC SSO must conduct weekly (at a minimum) safety audits during the field activities to ensure compliance with the HASP. Site safety audit checklists and comments must be kept in the project file. A location must be designated for storage of all data sheets and project files.

12.0 REFERENCES

1. *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*. American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 2002.

2. *Guidance Manual for Superfund Activities*. Volumes 1-9. U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, Cincinnati, Ohio, 1985.

3. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, National Institute for Occupational Safety and Health, Occupational Safety and Health Administration, U. S. Coast Guard, and U.S. Environmental Protection Agency, 1985.

4. Title 29 (Labor), Code of Federal Regulations, Parts 1900 through 1910, revised July 1, 2002.

5. *Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites, Final Report*, U.S. Environmental Protection Agency, 1985.

APPENDIX A

HEATLH AND SAFETY PLAN REVIEW ACKNOWLEDGEMENT

APPENDIX B

ILLINOIS REFINING DIVISION STANDARD OPERATING PROCEDURES

APPENDIX C

PROJECT-SPECIFIC HASP

APPENDIX D

MATERIAL SAFETY DATA SHEETS

APPENDIX E

TRC SUPERVISOR'S REPORT OF ACCIDENT

TABLE 1
AREAS OF CONCERN
FALCON REFINERY SUPERFUND SITE
INGLESIDE, TEXAS

AOC	LOCATION		SURFACE WATER SAMPLE NUMBER	SAMPLE LOCATION NUMBER	MONITOR WELL/GROUNDWATER LOCATONS	COPCs
1N	North section of the Refinery complex, on the northeast side of the FM 2725/Bishop Rd. intersection.	Surface Soil Subsurface Soil Groundwater		G2-01S - G2-04S	MW01-01 - MW01-02	Metals VOCs SVOCs PCBs Pesticides
1S	South section of the Refinery complex, on the southwest side of the FM 2725/Bishop Rd. intersection.	Surface Soil Subsurface Soil Groundwater		G2-05S - G2-24S	MW-03 - MW-07	Metals VOCs SVOCs PCBs Pesticides
2	On-site non-process areas, west of the south section of the Refinery complex.	Surface Soil Subsurface Soil		G2-25S - G2-28S		Metals VOCs SVOCs PCBs Pesticides
3	Wetlands	Surface Soil Subsurface Soil Sediment Surface Water*	G2-01SW - G2-16SW	G2-01SD - G2-06SD		Metals VOCs SVOCs PCBs Pesticides
4	Current barge docking site	Surface Soil Subsurface Soil		G2-29S - G2-33S		Metals VOCs SVOCs PCBs Pesticides
5	Redfish Bay adjacent to current barge docking facility	Sediment Surface Water		G2-07SD - G2-13SD		Metals VOCs SVOCs PCBs Pesticides
6	Neighborhood **					
7	Neighborhood **					
BKG	To be determined	Surface Soil Subsurface Soil Groundwater Sediment Surface Water	BG-15SW - BG20-SW	BG-09S - BG-14S BG-15SDW - BG-20SDW BG-21SDI - BG-26SDI	TWBG-09 - TWBG-14	Metals VOCs SVOCs

* Due to flucuations in surface water locations within wetlands, exact locations are not listed.
** May require sampling after Phase II addendum No. 1

AOC	Area of Concern
COPC	Contaminant of Potential Concern
VOC	Volatile Organic Compound
GW	groundwater
BKG	Background
SVOC	Semi-volatile Organic Compound
SD	Sediment
SW	Surface water

TABLE 1
AREAS OF CONCERN
FALCON REFINERY SUPERFUND SITE
INGLESIDE, TEXAS

AOC	LOCATION		SURFACE WATER SAMPLE NUMBER	SAMPLE LOCATION NUMBER	MONITOR WELL/GROUNDWATER LOCATONS	COPCs
1N	North section of the Refinery complex, on the northeast side of the FM 2725/Bishop Rd. intersection.	Surface Soil Subsurface Soil Groundwater		G2-01S - G2-04S	MW01-01 - MW01-02	Metals VOCs SVOCs PCBs Pesticides
1S	South section of the Refinery complex, on the southwest side of the FM 2725/Bishop Rd. intersection.	Surface Soil Subsurface Soil Groundwater		G2-05S - G2-24S	MW-03 - MW-07	Metals VOCs SVOCs PCBs Pesticides
2	On-site non-process areas, west of the south section of the Refinery complex.	Surface Soil Subsurface Soil		G2-25S - G2-28S		Metals VOCs SVOCs PCBs Pesticides
3	Wetlands	Surface Soil Subsurface Soil Sediment Surface Water*	G2-01SW - G2-16SW	G2-01SD - G2-06SD		Metals VOCs SVOCs PCBs Pesticides
4	Current barge docking site	Surface Soil Subsurface Soil		G2-29S - G2-33S		Metals VOCs SVOCs PCBs Pesticides
5	Redfish Bay adjacent to current barge docking facility	Sediment Surface Water		G2-07SD - G2-13SD		Metals VOCs SVOCs PCBs Pesticides
6	Neighborhood **					
7	Neighborhood **					
BKG	To be determined	Surface Soil Subsurface Soil Groundwater Sediment Surface Water	BG-15SW - BG20-SW	BG-09S - BG-14S BG-15SDW - BG-20SDW BG-21SDI - BG-26SDI	TWBG-09 - TWBG-14	Metals VOCs SVOCs

* Due to flucuations in surface water locations within wetlands, exact locations are not listed.
** May require sampling after Phase II addendum No. 1

AOC	Area of Concern
COPC	Contaminant of Potential Concern
VOC	Volatile Organic Compound
GW	groundwater
BKG	Background
SVOC	Semi-volatile Organic Compound
SD	Sediment
SW	Surface water

TRC
JOB SAFETY/ENVIRONMENTAL ANALYSIS (JSA)

JOB SAFETY ANALYSIS (JSA) **JOB:** **DATE:**

SITE: **JSA#**

PROJECT COORDINATOR: **CONTRACTOR(S):** TRC
SUBCONTRACTORS:

JSA TEAM:
Project Manager/Supervisor: _____ Phone: _____
EHS Field Safety Advisor: _____ Phone: _____
Site Safety Officer: _____ Phone: _____
Alternate Site Safety Officer: _____ Phone: _____

PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIRED: Hard Hat, Steel-Toed Boots, Safety Glasses, Traffic Safety Vest, Gloves, and Hearing Protection. Respiratory Protection (if required).
ADDITIONAL PPE:

Steps in Sequence	Hazards Involved	Recommendations for Safe Work
1)	•	•
2)	•	•
3)	•	•
4)	•	•
5)	•	•
6)	•	•
7)	•	•
8)	•	•

Approvals:

Site Safety Officer:	Date:	Project Manager/Supervisor:	Date:
_____	_____	_____	_____
EHS Field Safety Advisor:	**Date:**	**Alternate Site Safety Officer:**	**Date:**
_____	_____	_____	_____

Field Changes:

Steps in Sequence	Hazards Involved	Recommendations for Safe Work
1)	•	•
2)	•	•
3)	•	•
4)	•	•
5)	•	•

Identify Potential Hazards

- ☐ Abrasions
- ☐ Biological Hazards (plants, animals, insects)
- ☐ Cave-in (trench/excavation work)
- ☐ Chemical/Thermal Burn
- ☐ Cuts
- ☐ Dermatitis
- ☐ Dropping Materials/Tools to lower level
- ☐ Drowning/Flowing water
- ☐ Dust
- ☐ Electrical Shock
- ☐ Elevated/Overhead Work
- ☐ Energized Equipment
- ☐ Fire
- ☐ Flammability
- ☐ Foreign body in eye
- ☐ Hazardous materials (exposure or release)
- ☐ Heat or Cold Stress
- ☐ Heavy Equipment Operation
- ☐ Heavy Lifting
- ☐ High Noise Levels
- ☐ Impact Noise
- ☐ Inability to maintain communication
- ☐ Inclement weather
- ☐ Overhead work
- ☐ Overhead utilities
- ☐ Underground Utilities
- ☐ Pinch points
- ☐ Pressurized lines
- ☐ Slips, Trips, Falls
- ☐ Sprains/Strains
- ☐ Traffic
- ☐ Confined Space
- ☐ New or Rental Equipment
- ☐ Surface Water Run-On/Run-Off
- ☐ Odor/VOC Emissions
- ☐ Compressed Gas Cylinders
- ☐ Generated Wastes (solids/liquids)
- ☐ Known/Unknown Visitors
- ☐ Visibility
- ☐ New Personnel
- ☐ Hoists/Rigging/Slings/Wire Rope
- ☐ Special Operations/Instructions (attach)
- ☐ Ergonomics

Identify Controls

- ☐ Air Monitoring
- ☐ Barricades/Fencing/Silt Fencing
- ☐ Buddy System
- ☐ Appropriate Clothing/Monitoring of Weather
- ☐ Confined Space Procedures
- ☐ Decontamination
- ☐ Drinking Water/Fluids
- ☐ Dust abatement Measures
- ☐ Equipment inspection
- ☐ Exclusion zones
- ☐ Exhaust ventilation
- ☐ Fall Protection
- ☐ Fire extinguisher/Fire watch
- ☐ Flotation Devices/Lifelines
- ☐ Grounds on Equipment/Tanks
- ☐ Ground Fault Interrupter
- ☐ Ground Hydraulic Attachments
- ☐ Hand signal communication
- ☐ Hazardous/Flammable material storage
- ☐ Hazardous Plant/Animal Training
- ☐ Hearing Protection (Specify)
- ☐ Hoses, Access to water
- ☐ Hot Work Procedures
- ☐ Insect Repellent or Precautions
- ☐ Isolation of Equipment or Process (LO/TO)
- ☐ Storm-water Control Procedures/Methods
- ☐ Machine/Equipment Guarding
- ☐ Manual Lifting Equipment (Chain Falls)
- ☐ Protective Equipment (specify)
- ☐ Proper lifting techniques
- ☐ Proper tool for Job
- ☐ Radio Communication
- ☐ Respirator, (specify type)
- ☐ Safety Harness/Lanyard/Scaffold
- ☐ Sloping, Shoring, Trench Box
- ☐ Vehicle Inspection
- ☐ Spill Prevention Measures/Spill Kits
- ☐ Equipment Manuals/Training
- ☐ Emergency Procedures/Incident Management Plan
- ☐ Appropriate Labels/Signage
- ☐ Derived Waste Management Plan
- ☐ Visitor Escort/Orientation/Security
- ☐ Window Cleaning/Defrost
- ☐ Proper Work Position/Tools

Pre-Task Review (Yes/No/NA)

1. Has Job Hazard Analysis been completed and reviewed? _____
2. Is Job Scope understood by all Personnel? _____
3. Proper Safety Equipment on job site? ___
4. Permit Issues?
   What type? ☐ Hot Work
   ☐ Confined Space ☐ Excavation
   ☐ Other:_____
5. Proper Tools for Job on site? _____
6. Oxygen/Flammability checked? _____
7. Reviewed MSDSs for any hazardous substance that might be present? _____
8. Proper training for all personnel? _____
9. Are there any planned deviations from set procedures for equipment modifications? __ If so, contact supervisor to check applicability of MOC procedures.
10. Is there any work planned that could cause activation of emergency procedures? ___ If so, have these procedures been discussed and communicated?

Post-Task Review

1. Work area cleaned up?_____
2. All locks and tags removed and signed off by individuals?_____
3. Have Permits been turned in? _____
4. STAR submitted to EHS Department?
5. Were there any unplanned deviations from set procedures or equipment modifications? _____
   If so, contact supervisor to check applicability of MOC procedures.

Safety Task Analysis Review

Task Description:_____

_____

_____

List Tasks:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Company: _____

Completed By: _____

Date: _____

Job Location:_____

_____

List Additional Hazards (Hazards Not Shown with Check Box)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

List Additional Contorls (Controls Not Shown with Check Box)

_____

_____

_____

Tailgate Meeting Topic

_____

_____

_____

_____

Signatures of Personnel on Task Analysis Review/Tailgate Meeting:

_____

_____

_____

_____

_____

_____

Mentor Assigned to Work

_____

_____

_____

Lessons Learned (Based on changes in conditions (Near-Incidents/ Observations, Potential Emergencies)

Is there a better/safer way to perform the work/task?

_____

_____

_____

Supervisor Review (date/Time): _____

EHS Review (date/time):_____

Comments:_____

_____

_____

Air Quality Monitoring Record

Client:_____ **Project No.**:_____
Location:_____ **Site Eng.**:_____
Project Mgr.:_____ **Site H&S Ofcr.**:_____

Date	Initial	Time	Location	PID/FID PPM	O_2%	LEL%	Dräeger Tubes			Other
							_____	_____	_____	

Field Equipment Calibration/Maintenance Log

Client:_____ **Project No.**:_____
Location:_____ **Site Eng.**:_____
Project Mgr.:_____ **Site EHS Off.**:_____

Date	Type of Equipment [1]	Equipment ID Number	Procedure[2]	Reference Standards[3]	Initials of Individual	Company	Calibration OK Yes/No

Maintenance Required/Procedures:_____
_____
_____
_____
_____
_____

[1]Certifications or statements of manufacturer calibration can be obtained from RETEC office files.
[2] Use space below if necessary
[3] Type of calibration gas used and concentration; buffer solutions, etc.

DATE OF INCIDENT (D.O.I.):_____
(Month/Day/Year)
(xx/xx/xx)

TRC
Incident Report

(To be completed by Employee's Supervisor and by Employee involved in the Incident/Accident immediately after an Injury or Illness/Incident/Accident)

Incident Category:

☐ Employee Injury ☐ Property Damage ☐ Vehicle Damage ☐ Fire ☐ Near Miss ☐ Other	
Incident Location:	
Site Identification/Project No./WNO No:	
Site Address:	
Date Incident Occurred:	
Time Incident Occurred:	
Date Incident Reported:	
Time Incident Reported:	
Customer Project Manager:	

Employee Information:

Name:		
Field Office/Address:		
Supervisor Name/Phone:		
Employee Phone/Cell:		
Title or Occupation:		
Department:		

Type of Employee Injury or Illness:

☐ First Aid Only ☐ Medical Treatment Only ☐ Restricted Work-case ☐ Lost Workday ☐ Extended Time Away From Work (3 days or more) ☐ Fatality	
Estimated Number of Days on Restricted Work:	
Estimated Number of Days Away from Work:	

Employee Injury or Illness Description:

Describe the Injury or Illness:
First Aid/Medical Treatment Administered:
Name of Doctor's Office, Clinic, or Hospital:
Address and Phone Number:

Incident Description:

Equipment Involved:
Site Type: (Marketing, Refinery, etc.)
What task was being performed at time of incident?
Describe Incident in Detail :
Conditions at time of Incident: (weather, lighting):

Non-TRC Involvement:

Subcontractor Involved: ☐ No ☐ Yes
Name of Company:
Address:
Contact Name and Phone Number:
Additional Information:
Witnesses(s) to Incident: ☐ No ☐ Yes
Name(s) and Address(s):
Phone Number(s):
Additional Information:

Personal Protective Equipment (PPE):

List PPE required to complete the task: (glasses, safe. shoes, hard hat, respirator, hearing protection, etc.)
Was the employee using the proper PPE at the time of the Incident?

Safety Violation ☐ No ☐ Yes (Explain):

State the company safety rule, OSHA regulation, or specific training that was violated:
Describe the training the employee received to prevent this violation:

Immediate Corrective Actions:

Describe the immediate corrective actions taken:	
Signature of Investigating Supervisor:	**Date:**
Signature of Employee:	**Date:**

TRC Safety Manager/Director Signature: _____Date:_____

Health and Safety Plan

Falcon Refinery Superfund Site

Ingleside, San Patricio County, Texas

Prepared for:

National Oil Recovery Corporation
3717 Bowne Street
Flushing, NY 11354

Prepared by:

505 East Huntland Drive, Suite 250
Austin, Texas 78752

Stephen Halasz, Project Manager

August 2011

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1-1
2.0 ADMINISTRATIVE INFORMATION 2-1
2.1 Health and Safety Plan Requirement Rationale 2-1
2.2 Health and Safety Plan Approval 2-1
3.0 PROJECT DESCRIPTION 3-1
3.1 Facility Description 3-1
3.1.1 Areas of Concern 3-1
3.2 TRC Field Activities 3-3
4.0 SITE HAZARDS 4-1
4.1 Chemical Hazards 4-1
4.2 Physical Hazards 4-1
4.2.1 Heat Stress 4-1
4.2.2 Cold Stress 4-3
4.2.3 Sunburn 4-4
4.2.4 Exposure to Excessive Noise 4-4
4.2.5 Heavy Equipment and Motor Vehicle Operation 4-5
4.2.6 Excavations and Trenches 4-6
4.2.7 Slips, Trips, and Falls 4-6
4.2.8 Manual Lifting 4-7
4.2.9 Hand and Power Tools 4-7
4.2.10 Weather-Related Hazards 4-8
4.2.11 Drowning Hazards 4-8
4.3 Biological Hazards 4-9
4.4 Utility Clearance 4-9
5.0 ACTIVITY-SPECIFIC REQUIREMENTS 5-1
5.1 Site Communication 5-1
5.1.1 External Communication 5-1
5.1.2 Internal Communication 5-1
5.2 Standard Work Uniform 5-1
5.3 Personal Protective Equipment 5-2

5.4 Work Zones 5-3
5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible) 5-3
5.4.2 Contamination Reduction Zone (CRZ) 5-3
5.4.3 Support Zone 5-4
5.5 Decontamination Procedures 5-4
5.5.1 Equipment Decontamination 5-4
5.5.2 Personnel Decontamination 5-4
5.5.3 Storage Procedures for Expendable Clothing/Equipment 5-5
6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS 6-1
6.1 Responsibilities of the SHSO 6-1
6.2 Health and Safety Clearances 6-1
6.3 Distribution of the HASP 6-1
6.4 Safety Briefings 6-2
6.5 On-Site Presence of Plan 6-2
6.6 Respirators 6-2
6.6.1 Usage 6-2
6.6.2 Cleaning 6-3
6.6.3 Storage 6-3
7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS 7-1
7.1 General Work Rules 7-1
7.2 Documentation 7-3
7.3 Site Specific Requirements 7-3
7.3.1 Housekeeping 7-3
7.3.2 Spills 7-3
7.3.3 Operation of Vehicles and Equipment 7-4
8.0 MONITORING 8-1
8.1 Monitoring Instruments 8-1
8.2 Action Levels 8-1
8.3 pH Monitoring 8-2
9.0 EMERGENCY PROCEDURES 9-3
9.1 Medical Injuries 9-3

9.2 Fire and Explosion Response Procedures 9-3
9.3 Emergency Medical Information 9-4
9.3.1 First Aid 9-4
9.3.2 Hospitals 9-4
9.4 Incident Investigation 9-4
9.4.1 Emergency Numbers 9-6
10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP 10-1

APPENDIX A: Potential Chemical Hazards
APPENDIX B: Material Safety Data Sheets
APPENDIX C: Job Safety Analysis (JSA) Form
APPENDIX D: Safety Task Analysis Review (STAR) Form
APPENDIX E: Air Monitoring Forms
APPENDIX F: Map/Route to the Nearest Hospitals
APPENDIX G: TRC Incident Report Form

1.0 INTRODUCTION

This Health and Safety Plan (HASP) outlines the health and safety requirements for on-site activities associated with soil and groundwater investigation activities within National Oil Recovery Corporation's (NORCO's) former Falcon Refinery located 1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road near Ingleside, San Patricio County, Texas (the Site). The Site is bordered by wetlands to the northeast and southeast, residential areas to the north and southwest, an abandoned refinery to the northwest, and a construction company to the southwest.

This HASP has been developed in conformance with the directives and requirements of the TRC *Health and Safety Policy and Procedure Manual*, October 2010, and 29 CFR 1910.120(i)(2). This HASP and any subsequent addenda will apply to all TRC personnel and subcontractors who are involved with on-site activities at the Site. By implementing this plan, TRC does not assume any liability for the health and safety of non-TRC personnel involved in the activities performed during this project.

TRC field personnel and TRC subcontracted field personnel must participate in medical monitoring, respirator fit testing, and hazardous waste training programs as specified by Occupational Safety and Health Administration (OSHA) regulations (per 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response [HAZWOPER]).

All work must be conducted in compliance with applicable OSHA regulations, including 29 CFR 1910 (General Industry Standards) and 29 CFR 1926 (Construction Industry Standards).

2.0 ADMINISTRATIVE INFORMATION

Site Name: Falcon Refinery Superfund Site

Site Location: Ingleside, San Patricio County, Texas

Project Title: Phase II Remedial Investigation/Feasibility Study

Client: National Oil Recovery Corporation

Project Manager: Stephen Halasz

TRC Task Leader(s):

Corporate Health & Safety Officer (CHSO): Ron Severson

Health & Safety Coordinator (HSC): Matt Webre

Assistant Project Manager: TBD

Field/Site Health & Safety Officer (SHSO): Alonzo Arredondo

2.1 Health and Safety Plan Requirement Rationale

This HASP is required due to past and present conditions, which may have existed at the Site. The chemicals of potential concern (COPCs) include metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides/herbicides.

2.2 Health and Safety Plan Approval

Health & Safety Officer: Matt Webre

Signature:_____ Date:_____

3.0 PROJECT DESCRIPTION

The following sections describe the Site, specifically the areas of concern (AOCs), and proposed field activities.

3.1 Facility Description

The Site consists of a refinery which operated intermittently and is currently inactive. When in operation, the refinery had a capacity of 40,000 barrels per day and the primary products consisted of naphtha, jet fuel, kerosene, diesel, and fuel oil.

3.1.1 Areas of Concern

Seven AOCs have been identified as potential areas impacted by COPCs. Three AOCs are identified on-site and four are off-site. The AOCs are summarized in Table 1 and shown on Figure 1.

AOC-1 Former Operational Units

AOC-1N and AOC-1S includes the entire North site, former operational units (OU) areas of the South site, a drum disposal area, and an area where metal waste was discarded. Preliminary COPCs to be screened at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

AOC-2 On-Site Non-Operational Areas

Areas of the refinery not used for operations or storage and with no record of releases are included in AOC-2. Although no COPCs were anticipated in AOC-2, the screened COPCs included metals, VOCs, and SVOCs. Potentially affected media include soil and possibly groundwater.

AOC-3 Wetlands

Included in AOC-3 are wetlands immediately adjacent to the site bordered by Bay Avenue, Bishop Road, and a dam on the upstream side; wetlands located between Bishop Road, Sunray Road, Bay Avenue, and residences along Thayer Avenue; and wetlands between Sunray Road, residences along FM 2725, Gulf Marine Fabricators, Offshore Specialty Fabricators, and the outlet of the wetlands into the Intracoastal Waterway.

There is one active and several abandoned pipelines leading from the refinery to the current and historic barge dock facilities. During June 2006, the abandoned pipelines

were cut, the contents of the pipelines were removed, and plates were welded on the pipeline ends to seal them.

Wetland assessment activities will evaluate releases from the refinery, including any unpermitted wastewater effluent discharges, two known pipeline releases, and possible releases from pipelines leading from the refinery to the current and historic barge dock facilities.

There have been documented spills of hydrocarbons, waste and volatile organics. As a result, the screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, herbicides, and pesticides. Potentially affected media include sediment, soil, surface water and groundwater.

AOC-4 Current Barge Docking Facility

Included in AOC-4 is the current barge docking facility, which is approximately 0.5 acres and is located on the Intracoastal Waterway. The fenced facility, which is connected to the refinery by pipelines, is used to load and unload barges. Historically, crude oil and refined products were loaded and unloaded at this docking facility.

There have been no reported releases nor is there evidence of spills associated with this AOC. The screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and possibly groundwater.

AOC-5 Intracoastal Waterway

Sediments and surface water adjacent to the current and historic barge dock facilities are included in this AOC. The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include sediment and surface water. Samples will be obtained from a boat.

AOC-6 Thayer Road

Included in this AOC is the neighborhood along Thayer Road, located north of Bishop Road across from the refinery (AOC-1S). The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater. No sampling is required within AOC-6 at this time.

AOC-7 Bishop Road

Included in this AOC is the neighborhood along Bishop Road, located south of Bishop Road across from AOC-1N. The screened COPCs at this AOC include metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater. No sampling is required within AOC-6 at this time.

3.2 TRC Field Activities

TRC will conduct the following activities on-site including: (1) surface and subsurface soil sampling; (2) installation of permanent monitoring wells; and (3) groundwater sampling. Off-site activities will include: (1) surface and subsurface soil sampling; (2) installation of permanent? monitoring wells; (3) surface and groundwater sampling; (4) sediment sampling in the wetlands and bay; and (5) biota sampling.

Table 1. Areas of Concern

Figure 1. Site Map

4.0 SITE HAZARDS

The following site hazards are present or could be encountered at the project area.

4.1 Chemical Hazards

Due to the storage of naphtha, jet fuel, kerosene, diesel, and fuel oil, COPCs at the Site include metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Specifically, benzene, toluene, ethylbenzene, and xylene (BTEX) is of primary concern for this HASP. Site personnel should avoid touching, breathing or ingesting any media encountered on-site. Nitrile gloves must be worn at all times when in contact with soil, water, and/or hydrocarbons. Section 8 describes in detail procedures that will be followed in ensure a safe breathing zone and protection from vapors of COPCs. Appendix A summarizes the various constituents of concern, the Permissible Exposure Levels (PELs), and the major potential health effects of each. Material Safety Data Sheets (MSDSs) for the COPCs are located in Appendix B.

4.2 Physical Hazards

4.2.1 Heat Stress

Heat stress results when the body is unable to get rid of excess heat. Stages of heat stress are heat cramps, heat exhaustion, and heat stroke. The latter can be fatal. Heat stress is of particular concern when workers must wear chemical protective clothing and ambient air temperatures are high, because protective clothing reduces evaporative body cooling. If ambient air temperatures at the site reach 70°F, heat stress symptoms should be watched for and control measures applied, if they appear.

These symptoms include:

- Heat rash, which may result from continuous exposure to heat or humid air.
- Heat cramps which are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include:
  - Muscle spasms, and
  - Pain in the hands, feet, and abdomen.
- Heat exhaustion, which may occur from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

  - Pale, cool, moist skin,
  - Heavy sweating,
  - Dizziness,
  - Nausea, and
  - Fainting.

- Heat stroke is the most serious form of heat stress in which temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms include:
  - Red, hot, unusually dry skin,
  - Lack of or reduced perspiration,
  - Nausea,
  - Dizziness and confusion,
  - Strong, rapid pulse, and
  - Coma.

A worker who exhibits any of these symptoms will be immediately relieved of responsibilities and told to consume electrolyte fluid or cool water while resting in a shaded area. The individual should not return to work until symptoms are no longer recognizable. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored for any increase in heart rate or body temperature for the remainder of their shift. In addition, the worker will be requested to consume electrolyte fluid or cool water every hour.

The SHSO will monitor workers hourly when:

- Symptoms of heat stress are reported or observed;
- Ambient temperatures exceed 70º F and workers are dressed in impervious clothing; or
- Ambient temperatures exceed 90º F and workers are dressed in normal clothing.

Workers will be monitored for heat stress conditions by measuring the heart rate (HR) by radial (wrist) pulse for 30 seconds after one minute of rest. The HR after one minute of rest should not exceed 110 beats per minute. If HR is higher, the next work period shall be shortened by 33%, while the rest period length remains the same. If the pulse rate is still 110 beats per minute after one minute of rest in the next rest period, the following work cycle will be shortened by another 33 percent. This shortening of the work period must continue until the worker's HR is no greater than 110 beats per minute.

4.2.2 Cold Stress

Types of cold stress include general body coldness, hypothermia, and frostbite. The latter two require medical attention. Hypothermia can be fatal while frostbite can result in the amputation of limbs. If ambient air temperatures at the site reach below 39°F, cold stress symptoms should be watched for and control measures applied, if they appear. These symptoms include:

- General body coldness, which is caused by a drop in skin temperature. Signs and symptoms include shivering, numbness in extremities, and loss in manual dexterity and strength.
- Hypothermia is a decrease in deep body temperature (normally 98.6ºF). Signs and symptoms include uncontrollable shivering, slurred speech and memory lapses, irregular breathing, and drowsiness.
- Frostbite occurs when there is inadequate circulation and/or insulation of a body part. Signs and symptoms include skin color change (white or grayish yellow to reddish violet to black), and pain initially, followed by cold and numbness in the affected part.

Preventative measures will help avert serious illness due to cold stress. Appropriate clothing will be worn on the basis of the exterior temperature, wind chill factor, and the level of work. Precautions will be taken to minimize exposed flesh and clothing should be layered as appropriate. A worker who exhibits any symptoms of cold stress will be immediately relieved of responsibilities. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored. In addition, the following guidelines will be followed.

Work Below 39ºF (4ºC)

- The employees shall wear cold protective clothing appropriate for the level of cold and physical activity.
- If the air temperature at the site is decreased by wind or artificial ventilation, the cooling effect of the wind will be reduced by shielding the work area or by wearing a removable outer windbreak garment.
- If the clothing on the employee may become wet on the job site, the outer layer of the clothing will be water repellent.
- Workers who become immersed in water or whose clothing becomes wet will immediately be provided with a change of clothing and treated for hypothermia.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve.

TRC does not anticipate cold stress as a factor during these field activities.

4.2.3 Sunburn

Prolonged exposure of the skin to the sun, even on overcast days, can result in sunburn, which can be severe enough to be incapacitating, especially with fair-skinned individuals. Repeated sun burning can eventually cause premature aging of the skin and skin cancer in individuals. Always wear clothing to reduce the amount of exposed skin and frequently use sun block creams or lotions.

4.2.4 Exposure to Excessive Noise

Overexposure to noise can result in hearing loss. If it is difficult to hear normal speech when the speaker is 3 feet from the listener, for more than 4 hours a day, the noise level must be measured. If it exceeds 85 decibels (dBA) as an 8-hour, time-weighted average, hearing protection will be worn in accordance with 29 CFR 1910.95. If a sound level meter is not available, then the noise level will be assumed to be 85 dBA if one cannot communicate at normal voice level within 3 feet from another person. If this is the case, then appropriate hearing protection will be donned.

4.2.5 Heavy Equipment and Motor Vehicle Operation

Only qualified personnel will operate heavy equipment and motor vehicles. Equipment will not be operated in a manner that will endanger persons or property. All heavy equipment and motor vehicles will be operated in accordance with the manufacturer's instructions and 29 CFR 1926 Subpart O.

The following inspection and repair controls will also be implemented during this project:

- Equipment and vehicles will be inspected by the operator on a daily basis, prior to starting work.
- All heavy equipment exhaust systems will be checked daily and confirmed to have no embers or sparking.
- Any unsafe equipment or vehicles will be removed from service until safety defects can be corrected.
- Equipment will be shut down and locked out before maintenance or repairs are made.

Operators will follow these rules:

- Motor vehicles and heavy equipment will be shut down during re-fueling operations.
- Operators will not leave their equipment unattended while it is running.
- Whenever equipment is parked, the parking brake will be set. If the equipment is parked on an incline, in addition to setting the parking brake, the wheels will also be chocked.
- Operators will be trained and experienced in the use of their equipment.
- Vehicles or equipment will not be operated in a careless or unsafe manner.
- Personnel will wear appropriate personal protective equipment (PPE) when working with heavy equipment. Dermal protection must fit properly and be taped to prevent "caught on" or "caught between" hazards.

Required equipment features include:

- All heavy equipment will have an audible backup alarm and an audible warning device (i.e., a horn).
- Each piece of heavy equipment will have a portable fire extinguisher.

When working with moving equipment:

- One designated person will give signals to the operators of both equipment and vehicles in any work area.
- Personnel will stay clear of the operational area of the equipment. Workers are not permitted to stand directly underneath any load or piece of equipment, i.e., man-lift, backhoe bucket, crane load, etc.
- Work areas will be adequately illuminated.

4.2.6 Excavations and Trenches

Compliance with excavation and trenching standards established by OSHA regulation 29 CFR 1926 Subpart P is a requirement of this HASP, as well as the compliance with the requirements presented below.

- Trenches and other large holes must be marked with yellow caution tape at any time the excavation is left unattended. The caution tape must be placed no less than 2 feet from the edge of the excavation
- Personnel will not be allowed to enter an excavation greater than 4 feet deep unless the excavation is properly sloped.
- Excavation spoil shall be placed a minimum of 3 feet from the edge of the excavation.

4.2.7 Slips, Trips, and Falls

Slipping and tripping hazards may be encountered at the site. Footwear appropriate for walking over mud and rocks should be worn. In addition, proper site housekeeping and removal of trash and debris will reduce slipping and tripping hazards. Proper site housekeeping will be the responsibility of all site personnel, and the SHSO will make regular inspections to evaluate if the work area is adequately clean.

4.2.8 Manual Lifting

Back injuries are among the leading occupational injuries reported by industrial workers. Using proper manual lifting techniques can reduce back injuries such as pulls and disc impairments. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their back.

If the load is too heavy, do not lift it alone. Individual heavy lifting must be avoided. Lifting is always easier when performed with another person. Assistance should always be used when necessary.

4.2.9 Hand and Power Tools

Dangerous hand tools (such as saws, hammers, axes, knives, shovels) and power tools (such as chain saws, power augers, drill motors, chippers, water pumps, and weed trimmers) may be used during some investigation activities.

All hand and power tools will be maintained in a safe condition and in good repair. Hand and power tools will be used in accordance with 29 CFR 1926, Subpart I (1926.300 through 1926.307). Workers are not permitted to bring unsafe tools on-site. All tools will be used, inspected, and maintained in accordance with the manufacturer's instructions. Throwing tools or dropping tools to lower levels is prohibited. Hand and power tools will be inspected, tested, and determined to be in safe operating condition prior to each use. Periodic safety inspections of all tools will be conducted by the tool operator, the Site Manager or the SHSO to evaluate if the tools are in good condition and are being properly maintained. Any tool that fails an inspection will be immediately removed from service and tagged with a "Do Not Use" sign.

Workers using hand and power tools who are exposed to falling, flying, abrasive, or splashing hazards will be required to wear PPE. Eye protection must always be worn when working on-site. Additional eye and face protection, such as safety goggles or face shields, may also be required when working with specific hand and power tools. Workers using tools in areas where there is a head injury hazard will wear hard hats. Hearing protection will always be worn when working with power tools, and additional hearing protection may be required when working with certain power tools if noise levels are excessively high. Workers using tools that may subject their hands to an injury, such as cuts, abrasions, punctures, or burns, will wear protective gloves. Loose or frayed clothing, dangling jewelry, or loose long hair will not be worn when working with power tools.

Electric power-operated tools require ground fault circuit interceptors (GFCI). Electric power-operated tools will be double insulated or grounded, and equipped with an on/off switch. Guards must be provided to protect the operator and other nearby workers from hazards such as in-going nip points, rotating parts, flying chips, and sparks. All reciprocating, rotating, and moving parts of tools will be guarded if contact is possible. Removing machine guards is prohibited.

Circular saws must be equipped with guards that completely enclose the cutting edges and have anti-kickback devices. All planer and joiner blades must be fully guarded. The use of cracked, bent, or otherwise defective parts is prohibited. Chain saws must have an automatic chain brake or kickback device. The worker operating the chain saw will hold it with both hands during cutting operations. A chain saw must never be used to cut above the operator's shoulder height. Chain saws will not be re-fueled while running or hot. Power saws will not be left unattended.

Operators of these tools will be instructed on the proper operation and safety precautions prior to operating such equipment. Only qualified workers will operate pneumatic tools, powder-actuated tools, and abrasive blasting tools. No one shall operate equipment that is in ill repair.

4.2.10 Weather-Related Hazards

Weather-related hazards include the potential for heat, electrical storms, treacherous weather-related working conditions, or limited visibility. These hazards correlate with the season in which Site activities occur. Outside work will be suspended during electrical storms. In the event of other adverse weather conditions, the Field Team Leader will determine if work can continue without endangering the health and safety of on-site personnel.

4.2.11 Drowning Hazards

According to OSHA 29 CFR 1917.126, personnel will be required to wear a personal floatation device (PFD) when conducting work in areas where there is a potential to slip or fall into a body of water. The PFD will be inspected each day prior to use for defects and/or wear and tear. PFD's will be sized appropriately for personnel and used in accordance with the manufacturer's recommendations.

4.3 Biological Hazards

Poisonous snakes, chiggers, mosquitoes, spiders, and bees may be encountered at the Site. This requires that precautious measures be taken when disturbing rocks and other ground features. To greatly reduce insect bites, site personnel should use insect repellent, keep shirts buttoned, sleeves rolled down, and avoid areas with high grass and dense vegetation whenever possible. Snake guards should be used in areas (i.e., rock features, tall grass, etc.) where there is a potential to encounter snakes. Personnel that have allergic reactions to insect stings should inform the SHSO of the condition, carry the appropriate medications with them in the field, and take extra precautions to avoid being stung. Insect repellant should be used when working in vegetated areas.

4.4 Utility Clearance

The location of underground utilities will be identified in the area where soil borings and monitoring wells will be completed. As required by state law, the Texas One Call System, Texas Excavation Safety System, Inc., and/or the Lone Star Notification Center will be contacted. TRC personnel will meet with utility and pipeline representatives prior to commencing subsurface work. Additional utility clearance will consist of reviewing available site maps, visual inspection, corroboration with utility representatives, and probing the sample location with a hand auger or tile probe. Extreme caution must be taken to ensure that no or minimal damage occurs to the Site.

5.0 ACTIVITY-SPECIFIC REQUIREMENTS

5.1 Site Communication

Internal and external communications will be maintained to facilitate quick and smooth response to emergency situations. The following sections describe communication methods.

5.1.1 External Communication

External communication will be accomplished by telephone. The Field Task Leader will keep a cellular phone on-site at all times during investigation field activities.

All personnel must be familiar with the protocol (phone number of emergency organizations, contact person) for contacting public emergency aid teams such as fire departments, ambulance units, and hospitals. These numbers must be posted in the field logbook.

5.1.2 Internal Communication

Internal communication will be used among personnel to alert team members to emergencies, pass along safety information, and maintain site control. Verbal and visual signals will be necessary for internal communication. For effective communication, visual signals/commands must be pre-arranged. Both a primary and backup system are necessary.

5.2 Standard Work Uniform

TRC requires the following work clothing be worn by all on-site personnel:

- Steel-toed boots which have a defined heel, are of the lace-up variety, and are ankle height or taller;
- Safety glasses with permanently attached side shields that meet or exceed American National Standards Institute (ANSI) Z 87.1-1989; and
- Ear plugs when noise levels exceed 85 dBA (i.e., unable to communicate in a normal voice level at arm’s length distance from another individual);

5.3 Personal Protective Equipment

In addition to the standard work uniform, the following PPE will be worn within the Exclusion Zone (i.e., area within 25 feet of the work area), as deemed needed.

Level D Protective Uniform

- Steel toed boots;
- Hard hat;
- Hearing protection when noise levels exceed 85 dBA as an 8-hour, time-weighted average;
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Level C Protective Uniform

- Half-face (only for airborne levels of 1 to 10 parts per million [ppm]) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Full-face (only for airborne levels of 10 to 50 ppm) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Field Monitoring and Other Equipment

- Photoionization detector (PID) calibrated with 100 ppm Isobutylene;
- Personal floatation devices;
- Snake guards;
- Wind indicator;
- First aid kit;
- Fire extinguisher.

Conditions Warranting Upgrade from Level D to C (Notify SHSO)

- PID readings greater than 1 ppm above background in breathing zone for more than 1 minute; and
- Unusual odors (i.e., organic or aromatic) are noted.

Conditions Warranting Cessation of Work and Leaving Area Immediately (Notify SHSO)

- PID readings exceed 50 ppm above background in breathing zone for greater than 1 minute;
- The PID malfunctions (work may resume when meter is repaired);
- Odors (organic, aromatic, almond, mothball, sweet tarry, sweet pungent, or mint-like) are experienced while wearing respirators (indicating cartridge breakthrough);
- Any member of field team experiences symptoms possibly related to chemical exposure such as dizziness or nausea; and
- Any member of the field team experiences symptoms related to heat or cold stress.

5.4 Work Zones

Zones are marked by barriers in which specific tasks are to be completed. These zones include the exclusion zone, contamination reduction zone, and support zone.

5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible)

At a minimum, the Exclusion Zone will include at least a 25-foot radius around the work area.

5.4.2 Contamination Reduction Zone (CRZ)

As applicable, personnel performing equipment decontamination will wear PPE and follow the procedures for decontamination of equipment and personnel outlined in Section 5.5. All personnel and equipment must pass through the CRZ before leaving the site at the end of each workday. The CRZ will be located at the edge of the Exclusion Zone for personnel and small sampling equipment decontamination. All other equipment (i.e., drilling equipment) will be decontaminated at the Site decontamination area.

5.4.3 Support Zone

The Support Zone is intended as an area that remains free of contamination and is used for staging activities, breaks, and eating. It is extremely important to keep this area clean and free of contamination. Never bring contaminated equipment, articles, or yourself into the Support Zone without going through decontamination procedures first.

5.5 Decontamination Procedures

5.5.1 Equipment Decontamination

Drilling equipment and soil/water sampling equipment shall be fully decontaminated at the contamination reduction zones between and before they are removed from the site. Decontamination for drilling equipment will consist of soap and water wash and potable water rinse or using a high-pressure hot water or steam cleaning unit. Additional scrubbing may be required to remove all encrusted materials. Soil/water sampling equipment shall be cleaned between each use by the following procedures (1) removing any solids to the degree possible with a brush and tap water; (2) washing with a brush using laboratory-grade, non-phosphate detergent and tap water, (3) rinsing with tap water, (4) rinsing with 70-percent-grade isopropyl alcohol, and (5) rinsing with distilled water. All equipment decontamination water will be contained and disposed of properly.

5.5.2 Personnel Decontamination

A personnel decontamination area will be designated in the CRZ, which will be located at the edge of each Exclusion Zone. Personnel will become thoroughly familiar with the following decontamination procedures before work begins in an Exclusion Zone:

- Place equipment and/or samples in designated area, move to the next area (marked with signs), if necessary;
- Wash boots (overboots, if used) and outer gloves using soap (Alconox or equivalent) in water solution, and potable water rinse;
- Remove overboots (if used) and outer gloves, and place in plastic bags (in 30-gallon drum);
- Remove disposable coveralls (if used) and place in plastic bag in drum;
- Remove respirator (if used), thoroughly wash and store in a sealed bag outside the CRZ;

- Remove boots and store in appropriate location;
- Remove disposable inner gloves (if used) and place in plastic bag (in 30-gallon drum); and
- Wash hands and face with water and hand soap (especially before eating or drinking).

All personnel decontamination water will be contained and disposed of properly.

It is recommended that after leaving the Site at the end of the workday that personnel shower immediately at their place of lodging.

5.5.3 Storage Procedures for Expendable Clothing/Equipment

Used, expendable clothing and equipment shall be placed in drums labeled as "Waste PPE Material." Proper disposal of the drums will be coordinated with NORCO.

6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

6.1 Responsibilities of the SHSO

The TRC SHSO is responsible for project safety, decontamination, environmental monitoring, and field medical monitoring activities. The SHSO will ensure that all field personnel comply with the provisions of this HASP. The SHSO has the authority to stop Site work in the event of safety violations or if he/she makes the judgment that an upgraded level of personal protection may be required. **Anyone may stop any operation that threatens the health and safety of personnel.** The SHSO is responsible for designating and marking work zones and for restricting access to Exclusion Zones to properly attired personnel.

The SHSO reports directly to the Project Manager and the HSC. All safety-related questions should be referred to the Project Manager or HSC. The SHSO will keep the CHSO and Project Manager informed of the status of safety-related Site activities and assessments. The SHSO will notify the HSC and Project Manager immediately of any exposure incidents, injuries, accidents, or emergency situations.

6.2 Health and Safety Clearances

TRC personnel authorized to go on-site must meet the following requirements:

- Successfully complete a basic 40-hour health and safety training course and 8 hours of refresher training each year following completion of the basic course;
- At least one field employee must have completed and be current for cardiopulmonary resuscitation (CPR)/First Aid Training; and
- Receive clearances from a TRC-approved physician to wear respiratory protective devices and to work with hazardous materials.

6.3 Distribution of the HASP

A copy of this plan must be provided to each member of the site team covered by the plan and to an authorized representative of each TRC field subcontractor covered by its provisions. Each site team member receiving a copy of the plan must acknowledge receipt of, and express willingness to comply with, the provisions of the plan by signing the attached compliance agreement form. The signed forms must be submitted to the Project Manager or Assistant Project Manager for filing.

6.4 Safety Briefings

All TRC and TRC subcontracted personnel scheduled for fieldwork at the project area will receive an initial health and safety briefing by the SHSO prior to starting work activities. The briefing will include a thorough review of this HASP with particular attention to site-specific health and safety requirements and emergency response procedures. A Job Safety Analysis (JSA) will be completed for the specific tasks and reviewed by personnel prior to performing each task. The blank JSA form is included in Appendix C.

Daily briefings will be conducted by the SHSO on-site to reinforce health and safety awareness and to allow personnel the opportunity for comments or questions. All daily briefings will be documented on the Safety Task Analysis Review (STAR) form included in Appendix D.

6.5 On-Site Presence of Plan

A copy of this HASP must be present at the Site each day that work is in progress.

6.6 Respirators

6.6.1 Usage

The following procedures shall be followed to ensure that air-purifying respirators provide the full protection for which they are rated:

- All employees who are required to wear respirators shall be included in the TRC Medical Monitoring Program and will be medically approved for respirator use before donning a respirator;
- Employees shall wear only respirators for which they have been fit-tested by a competent individual;
- Respirators are to be donned outside the potential hazard zone in which they are planned to be used;
- Prior to donning, the wearer shall inspect the respirator for any physical defects or breakage including, but not limited to:
  - Broken or frayed straps,
  - Improperly seated valves,
  - Dirt,

  - Holes,
  - Distorted face seal, and
  - Opaque face piece on full-facepiece respirators.

- After donning the respirator, the employee shall conduct a negative-pressure fit check to assure that the inlet and exhaust valves, and the respirator cartridges, are properly seated. The employee shall then conduct a positive-pressure fit check to ensure that a proper face piece seal against the face has been obtained. The zone of potentially hazardous exposure is not to be entered until the employee has successfully executed both positive-pressure and negative-pressure fit checks.

- Employees shall immediately evacuate the work area if they experience difficulty breathing, dizziness, or other symptoms of potentially harmful chemical exposure.

- Appropriate respirator cartridges are to be replaced at the beginning of each workday or when breakthrough is detected (whichever comes first).

Note: If at any time during use of a respirator the contaminant of concern, or any other contaminant, is detected by smell, taste or irritation, the employee is to leave the work area immediately and inform the SHSO.

6.6.2 Cleaning

Respirators assigned to an individual employee shall be cleaned by that employee at the end of each day's work involving more than four hours of respirator use and at the end of every week in which the respirator is used for at least two hours. Respirators are to be washed and rinsed in warm water (120 to 140ºF) using a disinfecting solution intended for cleaning respirators, and blot or air-dried. Cleaning solutions, available from respirator manufacturers, will be provided on-site.

6.6.3 Storage

Respirators shall be stored in a manner that protects them from exposure to sunlight, dust, chemicals, and extremes of heat and cold. Respirators shall not be stored in tool kits. The preferred storage procedure for respirators is in individual plastic bags placed in rigid containers to prevent deformation of the face-piece.

7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

7.1 General Work Rules

- Fieldwork will be conducted only during daylight hours unless adequate lighting is provided.
- Smoking will be permitted only at designated areas at the Site.
- Gloves must be worn for jobs that have the potential for hand injury. The type of glove used depends upon the materials or equipment being handled. Leather or fleece gloves must not be used as a substitute for protective chemical gloves.
- In the event of direct skin contact by chemicals of concern, the affected area will be washed immediately with soap and water.
- In the event the PPE is ripped or torn, work shall stop and the PPE shall be removed and replaced as soon as possible.
- Personnel should never climb over or under refuse or obstacles so as to endanger themselves or others.
- Practice contamination avoidance. Never sit down or kneel, never lay equipment on the ground, avoid obvious sources of contamination such as puddles, and avoid unnecessary contact with on-site objects.
- Water samples to be analyzed for various contaminants may need to be, or already are, preserved with nitric acid, hydrochloric acid, or sulfuric acid before shipment to the analytical laboratory. Nitrile or polyvinyl chloride (PVC) gloves should be worn when handling these corrosive chemicals or samples preserved with them. Sample preservation should be performed in a well-ventilated area to avoid potential accumulation of toxic vapors. In circumstances where bad weather or poor lighting does not allow preservation at the site, preservation should be performed at a later time, or not at all. Samples should not be preserved in hotel rooms or other public areas.
- Good housekeeping is the responsibility of every employee. All work areas are to be kept as clean and orderly as possible. It is the responsibility of the persons performing the work to ensure that the work site is kept clean.

- No eating, drinking, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material will be allowed in the Exclusion Zone or Contamination Reduction Zone.

- Hard contact lenses should not be worn in the Exclusion Zone or Contamination Reduction Zone. No jewelry that interferes with protective clothing fit will be worn.

- No beards, sideburns, or mustaches will be allowed that interfere with respirator mask seals, if respirators are used. The SHSO will determine if facial hair presents such an interference.

- Field personnel should remain aware of wind direction throughout the day. Wind socks or flagging will be used for this purpose. Equipment setup and sampling efforts should be directed to the greatest extent possible so that workers remain upwind of potential sources of exposure.

- No drilling or earth moving activities will be permitted during periods of thunderstorms and lightning.

- Machinery, tools, material, electrical installation, and other equipment and work practices that are judged unsafe, or not in compliance with this HASP, OSHA, or other applicable standards, shall be removed or replaced or the work practice corrected. Only employees qualified by training and/or experience will operate equipment and machinery.

- Before excavating or sampling, an Exclusion Zone must be established around the equipment after it has been positioned. The boundary of the Exclusion Zone shall extend at least 25 feet from the work area and, if practical, marked with stakes spaced no more than 20 feet apart and connected with fluorescent orange tape. Only authorized personnel will be allowed to enter Exclusion Zones.

- Representatives of federal, state, and local agencies; newspaper and other news media; the public; and all other individuals who are not a part of the TRC site team are classified as visitors and will not be permitted to enter Exclusion Zones under control by TRC, unless they can prove that they have met OSHA medical and training requirements for hazardous waste operation, have available to them PPE equivalent to that specified in this plan, and obtain permission from the TRC site or project manager.

7.2 Documentation

The following must be kept on file by the SHSO:

- Copies of the TRC Employee Health and Safety Compliance Agreement (attached) documenting health and safety briefings and personnel signatures;
- Records of usage and calibration of environmental monitoring equipment;
- Documentation of employee injury/exposure incidents;
- Records of safety violation and remedial actions taken;
- Documentation of subcontractors' compliance with TRC for health and safety training and medical monitoring.

A health and safety field logbook will be maintained on-site and should contain such information as weather conditions, employees and visitors on-site, level of personal protection, monitoring instrument readings (average, peak, and background), subjects discussed during site health and safety briefings, and names of attendees. All field personnel, including subcontractors, must sign the TRC Employee Health and Safety Compliance Agreement indicating that they have attended a briefing by the SHSO, and that they understand and agree to abide by the provisions of this HASP, in addition to the provisions of their own health and safety plan prior to working at the project area.

7.3 Site Specific Requirements

7.3.1 Housekeeping

Good housekeeping is of the utmost importance in the prevention of accidents, injuries, and fires. Clean-up will be conducted on a daily basis.

7.3.2 Spills

No contaminants (i.e., oils, diesel fuel, gasoline, etc.) are to be discharged at the project area. Should a release occur, it must be reported by the quickest means possible to the NORCO representative. Decontamination water is considered to be contaminated and should not be released onto the ground. All decontamination water spills should be reported to the TRC Field Team Leader for determination of appropriate action.

7.3.3 Operation of Vehicles and Equipment

Equipment and vehicles must operate at a safe speed while being aware of operating conditions and other equipment and personnel working in close proximity. Extreme caution must be exercised at all grade crossings.

8.0 MONITORING

TRC anticipates the potential for a risk of COPC vapor inhalation exposure; therefore, ambient air monitoring will be conducted as part of this Health and Safety Plan. Additionally, pH monitoring will be conducted during investigation activities in AOC 1N and AOC-1S?.

8.1 Monitoring Instruments

A PID with a 10.6 electron volt lamp, calibrated with 100 ppm isobutylene, will be used to monitor breathing zone organic vapors. Calibration of the PID will be documented on the *Field Equipment Calibration/Maintenance Log* form including in Appendix E. The PID will read total hydrocarbon vapor levels. The action levels discussed below have been calculated taking into account known COPCs present at the Site and respective PELs.

At this time, TRC does not anticipate the potential for hydrogen sulfide (H_2S) gas inhalation exposure; therefore, continuous air monitoring for H_2S will not be conducted.

8.2 Action Levels

Respirators must be donned by all persons working in any Exclusion Zone in which the average PID reading is 1 ppm above background in the breathing zone (for greater than 1 minute). Half-face respirators will be worn from 1 to 10 ppm and full-face respirators will be worn from 10 to 50 ppm. The Exclusion Zone must be evacuated whenever the average PID reading equals or exceeds 50 ppm above background in the breathing zone for greater than 1 minute. PID action levels are listed in the table below. Air monitoring results will be documented on the *Air Quality Monitoring Record* form located in Appendix E.

If evacuation becomes necessary, the SHSO shall take charge and direct personnel to move from the Exclusion Zone to a predetermined area and to stay there. The SHSO shall first determine that all personnel have left the Exclusion Zone and are safe, then consult the HSC on how to proceed.

Action Levels for Air Monitoring

Equipment Type		Monitoring, Action Levels, and PPE
ORGANIC VAPORS		
☒ ☐ ☒	PID FID Detector Tube Type: benzene	Reading > 1 ppm or "Background" sustained for 1 minute, upgrade to Level C with half-face APR, Notify TRC SHSO. Reading > 10 ppm sustained for 1 minute, upgrade respiratory protection to full-face APR, Notify TRC SHSO. Reading > 50 ppm sustained for 1 minute, shutdown work activities, evacuate the area, move upwind, Notify the TRC SHSO.

8.3 pH Monitoring

Monitoring of groundwater and wastewater will be required at least daily during excavation activities to evaluate pH levels. Monitoring will also be performed in the event additional or new flows and/or sources of groundwater or wastewater are identified. Monitoring will be performed using either pH paper or a pH meter (in the field or a sample taken to the Laboratory). If a pH meter is utilized, the meter must be calibrated daily and the calibration results documented in the project field notes.

Monitoring will be performed in general accordance with the following procedures:

1. If pH paper is used, the paper will be placed so it comes in contact with the liquid for evaluation. The paper will be allowed to change colors. The color of the paper will be compared to the pH color chart included with the pH to determine the approximate pH. The pH value will be recorded in the project field notes.

2. If a pH meter is used, the pH probe will be placed in the liquid to be evaluated. The results will be read from the pH meter and recorded in the project field notes.

<u>If pH is less than 5 or greater than 9, then proper actions must be taken for conditions that are considered "acidic" or "caustic."</u>

9.0 EMERGENCY PROCEDURES

Emergency procedures listed in this HASP are designed to give the field team instructions in handling medical emergencies, fire, and explosions.

9.1 Medical Injuries

Medical problems that can occur on-site need to be handled competently and quickly. Each field team member should be aware of the instructions and information given below:

- Seek professional medical attention for personnel that are bleeding severely, experiencing intense pain, unconscious, or not breathing. Each member of the site team should know how to call for an ambulance.
- If you get anything in your eyes (chemical or dust), flood them with water for 15 minutes. Be sure to tell the SHSO. The SHSO will make sure that the victim washes the eyes for the full 15 minutes.
- Do not remove objects that are impaled (stuck) in the eye.
- Always seek medical attention for eye injuries.
- Stop bleeding with direct pressure. Place bandage over the wound and press down with your hand. If possible, raise the bleeding extremity above the level of the heart. Use a tourniquet ONLY in extreme cases when you are not able to stop severe bleeding.
- If you contact the waste, wash the affected area with soap and water immediately.

9.2 Fire and Explosion Response Procedures

Fires can be caused by the drilling rig activity. The TRC field team should verify that the drilling rig has a fire extinguisher on hand at all times. The procedures for using a fire extinguisher is to **pull** the safety pin, **aim** the extinguisher at the base of the flames and discharge the extinguisher by **squeezing** and **sweeping** the flames from a distance of 6 feet (PASS-pull, aim, squeeze, sweep). Move in closer as the flames are put out.

- Never use water on an electrical fire or a solvent fire. All extinguishers should be dry chemical labeled “Class A, B, or C”; and
- Keep decontamination solvents well away from the steam cleaner.

9.3 Emergency Medical Information

TRC Site Health & Safety Officer (SHSO):

Alonzo Arredondo (512) 699-9931

TRC Corporate Health and Safety Director:

Ron Severson (860) 298-6256 or (860) 906-4656

TRC Health and Safety Coordinator:

Matt Webre (512) 684-3140 or (512) 567-7936

TRC Safety Contact (Austin):

Matt Webre (512) 684-3140 or (512) 567-7936

Project Managers (Austin):

Stephen Halasz (512) 684-3351 or (512) 745-6155

9.3.1 First Aid

First aid at the Site will consist of a first aid kit, which will be brought to the Site daily by the SHSO and be kept at the edge of the Exclusion Zone during field activities.

9.3.2 Hospitals

Personnel with any injuries shall be taken to Care Regional Medical Center located approximately 5 miles northeast of the project area. A map and driving directions from Falcon Refinery to Care Regional Medical Center are provided in Appendix F.

9.4 Incident Investigation

It is important that all accidents and incidents that result in injury, illness, or medical treatment be reported immediately. Reporting consists of calling the Teleclaim Center and providing information on the injury. The Teleclaim Center will complete the first report of injury and file it accordingly. Copies will be sent to the Safety Director. Supervisors are required to complete the Supervisor's Report of Accident included in this section. It is TRC's responsibility to investigate each incident, file appropriate paperwork and conduct a follow-up analysis of each incident.

Reporting Phone Numbers

TRC Corporate Health and Safety Director: (860) 298-6256

Hartford Insurance Teleclaim:	1-800-327-3636
Human Resources Director:	1-800-365-8254

Any work related injury or illnesses that requires professional medical assistance should be reported immediately. Failure to promptly notify of a work related injury could make the claim questionable and subject to stricter review.

After medical attention has been administered, an incident investigation will be completed. The TRC Project Manager will also complete the *TRC Incident Report Form* located in Appendix G.

9.4.1 Emergency Numbers

Service	**Address**	**Phone**
Fire Department:	Ingleside Fire Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-7422
Police Department:	Ingleside Police Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-2531
Hospital:	Care Regional Medical Center 1711 West Wheeler Avenue Aransas Pass, TX 78336	**911** (361) 758-8585
Nearest phone: Cellular phone	Alonzo Arredondo Field Task Leader/SHSO	(512) 699-9931

Emergency Services are accessed through 911

10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP

The following TRC site personnel have read, understand, and agree to comply with all of the health and safety directives for the Falcon Refinery Superfund Site.

Crew	Date
_____	_____
_____	_____
._____	_____
_____	_____
_____	_____
_____	_____
_____	_____

In addition, the following contractor personnel have been briefed on the site hazards, have reviewed their own HASP (per 29 CFR 1910.120(i)(2), have completed the required 40-hour OSHA Training (per 29 CFR 1926.21 and 1910.120(e), have been properly respirator fit tested, and are involved in their company's Medical Surveillance Program (per 29 CFR 1910.120(f)). They hereby acknowledge having met all the above stated requirements for working at the Falcon Refinery Superfund Site.

Contractor Personnel	Company	Date

APPENDIX A

Potential Chemical Hazards

CHEMICAL HAZARD DATA								
			TWA					
Chemical Name	Carcinogen (Y/N)	Skin Absorption Hazard (Y/N)	OSHA PEL	NIOSH REL	ACGIH TLV	OSHA STEL	IDLH	Routes of Exposure
Benzene	Y	Y	1.0 ppm	0.1 ppm	0.5 ppm	5 ppm	500 ppm	I,S,G,C
Toluene	N	Y	200 ppm	100 ppm	50 ppm	300 ppm	500 ppm	I,S,G,C
Xylene(s)	N	Y	100 ppm	150 ppm	100 ppm	N/A	900 ppm	I,S,G,C
Ethylbenzene	N	N	100 ppm	100 ppm	100 ppm	N/A	800 ppm	I,G,C

TWA = Time-Weighted Average
PEL = Permissible Exposure Limit
REL = Recommended Exposure Limit identifying NIOSH
TLV = Threshold Limit Value identifying ACGIH
STEL = Short Term Exposure Limit
IDLH = Immediate Dangerous to Life or Health
Routes of Exposure: I = inhalation, S = skin absorption, G = ingestion, C = skin contact
ppm = parts per million
mg/m^3 = milligrams per cubic meter (of air)

APPENDIX B

Material Safety Data Sheets

MSDS SUMMARY SHEET

Manufacturer:
Name: PHILLIPS PETROLEUM COMPANY
Address 1:
Address 2:
Address 3:
CSZ: BARTLESVILLE **State:** OK **Zipcode:** 74004
Emergency phone: (800) 424-9300
Business phone: 800-762-0942

Product:

Ferndale MSDS#: 1354 **Version # :** 6
Manufacturer MSDS#: 0041
Current? : 2002
Name:

NO. 2 DIESEL FUEL

Synonyms:

CARB **Diesel** TF3
CARB **Diesel**
CARB **Diesel** 10%
Diesel Fuel Oil
EPA Low Sulfur **Diesel** Fuel
EPA Low Sulfur **Diesel** Fuel – Dyed
EPA Off Road High Sulfur **Diesel –** Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 **Diesel** Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur **Diesel** – Dyed
No. 2 Low Sulfur **Diesel** - Dyed
No. 2 Low Sulfur **Diesel** - Undyed
Crude column 3rd IR
Crude column 3rd side cut
Atmospheric tower 3rd side cut
Ultra Low Sulfur **Diesel** No. 2
Finished **Diesel**
DHT Reactor Feed
Straight Run **Diesel**
Diesel
Middle Distillate

Product/Catalog Numbers:
MSDS Date: 01/01/2002 **(received:** 01/14/2002**)**

NFPA codes:
Health: 0 **Flammability:** 2 **Reactivity:** 0

Trial Version
www.nuance.com

MATERIAL SAFETY DATA SHEET
No. 2 Diesel Fuel

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: No. 2 Diesel Fuel
Product Code: Multiple
SAP Code:
Synonyms:
1354
CARB Diesel TF3
CARB Diesel
CARB Diesel 10%
Diesel Fuel Oil
EPA Low Sulfur Diesel Fuel
EPA Low Sulfur Diesel Fuel – Dyed
EPA Off Road High Sulfur Diesel – Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 Diesel Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur Diesel – Dyed
No. 2 Low Sulfur Diesel - Dyed
No. 2 Low Sulfur Diesel – Undyed
No. 2 Ultra Low Sulfur Diesel – Dyed
No. 2 Ultra Low Sulfur Diesel - Undyed
Intended Use: Fuel
Chemical Family:
Responsible Party: Phillip's Petroleum Company
Bartlesville, Oklahoma 74004
For Additional MSDSs: 800-762-0942
Technical Information:

The intended use of this product is indicated above. If any additional use is known, please contact us at the Technical Information number listed.

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:
Spill, Leak, Fire or Accident
Call CHEMTREC
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

California Poison Control System: 800-356-3120

Health Hazards/Precautionary Measures: Causes severe skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Wash thoroughly after handling.

Physical Hazards/Precautionary Measures: Flammable liquid and vapor. Keep away from heat, sparks, flames, static electricity or other sources of ignition.

Appearance: Straw-colored to dyed red
Physical Form: Liquid
Odor: Characteristic petroleum

Trial Version www.nuance.com

HFPA Hazard Class:
Health: 0 (Least)
Flammability: 2 (Moderate)
Reactivity: 0 (Least)

HMIS Hazard Class
Not Evaluated

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% VOLUME	Limits	EXPOSURE GUIDELINE Agency	Type
Diesel Fuel No. 2 CAS# 68476-34-6	100	100* mg/m3	ACGIH	TWA-SKIN
Naphthalene CAS# 91-20-3	<1	10ppm	ACGIH	TWA
		15ppm	ACGIH	STEL
		10ppm	OSHA	TWA
		250ppm	NIOSH	IDLH

All components are listed on the TSCA inventory

Tosco Low Sulfur No. 2 Diesel meets the specifications of 40 CFR 60.41 for low sulfur diesel fuel.

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

*Proposed ACGIH (1999)

3. HAZARDS IDENTIFICATION

Potential Health Effects:

Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Severe skin irritant. Contact may cause redness, itching, burning, and severe skin damage. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin, leading to dermatitis (inflammation). Not actually toxic by skin absorption, but prolonged or repeated skin contact may be harmful (see Section 11).

Inhalation (Breathing): No information available. Studies by other exposure routes suggest a low degree of toxicity by inhalation.

Ingestion (Swallowing): Low degree of toxicity by ingestion. ASPIRATION HAZARD – This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Signs and Symptoms: Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea, diarrhea and transient excitation followed by signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).

Cancer: Possible skin cancer hazard (see Sections 11 and 14).

Target Organs: There is limited evidence from animal studies that overexposure may cause injury to the kidney (see Section 11).

Developmental: Inadequate data available for this material.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin disorders and kidney disorders.

Trial Version www.nuance.com

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Immediately remove contaminated shoes, clothing, and constrictive jewelry and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek immediate medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek immediate medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard; Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

5. FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: >125°F/>52°
OSHA Flammability Class: Combustible liquid
LEL %: 0.3 / UEL %: 10.0
Autoignition Temperature: 500°F/260°C

Unusual Fire & Explosion Hazards: This material is flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

Trial Version www.iwarc.com

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Spilled material may be absorbed into an appropriate material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharged. The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practices.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing or high pressure hydraulic oil equipment.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSIZ49.1 and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentration below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

www.Fuelvalue.com

Personal Protective Equipment (PPE):

Respiratory: A NIOSH certified air purifying respirator with an organic vapor cartridge maybe used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrants a respirator's use.

Skin: The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation and skin damage (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.

Eyes/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse. It is recommended that impervious clothing be worn when skin contact is possible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1atm).

Appearance: Straw-colored to dyed red
Physical State: Liquid
Odor: Characteristic petroleum
pH: unavailable
Vapor Pressure (mm Hg): 0.40
Vapor Densisty (air=1):>3
Boiling Point/Range: 320-700°F /160-371°C
Freezing/Melting Point: No Data
Solubility in Water: Negligible
Specific Gravity: 0.81-0.88 @ 60°F
Percent Volatile: Negligible
Evaporation Rate (nBuAc=1): <1
Viscosity: 32.6-40.0 SUS @ 100°F
Bulk Density: 7.08 lbs/gal
Flash Point: >125°F / >52°C
Flammable/Expolsive Limits (%): LEL: 0.3 / UEL: 10.0

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Flammable liquid and vapor. Vapor can cause flash fire.

Conditions To Avoid: Avoid all possible sources of ignition (see Sections 5 and 7).

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc.

Final Version
www.nuance.com

Hazardous Decomposition Products: The use of hydrocarbon fuels in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels. ACGIH has included a TLV of 0.05 mg/m3 TWA for diesel exhaust particulate on its 1999 Notice of Intended Changes. See Section 11 for additional information on hazards of engine exhaust.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Diesel Fuel No. 2 (CAS# 68476-34-6)

Carcinogenicity: Chronic dermal application of certain middle distillate streams contained in diesel fuel No. 2 resulted in an increased incidence of skin tumors in mice. This material has not been identified as carcinogen by NTP, IARC, or OSHA. Diesel exhaust is a probable cancer hazard based on tests with laboratory animals.

Target Organ(s): Limited evidence of renal impairment has been noted from a few case reports involving excessive exposure to diesel fuel No. 2.

Naphthalene (CAS# 91-20-3)

Carcinogenicity: Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has not been identified as a carcinogen by IARC or OSHA.

12. ECOLOGICAL INFORMATION

Not evaluated at this time.

13. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001) and benzene (D018). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material, once it becomes a waste, is subject to the land disposal restrictions in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent then the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container ?insate? could be considered a RCRA hazardous waste and must be disposed of with care and in compliance with federal, state and local regulations. Large empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller containers, consult with state and local regulations and disposal authorities.

14. TRANSPORT INFORMATION

DOT Shipping Description: Diesel Fuel, NA1983
Non-Bulk Package Marking: Diesel Fuel, 3, NA 1993, III

Trial Version www.nuance.com

15. REGULATORY INFORMATION

EPA SARA 311/312 (Title III Hazard Categories):

Acute Health:	Yes
Chronic Health:	Yes
Fire Hazard:	Yes
Pressure Hazard:	No
Reactive Hazard:	No

SARA 313 and 40 CFR 372:
This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Component	CAS Number	Weight %
-- None known --		

California Proposition 65:
Warning: This material contains the following chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Component	Effect
Benzene	Cancer, Developmental and Reproductive Toxicant
Toluene	Developmental Toxicant

Diesel engine exhaust, while not a component of this material, is on the Proposition 65 list of chemicals known to the State of California to cause cancer.

Carcinogen Identification:
This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any. Diesel exhaust is a probable cancer hazard based on tests in laboratory animals. It has been identified as carcinogen by IARC.

EPA (CERCLA Reportable Quantity: None

16. OTHER INFORMATION

Issue Date: 01/01/02
Previous Issue Date: 05/15/01
Product Code: Multiple
Revised Sections: None
Previous Product Code: Multiple
MSDS Number: 0041

Disclaimer of Expressed and Implied Warranties:

The information presented in this Material Data Safety Sheet is based on data believed to be accurate as of the date this Material Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THE PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Trial Version
www.nuance.com

Tosco Refining Company ***Ferndale Refinery***

UltraLow Sulfur Diesel Product Specification

Ferndale Product Code:34380xx (5) Product Code: ULSD2

(COMETS)

Specification	Unit	Limit	Test Procedure	Typical
Appearance				
Water & Sediment	Vol %	0.05 Max	D 2709	
Color	Number	3.0 Max	D 1500	
Haze Rating	Rating	2 Max	D 4176	
Composition				
Carbon Residue (Ramsbottom)	Wt %	0.35 Max	D 524, D 189	
Volatility				
90% Recovered	Deg; F	540 Min	D 86	
	Deg; F	640 Min	D 86	
Flash Point	Deg; F	125 Min (1)	D 93	130 F
Gravity	API	30 Min	D 287, D4052	
Fluidity				
Pour Point	Deg; F	See Season Table (6)	D 97	
Cloud Point	Deg; F	See Season Table (6)	D 2500	10 F
Viscosity @ 104F	cSt	1.9 Min	D 445	
	cSt	4.1 Max	D 445	
Lubricity, SLBOCLE	grams	3100 Min	D 6078	3300gm
Lubricity, HFRR	mm	.45	D 6079	
Combustion				
Cetane Index or Cetane Number (3,4)	Number	40.0 Min	D 976, D613	47.0
Corrosion				
Copper Strip, 3hr @ 50 deg C	Number	3 Max (2)	D 130	
Aromatics (4)	Vol %	35 Max	D 1319	25 %
Contaminants				
Total Sulfur	PPM	30 Max	D 2622, D4294	15-20ppm
Water & Sediment	Vol %	0.05 Max	D 1796	
Ash	Wt %	0.01 Max	D 482	
Additives				
Cetane Improver	Lb/MBbl	675 Max		
Dye		Undyed		

1. Minimum release specification is 125 deg. F. The refinery should target 135 deg. F.
2. Test result reported as a number and letter (e.g. 1a). Any letter is allowable as long as the number meets the spec shown.
3. Either specification must be met.
4. Either cetane index minimum or aromatics maximum must be met.
5. Winter cloud and pour specifications may be relaxed to the summer specifications by agreement with the customer.
6. Season Table

Month	Product Code	Pour Point	Cloud Point
Jan, Feb, Nov, Dec	WI	0 max (5)	14 max (5)
Mar - Oct	SU	15 max	24 max

TrialVersion www.nuance.com

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
959 ROUTE 46 EAST
PARSIPPANY, NEW JERSEY 07054-0624

EMERGENCY CONTACT:
CHEMTREC 1-800-424-9300
INFORMATION CONTACT:
973-257-1100

SUBSTANCE: ETHYL BENZENE

TRADE NAMES/SYNONYMS:
MTG MSDS 185; BENZENE, ETHYL-; EB; PHENYLETHANE; ETHYLBENZENE; ETHYLBENZOL; ALPHA-METHYLTOLUENE; UN 1175; C8H10; MAT08780

CHEMICAL FAMILY: hydrocarbons, aromatic

CREATION DATE: Jan 24 1989
REVISION DATE: Jun 17 2004

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: ETHYL BENZENE
CAS NUMBER: 100-41-4
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=3 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: liquid
ODOR: aromatic odor
MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, aspiration hazard, central nervous system depression, suspect cancer hazard (in animals)
PHYSICAL HAZARDS: Flammable liquid and vapor. Vapor may cause flash fire.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation (possibly severe), chest pain, difficulty breathing, headache,

drowsiness, dizziness, loss of coordination, coma
LONG TERM EXPOSURE: irritation, headache, drowsiness, emotional disturbances, cancer
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation (possibly severe)
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation (possibly severe)
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: nausea, vomiting, stomach pain, aspiration hazard
LONG TERM EXPOSURE: no information on significant adverse effects

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing and shoes before reuse. Destroy contaminated shoes.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

NOTE TO PHYSICIAN: For inhalation, consider oxygen. For ingestion, consider gastric lavage and activated charcoal slurry.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool

containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

FLASH POINT: 59 F (15 C) (CC)
LOWER FLAMMABLE LIMIT: 0.8%
UPPER FLAMMABLE LIMIT: 6.7%
AUTOIGNITION: 810 F (432 C)
FLAMMABILITY CLASS (OSHA): IB

6. ACCIDENTAL RELEASE MEASURES

AIR RELEASE:
Reduce vapors with water spray. Stay upwind and keep out of low areas.

SOIL RELEASE:
Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

WATER RELEASE:
Cover with absorbent sheets, spill-control pads or pillows. Neutralize. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
ETHYL BENZENE:
100 ppm (435 mg/m3) OSHA TWA
125 ppm (543 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
100 ppm ACGIH TWA
125 ppm ACGIH STEL
100 ppm (435 mg/m3) NIOSH recommended TWA 10 hour(s)
125 ppm (545 mg/m3) NIOSH recommended STEL

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
800 ppm
Any chemical cartridge respirator with organic vapor cartridge(s).
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any powered, air-purifying respirator with organic vapor cartridge(s).
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid
COLOR: colorless
ODOR: aromatic odor
MOLECULAR WEIGHT: 106.17
MOLECULAR FORMULA: C-H3-C-H2-C6-H5

BOILING POINT: 277 F (136 C)
FREEZING POINT: -139 F (-95 C)
VAPOR PRESSURE: 7.1 mmHg @ 20 C
VAPOR DENSITY (air=1): 3.66
SPECIFIC GRAVITY (water=1): 0.8670
WATER SOLUBILITY: 0.015%
PH: Not available
VOLATILITY: 100%
ODOR THRESHOLD: 140 ppm
EVAPORATION RATE: <1 (butyl acetate=1)
VISCOSITY: 0.64 cP @ 25 C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: alcohol, ether, benzene, sulfur dioxide, carbon tetrachloride
Insoluble: ammonia

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

INCOMPATIBILITIES: acids, bases, oxidizing materials, combustible materials

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of carbon

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

ETHYL BENZENE:
IRRITATION DATA:
15 mg/24 hour(s) open skin-rabbit mild; 500 mg eyes-rabbit severe
TOXICITY DATA:
55000 mg/m3/2 hour(s) inhalation-rat LC50; 17800 ul/kg skin-rabbit LD50; 3500 mg/kg oral-rat LD50
CARCINOGEN STATUS: IARC: Human Inadequate Evidence, Animal Sufficient Evidence, Group 2B; ACGIH: A3 -Animal Carcinogen
LOCAL EFFECTS:
Irritant: inhalation, skin, eye
ACUTE TOXICITY LEVEL:
Moderately Toxic: ingestion
Slightly Toxic: inhalation, dermal absorption

TARGET ORGANS: central nervous system
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: kidney disorders, liver disorders, respiratory disorders, skin disorders and allergies
TUMORIGENIC DATA: Available.
MUTAGENIC DATA: Available.
REPRODUCTIVE EFFECTS DATA: Available.
ADDITIONAL DATA: May cross the placenta.

12. ECOLOGICAL INFORMATION

FATE AND TRANSPORT:
KOW: 154170.05 (log = 5.196) (estimated from water solubility)

KOC: 44668.36 (log = 4.657) (estimated from water solubility)

HENRY'S LAW CONSTANT: 6.6 E -3 atm-m3/mol

BIOCONCENTRATION: 36.39 (estimated from water solubility)

AQUATIC PROCESSES: 2.6730095 hours (River Model: 1 m deep, 1 m/s flow, 3 m/s wind)

ENVIRONMENTAL SUMMARY: Relatively non-persistent in the environment. Not expected to leach through the soil or the sediment. Accumulates very little in the bodies of living organisms. Highly volatile from water.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Ethylbenzene
ID NUMBER: UN1175
HAZARD CLASS OR DIVISION: 3
PACKING GROUP: II
LABELING REQUIREMENTS: 3

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Ethylbenzene
UN NUMBER: UN1175

CLASS: 3
PACKING GROUP/RISK GROUP: II

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
ETHYL BENZENE: 1000 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: Yes
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
ETHYL BENZENE

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65:
Known to the state of California to cause the following:
ETHYL BENZENE
Cancer (Jun 11, 2004)

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: B2.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

©Copyright 1984-2005 MDL Information Systems, Inc. All rights reserved.

MATHESON TRI-GAS, INC. MAKES NO EXPRESS OR IMPLIED WARRANTIES, GUARANTEES OR REPRESENTATIONS REGARDING THE PRODUCT OR THE INFORMATION HEREIN, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE. MATHESON TRI-GAS, INC. SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE, WHETHER COMPENSATORY, CONSEQUENTIAL, EXEMPLARY, OR OTHERWISE, RESULTING FROM ANY PUBLICATION, USE OR RELIANCE UPON THE INFORMATION HEREIN.

Material Safety Data Sheet

MSDS ID NO.: 0274MAR019
Revision date: 07/25/2006

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon Residual Fuel Oil
Synonym: Bunker C Fuel; Fuel Oil Residual; Slurry Blendstock; No. 6 Fuel Oil; No. 6 Residual Fuel Oil; Residual Fuel Oil
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street
Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION / INFORMATION ON INGREDIENTS

Heavy or Residual Fuel Oil is a complex mixture of high molecular weight hydrocarbons produced from high temperature treatment of heavy petroleum fractions.

This product was analyzed by MPC and found to contain 0.05-0.6% of the 22 3-7 ring polycyclic aromatic compounds identified as Persistent Bioaccumulative Toxic (PBT) Chemicals subject to reporting under EPA EPCRA Section 313 regulations.

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon Residual Fuel Oil	68476-33-5	100			

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Petroleum Residua	Mixture	0-100			
Catalytic Cracked Clarified Oil	64741-62-4	0-90			
Diesel Oil	68334-30-5	0-30	= 100 mg/m³ TWA vapor and aerosol, as total hydrocarbons skin - potential for cutaneous absorption (as total hydrocarbons)		
Sulfur Compounds	Mixture	0.5-4			
5-methylchrysene	3697-24-3	0.01-0.2			
Naphthalene	91-20-3	0.01-0.15	Skin - potential significant contribution to overall exposure by the cutaneous route = 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m³ TWA = 15 ppm STEL = 75 mg/m³ STEL	
Benzo(a)phenanthrene	218-01-9	0.01-0.1	= 0.2 mg/m³ TWA as benzene soluble aerosol	= 0.2 mg/m³ TWA benzene soluble fraction	
Hydrogen Sulfide	7783-06-4	0-0.01	= 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 14 mg/m³ TWA = 15 ppm STEL = 21 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

THIS PRODUCT IS A BROWN TO BLACK VISCOUS COLORED LIQUID. THIS PRODUCT IS CONSIDERED TO BE A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD AND SHOULD BE KEPT AWAY FROM HEAT, FLAME AND SOURCES OF IGNITION. LONG-TERM SKIN EXPOSURE TO COMPONENTS OF THIS PRODUCT HAS CAUSED CANCER IN LABORATORY ANIMALS AND HUMANS. REPEATED SKIN CONTACT TO SOME COMPONENTS OF THIS PRODUCT HAVE PRODUCED SYSTEMIC TOXICITY (INCLUDING LIVER DAMAGE) IN LABORATORY ANIMALS. WHEN HEATED THIS MATERIAL MAY VENT TOXIC LEVELS OF HYDROGEN SULFIDE (H2S) VAPORS THAT ACCUMULATE IN THE VAPOR SPACES OF STORAGE AND TRANSPORT COMPARTMENTS. H2S VAPORS CAN CAUSE EYE, SKIN, AND RESPIRATORY TRACT IRRITATION AND ASPHYXIATION.

OSHA WARNING LABEL:

DANGER!
LONG-TERM SKIN EXPOSURE TO COMPONENTS OF THIS PRODUCT HAS CAUSED SKIN CANCER IN LABORATORY ANIMALS AND HUMANS.
REPEATED SKIN CONTACT TO SOME COMPONENTS IN THIS PRODUCT HAS PRODUCED SYSTEMIC TOXICITY (INCLUDING LIVER DAMAGE) IN LABORATORY ANIMALS.
MAY VENT HARMFUL CONCENTRATIONS OF HYDROGEN SULFIDE (H2S) GAS WHICH CAN CAUSE RESPIRATORY IRRITATION AND ASPHYXIATION.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Exposure to vapor or mist may cause pulmonary irritation, dizziness, nausea and loss of consciousness. Significant concentrations of hydrogen sulfide gas can be present in the vapor space of storage tanks and bulk transport compartments (See Sections 7, 8 & 11).

Ingestion: Product would be expected to have a low order of acute toxicity. Significant ingestion of some components of this product may cause liver damage.

Skin contact: Prolonged and repeated liquid contact can cause dermatitis, folliculitis or oil acne. Components of this product may cause skin sensitization. Components of this product can cause liver damage if absorbed through the skin.

Eye contact: Liquid or vapor contact may result in slight eye irritation.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon Residual Fuel Oil 68476-33-5	NE			

Notes: The International Agency for Research on Cancer (IARC) has determined that there is sufficient evidence for the carcinogenicity of residual (heavy) fuel oil in animals.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:

Diesel Oil 68334-30-5	Monograph 45, 1989; (Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms)		A3 - Animal Carcinogen (as total hydrocarbons)	
5-methylchrysene 3697-24-3	Supplement 7, 1987; Monograph 32, 1983	Reasonably Anticipated To Be A Carcinogen (Listed under ``Polycyclic aromatic hydrocarbons``)		
Naphthalene 91-20-3	Monograph 82, 2002	Reasonably Anticipated To Be A Carcinogen Listed	A4 - Not Classifiable as a Human Carcinogen	Present
Benzo(a)phenanthrene 218-01-9	Supplement 7, 1987; Monograph 35, 1985	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) A3 - Animal Carcinogen	Present

Notes:

The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of diesel fuel/fuel oil in humans. IARC determined that there was limited evidence for the carcinogenicity of marine diesel fuel in animals. Distillate (light) diesel fuels were not classifiable as to their carcinogeniicty to humans (Group 3A)

The International Agency for Research on Cancer (IARC) has determined that there is sufficient evidence for the carcinogenicity of catalytically cracked clarified oil (carbonblack feedstock) in animals.

The International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP) have concluded that certain polycyclic aromatic hydrocarbons, i.e. (benzo(a)pyrene, benz(a)anthracene, benzo(a)phenanthrene, indeno(1,2,3-cd)pyrene, benzo(j)fluoranthene, benzo(j,k,fluorine, benzo(g,h,i)perylene, and 5-methylchrysene are probably carcinogenic to humans (Group 2A and B).

The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: Ingestion not likely. If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Preexisting skin conditions, respiratory disorders, and impaired liver function may be aggravated by exposure to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a combustible liquid per the OSHA Hazard Communication Standard and should be handled accordingly. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Use water spray to cool exposed surfaces from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 131 (Min) F
Autoignition temperature: No data available.
Flammable limits in air - lower (%): 1.0
Flammable limits in air - upper (%): 6.0

NFPA rating:
Health: 2
Flammability: 2
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 2
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return product to source.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues. The fuel oil contained in this product may flash if product temperature is >131 F.

Harmful concentrations of hydrogen sulfide (H2S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments. Stay upwind and vent open hatches before unloading.

Avoid skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water. Never siphon this product by mouth.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or when there is inadequate ventilation.

Respiratory protection: Not required under normal conditions and adequate ventilation. Use atmosphere supplying respirators in confined spaces or when vapors exceed permissible limits; otherwise, an organic vapor respirator with pre-filter for fumes can be used. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Impermeable gloves (e.g., nitrile, viton, tyvek/saranex 23) to prevent skin contact.

Eye protection: Goggles and faceshield when handling hot material.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof. Chemical resistant apron or other protective clothing may be needed to avoid skin contact.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Black Viscous Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Black
Odor:	Hydrocarbon
Molecular weight:	Not determined.
pH:	Neutral
Boiling point/range (5-95%):	400-1300 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	Not determined
Density:	7.3-8.3 lbs/gal
Bulk density:	No data available.
Vapor density:	No data available.
Vapor pressure:	1 mm Hg @ 160 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability: The material is stable at 70 F, 760 mm pressure.

Polymerization: Will not occur.

Hazardous decomposition products: Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.

Materials to avoid: Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid: Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon Residual Fuel Oil	68476-33-5	No data available	No data available	No data available

Lifetime skin painting studies in animals with products similar to Heavy catalytic cracked distillate, No. 6 fuel oil and/or its components have produced tumors in animals following prolonged and repeated skin contact. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies.

Summary of health effect data on residual fuel oil components:

This product contains diesel fuel (middle distillate) at a level of >1.0% Lifetime skin painting studies in animals with similar distillate fuels have produced weak to moderate carcinogenic activity following prolonged and repeated exposure. Similar middle distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies.

This product may contain >0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused lung tumors in female mice. Male mice with the same exposure did not develop tumors. Exposure to 10-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and respiratory tract in male and female rats. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

Catalytic cracked clarified oil (CCCO) may be present in concentrations up to 100% in this product. Lifetime skin painting studies in animals with CCCO have produced tumors in animals following prolonged and repeated skin contact. Repeated dermal application of CCCO (30 mg/kg/day for 13 weeks) in rats resulted in anemia, liver degeneration and injury to bone marrow and lymphoid tissues. 100% mortality was observed at 2,000 mg/kg/day within three weeks. Repeated dermal application (30 mg/kg/day) of CCCO to pregnant rats during gestation produced maternal and fetal toxicity, some deaths and systemic toxicity (liver, thymus and blood). The number of viable offspring decreased at doses of 30 mg/kg/day and above. Many of the developmental effects (anomalies, resorptions and growth inhibition) were observed at doses which produced maternal toxicity. In a separate developmental study CCCO produced decreases in body weights and food consumption at doses from 10-250 mg/kg/day. Although fertility and reproductive function were not affected, the no observable adverse effect level for CCCO administered dermally was 1 mg/kg/day.

This product contains >0.1% 3-7 ring polynuclear aromatic hydrocarbons (PAC's). Some PAH's such as benzo(a)phenanthrene and 5-methylchrysene have been shown to be carcinogenic in experimental animals. An increased risk of cancer has been observed in workers employed in the aluminum production, coal gasification, coal-tar pitch, coke production and iron and steel industries that had been occupationally exposed to polynuclear aromatic hydrocarbons (PAC). Since these kinds of PACs have been measured at high levels in air samples taken in these idustries, IARC has concluded that these PACs are probably carcinogenic to humans.

Hydrogen sulfide gas (H_2S) is toxic by inhalation. Prolonged breathing of 50-100 ppm H_2S vapors can produce eye and respiratory tract irritation. Higher concentrations (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of >1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H_2S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H_2S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H_2S, respectively. Over the years a number of acute cases of H_2S poisonings have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: Product can be toxic to fish and aquatic life. The 24 hour TLM of the water soluble fraction of bunker C fuel oil is 3-6 ppm in marine and estuarine crustaceans and fish.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This material as supplied and by itself, when discarded or disposed of, is not an EPA RCRA hazardous waste according to federal regulations. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Fuel Oil, No. 6
UN/Identification No: NA 1993
Hazard Class: 3
Packing group: III
DOT reportable quantity (lbs): Not applicable.

TDG (Canada):

Proper shipping name: Fuel Oil, No. 6
UN/Identification No: NA 1993
Hazard Class: 3
Packing group: III
Regulated substances: Not applicable.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Petroleum Residua	NA
Catalytic Cracked Clarified Oil	NA
Diesel Oil	NA
Sulfur Compounds	NA
5-methylchrysene	NA
Naphthalene	NA
Benzo(a)phenanthrene	NA
Hydrogen Sulfide	hydrogen sulfide

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Petroleum Residua	NA
Catalytic Cracked Clarified Oil	NA
Diesel Oil	NA
Sulfur Compounds	NA
5-methylchrysene	NA
Naphthalene	= 0.454 kg final RQ = 1 lb final RQ = 100 lb final RQ = 45.4 kg final RQ
Benzo(a)phenanthrene	= 0.454 kg final RQ = 0.454 kg statutory RQ = 1 lb final RQ = 1 lb statutory RQ = 100 lb final RQ = 45.4 kg final RQ
Hydrogen Sulfide	= 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Petroleum Residua	None
Catalytic Cracked Clarified Oil	None
Diesel Oil	None
Sulfur Compounds	None
5-methylchrysene	= 100 lb Reporting Threshold Chemical Category N590, PBT Chemicals = 100 lb Reporting Threshold Listed under ``Polycyclic aromatic compounds``, Chemical Category N590, PBT Chemicals
Naphthalene	= 0.1 % de minimis concentration
Benzo(a)phenanthrene	= 100 lb Reporting Threshold Chemical Category N590, PBT Chemicals = 100 lb Reporting Threshold Listed under ``Polycyclic aromatic compounds``, Chemical Category N590, PBT Chemicals
Hydrogen Sulfide	None

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Petroleum Residua

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Catalytic Cracked Clarified Oil

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Diesel Oil

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	[present]
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Sulfur Compounds

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed

Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

5-methylchrysene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 4/1/88
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	SN 3758 (Polycyclic aromatic compounds category); Category Code N590; report 500 lbs. in combination of any listed chemicals SN 3758; Category Code N590
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Listed
New Jersey Right-To-Know:	Listed
Pennsylvania Right-To-Know:	Listed
Massachusetts Right-To Know:	Listed
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Listed
Illinois - Toxic Air Contaminants	Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Listed

Benzo(a)phenanthrene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 1/1/90
New Jersey Right-To-Know:	sn 0441
Pennsylvania Right-To-Know:	environmental hazard special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous

California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	carcinogen
New Jersey - Environmental Hazardous Substances List:	SN 3758 (Polycyclic aromatic compounds category); Category Code N590; report 500 lbs. in combination of any listed chemicals SN 3758; Category Code N590
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 100 lbs Air RQ

Hydrogen Sulfide

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 1017
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - fourth degree
New Jersey - Environmental Hazardous Substances List:	SN 1017
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 100 lbs Air RQ = 100 lbs Land/Water RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Diesel Oil	B3; D2B	
5-methylchrysene		1% (English Item 1032, French Item 1124)
Naphthalene	B4, D2A	1 %
Benzo(a)phenanthrene	D2A Uncontrolled product according to WHMIS classification criteria.	0.1% (English Item 405, French Item 562) 0.1% (English Item 411, French Item 1721)
Hydrogen Sulfide	A; B1; D1A; D2B	1% (English Item 851, French Item 1550)

16. OTHER INFORMATION

Additional Information: The pronounced and easily-recognized rotten egg odor of hydrogen sulfide gas (H2S) can be detected at concentrations as low as 0.003-0.13 ppm. Since higher H2S concentrations (100-200 ppm) cause olfactory fatigue and other hydrocarbon odors can "mask" H2S, the sense of smell cannot be used as a reliable indicator of H2S exposure.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Material Safety Data Sheet

MSDS ID NO.: 0123MAR019
Revision date: 07/25/2006

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon Aviation Turbine Fuel Jet A 3000 ppm Sulfur Max
Synonym: Aviation Turbine Fuel Jet A; Jet A Aviation Fuel; AV Turbine Fuel - Jet A; Jet Fuel 500 ppm Sulfur Max; Jet Fuel (0.05% Sulfur Max); Jet Fuel, Non-Road Use, Undyed
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street
Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION / INFORMATION ON INGREDIENTS

Aviation Turbine Fuel Jet A is a complex mixture of paraffins, cycloparaffins, olefins and aromatic hydrocarbons having hydrocarbon chain lengths predominantly in the range of C9 through C16. May contain a trace amount of benzene (<0.01%).

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon Aviation Turbine Fuel Jet A	8008-20-6	100	= 200 mg/m³ TWA application restricted to conditions in which there are negligible aerosol exposures skin - potential for cutaneous absorption (as total hydrocarbon vapor)		

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Saturated Hydrocarbons	Mixture	70-80			
Aromatic Hydrocarbons	Mixture	17-20			
Unsaturated Hydrocarbons	Mixture	3-6			
Naphthalene	91-20-3	0.01-0.5	Skin - potential significant contribution to overall exposure by the cutaneous route = 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m³ TWA = 15 ppm STEL = 75 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

JET FUEL IS A CLEAR TO AMBER COLORED LIQUID. THIS PRODUCT IS CONSIDERED TO BE A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD AND SHOULD BE KEPT AWAY FROM HEAT, FLAME AND SOURCES OF IGNITION. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH. PROLONGED OR REPEATED SKIN CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN WHICH MAY PRODUCE SEVERE IRRITATION OR DERMATITIS.

OSHA WARNING LABEL:

WARNING.
COMBUSTIBLE LIQUID.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.
PRODUCES SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Exposure to high vapor concentrations may produce headache, giddiness, vertigo, and anesthetic stupor.

Ingestion: Ingestion may result in nausea, vomiting, diarrhea and restlessness. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Produces little or no irritation on direct contact with the eye.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon Aviation Turbine Fuel Jet A 8008-20-6	NE		A3 - Animal Carcinogen (as total hydrocarbon vapor)	

Notes: The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of jet fuel in humans.

IARC has determined that there is sufficient evidence for the carcinogenicity in experimental animals of diesel engine exhaust and extracts of diesel engine exhaust particles. IARC determined that there is only limited evidence for the carcinogenicity in humans of diesel engine exhaust. However, IARC's overall evaluation has resulted in the IARC designation of diesel engine exhaust as probably carcinogenic to humans (Group 2A) because of the presence of certain engine exhaust components.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Naphthalene 91-20-3	Monograph 82, 2002	Reasonably Anticipated To Be A Carcinogen Listed	A4 - Not Classifiable as a Human Carcinogen	Present

Notes: The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. If swallowed, immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions and respiratory disorders may be aggravated by exposures to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a combustible liquid per the OSHA Hazard Communication Standard and should be handled accordingly. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Keep surrounding area cool with water spray from a distance and prevent further ignition of combustible material. Keep run-off water out of sewers and water sources.

Flash point: 120-190 F
Autoignition temperature: 489 F
Flammable limits in air - lower (%): 0.7
Flammable limits in air - upper (%): 5.0

NFPA rating:
Health: 1
Flammability: 2
Reactivity: 1
Other: -

HMIS classification:
Health: 1
Flammability: 2
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Avoid repeated and prolonged skin contact. Never siphon this product by mouth. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required when using at elevated temperatures that generate vapors or mists.

Respiratory protection: Use approved organic vapor chemical cartridge or supplied air respirators when material produces vapors that exceed permissible limits or excessive vapors are generated. Observe respirator protection factor criteria cited in ANSI Z88.2. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride and polyurethane gloves to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: No special protective clothing is normally required. Select protective clothing depending on industrial operations. Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Clear to Amber Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Clear or Amber
Odor:	Slight Hydrocarbon
Molecular weight:	180
pH:	Neutral
Boiling point/range (5-95%):	360-550 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	Not determined
Density:	6.76 lbs/gal
Bulk density:	No data available.

Vapor density:	4-5
Vapor pressure:	1-10 mm Hg @ 100 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	10%
Viscosity:	1.3-2.1 @ 50 C

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
Materials to avoid:	Strong oxidizers such as nitrates, perchlorates, chlorine, fluorine.
Conditions to avoid:	Excessive heat, sources of igition and open flames.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon Aviation Turbine Fuel Jet A	8008-20-6	>2 mg/l for 4 hr [Rat]	>5 ml/kg [Rabbit]	9-16 ml/kg [Rat]

Lifetime skin painting studies in animals with similar distillate fuels have produced weak to moderate carcinogenic activity following prolonged and repeated exposure. Similar middle distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies. Some components of this product, have been shown to produce a species specific, sex hormonal dependent kidney lesion in male rats from repeated oral or inhalation exposure. Subsequent research has shown that the kidney damage develops via the formation of a alpha-2µ-globulin, a mechanism unique to the male rat. Humans do not form alpha-2µ-globulin, therefore, the kidney effects resulting from this mechanism are not relevant in humans. Some components of this product were found to be positive in a few mutagenicity tests while negative in the majority of others. The exact relationship between these results and human health is not known.

Summary of health effect data on distillate fuel components:

This product may contain >0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused lung tumors in female mice. Male mice with the same exposure did not develop tumors. Exposure to 10-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and respiratory tract in male and female rats. Oral administration of 133-267 mg/kg/day of naphthalene in mice for up to 90 days did not produce mortality, systemic toxicity, adversely affect organ or body weight or produce changes in blood. Repeated oral administration of naphthalene produced an anemia in dogs. Repeated intraperitoneal doses of naphthalene produced lung damage in mice. Repeated high doses of naphthalene has caused the formation of cataracts and retinotoxicity in the eyes of rats and rabbits due to accumulation of 1,2-naphthoquinone, a toxic metabolite. Effects in human eyes is uncertain and not well documented. Pregnant rats administered intraperitoneal doses of naphthalene during gestation gave birth to offspring that had delayed heart and bone development. Pregnant mice given near lethal doses of naphthalene showed no significant maternal toxicity and a reduction in the number of pups per litter, but no gross abnormalities in offspring. Suppressed spermatogenesis and progeny development have been reported in mice, rats and guinea pigs after exposure to high concentrations of naphthalene in their drinking water. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

Summary of health effect information on diesel engine exhaust:

Chronic inhalation studies of whole diesel engine exhaust in mice and rats produced a significant increase in lung tumors. Combustion of kerosine and/or diesel fuels produces gases and particulates which include carbon monoxide, carbon dioxide, oxides of nitrogen and/or sulfur and hydrocarbons. Significant exposure to carbon monoxide vapors decreases the oxygen carrying capacity of the blood and may cause tissue hypoxia via formation of carboxyhemoglobin.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects:

Product can be toxic to aquatic life and cause fouling of the shoreline at high concentrations. The 96 hour LL50 values for an accomadated fraction (WAF) of fuel oil ranged from 3.2 to 65 mg/l in fish and 2-210 mg/l in invertebrates. EL50 values for inhibition of algal growth ranged from 1.8 to 2.9 mg/l for No. 2 fuel oil and from 10 to 78 mg/l for diesel fuel. This product does not concentrate or accumulate in the food chain. If released to soil and water, this product is expected to biodegrade under both aerobic and anaerobic conditions.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations:

This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "characteristic" hazardous waste. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Fuel, Aviation, Turbine Engine
UN/Identification No: UN 1863
Hazard Class: 3
Packing group: III
DOT reportable quantity (lbs): Not applicable.

TDG (Canada):

Proper shipping name: Fuel, Aviation, Turbine Engine
UN/Identification No: UN 1863
Hazard Class: 3
Packing group: III
Regulated substances: Not applicable.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	= 0.454 kg final RQ = 1 lb final RQ = 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Fire Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Saturated Hydrocarbons	None
Aromatic Hydrocarbons	None
Unsaturated Hydrocarbons	None
Naphthalene	= 0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Saturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Aromatic Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Unsaturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.

Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Listed
New Jersey Right-To-Know:	Listed
Pennsylvania Right-To-Know:	Listed
Massachusetts Right-To Know:	Listed
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Listed
Illinois - Toxic Air Contaminants	Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Listed

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Naphthalene	B4, D2A	1 %

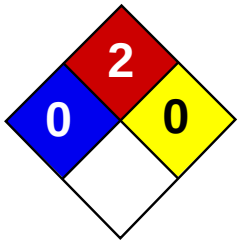
16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet



Health	2
Fire	2
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Kerosene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Kerosene

Catalog Codes: SLK1048

CAS#: 8008-20-6 or 64742-81-0

RTECS: OA5500000

TSCA: TSCA 8(b) inventory: Kerosene

CI#: Not available.

Synonym: Astral Oil; Coal Oil, Fuel Oil No. 5, Deobase, Astral Oil, Jet A Fuel; Jet Fuel JP-1; JP-5 Navy Fuel; Kerosine, petroleum; Range Oil; K1 Kerosene; Kerosene, hydrodesulfurized; Kerosine

Chemical Name: Kerosene

Chemical Formula: Not available.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**
Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Trial version
www.nuance.com

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Kerosene	8008-20-6 or 64742-81-0	100

Toxicological Data on Ingredients: Kerosene: ORAL (LD50): Acute: 15000 mg/kg [Rat]. 20000 mg/kg [Guinea pig]. 2835 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to the nervous system. The substance may be toxic to blood, kidneys, liver, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do NOT induce vomiting. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Trial Version
www.nuance.com

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 210°C (410°F)

Flash Points: CLOSED CUP: 38°C (100.4°F). (Tagliabue.)

Flammable Limits: LOWER: 0.7% UPPER: 5% - 7%

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Oily liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: Not available.

Color: Yellow. Clear (Light.)

pH (1% soln/water): Not applicable.

Boiling Point: 149°C (300.2°F) - 325 C

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: 0.775 - .840(Water = 1)

Vapor Pressure: 0.1 kPa (@ 20°C)

Vapor Density: 4.5 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Trial Version
www.nuance.com

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Miscible with other petroleum solvents

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (sparks, flames), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact.

Toxicity to Animals: Acute oral toxicity (LD50): 2835 mg/kg [Rabbit].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. Causes damage to the following organs: the nervous system. May cause damage to the following organs: blood, kidneys, liver, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant). Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes moderate to severe skin irritation. It can cause defatting dermatitis. Eyes: May cause eye irritation. Inhalation: May cause respiratory tract and mucous membrane irritation and a burning sensation in the chest. Because of its relatively low volatility, overexposure by inhalation is uncommon, but it can occur in poorly ventilated areas or by inhalation of mists or aerosols. Symptoms of inhalation overexposure include central nevous system (CNS) depression (transient euphora, headache, irritability, excitement, ringing in the ears, weakness, incoordination, confusion, disorientation, drowsiness, tremor, somnolence, hallucinations, seizures, coma, death). May affect the heart (cardiac arrythmias), liver, kidneys, and respiration(asphyxia, apnea, acute pulmonary edema, dyspnea, fibrosis, or cyanosis) Ingestion: Causes gastrointestinal tract irritation with burning sensation in mouth, esophagus, and stomach, a b d o m i n a l p a i n , n a u s e a , v o m i t i n g , h y p e r m o t i l i t y , d i a r r h e a , h e a d a c h e , m a l a i s e . M a y a f f e c t respiration/ trachea/bronchi through accidental pulmonary aspiration which can cause hypoxia, chemical pneumonitis, and noncardiogenic pulmonary edema, pulmonary hemmorrhage, coughing, breathing difficulty, acute or chronic pulmonary edema, emphysema, respiratory stimulation. It may also affect the heart (dysrrhythmias, myocardial depression, tachycardia), liver, endocrine system (pancreas - hypoglycemia), behavior/central nervous system (symptoms similar to that of inhalation). Chronic Potential Health Effects: Inhalation: Repeated or prolonged inhalation may cause respiratory tract irritation and affect behavior/central nervous system with symptoms similar to that of acute inhalation. It may also affect the blood (changes in white blood cell count, changes in serum compositon, pigmented or nucleated red blood cells, leukopenia, normocytic anemia) , cardiovascular

Trial Version
www.nuance.com

system, respiratory system (trachea, bronchi), and may cause kidney damage. Ingestion: Repeated or prolonged ingestion may affect the liver, endocrine system (adrenal gland, pancreas, spleen), and metabolism (weight loss), and blood. Skin: Repeated or prolonged skin contact may cause defatting dermatitis, erythema, and eczema-like skin lesions, drying and cracking of the skin, and possible burns.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: Not available.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Kerosene UNNA: 1223 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Kerosene Rhode Island RTK hazardous substances: Kerosene Pennsylvania RTK: Kerosene Massachusetts RTK: Kerosene Massachusetts spill list: Kerosene New Jersey: Kerosene TSCA 8(b) inventory: Kerosene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable. R65- Harmful: may cause lung damage if swallowed. S23- Do not breathe gas/fumes/vapour/spray S24- Avoid contact with skin. S62- If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Trial Version
www.nuance.com

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:54 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Trial Version
www.nuance.com

Material Safety Data Sheet

MSDS ID NO.: 0156MAR019
Revision date: 02/02/2004

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: MAPLLC Benzene
Synonyms: Benzene; Cyclohexatriene;
Chemical Family: Aromatic Hydrocarbon
Formula: C6H6

Supplier:
Marathon Ashland Petroleum LLC
539 SOUTH MAIN STREET
FINDLAY OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Benzene is an C6 aromatic petroleum hydrocarbon.

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
MAPLLC Benzene	71-43-2	100	= 0.5 ppm TWA = 2.5 ppm STEL skin - potential for cutaneous absorption	= 10 ppm TWA unless specified in 1910.1028 = 25 ppm Ceiling unless specified in 1910.1028 = 50 ppm STEL 10 min, unless specified in 1910.1028	OSHA Exposure Limit as specified in 1910.1028: =1.0 ppm TWA = 5 ppm STEL = 0.5 ppm Action Level

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Benzene	71-43-2	99-100	= 0.5 ppm TWA = 2.5 ppm STEL skin - potential for cutaneous absorption	= 10 ppm TWA unless specified in 1910.1028 = 25 ppm Ceiling unless specified in 1910.1028 = 50 ppm STEL 10 min, unless specified in 1910.1028	OSHA Exposure Limit as specified in 1910.1028: =1.0 ppm TWA = 5 ppm STEL = 0.5 ppm Action Level

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

BENZENE IS A COLORLESS LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. CONTAINS BENZENE WHICH MAY CAUSE CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH.

OSHA WARNING LABEL:

DANGER!
CONTAINS BENZENE.
CANCER HAZARD.
EXTREMELY FLAMMABLE.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Acute exposure to vapor concentrations of 50-150 ppm benzene can cause respiratory irritation, headache, dizziness and loss of coordination. Concentrations exceeding 500 ppm may cause central nervous system depression, loss of consciousness, coma and death resulting from respiratory failure. Excessive benzene exposure may cause cardiac sensitization.

Ingestion: Liquid ingestion causes severe gastrointestinal pain, abdominal cramps, nausea, vomiting, narcosis and central nervous system depression. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Eye irritation may result from contact with the liquid or exposure to the vapor at concentrations above the TLV.

Carcinogenic Evaluation:

Product information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
MAPLLC Benzene 71-43-2	Supplement 7, 1987; Monograph 29, 1982	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen	Present

Notes: Benzene is listed by the National Toxicology Program, the International Agency for Research on Cancer (IARC) and by OSHA as a chemical casually associated with certain forms of leukemia (cancer) in humans.

Component Information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Benzene 71-43-2	Supplement 7, 1987; Monograph 29, 1982	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen	Present

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions, respiratory disorders or impaired blood forming organ functions may be aggravated by exposure to this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Special protective equipment for firefighters: Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 12 F
Autoignition temperature: 1076 F
Flammable limits in air - lower (%): 1.3
Flammable limits in air - upper (%): 7.9

NFPA rating:
Health: 2
Flammability: 3
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 3
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Never siphon this product by mouth. Avoid skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in OSHA Benzene Standard (29 CFR 1910.1028). Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Viton gloves should be used to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Pure
Color:	Colorless
Odor:	Aromatic
Molecular weight:	78.1
pH:	Neutral
Boiling point/range:	176 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	0.88
Density:	7.32 lbs/gal
Bulk density:	No data available.
Vapor density:	2.8
Vapor pressure:	100 mm Hg @ 79 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability: The material is stable at 70 F, 760 mm pressure.

Polymerization: Will not occur.

Hazardous decomposition products: Carbon monoxide, benzene vapor

Materials to avoid: Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid: Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information

Name	CAS Number	Inhalation:	Dermal:	Oral:
MAPLLC Benzene	71-43-2	LC50 = 13,700 ppm for 4 hrs [Rat]	LD50 > 8260 mg/kg [Rabbit]	LD50 = 810 - 10,000 mg/kg [Rat]

Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in man. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: The 96 hour LC50 of benzene for stripped bass is 10-100 ppm. The 7 day No Observed Effect Concentration (NOEC) for benzene in daphnia is 3 mg/l. This product does not concentrate or accumulate in the food chain.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "ignitable" hazardous waste (D001). This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name:	Benzene
UN/Identification No:	UN 1114
Hazard Class:	3
Packing group:	II
DOT reportable quantity (lbs):	10 pounds.

TDG (Canada):

Proper shipping name:	Benzene
UN/Identification No:	UN 1114
Hazard Class:	3
Packing group:	II
Regulated substances:	10 pounds.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Benzene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Benzene	= 0.454 kg final RQ = 0.454 kg statutory RQ = 1 lb final RQ = 1 lb statutory RQ = 10 lb final RQ = 10 lb final RQ receives an adjustable RQ of 10 lbs based on potential carcinogenicity in August 14, 1989 final rule = 100 lb final RQ = 4.54 kg final RQ = 4.54 kg final RQ receives an adjustable RQ of 10 lbs based on potential carcinogenicity in August 14, 1989 final rule = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard.
Chronic Health Hazard.
Fire Hazard.

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Benzene	= 0.1 percent de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 2/27/87 developmental toxicity; initial date 12/26/97 male reproductive toxicity; initial date 12/26/97
New Jersey Right-To-Know:	sn 0197
Pennsylvania Right-To-Know:	environmental hazard; special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable, Carcinogen; skin
Michigan critical materials register list:	Annual usage threshold = 100 pounds
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	carcinogen; flammable - third degree; mutagen
New Jersey - Environmental Hazardous Substances List:	SN 0197
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 10 lbs Air RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Benzene	B2; D2A	0.1% (English Item 153, French Item 277)

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Ashland Petroleum LLC (MAPLLC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MAPLLC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Material Safety Data Sheet

MSDS ID NO.: 0157MAR019
Revision date: 02/02/2004

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: MAPLLC Toluene
Synonyms: Toluene; Toluol; Methyl Benzene
Chemical Family: Aromatic Hydrocarbon
Formula: C6H5(CH3)

Supplier:
Marathon Ashland Petroleum LLC
539 SOUTH MAIN STREET
FINDLAY OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Toluene is an C7 aromatic petroleum hydrocarbon. Contains trace amounts of xylene (<0.1%), paraffins, cycloparaffins and benzene (<50 ppm).

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
MAPLLC Toluene	108-88-3	100	= 50 ppm TWA skin - potential for cutaneous absorption	= 100 ppm TWA = 150 ppm STEL = 375 mg/m³ TWA = 560 mg/m³ STEL	

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Toluene	108-88-3	99-100	= 50 ppm TWA skin - potential for cutaneous absorption	= 100 ppm TWA = 150 ppm STEL = 375 mg/m³ TWA = 560 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

TOLUENE IS A COLORLESS LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH.

OSHA WARNING LABEL:

DANGER!
EXTREMELY FLAMMABLE.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Overexposure or prolonged exposure to lower concentrations can cause respiratory irritation. Gross overexposure can cause central nervous system depression, producing symptoms of headache, dizziness, narcosis, and muscular incoordination. Excessive product exposure may cause cardiac sensitization.

Ingestion: Liquid ingestion causes severe gastrointestinal pain, abdominal cramps, nausea, vomiting, narcosis and central nervous system depression. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Eye irritation may result from contact with the liquid or exposure to the vapor at concentrations above the TLV.

Carcinogenic Evaluation:

Product information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
MAPLLC Toluene 108-88-3	NE		A4 - Not Classifiable as a Human Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for the carcinogenicity of toluene in either humans or animals (Group 3).

Component Information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Toluene 108-88-3			A4 - Not Classifiable as a Human Carcinogen	

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions and respiratory disorders may be aggravated by exposures to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Special protective equipment for firefighters: Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 40 F
Autoignition temperature: 896 F
Flammable limits in air - lower (%): 1.2
Flammable limits in air - upper (%): 7.1

NFPA rating:
Health: 2
Flammability: 3
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 3
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Never siphon this product by mouth. Avoid repeated and prolonged skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in ANSI Z88.2. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Viton gloves should be used to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Pure
Color:	Colorless
Odor:	Aromatic
Molecular weight:	92.1
pH:	Neutral
Boiling point/range:	231 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	0.87 @ 60 F
Density:	7.3 lbs/gal @ 60 F
Bulk density:	No data available.
Vapor density:	3.1
Vapor pressure:	21 mm Hg @ 68 F
Evaporation rate:	No data available.
Solubility:	515 mg/l at 20 C
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability: The material is stable at 70 F, 760 mm pressure.

Polymerization: Will not occur.

Hazardous decomposition products: Carbon monoxide, toluene vapors

Materials to avoid: Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid: Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information

Name	CAS Number	Inhalation:	Dermal:	Oral:
MAPLLC Toluene	108-88-3	LC50 = 3388-8800 ppm for 4 hrs [Rats]	LD50 = 14.1 ml/kg [Rabbit]	LD50 = 5.5-7.5 gm/kg [Rat]

Toluene was not carcinogenic in mice and rats exposed in a 2 year inhalation study for 6 hours/day, 5 days/week at concentrations of 600 or 1200 ppm.

Exposure to pregnant rats and mice during gestation to toluene produced some maternal and development toxicity (decreased fetal weight and increased sleletal variations). Toluene produced a mid frequency hearing loss in rats subchronically exposed to high concentrations of toluene. Decreased learning capability and deficits in operant behavior have been observed in animals subjected to exposure regimens that generally exceed established exposure limits.

Deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney and brain damage and central nervous system effects (incoordination, lassitude and memory loss) in individuals abusing toluene for its euphoric effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: The 96 hour LC50 for toluene ranges from 5.4 to 26 mg/l in fathead minnow and salmon. The 48 hour ED50 for toluene is 11.5 mg/l in daphnia. The 96 hour No Observed Effect Concentration (NOEC) of toluene in algae is 10 mg/l. This product does not concentrate or accumulate in the food chain.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "ignitable" hazardous waste (D001). This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Toluene
UN/Identification No: UN 1294
Hazard Class: 3
Packing group: II
DOT reportable quantity (lbs): 1000 pounds.

TDG (Canada):

Proper shipping name: Toluene
UN/Identification No: UN 1294
Hazard Class: 3
Packing group: II
Regulated substances: 1000 pounds.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Toluene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Toluene	= 0.454 kg final RQ = 1 lb final RQ = 10 lb final RQ = 100 lb final RQ = 1000 lb final RQ = 4.54 kg final RQ = 45.4 kg final RQ = 454 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard.
Fire Hazard.

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Toluene	= 1.0 percent de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Toluene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	developmental toxicity; initial date 1/1/91
New Jersey Right-To-Know:	sn 1866
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable; skin
Michigan critical materials register list:	Annual usage threshold = 100 pounds
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 1866
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Toluene	B2; D2A	1% (English Item 1578, French Item 1622)

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Ashland Petroleum LLC (MAPLLC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MAPLLC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Material Safety Data Sheet

MSDS ID NO.: 0158MAR019
Revision date: 02/02/2004

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: MAPLLC Xylene
Synonyms: Xylene; Mixed Xylenes, Dimethyl Benzene; Methyl Toluene
Chemical Family: Aromatic Hydrocarbon
Formula: C6H4(CH3)2

Supplier:
Marathon Ashland Petroleum LLC
539 SOUTH MAIN STREET
FINDLAY OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Xylene is an mixture of C8 aromatic petroleum hydrocarbons composed of the three isomers of xylene (ortho, meta & para) and ethylbenzene. Contains trace amounts of toluene, C9 hydrocarbons and benzene (<50 ppm).

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
MAPLLC Xylene	1330-20-7	100	= 100 ppm TWA = 150 ppm STEL	= 100 ppm TWA = 150 ppm STEL = 435 mg/m³ TWA = 655 mg/m³ STEL	

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Xylene	1330-20-7	85	= 100 ppm TWA = 150 ppm STEL	= 100 ppm TWA = 150 ppm STEL = 435 mg/m³ TWA = 655 mg/m³ STEL	
Ethyl Benzene	100-41-4	15	= 100 ppm TWA = 125 ppm STEL	= 100 ppm TWA = 125 ppm STEL = 435 mg/m³ TWA = 545 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

XYLENE IS A COLORLESS LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. CONTAINS ETHYLBENZENE THAT HAS PRODUCED CANCER IN LABORATORY ANIMALS. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH. CONTACT MAY CAUSE EYE AND SKIN IRRITATION.

OSHA WARNING LABEL:

DANGER!
FLAMMABLE LIQUID.
MAY CAUSE EYE OR SKIN IRRITATION.
CONTAINS ETHYLBENZENE THAT HAS CAUSED CANCER IN LABORATORY ANIMALS.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Overexposure or prolonged exposure to lower concentrations can cause respiratory irritation. Gross overexposure can cause central nervous system depression, producing symptoms of headache, dizziness, narcosis, and muscular incoordination. Excessive product exposure may cause cardiac sensitization.

Ingestion: Liquid ingestion causes severe gastrointestinal pain, abdominal cramps, nausea, vomiting, narcosis and central nervous system depression. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Liquid contact will produce a burning sensation and irritation in the eye. Eye irritation, photophobia and reversible corneal vacuolization may occur from vapor exposure above the TLV.

Carcinogenic Evaluation:

Product information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
MAPLLC Xylene 1330-20-7	NE		A4 - Not Classifiable as a Human Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for the carcinogenicity of xylene in either humans or animals (Group 3).

Component Information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Xylene 1330-20-7			A4 - Not Classifiable as a Human Carcinogen	
Ethyl Benzene 100-41-4	Monograph 77, 2000		A3 - Animal Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has concluded that ethyl benzene is possibly carcinogenic to humans (Group 2B).

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Preexisting skin, eye and respiratory disorders may be aggravated by exposure to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Special protective equipment for firefighters: Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 86-93 F
Autoignition temperature: 867-984 F
Flammable limits in air - lower (%): 1.1
Flammable limits in air - upper (%): 7.0

NFPA rating:
Health: 2
Flammability: 3
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 3
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Never siphon this product by mouth. Avoid repeated and prolonged skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in ANSI Z88.2.

Skin and body protection: Viton gloves should be used to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Colorless
Odor:	Sweet Aromatic
Molecular weight:	106.1
pH:	Neutral
Boiling point/range:	280-291 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	0.86 @ 60 F
Density:	7.2 lbs/ gal
Bulk density:	No data available.
Vapor density:	3.7
Vapor pressure:	6-16 mm Hg @ 68 F

Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Carbon monoxide, xylene vapors
Materials to avoid:	Strong oxidizers such as nitrates, chlorates, peroxides.
Conditions to avoid:	Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information

Name	CAS Number	Inhalation:	Dermal:	Oral:
MAPLLC Xylene	1330-20-7	LC50 = 5,267-6,700 ppm 4-6 hrs [Rats/Mice]	LD50 > 4 gm/kg [Rabbits]	LD50 = 2.5 - 10 ml/kg [Rats]

Laboratory animals exposed to high doses of xylene showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylene produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations have shown impairment of performance abilities (behavioral tests) in animals and man. Xylene produced a mid frequency hearing loss in rats subchronically exposed to high concentrations of xylene.

Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances.

The product contains >1.0% ethyl benzene (EB). Rats and mice exposed to 750 ppm EB for 6 hours/day, 5 days/week for two years developed kidney tumors in male and femmale rats and lung tumors in male mice and liver tumor in female mice.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: The 96 hour LC50 for xylene isomers range from 2.6-28 mg/l in flathead minnow and rainbow trout. The 24 hour ED50 for xylene ranges from 1.0-3.6 mg/l in daphnia. The 192 hour EC50 for xylene ranges from 3.9-4.4 mg/l in algae. This product does not concentrate or accumulate in the food chain.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "ignitable" hazardous waste (D001). This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name:	Xylenes
UN/Identification No:	UN 1307
Hazard Class:	3
Packing group:	III
DOT reportable quantity (lbs):	1000 pounds.

TDG (Canada):

Proper shipping name:	Xylenes
UN/Identification No:	UN 1307
Hazard Class:	3
Packing group:	III
Regulated substances:	1000 pounds.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Xylene	NA
Ethyl Benzene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Xylene	= 100 lb final RQ = 45.4 kg final RQ
Ethyl Benzene	= 100 lb final RQ = 1000 lb final RQ = 45.4 kg final RQ = 454 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard.
Fire Hazard.
Chronic Health Hazard.

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Xylene	= 1.0 percent de minimis concentration
Ethyl Benzene	= 0.1 percent de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Xylene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 2014
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Annual usage threshold = 100 pounds (all isomers)
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 2014
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Ethyl Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 0851
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree

New Jersey - Environmental Hazardous Substances List:	SN 0851
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Xylene	B2; D2A; D2B	
Ethyl Benzene	B2; D2A; D2B	0.1% (English Item 697, French Item 854)

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Ashland Petroleum LLC (MAPLLC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MAPLLC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

APPENDIX C

Job Safety Analysis (JSA) Form

TRC
JOB SAFETY/ENVIRONMENTAL ANALYSIS (JSA)

JOB SAFETY ANALYSIS (JSA) **JOB:** **DATE:**

SITE: **JSA#**

PROJECT COORDINATOR: **CONTRACTOR(S):** TRC
SUBCONTRACTORS:

JSA TEAM:
Project Manager/Supervisor: _____ Phone: _____
EHS Field Safety Advisor: _____ Phone: _____
Site Safety Officer: _____ Phone: _____
Alternate Site Safety Officer: _____ Phone: _____

PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIRED: Hard Hat, Steel-Toed Boots, Safety Glasses, Traffic Safety Vest, Gloves, and Hearing Protection. Respiratory Protection (if required).
ADDITIONAL PPE:

Steps in Sequence	Hazards Involved	Recommendations for Safe Work
1)	•	•
2)	•	•
3)	•	•
4)	•	•
5)	•	•
6)	•	•
7)	•	•
8)	•	•

Approvals:

Site Safety Officer:	Date:	Project Manager/Supervisor:	Date:
_____	_____	_____	_____
EHS Field Safety Advisor:	**Date:**	**Alternate Site Safety Officer:**	**Date:**
_____	_____	_____	_____

Field Changes:

Steps in Sequence	Hazards Involved	Recommendations for Safe Work
1)	•	•
2)	•	•
3)	•	•
4)	•	•
5)	•	•

APPENDIX D

Safety Task Analysis Review (STAR) Form

Identify Potential Hazards

- ☐ Abrasions
- ☐ Biological Hazards (plants, animals, insects)
- ☐ Cave-in (trench/excavation work)
- ☐ Chemical/Thermal Burn
- ☐ Cuts
- ☐ Dermatitis
- ☐ Dropping Materials/Tools to lower level
- ☐ Drowning/Flowing water
- ☐ Dust
- ☐ Electrical Shock
- ☐ Elevated/Overhead Work
- ☐ Energized Equipment
- ☐ Fire
- ☐ Flammability
- ☐ Foreign body in eye
- ☐ Hazardous materials (exposure or release)
- ☐ Heat or Cold Stress
- ☐ Heavy Equipment Operation
- ☐ Heavy Lifting
- ☐ High Noise Levels
- ☐ Impact Noise
- ☐ Inability to maintain communication
- ☐ Inclement weather
- ☐ Overhead work
- ☐ Overhead utilities
- ☐ Underground Utilities
- ☐ Pinch points
- ☐ Pressurized lines
- ☐ Slips, Trips, Falls
- ☐ Sprains/Strains
- ☐ Traffic
- ☐ Confined Space
- ☐ New or Rental Equipment
- ☐ Surface Water Run-On/Run-Off
- ☐ Odor/VOC Emissions
- ☐ Compressed Gas Cylinders
- ☐ Generated Wastes (solids/liquids)
- ☐ Known/Unknown Visitors
- ☐ Visibility
- ☐ New Personnel
- ☐ Hoists/Rigging/Slings/Wire Rope
- ☐ Special Operations/Instructions (attach)
- ☐ Ergonomics

Identify Controls

- ☐ Air Monitoring
- ☐ Barricades/Fencing/Silt Fencing
- ☐ Buddy System
- ☐ Appropriate Clothing/Monitoring of Weather
- ☐ Confined Space Procedures
- ☐ Decontamination
- ☐ Drinking Water/Fluids
- ☐ Dust abatement Measures
- ☐ Equipment inspection
- ☐ Exclusion zones
- ☐ Exhaust ventilation
- ☐ Fall Protection
- ☐ Fire extinguisher/Fire watch
- ☐ Flotation Devices/Lifelines
- ☐ Grounds on Equipment/Tanks
- ☐ Ground Fault Interrupter
- ☐ Ground Hydraulic Attachments
- ☐ Hand signal communication
- ☐ Hazardous/Flammable material storage
- ☐ Hazardous Plant/Animal Training
- ☐ Hearing Protection (Specify)
- ☐ Hoses, Access to water
- ☐ Hot Work Procedures
- ☐ Insect Repellent or Precautions
- ☐ Isolation of Equipment or Process (LO/TO)
- ☐ Storm-water Control Procedures/Methods
- ☐ Machine/Equipment Guarding
- ☐ Manual Lifting Equipment (Chain Falls)
- ☐ Protective Equipment (specify)
- ☐ Proper lifting techniques
- ☐ Proper tool for Job
- ☐ Radio Communication
- ☐ Respirator, (specify type)
- ☐ Safety Harness/Lanyard/Scaffold
- ☐ Sloping, Shoring, Trench Box
- ☐ Vehicle Inspection
- ☐ Spill Prevention Measures/Spill Kits
- ☐ Equipment Manuals/Training
- ☐ Emergency Procedures/Incident Management Plan
- ☐ Appropriate Labels/Signage
- ☐ Derived Waste Management Plan
- ☐ Visitor Escort/Orientation/Security
- ☐ Window Cleaning/Defrost
- ☐ Proper Work Position/Tools

Pre-Task Review (Yes/No/NA)

1. Has Job Hazard Analysis been completed and reviewed? _____
2. Is Job Scope understood by all Personnel? _____
3. Proper Safety Equipment on job site? ___
4. Permit Issues?
   What type? ☐ Hot Work
   ☐ Confined Space ☐ Excavation
   ☐ Other:_____
5. Proper Tools for Job on site? _____
6. Oxygen/Flammability checked? _____
7. Reviewed MSDSs for any hazardous substance that might be present? _____
8. Proper training for all personnel? _____
9. Are there any planned deviations from set procedures for equipment modifications? __ If so, contact supervisor to check applicability of MOC procedures.
10. Is there any work planned that could cause activation of emergency procedures? ___ If so, have these procedures been discussed and communicated?

Post-Task Review

1. Work area cleaned up?_____
2. All locks and tags removed and signed off by individuals?_____
3. Have Permits been turned in? _____
4. STAR submitted to EHS Department?
5. Were there any unplanned deviations from set procedures or equipment modifications? _____
   If so, contact supervisor to check applicability of MOC procedures.

Safety Task Analysis Review

Task Description:_____

_____

_____

List Tasks:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Company: _____

Completed By: _____

Date: _____

Job Location:_____

_____

List Additional Hazards (Hazards Not Shown with Check Box)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

List Additional Contorls (Controls Not Shown with Check Box)

_____

_____

_____

Tailgate Meeting Topic

_____

_____

_____

_____

Signatures of Personnel on Task Analysis Review/Tailgate Meeting:

_____

_____

_____

_____

_____

_____

Mentor Assigned to Work

_____

_____

_____

Lessons Learned (Based on changes in conditions (Near-Incidents/ Observations, Potential Emergencies)

Is there a better/safer way to perform the work/task?

_____

_____

_____

Supervisor Review (date/Time): _____

EHS Review (date/time):_____

Comments:_____

_____

_____

APPENDIX E

Air Monitoring Forms

Air Quality Monitoring Record

Client:_____ **Project No.**:_____
Location:_____ **Site Eng.**:_____
Project Mgr.:_____ **Site H&S Ofcr.**:_____

Date	Initial	Time	Location	PID/FID PPM	O_2%	LEL%	Dräeger Tubes			Other
							_____ _____	_____ _____	_____ _____	

Field Equipment Calibration/Maintenance Log

Client:_____ **Project No.**:_____
Location:_____ **Site Eng.**:_____
Project Mgr.:_____ **Site EHS Off.**:_____

Date	Type of Equipment[1]	Equipment ID Number	Procedure[2]	Reference Standards[3]	Initials of Individual	Company	Calibration OK Yes/No

Maintenance Required/Procedures:_____
_____
_____
_____
_____
_____

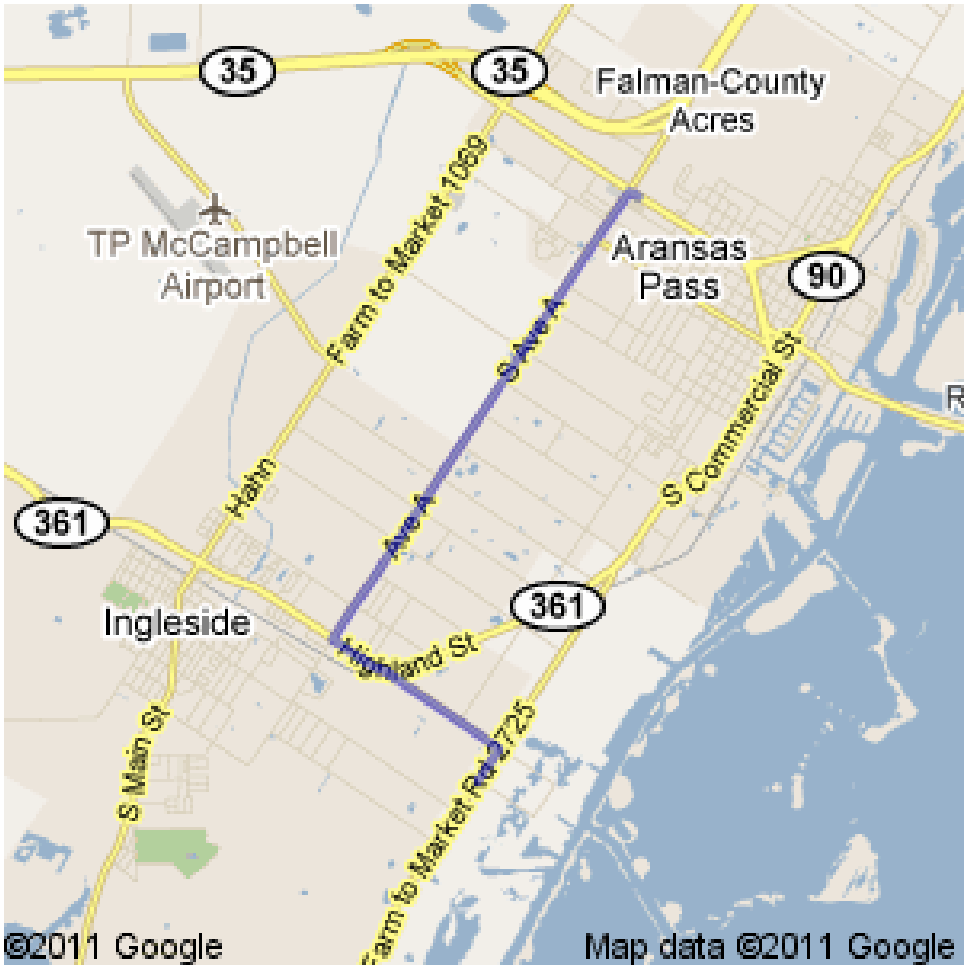
[1]Certifications or statements of manufacturer calibration can be obtained from RETEC office files.
[2] Use space below if necessary
[3] Type of calibration gas used and concentration; buffer solutions, etc.

APPENDIX F

Map/Route to the Nearest Hospital

Driving Directions from the Site (Former Falcon Refinery (1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road, Ingleside, San Patricio County, Texas) to Care Regional Medical Center, 1711 West Wheeler Avenue, Aransas Pass, Texas 78336. Phone: (361) 758-8585

1. Head northeast on Farm to Market Rd 2725 toward Co Rd 146/Sunray Rd. 0.3 mi
2. Take the 1st left onto Co Rd 146/Sunray Rd. 0.9 mi
3. Continue onto Highland St. 0.4 mi
4. Turn right onto Ave A. 3.5 mi
5. Turn right onto W Wheeler Ave Destination will be on the right. 367 ft



APPENDIX G

TRC Incident Report Form

DATE OF INCIDENT (D.O.I.):_____
(Month/Day/Year)
(xx/xx/xx)

TRC
Incident Report

(To be completed by Employee's Supervisor and by Employee involved in the Incident/Accident immediately after an Injury or Illness/Incident/Accident)

Incident Category:

☐ Employee Injury ☐ Property Damage ☐ Vehicle Damage ☐ Fire ☐ Near Miss ☐ Other	
Incident Location:	
Site Identification/Project No./WNO No:	
Site Address:	
Date Incident Occurred:	
Time Incident Occurred:	
Date Incident Reported:	
Time Incident Reported:	
Customer Project Manager:	

Employee Information:

Name:		
Field Office/Address:		
Supervisor Name/Phone:		
Employee Phone/Cell:		
Title or Occupation:		
Department:		

Type of Employee Injury or Illness:

☐ First Aid Only ☐ Medical Treatment Only ☐ Restricted Work-case ☐ Lost Workday ☐ Extended Time Away From Work (3 days or more) ☐ Fatality	
Estimated Number of Days on Restricted Work:	
Estimated Number of Days Away from Work:	

Employee Injury or Illness Description:

Describe the Injury or Illness:
First Aid/Medical Treatment Administered:
Name of Doctor's Office, Clinic, or Hospital:
Address and Phone Number:

Incident Description:

Equipment Involved:
Site Type: (Marketing, Refinery, etc.)
What task was being performed at time of incident?
Describe Incident in Detail :
Conditions at time of Incident: (weather, lighting):

Non-TRC Involvement:

Subcontractor Involved: ☐ No ☐ Yes
Name of Company:
Address:
Contact Name and Phone Number:
Additional Information:
Witnesses(s) to Incident: ☐ No ☐ Yes
Name(s) and Address(s):
Phone Number(s):
Additional Information:

Personal Protective Equipment (PPE):

List PPE required to complete the task: (glasses, safe. shoes, hard hat, respirator, hearing protection, etc.)
Was the employee using the proper PPE at the time of the Incident?

Safety Violation ☐ No ☐ Yes (Explain):

State the company safety rule, OSHA regulation, or specific training that was violated:
Describe the training the employee received to prevent this violation:

Immediate Corrective Actions:

Describe the immediate corrective actions taken:	
Signature of Investigating Supervisor:	**Date:**
Signature of Employee:	**Date:**

TRC Safety Manager/Director Signature: _____Date:_____

Health and Safety Plan

Falcon Refinery Superfund Site

Ingleside, San Patricio County, Texas

Prepared for:

National Oil Recovery Corporation
3717 Bowne Street
Flushing, NY 11354

Prepared by:

505 East Huntland Drive, Suite 250
Austin, Texas 78752

Stephen Halasz, Project Manager

August 2011

Deleted: May

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1-1
2.0 ADMINISTRATIVE INFORMATION 2-1
2.1 Health and Safety Plan Requirement Rationale 2-1
2.2 Health and Safety Plan Approval 2-1
3.0 PROJECT DESCRIPTION 3-1
3.1 Facility Description 3-1
3.1.1 Areas of Concern 3-1
3.2 TRC Field Activities 3-3
4.0 SITE HAZARDS 4-1
4.1 Chemical Hazards 4-1
4.2 Physical Hazards 4-1
4.2.1 Heat Stress 4-1
4.2.2 Cold Stress 4-3
4.2.3 Sunburn 4-4
4.2.4 Exposure to Excessive Noise 4-4
4.2.5 Heavy Equipment and Motor Vehicle Operation 4-5
4.2.6 Excavations and Trenches 4-6
4.2.7 Slips, Trips, and Falls 4-6
4.2.8 Manual Lifting 4-7
4.2.9 Hand and Power Tools 4-7
4.2.10 Weather-Related Hazards 4-8
4.2.11 Drowning Hazards 4-8
4.3 Biological Hazards 4-9
4.4 Utility Clearance 4-9
5.0 ACTIVITY-SPECIFIC REQUIREMENTS 5-1
5.1 Site Communication 5-1
5.1.1 External Communication 5-1
5.1.2 Internal Communication 5-1
5.2 Standard Work Uniform 5-1
5.3 Personal Protective Equipment 5-2

5.4 Work Zones 5-3
5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible) 5-3
5.4.2 Contamination Reduction Zone (CRZ) 5-3
5.4.3 Support Zone 5-4
5.5 Decontamination Procedures 5-4
5.5.1 Equipment Decontamination 5-4
5.5.2 Personnel Decontamination 5-4
5.5.3 Storage Procedures for Expendable Clothing/Equipment 5-5
6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS 6-1
6.1 Responsibilities of the SHSO 6-1
6.2 Health and Safety Clearances 6-1
6.3 Distribution of the HASP 6-1
6.4 Safety Briefings 6-2
6.5 On-Site Presence of Plan 6-2
6.6 Respirators 6-2
6.6.1 Usage 6-2
6.6.2 Cleaning 6-3
6.6.3 Storage 6-3
7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS 7-1
7.1 General Work Rules 7-1
7.2 Documentation 7-3
7.3 Site Specific Requirements 7-3
7.3.1 Housekeeping 7-3
7.3.2 Spills 7-3
7.3.3 Operation of Vehicles and Equipment 7-4
8.0 MONITORING 8-1
8.1 Monitoring Instruments 8-1
8.2 Action Levels 8-1
8.3 pH Monitoring 8-2
9.0 EMERGENCY PROCEDURES 9-3
9.1 Medical Injuries 9-3

9.2 Fire and Explosion Response Procedures 9-3
9.3 Emergency Medical Information 9-4
9.3.1 First Aid 9-4
9.3.2 Hospitals 9-4
9.4 Incident Investigation 9-4
9.4.1 Emergency Numbers 9-6
10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP 10-1

APPENDIX A: Potential Chemical Hazards
APPENDIX B: Material Safety Data Sheets
APPENDIX C: Job Safety Analysis (JSA) Form
APPENDIX D: Safety Task Analysis Review (STAR) Form
APPENDIX E: Air Monitoring Forms
APPENDIX F: Map/Route to the Nearest Hospitals
APPENDIX G: TRC Incident Report Form

1.0 INTRODUCTION

This Health and Safety Plan (HASP) outlines the health and safety requirements for on-site activities associated with soil and groundwater investigation activities within National Oil Recovery Corporation's (NORCO's) former Falcon Refinery located 1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road near Ingleside, San Patricio County, Texas (the Site). The Site is bordered by wetlands to the northeast and southeast, residential areas to the north and southwest, an abandoned refinery to the northwest, and a construction company to the southwest.

This HASP has been developed in conformance with the directives and requirements of the TRC *Health and Safety Policy and Procedure Manual*, October 2010, and 29 CFR 1910.120(i)(2). This HASP and any subsequent addenda will apply to all TRC personnel and subcontractors who are involved with on-site activities at the Site. By implementing this plan, TRC does not assume any liability for the health and safety of non-TRC personnel involved in the activities performed during this project.

Deleted: June 2001

TRC field personnel and TRC subcontracted field personnel must participate in medical monitoring, respirator fit testing, and hazardous waste training programs as specified by Occupational Safety and Health Administration (OSHA) regulations (per 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response [HAZWOPER]).

All work must be conducted in compliance with applicable OSHA regulations, including 29 CFR 1910 (General Industry Standards) and 29 CFR 1926 (Construction Industry Standards).

2.0 ADMINISTRATIVE INFORMATION

Site Name: Falcon Refinery Superfund Site

Site Location: Ingleside, San Patricio County, Texas

Project Title: Phase II Remedial Investigation/Feasibility Study

Client: National Oil Recovery Corporation

Project Manager: Stephen Halasz

TRC Task Leader(s):

Corporate Health & Safety Officer (CHSO): Ron Severson

Health & Safety Coordinator (HSC): Matt Webre

Assistant Project Manager: TBD

Field/Site Health & Safety Officer (SHSO): Alonzo Arredondo

2.1 Health and Safety Plan Requirement Rationale

This HASP is required due to past and present conditions, which may have existed at the Site. The chemicals of potential concern (COPCs) include metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides/herbicides.

Commented [TC1]: Just wondering, what are these related to?

2.2 Health and Safety Plan Approval

Health & Safety Officer: Matt Webre

Signature:_____ Date:_____

3.0 PROJECT DESCRIPTION

The following sections describe the Site, specifically the areas of concern (AOCs), and proposed field activities.

3.1 Facility Description

The Site consists of a refinery which operated intermittently and is currently inactive. When in operation, the refinery had a capacity of 40,000 barrels per day and the primary products consisted of naphtha, jet fuel, kerosene, diesel, and fuel oil.

3.1.1 Areas of Concern

Seven AOCs have been identified as potential areas impacted by COPCs. Three AOCs are identified on-site and four are off-site. The AOCs are summarized in Table 1 and shown on Figure 1.

AOC-1 Former Operational Units

AOC-1N and AOC-1S includes the entire North site, former operational units (OU) areas of the South site, a drum disposal area, and an area where metal waste was discarded. Preliminary COPCs to be screened at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

Commented [TC2]: Map ans table AOC-1N?

AOC-2 On-Site Non-Operational Areas

Areas of the refinery not used for operations or storage and with no record of releases are included in AOC-2. Although no COPCs were anticipated in AOC-2, the screened COPCs included metals, VOCs, and SVOCs. Potentially affected media include soil and groundwater.

Commented [TC3]: Not included on Table 1

AOC-3 Wetlands

Included in AOC-3 are wetlands immediately adjacent to the site bordered by Bay Avenue, Bishop Road, and a dam on the upstream side; wetlands located between Bishop Road, Sunray Road, Bay Avenue, and residences along Thayer Avenue; and wetlands between Sunray Road, residences along FM 2725, Gulf Marine Fabricators, Offshore Specialty Fabricators, and the outlet of the wetlands into the Intracoastal Waterway.

Commented [TC4]: Indicate locations on figure

Deleted: i

There is one active and several abandoned pipelines leading from the refinery to the current and historic barge dock facilities. During June 2006, the abandoned pipelines

Commented [TC5]: Figure title is historic barge dock, make consistent.

Deleted: former

were cut, the contents of the pipelines were removed, and plates were welded on the pipeline ends to seal them.

Wetland assessment activities will evaluate releases from the refinery, including any unpermitted wastewater effluent discharges, two known pipeline releases, and possible releases from pipelines leading from the refinery to the current and historic barge dock facilities.

Deleted: former

There have been documented spills of hydrocarbons, waste and volatile organics. As a result, the screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, herbicides, and pesticides. Potentially affected media include sediment, soil, surface water and groundwater.

AOC-4 Current Barge Docking Facility

Included in AOC-4 is the current barge docking facility, which is approximately 0.5 acres and is located on the Intracoastal Waterway. The fenced facility, which is connected to the refinery by pipelines, is used to load and unload barges. Historically, crude oil and refined products were loaded and unloaded at this docking facility.

Deleted: i

Deleted: w

Deleted: At the time of this report, only crude oil passed through the docking facility.

Deleted: however,

Deleted: also

There have been no reported releases nor is there evidence of spills associated with this AOC. The screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

Commented [TC6]: Not on Table 1

AOC-5 Intracoastal Waterway

Sediments and surface water adjacent to the current and historic barge dock facilities are included in this AOC. The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include sediment and surface water.

Deleted: former

Deleted: y

Commented [TC7]: How are we collecting samples from here….in a boat or from the shore?

AOC-6 Thayer Road

Included in this AOC is the neighborhood along Thayer Road, located north of Bishop Road across from the refinery (AOC-1S). The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater. No sampling is required within AOC-6 at this time?

Deleted: across

AOC-7 Bishop Road

Included in this AOC is the neighborhood along Bishop Road, located south of Bishop Road across from AOC-1N. The screened COPCs at this AOC include metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater. No sampling is required within AOC-6 at this time?

3.2 TRC Field Activities

TRC will conduct the following activities on-site including: (1) surface and subsurface soil sampling; (2) installation of permanent monitoring wells; and (3) groundwater sampling. Off-site activities will include: (1) surface and subsurface soil sampling; (2) installation of permanent? monitoring wells; (3) surface and groundwater sampling; (4) sediment sampling in the wetlands and bay; and (5) biota sampling.

Deleted: across

Deleted: the North site

Deleted: d

Deleted: 2

Deleted: ; (4) surface and subsurface soil sampling; and (5) off-site monitor well installation.

Table 1. Areas of Concern

Figure 1. Site Map

4.0 SITE HAZARDS

The following site hazards are present or could be encountered at the project area.

4.1 Chemical Hazards

Due to the storage of naphtha, jet fuel, kerosene, diesel, and fuel oil, COPCs at the Site include metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Specifically, benzene, toluene, ethylbenzene, and xylene (BTEX) is of primary concern for this HASP. Site personnel should avoid touching, breathing or ingesting any media encountered on-site. Nitrile gloves must be worn at all times when in contact with soil, water, and/or hydrocarbons. Section 8 describes in detail procedures that will be followed in ensure a safe breathing zone and protection from vapors of COPCs. Appendix A summarizes the various constituents of concern, the Permissible Exposure Levels (PELs), and the major potential health effects of each. Material Safety Data Sheets (MSDSs) for the COPCs are located in Appendix B.

4.2 Physical Hazards

4.2.1 Heat Stress

Heat stress results when the body is unable to get rid of excess heat. Stages of heat stress are heat cramps, heat exhaustion, and heat stroke. The latter can be fatal. Heat stress is of particular concern when workers must wear chemical protective clothing and ambient air temperatures are high, because protective clothing reduces evaporative body cooling. If ambient air temperatures at the site reach 70°F, heat stress symptoms should be watched for and control measures applied, if they appear.

These symptoms include:

- Heat rash, which may result from continuous exposure to heat or humid air.
- Heat cramps which are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include:
  - Muscle spasms, and
  - Pain in the hands, feet, and abdomen.
- Heat exhaustion, which may occur from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, moist skin,
- Heavy sweating,
- Dizziness,
- Nausea, and
- Fainting.

- Heat stroke is the most serious form of heat stress in which temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms include:
  - Red, hot, unusually dry skin,
  - Lack of or reduced perspiration,
  - Nausea,
  - Dizziness and confusion,
  - Strong, rapid pulse, and
  - Coma.

A worker who exhibits any of these symptoms will be immediately relieved of responsibilities and told to consume electrolyte fluid or cool water while resting in a shaded area. The individual should not return to work until symptoms are no longer recognizable. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored for any increase in heart rate or body temperature for the remainder of their shift. In addition, the worker will be requested to consume electrolyte fluid or cool water every hour.

The SHSO will monitor workers hourly when:

- Symptoms of heat stress are reported or observed;
- Ambient temperatures exceed 70º F and workers are dressed in impervious clothing; or
- Ambient temperatures exceed 90º F and workers are dressed in normal clothing.

Workers will be monitored for heat stress conditions by measuring the heart rate (HR) by radial (wrist) pulse for 30 seconds after one minute of rest. The HR after one minute of rest should not exceed 110 beats per minute. If HR is higher, the next work period shall be shortened by 33%, while the rest period length remains the same. If the pulse rate is still 110 beats per minute after one minute of rest in the next rest period, the following work cycle will be shortened by another 33 percent. This shortening of the work period must continue until the worker's HR is no greater than 110 beats per minute.

4.2.2 Cold Stress

Types of cold stress include general body coldness, hypothermia, and frostbite. The latter two require medical attention. Hypothermia can be fatal while frostbite can result in the amputation of limbs. If ambient air temperatures at the site reach below 39°F, cold stress symptoms should be watched for and control measures applied, if they appear. These symptoms include:

- General body coldness, which is caused by a drop in skin temperature. Signs and symptoms include shivering, numbness in extremities, and loss in manual dexterity and strength.
- Hypothermia is a decrease in deep body temperature (normally 98.6ºF). Signs and symptoms include uncontrollable shivering, slurred speech and memory lapses, irregular breathing, and drowsiness.
- Frostbite occurs when there is inadequate circulation and/or insulation of a body part. Signs and symptoms include skin color change (white or grayish yellow to reddish violet to black), and pain initially, followed by cold and numbness in the affected part.

Preventative measures will help avert serious illness due to cold stress. Appropriate clothing will be worn on the basis of the exterior temperature, wind chill factor, and the level of work. Precautions will be taken to minimize exposed flesh and clothing should be layered as appropriate. A worker who exhibits any symptoms of cold stress will be immediately relieved of responsibilities. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored. In addition, the following guidelines will be followed.

Work Below 39ºF (4ºC)

- The employees shall wear cold protective clothing appropriate for the level of cold and physical activity.
- If the air temperature at the site is decreased by wind or artificial ventilation, the cooling effect of the wind will be reduced by shielding the work area or by wearing a removable outer windbreak garment.
- If the clothing on the employee may become wet on the job site, the outer layer of the clothing will be water repellent.
- Workers who become immersed in water or whose clothing becomes wet will immediately be provided with a change of clothing and treated for hypothermia.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve.

TRC does not anticipate cold stress as a factor during these field activities.

4.2.3 Sunburn

Prolonged exposure of the skin to the sun, even on overcast days, can result in sunburn, which can be severe enough to be incapacitating, especially with fair-skinned individuals. Repeated sun burning can eventually cause premature aging of the skin and skin cancer in individuals. Always wear clothing to reduce the amount of exposed skin and frequently use sun block creams or lotions.

4.2.4 Exposure to Excessive Noise

Overexposure to noise can result in hearing loss. If it is difficult to hear normal speech when the speaker is 3 feet from the listener, for more than 4 hours a day, the noise level must be measured. If it exceeds 85 decibels (dBA) as an 8-hour, time-weighted average, hearing protection will be worn in accordance with 29 CFR 1910.95. If a sound level meter is not available, then the noise level will be assumed to be 85 dBA if one cannot communicate at normal voice level within 3 feet from another person. If this is the case, then appropriate hearing protection will be donned.

4.2.5 Heavy Equipment and Motor Vehicle Operation

Only qualified personnel will operate heavy equipment and motor vehicles. Equipment will not be operated in a manner that will endanger persons or property. All heavy equipment and motor vehicles will be operated in accordance with the manufacturer's instructions and 29 CFR 1926 Subpart O.

The following inspection and repair controls will also be implemented during this project:

- Equipment and vehicles will be inspected by the operator on a daily basis, prior to starting work.
- All heavy equipment exhaust systems will be checked daily and confirmed to have no embers or sparking.
- Any unsafe equipment or vehicles will be removed from service until safety defects can be corrected.
- Equipment will be shut down and locked out before maintenance or repairs are made.

Operators will follow these rules:

- Motor vehicles and heavy equipment will be shut down during re-fueling operations.
- Operators will not leave their equipment unattended while it is running.
- Whenever equipment is parked, the parking brake will be set. If the equipment is parked on an incline, in addition to setting the parking brake, the wheels will also be chocked.
- Operators will be trained and experienced in the use of their equipment.
- Vehicles or equipment will not be operated in a careless or unsafe manner.
- Personnel will wear appropriate personal protective equipment (PPE) when working with heavy equipment. Dermal protection must fit properly and be taped to prevent "caught on" or "caught between" hazards.

Required equipment features include:

Deleted: ¶

- All heavy equipment will have an audible backup alarm and an audible warning device (i.e., a horn).
- Each piece of heavy equipment will have a portable fire extinguisher.

When working with moving equipment:

- One designated person will give signals to the operators of both equipment and vehicles in any work area.
- Personnel will stay clear of the operational area of the equipment. Workers are not permitted to stand directly underneath any load or piece of equipment, i.e., man-lift, backhoe bucket, crane load, etc.
- Work areas will be adequately illuminated.

4.2.6 Excavations and Trenches

Compliance with excavation and trenching standards established by OSHA regulation 29 CFR 1926 Subpart P is a requirement of this HASP, as well as the compliance with the requirements presented below.

- Trenches and other large holes must be marked with yellow caution tape at any time the excavation is left unattended. The caution tape must be placed no less than 2 feet from the edge of the excavation
- Personnel will not be allowed to enter an excavation greater than 4 feet deep unless the excavation is properly sloped.
- Excavation spoil shall be placed a minimum of 3 feet from the edge of the excavation.

4.2.7 Slips, Trips, and Falls

Slipping and tripping hazards may be encountered at the site. Footwear appropriate for walking over mud and rocks should be worn. In addition, proper site housekeeping and removal of trash and debris will reduce slipping and tripping hazards. Proper site housekeeping will be the responsibility of all site personnel, and the SHSO will make regular inspections to evaluate if the work area is adequately clean.

4.2.8 Manual Lifting

Back injuries are among the leading occupational injuries reported by industrial workers. Using proper manual lifting techniques can reduce back injuries such as pulls and disc impairments. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their back.

If the load is too heavy, do not lift it alone. Individual heavy lifting must be avoided. Lifting is always easier when performed with another person. Assistance should always be used when necessary.

4.2.9 Hand and Power Tools

Dangerous hand tools (such as saws, hammers, axes, knives, shovels) and power tools (such as chain saws, power augers, drill motors, chippers, water pumps, and weed trimmers) may be used during some investigation activities.

All hand and power tools will be maintained in a safe condition and in good repair. Hand and power tools will be used in accordance with 29 CFR 1926, Subpart I (1926.300 through 1926.307). Workers are not permitted to bring unsafe tools on-site. All tools will be used, inspected, and maintained in accordance with the manufacturer's instructions. Throwing tools or dropping tools to lower levels is prohibited. Hand and power tools will be inspected, tested, and determined to be in safe operating condition prior to each use. Periodic safety inspections of all tools will be conducted by the tool operator, the Site Manager or the SHSO to evaluate if the tools are in good condition and are being properly maintained. Any tool that fails an inspection will be immediately removed from service and tagged with a "Do Not Use" sign.

Workers using hand and power tools who are exposed to falling, flying, abrasive, or splashing hazards will be required to wear PPE. Eye protection must always be worn when working on-site. Additional eye and face protection, such as safety goggles or face shields, may also be required when working with specific hand and power tools. Workers using tools in areas where there is a head injury hazard will wear hard hats. Hearing protection will always be worn when working with power tools, and additional hearing protection may be required when working with certain power tools if noise levels are excessively high. Workers using tools that may subject their hands to an injury, such as cuts, abrasions, punctures, or burns, will wear protective gloves. Loose or frayed clothing, dangling jewelry, or loose long hair will not be worn when working with power tools.

Electric power-operated tools require ground fault circuit interceptors (GFCI). Electric power-operated tools will be double insulated or grounded, and equipped with an on/off switch. Guards must be provided to protect the operator and other nearby workers from hazards such as in-going nip points, rotating parts, flying chips, and sparks. All reciprocating, rotating, and moving parts of tools will be guarded if contact is possible. Removing machine guards is prohibited.

Circular saws must be equipped with guards that completely enclose the cutting edges and have anti-kickback devices. All planer and joiner blades must be fully guarded. The use of cracked, bent, or otherwise defective parts is prohibited. Chain saws must have an automatic chain brake or kickback device. The worker operating the chain saw will hold it with both hands during cutting operations. A chain saw must never be used to cut above the operator's shoulder height. Chain saws will not be re-fueled while running or hot. Power saws will not be left unattended.

Operators of these tools will be instructed on the proper operation and safety precautions prior to operating such equipment. Only qualified workers will operate pneumatic tools, powder-actuated tools, and abrasive blasting tools. No one shall operate equipment that is in ill repair.

4.2.10 Weather-Related Hazards

Weather-related hazards include the potential for heat, electrical storms, treacherous weather-related working conditions, or limited visibility. These hazards correlate with the season in which Site activities occur. Outside work will be suspended during electrical storms. In the event of other adverse weather conditions, the Field Team Leader will determine if work can continue without endangering the health and safety of on-site personnel.

4.2.11 Drowning Hazards

According to OSHA 29 CFR 1917.126, personnel will be required to wear a personal floatation device (PFD) when conducting work in areas where there is a potential to slip or fall into a body of water. The PFD will be inspected each day prior to use for defects and/or wear and tear. PFD's will be sized appropriately for personnel and used in accordance with the manufacturer's recommendations.

4.3 Biological Hazards

Poisonous snakes, chiggers, mosquitoes, spiders, and bees may be encountered at the Site. This requires that precautious measures be taken when disturbing rocks and other ground features. To greatly reduce insect bites, site personnel should use insect repellent, keep shirts buttoned, sleeves rolled down, and avoid areas with high grass and dense vegetation whenever possible. Snake guards should be used in areas (i.e., rock features, tall grass, etc.) where there is a potential to encounter snakes. Personnel that have allergic reactions to insect stings should inform the SHSO of the condition, carry the appropriate medications with them in the field, and take extra precautions to avoid being stung. Insect repellant should be used when working in vegetated areas.

4.4 Utility Clearance

The location of underground utilities will be identified in the area where soil borings and monitoring wells will be completed. As required by state law, the Texas One Call System, Texas Excavation Safety System, Inc., and/or the Lone Star Notification Center will be contacted. TRC personnel will meet with utility and pipeline representatives prior to commencing subsurface work. Additional utility clearance will consist of reviewing available site maps, visual inspection, corroboration with utility representatives, and probing the sample location with a hand auger or tile probe. Extreme caution must be taken to ensure that no or minimal damage occurs to the Site.

5.0 ACTIVITY-SPECIFIC REQUIREMENTS

5.1 Site Communication

Internal and external communications will be maintained to facilitate quick and smooth response to emergency situations. The following sections describe communication methods.

5.1.1 External Communication

External communication will be accomplished by telephone. The Field Task Leader will keep a cellular phone on-site at all times during investigation field activities.

All personnel must be familiar with the protocol (phone number of emergency organizations, contact person) for contacting public emergency aid teams such as fire departments, ambulance units, and hospitals. These numbers must be posted in the field logbook.

5.1.2 Internal Communication

Internal communication will be used among personnel to alert team members to emergencies, pass along safety information, and maintain site control. Verbal and visual signals will be necessary for internal communication. For effective communication, visual signals/commands must be pre-arranged. Both a primary and backup system are necessary.

5.2 Standard Work Uniform

TRC requires the following work clothing be worn by all on-site personnel:

- Steel-toed boots which have a defined heel, are of the lace-up variety, and are ankle height or taller;
- Safety glasses with permanently attached side shields that meet or exceed American National Standards Institute (ANSI) Z 87.1-1989; and
- Ear plugs when noise levels exceed 85 dBA (i.e., unable to communicate in a normal voice level at arm's length distance from another individual);

5.3 Personal Protective Equipment

In addition to the standard work uniform, the following PPE will be worn within the Exclusion Zone (i.e., area within 25 feet of the work area), as deemed needed.

Level D Protective Uniform

- Steel toed boots;
- Hard hat;
- Hearing protection when noise levels exceed 85 dBA as an 8-hour, time-weighted average;
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Level C Protective Uniform

- Half-face (only for airborne levels of 1 to 10 parts per million [ppm]) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Full-face (only for airborne levels of 10 to 50 ppm) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Field Monitoring and Other Equipment

- Photoionization detector (PID) calibrated with 100 ppm Isobutylene;
- Personal floatation devices;
- Snake guards;
- Wind indicator;
- First aid kit;
- Fire extinguisher.

Deleted: (

Deleted:)

Conditions Warranting Upgrade from Level D to C (Notify SHSO)

- PID readings greater than 1 ppm above background in breathing zone for more than 1 minute; and
- Unusual odors (i.e., organic or aromatic) are noted.

Conditions Warranting Cessation of Work and Leaving Area Immediately (Notify SHSO)

- PID readings exceed 50 ppm above background in breathing zone for greater than 1 minute;
- The PID malfunctions (work may resume when meter is repaired);
- Odors (organic, aromatic, almond, mothball, sweet tarry, sweet pungent, or mint-like) are experienced while wearing respirators (indicating cartridge breakthrough);
- Any member of field team experiences symptoms possibly related to chemical exposure such as dizziness or nausea; and
- Any member of the field team experiences symptoms related to heat or cold stress.

5.4 Work Zones

Zones are marked by barriers in which specific tasks are to be completed. These zones include the exclusion zone, contamination reduction zone, and support zone.

5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible)

At a minimum, the Exclusion Zone will include at least a 25-foot radius around the work area.

5.4.2 Contamination Reduction Zone (CRZ)

As applicable, personnel performing equipment decontamination will wear PPE and follow the procedures for decontamination of equipment and personnel outlined in Section 5.5. All personnel and equipment must pass through the CRZ before leaving the site at the end of each workday. The CRZ will be located at the edge of the Exclusion Zone for personnel and small sampling equipment decontamination. All other equipment (i.e., drilling equipment) will be decontaminated at the Site decontamination area.

5.4.3 Support Zone

The Support Zone is intended as an area that remains free of contamination and is used for staging activities, breaks, and eating. It is extremely important to keep this area clean and free of contamination. Never bring contaminated equipment, articles, or yourself into the Support Zone without going through decontamination procedures first.

5.5 Decontamination Procedures

5.5.1 Equipment Decontamination

Drilling equipment and soil/water sampling equipment shall be fully decontaminated at the contamination reduction zones between and before they are removed from the site. Decontamination for drilling equipment will consist of soap and water wash and potable water rinse or using a high-pressure hot water or steam cleaning unit. Additional scrubbing may be required to remove all encrusted materials. Soil/water sampling equipment shall be cleaned between each use by the following procedures (1) removing any solids to the degree possible with a brush and tap water; (2) washing with a brush using laboratory-grade, non-phosphate detergent and tap water, (3) rinsing with tap water, (4) rinsing with 70-percent-grade isopropyl alcohol, and (5) rinsing with distilled water. All equipment decontamination water will be contained and disposed of properly.

5.5.2 Personnel Decontamination

A personnel decontamination area will be designated in the CRZ, which will be located at the edge of each Exclusion Zone. Personnel will become thoroughly familiar with the following decontamination procedures before work begins in an Exclusion Zone:

- Place equipment and/or samples in designated area, move to the next area (marked with signs), if necessary;
- Wash boots (overboots, if used) and outer gloves using soap (Alconox or equivalent) in water solution, and potable water rinse;
- Remove overboots (if used) and outer gloves, and place in plastic bags (in 30-gallon drum);
- Remove disposable coveralls (if used) and place in plastic bag in drum;
- Remove respirator (if used), thoroughly wash and store in a sealed bag outside the CRZ;

- Remove boots and store in appropriate location;
- Remove disposable inner gloves (if used) and place in plastic bag (in 30-gallon drum); and
- Wash hands and face with water and hand soap (especially before eating or drinking).

All personnel decontamination water will be contained and disposed of properly.

It is recommended that after leaving the Site at the end of the workday that personnel shower immediately at their place of lodging.

5.5.3 Storage Procedures for Expendable Clothing/Equipment

Used, expendable clothing and equipment shall be placed in drums labeled as "Waste PPE Material." Proper disposal of the drums will be coordinated with NORCO.

6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

6.1 Responsibilities of the SHSO

The TRC SHSO is responsible for project safety, decontamination, environmental monitoring, and field medical monitoring activities. The SHSO will ensure that all field personnel comply with the provisions of this HASP. The SHSO has the authority to stop Site work in the event of safety violations or if he/she makes the judgment that an upgraded level of personal protection may be required. **Anyone may stop any operation that threatens the health and safety of personnel.** The SHSO is responsible for designating and marking work zones and for restricting access to Exclusion Zones to properly attired personnel.

The SHSO reports directly to the Project Manager and the HSC. All safety-related questions should be referred to the Project Manager or HSC. The SHSO will keep the CHSO and Project Manager informed of the status of safety-related Site activities and assessments. The SHSO will notify the HSC and Project Manager immediately of any exposure incidents, injuries, accidents, or emergency situations.

Deleted: C
Deleted: O
Deleted: C
Deleted: O
Deleted: C
Deleted: O

6.2 Health and Safety Clearances

TRC personnel authorized to go on-site must meet the following requirements:

- Successfully complete a basic 40-hour health and safety training course and 8 hours of refresher training each year following completion of the basic course;
- At least one field employee must have completed and be current for cardiopulmonary resuscitation (CPR)/First Aid Training; and
- Receive clearances from a TRC-approved physician to wear respiratory protective devices and to work with hazardous materials.

6.3 Distribution of the HASP

A copy of this plan must be provided to each member of the site team covered by the plan and to an authorized representative of each TRC field subcontractor covered by its provisions. Each site team member receiving a copy of the plan must acknowledge receipt of, and express willingness to comply with, the provisions of the plan by signing the attached compliance agreement form. The signed forms must be submitted to the Project Manager or Assistant Project Manager for filing.

6.4 Safety Briefings

All TRC and TRC subcontracted personnel scheduled for fieldwork at the project area will receive an initial health and safety briefing by the SHSO prior to starting work activities. The briefing will include a thorough review of this HASP with particular attention to site-specific health and safety requirements and emergency response procedures. A Job Safety Analysis (JSA) will be completed for the specific tasks and reviewed by personnel prior to performing each task. The blank JSA form is included in Appendix C.

Daily briefings will be conducted by the SHSO on-site to reinforce health and safety awareness and to allow personnel the opportunity for comments or questions. All daily briefings will be documented on the Safety Task Analysis Review (STAR) form included in Appendix D.

6.5 On-Site Presence of Plan

A copy of this HASP must be present at the Site each day that work is in progress.

6.6 Respirators

6.6.1 Usage

The following procedures shall be followed to ensure that air-purifying respirators provide the full protection for which they are rated:

- All employees who are required to wear respirators shall be included in the TRC Medical Monitoring Program and will be medically approved for respirator use before donning a respirator;
- Employees shall wear only respirators for which they have been fit-tested by a competent individual;
- Respirators are to be donned outside the potential hazard zone in which they are planned to be used;
- Prior to donning, the wearer shall inspect the respirator for any physical defects or breakage including, but not limited to:
  - Broken or frayed straps,
  - Improperly seated valves,
  - Dirt,

  - Holes,
  - Distorted face seal, and
  - Opaque face piece on full-facepiece respirators.

- After donning the respirator, the employee shall conduct a negative-pressure fit check to assure that the inlet and exhaust valves, and the respirator cartridges, are properly seated. The employee shall then conduct a positive-pressure fit check to ensure that a proper face piece seal against the face has been obtained. The zone of potentially hazardous exposure is not to be entered until the employee has successfully executed both positive-pressure and negative-pressure fit checks.

- Employees shall immediately evacuate the work area if they experience difficulty breathing, dizziness, or other symptoms of potentially harmful chemical exposure.

- Appropriate respirator cartridges are to be replaced at the beginning of each workday or when breakthrough is detected (whichever comes first).

Note: If at any time during use of a respirator the contaminant of concern, or any other contaminant, is detected by smell, taste or irritation, the employee is to leave the work area immediately and inform the SHSO.

6.6.2 Cleaning

Respirators assigned to an individual employee shall be cleaned by that employee at the end of each day's work involving more than four hours of respirator use and at the end of every week in which the respirator is used for at least two hours. Respirators are to be washed and rinsed in warm water (120 to 140ºF) using a disinfecting solution intended for cleaning respirators, and blot or air-dried. Cleaning solutions, available from respirator manufacturers, will be provided on-site.

6.6.3 Storage

Respirators shall be stored in a manner that protects them from exposure to sunlight, dust, chemicals, and extremes of heat and cold. Respirators shall not be stored in tool kits. The preferred storage procedure for respirators is in individual plastic bags placed in rigid containers to prevent deformation of the face-piece.

7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

7.1 General Work Rules

- Fieldwork will be conducted only during daylight hours unless adequate lighting is provided.
- Smoking will be permitted only at designated areas at the Site.
- Gloves must be worn for jobs that have the potential for hand injury. The type of glove used depends upon the materials or equipment being handled. Leather or fleece gloves must not be used as a substitute for protective chemical gloves.
- In the event of direct skin contact by chemicals of concern, the affected area will be washed immediately with soap and water.
- In the event the PPE is ripped or torn, work shall stop and the PPE shall be removed and replaced as soon as possible.
- Personnel should never climb over or under refuse or obstacles so as to endanger themselves or others.
- Practice contamination avoidance. Never sit down or kneel, never lay equipment on the ground, avoid obvious sources of contamination such as puddles, and avoid unnecessary contact with on-site objects.
- Water samples to be analyzed for various contaminants may need to be, or already are, preserved with nitric acid, hydrochloric acid, or sulfuric acid before shipment to the analytical laboratory. Nitrile or polyvinyl chloride (PVC) gloves should be worn when handling these corrosive chemicals or samples preserved with them. Sample preservation should be performed in a well-ventilated area to avoid potential accumulation of toxic vapors. In circumstances where bad weather or poor lighting does not allow preservation at the site, preservation should be performed at a later time, or not at all. Samples should not be preserved in hotel rooms or other public areas.
- Good housekeeping is the responsibility of every employee. All work areas are to be kept as clean and orderly as possible. It is the responsibility of the persons performing the work to ensure that the work site is kept clean.

- No eating, drinking, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material will be allowed in the Exclusion Zone or Contamination Reduction Zone.

- Hard contact lenses should not be worn in the Exclusion Zone or Contamination Reduction Zone. No jewelry that interferes with protective clothing fit will be worn.

- No beards, sideburns, or mustaches will be allowed that interfere with respirator mask seals, if respirators are used. The SHSO will determine if facial hair presents such an interference.

- Field personnel should remain aware of wind direction throughout the day. Wind socks or flagging will be used for this purpose. Equipment setup and sampling efforts should be directed to the greatest extent possible so that workers remain upwind of potential sources of exposure.

- No drilling or earth moving activities will be permitted during periods of thunderstorms and lightning.

- Machinery, tools, material, electrical installation, and other equipment and work practices that are judged unsafe, or not in compliance with this HASP, OSHA, or other applicable standards, shall be removed or replaced or the work practice corrected. Only employees qualified by training and/or experience will operate equipment and machinery.

- Before excavating or sampling, an Exclusion Zone must be established around the equipment after it has been positioned. The boundary of the Exclusion Zone shall extend at least 25 feet from the work area and, if practical, marked with stakes spaced no more than 20 feet apart and connected with fluorescent orange tape. Only authorized personnel will be allowed to enter Exclusion Zones.

- Representatives of federal, state, and local agencies; newspaper and other news media; the public; and all other individuals who are not a part of the TRC site team are classified as visitors and will not be permitted to enter Exclusion Zones under control by TRC, unless they can prove that they have met OSHA medical and training requirements for hazardous waste operation, have available to them PPE equivalent to that specified in this plan, and obtain permission from the TRC site or project manager.

7.2 Documentation

The following must be kept on file by the SHSO:

- Copies of the TRC Employee Health and Safety Compliance Agreement (attached) documenting health and safety briefings and personnel signatures;
- Records of usage and calibration of environmental monitoring equipment;
- Documentation of employee injury/exposure incidents;
- Records of safety violation and remedial actions taken;
- Documentation of subcontractors' compliance with TRC for health and safety training and medical monitoring.

A health and safety field logbook will be maintained on-site and should contain such information as weather conditions, employees and visitors on-site, level of personal protection, monitoring instrument readings (average, peak, and background), subjects discussed during site health and safety briefings, and names of attendees. All field personnel, including subcontractors, must sign the TRC Employee Health and Safety Compliance Agreement indicating that they have attended a briefing by the SHSO, and that they understand and agree to abide by the provisions of this HASP, in addition to the provisions of their own health and safety plan prior to working at the project area.

7.3 Site Specific Requirements

7.3.1 Housekeeping

Good housekeeping is of the utmost importance in the prevention of accidents, injuries, and fires. Clean-up will be conducted on a daily basis.

7.3.2 Spills

No contaminants (i.e., oils, diesel fuel, gasoline, etc.) are to be discharged at the project area. Should a release occur, it must be reported by the quickest means possible to the NORCO representative. Decontamination water is considered to be contaminated and should not be released onto the ground. All decontamination water spills should be reported to the TRC Field Team Leader for determination of appropriate action.

7.3.3 Operation of Vehicles and Equipment

Equipment and vehicles must operate at a safe speed while being aware of operating conditions and other equipment and personnel working in close proximity. Extreme caution must be exercised at all grade crossings.

8.0 MONITORING

TRC anticipates the potential for a risk of COPC vapor inhalation exposure; therefore, ambient air monitoring will be conducted as part of this Health and Safety Plan. Additionally, pH monitoring will be conducted during investigation activities in AOC 1N and AOC-1S?.

8.1 Monitoring Instruments

A PID with a 10.6 electron volt lamp, calibrated with 100 ppm isobutylene, will be used to monitor breathing zone organic vapors. Calibration of the PID will be documented on the *Field Equipment Calibration/Maintenance Log* form including in Appendix E. The PID will read total hydrocarbon vapor levels. The action levels discussed below have been calculated taking into account known COPCs present at the Site and respective PELs.

At this time, TRC does not anticipate the potential for hydrogen sulfide (H_2S) gas inhalation exposure; therefore, continuous air monitoring for H_2S will not be conducted.

8.2 Action Levels

Respirators must be donned by all persons working in any Exclusion Zone in which the average PID reading is 1 ppm above background in the breathing zone (for greater than 1 minute). Half-face respirators will be worn from 1 to 10 ppm and full-face respirators will be worn from 10 to 50 ppm. The Exclusion Zone must be evacuated whenever the average PID reading equals or exceeds 50 ppm above background in the breathing zone for greater than 1 minute. PID action levels are listed in the table below. Air monitoring results will be documented on the *Air Quality Monitoring Record* form located in Appendix E.

If evacuation becomes necessary, the SHSO shall take charge and direct personnel to move from the Exclusion Zone to a predetermined area and to stay there. The SHSO shall first determine that all personnel have left the Exclusion Zone and are safe, then consult the HSC on how to proceed.

Deleted: C

Deleted: O

Action Levels for Air Monitoring

Equipment Type		Monitoring, Action Levels, and PPE
ORGANIC VAPORS		
☒	PID	Reading > 1 ppm or "Background" sustained for 1 minute, upgrade to Level C with half-face APR, Notify TRC SHSO.
☐	FID	Reading > 10 ppm sustained for 1 minute, upgrade respiratory protection to full-face APR, Notify TRC SHSO.
☒	Detector Tube Type: benzene	Reading > 50 ppm sustained for 1 minute, shutdown work activities, evacuate the area, move upwind, Notify the TRC SHSO.

Deleted: ☐

8.3 pH Monitoring

Monitoring of groundwater and wastewater will be required at least daily during excavation activities to evaluate pH levels. Monitoring will also be performed in the event additional or new flows and/or sources of groundwater or wastewater are identified. Monitoring will be performed using either pH paper or a pH meter (in the field or a sample taken to the Laboratory). If a pH meter is utilized, the meter must be calibrated daily and the calibration results documented in the project field notes.

Monitoring will be performed in general accordance with the following procedures:

1. If pH paper is used, the paper will be placed so it comes in contact with the liquid for evaluation. The paper will be allowed to change colors. The color of the paper will be compared to the pH color chart included with the pH to determine the approximate pH. The pH value will be recorded in the project field notes.

2. If a pH meter is used, the pH probe will be placed in the liquid to be evaluated. The results will be read from the pH meter and recorded in the project field notes.

If pH is less than 5 or greater than 9, then proper actions must be taken for conditions that are considered "acidic" or "caustic."

9.0 EMERGENCY PROCEDURES

Emergency procedures listed in this HASP are designed to give the field team instructions in handling medical emergencies, fire, and explosions.

9.1 Medical Injuries

Medical problems that can occur on-site need to be handled competently and quickly. Each field team member should be aware of the instructions and information given below:

- Seek professional medical attention for personnel that are bleeding severely, experiencing intense pain, unconscious, or not breathing. Each member of the site team should know how to call for an ambulance.
- If you get anything in your eyes (chemical or dust), flood them with water for 15 minutes. Be sure to tell the SHSO. The SHSO will make sure that the victim washes the eyes for the full 15 minutes.
- Do not remove objects that are impaled (stuck) in the eye.
- Always seek medical attention for eye injuries.
- Stop bleeding with direct pressure. Place bandage over the wound and press down with your hand. If possible, raise the bleeding extremity above the level of the heart. Use a tourniquet ONLY in extreme cases when you are not able to stop severe bleeding.
- If you contact the waste, wash the affected area with soap and water immediately.

9.2 Fire and Explosion Response Procedures

Fires can be caused by the drilling rig activity. The TRC field team should verify that the drilling rig has a fire extinguisher on hand at all times. The procedures for using a fire extinguisher is to **pull** the safety pin, **aim** the extinguisher at the base of the flames and discharge the extinguisher by **squeezing** and **sweeping** the flames from a distance of 6 feet (PASS-pull, aim, squeeze, sweep). Move in closer as the flames are put out.

- Never use water on an electrical fire or a solvent fire. All extinguishers should be dry chemical labeled “Class A, B, or C”; and
- Keep decontamination solvents well away from the steam cleaner.

9.3 Emergency Medical Information

TRC Site Health & Safety Officer (SHSO):

Alonzo Arredondo (979) 229-3521

Commented [TC8]: Update phone number

TRC Corporate Health and Safety Director:

Ron Severson (860) 298-6256 or (860) 906-4656

TRC Health and Safety Coordinator:

Matt Webre (512) 684-3140 or (512) 567-7936

TRC Safety Contact (Austin):

Matt Webre (512) 684-3140 or (512) 567-7936

Project Managers (Austin):

Stephen Halasz (512) 684-3351 or (512) 745-6155

9.3.1 First Aid

First aid at the Site will consist of a first aid kit, which will be brought to the Site daily by the SHSO and be kept at the edge of the Exclusion Zone during field activities.

9.3.2 Hospitals

Personnel with any injuries shall be taken to Care Regional Medical Center located approximately 5 miles northeast of the project area. A map and driving directions from Falcon Refinery to Care Regional Medical Center are provided in Appendix F.

Deleted: C

9.4 Incident Investigation

It is important that all accidents and incidents that result in injury, illness, or medical treatment be reported immediately. Reporting consists of calling the Teleclaim Center and providing information on the injury. The Teleclaim Center will complete the first report of injury and file it accordingly. Copies will be sent to the Safety Director. Supervisors are required to complete the Supervisor's Report of Accident included in this section. It is TRC's responsibility to investigate each incident, file appropriate paperwork and conduct a follow-up analysis of each incident.

Reporting Phone Numbers

TRC Corporate Health and Safety Director: (860) 298-6256

Hartford Insurance Teleclaim: 1-800-327-3636
Human Resources Director: 1-800-365-8254

Any work related injury or illnesses that requires professional medical assistance should be reported immediately. Failure to promptly notify of a work related injury could make the claim questionable and subject to stricter review.

After medical attention has been administered, an incident investigation will be completed. The TRC Project Manager will also complete the *TRC Incident Report Form* located in Appendix G.

9.4.1 Emergency Numbers

Service	Address	Phone
Fire Department:	Ingleside Fire Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-7422
Police Department:	Ingleside Police Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-2531
Hospital:	Care Regional Medical Center 1711 West Wheeler Avenue Aransas Pass, TX 78336	**911** (361) 758-8585
Nearest phone: Cellular phone	Alonzo Arredondo Field Task Leader/SHSO	(979) 229-3521

Commented [TC9]: Update phone number

Emergency Services are accessed through 911

10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP

The following TRC site personnel have read, understand, and agree to comply with all of the health and safety directives for the Falcon Refinery Superfund Site.

Crew	Date
.	

In addition, the following contractor personnel have been briefed on the site hazards, have reviewed their own HASP (per 29 CFR 1910.120(i)(2), have completed the required 40-hour OSHA Training (per 29 CFR 1926.21 and 1910.120(e), have been properly respirator fit tested, and are involved in their company's Medical Surveillance Program (per 29 CFR 1910.120(f)). They hereby acknowledge having met all the above stated requirements for working at the Falcon Refinery Superfund Site.

Contractor Personnel	Company	Date

APPENDIX A

Potential Chemical Hazards

CHEMICAL HAZARD DATA								
			TWA					
Chemical Name	Carcinogen (Y/N)	Skin Absorption Hazard (Y/N)	OSHA PEL	NIOSH REL	ACGIH TLV	OSHA STEL	IDLH	Routes of Exposure
Benzene	Y	Y	1.0 ppm	0.1 ppm	0.5 ppm	5 ppm	500 ppm	I,S,G,C
Toluene	N	Y	200 ppm	100 ppm	50 ppm	300 ppm	500 ppm	I,S,G,C
Xylene(s)	N	Y	100 ppm	150 ppm	100 ppm	N/A	900 ppm	I,S,G,C
Ethylbenzene	N	N	100 ppm	100 ppm	100 ppm	N/A	800 ppm	I,G,C

TWA = Time-Weighted Average
PEL = Permissible Exposure Limit
REL = Recommended Exposure Limit identifying NIOSH
TLV = Threshold Limit Value identifying ACGIH
STEL = Short Term Exposure Limit
IDLH = Immediate Dangerous to Life or Health
Routes of Exposure: I = inhalation, S = skin absorption, G = ingestion, C = skin contact
ppm = parts per million
mg/m^3 = milligrams per cubic meter (of air)

APPENDIX B

Material Safety Data Sheets

INSERT MSDS'S HERE

APPENDIX C

Job Safety Analysis (JSA) Form

APPENDIX D

Safety Task Analysis Review (STAR) Form

APPENDIX E

Air Monitoring Forms

APPENDIX F

Map/Route to the Nearest Hospital

Driving Directions from the Site (Former Falcon Refinery (1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road, Ingleside, San Patricio County, Texas) to Care Regional Medical Center, 1711 West Wheeler Avenue, Aransas Pass, Texas 78336. Phone: (361) 758-8585

1. Head northeast on Farm to Market Rd 2725 toward Co Rd 146/Sunray Rd. 0.3 mi
2. Take the 1st left onto Co Rd 146/Sunray Rd. 0.9 mi
3. Continue onto Highland St. 0.4 mi
4. Turn right onto Ave A. 3.5 mi
5. Turn right onto W Wheeler Ave Destination will be on the right. 367 ft

Deleted: C

APPENDIX G

TRC Incident Report Form

Health and Safety Plan

Falcon Refinery Superfund Site

Ingleside, San Patricio County, Texas

Prepared for:

National Oil Recovery Corporation
3717 Bowne Street
Flushing, NY 11354

Prepared by:

505 East Huntland Drive, Suite 250
Austin, Texas 78752

Stephen Halasz, Project Manager

August 2011

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1-1
2.0 ADMINISTRATIVE INFORMATION 2-1
2.1 Health and Safety Plan Requirement Rationale 2-1
2.2 Health and Safety Plan Approval 2-1
3.0 PROJECT DESCRIPTION 3-1
3.1 Facility Description 3-1
3.1.1 Areas of Concern 3-1
3.2 TRC Field Activities 3-3
4.0 SITE HAZARDS 4-1
4.1 Chemical Hazards 4-1
4.2 Physical Hazards 4-1
4.2.1 Heat Stress 4-1
4.2.2 Cold Stress 4-3
4.2.3 Sunburn 4-4
4.2.4 Exposure to Excessive Noise 4-4
4.2.5 Heavy Equipment and Motor Vehicle Operation 4-5
4.2.6 Excavations and Trenches 4-6
4.2.7 Slips, Trips, and Falls 4-6
4.2.8 Manual Lifting 4-7
4.2.9 Hand and Power Tools 4-7
4.2.10 Weather-Related Hazards 4-8
4.2.11 Drowning Hazards 4-8
4.3 Biological Hazards 4-9
4.4 Utility Clearance 4-9
5.0 ACTIVITY-SPECIFIC REQUIREMENTS 5-1
5.1 Site Communication 5-1
5.1.1 External Communication 5-1
5.1.2 Internal Communication 5-1
5.2 Standard Work Uniform 5-1
5.3 Personal Protective Equipment 5-2

5.4 Work Zones 5-3
5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible) 5-3
5.4.2 Contamination Reduction Zone (CRZ) 5-3
5.4.3 Support Zone 5-4
5.5 Decontamination Procedures 5-4
5.5.1 Equipment Decontamination 5-4
5.5.2 Personnel Decontamination 5-4
5.5.3 Storage Procedures for Expendable Clothing/Equipment 5-5
6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS 6-1
6.1 Responsibilities of the SHSO 6-1
6.2 Health and Safety Clearances 6-1
6.3 Distribution of the HASP 6-1
6.4 Safety Briefings 6-2
6.5 On-Site Presence of Plan 6-2
6.6 Respirators 6-2
6.6.1 Usage 6-2
6.6.2 Cleaning 6-3
6.6.3 Storage 6-3
7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS 7-1
7.1 General Work Rules 7-1
7.2 Documentation 7-3
7.3 Site Specific Requirements 7-3
7.3.1 Housekeeping 7-3
7.3.2 Spills 7-3
7.3.3 Operation of Vehicles and Equipment 7-4
8.0 MONITORING 8-1
8.1 Monitoring Instruments 8-1
8.2 Action Levels 8-1
8.3 pH Monitoring 8-2
9.0 EMERGENCY PROCEDURES 9-3
9.1 Medical Injuries 9-3

9.2 Fire and Explosion Response Procedures 9-3
9.3 Emergency Medical Information 9-4
9.3.1 First Aid 9-4
9.3.2 Hospitals 9-4
9.4 Incident Investigation 9-4
9.4.1 Emergency Numbers 9-6
10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP 10-1

APPENDIX A: Potential Chemical Hazards
APPENDIX B: Material Safety Data Sheets
APPENDIX C: Job Safety Analysis (JSA) Form
APPENDIX D: Safety Task Analysis Review (STAR) Form
APPENDIX E: Air Monitoring Forms
APPENDIX F: Map/Route to the Nearest Hospitals
APPENDIX G: TRC Incident Report Form

1.0 INTRODUCTION

This Health and Safety Plan (HASP) outlines the health and safety requirements for on-site activities associated with soil and groundwater investigation activities within National Oil Recovery Corporation's (NORCO's) former Falcon Refinery located 1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road near Ingleside, San Patricio County, Texas (the Site). The Site is bordered by wetlands to the northeast and southeast, residential areas to the north and southwest, an abandoned refinery to the northwest, and a construction company to the southwest.

This HASP has been developed in conformance with the directives and requirements of the TRC *Health and Safety Policy and Procedure Manual*, October 2010, and 29 CFR 1910.120(i)(2). This HASP and any subsequent addenda will apply to all TRC personnel and subcontractors who are involved with on-site activities at the Site. By implementing this plan, TRC does not assume any liability for the health and safety of non-TRC personnel involved in the activities performed during this project.

TRC field personnel and TRC subcontracted field personnel must participate in medical monitoring, respirator fit testing, and hazardous waste training programs as specified by Occupational Safety and Health Administration (OSHA) regulations (per 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response [HAZWOPER]).

All work must be conducted in compliance with applicable OSHA regulations, including 29 CFR 1910 (General Industry Standards) and 29 CFR 1926 (Construction Industry Standards).

2.0 ADMINISTRATIVE INFORMATION

Site Name: Falcon Refinery Superfund Site

Site Location: Ingleside, San Patricio County, Texas

Project Title: Phase II Remedial Investigation/Feasibility Study

Client: National Oil Recovery Corporation

Project Manager: Stephen Halasz

TRC Task Leader(s):

Corporate Health & Safety Officer (CHSO): Ron Severson

Health & Safety Coordinator (HSC): Matt Webre

Assistant Project Manager: TBD

Field/Site Health & Safety Officer (SHSO): Alonzo Arredondo

2.1 Health and Safety Plan Requirement Rationale

This HASP is required due to past and present conditions, which may have existed at the Site. The chemicals of potential concern (COPCs) include metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides/herbicides.

2.2 Health and Safety Plan Approval

Health & Safety Officer: Matt Webre

Signature:_____ Date:_____

3.0 PROJECT DESCRIPTION

The following sections describe the Site, specifically the areas of concern (AOCs), and proposed field activities.

3.1 Facility Description

The Site consists of a refinery which operated intermittently and is currently inactive. When in operation, the refinery had a capacity of 40,000 barrels per day and the primary products consisted of naphtha, jet fuel, kerosene, diesel, and fuel oil.

3.1.1 Areas of Concern

Seven AOCs have been identified as potential areas impacted by COPCs. Three AOCs are identified on-site and four are off-site. The AOCs are summarized in Table 1 and shown on Figure 1.

AOC-1 Former Operational Units

AOC-1N and AOC-1S includes the entire North site, former operational units (OU) areas of the South site, a drum disposal area, and an area where metal waste was discarded. Preliminary COPCs to be screened at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

AOC-2 On-Site Non-Operational Areas

Areas of the refinery not used for operations or storage and with no record of releases are included in AOC-2. Although no COPCs were anticipated in AOC-2, the screened COPCs included metals, VOCs, and SVOCs. Potentially affected media include soil and possibly groundwater.

AOC-3 Wetlands

Included in AOC-3 are wetlands immediately adjacent to the site bordered by Bay Avenue, Bishop Road, and a dam on the upstream side; wetlands located between Bishop Road, Sunray Road, Bay Avenue, and residences along Thayer Avenue; and wetlands between Sunray Road, residences along FM 2725, Gulf Marine Fabricators, Offshore Specialty Fabricators, and the outlet of the wetlands into the Intracoastal Waterway.

There is one active and several abandoned pipelines leading from the refinery to the current and historic barge dock facilities. During June 2006, the abandoned pipelines

were cut, the contents of the pipelines were removed, and plates were welded on the pipeline ends to seal them.

Wetland assessment activities will evaluate releases from the refinery, including any unpermitted wastewater effluent discharges, two known pipeline releases, and possible releases from pipelines leading from the refinery to the current and historic barge dock facilities.

There have been documented spills of hydrocarbons, waste and volatile organics. As a result, the screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, herbicides, and pesticides. Potentially affected media include sediment, soil, surface water and groundwater.

AOC-4 Current Barge Docking Facility

Included in AOC-4 is the current barge docking facility, which is approximately 0.5 acres and is located on the Intracoastal Waterway. The fenced facility, which is connected to the refinery by pipelines, is used to load and unload barges. Historically, crude oil and refined products were loaded and unloaded at this docking facility.

There have been no reported releases nor is there evidence of spills associated with this AOC. The screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and possibly groundwater.

AOC-5 Intracoastal Waterway

Sediments and surface water adjacent to the current and historic barge dock facilities are included in this AOC. The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include sediment and surface water. Samples will be obtained from a boat.

AOC-6 Thayer Road

Included in this AOC is the neighborhood along Thayer Road, located north of Bishop Road across from the refinery (AOC-1S). The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater. No sampling is required within AOC-6 at this time.

AOC-7 Bishop Road

Included in this AOC is the neighborhood along Bishop Road, located south of Bishop Road across from AOC-1N. The screened COPCs at this AOC include metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater. No sampling is required within AOC-6 at this time.

3.2 TRC Field Activities

TRC will conduct the following activities on-site including: (1) surface and subsurface soil sampling; (2) installation of permanent monitoring wells; and (3) groundwater sampling. Off-site activities will include: (1) surface and subsurface soil sampling; (2) installation of permanent? monitoring wells; (3) surface and groundwater sampling; (4) sediment sampling in the wetlands and bay; and (5) biota sampling.

Table 1. Areas of Concern

Figure 1. Site Map

4.0 SITE HAZARDS

The following site hazards are present or could be encountered at the project area.

4.1 Chemical Hazards

Due to the storage of naphtha, jet fuel, kerosene, diesel, and fuel oil, COPCs at the Site include metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Specifically, benzene, toluene, ethylbenzene, and xylene (BTEX) is of primary concern for this HASP. Site personnel should avoid touching, breathing or ingesting any media encountered on-site. Nitrile gloves must be worn at all times when in contact with soil, water, and/or hydrocarbons. Section 8 describes in detail procedures that will be followed in ensure a safe breathing zone and protection from vapors of COPCs. Appendix A summarizes the various constituents of concern, the Permissible Exposure Levels (PELs), and the major potential health effects of each. Material Safety Data Sheets (MSDSs) for the COPCs are located in Appendix B.

4.2 Physical Hazards

4.2.1 Heat Stress

Heat stress results when the body is unable to get rid of excess heat. Stages of heat stress are heat cramps, heat exhaustion, and heat stroke. The latter can be fatal. Heat stress is of particular concern when workers must wear chemical protective clothing and ambient air temperatures are high, because protective clothing reduces evaporative body cooling. If ambient air temperatures at the site reach 70°F, heat stress symptoms should be watched for and control measures applied, if they appear.

These symptoms include:

- Heat rash, which may result from continuous exposure to heat or humid air.
- Heat cramps which are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include:
  - Muscle spasms, and
  - Pain in the hands, feet, and abdomen.
- Heat exhaustion, which may occur from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

  - Pale, cool, moist skin,
  - Heavy sweating,
  - Dizziness,
  - Nausea, and
  - Fainting.

- Heat stroke is the most serious form of heat stress in which temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms include:
  - Red, hot, unusually dry skin,
  - Lack of or reduced perspiration,
  - Nausea,
  - Dizziness and confusion,
  - Strong, rapid pulse, and
  - Coma.

A worker who exhibits any of these symptoms will be immediately relieved of responsibilities and told to consume electrolyte fluid or cool water while resting in a shaded area. The individual should not return to work until symptoms are no longer recognizable. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored for any increase in heart rate or body temperature for the remainder of their shift. In addition, the worker will be requested to consume electrolyte fluid or cool water every hour.

The SHSO will monitor workers hourly when:

- Symptoms of heat stress are reported or observed;
- Ambient temperatures exceed 70º F and workers are dressed in impervious clothing; or
- Ambient temperatures exceed 90º F and workers are dressed in normal clothing.

Workers will be monitored for heat stress conditions by measuring the heart rate (HR) by radial (wrist) pulse for 30 seconds after one minute of rest. The HR after one minute of rest should not exceed 110 beats per minute. If HR is higher, the next work period shall be shortened by 33%, while the rest period length remains the same. If the pulse rate is still 110 beats per minute after one minute of rest in the next rest period, the following work cycle will be shortened by another 33 percent. This shortening of the work period must continue until the worker's HR is no greater than 110 beats per minute.

4.2.2 Cold Stress

Types of cold stress include general body coldness, hypothermia, and frostbite. The latter two require medical attention. Hypothermia can be fatal while frostbite can result in the amputation of limbs. If ambient air temperatures at the site reach below 39°F, cold stress symptoms should be watched for and control measures applied, if they appear. These symptoms include:

- General body coldness, which is caused by a drop in skin temperature. Signs and symptoms include shivering, numbness in extremities, and loss in manual dexterity and strength.
- Hypothermia is a decrease in deep body temperature (normally 98.6ºF). Signs and symptoms include uncontrollable shivering, slurred speech and memory lapses, irregular breathing, and drowsiness.
- Frostbite occurs when there is inadequate circulation and/or insulation of a body part. Signs and symptoms include skin color change (white or grayish yellow to reddish violet to black), and pain initially, followed by cold and numbness in the affected part.

Preventative measures will help avert serious illness due to cold stress. Appropriate clothing will be worn on the basis of the exterior temperature, wind chill factor, and the level of work. Precautions will be taken to minimize exposed flesh and clothing should be layered as appropriate. A worker who exhibits any symptoms of cold stress will be immediately relieved of responsibilities. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored. In addition, the following guidelines will be followed.

Work Below 39ºF (4ºC)

- The employees shall wear cold protective clothing appropriate for the level of cold and physical activity.
- If the air temperature at the site is decreased by wind or artificial ventilation, the cooling effect of the wind will be reduced by shielding the work area or by wearing a removable outer windbreak garment.
- If the clothing on the employee may become wet on the job site, the outer layer of the clothing will be water repellent.
- Workers who become immersed in water or whose clothing becomes wet will immediately be provided with a change of clothing and treated for hypothermia.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve.

TRC does not anticipate cold stress as a factor during these field activities.

4.2.3 Sunburn

Prolonged exposure of the skin to the sun, even on overcast days, can result in sunburn, which can be severe enough to be incapacitating, especially with fair-skinned individuals. Repeated sun burning can eventually cause premature aging of the skin and skin cancer in individuals. Always wear clothing to reduce the amount of exposed skin and frequently use sun block creams or lotions.

4.2.4 Exposure to Excessive Noise

Overexposure to noise can result in hearing loss. If it is difficult to hear normal speech when the speaker is 3 feet from the listener, for more than 4 hours a day, the noise level must be measured. If it exceeds 85 decibels (dBA) as an 8-hour, time-weighted average, hearing protection will be worn in accordance with 29 CFR 1910.95. If a sound level meter is not available, then the noise level will be assumed to be 85 dBA if one cannot communicate at normal voice level within 3 feet from another person. If this is the case, then appropriate hearing protection will be donned.

4.2.5 Heavy Equipment and Motor Vehicle Operation

Only qualified personnel will operate heavy equipment and motor vehicles. Equipment will not be operated in a manner that will endanger persons or property. All heavy equipment and motor vehicles will be operated in accordance with the manufacturer's instructions and 29 CFR 1926 Subpart O.

The following inspection and repair controls will also be implemented during this project:

- Equipment and vehicles will be inspected by the operator on a daily basis, prior to starting work.
- All heavy equipment exhaust systems will be checked daily and confirmed to have no embers or sparking.
- Any unsafe equipment or vehicles will be removed from service until safety defects can be corrected.
- Equipment will be shut down and locked out before maintenance or repairs are made.

Operators will follow these rules:

- Motor vehicles and heavy equipment will be shut down during re-fueling operations.
- Operators will not leave their equipment unattended while it is running.
- Whenever equipment is parked, the parking brake will be set. If the equipment is parked on an incline, in addition to setting the parking brake, the wheels will also be chocked.
- Operators will be trained and experienced in the use of their equipment.
- Vehicles or equipment will not be operated in a careless or unsafe manner.
- Personnel will wear appropriate personal protective equipment (PPE) when working with heavy equipment. Dermal protection must fit properly and be taped to prevent "caught on" or "caught between" hazards.

Required equipment features include:

- All heavy equipment will have an audible backup alarm and an audible warning device (i.e., a horn).
- Each piece of heavy equipment will have a portable fire extinguisher.

When working with moving equipment:

- One designated person will give signals to the operators of both equipment and vehicles in any work area.
- Personnel will stay clear of the operational area of the equipment. Workers are not permitted to stand directly underneath any load or piece of equipment, i.e., man-lift, backhoe bucket, crane load, etc.
- Work areas will be adequately illuminated.

4.2.6 Excavations and Trenches

Compliance with excavation and trenching standards established by OSHA regulation 29 CFR 1926 Subpart P is a requirement of this HASP, as well as the compliance with the requirements presented below.

- Trenches and other large holes must be marked with yellow caution tape at any time the excavation is left unattended. The caution tape must be placed no less than 2 feet from the edge of the excavation
- Personnel will not be allowed to enter an excavation greater than 4 feet deep unless the excavation is properly sloped.
- Excavation spoil shall be placed a minimum of 3 feet from the edge of the excavation.

4.2.7 Slips, Trips, and Falls

Slipping and tripping hazards may be encountered at the site. Footwear appropriate for walking over mud and rocks should be worn. In addition, proper site housekeeping and removal of trash and debris will reduce slipping and tripping hazards. Proper site housekeeping will be the responsibility of all site personnel, and the SHSO will make regular inspections to evaluate if the work area is adequately clean.

4.2.8 Manual Lifting

Back injuries are among the leading occupational injuries reported by industrial workers. Using proper manual lifting techniques can reduce back injuries such as pulls and disc impairments. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their back.

If the load is too heavy, do not lift it alone. Individual heavy lifting must be avoided. Lifting is always easier when performed with another person. Assistance should always be used when necessary.

4.2.9 Hand and Power Tools

Dangerous hand tools (such as saws, hammers, axes, knives, shovels) and power tools (such as chain saws, power augers, drill motors, chippers, water pumps, and weed trimmers) may be used during some investigation activities.

All hand and power tools will be maintained in a safe condition and in good repair. Hand and power tools will be used in accordance with 29 CFR 1926, Subpart I (1926.300 through 1926.307). Workers are not permitted to bring unsafe tools on-site. All tools will be used, inspected, and maintained in accordance with the manufacturer's instructions. Throwing tools or dropping tools to lower levels is prohibited. Hand and power tools will be inspected, tested, and determined to be in safe operating condition prior to each use. Periodic safety inspections of all tools will be conducted by the tool operator, the Site Manager or the SHSO to evaluate if the tools are in good condition and are being properly maintained. Any tool that fails an inspection will be immediately removed from service and tagged with a "Do Not Use" sign.

Workers using hand and power tools who are exposed to falling, flying, abrasive, or splashing hazards will be required to wear PPE. Eye protection must always be worn when working on-site. Additional eye and face protection, such as safety goggles or face shields, may also be required when working with specific hand and power tools. Workers using tools in areas where there is a head injury hazard will wear hard hats. Hearing protection will always be worn when working with power tools, and additional hearing protection may be required when working with certain power tools if noise levels are excessively high. Workers using tools that may subject their hands to an injury, such as cuts, abrasions, punctures, or burns, will wear protective gloves. Loose or frayed clothing, dangling jewelry, or loose long hair will not be worn when working with power tools.

Electric power-operated tools require ground fault circuit interceptors (GFCI). Electric power-operated tools will be double insulated or grounded, and equipped with an on/off switch. Guards must be provided to protect the operator and other nearby workers from hazards such as in-going nip points, rotating parts, flying chips, and sparks. All reciprocating, rotating, and moving parts of tools will be guarded if contact is possible. Removing machine guards is prohibited.

Circular saws must be equipped with guards that completely enclose the cutting edges and have anti-kickback devices. All planer and joiner blades must be fully guarded. The use of cracked, bent, or otherwise defective parts is prohibited. Chain saws must have an automatic chain brake or kickback device. The worker operating the chain saw will hold it with both hands during cutting operations. A chain saw must never be used to cut above the operator's shoulder height. Chain saws will not be re-fueled while running or hot. Power saws will not be left unattended.

Operators of these tools will be instructed on the proper operation and safety precautions prior to operating such equipment. Only qualified workers will operate pneumatic tools, powder-actuated tools, and abrasive blasting tools. No one shall operate equipment that is in ill repair.

4.2.10 Weather-Related Hazards

Weather-related hazards include the potential for heat, electrical storms, treacherous weather-related working conditions, or limited visibility. These hazards correlate with the season in which Site activities occur. Outside work will be suspended during electrical storms. In the event of other adverse weather conditions, the Field Team Leader will determine if work can continue without endangering the health and safety of on-site personnel.

4.2.11 Drowning Hazards

According to OSHA 29 CFR 1917.126, personnel will be required to wear a personal floatation device (PFD) when conducting work in areas where there is a potential to slip or fall into a body of water. The PFD will be inspected each day prior to use for defects and/or wear and tear. PFD's will be sized appropriately for personnel and used in accordance with the manufacturer's recommendations.

4.3 Biological Hazards

Poisonous snakes, chiggers, mosquitoes, spiders, and bees may be encountered at the Site. This requires that precautious measures be taken when disturbing rocks and other ground features. To greatly reduce insect bites, site personnel should use insect repellent, keep shirts buttoned, sleeves rolled down, and avoid areas with high grass and dense vegetation whenever possible. Snake guards should be used in areas (i.e., rock features, tall grass, etc.) where there is a potential to encounter snakes. Personnel that have allergic reactions to insect stings should inform the SHSO of the condition, carry the appropriate medications with them in the field, and take extra precautions to avoid being stung. Insect repellant should be used when working in vegetated areas.

4.4 Utility Clearance

The location of underground utilities will be identified in the area where soil borings and monitoring wells will be completed. As required by state law, the Texas One Call System, Texas Excavation Safety System, Inc., and/or the Lone Star Notification Center will be contacted. TRC personnel will meet with utility and pipeline representatives prior to commencing subsurface work. Additional utility clearance will consist of reviewing available site maps, visual inspection, corroboration with utility representatives, and probing the sample location with a hand auger or tile probe. Extreme caution must be taken to ensure that no or minimal damage occurs to the Site.

5.0 ACTIVITY-SPECIFIC REQUIREMENTS

5.1 Site Communication

Internal and external communications will be maintained to facilitate quick and smooth response to emergency situations. The following sections describe communication methods.

5.1.1 External Communication

External communication will be accomplished by telephone. The Field Task Leader will keep a cellular phone on-site at all times during investigation field activities.

All personnel must be familiar with the protocol (phone number of emergency organizations, contact person) for contacting public emergency aid teams such as fire departments, ambulance units, and hospitals. These numbers must be posted in the field logbook.

5.1.2 Internal Communication

Internal communication will be used among personnel to alert team members to emergencies, pass along safety information, and maintain site control. Verbal and visual signals will be necessary for internal communication. For effective communication, visual signals/commands must be pre-arranged. Both a primary and backup system are necessary.

5.2 Standard Work Uniform

TRC requires the following work clothing be worn by all on-site personnel:

- Steel-toed boots which have a defined heel, are of the lace-up variety, and are ankle height or taller;
- Safety glasses with permanently attached side shields that meet or exceed American National Standards Institute (ANSI) Z 87.1-1989; and
- Ear plugs when noise levels exceed 85 dBA (i.e., unable to communicate in a normal voice level at arm’s length distance from another individual);

5.3 Personal Protective Equipment

In addition to the standard work uniform, the following PPE will be worn within the Exclusion Zone (i.e., area within 25 feet of the work area), as deemed needed.

Level D Protective Uniform

- Steel toed boots;
- Hard hat;
- Hearing protection when noise levels exceed 85 dBA as an 8-hour, time-weighted average;
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Level C Protective Uniform

- Half-face (only for airborne levels of 1 to 10 parts per million [ppm]) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Full-face (only for airborne levels of 10 to 50 ppm) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Field Monitoring and Other Equipment

- Photoionization detector (PID) calibrated with 100 ppm Isobutylene;
- Personal floatation devices;
- Snake guards;
- Wind indicator;
- First aid kit;
- Fire extinguisher.

Conditions Warranting Upgrade from Level D to C (Notify SHSO)

- PID readings greater than 1 ppm above background in breathing zone for more than 1 minute; and
- Unusual odors (i.e., organic or aromatic) are noted.

Conditions Warranting Cessation of Work and Leaving Area Immediately (Notify SHSO)

- PID readings exceed 50 ppm above background in breathing zone for greater than 1 minute;
- The PID malfunctions (work may resume when meter is repaired);
- Odors (organic, aromatic, almond, mothball, sweet tarry, sweet pungent, or mint-like) are experienced while wearing respirators (indicating cartridge breakthrough);
- Any member of field team experiences symptoms possibly related to chemical exposure such as dizziness or nausea; and
- Any member of the field team experiences symptoms related to heat or cold stress.

5.4 Work Zones

Zones are marked by barriers in which specific tasks are to be completed. These zones include the exclusion zone, contamination reduction zone, and support zone.

5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible)

At a minimum, the Exclusion Zone will include at least a 25-foot radius around the work area.

5.4.2 Contamination Reduction Zone (CRZ)

As applicable, personnel performing equipment decontamination will wear PPE and follow the procedures for decontamination of equipment and personnel outlined in Section 5.5. All personnel and equipment must pass through the CRZ before leaving the site at the end of each workday. The CRZ will be located at the edge of the Exclusion Zone for personnel and small sampling equipment decontamination. All other equipment (i.e., drilling equipment) will be decontaminated at the Site decontamination area.

5.4.3 Support Zone

The Support Zone is intended as an area that remains free of contamination and is used for staging activities, breaks, and eating. It is extremely important to keep this area clean and free of contamination. Never bring contaminated equipment, articles, or yourself into the Support Zone without going through decontamination procedures first.

5.5 Decontamination Procedures

5.5.1 Equipment Decontamination

Drilling equipment and soil/water sampling equipment shall be fully decontaminated at the contamination reduction zones between and before they are removed from the site. Decontamination for drilling equipment will consist of soap and water wash and potable water rinse or using a high-pressure hot water or steam cleaning unit. Additional scrubbing may be required to remove all encrusted materials. Soil/water sampling equipment shall be cleaned between each use by the following procedures (1) removing any solids to the degree possible with a brush and tap water; (2) washing with a brush using laboratory-grade, non-phosphate detergent and tap water, (3) rinsing with tap water, (4) rinsing with 70-percent-grade isopropyl alcohol, and (5) rinsing with distilled water. All equipment decontamination water will be contained and disposed of properly.

5.5.2 Personnel Decontamination

A personnel decontamination area will be designated in the CRZ, which will be located at the edge of each Exclusion Zone. Personnel will become thoroughly familiar with the following decontamination procedures before work begins in an Exclusion Zone:

- Place equipment and/or samples in designated area, move to the next area (marked with signs), if necessary;
- Wash boots (overboots, if used) and outer gloves using soap (Alconox or equivalent) in water solution, and potable water rinse;
- Remove overboots (if used) and outer gloves, and place in plastic bags (in 30-gallon drum);
- Remove disposable coveralls (if used) and place in plastic bag in drum;
- Remove respirator (if used), thoroughly wash and store in a sealed bag outside the CRZ;

- Remove boots and store in appropriate location;
- Remove disposable inner gloves (if used) and place in plastic bag (in 30-gallon drum); and
- Wash hands and face with water and hand soap (especially before eating or drinking).

All personnel decontamination water will be contained and disposed of properly.

It is recommended that after leaving the Site at the end of the workday that personnel shower immediately at their place of lodging.

5.5.3 Storage Procedures for Expendable Clothing/Equipment

Used, expendable clothing and equipment shall be placed in drums labeled as "Waste PPE Material." Proper disposal of the drums will be coordinated with NORCO.

6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

6.1 Responsibilities of the SHSO

The TRC SHSO is responsible for project safety, decontamination, environmental monitoring, and field medical monitoring activities. The SHSO will ensure that all field personnel comply with the provisions of this HASP. The SHSO has the authority to stop Site work in the event of safety violations or if he/she makes the judgment that an upgraded level of personal protection may be required. **Anyone may stop any operation that threatens the health and safety of personnel.** The SHSO is responsible for designating and marking work zones and for restricting access to Exclusion Zones to properly attired personnel.

The SHSO reports directly to the Project Manager and the HSC. All safety-related questions should be referred to the Project Manager or HSC. The SHSO will keep the CHSO and Project Manager informed of the status of safety-related Site activities and assessments. The SHSO will notify the HSC and Project Manager immediately of any exposure incidents, injuries, accidents, or emergency situations.

6.2 Health and Safety Clearances

TRC personnel authorized to go on-site must meet the following requirements:

- Successfully complete a basic 40-hour health and safety training course and 8 hours of refresher training each year following completion of the basic course;
- At least one field employee must have completed and be current for cardiopulmonary resuscitation (CPR)/First Aid Training; and
- Receive clearances from a TRC-approved physician to wear respiratory protective devices and to work with hazardous materials.

6.3 Distribution of the HASP

A copy of this plan must be provided to each member of the site team covered by the plan and to an authorized representative of each TRC field subcontractor covered by its provisions. Each site team member receiving a copy of the plan must acknowledge receipt of, and express willingness to comply with, the provisions of the plan by signing the attached compliance agreement form. The signed forms must be submitted to the Project Manager or Assistant Project Manager for filing.

6.4 Safety Briefings

All TRC and TRC subcontracted personnel scheduled for fieldwork at the project area will receive an initial health and safety briefing by the SHSO prior to starting work activities. The briefing will include a thorough review of this HASP with particular attention to site-specific health and safety requirements and emergency response procedures. A Job Safety Analysis (JSA) will be completed for the specific tasks and reviewed by personnel prior to performing each task. The blank JSA form is included in Appendix C.

Daily briefings will be conducted by the SHSO on-site to reinforce health and safety awareness and to allow personnel the opportunity for comments or questions. All daily briefings will be documented on the Safety Task Analysis Review (STAR) form included in Appendix D.

6.5 On-Site Presence of Plan

A copy of this HASP must be present at the Site each day that work is in progress.

6.6 Respirators

6.6.1 Usage

The following procedures shall be followed to ensure that air-purifying respirators provide the full protection for which they are rated:

- All employees who are required to wear respirators shall be included in the TRC Medical Monitoring Program and will be medically approved for respirator use before donning a respirator;
- Employees shall wear only respirators for which they have been fit-tested by a competent individual;
- Respirators are to be donned outside the potential hazard zone in which they are planned to be used;
- Prior to donning, the wearer shall inspect the respirator for any physical defects or breakage including, but not limited to:
  - Broken or frayed straps,
  - Improperly seated valves,
  - Dirt,

  - Holes,
  - Distorted face seal, and
  - Opaque face piece on full-facepiece respirators.

- After donning the respirator, the employee shall conduct a negative-pressure fit check to assure that the inlet and exhaust valves, and the respirator cartridges, are properly seated. The employee shall then conduct a positive-pressure fit check to ensure that a proper face piece seal against the face has been obtained. The zone of potentially hazardous exposure is not to be entered until the employee has successfully executed both positive-pressure and negative-pressure fit checks.

- Employees shall immediately evacuate the work area if they experience difficulty breathing, dizziness, or other symptoms of potentially harmful chemical exposure.

- Appropriate respirator cartridges are to be replaced at the beginning of each workday or when breakthrough is detected (whichever comes first).

Note: If at any time during use of a respirator the contaminant of concern, or any other contaminant, is detected by smell, taste or irritation, the employee is to leave the work area immediately and inform the SHSO.

6.6.2 Cleaning

Respirators assigned to an individual employee shall be cleaned by that employee at the end of each day's work involving more than four hours of respirator use and at the end of every week in which the respirator is used for at least two hours. Respirators are to be washed and rinsed in warm water (120 to 140ºF) using a disinfecting solution intended for cleaning respirators, and blot or air-dried. Cleaning solutions, available from respirator manufacturers, will be provided on-site.

6.6.3 Storage

Respirators shall be stored in a manner that protects them from exposure to sunlight, dust, chemicals, and extremes of heat and cold. Respirators shall not be stored in tool kits. The preferred storage procedure for respirators is in individual plastic bags placed in rigid containers to prevent deformation of the face-piece.

7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

7.1 General Work Rules

- Fieldwork will be conducted only during daylight hours unless adequate lighting is provided.
- Smoking will be permitted only at designated areas at the Site.
- Gloves must be worn for jobs that have the potential for hand injury. The type of glove used depends upon the materials or equipment being handled. Leather or fleece gloves must not be used as a substitute for protective chemical gloves.
- In the event of direct skin contact by chemicals of concern, the affected area will be washed immediately with soap and water.
- In the event the PPE is ripped or torn, work shall stop and the PPE shall be removed and replaced as soon as possible.
- Personnel should never climb over or under refuse or obstacles so as to endanger themselves or others.
- Practice contamination avoidance. Never sit down or kneel, never lay equipment on the ground, avoid obvious sources of contamination such as puddles, and avoid unnecessary contact with on-site objects.
- Water samples to be analyzed for various contaminants may need to be, or already are, preserved with nitric acid, hydrochloric acid, or sulfuric acid before shipment to the analytical laboratory. Nitrile or polyvinyl chloride (PVC) gloves should be worn when handling these corrosive chemicals or samples preserved with them. Sample preservation should be performed in a well-ventilated area to avoid potential accumulation of toxic vapors. In circumstances where bad weather or poor lighting does not allow preservation at the site, preservation should be performed at a later time, or not at all. Samples should not be preserved in hotel rooms or other public areas.
- Good housekeeping is the responsibility of every employee. All work areas are to be kept as clean and orderly as possible. It is the responsibility of the persons performing the work to ensure that the work site is kept clean.

- No eating, drinking, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material will be allowed in the Exclusion Zone or Contamination Reduction Zone.

- Hard contact lenses should not be worn in the Exclusion Zone or Contamination Reduction Zone. No jewelry that interferes with protective clothing fit will be worn.

- No beards, sideburns, or mustaches will be allowed that interfere with respirator mask seals, if respirators are used. The SHSO will determine if facial hair presents such an interference.

- Field personnel should remain aware of wind direction throughout the day. Wind socks or flagging will be used for this purpose. Equipment setup and sampling efforts should be directed to the greatest extent possible so that workers remain upwind of potential sources of exposure.

- No drilling or earth moving activities will be permitted during periods of thunderstorms and lightning.

- Machinery, tools, material, electrical installation, and other equipment and work practices that are judged unsafe, or not in compliance with this HASP, OSHA, or other applicable standards, shall be removed or replaced or the work practice corrected. Only employees qualified by training and/or experience will operate equipment and machinery.

- Before excavating or sampling, an Exclusion Zone must be established around the equipment after it has been positioned. The boundary of the Exclusion Zone shall extend at least 25 feet from the work area and, if practical, marked with stakes spaced no more than 20 feet apart and connected with fluorescent orange tape. Only authorized personnel will be allowed to enter Exclusion Zones.

- Representatives of federal, state, and local agencies; newspaper and other news media; the public; and all other individuals who are not a part of the TRC site team are classified as visitors and will not be permitted to enter Exclusion Zones under control by TRC, unless they can prove that they have met OSHA medical and training requirements for hazardous waste operation, have available to them PPE equivalent to that specified in this plan, and obtain permission from the TRC site or project manager.

7.2 Documentation

The following must be kept on file by the SHSO:

- Copies of the TRC Employee Health and Safety Compliance Agreement (attached) documenting health and safety briefings and personnel signatures;
- Records of usage and calibration of environmental monitoring equipment;
- Documentation of employee injury/exposure incidents;
- Records of safety violation and remedial actions taken;
- Documentation of subcontractors' compliance with TRC for health and safety training and medical monitoring.

A health and safety field logbook will be maintained on-site and should contain such information as weather conditions, employees and visitors on-site, level of personal protection, monitoring instrument readings (average, peak, and background), subjects discussed during site health and safety briefings, and names of attendees. All field personnel, including subcontractors, must sign the TRC Employee Health and Safety Compliance Agreement indicating that they have attended a briefing by the SHSO, and that they understand and agree to abide by the provisions of this HASP, in addition to the provisions of their own health and safety plan prior to working at the project area.

7.3 Site Specific Requirements

7.3.1 Housekeeping

Good housekeeping is of the utmost importance in the prevention of accidents, injuries, and fires. Clean-up will be conducted on a daily basis.

7.3.2 Spills

No contaminants (i.e., oils, diesel fuel, gasoline, etc.) are to be discharged at the project area. Should a release occur, it must be reported by the quickest means possible to the NORCO representative. Decontamination water is considered to be contaminated and should not be released onto the ground. All decontamination water spills should be reported to the TRC Field Team Leader for determination of appropriate action.

7.3.3 Operation of Vehicles and Equipment

Equipment and vehicles must operate at a safe speed while being aware of operating conditions and other equipment and personnel working in close proximity. Extreme caution must be exercised at all grade crossings.

8.0 MONITORING

TRC anticipates the potential for a risk of COPC vapor inhalation exposure; therefore, ambient air monitoring will be conducted as part of this Health and Safety Plan. Additionally, pH monitoring will be conducted during investigation activities in AOC 1N and AOC-1S?.

8.1 Monitoring Instruments

A PID with a 10.6 electron volt lamp, calibrated with 100 ppm isobutylene, will be used to monitor breathing zone organic vapors. Calibration of the PID will be documented on the *Field Equipment Calibration/Maintenance Log* form including in Appendix E. The PID will read total hydrocarbon vapor levels. The action levels discussed below have been calculated taking into account known COPCs present at the Site and respective PELs.

At this time, TRC does not anticipate the potential for hydrogen sulfide (H_2S) gas inhalation exposure; therefore, continuous air monitoring for H_2S will not be conducted.

8.2 Action Levels

Respirators must be donned by all persons working in any Exclusion Zone in which the average PID reading is 1 ppm above background in the breathing zone (for greater than 1 minute). Half-face respirators will be worn from 1 to 10 ppm and full-face respirators will be worn from 10 to 50 ppm. The Exclusion Zone must be evacuated whenever the average PID reading equals or exceeds 50 ppm above background in the breathing zone for greater than 1 minute. PID action levels are listed in the table below. Air monitoring results will be documented on the *Air Quality Monitoring Record* form located in Appendix E.

If evacuation becomes necessary, the SHSO shall take charge and direct personnel to move from the Exclusion Zone to a predetermined area and to stay there. The SHSO shall first determine that all personnel have left the Exclusion Zone and are safe, then consult the HSC on how to proceed.

Action Levels for Air Monitoring

Equipment Type		Monitoring, Action Levels, and PPE
ORGANIC VAPORS		
☒ ☐ ☒	PID FID Detector Tube Type: benzene	Reading > 1 ppm or "Background" sustained for 1 minute, upgrade to Level C with half-face APR, Notify TRC SHSO. Reading > 10 ppm sustained for 1 minute, upgrade respiratory protection to full-face APR, Notify TRC SHSO. Reading > 50 ppm sustained for 1 minute, shutdown work activities, evacuate the area, move upwind, Notify the TRC SHSO.

8.3 pH Monitoring

Monitoring of groundwater and wastewater will be required at least daily during excavation activities to evaluate pH levels. Monitoring will also be performed in the event additional or new flows and/or sources of groundwater or wastewater are identified. Monitoring will be performed using either pH paper or a pH meter (in the field or a sample taken to the Laboratory). If a pH meter is utilized, the meter must be calibrated daily and the calibration results documented in the project field notes.

Monitoring will be performed in general accordance with the following procedures:

1. If pH paper is used, the paper will be placed so it comes in contact with the liquid for evaluation. The paper will be allowed to change colors. The color of the paper will be compared to the pH color chart included with the pH to determine the approximate pH. The pH value will be recorded in the project field notes.

2. If a pH meter is used, the pH probe will be placed in the liquid to be evaluated. The results will be read from the pH meter and recorded in the project field notes.

<u>If pH is less than 5 or greater than 9, then proper actions must be taken for conditions that are considered "acidic" or "caustic."</u>

9.0 EMERGENCY PROCEDURES

Emergency procedures listed in this HASP are designed to give the field team instructions in handling medical emergencies, fire, and explosions.

9.1 Medical Injuries

Medical problems that can occur on-site need to be handled competently and quickly. Each field team member should be aware of the instructions and information given below:

- Seek professional medical attention for personnel that are bleeding severely, experiencing intense pain, unconscious, or not breathing. Each member of the site team should know how to call for an ambulance.
- If you get anything in your eyes (chemical or dust), flood them with water for 15 minutes. Be sure to tell the SHSO. The SHSO will make sure that the victim washes the eyes for the full 15 minutes.
- Do not remove objects that are impaled (stuck) in the eye.
- Always seek medical attention for eye injuries.
- Stop bleeding with direct pressure. Place bandage over the wound and press down with your hand. If possible, raise the bleeding extremity above the level of the heart. Use a tourniquet ONLY in extreme cases when you are not able to stop severe bleeding.
- If you contact the waste, wash the affected area with soap and water immediately.

9.2 Fire and Explosion Response Procedures

Fires can be caused by the drilling rig activity. The TRC field team should verify that the drilling rig has a fire extinguisher on hand at all times. The procedures for using a fire extinguisher is to **pull** the safety pin, **aim** the extinguisher at the base of the flames and discharge the extinguisher by **squeezing** and **sweeping** the flames from a distance of 6 feet (PASS-pull, aim, squeeze, sweep). Move in closer as the flames are put out.

- Never use water on an electrical fire or a solvent fire. All extinguishers should be dry chemical labeled “Class A, B, or C”; and
- Keep decontamination solvents well away from the steam cleaner.

9.3 Emergency Medical Information

TRC Site Health & Safety Officer (SHSO):

Alonzo Arredondo (512) 699-9931

TRC Corporate Health and Safety Director:

Ron Severson (860) 298-6256 or (860) 906-4656

TRC Health and Safety Coordinator:

Matt Webre (512) 684-3140 or (512) 567-7936

TRC Safety Contact (Austin):

Matt Webre (512) 684-3140 or (512) 567-7936

Project Managers (Austin):

Stephen Halasz (512) 684-3351 or (512) 745-6155

9.3.1 First Aid

First aid at the Site will consist of a first aid kit, which will be brought to the Site daily by the SHSO and be kept at the edge of the Exclusion Zone during field activities.

9.3.2 Hospitals

Personnel with any injuries shall be taken to Care Regional Medical Center located approximately 5 miles northeast of the project area. A map and driving directions from Falcon Refinery to Care Regional Medical Center are provided in Appendix F.

9.4 Incident Investigation

It is important that all accidents and incidents that result in injury, illness, or medical treatment be reported immediately. Reporting consists of calling the Teleclaim Center and providing information on the injury. The Teleclaim Center will complete the first report of injury and file it accordingly. Copies will be sent to the Safety Director. Supervisors are required to complete the Supervisor's Report of Accident included in this section. It is TRC's responsibility to investigate each incident, file appropriate paperwork and conduct a follow-up analysis of each incident.

Reporting Phone Numbers

TRC Corporate Health and Safety Director: (860) 298-6256

Hartford Insurance Teleclaim:	1-800-327-3636
Human Resources Director:	1-800-365-8254

Any work related injury or illnesses that requires professional medical assistance should be reported immediately. Failure to promptly notify of a work related injury could make the claim questionable and subject to stricter review.

After medical attention has been administered, an incident investigation will be completed. The TRC Project Manager will also complete the *TRC Incident Report Form* located in Appendix G.

9.4.1 Emergency Numbers

Service	**Address**	**Phone**
Fire Department:	Ingleside Fire Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-7422
Police Department:	Ingleside Police Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-2531
Hospital:	Care Regional Medical Center 1711 West Wheeler Avenue Aransas Pass, TX 78336	**911** (361) 758-8585
Nearest phone: Cellular phone	Alonzo Arredondo Field Task Leader/SHSO	(512) 699-9931

Emergency Services are accessed through 911

10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP

The following TRC site personnel have read, understand, and agree to comply with all of the health and safety directives for the Falcon Refinery Superfund Site.

Crew	Date
_____	_____
_____	_____
._____	_____
_____	_____
_____	_____
_____	_____
_____	_____

In addition, the following contractor personnel have been briefed on the site hazards, have reviewed their own HASP (per 29 CFR 1910.120(i)(2), have completed the required 40-hour OSHA Training (per 29 CFR 1926.21 and 1910.120(e), have been properly respirator fit tested, and are involved in their company's Medical Surveillance Program (per 29 CFR 1910.120(f)). They hereby acknowledge having met all the above stated requirements for working at the Falcon Refinery Superfund Site.

Contractor Personnel	Company	Date

APPENDIX A

Potential Chemical Hazards

CHEMICAL HAZARD DATA								
			TWA					
Chemical Name	Carcinogen (Y/N)	Skin Absorption Hazard (Y/N)	OSHA PEL	NIOSH REL	ACGIH TLV	OSHA STEL	IDLH	Routes of Exposure
Benzene	Y	Y	1.0 ppm	0.1 ppm	0.5 ppm	5 ppm	500 ppm	I,S,G,C
Toluene	N	Y	200 ppm	100 ppm	50 ppm	300 ppm	500 ppm	I,S,G,C
Xylene(s)	N	Y	100 ppm	150 ppm	100 ppm	N/A	900 ppm	I,S,G,C
Ethylbenzene	N	N	100 ppm	100 ppm	100 ppm	N/A	800 ppm	I,G,C

TWA = Time-Weighted Average
PEL = Permissible Exposure Limit
REL = Recommended Exposure Limit identifying NIOSH
TLV = Threshold Limit Value identifying ACGIH
STEL = Short Term Exposure Limit
IDLH = Immediate Dangerous to Life or Health
Routes of Exposure: I = inhalation, S = skin absorption, G = ingestion, C = skin contact
ppm = parts per million
mg/m^3 = milligrams per cubic meter (of air)

APPENDIX B

Material Safety Data Sheets

INSERT MSDS'S HERE

APPENDIX C

Job Safety Analysis (JSA) Form

APPENDIX D

Safety Task Analysis Review (STAR) Form

APPENDIX E

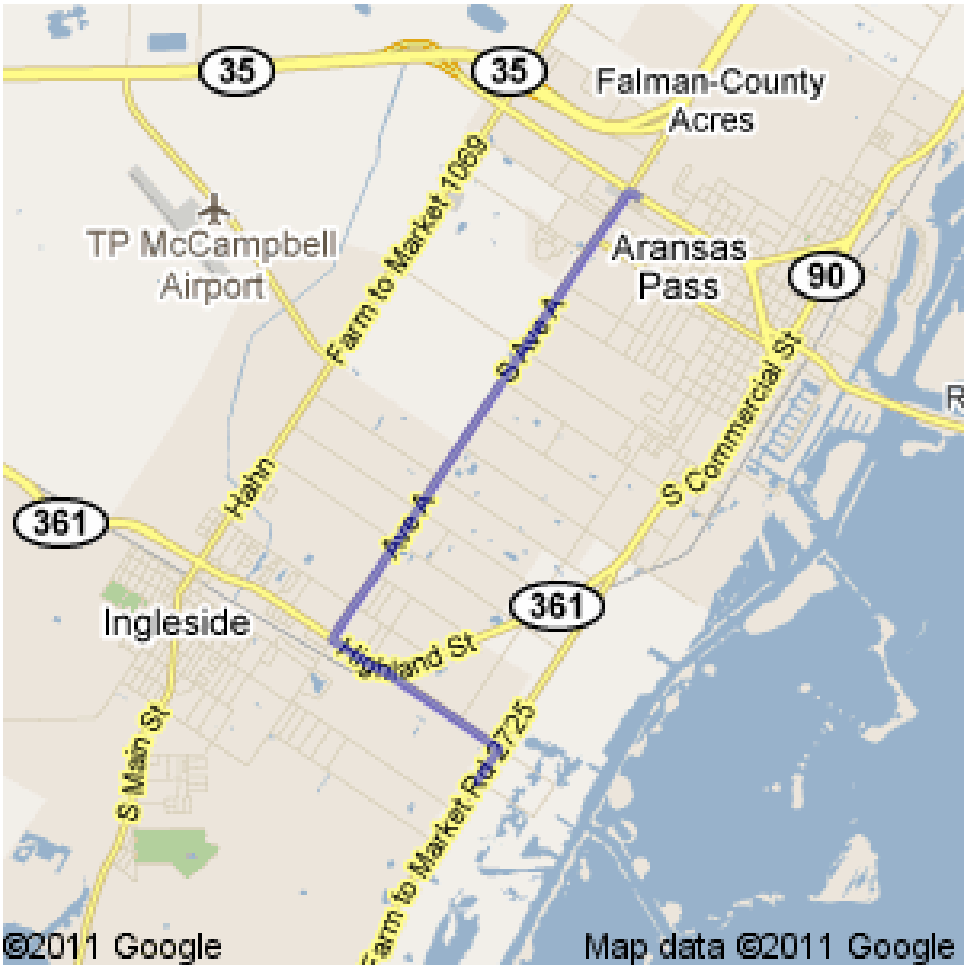
Air Monitoring Forms

APPENDIX F

Map/Route to the Nearest Hospital

Driving Directions from the Site (Former Falcon Refinery (1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road, Ingleside, San Patricio County, Texas) to Care Regional Medical Center, 1711 West Wheeler Avenue, Aransas Pass, Texas 78336. Phone: (361) 758-8585

1. Head northeast on Farm to Market Rd 2725 toward Co Rd 146/Sunray Rd. 0.3 mi
2. Take the 1st left onto Co Rd 146/Sunray Rd. 0.9 mi
3. Continue onto Highland St. 0.4 mi
4. Turn right onto Ave A. 3.5 mi
5. Turn right onto W Wheeler Ave Destination will be on the right. 367 ft



APPENDIX G

TRC Incident Report Form

Health and Safety Plan

Falcon Refinery Superfund Site

Ingleside, San Patricio County, Texas

Prepared for:

National Oil Recovery Corporation
3717 Bowne Street
Flushing, NY 11354

Prepared by:

505 East Huntland Drive, Suite 250
Austin, Texas 78752

Stephen Halasz, Project Manager

May 2011

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1-1
2.0 ADMINISTRATIVE INFORMATION 2-1
2.1 Health and Safety Plan Requirement Rationale 2-1
2.2 Health and Safety Plan Approval 2-1
3.0 PROJECT DESCRIPTION 3-1
3.1 Facility Description 3-1
3.1.1 Areas of Concern 3-1
3.2 TRC Field Activities 3-3
4.0 SITE HAZARDS 4-1
4.1 Chemical Hazards 4-1
4.2 Physical Hazards 4-1
4.2.1 Heat Stress 4-1
4.2.2 Cold Stress 4-3
4.2.3 Sunburn 4-4
4.2.4 Exposure to Excessive Noise 4-4
4.2.5 Heavy Equipment and Motor Vehicle Operation 4-5
4.2.6 Excavations and Trenches 4-6
4.2.7 Slips, Trips, and Falls 4-6
4.2.8 Manual Lifting 4-7
4.2.9 Hand and Power Tools 4-7
4.2.10 Weather-Related Hazards 4-8
4.2.11 Drowning Hazards 4-8
4.3 Biological Hazards 4-9
4.4 Utility Clearance 4-9
5.0 ACTIVITY-SPECIFIC REQUIREMENTS 5-1
5.1 Site Communication 5-1
5.1.1 External Communication 5-1
5.1.2 Internal Communication 5-1
5.2 Standard Work Uniform 5-1
5.3 Personal Protective Equipment 5-2

5.4 Work Zones 5-3
5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible) 5-3
5.4.2 Contamination Reduction Zone (CRZ) 5-3
5.4.3 Support Zone 5-4
5.5 Decontamination Procedures 5-4
5.5.1 Equipment Decontamination 5-4
5.5.2 Personnel Decontamination 5-4
5.5.3 Storage Procedures for Expendable Clothing/Equipment 5-5
6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS 6-1
6.1 Responsibilities of the SHSO 6-1
6.2 Health and Safety Clearances 6-1
6.3 Distribution of the HASP 6-1
6.4 Safety Briefings 6-2
6.5 On-Site Presence of Plan 6-2
6.6 Respirators 6-2
6.6.1 Usage 6-2
6.6.2 Cleaning 6-3
6.6.3 Storage 6-3
7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS 7-1
7.1 General Work Rules 7-1
7.2 Documentation 7-2
7.3 Site Specific Requirements 7-3
7.3.1 Housekeeping 7-3
7.3.2 Spills 7-3
7.3.3 Operation of Vehicles and Equipment 7-3
8.0 MONITORING 8-1
8.1 Monitoring Instruments 8-1
8.2 Action Levels 8-1
8.3 pH Monitoring 8-2
9.0 EMERGENCY PROCEDURES 9-3
9.1 Medical Injuries 9-3

9.2 Fire and Explosion Response Procedures 9-3
9.3 Emergency Medical Information 9-4
9.3.1 First Aid 9-4
9.3.2 Hospitals 9-4
9.3.3 Emergency Numbers 9-5
10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP 10-1

APPENDIX A: Potential Chemical Hazards
APPENDIX B: Material Safety Data Sheets
APPENDIX C: Map/Route to the Nearest Hospitals

1.0 INTRODUCTION

This Health and Safety Plan (HASP) outlines the health and safety requirements for on-site activities associated with soil and groundwater investigation activities within National Oil Recovery Corporation's (NORCO's) former Falcon Refinery located 1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road near Ingleside, San Patricio County, Texas (the Site). The Site is bordered by wetlands to the northeast and southeast, residential areas to the north and southwest, an abandoned refinery to the northwest, and a construction company to the southwest.

This HASP has been developed in conformance with the directives and requirements of the TRC *Health and Safety Policy and Procedure Manual*, June 2001, and 29 CFR 1910.120(i)(2). This HASP and any subsequent addenda will apply to all TRC personnel and subcontractors who are involved with on-site activities at the Site. By implementing this plan, TRC does not assume any liability for the health and safety of non-TRC personnel involved in the activities performed during this project.

TRC field personnel and TRC subcontracted field personnel must participate in medical monitoring, respirator fit testing, and hazardous waste training programs as specified by Occupational Safety and Health Administration (OSHA) regulations (per 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response [HAZWOPER]).

All work must be conducted in compliance with applicable OSHA regulations, including 29 CFR 1910 (General Industry Standards) and 29 CFR 1926 (Construction Industry Standards).

2.0 ADMINISTRATIVE INFORMATION

Site Name: Falcon Refinery Superfund Site

Site Location: Ingleside, San Patricio County, Texas

Project Title: Phase II Remedial Investigation/Feasibility Study

Client: National Oil Recovery Corporation

Project Manager: Stephen Halasz

TRC Task Leader(s):

Corporate Health & Safety Officer (CHSO): Gary Ritter

Regional Health & Safety Officer (RHSO): Matt Webre

Assistant Project Manager: TBD

Field/Site Health & Safety Officer (SHSO): Richard Kotzur

2.1 Health and Safety Plan Requirement Rationale

This HASP is required due to past and present conditions, which may have existed at the Site. The chemicals of potential concern (COPCs) include metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides/herbicides.

2.2 Health and Safety Plan Approval

Health & Safety Officer: Matt Webre

Signature:_____ Date:_____

3.0 PROJECT DESCRIPTION

The following sections describe the Site, specifically the areas of concern (AOCs), and proposed field activities.

3.1 Facility Description

The Site consists of a refinery which operated intermittently and is currently inactive. When in operation, the refinery had a capacity of 40,000 barrels per day and the primary products consisted of naphtha, jet fuel, kerosene, diesel, and fuel oil.

3.1.1 Areas of Concern

Seven AOCs have been identified as potential areas impacted by COPCs. Three AOCs are identified on-site and four are off-site. The AOCs are summarized in Table 1 and shown on Figure 1.

AOC-1 Former Operational Units

AOC-1 includes the entire North site, former operational units (OU) areas of the South site, a drum disposal area, and an area where metal waste was discarded. Preliminary COPCs to be screened at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

AOC-2 On-Site Non-Operational Areas

Areas of the refinery not used for operations or storage and with no record of releases are included in AOC-2. Although no COPCs were anticipated in AOC-2, the screened COPCs included metals, VOCs, and SVOCs. Potentially affected media include soil and groundwater.

AOC-3 Wetlands

Included in AOC-3 are wetlands immediately adjacent to the site bordered by Bay Avenue, Bishop Road, and a dam on the upstream side; wetlands located between Bishop Road, Sunray Road, Bay Avenue, and residences along Thayer Avenue; and wetlands between Sunray Road, residences along FM 2725, Gulf Marine Fabricators, Offshore Specialty Fabricators, and the outlet of the wetlands into the intracoastal.

There is one active and several abandoned pipelines leading from the refinery to the current and former barge dock facilities. During June 2006, the abandoned pipelines were

cut, the contents of the pipelines were removed, and plates were welded on the pipeline ends to seal them.

Wetland assessment activities will evaluate releases from the refinery, including any unpermitted wastewater effluent discharges, two known pipeline releases, and possible releases from pipelines leading from the refinery to the current and former barge dock facilities.

There have been documented spills of hydrocarbons, waste and volatile organics. As a result, the screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, herbicides, and pesticides. Potentially affected media include sediment, soil, surface water and groundwater.

AOC-4 Current Barge Docking Facility

Included in AOC-4 is the current barge docking facility, which is approximately 0.5 acres and is located on the intracoastal waterway. The fenced facility, which is connected to the refinery by pipelines, is used to load and unload barges. At the time of this report, only crude oil passed through the docking facility. Historically, however, refined products were also loaded and unloaded at this docking facility.

There have been no reported releases nor is there evidence of spills associated with this AOC. The screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

AOC-5 Intracoastal Waterway

Sediments and surface water adjacent to the current and former barge dock facility are included in this AOC. The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include sediment and surface water.

AOC-6 Thayer Road

Included in this AOC is the neighborhood along Thayer Road, located across Bishop Road from the refinery. The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

AOC-7 Bishop Road

Included in this AOC is the neighborhood along Bishop Road, located across Bishop Road from the North site. The screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

3.2 TRC Field Activities

TRC will conduct the following activities on-site including (1) surface and subsurface soil sampling; (2) installation of permanent monitoring wells; and (3) groundwater sampling. Off-site activities include: (1) sediment sampling in the wetlands and bay; (2) biota sampling; (3) surface and groundwater sampling; (4) surface and subsurface soil sampling; and (5) off-site monitor well installation.

Table 1. Areas of Concern

Figure 1. Site Map

4.0 SITE HAZARDS

The following site hazards are present or could be encountered at the project area.

4.1 Chemical Hazards

Due to the storage of naphtha, jet fuel, kerosene, diesel, and fuel oil, COPCs at the Site include metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Specifically, benzene, toluene, ethylbenzene, and xylene (BTEX) is of primary concern for this HASP. Site personnel should avoid touching, breathing or ingesting any media encountered on-site. Nitrile gloves must be worn at all times when in contact with soil, water, and/or hydrocarbons. Section 8 describes in detail procedures that will be followed in ensure a safe breathing zone and protection from vapors of COPCs. Appendix A summarizes the various constituents of concern, the Permissible Exposure Levels (PELs), and the major potential health effects of each. Material Safety Data Sheets (MSDSs) for the COPCs are located in Appendix B.

4.2 Physical Hazards

4.2.1 Heat Stress

Heat stress results when the body is unable to get rid of excess heat. Stages of heat stress are heat cramps, heat exhaustion, and heat stroke. The latter can be fatal. Heat stress is of particular concern when workers must wear chemical protective clothing and ambient air temperatures are high, because protective clothing reduces evaporative body cooling. If ambient air temperatures at the site reach 70°F, heat stress symptoms should be watched for and control measures applied, if they appear.

These symptoms include:

- Heat rash, which may result from continuous exposure to heat or humid air.
- Heat cramps which are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include:
  - Muscle spasms, and
  - Pain in the hands, feet, and abdomen.
- Heat exhaustion, which may occur from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

  - Pale, cool, moist skin,
  - Heavy sweating,
  - Dizziness,
  - Nausea, and
  - Fainting.

- Heat stroke is the most serious form of heat stress in which temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms include:
  - Red, hot, unusually dry skin,
  - Lack of or reduced perspiration,
  - Nausea,
  - Dizziness and confusion,
  - Strong, rapid pulse, and
  - Coma.

A worker who exhibits any of these symptoms will be immediately relieved of responsibilities and told to consume electrolyte fluid or cool water while resting in a shaded area. The individual should not return to work until symptoms are no longer recognizable. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored for any increase in heart rate or body temperature for the remainder of their shift. In addition, the worker will be requested to consume electrolyte fluid or cool water every hour.

The SHSO will monitor workers hourly when:

- Symptoms of heat stress are reported or observed;
- Ambient temperatures exceed 70º F and workers are dressed in impervious clothing; or
- Ambient temperatures exceed 90º F and workers are dressed in normal clothing.

Workers will be monitored for heat stress conditions by measuring the heart rate (HR) by radial (wrist) pulse for 30 seconds after one minute of rest. The HR after one minute of rest should not exceed 110 beats per minute. If HR is higher, the next work period shall be shortened by 33%, while the rest period length remains the same. If the pulse rate is still 110 beats per minute after one minute of rest in the next rest period, the following work cycle will be shortened by another 33 percent. This shortening of the work period must continue until the worker's HR is no greater than 110 beats per minute.

4.2.2 Cold Stress

Types of cold stress include general body coldness, hypothermia, and frostbite. The latter two require medical attention. Hypothermia can be fatal while frostbite can result in the amputation of limbs. If ambient air temperatures at the site reach below 39°F, cold stress symptoms should be watched for and control measures applied, if they appear. These symptoms include:

- General body coldness, which is caused by a drop in skin temperature. Signs and symptoms include shivering, numbness in extremities, and loss in manual dexterity and strength.
- Hypothermia is a decrease in deep body temperature (normally 98.6ºF). Signs and symptoms include uncontrollable shivering, slurred speech and memory lapses, irregular breathing, and drowsiness.
- Frostbite occurs when there is inadequate circulation and/or insulation of a body part. Signs and symptoms include skin color change (white or grayish yellow to reddish violet to black), and pain initially, followed by cold and numbness in the affected part.

Preventative measures will help avert serious illness due to cold stress. Appropriate clothing will be worn on the basis of the exterior temperature, wind chill factor, and the level of work. Precautions will be taken to minimize exposed flesh and clothing should be layered as appropriate. A worker who exhibits any symptoms of cold stress will be immediately relieved of responsibilities. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored. In addition, the following guidelines will be followed.

Work Below 39ºF (4ºC)

- The employees shall wear cold protective clothing appropriate for the level of cold and physical activity.
- If the air temperature at the site is decreased by wind or artificial ventilation, the cooling effect of the wind will be reduced by shielding the work area or by wearing a removable outer windbreak garment.
- If the clothing on the employee may become wet on the job site, the outer layer of the clothing will be water repellent.
- Workers who become immersed in water or whose clothing becomes wet will immediately be provided with a change of clothing and treated for hypothermia.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve.

TRC does not anticipate cold stress as a factor during these field activities.

4.2.3 Sunburn

Prolonged exposure of the skin to the sun, even on overcast days, can result in sunburn, which can be severe enough to be incapacitating, especially with fair-skinned individuals. Repeated sun burning can eventually cause premature aging of the skin and skin cancer in individuals. Always wear clothing to reduce the amount of exposed skin and frequently use sun block creams or lotions.

4.2.4 Exposure to Excessive Noise

Overexposure to noise can result in hearing loss. If it is difficult to hear normal speech when the speaker is 3 feet from the listener, for more than 4 hours a day, the noise level must be measured. If it exceeds 85 decibels (dBA) as an 8-hour, time-weighted average, hearing protection will be worn in accordance with 29 CFR 1910.95. If a sound level meter is not available, then the noise level will be assumed to be 85 dBA if one cannot communicate at normal voice level within 3 feet from another person. If this is the case, then appropriate hearing protection will be donned.

4.2.5 Heavy Equipment and Motor Vehicle Operation

Only qualified personnel will operate heavy equipment and motor vehicles. Equipment will not be operated in a manner that will endanger persons or property. All heavy equipment and motor vehicles will be operated in accordance with the manufacturer's instructions and 29 CFR 1926 Subpart O.

The following inspection and repair controls will also be implemented during this project:

- Equipment and vehicles will be inspected by the operator on a daily basis, prior to starting work.
- All heavy equipment exhaust systems will be checked daily and confirmed to have no embers or sparking.
- Any unsafe equipment or vehicles will be removed from service until safety defects can be corrected.
- Equipment will be shut down and locked out before maintenance or repairs are made.

Operators will follow these rules:

- Motor vehicles and heavy equipment will be shut down during re-fueling operations.
- Operators will not leave their equipment unattended while it is running.
- Whenever equipment is parked, the parking brake will be set. If the equipment is parked on an incline, in addition to setting the parking brake, the wheels will also be chocked.
- Operators will be trained and experienced in the use of their equipment.
- Vehicles or equipment will not be operated in a careless or unsafe manner.
- Personnel will wear appropriate personal protective equipment (PPE) when working with heavy equipment. Dermal protection must fit properly and be taped to prevent "caught on" or "caught between" hazards.

Required equipment features include:

- All heavy equipment will have an audible backup alarm and an audible warning device (i.e., a horn).
- Each piece of heavy equipment will have a portable fire extinguisher.

When working with moving equipment:

- One designated person will give signals to the operators of both equipment and vehicles in any work area.
- Personnel will stay clear of the operational area of the equipment. Workers are not permitted to stand directly underneath any load or piece of equipment, i.e., man-lift, backhoe bucket, crane load, etc.
- Work areas will be adequately illuminated.

4.2.6 Excavations and Trenches

Compliance with excavation and trenching standards established by OSHA regulation 29 CFR 1926 Subpart P is a requirement of this HASP, as well as the compliance with the requirements presented below.

- Trenches and other large holes must be marked with yellow caution tape at any time the excavation is left unattended. The caution tape must be placed no less than 2 feet from the edge of the excavation
- Personnel will not be allowed to enter an excavation greater than 4 feet deep unless the excavation is properly sloped.
- Excavation spoil shall be placed a minimum of 3 feet from the edge of the excavation.

4.2.7 Slips, Trips, and Falls

Slipping and tripping hazards may be encountered at the site. Footwear appropriate for walking over mud and rocks should be worn. In addition, proper site housekeeping and removal of trash and debris will reduce slipping and tripping hazards. Proper site housekeeping will be the responsibility of all site personnel, and the SHSO will make regular inspections to evaluate if the work area is adequately clean.

4.2.8 Manual Lifting

Back injuries are among the leading occupational injuries reported by industrial workers. Using proper manual lifting techniques can reduce back injuries such as pulls and disc impairments. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their back.

If the load is too heavy, do not lift it alone. Individual heavy lifting must be avoided. Lifting is always easier when performed with another person. Assistance should always be used when necessary.

4.2.9 Hand and Power Tools

Dangerous hand tools (such as saws, hammers, axes, knives, shovels) and power tools (such as chain saws, power augers, drill motors, chippers, water pumps, and weed trimmers) may be used during some investigation activities.

All hand and power tools will be maintained in a safe condition and in good repair. Hand and power tools will be used in accordance with 29 CFR 1926, Subpart I (1926.300 through 1926.307). Workers are not permitted to bring unsafe tools on-site. All tools will be used, inspected, and maintained in accordance with the manufacturer's instructions. Throwing tools or dropping tools to lower levels is prohibited. Hand and power tools will be inspected, tested, and determined to be in safe operating condition prior to each use. Periodic safety inspections of all tools will be conducted by the tool operator, the Site Manager or the SHSO to evaluate if the tools are in good condition and are being properly maintained. Any tool that fails an inspection will be immediately removed from service and tagged with a "Do Not Use" sign.

Workers using hand and power tools who are exposed to falling, flying, abrasive, or splashing hazards will be required to wear PPE. Eye protection must always be worn when working on-site. Additional eye and face protection, such as safety goggles or face shields, may also be required when working with specific hand and power tools. Workers using tools in areas where there is a head injury hazard will wear hard hats. Hearing protection will always be worn when working with power tools, and additional hearing protection may be required when working with certain power tools if noise levels are excessively high. Workers using tools that may subject their hands to an injury, such as cuts, abrasions, punctures, or burns, will wear protective gloves. Loose or frayed clothing, dangling jewelry, or loose long hair will not be worn when working with power tools.

Electric power-operated tools require ground fault circuit interceptors (GFCI). Electric power-operated tools will be double insulated or grounded, and equipped with an on/off switch. Guards must be provided to protect the operator and other nearby workers from hazards such as in-going nip points, rotating parts, flying chips, and sparks. All reciprocating, rotating, and moving parts of tools will be guarded if contact is possible. Removing machine guards is prohibited.

Circular saws must be equipped with guards that completely enclose the cutting edges and have anti-kickback devices. All planer and joiner blades must be fully guarded. The use of cracked, bent, or otherwise defective parts is prohibited. Chain saws must have an automatic chain brake or kickback device. The worker operating the chain saw will hold it with both hands during cutting operations. A chain saw must never be used to cut above the operator's shoulder height. Chain saws will not be re-fueled while running or hot. Power saws will not be left unattended.

Operators of these tools will be instructed on the proper operation and safety precautions prior to operating such equipment. Only qualified workers will operate pneumatic tools, powder-actuated tools, and abrasive blasting tools. No one shall operate equipment that is in ill repair.

4.2.10 Weather-Related Hazards

Weather-related hazards include the potential for heat, electrical storms, treacherous weather-related working conditions, or limited visibility. These hazards correlate with the season in which Site activities occur. Outside work will be suspended during electrical storms. In the event of other adverse weather conditions, the Field Team Leader will determine if work can continue without endangering the health and safety of on-site personnel.

4.2.11 Drowning Hazards

According to OSHA 29 CFR 1917.126, personnel will be required to wear a personal floatation device (PFD) when conducting work in areas where there is a potential to slip or fall into a body of water. The PFD will be inspected each day prior to use for defects and/or wear and tear. PFD's will be sized appropriately for personnel and used in accordance with the manufacturer's recommendations.

4.3 Biological Hazards

Poisonous snakes, chiggers, mosquitoes, spiders, and bees may be encountered at the Site. This requires that precautious measures be taken when disturbing rocks and other ground features. To greatly reduce insect bites, site personnel should use insect repellent, keep shirts buttoned, sleeves rolled down, and avoid areas with high grass and dense vegetation whenever possible. Snake guards should be used in areas (i.e., rock features, tall grass, etc.) where there is a potential to encounter snakes. Personnel that have allergic reactions to insect stings should inform the SHSO of the condition, carry the appropriate medications with them in the field, and take extra precautions to avoid being stung. Insect repellant should be used when working in vegetated areas.

4.4 Utility Clearance

The location of underground utilities will be identified in the area where soil borings and monitoring wells will be completed. As required by state law, the Texas One Call System, Texas Excavation Safety System, Inc., and/or the Lone Star Notification Center will be contacted. TRC personnel will meet with utility and pipeline representatives prior to commencing subsurface work. Additional utility clearance will consist of reviewing available site maps, visual inspection, corroboration with utility representatives, and probing the sample location with a hand auger or tile probe. Extreme caution must be taken to ensure that no or minimal damage occurs to the Site.

5.0 ACTIVITY-SPECIFIC REQUIREMENTS

5.1 Site Communication

Internal and external communications will be maintained to facilitate quick and smooth response to emergency situations. The following sections describe communication methods.

5.1.1 External Communication

External communication will be accomplished by telephone. The Field Task Leader will keep a cellular phone on-site at all times during investigation field activities.

All personnel must be familiar with the protocol (phone number of emergency organizations, contact person) for contacting public emergency aid teams such as fire departments, ambulance units, and hospitals. These numbers must be posted in the field logbook.

5.1.2 Internal Communication

Internal communication will be used among personnel to alert team members to emergencies, pass along safety information, and maintain site control. Verbal and visual signals will be necessary for internal communication. For effective communication, visual signals/commands must be pre-arranged. Both a primary and backup system are necessary.

5.2 Standard Work Uniform

TRC requires the following work clothing be worn by all on-site personnel:

- Steel-toed boots which have a defined heel, are of the lace-up variety, and are ankle height or taller;
- Safety glasses with permanently attached side shields that meet or exceed American National Standards Institute (ANSI) Z 87.1-1989; and
- Ear plugs when noise levels exceed 85 dBA (i.e., unable to communicate in a normal voice level at arm’s length distance from another individual);

5.3 Personal Protective Equipment

In addition to the standard work uniform, the following PPE will be worn within the Exclusion Zone (i.e., area within 25 feet of the work area), as deemed needed.

Level D Protective Uniform

- Steel toed boots;
- Hard hat;
- Hearing protection when noise levels exceed 85 dBA as an 8-hour, time-weighted average;
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Level C Protective Uniform

- Half-face (only for airborne levels of 1 to 10 parts per million [ppm]) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Full-face (only for airborne levels of 10 to 50 ppm) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Field Monitoring and Other Equipment

- Photoionization detector (PID) (calibrated with 100 ppm Isobutylene);
- Personal floatation devices;
- Snake guards;
- Wind indicator;
- First aid kit;
- Fire extinguisher.

Conditions Warranting Upgrade from Level D to C (Notify SHSO)

- PID readings greater than 1 ppm above background in breathing zone for more than 1 minute; and
- Unusual odors (i.e., organic or aromatic) are noted.

Conditions Warranting Cessation of Work and Leaving Area Immediately (Notify SHSO)

- PID readings exceed 50 ppm above background in breathing zone for greater than 1 minute;
- The PID malfunctions (work may resume when meter is repaired);
- Odors (organic, aromatic, almond, mothball, sweet tarry, sweet pungent, or mint-like) are experienced while wearing respirators (indicating cartridge breakthrough);
- Any member of field team experiences symptoms possibly related to chemical exposure such as dizziness or nausea; and
- Any member of the field team experiences symptoms related to heat or cold stress.

5.4 Work Zones

Zones are marked by barriers in which specific tasks are to be completed. These zones include the exclusion zone, contamination reduction zone, and support zone.

5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible)

At a minimum, the Exclusion Zone will include at least a 25-foot radius around the work area.

5.4.2 Contamination Reduction Zone (CRZ)

As applicable, personnel performing equipment decontamination will wear PPE and follow the procedures for decontamination of equipment and personnel outlined in Section 5.5. All personnel and equipment must pass through the CRZ before leaving the site at the end of each workday. The CRZ will be located at the edge of the Exclusion Zone for personnel and small sampling equipment decontamination. All other equipment (i.e., drilling equipment) will be decontaminated at the Site decontamination area.

5.4.3 Support Zone

The Support Zone is intended as an area that remains free of contamination and is used for staging activities, breaks, and eating. It is extremely important to keep this area clean and free of contamination. Never bring contaminated equipment, articles, or yourself into the Support Zone without going through decontamination procedures first.

5.5 Decontamination Procedures

5.5.1 Equipment Decontamination

Drilling equipment and soil/water sampling equipment shall be fully decontaminated at the contamination reduction zones between and before they are removed from the site. Decontamination for drilling equipment will consist of soap and water wash and potable water rinse or using a high-pressure hot water or steam cleaning unit. Additional scrubbing may be required to remove all encrusted materials. Soil/water sampling equipment shall be cleaned between each use by the following procedures (1) removing any solids to the degree possible with a brush and tap water; (2) washing with a brush using laboratory-grade, non-phosphate detergent and tap water, (3) rinsing with tap water, (4) rinsing with 70-percent-grade isopropyl alcohol, and (5) rinsing with distilled water. All equipment decontamination water will be contained and disposed of properly.

5.5.2 Personnel Decontamination

A personnel decontamination area will be designated in the CRZ, which will be located at the edge of each Exclusion Zone. Personnel will become thoroughly familiar with the following decontamination procedures before work begins in an Exclusion Zone:

- Place equipment and/or samples in designated area, move to the next area (marked with signs), if necessary;
- Wash boots (overboots, if used) and outer gloves using soap (Alconox or equivalent) in water solution, and potable water rinse;
- Remove overboots (if used) and outer gloves, and place in plastic bags (in 30-gallon drum);
- Remove disposable coveralls (if used) and place in plastic bag in drum;
- Remove respirator (if used), thoroughly wash and store in a sealed bag outside the CRZ;

- Remove boots and store in appropriate location;
- Remove disposable inner gloves (if used) and place in plastic bag (in 30-gallon drum); and
- Wash hands and face with water and hand soap (especially before eating or drinking).

All personnel decontamination water will be contained and disposed of properly.

It is recommended that after leaving the Site at the end of the workday that personnel shower immediately at their place of lodging.

5.5.3 Storage Procedures for Expendable Clothing/Equipment

Used, expendable clothing and equipment shall be placed in drums labeled as "Waste PPE Material." Proper disposal of the drums will be coordinated with NORCO.

6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

6.1 Responsibilities of the SHSO

The TRC SHSO is responsible for project safety, decontamination, environmental monitoring, and field medical monitoring activities. The SHSO will ensure that all field personnel comply with the provisions of this HASP. The SHSO has the authority to stop Site work in the event of safety violations or if he/she makes the judgment that an upgraded level of personal protection may be required. Anyone may stop any operation that threatens the health and safety of personnel. The SHSO is responsible for designating and marking work zones and for restricting access to Exclusion Zones to properly attired personnel.

The SHSO reports directly to the CHSO. All safety-related questions should be referred to the CHSO. The SHSO will keep the CHSO and Project Manager informed of the status of safety-related Site activities and assessments. The SHSO will notify the CHSO and Project Manager immediately of any exposure incidents, injuries, accidents, or emergency situations.

6.2 Health and Safety Clearances

TRC personnel authorized to go on-site must meet the following requirements:

- Successfully complete a basic 40-hour health and safety training course and 8 hours of refresher training each year following completion of the basic course;
- At least one field employee must have completed and be current for cardiopulmonary resuscitation (CPR)/First Aid Training; and
- Receive clearances from a TRC-approved physician to wear respiratory protective devices and to work with hazardous materials.

6.3 Distribution of the HASP

A copy of this plan must be provided to each member of the site team covered by the plan and to an authorized representative of each TRC field subcontractor covered by its provisions. Each site team member receiving a copy of the plan must acknowledge receipt of, and express willingness to comply with, the provisions of the plan by signing the attached compliance agreement form. The signed forms must be submitted to the Project Manager or Assistant Project Manager for filing.

6.4 Safety Briefings

All TRC and TRC subcontracted personnel scheduled for fieldwork at the project area will receive an initial health and safety briefing by the SHSO prior to starting work activities. The briefing will include a thorough review of this HASP with particular attention to site-specific health and safety requirements and emergency response procedures. Daily briefings will be conducted by the SHSO on-site to reinforce health and safety awareness and to allow personnel the opportunity for comments or questions. All daily briefings will be documented.

6.5 On-Site Presence of Plan

A copy of this HASP must be present at the Site each day that work is in progress.

6.6 Respirators

6.6.1 Usage

The following procedures shall be followed to ensure that air-purifying respirators provide the full protection for which they are rated:

- All employees who are required to wear respirators shall be included in the TRC Medical Monitoring Program and will be medically approved for respirator use before donning a respirator;
- Employees shall wear only respirators for which they have been fit-tested by a competent individual;
- Respirators are to be donned outside the potential hazard zone in which they are planned to be used;
- Prior to donning, the wearer shall inspect the respirator for any physical defects or breakage including, but not limited to:
  - Broken or frayed straps,
  - Improperly seated valves,
  - Dirt,
  - Holes,
  - Distorted face seal, and
  - Opaque face piece on full-facepiece respirators.

- After donning the respirator, the employee shall conduct a negative-pressure fit check to assure that the inlet and exhaust valves, and the respirator cartridges, are properly seated. The employee shall then conduct a positive-pressure fit check to ensure that a proper face piece seal against the face has been obtained. The zone of potentially hazardous exposure is not to be entered until the employee has successfully executed both positive-pressure and negative-pressure fit checks.

- Employees shall immediately evacuate the work area if they experience difficulty breathing, dizziness, or other symptoms of potentially harmful chemical exposure.

- Appropriate respirator cartridges are to be replaced at the beginning of each workday or when breakthrough is detected (whichever comes first).

Note: If at any time during use of a respirator the contaminant of concern, or any other contaminant, is detected by smell, taste or irritation, the employee is to leave the work area immediately and inform the SHSO.

6.6.2 Cleaning

Respirators assigned to an individual employee shall be cleaned by that employee at the end of each day's work involving more than four hours of respirator use and at the end of every week in which the respirator is used for at least two hours. Respirators are to be washed and rinsed in warm water (120 to 140ºF) using a disinfecting solution intended for cleaning respirators, and blot or air-dried. Cleaning solutions, available from respirator manufacturers, will be provided on-site.

6.6.3 Storage

Respirators shall be stored in a manner that protects them from exposure to sunlight, dust, chemicals, and extremes of heat and cold. Respirators shall not be stored in tool kits. The preferred storage procedure for respirators is in individual plastic bags placed in rigid containers to prevent deformation of the face-piece.

7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

7.1 General Work Rules

- Fieldwork will be conducted only during daylight hours unless adequate lighting is provided.
- Smoking will be permitted only at designated areas at the Site.
- In the event of direct skin contact by chemicals of concern, the affected area will be washed immediately with soap and water.
- In the event the PPE is ripped or torn, work shall stop and the PPE shall be removed and replaced as soon as possible.
- Personnel should never climb over or under refuse or obstacles so as to endanger themselves or others.
- Practice contamination avoidance. Never sit down or kneel, never lay equipment on the ground, avoid obvious sources of contamination such as puddles, and avoid unnecessary contact with on-site objects.
- Water samples to be analyzed for various contaminants may need to be, or already are, preserved with nitric acid, hydrochloric acid, or sulfuric acid before shipment to the analytical laboratory. Nitrile or polyvinyl chloride (PVC) gloves should be worn when handling these corrosive chemicals or samples preserved with them. Sample preservation should be performed in a well-ventilated area to avoid potential accumulation of toxic vapors. In circumstances where bad weather or poor lighting does not allow preservation at the site, preservation should be performed at a later time, or not at all. Samples should not be preserved in hotel rooms or other public areas.
- No eating, drinking, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material will be allowed in the Exclusion Zone or Contamination Reduction Zone.
- Hard contact lenses should not be worn in the Exclusion Zone or Contamination Reduction Zone. No jewelry that interferes with protective clothing fit will be worn.

- No beards, sideburns, or mustaches will be allowed that interfere with respirator mask seals, if respirators are used. The SHSO will determine if facial hair presents such an interference.

- Field personnel should remain aware of wind direction throughout the day. Wind socks or flagging will be used for this purpose. Equipment setup and sampling efforts should be directed to the greatest extent possible so that workers remain upwind of potential sources of exposure.

- No drilling or earth moving activities will be permitted during periods of thunderstorms and lightning.

- Machinery, tools, material, electrical installation, and other equipment and work practices that are judged unsafe, or not in compliance with this HASP, OSHA, or other applicable standards, shall be removed or replaced or the work practice corrected. Only employees qualified by training and/or experience will operate equipment and machinery.

- Before excavating or sampling, an Exclusion Zone must be established around the equipment after it has been positioned. The boundary of the Exclusion Zone shall extend at least 25 feet from the work area and, if practical, marked with stakes spaced no more than 20 feet apart and connected with fluorescent orange tape. Only authorized personnel will be allowed to enter Exclusion Zones.

- Representatives of federal, state, and local agencies; newspaper and other news media; the public; and all other individuals who are not a part of the TRC site team are classified as visitors and will not be permitted to enter Exclusion Zones under control by TRC, unless they can prove that they have met OSHA medical and training requirements for hazardous waste operation, have available to them PPE equivalent to that specified in this plan, and obtain permission from the TRC site or project manager.

7.2 Documentation

The following must be kept on file by the SHSO:

- Copies of the TRC Employee Health and Safety Compliance Agreement (attached) documenting health and safety briefings and personnel signatures;

- Records of usage and calibration of environmental monitoring equipment;
- Documentation of employee injury/exposure incidents;
- Records of safety violation and remedial actions taken;
- Documentation of subcontractors' compliance with TRC for health and safety training and medical monitoring.

A health and safety field logbook will be maintained on-site and should contain such information as weather conditions, employees and visitors on-site, level of personal protection, monitoring instrument readings (average, peak, and background), subjects discussed during site health and safety briefings, and names of attendees. All field personnel, including subcontractors, must sign the TRC Employee Health and Safety Compliance Agreement indicating that they have attended a briefing by the SHSO, and that they understand and agree to abide by the provisions of this HASP, in addition to the provisions of their own health and safety plan prior to working at the project area.

7.3 Site Specific Requirements

7.3.1 Housekeeping

Good housekeeping is of the utmost importance in the prevention of accidents, injuries, and fires. Clean-up will be conducted on a daily basis.

7.3.2 Spills

No contaminants (i.e., oils, diesel fuel, gasoline, etc.) are to be discharged at the project area. Should a release occur, it must be reported by the quickest means possible to the NORCO representative. Decontamination water is considered to be contaminated and should not be released onto the ground. All decontamination water spills should be reported to the TRC Field Team Leader for determination of appropriate action.

7.3.3 Operation of Vehicles and Equipment

Equipment and vehicles must operate at a safe speed while being aware of operating conditions and other equipment and personnel working in close proximity. Extreme caution must be exercised at all grade crossings.

8.0 MONITORING

TRC anticipates the potential for a risk of COPC vapor inhalation exposure; therefore, ambient air monitoring will be conducted as part of this Health and Safety Plan. Additionally, pH monitoring will be conducted during investigation activities in AOC 1.

8.1 Monitoring Instruments

A PID with a 10.6 electron volt lamp, calibrated with 100 ppm isobutylene, will be used to monitor breathing zone organic vapors. The PID will read total hydrocarbon vapor levels. The action levels discussed below have been calculated taking into account known COPCs present at the Site and respective PELs.

At this time, TRC does not anticipate the potential for hydrogen sulfide (H_2S) gas inhalation exposure; therefore, continuous air monitoring for H_2S will not be conducted.

8.2 Action Levels

Respirators must be donned by all persons working in any Exclusion Zone in which the average PID reading is 1 ppm above background in the breathing zone (for greater than 1 minute). Half-face respirators will be worn from 1 to 10 ppm and full-face respirators will be worn from 10 to 50 ppm. The Exclusion Zone must be evacuated whenever the average PID reading equals or exceeds 50 ppm above background in the breathing zone for greater than 1 minute. PID action levels are listed in the table below.

If evacuation becomes necessary, the SHSO shall take charge and direct personnel to move from the Exclusion Zone to a predetermined area and to stay there. The SHSO shall first determine that all personnel have left the Exclusion Zone and are safe, then consult the CHSO on how to proceed.

Action Levels for Air Monitoring

Equipment Type		Monitoring, Action Levels, and PPE
ORGANIC VAPORS		
☒ ☐ ☐	PID FID Detector Tube Type: benzene	Reading > 1 ppm or "Background" sustained for 1 minute, upgrade to Level C with half-face APR, Notify TRC SHSO. Reading > 10 ppm sustained for 1 minute, upgrade respiratory protection to full-face APR, Notify TRC SHSO. Reading > 50 ppm sustained for 1 minute, shutdown work activities, evacuate the area, move upwind, Notify the TRC SHSO.

8.3 pH Monitoring

Monitoring of groundwater and wastewater will be required at least daily during excavation activities to evaluate pH levels. Monitoring will also be performed in the event additional or new flows and/or sources of groundwater or wastewater are identified. Monitoring will be performed using either pH paper or a pH meter (in the field or a sample taken to the Laboratory). If a pH meter is utilized, the meter must be calibrated daily and the calibration results documented in the project field notes.

Monitoring will be performed in general accordance with the following procedures:

1. If pH paper is used, the paper will be placed so it comes in contact with the liquid for evaluation. The paper will be allowed to change colors. The color of the paper will be compared to the pH color chart included with the pH to determine the approximate pH. The pH value will be recorded in the project field notes.

2. If a pH meter is used, the pH probe will be placed in the liquid to be evaluated. The results will be read from the pH meter and recorded in the project field notes.

<u>If pH is greater than 9, then proper actions must be taken for conditions that are considered “caustic.”</u>

9.0 EMERGENCY PROCEDURES

Emergency procedures listed in this HASP are designed to give the field team instructions in handling medical emergencies, fire, and explosions.

9.1 Medical Injuries

Medical problems that can occur on-site need to be handled competently and quickly. Each field team member should be aware of the instructions and information given below:

- Seek professional medical attention for personnel that are bleeding severely, experiencing intense pain, unconscious, or not breathing. Each member of the site team should know how to call for an ambulance.
- If you get anything in your eyes (chemical or dust), flood them with water for 15 minutes. Be sure to tell the SHSO. The SHSO will make sure that the victim washes the eyes for the full 15 minutes.
- Do not remove objects that are impaled (stuck) in the eye.
- Always seek medical attention for eye injuries.
- Stop bleeding with direct pressure. Place bandage over the wound and press down with your hand. If possible, raise the bleeding extremity above the level of the heart. Use a tourniquet ONLY in extreme cases when you are not able to stop severe bleeding.
- If you contact the waste, wash the affected area with soap and water immediately.

9.2 Fire and Explosion Response Procedures

Fires can be caused by the drilling rig activity. The TRC field team should verify that the drilling rig has a fire extinguisher on hand at all times. The procedures for using a fire extinguisher is to **pull** the safety pin, **aim** the extinguisher at the base of the flames and discharge the extinguisher by **squeezing** and **sweeping** the flames from a distance of 6 feet (PASS-pull, aim, squeeze, sweep). Move in closer as the flames are put out.

- Never use water on an electrical fire or a solvent fire. All extinguishers should be dry chemical labeled “Class A, B, or C”; and
- Keep decontamination solvents well away from the steam cleaner.

9.3 Emergency Medical Information

TRC Site Health & Safety Officer (SHSO):

Richard Kotzur (979) 229-3521

TRC Corporate Health and Safety Director:

Gary Ritter (860) 298-9692

TRC Regional Health and Safety Coordinator:

Matt Webre (512) 684-3140 or (512) 567-7936

TRC Safety Contact (Austin):

Matt Webre (512) 684-3140 or (512) 567-7936

Project Managers (Austin):

Stephen Halasz (512) 684-3351 or (512) 745-6155

9.3.1 First Aid

First aid at the Site will consist of a first aid kit, which will be brought to the Site daily by the SHSO and be kept at the edge of the Exclusion Zone during field activities.

9.3.2 Hospitals

Personnel with any injuries shall be taken to Care Regional Medical Center located approximately 5 miles northeast of the project area. A map and driving directions from Falcon Refinery to Care Regional Medical Center are provided in Appendix C.

9.3.3 Emergency Numbers

Service	**Address**	**Phone**
Fire Department:	Ingleside Fire Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-7422
Police Department:	Ingleside Police Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-2531
Hospital:	Care Regional Medical Center 1711 West Wheeler Avenue Aransas Pass, TX 78336	**911** (361) 758-8585
Nearest phone: Cellular phone	Richard Kotzur Field Task Leader/SHSO	(979) 229-3521

Emergency Services are accessed through 911

10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP

The following TRC site personnel have read, understand, and agree to comply with all of the health and safety directives for the Falcon Refinery Superfund Site.

Crew	Date
_____	_____
_____	_____
._____	_____
_____	_____
_____	_____
_____	_____
_____	_____

In addition, the following contractor personnel have been briefed on the site hazards, have reviewed their own HASP (per 29 CFR 1910.120(i)(2), have completed the required 40-hour OSHA Training (per 29 CFR 1926.21 and 1910.120(e), have been properly respirator fit tested, and are involved in their company's Medical Surveillance Program (per 29 CFR 1910.120(f)). They hereby acknowledge having met all the above stated requirements for working at the Falcon Refinery Superfund Site.

Contractor Personnel	**Company**	**Date**

APPENDIX A

Potential Chemical Hazards

CHEMICAL HAZARD DATA								
			TWA					
Chemical Name	Carcinogen (Y/N)	Skin Absorption Hazard (Y/N)	OSHA PEL	NIOSH REL	ACGIH TLV	OSHA STEL	IDLH	Routes of Exposure
Benzene	Y	Y	1.0 ppm	0.1 ppm	0.5 ppm	5 ppm	500 ppm	I,S,G,C
Toluene	N	Y	200 ppm	100 ppm	50 ppm	300 ppm	500 ppm	I,S,G,C
Xylene(s)	N	Y	100 ppm	150 ppm	100 ppm	N/A	900 ppm	I,S,G,C
Ethylbenzene	N	N	100 ppm	100 ppm	100 ppm	N/A	800 ppm	I,G,C

TWA = Time-Weighted Average
PEL = Permissible Exposure Limit
REL = Recommended Exposure Limit identifying NIOSH
TLV = Threshold Limit Value identifying ACGIH
STEL = Short Term Exposure Limit
IDLH = Immediate Dangerous to Life or Health
Routes of Exposure: I = inhalation, S = skin absorption, G = ingestion, C = skin contact
ppm = parts per million
mg/m^3 = milligrams per cubic meter (of air)

APPENDIX B

Material Safety Data Sheets

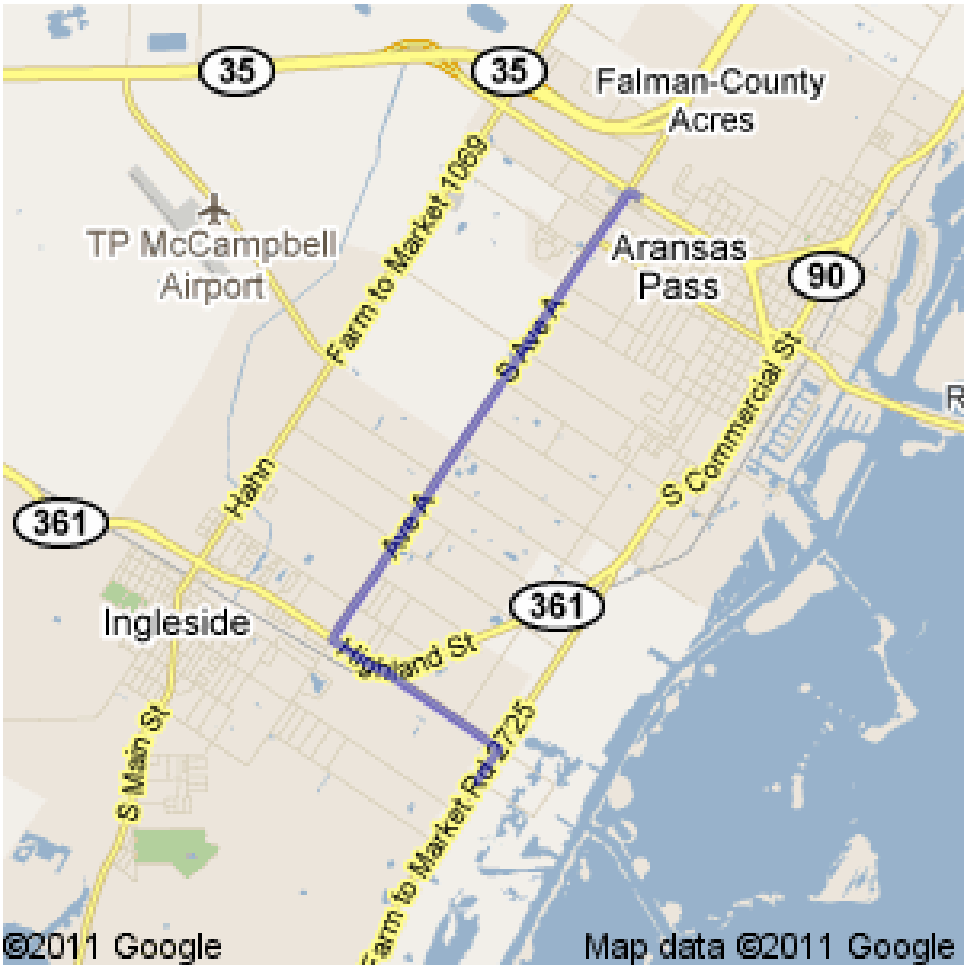
INSERT MSDS'S HERE

APPENDIX C

Map/Route to the Nearest Hospital

Driving Directions from the Site (Former Falcon Refinery (1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road, Ingleside, San Patricio County, Texas) to Care Regional Medical Center, 1711 West Wheeler Avenue, Aransas Pass, Texas 78336. Phone: (361) 758-8585

1. Head northeast on Farm to Market Rd 2725 toward Co Rd 146/Sunray Rd. 0.3 mi
2. Take the 1st left onto Co Rd 146/Sunray Rd. 0.9 mi
3. Continue onto Highland St. 0.4 mi
4. Turn right onto Ave A. 3.5 mi
5. Turn right onto W Wheeler Ave Destination will be on the right. 367 ft



Health and Safety Plan

Falcon Refinery Superfund Site

Ingleside, San Patricio County, Texas

Prepared for:

National Oil Recovery Corporation
3717 Bowne Street
Flushing, NY 11354

Prepared by:

505 East Huntland Drive, Suite 250
Austin, Texas 78752

Stephen Halasz, Project Manager

August 2011

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1-1
2.0 ADMINISTRATIVE INFORMATION 2-1
2.1 Health and Safety Plan Requirement Rationale 2-1
2.2 Health and Safety Plan Approval 2-1
3.0 PROJECT DESCRIPTION 3-1
3.1 Facility Description 3-1
3.1.1 Areas of Concern 3-1
3.2 TRC Field Activities 3-3
4.0 SITE HAZARDS 4-1
4.1 Chemical Hazards 4-1
4.2 Physical Hazards 4-1
4.2.1 Heat Stress 4-1
4.2.2 Cold Stress 4-3
4.2.3 Sunburn 4-4
4.2.4 Exposure to Excessive Noise 4-4
4.2.5 Heavy Equipment and Motor Vehicle Operation 4-5
4.2.6 Excavations and Trenches 4-6
4.2.7 Slips, Trips, and Falls 4-6
4.2.8 Manual Lifting 4-7
4.2.9 Hand and Power Tools 4-7
4.2.10 Weather-Related Hazards 4-8
4.2.11 Drowning Hazards 4-8
4.3 Biological Hazards 4-9
4.4 Utility Clearance 4-9
5.0 ACTIVITY-SPECIFIC REQUIREMENTS 5-1
5.1 Site Communication 5-1
5.1.1 External Communication 5-1
5.1.2 Internal Communication 5-1
5.2 Standard Work Uniform 5-1
5.3 Personal Protective Equipment 5-2

5.4 Work Zones 5-3
5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible) 5-3
5.4.2 Contamination Reduction Zone (CRZ) 5-3
5.4.3 Support Zone 5-4
5.5 Decontamination Procedures 5-4
5.5.1 Equipment Decontamination 5-4
5.5.2 Personnel Decontamination 5-4
5.5.3 Storage Procedures for Expendable Clothing/Equipment 5-5
6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS 6-1
6.1 Responsibilities of the SHSO 6-1
6.2 Health and Safety Clearances 6-1
6.3 Distribution of the HASP 6-1
6.4 Safety Briefings 6-2
6.5 On-Site Presence of Plan 6-2
6.6 Respirators 6-2
6.6.1 Usage 6-2
6.6.2 Cleaning 6-3
6.6.3 Storage 6-3
7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS 7-1
7.1 General Work Rules 7-1
7.2 Documentation 7-3
7.3 Site Specific Requirements 7-3
7.3.1 Housekeeping 7-3
7.3.2 Spills 7-3
7.3.3 Operation of Vehicles and Equipment 7-4
8.0 MONITORING 8-1
8.1 Monitoring Instruments 8-1
8.2 Action Levels 8-1
8.3 pH Monitoring 8-2
9.0 EMERGENCY PROCEDURES 9-3
9.1 Medical Injuries 9-3

9.2 Fire and Explosion Response Procedures 9-3
9.3 Emergency Medical Information 9-4
9.3.1 First Aid 9-4
9.3.2 Hospitals 9-4
9.4 Incident Investigation 9-4
9.4.1 Emergency Numbers 9-6
10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP 10-1

APPENDIX A: Potential Chemical Hazards
APPENDIX B: Material Safety Data Sheets
APPENDIX C: Job Safety Analysis (JSA) Form
APPENDIX D: Safety Task Analysis Review (STAR) Form
APPENDIX E: Air Monitoring Forms
APPENDIX F: Map/Route to the Nearest Hospitals
APPENDIX G: TRC Incident Report Form

1.0 INTRODUCTION

This Health and Safety Plan (HASP) outlines the health and safety requirements for on-site activities associated with soil and groundwater investigation activities within National Oil Recovery Corporation's (NORCO's) former Falcon Refinery located 1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road near Ingleside, San Patricio County, Texas (the Site). The Site is bordered by wetlands to the northeast and southeast, residential areas to the north and southwest, an abandoned refinery to the northwest, and a construction company to the southwest.

This HASP has been developed in conformance with the directives and requirements of the TRC *Health and Safety Policy and Procedure Manual*, October 2010, and 29 CFR 1910.120(i)(2). This HASP and any subsequent addenda will apply to all TRC personnel and subcontractors who are involved with on-site activities at the Site. By implementing this plan, TRC does not assume any liability for the health and safety of non-TRC personnel involved in the activities performed during this project.

TRC field personnel and TRC subcontracted field personnel must participate in medical monitoring, respirator fit testing, and hazardous waste training programs as specified by Occupational Safety and Health Administration (OSHA) regulations (per 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response [HAZWOPER]).

All work must be conducted in compliance with applicable OSHA regulations, including 29 CFR 1910 (General Industry Standards) and 29 CFR 1926 (Construction Industry Standards).

2.0 ADMINISTRATIVE INFORMATION

Site Name: Falcon Refinery Superfund Site

Site Location: Ingleside, San Patricio County, Texas

Project Title: Phase II Remedial Investigation/Feasibility Study

Client: National Oil Recovery Corporation

Project Manager: Stephen Halasz

TRC Task Leader(s):

Corporate Health & Safety Officer (CHSO): Ron Severson

Health & Safety Coordinator (HSC): Matt Webre

Assistant Project Manager: TBD

Field/Site Health & Safety Officer (SHSO): Alonzo Arredondo

2.1 Health and Safety Plan Requirement Rationale

This HASP is required due to past and present conditions, which may have existed at the Site. The chemicals of potential concern (COPCs) include metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides/herbicides.

2.2 Health and Safety Plan Approval

Health & Safety Officer: Matt Webre

Signature:_____ Date:_____

3.0 PROJECT DESCRIPTION

The following sections describe the Site, specifically the areas of concern (AOCs), and proposed field activities.

3.1 Facility Description

The Site consists of a refinery which operated intermittently and is currently inactive. When in operation, the refinery had a capacity of 40,000 barrels per day and the primary products consisted of naphtha, jet fuel, kerosene, diesel, and fuel oil.

3.1.1 Areas of Concern

Seven AOCs have been identified as potential areas impacted by COPCs. Three AOCs are identified on-site and four are off-site. The AOCs are summarized in Table 1 and shown on Figure 1.

AOC-1 Former Operational Units

AOC-1N and AOC-1S includes the entire North site, former operational units (OU) areas of the South site, a drum disposal area, and an area where metal waste was discarded. Preliminary COPCs to be screened at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater.

AOC-2 On-Site Non-Operational Areas

Areas of the refinery not used for operations or storage and with no record of releases are included in AOC-2. Although no COPCs were anticipated in AOC-2, the screened COPCs included metals, VOCs, and SVOCs. Potentially affected media include soil and possibly groundwater.

AOC-3 Wetlands

Included in AOC-3 are wetlands immediately adjacent to the site bordered by Bay Avenue, Bishop Road, and a dam on the upstream side; wetlands located between Bishop Road, Sunray Road, Bay Avenue, and residences along Thayer Avenue; and wetlands between Sunray Road, residences along FM 2725, Gulf Marine Fabricators, Offshore Specialty Fabricators, and the outlet of the wetlands into the Intracoastal Waterway.

There is one active and several abandoned pipelines leading from the refinery to the current and historic barge dock facilities. During June 2006, the abandoned pipelines

were cut, the contents of the pipelines were removed, and plates were welded on the pipeline ends to seal them.

Wetland assessment activities will evaluate releases from the refinery, including any unpermitted wastewater effluent discharges, two known pipeline releases, and possible releases from pipelines leading from the refinery to the current and historic barge dock facilities.

There have been documented spills of hydrocarbons, waste and volatile organics. As a result, the screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, herbicides, and pesticides. Potentially affected media include sediment, soil, surface water and groundwater.

AOC-4 Current Barge Docking Facility

Included in AOC-4 is the current barge docking facility, which is approximately 0.5 acres and is located on the Intracoastal Waterway. The fenced facility, which is connected to the refinery by pipelines, is used to load and unload barges. Historically, crude oil and refined products were loaded and unloaded at this docking facility.

There have been no reported releases nor is there evidence of spills associated with this AOC. The screened COPCs at this AOC included metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and possibly groundwater.

AOC-5 Intracoastal Waterway

Sediments and surface water adjacent to the current and historic barge dock facilities are included in this AOC. The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include sediment and surface water. Samples will be obtained from a boat.

AOC-6 Thayer Road

Included in this AOC is the neighborhood along Thayer Road, located north of Bishop Road across from the refinery (AOC-1S). The screened COPCs at this AOC are metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater. No sampling is required within AOC-6 at this time.

AOC-7 Bishop Road

Included in this AOC is the neighborhood along Bishop Road, located south of Bishop Road across from AOC-1N. The screened COPCs at this AOC include metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Potentially affected media include soil and groundwater. No sampling is required within AOC-6 at this time.

3.2 TRC Field Activities

TRC will conduct the following activities on-site including: (1) surface and subsurface soil sampling; (2) installation of permanent monitoring wells; and (3) groundwater sampling. Off-site activities will include: (1) surface and subsurface soil sampling; (2) installation of permanent? monitoring wells; (3) surface and groundwater sampling; (4) sediment sampling in the wetlands and bay; and (5) biota sampling.

TABLE 1
AREAS OF CONCERN
FALCON REFINERY SUPERFUND SITE
INGLESIDE, TEXAS

AOC	LOCATION		SURFACE WATER SAMPLE NUMBER	SAMPLE LOCATION NUMBER	MONITOR WELL/GROUNDWATER LOCATONS	COPCs
1N	North section of the Refinery complex, on the northeast side of the FM 2725/Bishop Rd. intersection.	Surface Soil Subsurface Soil Groundwater		G2-01S - G2-04S	MW01-01 - MW01-02	Metals VOCs SVOCs PCBs Pesticides
1S	South section of the Refinery complex, on the southwest side of the FM 2725/Bishop Rd. intersection.	Surface Soil Subsurface Soil Groundwater		G2-05S - G2-24S	MW-03 - MW-07	Metals VOCs SVOCs PCBs Pesticides
2	On-site non-process areas, west of the south section of the Refinery complex.	Surface Soil Subsurface Soil		G2-25S - G2-28S		Metals VOCs SVOCs PCBs Pesticides
3	Wetlands	Surface Soil Subsurface Soil Sediment Surface Water*	G2-01SW - G2-16SW	G2-01SD - G2-06SD		Metals VOCs SVOCs PCBs Pesticides
4	Current barge docking site	Surface Soil Subsurface Soil		G2-29S - G2-33S		Metals VOCs SVOCs PCBs Pesticides
5	Redfish Bay adjacent to current barge docking facility	Sediment Surface Water		G2-07SD - G2-13SD		Metals VOCs SVOCs PCBs Pesticides
6	Neighborhood **					
7	Neighborhood **					
BKG	To be determined	Surface Soil Subsurface Soil Groundwater Sediment Surface Water	BG-15SW - BG20-SW	BG-09S - BG-14S BG-15SDW - BG-20SDW BG-21SDI - BG-26SDI	TWBG-09 - TWBG-14	Metals VOCs SVOCs

* Due to flucuations in surface water locations within wetlands, exact locations are not listed.
** May require sampling after Phase II addendum No. 1

AOC	Area of Concern
COPC	Contaminant of Potential Concern
VOC	Volatile Organic Compound
GW	groundwater
BKG	Background
SVOC	Semi-volatile Organic Compound
SD	Sediment
SW	Surface water

Legend

- Area of Concern (AOC) Boundary

Active NORCO Pipeline

- Above Ground
- Underground

Abandoned NORCO Pipeline

- Above Ground
- Underground

Outside Operations

- Gulf South Pipeline
- Boss Pipeline
- Gathering Line 2'
- Plains Marketing Pipeline

Source: National Agriculture Imagery Program (NAIP), 2009.

N

400 0 400

Feet

SITE MAP

FALCON REFINERY
INGELSIDE, SAN PATRICIO COUNTY, TEXAS

PROJECT NO.: 182978 | DATE: 5/11/2011

TRC
505 EAST HUNTLAND DRIVE
SUITE 250
AUSTIN, TEXAS 78752
512-329-6080

FIGURE 1

4.0 SITE HAZARDS

The following site hazards are present or could be encountered at the project area.

4.1 Chemical Hazards

Due to the storage of naphtha, jet fuel, kerosene, diesel, and fuel oil, COPCs at the Site include metals, VOCs, SVOCs, PCBs, and pesticides/herbicides. Specifically, benzene, toluene, ethylbenzene, and xylene (BTEX) is of primary concern for this HASP. Site personnel should avoid touching, breathing or ingesting any media encountered on-site. Nitrile gloves must be worn at all times when in contact with soil, water, and/or hydrocarbons. Section 8 describes in detail procedures that will be followed in ensure a safe breathing zone and protection from vapors of COPCs. Appendix A summarizes the various constituents of concern, the Permissible Exposure Levels (PELs), and the major potential health effects of each. Material Safety Data Sheets (MSDSs) for the COPCs are located in Appendix B.

4.2 Physical Hazards

4.2.1 Heat Stress

Heat stress results when the body is unable to get rid of excess heat. Stages of heat stress are heat cramps, heat exhaustion, and heat stroke. The latter can be fatal. Heat stress is of particular concern when workers must wear chemical protective clothing and ambient air temperatures are high, because protective clothing reduces evaporative body cooling. If ambient air temperatures at the site reach 70°F, heat stress symptoms should be watched for and control measures applied, if they appear.

These symptoms include:

- Heat rash, which may result from continuous exposure to heat or humid air.
- Heat cramps which are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include:
  - Muscle spasms, and
  - Pain in the hands, feet, and abdomen.
- Heat exhaustion, which may occur from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

  - Pale, cool, moist skin,
  - Heavy sweating,
  - Dizziness,
  - Nausea, and
  - Fainting.

- Heat stroke is the most serious form of heat stress in which temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms include:
  - Red, hot, unusually dry skin,
  - Lack of or reduced perspiration,
  - Nausea,
  - Dizziness and confusion,
  - Strong, rapid pulse, and
  - Coma.

A worker who exhibits any of these symptoms will be immediately relieved of responsibilities and told to consume electrolyte fluid or cool water while resting in a shaded area. The individual should not return to work until symptoms are no longer recognizable. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored for any increase in heart rate or body temperature for the remainder of their shift. In addition, the worker will be requested to consume electrolyte fluid or cool water every hour.

The SHSO will monitor workers hourly when:

- Symptoms of heat stress are reported or observed;
- Ambient temperatures exceed 70º F and workers are dressed in impervious clothing; or
- Ambient temperatures exceed 90º F and workers are dressed in normal clothing.

Workers will be monitored for heat stress conditions by measuring the heart rate (HR) by radial (wrist) pulse for 30 seconds after one minute of rest. The HR after one minute of rest should not exceed 110 beats per minute. If HR is higher, the next work period shall be shortened by 33%, while the rest period length remains the same. If the pulse rate is still 110 beats per minute after one minute of rest in the next rest period, the following work cycle will be shortened by another 33 percent. This shortening of the work period must continue until the worker's HR is no greater than 110 beats per minute.

4.2.2 Cold Stress

Types of cold stress include general body coldness, hypothermia, and frostbite. The latter two require medical attention. Hypothermia can be fatal while frostbite can result in the amputation of limbs. If ambient air temperatures at the site reach below 39°F, cold stress symptoms should be watched for and control measures applied, if they appear. These symptoms include:

- General body coldness, which is caused by a drop in skin temperature. Signs and symptoms include shivering, numbness in extremities, and loss in manual dexterity and strength.
- Hypothermia is a decrease in deep body temperature (normally 98.6ºF). Signs and symptoms include uncontrollable shivering, slurred speech and memory lapses, irregular breathing, and drowsiness.
- Frostbite occurs when there is inadequate circulation and/or insulation of a body part. Signs and symptoms include skin color change (white or grayish yellow to reddish violet to black), and pain initially, followed by cold and numbness in the affected part.

Preventative measures will help avert serious illness due to cold stress. Appropriate clothing will be worn on the basis of the exterior temperature, wind chill factor, and the level of work. Precautions will be taken to minimize exposed flesh and clothing should be layered as appropriate. A worker who exhibits any symptoms of cold stress will be immediately relieved of responsibilities. If symptoms appear critical, persist, or get worse, the SHSO will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored. In addition, the following guidelines will be followed.

Work Below 39ºF (4ºC)

- The employees shall wear cold protective clothing appropriate for the level of cold and physical activity.
- If the air temperature at the site is decreased by wind or artificial ventilation, the cooling effect of the wind will be reduced by shielding the work area or by wearing a removable outer windbreak garment.
- If the clothing on the employee may become wet on the job site, the outer layer of the clothing will be water repellent.
- Workers who become immersed in water or whose clothing becomes wet will immediately be provided with a change of clothing and treated for hypothermia.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve.

TRC does not anticipate cold stress as a factor during these field activities.

4.2.3 Sunburn

Prolonged exposure of the skin to the sun, even on overcast days, can result in sunburn, which can be severe enough to be incapacitating, especially with fair-skinned individuals. Repeated sun burning can eventually cause premature aging of the skin and skin cancer in individuals. Always wear clothing to reduce the amount of exposed skin and frequently use sun block creams or lotions.

4.2.4 Exposure to Excessive Noise

Overexposure to noise can result in hearing loss. If it is difficult to hear normal speech when the speaker is 3 feet from the listener, for more than 4 hours a day, the noise level must be measured. If it exceeds 85 decibels (dBA) as an 8-hour, time-weighted average, hearing protection will be worn in accordance with 29 CFR 1910.95. If a sound level meter is not available, then the noise level will be assumed to be 85 dBA if one cannot communicate at normal voice level within 3 feet from another person. If this is the case, then appropriate hearing protection will be donned.

4.2.5 Heavy Equipment and Motor Vehicle Operation

Only qualified personnel will operate heavy equipment and motor vehicles. Equipment will not be operated in a manner that will endanger persons or property. All heavy equipment and motor vehicles will be operated in accordance with the manufacturer's instructions and 29 CFR 1926 Subpart O.

The following inspection and repair controls will also be implemented during this project:

- Equipment and vehicles will be inspected by the operator on a daily basis, prior to starting work.
- All heavy equipment exhaust systems will be checked daily and confirmed to have no embers or sparking.
- Any unsafe equipment or vehicles will be removed from service until safety defects can be corrected.
- Equipment will be shut down and locked out before maintenance or repairs are made.

Operators will follow these rules:

- Motor vehicles and heavy equipment will be shut down during re-fueling operations.
- Operators will not leave their equipment unattended while it is running.
- Whenever equipment is parked, the parking brake will be set. If the equipment is parked on an incline, in addition to setting the parking brake, the wheels will also be chocked.
- Operators will be trained and experienced in the use of their equipment.
- Vehicles or equipment will not be operated in a careless or unsafe manner.
- Personnel will wear appropriate personal protective equipment (PPE) when working with heavy equipment. Dermal protection must fit properly and be taped to prevent "caught on" or "caught between" hazards.

Required equipment features include:

- All heavy equipment will have an audible backup alarm and an audible warning device (i.e., a horn).
- Each piece of heavy equipment will have a portable fire extinguisher.

When working with moving equipment:

- One designated person will give signals to the operators of both equipment and vehicles in any work area.
- Personnel will stay clear of the operational area of the equipment. Workers are not permitted to stand directly underneath any load or piece of equipment, i.e., man-lift, backhoe bucket, crane load, etc.
- Work areas will be adequately illuminated.

4.2.6 Excavations and Trenches

Compliance with excavation and trenching standards established by OSHA regulation 29 CFR 1926 Subpart P is a requirement of this HASP, as well as the compliance with the requirements presented below.

- Trenches and other large holes must be marked with yellow caution tape at any time the excavation is left unattended. The caution tape must be placed no less than 2 feet from the edge of the excavation
- Personnel will not be allowed to enter an excavation greater than 4 feet deep unless the excavation is properly sloped.
- Excavation spoil shall be placed a minimum of 3 feet from the edge of the excavation.

4.2.7 Slips, Trips, and Falls

Slipping and tripping hazards may be encountered at the site. Footwear appropriate for walking over mud and rocks should be worn. In addition, proper site housekeeping and removal of trash and debris will reduce slipping and tripping hazards. Proper site housekeeping will be the responsibility of all site personnel, and the SHSO will make regular inspections to evaluate if the work area is adequately clean.

4.2.8 Manual Lifting

Back injuries are among the leading occupational injuries reported by industrial workers. Using proper manual lifting techniques can reduce back injuries such as pulls and disc impairments. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their back.

If the load is too heavy, do not lift it alone. Individual heavy lifting must be avoided. Lifting is always easier when performed with another person. Assistance should always be used when necessary.

4.2.9 Hand and Power Tools

Dangerous hand tools (such as saws, hammers, axes, knives, shovels) and power tools (such as chain saws, power augers, drill motors, chippers, water pumps, and weed trimmers) may be used during some investigation activities.

All hand and power tools will be maintained in a safe condition and in good repair. Hand and power tools will be used in accordance with 29 CFR 1926, Subpart I (1926.300 through 1926.307). Workers are not permitted to bring unsafe tools on-site. All tools will be used, inspected, and maintained in accordance with the manufacturer's instructions. Throwing tools or dropping tools to lower levels is prohibited. Hand and power tools will be inspected, tested, and determined to be in safe operating condition prior to each use. Periodic safety inspections of all tools will be conducted by the tool operator, the Site Manager or the SHSO to evaluate if the tools are in good condition and are being properly maintained. Any tool that fails an inspection will be immediately removed from service and tagged with a "Do Not Use" sign.

Workers using hand and power tools who are exposed to falling, flying, abrasive, or splashing hazards will be required to wear PPE. Eye protection must always be worn when working on-site. Additional eye and face protection, such as safety goggles or face shields, may also be required when working with specific hand and power tools. Workers using tools in areas where there is a head injury hazard will wear hard hats. Hearing protection will always be worn when working with power tools, and additional hearing protection may be required when working with certain power tools if noise levels are excessively high. Workers using tools that may subject their hands to an injury, such as cuts, abrasions, punctures, or burns, will wear protective gloves. Loose or frayed clothing, dangling jewelry, or loose long hair will not be worn when working with power tools.

Electric power-operated tools require ground fault circuit interceptors (GFCI). Electric power-operated tools will be double insulated or grounded, and equipped with an on/off switch. Guards must be provided to protect the operator and other nearby workers from hazards such as in-going nip points, rotating parts, flying chips, and sparks. All reciprocating, rotating, and moving parts of tools will be guarded if contact is possible. Removing machine guards is prohibited.

Circular saws must be equipped with guards that completely enclose the cutting edges and have anti-kickback devices. All planer and joiner blades must be fully guarded. The use of cracked, bent, or otherwise defective parts is prohibited. Chain saws must have an automatic chain brake or kickback device. The worker operating the chain saw will hold it with both hands during cutting operations. A chain saw must never be used to cut above the operator's shoulder height. Chain saws will not be re-fueled while running or hot. Power saws will not be left unattended.

Operators of these tools will be instructed on the proper operation and safety precautions prior to operating such equipment. Only qualified workers will operate pneumatic tools, powder-actuated tools, and abrasive blasting tools. No one shall operate equipment that is in ill repair.

4.2.10 Weather-Related Hazards

Weather-related hazards include the potential for heat, electrical storms, treacherous weather-related working conditions, or limited visibility. These hazards correlate with the season in which Site activities occur. Outside work will be suspended during electrical storms. In the event of other adverse weather conditions, the Field Team Leader will determine if work can continue without endangering the health and safety of on-site personnel.

4.2.11 Drowning Hazards

According to OSHA 29 CFR 1917.126, personnel will be required to wear a personal floatation device (PFD) when conducting work in areas where there is a potential to slip or fall into a body of water. The PFD will be inspected each day prior to use for defects and/or wear and tear. PFD's will be sized appropriately for personnel and used in accordance with the manufacturer's recommendations.

4.3 Biological Hazards

Poisonous snakes, chiggers, mosquitoes, spiders, and bees may be encountered at the Site. This requires that precautious measures be taken when disturbing rocks and other ground features. To greatly reduce insect bites, site personnel should use insect repellent, keep shirts buttoned, sleeves rolled down, and avoid areas with high grass and dense vegetation whenever possible. Snake guards should be used in areas (i.e., rock features, tall grass, etc.) where there is a potential to encounter snakes. Personnel that have allergic reactions to insect stings should inform the SHSO of the condition, carry the appropriate medications with them in the field, and take extra precautions to avoid being stung. Insect repellant should be used when working in vegetated areas.

4.4 Utility Clearance

The location of underground utilities will be identified in the area where soil borings and monitoring wells will be completed. As required by state law, the Texas One Call System, Texas Excavation Safety System, Inc., and/or the Lone Star Notification Center will be contacted. TRC personnel will meet with utility and pipeline representatives prior to commencing subsurface work. Additional utility clearance will consist of reviewing available site maps, visual inspection, corroboration with utility representatives, and probing the sample location with a hand auger or tile probe. Extreme caution must be taken to ensure that no or minimal damage occurs to the Site.

5.0 ACTIVITY-SPECIFIC REQUIREMENTS

5.1 Site Communication

Internal and external communications will be maintained to facilitate quick and smooth response to emergency situations. The following sections describe communication methods.

5.1.1 External Communication

External communication will be accomplished by telephone. The Field Task Leader will keep a cellular phone on-site at all times during investigation field activities.

All personnel must be familiar with the protocol (phone number of emergency organizations, contact person) for contacting public emergency aid teams such as fire departments, ambulance units, and hospitals. These numbers must be posted in the field logbook.

5.1.2 Internal Communication

Internal communication will be used among personnel to alert team members to emergencies, pass along safety information, and maintain site control. Verbal and visual signals will be necessary for internal communication. For effective communication, visual signals/commands must be pre-arranged. Both a primary and backup system are necessary.

5.2 Standard Work Uniform

TRC requires the following work clothing be worn by all on-site personnel:

- Steel-toed boots which have a defined heel, are of the lace-up variety, and are ankle height or taller;
- Safety glasses with permanently attached side shields that meet or exceed American National Standards Institute (ANSI) Z 87.1-1989; and
- Ear plugs when noise levels exceed 85 dBA (i.e., unable to communicate in a normal voice level at arm’s length distance from another individual);

5.3 Personal Protective Equipment

In addition to the standard work uniform, the following PPE will be worn within the Exclusion Zone (i.e., area within 25 feet of the work area), as deemed needed.

Level D Protective Uniform

- Steel toed boots;
- Hard hat;
- Hearing protection when noise levels exceed 85 dBA as an 8-hour, time-weighted average;
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Level C Protective Uniform

- Half-face (only for airborne levels of 1 to 10 parts per million [ppm]) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Full-face (only for airborne levels of 10 to 50 ppm) with organic vapor/dust cartridges (refer to Section 8.2 for respirator use action levels);
- Tyvek coveralls when there is a potential to come in contact with impacted material;
- Nitrile gloves when handling soil, water, and/or hydrocarbons.

Field Monitoring and Other Equipment

- Photoionization detector (PID) calibrated with 100 ppm Isobutylene;
- Personal floatation devices;
- Snake guards;
- Wind indicator;
- First aid kit;
- Fire extinguisher.

Conditions Warranting Upgrade from Level D to C (Notify SHSO)

- PID readings greater than 1 ppm above background in breathing zone for more than 1 minute; and
- Unusual odors (i.e., organic or aromatic) are noted.

Conditions Warranting Cessation of Work and Leaving Area Immediately (Notify SHSO)

- PID readings exceed 50 ppm above background in breathing zone for greater than 1 minute;
- The PID malfunctions (work may resume when meter is repaired);
- Odors (organic, aromatic, almond, mothball, sweet tarry, sweet pungent, or mint-like) are experienced while wearing respirators (indicating cartridge breakthrough);
- Any member of field team experiences symptoms possibly related to chemical exposure such as dizziness or nausea; and
- Any member of the field team experiences symptoms related to heat or cold stress.

5.4 Work Zones

Zones are marked by barriers in which specific tasks are to be completed. These zones include the exclusion zone, contamination reduction zone, and support zone.

5.4.1 Exclusion Zone (to be marked by flagging, tape, etc., where feasible)

At a minimum, the Exclusion Zone will include at least a 25-foot radius around the work area.

5.4.2 Contamination Reduction Zone (CRZ)

As applicable, personnel performing equipment decontamination will wear PPE and follow the procedures for decontamination of equipment and personnel outlined in Section 5.5. All personnel and equipment must pass through the CRZ before leaving the site at the end of each workday. The CRZ will be located at the edge of the Exclusion Zone for personnel and small sampling equipment decontamination. All other equipment (i.e., drilling equipment) will be decontaminated at the Site decontamination area.

5.4.3 Support Zone

The Support Zone is intended as an area that remains free of contamination and is used for staging activities, breaks, and eating. It is extremely important to keep this area clean and free of contamination. Never bring contaminated equipment, articles, or yourself into the Support Zone without going through decontamination procedures first.

5.5 Decontamination Procedures

5.5.1 Equipment Decontamination

Drilling equipment and soil/water sampling equipment shall be fully decontaminated at the contamination reduction zones between and before they are removed from the site. Decontamination for drilling equipment will consist of soap and water wash and potable water rinse or using a high-pressure hot water or steam cleaning unit. Additional scrubbing may be required to remove all encrusted materials. Soil/water sampling equipment shall be cleaned between each use by the following procedures (1) removing any solids to the degree possible with a brush and tap water; (2) washing with a brush using laboratory-grade, non-phosphate detergent and tap water, (3) rinsing with tap water, (4) rinsing with 70-percent-grade isopropyl alcohol, and (5) rinsing with distilled water. All equipment decontamination water will be contained and disposed of properly.

5.5.2 Personnel Decontamination

A personnel decontamination area will be designated in the CRZ, which will be located at the edge of each Exclusion Zone. Personnel will become thoroughly familiar with the following decontamination procedures before work begins in an Exclusion Zone:

- Place equipment and/or samples in designated area, move to the next area (marked with signs), if necessary;
- Wash boots (overboots, if used) and outer gloves using soap (Alconox or equivalent) in water solution, and potable water rinse;
- Remove overboots (if used) and outer gloves, and place in plastic bags (in 30-gallon drum);
- Remove disposable coveralls (if used) and place in plastic bag in drum;
- Remove respirator (if used), thoroughly wash and store in a sealed bag outside the CRZ;

- Remove boots and store in appropriate location;
- Remove disposable inner gloves (if used) and place in plastic bag (in 30-gallon drum); and
- Wash hands and face with water and hand soap (especially before eating or drinking).

All personnel decontamination water will be contained and disposed of properly.

It is recommended that after leaving the Site at the end of the workday that personnel shower immediately at their place of lodging.

5.5.3 Storage Procedures for Expendable Clothing/Equipment

Used, expendable clothing and equipment shall be placed in drums labeled as "Waste PPE Material." Proper disposal of the drums will be coordinated with NORCO.

6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

6.1 Responsibilities of the SHSO

The TRC SHSO is responsible for project safety, decontamination, environmental monitoring, and field medical monitoring activities. The SHSO will ensure that all field personnel comply with the provisions of this HASP. The SHSO has the authority to stop Site work in the event of safety violations or if he/she makes the judgment that an upgraded level of personal protection may be required. **Anyone may stop any operation that threatens the health and safety of personnel.** The SHSO is responsible for designating and marking work zones and for restricting access to Exclusion Zones to properly attired personnel.

The SHSO reports directly to the Project Manager and the HSC. All safety-related questions should be referred to the Project Manager or HSC. The SHSO will keep the CHSO and Project Manager informed of the status of safety-related Site activities and assessments. The SHSO will notify the HSC and Project Manager immediately of any exposure incidents, injuries, accidents, or emergency situations.

6.2 Health and Safety Clearances

TRC personnel authorized to go on-site must meet the following requirements:

- Successfully complete a basic 40-hour health and safety training course and 8 hours of refresher training each year following completion of the basic course;
- At least one field employee must have completed and be current for cardiopulmonary resuscitation (CPR)/First Aid Training; and
- Receive clearances from a TRC-approved physician to wear respiratory protective devices and to work with hazardous materials.

6.3 Distribution of the HASP

A copy of this plan must be provided to each member of the site team covered by the plan and to an authorized representative of each TRC field subcontractor covered by its provisions. Each site team member receiving a copy of the plan must acknowledge receipt of, and express willingness to comply with, the provisions of the plan by signing the attached compliance agreement form. The signed forms must be submitted to the Project Manager or Assistant Project Manager for filing.

6.4 Safety Briefings

All TRC and TRC subcontracted personnel scheduled for fieldwork at the project area will receive an initial health and safety briefing by the SHSO prior to starting work activities. The briefing will include a thorough review of this HASP with particular attention to site-specific health and safety requirements and emergency response procedures. A Job Safety Analysis (JSA) will be completed for the specific tasks and reviewed by personnel prior to performing each task. The blank JSA form is included in Appendix C.

Daily briefings will be conducted by the SHSO on-site to reinforce health and safety awareness and to allow personnel the opportunity for comments or questions. All daily briefings will be documented on the Safety Task Analysis Review (STAR) form included in Appendix D.

6.5 On-Site Presence of Plan

A copy of this HASP must be present at the Site each day that work is in progress.

6.6 Respirators

6.6.1 Usage

The following procedures shall be followed to ensure that air-purifying respirators provide the full protection for which they are rated:

- All employees who are required to wear respirators shall be included in the TRC Medical Monitoring Program and will be medically approved for respirator use before donning a respirator;
- Employees shall wear only respirators for which they have been fit-tested by a competent individual;
- Respirators are to be donned outside the potential hazard zone in which they are planned to be used;
- Prior to donning, the wearer shall inspect the respirator for any physical defects or breakage including, but not limited to:
  - Broken or frayed straps,
  - Improperly seated valves,
  - Dirt,

  - Holes,
  - Distorted face seal, and
  - Opaque face piece on full-facepiece respirators.

- After donning the respirator, the employee shall conduct a negative-pressure fit check to assure that the inlet and exhaust valves, and the respirator cartridges, are properly seated. The employee shall then conduct a positive-pressure fit check to ensure that a proper face piece seal against the face has been obtained. The zone of potentially hazardous exposure is not to be entered until the employee has successfully executed both positive-pressure and negative-pressure fit checks.

- Employees shall immediately evacuate the work area if they experience difficulty breathing, dizziness, or other symptoms of potentially harmful chemical exposure.

- Appropriate respirator cartridges are to be replaced at the beginning of each workday or when breakthrough is detected (whichever comes first).

Note: If at any time during use of a respirator the contaminant of concern, or any other contaminant, is detected by smell, taste or irritation, the employee is to leave the work area immediately and inform the SHSO.

6.6.2 Cleaning

Respirators assigned to an individual employee shall be cleaned by that employee at the end of each day's work involving more than four hours of respirator use and at the end of every week in which the respirator is used for at least two hours. Respirators are to be washed and rinsed in warm water (120 to 140ºF) using a disinfecting solution intended for cleaning respirators, and blot or air-dried. Cleaning solutions, available from respirator manufacturers, will be provided on-site.

6.6.3 Storage

Respirators shall be stored in a manner that protects them from exposure to sunlight, dust, chemicals, and extremes of heat and cold. Respirators shall not be stored in tool kits. The preferred storage procedure for respirators is in individual plastic bags placed in rigid containers to prevent deformation of the face-piece.

7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

7.1 General Work Rules

- Fieldwork will be conducted only during daylight hours unless adequate lighting is provided.
- Smoking will be permitted only at designated areas at the Site.
- Gloves must be worn for jobs that have the potential for hand injury. The type of glove used depends upon the materials or equipment being handled. Leather or fleece gloves must not be used as a substitute for protective chemical gloves.
- In the event of direct skin contact by chemicals of concern, the affected area will be washed immediately with soap and water.
- In the event the PPE is ripped or torn, work shall stop and the PPE shall be removed and replaced as soon as possible.
- Personnel should never climb over or under refuse or obstacles so as to endanger themselves or others.
- Practice contamination avoidance. Never sit down or kneel, never lay equipment on the ground, avoid obvious sources of contamination such as puddles, and avoid unnecessary contact with on-site objects.
- Water samples to be analyzed for various contaminants may need to be, or already are, preserved with nitric acid, hydrochloric acid, or sulfuric acid before shipment to the analytical laboratory. Nitrile or polyvinyl chloride (PVC) gloves should be worn when handling these corrosive chemicals or samples preserved with them. Sample preservation should be performed in a well-ventilated area to avoid potential accumulation of toxic vapors. In circumstances where bad weather or poor lighting does not allow preservation at the site, preservation should be performed at a later time, or not at all. Samples should not be preserved in hotel rooms or other public areas.
- Good housekeeping is the responsibility of every employee. All work areas are to be kept as clean and orderly as possible. It is the responsibility of the persons performing the work to ensure that the work site is kept clean.

- No eating, drinking, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material will be allowed in the Exclusion Zone or Contamination Reduction Zone.

- Hard contact lenses should not be worn in the Exclusion Zone or Contamination Reduction Zone. No jewelry that interferes with protective clothing fit will be worn.

- No beards, sideburns, or mustaches will be allowed that interfere with respirator mask seals, if respirators are used. The SHSO will determine if facial hair presents such an interference.

- Field personnel should remain aware of wind direction throughout the day. Wind socks or flagging will be used for this purpose. Equipment setup and sampling efforts should be directed to the greatest extent possible so that workers remain upwind of potential sources of exposure.

- No drilling or earth moving activities will be permitted during periods of thunderstorms and lightning.

- Machinery, tools, material, electrical installation, and other equipment and work practices that are judged unsafe, or not in compliance with this HASP, OSHA, or other applicable standards, shall be removed or replaced or the work practice corrected. Only employees qualified by training and/or experience will operate equipment and machinery.

- Before excavating or sampling, an Exclusion Zone must be established around the equipment after it has been positioned. The boundary of the Exclusion Zone shall extend at least 25 feet from the work area and, if practical, marked with stakes spaced no more than 20 feet apart and connected with fluorescent orange tape. Only authorized personnel will be allowed to enter Exclusion Zones.

- Representatives of federal, state, and local agencies; newspaper and other news media; the public; and all other individuals who are not a part of the TRC site team are classified as visitors and will not be permitted to enter Exclusion Zones under control by TRC, unless they can prove that they have met OSHA medical and training requirements for hazardous waste operation, have available to them PPE equivalent to that specified in this plan, and obtain permission from the TRC site or project manager.

7.2 Documentation

The following must be kept on file by the SHSO:

- Copies of the TRC Employee Health and Safety Compliance Agreement (attached) documenting health and safety briefings and personnel signatures;
- Records of usage and calibration of environmental monitoring equipment;
- Documentation of employee injury/exposure incidents;
- Records of safety violation and remedial actions taken;
- Documentation of subcontractors' compliance with TRC for health and safety training and medical monitoring.

A health and safety field logbook will be maintained on-site and should contain such information as weather conditions, employees and visitors on-site, level of personal protection, monitoring instrument readings (average, peak, and background), subjects discussed during site health and safety briefings, and names of attendees. All field personnel, including subcontractors, must sign the TRC Employee Health and Safety Compliance Agreement indicating that they have attended a briefing by the SHSO, and that they understand and agree to abide by the provisions of this HASP, in addition to the provisions of their own health and safety plan prior to working at the project area.

7.3 Site Specific Requirements

7.3.1 Housekeeping

Good housekeeping is of the utmost importance in the prevention of accidents, injuries, and fires. Clean-up will be conducted on a daily basis.

7.3.2 Spills

No contaminants (i.e., oils, diesel fuel, gasoline, etc.) are to be discharged at the project area. Should a release occur, it must be reported by the quickest means possible to the NORCO representative. Decontamination water is considered to be contaminated and should not be released onto the ground. All decontamination water spills should be reported to the TRC Field Team Leader for determination of appropriate action.

7.3.3 Operation of Vehicles and Equipment

Equipment and vehicles must operate at a safe speed while being aware of operating conditions and other equipment and personnel working in close proximity. Extreme caution must be exercised at all grade crossings.

8.0 MONITORING

TRC anticipates the potential for a risk of COPC vapor inhalation exposure; therefore, ambient air monitoring will be conducted as part of this Health and Safety Plan. Additionally, pH monitoring will be conducted during investigation activities in AOC 1N and AOC-1S?.

8.1 Monitoring Instruments

A PID with a 10.6 electron volt lamp, calibrated with 100 ppm isobutylene, will be used to monitor breathing zone organic vapors. Calibration of the PID will be documented on the *Field Equipment Calibration/Maintenance Log* form including in Appendix E. The PID will read total hydrocarbon vapor levels. The action levels discussed below have been calculated taking into account known COPCs present at the Site and respective PELs.

At this time, TRC does not anticipate the potential for hydrogen sulfide (H_2S) gas inhalation exposure; therefore, continuous air monitoring for H_2S will not be conducted.

8.2 Action Levels

Respirators must be donned by all persons working in any Exclusion Zone in which the average PID reading is 1 ppm above background in the breathing zone (for greater than 1 minute). Half-face respirators will be worn from 1 to 10 ppm and full-face respirators will be worn from 10 to 50 ppm. The Exclusion Zone must be evacuated whenever the average PID reading equals or exceeds 50 ppm above background in the breathing zone for greater than 1 minute. PID action levels are listed in the table below. Air monitoring results will be documented on the *Air Quality Monitoring Record* form located in Appendix E.

If evacuation becomes necessary, the SHSO shall take charge and direct personnel to move from the Exclusion Zone to a predetermined area and to stay there. The SHSO shall first determine that all personnel have left the Exclusion Zone and are safe, then consult the HSC on how to proceed.

Action Levels for Air Monitoring

Equipment Type		Monitoring, Action Levels, and PPE
ORGANIC VAPORS		
☒ ☐ ☒	PID FID Detector Tube Type: benzene	Reading > 1 ppm or "Background" sustained for 1 minute, upgrade to Level C with half-face APR, Notify TRC SHSO. Reading > 10 ppm sustained for 1 minute, upgrade respiratory protection to full-face APR, Notify TRC SHSO. Reading > 50 ppm sustained for 1 minute, shutdown work activities, evacuate the area, move upwind, Notify the TRC SHSO.

8.3 pH Monitoring

Monitoring of groundwater and wastewater will be required at least daily during excavation activities to evaluate pH levels. Monitoring will also be performed in the event additional or new flows and/or sources of groundwater or wastewater are identified. Monitoring will be performed using either pH paper or a pH meter (in the field or a sample taken to the Laboratory). If a pH meter is utilized, the meter must be calibrated daily and the calibration results documented in the project field notes.

Monitoring will be performed in general accordance with the following procedures:

1. If pH paper is used, the paper will be placed so it comes in contact with the liquid for evaluation. The paper will be allowed to change colors. The color of the paper will be compared to the pH color chart included with the pH to determine the approximate pH. The pH value will be recorded in the project field notes.

2. If a pH meter is used, the pH probe will be placed in the liquid to be evaluated. The results will be read from the pH meter and recorded in the project field notes.

<u>If pH is less than 5 or greater than 9, then proper actions must be taken for conditions that are considered "acidic" or "caustic."</u>

9.0 EMERGENCY PROCEDURES

Emergency procedures listed in this HASP are designed to give the field team instructions in handling medical emergencies, fire, and explosions.

9.1 Medical Injuries

Medical problems that can occur on-site need to be handled competently and quickly. Each field team member should be aware of the instructions and information given below:

- Seek professional medical attention for personnel that are bleeding severely, experiencing intense pain, unconscious, or not breathing. Each member of the site team should know how to call for an ambulance.
- If you get anything in your eyes (chemical or dust), flood them with water for 15 minutes. Be sure to tell the SHSO. The SHSO will make sure that the victim washes the eyes for the full 15 minutes.
- Do not remove objects that are impaled (stuck) in the eye.
- Always seek medical attention for eye injuries.
- Stop bleeding with direct pressure. Place bandage over the wound and press down with your hand. If possible, raise the bleeding extremity above the level of the heart. Use a tourniquet ONLY in extreme cases when you are not able to stop severe bleeding.
- If you contact the waste, wash the affected area with soap and water immediately.

9.2 Fire and Explosion Response Procedures

Fires can be caused by the drilling rig activity. The TRC field team should verify that the drilling rig has a fire extinguisher on hand at all times. The procedures for using a fire extinguisher is to **pull** the safety pin, **aim** the extinguisher at the base of the flames and discharge the extinguisher by **squeezing** and **sweeping** the flames from a distance of 6 feet (PASS-pull, aim, squeeze, sweep). Move in closer as the flames are put out.

- Never use water on an electrical fire or a solvent fire. All extinguishers should be dry chemical labeled “Class A, B, or C”; and
- Keep decontamination solvents well away from the steam cleaner.

9.3 Emergency Medical Information

TRC Site Health & Safety Officer (SHSO):

Alonzo Arredondo (512) 699-9931

TRC Corporate Health and Safety Director:

Ron Severson (860) 298-6256 or (860) 906-4656

TRC Health and Safety Coordinator:

Matt Webre (512) 684-3140 or (512) 567-7936

TRC Safety Contact (Austin):

Matt Webre (512) 684-3140 or (512) 567-7936

Project Managers (Austin):

Stephen Halasz (512) 684-3351 or (512) 745-6155

9.3.1 First Aid

First aid at the Site will consist of a first aid kit, which will be brought to the Site daily by the SHSO and be kept at the edge of the Exclusion Zone during field activities.

9.3.2 Hospitals

Personnel with any injuries shall be taken to Care Regional Medical Center located approximately 5 miles northeast of the project area. A map and driving directions from Falcon Refinery to Care Regional Medical Center are provided in Appendix F.

9.4 Incident Investigation

It is important that all accidents and incidents that result in injury, illness, or medical treatment be reported immediately. Reporting consists of calling the Teleclaim Center and providing information on the injury. The Teleclaim Center will complete the first report of injury and file it accordingly. Copies will be sent to the Safety Director. Supervisors are required to complete the Supervisor's Report of Accident included in this section. It is TRC's responsibility to investigate each incident, file appropriate paperwork and conduct a follow-up analysis of each incident.

Reporting Phone Numbers

TRC Corporate Health and Safety Director: (860) 298-6256

Hartford Insurance Teleclaim:	1-800-327-3636
Human Resources Director:	1-800-365-8254

Any work related injury or illnesses that requires professional medical assistance should be reported immediately. Failure to promptly notify of a work related injury could make the claim questionable and subject to stricter review.

After medical attention has been administered, an incident investigation will be completed. The TRC Project Manager will also complete the *TRC Incident Report Form* located in Appendix G.

9.4.1 Emergency Numbers

Service	**Address**	**Phone**
Fire Department:	Ingleside Fire Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-7422
Police Department:	Ingleside Police Department 2425 Eighth Street Ingleside, TX 78362	**911** (361) 776-2531
Hospital:	Care Regional Medical Center 1711 West Wheeler Avenue Aransas Pass, TX 78336	**911** (361) 758-8585
Nearest phone: Cellular phone	Alonzo Arredondo Field Task Leader/SHSO	(512) 699-9931

Emergency Services are accessed through 911

10.0 SITE PERSONNEL ACKNOWLEDGE OF HASP

The following TRC site personnel have read, understand, and agree to comply with all of the health and safety directives for the Falcon Refinery Superfund Site.

Crew	Date
_____	_____
_____	_____
._____	_____
_____	_____
_____	_____
_____	_____
_____	_____

In addition, the following contractor personnel have been briefed on the site hazards, have reviewed their own HASP (per 29 CFR 1910.120(i)(2), have completed the required 40-hour OSHA Training (per 29 CFR 1926.21 and 1910.120(e), have been properly respirator fit tested, and are involved in their company's Medical Surveillance Program (per 29 CFR 1910.120(f)). They hereby acknowledge having met all the above stated requirements for working at the Falcon Refinery Superfund Site.

Contractor Personnel	Company	Date

APPENDIX A

Potential Chemical Hazards

CHEMICAL HAZARD DATA								
			TWA					
Chemical Name	Carcinogen (Y/N)	Skin Absorption Hazard (Y/N)	OSHA PEL	NIOSH REL	ACGIH TLV	OSHA STEL	IDLH	Routes of Exposure
Benzene	Y	Y	1.0 ppm	0.1 ppm	0.5 ppm	5 ppm	500 ppm	I,S,G,C
Toluene	N	Y	200 ppm	100 ppm	50 ppm	300 ppm	500 ppm	I,S,G,C
Xylene(s)	N	Y	100 ppm	150 ppm	100 ppm	N/A	900 ppm	I,S,G,C
Ethylbenzene	N	N	100 ppm	100 ppm	100 ppm	N/A	800 ppm	I,G,C

TWA = Time-Weighted Average
PEL = Permissible Exposure Limit
REL = Recommended Exposure Limit identifying NIOSH
TLV = Threshold Limit Value identifying ACGIH
STEL = Short Term Exposure Limit
IDLH = Immediate Dangerous to Life or Health
Routes of Exposure: I = inhalation, S = skin absorption, G = ingestion, C = skin contact
ppm = parts per million
mg/m^3 = milligrams per cubic meter (of air)

APPENDIX B

Material Safety Data Sheets

MSDS SUMMARY SHEET

Manufacturer:
Name: PHILLIPS PETROLEUM COMPANY
Address 1:
Address 2:
Address 3:
CSZ: BARTLESVILLE **State:** OK **Zipcode:** 74004
Emergency phone: (800) 424-9300
Business phone: 800-762-0942

Product:

Ferndale MSDS#: 1354 **Version # :** 6
Manufacturer MSDS#: 0041
Current? : 2002
Name:

NO. 2 DIESEL FUEL

Synonyms:

CARB **Diesel** TF3
CARB **Diesel**
CARB **Diesel** 10%
Diesel Fuel Oil
EPA Low Sulfur **Diesel** Fuel
EPA Low Sulfur **Diesel** Fuel – Dyed
EPA Off Road High Sulfur **Diesel –** Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 **Diesel** Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur **Diesel** – Dyed
No. 2 Low Sulfur **Diesel** - Dyed
No. 2 Low Sulfur **Diesel** - Undyed
Crude column 3rd IR
Crude column 3rd side cut
Atmospheric tower 3rd side cut
Ultra Low Sulfur **Diesel** No. 2
Finished **Diesel**
DHT Reactor Feed
Straight Run **Diesel**
Diesel
Middle Distillate

Product/Catalog Numbers:
MSDS Date: 01/01/2002 **(received:** 01/14/2002**)**

NFPA codes:
Health: 0 **Flammability:** 2 **Reactivity:** 0

Trial Version
www.nuance.com

MATERIAL SAFETY DATA SHEET
No. 2 Diesel Fuel

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: No. 2 Diesel Fuel
Product Code: Multiple
SAP Code:
Synonyms:
1354
CARB Diesel TF3
CARB Diesel
CARB Diesel 10%
Diesel Fuel Oil
EPA Low Sulfur Diesel Fuel
EPA Low Sulfur Diesel Fuel – Dyed
EPA Off Road High Sulfur Diesel – Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 Diesel Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur Diesel – Dyed
No. 2 Low Sulfur Diesel - Dyed
No. 2 Low Sulfur Diesel – Undyed
No. 2 Ultra Low Sulfur Diesel – Dyed
No. 2 Ultra Low Sulfur Diesel - Undyed
Intended Use: Fuel
Chemical Family:
Responsible Party: Phillip's Petroleum Company
Bartlesville, Oklahoma 74004
For Additional MSDSs: 800-762-0942
Technical Information:

The intended use of this product is indicated above. If any additional use is known, please contact us at the Technical Information number listed.

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:
Spill, Leak, Fire or Accident
Call CHEMTREC
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

California Poison Control System: 800-356-3120

Health Hazards/Precautionary Measures: Causes severe skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Wash thoroughly after handling.

Physical Hazards/Precautionary Measures: Flammable liquid and vapor. Keep away from heat, sparks, flames, static electricity or other sources of ignition.

Appearance: Straw-colored to dyed red
Physical Form: Liquid
Odor: Characteristic petroleum

Trial Version www.nuance.com

HFPA Hazard Class:
Health: 0 (Least)
Flammability: 2 (Moderate)
Reactivity: 0 (Least)

HMIS Hazard Class
Not Evaluated

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% VOLUME	Limits	EXPOSURE GUIDELINE Agency	Type
Diesel Fuel No. 2 CAS# 68476-34-6	100	100* mg/m3	ACGIH	TWA-SKIN
Naphthalene CAS# 91-20-3	<1	10ppm	ACGIH	TWA
		15ppm	ACGIH	STEL
		10ppm	OSHA	TWA
		250ppm	NIOSH	IDLH

All components are listed on the TSCA inventory

Tosco Low Sulfur No. 2 Diesel meets the specifications of 40 CFR 60.41 for low sulfur diesel fuel.

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

*Proposed ACGIH (1999)

3. HAZARDS IDENTIFICATION

Potential Health Effects:

Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Severe skin irritant. Contact may cause redness, itching, burning, and severe skin damage. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin, leading to dermatitis (inflammation). Not actually toxic by skin absorption, but prolonged or repeated skin contact may be harmful (see Section 11).

Inhalation (Breathing): No information available. Studies by other exposure routes suggest a low degree of toxicity by inhalation.

Ingestion (Swallowing): Low degree of toxicity by ingestion. ASPIRATION HAZARD – This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Signs and Symptoms: Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea, diarrhea and transient excitation followed by signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).

Cancer: Possible skin cancer hazard (see Sections 11 and 14).

Target Organs: There is limited evidence from animal studies that overexposure may cause injury to the kidney (see Section 11).

Developmental: Inadequate data available for this material.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin disorders and kidney disorders.

Trial Version www.nuance.com

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Immediately remove contaminated shoes, clothing, and constrictive jewelry and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek immediate medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek immediate medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard; Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

5. FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: >125°F/>52°
OSHA Flammability Class: Combustible liquid
LEL %: 0.3 / UEL %: 10.0
Autoignition Temperature: 500°F/260°C

Unusual Fire & Explosion Hazards: This material is flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

Trial Version www.iwarc.com

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Spilled material may be absorbed into an appropriate material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharged. The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practices.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing or high pressure hydraulic oil equipment.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSIZ49.1 and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentration below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

www.Fuelvalue.com

Personal Protective Equipment (PPE):

Respiratory: A NIOSH certified air purifying respirator with an organic vapor cartridge maybe used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrants a respirator's use.

Skin: The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation and skin damage (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.

Eyes/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse. It is recommended that impervious clothing be worn when skin contact is possible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1atm).

Appearance: Straw-colored to dyed red
Physical State: Liquid
Odor: Characteristic petroleum
pH: unavailable
Vapor Pressure (mm Hg): 0.40
Vapor Densisty (air=1):>3
Boiling Point/Range: 320-700°F /160-371°C
Freezing/Melting Point: No Data
Solubility in Water: Negligible
Specific Gravity: 0.81-0.88 @ 60°F
Percent Volatile: Negligible
Evaporation Rate (nBuAc=1): <1
Viscosity: 32.6-40.0 SUS @ 100°F
Bulk Density: 7.08 lbs/gal
Flash Point: >125°F / >52°C
Flammable/Expolsive Limits (%): LEL: 0.3 / UEL: 10.0

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Flammable liquid and vapor. Vapor can cause flash fire.

Conditions To Avoid: Avoid all possible sources of ignition (see Sections 5 and 7).

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc.

Final Version
www.nuance.com

Hazardous Decomposition Products: The use of hydrocarbon fuels in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels. ACGIH has included a TLV of 0.05 mg/m3 TWA for diesel exhaust particulate on its 1999 Notice of Intended Changes. See Section 11 for additional information on hazards of engine exhaust.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Diesel Fuel No. 2 (CAS# 68476-34-6)

Carcinogenicity: Chronic dermal application of certain middle distillate streams contained in diesel fuel No. 2 resulted in an increased incidence of skin tumors in mice. This material has not been identified as carcinogen by NTP, IARC, or OSHA. Diesel exhaust is a probable cancer hazard based on tests with laboratory animals.

Target Organ(s): Limited evidence of renal impairment has been noted from a few case reports involving excessive exposure to diesel fuel No. 2.

Naphthalene (CAS# 91-20-3)

Carcinogenicity: Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has not been identified as a carcinogen by IARC or OSHA.

12. ECOLOGICAL INFORMATION

Not evaluated at this time.

13. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001) and benzene (D018). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material, once it becomes a waste, is subject to the land disposal restrictions in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent then the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container ?insate? could be considered a RCRA hazardous waste and must be disposed of with care and in compliance with federal, state and local regulations. Large empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller containers, consult with state and local regulations and disposal authorities.

14. TRANSPORT INFORMATION

DOT Shipping Description: Diesel Fuel, NA1983
Non-Bulk Package Marking: Diesel Fuel, 3, NA 1993, III

Trial Version www.nuance.com

15. REGULATORY INFORMATION

EPA SARA 311/312 (Title III Hazard Categories):

Acute Health:	Yes
Chronic Health:	Yes
Fire Hazard:	Yes
Pressure Hazard:	No
Reactive Hazard:	No

SARA 313 and 40 CFR 372:
This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Component	CAS Number	Weight %
-- None known --		

California Proposition 65:
Warning: This material contains the following chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Component	Effect
Benzene	Cancer, Developmental and Reproductive Toxicant
Toluene	Developmental Toxicant

Diesel engine exhaust, while not a component of this material, is on the Proposition 65 list of chemicals known to the State of California to cause cancer.

Carcinogen Identification:
This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any. Diesel exhaust is a probable cancer hazard based on tests in laboratory animals. It has been identified as carcinogen by IARC.

EPA (CERCLA Reportable Quantity: None

16. OTHER INFORMATION

Issue Date: 01/01/02
Previous Issue Date: 05/15/01
Product Code: Multiple
Revised Sections: None
Previous Product Code: Multiple
MSDS Number: 0041

Disclaimer of Expressed and Implied Warranties:

The information presented in this Material Data Safety Sheet is based on data believed to be accurate as of the date this Material Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THE PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Trial Version
www.nuance.com

Tosco Refining Company ***Ferndale Refinery***

UltraLow Sulfur Diesel Product Specification

Ferndale Product Code:34380xx (5) Product Code: ULSD2

(COMETS)

Specification	Unit	Limit	Test Procedure	Typical
Appearance				
Water & Sediment	Vol %	0.05 Max	D 2709	
Color	Number	3.0 Max	D 1500	
Haze Rating	Rating	2 Max	D 4176	
Composition				
Carbon Residue (Ramsbottom)	Wt %	0.35 Max	D 524, D 189	
Volatility				
90% Recovered	Deg; F	540 Min	D 86	
	Deg; F	640 Min	D 86	
Flash Point	Deg; F	125 Min (1)	D 93	130 F
Gravity	API	30 Min	D 287, D4052	
Fluidity				
Pour Point	Deg; F	See Season Table (6)	D 97	
Cloud Point	Deg; F	See Season Table (6)	D 2500	10 F
Viscosity @ 104F	cSt	1.9 Min	D 445	
	cSt	4.1 Max	D 445	
Lubricity, SLBOCLE	grams	3100 Min	D 6078	3300gm
Lubricity, HFRR	mm	.45	D 6079	
Combustion				
Cetane Index or Cetane Number (3,4)	Number	40.0 Min	D 976, D613	47.0
Corrosion				
Copper Strip, 3hr @ 50 deg C	Number	3 Max (2)	D 130	
Aromatics (4)	Vol %	35 Max	D 1319	25 %
Contaminants				
Total Sulfur	PPM	30 Max	D 2622, D4294	15-20ppm
Water & Sediment	Vol %	0.05 Max	D 1796	
Ash	Wt %	0.01 Max	D 482	
Additives				
Cetane Improver	Lb/MBbl	675 Max		
Dye		Undyed		

1. Minimum release specification is 125 deg. F. The refinery should target 135 deg. F.
2. Test result reported as a number and letter (e.g. 1a). Any letter is allowable as long as the number meets the spec shown.
3. Either specification must be met.
4. Either cetane index minimum or aromatics maximum must be met.
5. Winter cloud and pour specifications may be relaxed to the summer specifications by agreement with the customer.
6. Season Table

Month	Product Code	Pour Point	Cloud Point
Jan, Feb, Nov, Dec	WI	0 max (5)	14 max (5)
Mar - Oct	SU	15 max	24 max

TrialVersion www.nuance.com

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
959 ROUTE 46 EAST
PARSIPPANY, NEW JERSEY 07054-0624

EMERGENCY CONTACT:
CHEMTREC 1-800-424-9300
INFORMATION CONTACT:
973-257-1100

SUBSTANCE: ETHYL BENZENE

TRADE NAMES/SYNONYMS:
MTG MSDS 185; BENZENE, ETHYL-; EB; PHENYLETHANE; ETHYLBENZENE; ETHYLBENZOL; ALPHA-METHYLTOLUENE; UN 1175; C8H10; MAT08780

CHEMICAL FAMILY: hydrocarbons, aromatic

CREATION DATE: Jan 24 1989
REVISION DATE: Jun 17 2004

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: ETHYL BENZENE
CAS NUMBER: 100-41-4
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=3 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: liquid
ODOR: aromatic odor
MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, aspiration hazard, central nervous system depression, suspect cancer hazard (in animals)
PHYSICAL HAZARDS: Flammable liquid and vapor. Vapor may cause flash fire.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation (possibly severe), chest pain, difficulty breathing, headache,

drowsiness, dizziness, loss of coordination, coma
LONG TERM EXPOSURE: irritation, headache, drowsiness, emotional disturbances, cancer
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation (possibly severe)
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation (possibly severe)
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: nausea, vomiting, stomach pain, aspiration hazard
LONG TERM EXPOSURE: no information on significant adverse effects

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing and shoes before reuse. Destroy contaminated shoes.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

NOTE TO PHYSICIAN: For inhalation, consider oxygen. For ingestion, consider gastric lavage and activated charcoal slurry.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool

containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

FLASH POINT: 59 F (15 C) (CC)
LOWER FLAMMABLE LIMIT: 0.8%
UPPER FLAMMABLE LIMIT: 6.7%
AUTOIGNITION: 810 F (432 C)
FLAMMABILITY CLASS (OSHA): IB

6. ACCIDENTAL RELEASE MEASURES

AIR RELEASE:
Reduce vapors with water spray. Stay upwind and keep out of low areas.

SOIL RELEASE:
Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

WATER RELEASE:
Cover with absorbent sheets, spill-control pads or pillows. Neutralize. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
ETHYL BENZENE:
100 ppm (435 mg/m3) OSHA TWA
125 ppm (543 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
100 ppm ACGIH TWA
125 ppm ACGIH STEL
100 ppm (435 mg/m3) NIOSH recommended TWA 10 hour(s)
125 ppm (545 mg/m3) NIOSH recommended STEL

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
800 ppm
Any chemical cartridge respirator with organic vapor cartridge(s).
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any powered, air-purifying respirator with organic vapor cartridge(s).
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid
COLOR: colorless
ODOR: aromatic odor
MOLECULAR WEIGHT: 106.17
MOLECULAR FORMULA: C-H3-C-H2-C6-H5

BOILING POINT: 277 F (136 C)
FREEZING POINT: -139 F (-95 C)
VAPOR PRESSURE: 7.1 mmHg @ 20 C
VAPOR DENSITY (air=1): 3.66
SPECIFIC GRAVITY (water=1): 0.8670
WATER SOLUBILITY: 0.015%
PH: Not available
VOLATILITY: 100%
ODOR THRESHOLD: 140 ppm
EVAPORATION RATE: <1 (butyl acetate=1)
VISCOSITY: 0.64 cP @ 25 C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: alcohol, ether, benzene, sulfur dioxide, carbon tetrachloride
Insoluble: ammonia

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

INCOMPATIBILITIES: acids, bases, oxidizing materials, combustible materials

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of carbon

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

ETHYL BENZENE:
IRRITATION DATA:
15 mg/24 hour(s) open skin-rabbit mild; 500 mg eyes-rabbit severe
TOXICITY DATA:
55000 mg/m3/2 hour(s) inhalation-rat LC50; 17800 ul/kg skin-rabbit LD50; 3500 mg/kg oral-rat LD50
CARCINOGEN STATUS: IARC: Human Inadequate Evidence, Animal Sufficient Evidence, Group 2B; ACGIH: A3 -Animal Carcinogen
LOCAL EFFECTS:
Irritant: inhalation, skin, eye
ACUTE TOXICITY LEVEL:
Moderately Toxic: ingestion
Slightly Toxic: inhalation, dermal absorption

TARGET ORGANS: central nervous system
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: kidney disorders, liver disorders, respiratory disorders, skin disorders and allergies
TUMORIGENIC DATA: Available.
MUTAGENIC DATA: Available.
REPRODUCTIVE EFFECTS DATA: Available.
ADDITIONAL DATA: May cross the placenta.

12. ECOLOGICAL INFORMATION

FATE AND TRANSPORT:
KOW: 154170.05 (log = 5.196) (estimated from water solubility)

KOC: 44668.36 (log = 4.657) (estimated from water solubility)

HENRY'S LAW CONSTANT: 6.6 E -3 atm-m3/mol

BIOCONCENTRATION: 36.39 (estimated from water solubility)

AQUATIC PROCESSES: 2.6730095 hours (River Model: 1 m deep, 1 m/s flow, 3 m/s wind)

ENVIRONMENTAL SUMMARY: Relatively non-persistent in the environment. Not expected to leach through the soil or the sediment. Accumulates very little in the bodies of living organisms. Highly volatile from water.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Ethylbenzene
ID NUMBER: UN1175
HAZARD CLASS OR DIVISION: 3
PACKING GROUP: II
LABELING REQUIREMENTS: 3

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Ethylbenzene
UN NUMBER: UN1175

CLASS: 3
PACKING GROUP/RISK GROUP: II

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
ETHYL BENZENE: 1000 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: Yes
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
ETHYL BENZENE

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65:
Known to the state of California to cause the following:
ETHYL BENZENE
Cancer (Jun 11, 2004)

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: B2.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

©Copyright 1984-2005 MDL Information Systems, Inc. All rights reserved.

MATHESON TRI-GAS, INC. MAKES NO EXPRESS OR IMPLIED WARRANTIES, GUARANTEES OR REPRESENTATIONS REGARDING THE PRODUCT OR THE INFORMATION HEREIN, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE. MATHESON TRI-GAS, INC. SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE, WHETHER COMPENSATORY, CONSEQUENTIAL, EXEMPLARY, OR OTHERWISE, RESULTING FROM ANY PUBLICATION, USE OR RELIANCE UPON THE INFORMATION HEREIN.

Material Safety Data Sheet

MSDS ID NO.: 0274MAR019
Revision date: 07/25/2006

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon Residual Fuel Oil
Synonym: Bunker C Fuel; Fuel Oil Residual; Slurry Blendstock; No. 6 Fuel Oil; No. 6 Residual Fuel Oil; Residual Fuel Oil
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street
Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION / INFORMATION ON INGREDIENTS

Heavy or Residual Fuel Oil is a complex mixture of high molecular weight hydrocarbons produced from high temperature treatment of heavy petroleum fractions.

This product was analyzed by MPC and found to contain 0.05-0.6% of the 22 3-7 ring polycyclic aromatic compounds identified as Persistent Bioaccumulative Toxic (PBT) Chemicals subject to reporting under EPA EPCRA Section 313 regulations.

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon Residual Fuel Oil	68476-33-5	100			

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Petroleum Residua	Mixture	0-100			
Catalytic Cracked Clarified Oil	64741-62-4	0-90			
Diesel Oil	68334-30-5	0-30	= 100 mg/m³ TWA vapor and aerosol, as total hydrocarbons skin - potential for cutaneous absorption (as total hydrocarbons)		
Sulfur Compounds	Mixture	0.5-4			
5-methylchrysene	3697-24-3	0.01-0.2			
Naphthalene	91-20-3	0.01-0.15	Skin - potential significant contribution to overall exposure by the cutaneous route = 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m³ TWA = 15 ppm STEL = 75 mg/m³ STEL	
Benzo(a)phenanthrene	218-01-9	0.01-0.1	= 0.2 mg/m³ TWA as benzene soluble aerosol	= 0.2 mg/m³ TWA benzene soluble fraction	
Hydrogen Sulfide	7783-06-4	0-0.01	= 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 14 mg/m³ TWA = 15 ppm STEL = 21 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

THIS PRODUCT IS A BROWN TO BLACK VISCOUS COLORED LIQUID. THIS PRODUCT IS CONSIDERED TO BE A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD AND SHOULD BE KEPT AWAY FROM HEAT, FLAME AND SOURCES OF IGNITION. LONG-TERM SKIN EXPOSURE TO COMPONENTS OF THIS PRODUCT HAS CAUSED CANCER IN LABORATORY ANIMALS AND HUMANS. REPEATED SKIN CONTACT TO SOME COMPONENTS OF THIS PRODUCT HAVE PRODUCED SYSTEMIC TOXICITY (INCLUDING LIVER DAMAGE) IN LABORATORY ANIMALS. WHEN HEATED THIS MATERIAL MAY VENT TOXIC LEVELS OF HYDROGEN SULFIDE (H2S) VAPORS THAT ACCUMULATE IN THE VAPOR SPACES OF STORAGE AND TRANSPORT COMPARTMENTS. H2S VAPORS CAN CAUSE EYE, SKIN, AND RESPIRATORY TRACT IRRITATION AND ASPHYXIATION.

OSHA WARNING LABEL:

DANGER!
LONG-TERM SKIN EXPOSURE TO COMPONENTS OF THIS PRODUCT HAS CAUSED SKIN CANCER IN LABORATORY ANIMALS AND HUMANS.
REPEATED SKIN CONTACT TO SOME COMPONENTS IN THIS PRODUCT HAS PRODUCED SYSTEMIC TOXICITY (INCLUDING LIVER DAMAGE) IN LABORATORY ANIMALS.
MAY VENT HARMFUL CONCENTRATIONS OF HYDROGEN SULFIDE (H2S) GAS WHICH CAN CAUSE RESPIRATORY IRRITATION AND ASPHYXIATION.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Exposure to vapor or mist may cause pulmonary irritation, dizziness, nausea and loss of consciousness. Significant concentrations of hydrogen sulfide gas can be present in the vapor space of storage tanks and bulk transport compartments (See Sections 7, 8 & 11).

Ingestion: Product would be expected to have a low order of acute toxicity. Significant ingestion of some components of this product may cause liver damage.

Skin contact: Prolonged and repeated liquid contact can cause dermatitis, folliculitis or oil acne. Components of this product may cause skin sensitization. Components of this product can cause liver damage if absorbed through the skin.

Eye contact: Liquid or vapor contact may result in slight eye irritation.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon Residual Fuel Oil 68476-33-5	NE			

Notes: The International Agency for Research on Cancer (IARC) has determined that there is sufficient evidence for the carcinogenicity of residual (heavy) fuel oil in animals.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:

Diesel Oil 68334-30-5	Monograph 45, 1989; (Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms)		A3 - Animal Carcinogen (as total hydrocarbons)	
5-methylchrysene 3697-24-3	Supplement 7, 1987; Monograph 32, 1983	Reasonably Anticipated To Be A Carcinogen (Listed under ``Polycyclic aromatic hydrocarbons``)		
Naphthalene 91-20-3	Monograph 82, 2002	Reasonably Anticipated To Be A Carcinogen Listed	A4 - Not Classifiable as a Human Carcinogen	Present
Benzo(a)phenanthrene 218-01-9	Supplement 7, 1987; Monograph 35, 1985	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) A3 - Animal Carcinogen	Present

Notes:

The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of diesel fuel/fuel oil in humans. IARC determined that there was limited evidence for the carcinogenicity of marine diesel fuel in animals. Distillate (light) diesel fuels were not classifiable as to their carcinogeniicty to humans (Group 3A)

The International Agency for Research on Cancer (IARC) has determined that there is sufficient evidence for the carcinogenicity of catalytically cracked clarified oil (carbonblack feedstock) in animals.

The International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP) have concluded that certain polycyclic aromatic hydrocarbons, i.e. (benzo(a)pyrene, benz(a)anthracene, benzo(a)phenanthrene, indeno(1,2,3-cd)pyrene, benzo(j)fluoranthene, benzo(j,k,fluorine, benzo(g,h,i)perylene, and 5-methylchrysene are probably carcinogenic to humans (Group 2A and B).

The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: Ingestion not likely. If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Preexisting skin conditions, respiratory disorders, and impaired liver function may be aggravated by exposure to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a combustible liquid per the OSHA Hazard Communication Standard and should be handled accordingly. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Use water spray to cool exposed surfaces from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 131 (Min) F
Autoignition temperature: No data available.
Flammable limits in air - lower (%): 1.0
Flammable limits in air - upper (%): 6.0

NFPA rating:
Health: 2
Flammability: 2
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 2
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return product to source.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues. The fuel oil contained in this product may flash if product temperature is >131 F.

Harmful concentrations of hydrogen sulfide (H2S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments. Stay upwind and vent open hatches before unloading.

Avoid skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water. Never siphon this product by mouth.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or when there is inadequate ventilation.

Respiratory protection: Not required under normal conditions and adequate ventilation. Use atmosphere supplying respirators in confined spaces or when vapors exceed permissible limits; otherwise, an organic vapor respirator with pre-filter for fumes can be used. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Impermeable gloves (e.g., nitrile, viton, tyvek/saranex 23) to prevent skin contact.

Eye protection: Goggles and faceshield when handling hot material.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof. Chemical resistant apron or other protective clothing may be needed to avoid skin contact.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Black Viscous Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Black
Odor:	Hydrocarbon
Molecular weight:	Not determined.
pH:	Neutral
Boiling point/range (5-95%):	400-1300 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	Not determined
Density:	7.3-8.3 lbs/gal
Bulk density:	No data available.
Vapor density:	No data available.
Vapor pressure:	1 mm Hg @ 160 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability: The material is stable at 70 F, 760 mm pressure.

Polymerization: Will not occur.

Hazardous decomposition products: Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.

Materials to avoid: Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid: Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon Residual Fuel Oil	68476-33-5	No data available	No data available	No data available

Lifetime skin painting studies in animals with products similar to Heavy catalytic cracked distillate, No. 6 fuel oil and/or its components have produced tumors in animals following prolonged and repeated skin contact. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies.

Summary of health effect data on residual fuel oil components:

This product contains diesel fuel (middle distillate) at a level of >1.0% Lifetime skin painting studies in animals with similar distillate fuels have produced weak to moderate carcinogenic activity following prolonged and repeated exposure. Similar middle distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies.

This product may contain >0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused lung tumors in female mice. Male mice with the same exposure did not develop tumors. Exposure to 10-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and respiratory tract in male and female rats. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

Catalytic cracked clarified oil (CCCO) may be present in concentrations up to 100% in this product. Lifetime skin painting studies in animals with CCCO have produced tumors in animals following prolonged and repeated skin contact. Repeated dermal application of CCCO (30 mg/kg/day for 13 weeks) in rats resulted in anemia, liver degeneration and injury to bone marrow and lymphoid tissues. 100% mortality was observed at 2,000 mg/kg/day within three weeks. Repeated dermal application (30 mg/kg/day) of CCCO to pregnant rats during gestation produced maternal and fetal toxicity, some deaths and systemic toxicity (liver, thymus and blood). The number of viable offspring decreased at doses of 30 mg/kg/day and above. Many of the developmental effects (anomalies, resorptions and growth inhibition) were observed at doses which produced maternal toxicity. In a separate developmental study CCCO produced decreases in body weights and food consumption at doses from 10-250 mg/kg/day. Although fertility and reproductive function were not affected, the no observable adverse effect level for CCCO administered dermally was 1 mg/kg/day.

This product contains >0.1% 3-7 ring polynuclear aromatic hydrocarbons (PAC's). Some PAH's such as benzo(a)phenanthrene and 5-methylchrysene have been shown to be carcinogenic in experimental animals. An increased risk of cancer has been observed in workers employed in the aluminum production, coal gasification, coal-tar pitch, coke production and iron and steel industries that had been occupationally exposed to polynuclear aromatic hydrocarbons (PAC). Since these kinds of PACs have been measured at high levels in air samples taken in these idustries, IARC has concluded that these PACs are probably carcinogenic to humans.

Hydrogen sulfide gas (H_2S) is toxic by inhalation. Prolonged breathing of 50-100 ppm H_2S vapors can produce eye and respiratory tract irritation. Higher concentrations (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of >1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H_2S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H_2S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H_2S, respectively. Over the years a number of acute cases of H_2S poisonings have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: Product can be toxic to fish and aquatic life. The 24 hour TLM of the water soluble fraction of bunker C fuel oil is 3-6 ppm in marine and estuarine crustaceans and fish.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This material as supplied and by itself, when discarded or disposed of, is not an EPA RCRA hazardous waste according to federal regulations. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Fuel Oil, No. 6
UN/Identification No: NA 1993
Hazard Class: 3
Packing group: III
DOT reportable quantity (lbs): Not applicable.

TDG (Canada):

Proper shipping name: Fuel Oil, No. 6
UN/Identification No: NA 1993
Hazard Class: 3
Packing group: III
Regulated substances: Not applicable.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Petroleum Residua	NA
Catalytic Cracked Clarified Oil	NA
Diesel Oil	NA
Sulfur Compounds	NA
5-methylchrysene	NA
Naphthalene	NA
Benzo(a)phenanthrene	NA
Hydrogen Sulfide	hydrogen sulfide

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Petroleum Residua	NA
Catalytic Cracked Clarified Oil	NA
Diesel Oil	NA
Sulfur Compounds	NA
5-methylchrysene	NA
Naphthalene	= 0.454 kg final RQ = 1 lb final RQ = 100 lb final RQ = 45.4 kg final RQ
Benzo(a)phenanthrene	= 0.454 kg final RQ = 0.454 kg statutory RQ = 1 lb final RQ = 1 lb statutory RQ = 100 lb final RQ = 45.4 kg final RQ
Hydrogen Sulfide	= 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Petroleum Residua	None
Catalytic Cracked Clarified Oil	None
Diesel Oil	None
Sulfur Compounds	None
5-methylchrysene	= 100 lb Reporting Threshold Chemical Category N590, PBT Chemicals = 100 lb Reporting Threshold Listed under ``Polycyclic aromatic compounds``, Chemical Category N590, PBT Chemicals
Naphthalene	= 0.1 % de minimis concentration
Benzo(a)phenanthrene	= 100 lb Reporting Threshold Chemical Category N590, PBT Chemicals = 100 lb Reporting Threshold Listed under ``Polycyclic aromatic compounds``, Chemical Category N590, PBT Chemicals
Hydrogen Sulfide	None

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Petroleum Residua

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Catalytic Cracked Clarified Oil

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Diesel Oil

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	[present]
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Sulfur Compounds

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed

Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

5-methylchrysene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 4/1/88
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	SN 3758 (Polycyclic aromatic compounds category); Category Code N590; report 500 lbs. in combination of any listed chemicals SN 3758; Category Code N590
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Listed
New Jersey Right-To-Know:	Listed
Pennsylvania Right-To-Know:	Listed
Massachusetts Right-To Know:	Listed
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Listed
Illinois - Toxic Air Contaminants	Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Listed

Benzo(a)phenanthrene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 1/1/90
New Jersey Right-To-Know:	sn 0441
Pennsylvania Right-To-Know:	environmental hazard special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous

California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	carcinogen
New Jersey - Environmental Hazardous Substances List:	SN 3758 (Polycyclic aromatic compounds category); Category Code N590; report 500 lbs. in combination of any listed chemicals SN 3758; Category Code N590
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 100 lbs Air RQ

Hydrogen Sulfide

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 1017
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - fourth degree
New Jersey - Environmental Hazardous Substances List:	SN 1017
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 100 lbs Air RQ = 100 lbs Land/Water RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Diesel Oil	B3; D2B	
5-methylchrysene		1% (English Item 1032, French Item 1124)
Naphthalene	B4, D2A	1 %
Benzo(a)phenanthrene	D2A Uncontrolled product according to WHMIS classification criteria.	0.1% (English Item 405, French Item 562) 0.1% (English Item 411, French Item 1721)
Hydrogen Sulfide	A; B1; D1A; D2B	1% (English Item 851, French Item 1550)

16. OTHER INFORMATION

Additional Information: The pronounced and easily-recognized rotten egg odor of hydrogen sulfide gas (H2S) can be detected at concentrations as low as 0.003-0.13 ppm. Since higher H2S concentrations (100-200 ppm) cause olfactory fatigue and other hydrocarbon odors can "mask" H2S, the sense of smell cannot be used as a reliable indicator of H2S exposure.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Material Safety Data Sheet

MSDS ID NO.: 0123MAR019
Revision date: 07/25/2006

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name: Marathon Aviation Turbine Fuel Jet A 3000 ppm Sulfur Max
Synonym: Aviation Turbine Fuel Jet A; Jet A Aviation Fuel; AV Turbine Fuel - Jet A; Jet Fuel 500 ppm Sulfur Max; Jet Fuel (0.05% Sulfur Max); Jet Fuel, Non-Road Use, Undyed
Chemical Family: Petroleum Hydrocarbon
Formula: Mixture

Manufacturer:
Marathon Petroleum Company LLC
539 South Main Street
Findlay OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION / INFORMATION ON INGREDIENTS

Aviation Turbine Fuel Jet A is a complex mixture of paraffins, cycloparaffins, olefins and aromatic hydrocarbons having hydrocarbon chain lengths predominantly in the range of C9 through C16. May contain a trace amount of benzene (<0.01%).

Product information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Marathon Aviation Turbine Fuel Jet A	8008-20-6	100	= 200 mg/m³ TWA application restricted to conditions in which there are negligible aerosol exposures skin - potential for cutaneous absorption (as total hydrocarbon vapor)		

Component Information:

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Saturated Hydrocarbons	Mixture	70-80			
Aromatic Hydrocarbons	Mixture	17-20			
Unsaturated Hydrocarbons	Mixture	3-6			
Naphthalene	91-20-3	0.01-0.5	Skin - potential significant contribution to overall exposure by the cutaneous route = 10 ppm TWA = 15 ppm STEL	= 10 ppm TWA = 50 mg/m³ TWA = 15 ppm STEL = 75 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

JET FUEL IS A CLEAR TO AMBER COLORED LIQUID. THIS PRODUCT IS CONSIDERED TO BE A COMBUSTIBLE LIQUID PER THE OSHA HAZARD COMMUNICATION STANDARD AND SHOULD BE KEPT AWAY FROM HEAT, FLAME AND SOURCES OF IGNITION. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH. PROLONGED OR REPEATED SKIN CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN WHICH MAY PRODUCE SEVERE IRRITATION OR DERMATITIS.

OSHA WARNING LABEL:

WARNING.
COMBUSTIBLE LIQUID.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.
PRODUCES SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Exposure to high vapor concentrations may produce headache, giddiness, vertigo, and anesthetic stupor.

Ingestion: Ingestion may result in nausea, vomiting, diarrhea and restlessness. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Produces little or no irritation on direct contact with the eye.

Carcinogenic Evaluation:

Product information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Marathon Aviation Turbine Fuel Jet A 8008-20-6	NE		A3 - Animal Carcinogen (as total hydrocarbon vapor)	

Notes: The International Agency for Research on Cancer (IARC) has determined that there is inadequate evidence for the carcinogenicity of jet fuel in humans.

IARC has determined that there is sufficient evidence for the carcinogenicity in experimental animals of diesel engine exhaust and extracts of diesel engine exhaust particles. IARC determined that there is only limited evidence for the carcinogenicity in humans of diesel engine exhaust. However, IARC's overall evaluation has resulted in the IARC designation of diesel engine exhaust as probably carcinogenic to humans (Group 2A) because of the presence of certain engine exhaust components.

Component Information:

Name	IARC Carcinogens:	NTP Carcinogens:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Naphthalene 91-20-3	Monograph 82, 2002	Reasonably Anticipated To Be A Carcinogen Listed	A4 - Not Classifiable as a Human Carcinogen	Present

Notes: The International Agency for Research on Cancer (IARC) and the Environmental Protection Agency (EPA) have determined that naphthalene could be a possible human carcinogen.

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician. If symptoms or irritation occur with any exposure, call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. If swallowed, immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions and respiratory disorders may be aggravated by exposures to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a combustible liquid per the OSHA Hazard Communication Standard and should be handled accordingly. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 128.

Special protective equipment for firefighters: Avoid using straight water streams. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Avoid excessive water spray application. Keep surrounding area cool with water spray from a distance and prevent further ignition of combustible material. Keep run-off water out of sewers and water sources.

Flash point: 120-190 F
Autoignition temperature: 489 F
Flammable limits in air - lower (%): 0.7
Flammable limits in air - upper (%): 5.0

NFPA rating:
Health: 1
Flammability: 2
Reactivity: 1
Other: -

HMIS classification:
Health: 1
Flammability: 2
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Avoid repeated and prolonged skin contact. Never siphon this product by mouth. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required when using at elevated temperatures that generate vapors or mists.

Respiratory protection: Use approved organic vapor chemical cartridge or supplied air respirators when material produces vapors that exceed permissible limits or excessive vapors are generated. Observe respirator protection factor criteria cited in ANSI Z88.2. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride and polyurethane gloves to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: No special protective clothing is normally required. Select protective clothing depending on industrial operations. Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Clear to Amber Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Clear or Amber
Odor:	Slight Hydrocarbon
Molecular weight:	180
pH:	Neutral
Boiling point/range (5-95%):	360-550 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	Not determined
Density:	6.76 lbs/gal
Bulk density:	No data available.

Vapor density:	4-5
Vapor pressure:	1-10 mm Hg @ 100 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	10%
Viscosity:	1.3-2.1 @ 50 C

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
Materials to avoid:	Strong oxidizers such as nitrates, perchlorates, chlorine, fluorine.
Conditions to avoid:	Excessive heat, sources of igition and open flames.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information:

Name	CAS Number	Inhalation:	Dermal:	Oral:
Marathon Aviation Turbine Fuel Jet A	8008-20-6	>2 mg/l for 4 hr [Rat]	>5 ml/kg [Rabbit]	9-16 ml/kg [Rat]

Lifetime skin painting studies in animals with similar distillate fuels have produced weak to moderate carcinogenic activity following prolonged and repeated exposure. Similar middle distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. Repeated dermal application has produced severe irritation and systemic toxicity in subacute toxicity studies. Some components of this product, have been shown to produce a species specific, sex hormonal dependent kidney lesion in male rats from repeated oral or inhalation exposure. Subsequent research has shown that the kidney damage develops via the formation of a alpha-2µ-globulin, a mechanism unique to the male rat. Humans do not form alpha-2µ-globulin, therefore, the kidney effects resulting from this mechanism are not relevant in humans. Some components of this product were found to be positive in a few mutagenicity tests while negative in the majority of others. The exact relationship between these results and human health is not known.

Summary of health effect data on distillate fuel components:

This product may contain >0.1% naphthalene. Exposure to naphthalene at 30 ppm for two years caused lung tumors in female mice. Male mice with the same exposure did not develop tumors. Exposure to 10-60 ppm naphthalene for 2 years caused tumors in the tissue lining of the nose and respiratory tract in male and female rats. Oral administration of 133-267 mg/kg/day of naphthalene in mice for up to 90 days did not produce mortality, systemic toxicity, adversely affect organ or body weight or produce changes in blood. Repeated oral administration of naphthalene produced an anemia in dogs. Repeated intraperitoneal doses of naphthalene produced lung damage in mice. Repeated high doses of naphthalene has caused the formation of cataracts and retinotoxicity in the eyes of rats and rabbits due to accumulation of 1,2-naphthoquinone, a toxic metabolite. Effects in human eyes is uncertain and not well documented. Pregnant rats administered intraperitoneal doses of naphthalene during gestation gave birth to offspring that had delayed heart and bone development. Pregnant mice given near lethal doses of naphthalene showed no significant maternal toxicity and a reduction in the number of pups per litter, but no gross abnormalities in offspring. Suppressed spermatogenesis and progeny development have been reported in mice, rats and guinea pigs after exposure to high concentrations of naphthalene in their drinking water. Certain groups or individuals, i.e., infants, Semites, Arabs, Asians and Blacks, with a certain blood enzyme deficiency (glucose-6-phosphate dehydrogenase) are particularly susceptible to hemolytic agents and can rapidly develop hemolytic anemia and systemic poisoning from ingestion or inhalation of naphthalene.

Summary of health effect information on diesel engine exhaust:

Chronic inhalation studies of whole diesel engine exhaust in mice and rats produced a significant increase in lung tumors. Combustion of kerosine and/or diesel fuels produces gases and particulates which include carbon monoxide, carbon dioxide, oxides of nitrogen and/or sulfur and hydrocarbons. Significant exposure to carbon monoxide vapors decreases the oxygen carrying capacity of the blood and may cause tissue hypoxia via formation of carboxyhemoglobin.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects:

Product can be toxic to aquatic life and cause fouling of the shoreline at high concentrations. The 96 hour LL50 values for an accomadated fraction (WAF) of fuel oil ranged from 3.2 to 65 mg/l in fish and 2-210 mg/l in invertebrates. EL50 values for inhibition of algal growth ranged from 1.8 to 2.9 mg/l for No. 2 fuel oil and from 10 to 78 mg/l for diesel fuel. This product does not concentrate or accumulate in the food chain. If released to soil and water, this product is expected to biodegrade under both aerobic and anaerobic conditions.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations:

This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "characteristic" hazardous waste. This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Fuel, Aviation, Turbine Engine
UN/Identification No: UN 1863
Hazard Class: 3
Packing group: III
DOT reportable quantity (lbs): Not applicable.

TDG (Canada):

Proper shipping name: Fuel, Aviation, Turbine Engine
UN/Identification No: UN 1863
Hazard Class: 3
Packing group: III
Regulated substances: Not applicable.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Saturated Hydrocarbons	NA
Aromatic Hydrocarbons	NA
Unsaturated Hydrocarbons	NA
Naphthalene	= 0.454 kg final RQ = 1 lb final RQ = 100 lb final RQ = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard
Fire Hazard

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Saturated Hydrocarbons	None
Aromatic Hydrocarbons	None
Unsaturated Hydrocarbons	None
Naphthalene	= 0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Saturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Aromatic Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.
Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Unsaturated Hydrocarbons

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	Not Listed.
Pennsylvania Right-To-Know:	Not Listed.

Massachusetts Right-To Know:	Not Listed.
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Not Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Listed
New Jersey Right-To-Know:	Listed
Pennsylvania Right-To-Know:	Listed
Massachusetts Right-To Know:	Listed
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Listed
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Listed
Illinois - Toxic Air Contaminants	Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Listed

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Naphthalene	B4, D2A	1 %

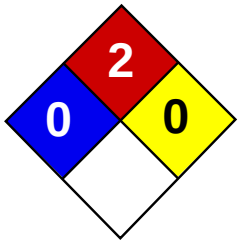
16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Petroleum Company LLC (MPC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MPC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet



Health	2
Fire	2
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Kerosene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Kerosene

Catalog Codes: SLK1048

CAS#: 8008-20-6 or 64742-81-0

RTECS: OA5500000

TSCA: TSCA 8(b) inventory: Kerosene

CI#: Not available.

Synonym: Astral Oil; Coal Oil, Fuel Oil No. 5, Deobase, Astral Oil, Jet A Fuel; Jet Fuel JP-1; JP-5 Navy Fuel; Kerosine, petroleum; Range Oil; K1 Kerosene; Kerosene, hydrodesulfurized; Kerosine

Chemical Name: Kerosene

Chemical Formula: Not available.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**
Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Trial version
www.nuance.com

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Kerosene	8008-20-6 or 64742-81-0	100

Toxicological Data on Ingredients: Kerosene: ORAL (LD50): Acute: 15000 mg/kg [Rat]. 20000 mg/kg [Guinea pig]. 2835 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to the nervous system. The substance may be toxic to blood, kidneys, liver, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do NOT induce vomiting. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Trial Version
www.nuance.com

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 210°C (410°F)

Flash Points: CLOSED CUP: 38°C (100.4°F). (Tagliabue.)

Flammable Limits: LOWER: 0.7% UPPER: 5% - 7%

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Oily liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: Not available.

Color: Yellow. Clear (Light.)

pH (1% soln/water): Not applicable.

Boiling Point: 149°C (300.2°F) - 325 C

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: 0.775 - .840(Water = 1)

Vapor Pressure: 0.1 kPa (@ 20°C)

Vapor Density: 4.5 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Trial Version
www.nuance.com

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Miscible with other petroleum solvents

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (sparks, flames), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact.

Toxicity to Animals: Acute oral toxicity (LD50): 2835 mg/kg [Rabbit].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. Causes damage to the following organs: the nervous system. May cause damage to the following organs: blood, kidneys, liver, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant). Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes moderate to severe skin irritation. It can cause defatting dermatitis. Eyes: May cause eye irritation. Inhalation: May cause respiratory tract and mucous membrane irritation and a burning sensation in the chest. Because of its relatively low volatility, overexposure by inhalation is uncommon, but it can occur in poorly ventilated areas or by inhalation of mists or aerosols. Symptoms of inhalation overexposure include central nevous system (CNS) depression (transient euphora, headache, irritability, excitement, ringing in the ears, weakness, incoordination, confusion, disorientation, drowsiness, tremor, somnolence, hallucinations, seizures, coma, death). May affect the heart (cardiac arrythmias), liver, kidneys, and respiration(asphyxia, apnea, acute pulmonary edema, dyspnea, fibrosis, or cyanosis) Ingestion: Causes gastrointestinal tract irritation with burning sensation in mouth, esophagus, and stomach, a b d o m i n a l p a i n , n a u s e a , v o m i t i n g , h y p e r m o t i l i t y , d i a r r h e a , h e a d a c h e , m a l a i s e . M a y a f f e c t respiration/ trachea/bronchi through accidental pulmonary aspiration which can cause hypoxia, chemical pneumonitis, and noncardiogenic pulmonary edema, pulmonary hemmorrhage, coughing, breathing difficulty, acute or chronic pulmonary edema, emphysema, respiratory stimulation. It may also affect the heart (dysrrhythmias, myocardial depression, tachycardia), liver, endocrine system (pancreas - hypoglycemia), behavior/central nervous system (symptoms similar to that of inhalation). Chronic Potential Health Effects: Inhalation: Repeated or prolonged inhalation may cause respiratory tract irritation and affect behavior/central nervous system with symptoms similar to that of acute inhalation. It may also affect the blood (changes in white blood cell count, changes in serum compositon, pigmented or nucleated red blood cells, leukopenia, normocytic anemia) , cardiovascular

Trial Version
www.nuance.com

system, respiratory system (trachea, bronchi), and may cause kidney damage. Ingestion: Repeated or prolonged ingestion may affect the liver, endocrine system (adrenal gland, pancreas, spleen), and metabolism (weight loss), and blood. Skin: Repeated or prolonged skin contact may cause defatting dermatitis, erythema, and eczema-like skin lesions, drying and cracking of the skin, and possible burns.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: Not available.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Kerosene UNNA: 1223 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Kerosene Rhode Island RTK hazardous substances: Kerosene Pennsylvania RTK: Kerosene Massachusetts RTK: Kerosene Massachusetts spill list: Kerosene New Jersey: Kerosene TSCA 8(b) inventory: Kerosene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable. R65- Harmful: may cause lung damage if swallowed. S23- Do not breathe gas/fumes/vapour/spray S24- Avoid contact with skin. S62- If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Trial Version
www.nuance.com

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:54 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Trial Version
www.nuance.com

Material Safety Data Sheet

MSDS ID NO.: 0156MAR019
Revision date: 02/02/2004

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: MAPLLC Benzene
Synonyms: Benzene; Cyclohexatriene;
Chemical Family: Aromatic Hydrocarbon
Formula: C6H6

Supplier:
Marathon Ashland Petroleum LLC
539 SOUTH MAIN STREET
FINDLAY OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Benzene is an C6 aromatic petroleum hydrocarbon.

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
MAPLLC Benzene	71-43-2	100	= 0.5 ppm TWA = 2.5 ppm STEL skin - potential for cutaneous absorption	= 10 ppm TWA unless specified in 1910.1028 = 25 ppm Ceiling unless specified in 1910.1028 = 50 ppm STEL 10 min, unless specified in 1910.1028	OSHA Exposure Limit as specified in 1910.1028: =1.0 ppm TWA = 5 ppm STEL = 0.5 ppm Action Level

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Benzene	71-43-2	99-100	= 0.5 ppm TWA = 2.5 ppm STEL skin - potential for cutaneous absorption	= 10 ppm TWA unless specified in 1910.1028 = 25 ppm Ceiling unless specified in 1910.1028 = 50 ppm STEL 10 min, unless specified in 1910.1028	OSHA Exposure Limit as specified in 1910.1028: =1.0 ppm TWA = 5 ppm STEL = 0.5 ppm Action Level

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

BENZENE IS A COLORLESS LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. CONTAINS BENZENE WHICH MAY CAUSE CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH.

OSHA WARNING LABEL:

DANGER!
CONTAINS BENZENE.
CANCER HAZARD.
EXTREMELY FLAMMABLE.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Acute exposure to vapor concentrations of 50-150 ppm benzene can cause respiratory irritation, headache, dizziness and loss of coordination. Concentrations exceeding 500 ppm may cause central nervous system depression, loss of consciousness, coma and death resulting from respiratory failure. Excessive benzene exposure may cause cardiac sensitization.

Ingestion: Liquid ingestion causes severe gastrointestinal pain, abdominal cramps, nausea, vomiting, narcosis and central nervous system depression. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Eye irritation may result from contact with the liquid or exposure to the vapor at concentrations above the TLV.

Carcinogenic Evaluation:

Product information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
MAPLLC Benzene 71-43-2	Supplement 7, 1987; Monograph 29, 1982	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen	Present

Notes: Benzene is listed by the National Toxicology Program, the International Agency for Research on Cancer (IARC) and by OSHA as a chemical casually associated with certain forms of leukemia (cancer) in humans.

Component Information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Benzene 71-43-2	Supplement 7, 1987; Monograph 29, 1982	Known Carcinogen Reasonably Anticipated To Be A Carcinogen	A1 - Confirmed Human Carcinogen	Present

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions, respiratory disorders or impaired blood forming organ functions may be aggravated by exposure to this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Special protective equipment for firefighters: Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 12 F
Autoignition temperature: 1076 F
Flammable limits in air - lower (%): 1.3
Flammable limits in air - upper (%): 7.9

NFPA rating:
Health: 2
Flammability: 3
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 3
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Never siphon this product by mouth. Avoid skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in OSHA Benzene Standard (29 CFR 1910.1028). Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Viton gloves should be used to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Pure
Color:	Colorless
Odor:	Aromatic
Molecular weight:	78.1
pH:	Neutral
Boiling point/range:	176 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	0.88
Density:	7.32 lbs/gal
Bulk density:	No data available.
Vapor density:	2.8
Vapor pressure:	100 mm Hg @ 79 F
Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability: The material is stable at 70 F, 760 mm pressure.

Polymerization: Will not occur.

Hazardous decomposition products: Carbon monoxide, benzene vapor

Materials to avoid: Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid: Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information

Name	CAS Number	Inhalation:	Dermal:	Oral:
MAPLLC Benzene	71-43-2	LC50 = 13,700 ppm for 4 hrs [Rat]	LD50 > 8260 mg/kg [Rabbit]	LD50 = 810 - 10,000 mg/kg [Rat]

Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in man. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: The 96 hour LC50 of benzene for stripped bass is 10-100 ppm. The 7 day No Observed Effect Concentration (NOEC) for benzene in daphnia is 3 mg/l. This product does not concentrate or accumulate in the food chain.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "ignitable" hazardous waste (D001). This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name:	Benzene
UN/Identification No:	UN 1114
Hazard Class:	3
Packing group:	II
DOT reportable quantity (lbs):	10 pounds.

TDG (Canada):

Proper shipping name:	Benzene
UN/Identification No:	UN 1114
Hazard Class:	3
Packing group:	II
Regulated substances:	10 pounds.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Benzene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Benzene	= 0.454 kg final RQ = 0.454 kg statutory RQ = 1 lb final RQ = 1 lb statutory RQ = 10 lb final RQ = 10 lb final RQ receives an adjustable RQ of 10 lbs based on potential carcinogenicity in August 14, 1989 final rule = 100 lb final RQ = 4.54 kg final RQ = 4.54 kg final RQ receives an adjustable RQ of 10 lbs based on potential carcinogenicity in August 14, 1989 final rule = 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard.
Chronic Health Hazard.
Fire Hazard.

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Benzene	= 0.1 percent de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	carcinogen; initial date 2/27/87 developmental toxicity; initial date 12/26/97 male reproductive toxicity; initial date 12/26/97
New Jersey Right-To-Know:	sn 0197
Pennsylvania Right-To-Know:	environmental hazard; special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable, Carcinogen; skin
Michigan critical materials register list:	Annual usage threshold = 100 pounds
Massachusetts Extraordinarily Hazardous Substances:	carcinogen; extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	[present]
New Jersey - Special Hazardous Substances:	carcinogen; flammable - third degree; mutagen
New Jersey - Environmental Hazardous Substances List:	SN 0197
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 10 lbs Air RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Benzene	B2; D2A	0.1% (English Item 153, French Item 277)

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Ashland Petroleum LLC (MAPLLC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MAPLLC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Material Safety Data Sheet

MSDS ID NO.: 0157MAR019
Revision date: 02/02/2004

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: MAPLLC Toluene
Synonyms: Toluene; Toluol; Methyl Benzene
Chemical Family: Aromatic Hydrocarbon
Formula: C6H5(CH3)

Supplier:
Marathon Ashland Petroleum LLC
539 SOUTH MAIN STREET
FINDLAY OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Toluene is an C7 aromatic petroleum hydrocarbon. Contains trace amounts of xylene (<0.1%), paraffins, cycloparaffins and benzene (<50 ppm).

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
MAPLLC Toluene	108-88-3	100	= 50 ppm TWA skin - potential for cutaneous absorption	= 100 ppm TWA = 150 ppm STEL = 375 mg/m³ TWA = 560 mg/m³ STEL	

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Toluene	108-88-3	99-100	= 50 ppm TWA skin - potential for cutaneous absorption	= 100 ppm TWA = 150 ppm STEL = 375 mg/m³ TWA = 560 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

TOLUENE IS A COLORLESS LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH.

OSHA WARNING LABEL:

DANGER!
EXTREMELY FLAMMABLE.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Overexposure or prolonged exposure to lower concentrations can cause respiratory irritation. Gross overexposure can cause central nervous system depression, producing symptoms of headache, dizziness, narcosis, and muscular incoordination. Excessive product exposure may cause cardiac sensitization.

Ingestion: Liquid ingestion causes severe gastrointestinal pain, abdominal cramps, nausea, vomiting, narcosis and central nervous system depression. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Eye irritation may result from contact with the liquid or exposure to the vapor at concentrations above the TLV.

Carcinogenic Evaluation:

Product information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
MAPLLC Toluene 108-88-3	NE		A4 - Not Classifiable as a Human Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for the carcinogenicity of toluene in either humans or animals (Group 3).

Component Information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Toluene 108-88-3			A4 - Not Classifiable as a Human Carcinogen	

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Pre-existing skin conditions and respiratory disorders may be aggravated by exposures to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Special protective equipment for firefighters: Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 40 F
Autoignition temperature: 896 F
Flammable limits in air - lower (%): 1.2
Flammable limits in air - upper (%): 7.1

NFPA rating:
Health: 2
Flammability: 3
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 3
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Never siphon this product by mouth. Avoid repeated and prolonged skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in ANSI Z88.2. Self-contained breathing apparatus should be used for fire fighting.

Skin and body protection: Viton gloves should be used to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Pure
Color:	Colorless
Odor:	Aromatic
Molecular weight:	92.1
pH:	Neutral
Boiling point/range:	231 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	0.87 @ 60 F
Density:	7.3 lbs/gal @ 60 F
Bulk density:	No data available.
Vapor density:	3.1
Vapor pressure:	21 mm Hg @ 68 F
Evaporation rate:	No data available.
Solubility:	515 mg/l at 20 C
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability: The material is stable at 70 F, 760 mm pressure.

Polymerization: Will not occur.

Hazardous decomposition products: Carbon monoxide, toluene vapors

Materials to avoid: Strong oxidizers such as nitrates, chlorates, peroxides.

Conditions to avoid: Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information

Name	CAS Number	Inhalation:	Dermal:	Oral:
MAPLLC Toluene	108-88-3	LC50 = 3388-8800 ppm for 4 hrs [Rats]	LD50 = 14.1 ml/kg [Rabbit]	LD50 = 5.5-7.5 gm/kg [Rat]

Toluene was not carcinogenic in mice and rats exposed in a 2 year inhalation study for 6 hours/day, 5 days/week at concentrations of 600 or 1200 ppm.

Exposure to pregnant rats and mice during gestation to toluene produced some maternal and development toxicity (decreased fetal weight and increased sleletal variations). Toluene produced a mid frequency hearing loss in rats subchronically exposed to high concentrations of toluene. Decreased learning capability and deficits in operant behavior have been observed in animals subjected to exposure regimens that generally exceed established exposure limits.

Deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney and brain damage and central nervous system effects (incoordination, lassitude and memory loss) in individuals abusing toluene for its euphoric effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: The 96 hour LC50 for toluene ranges from 5.4 to 26 mg/l in fathead minnow and salmon. The 48 hour ED50 for toluene is 11.5 mg/l in daphnia. The 96 hour No Observed Effect Concentration (NOEC) of toluene in algae is 10 mg/l. This product does not concentrate or accumulate in the food chain.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "ignitable" hazardous waste (D001). This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name: Toluene
UN/Identification No: UN 1294
Hazard Class: 3
Packing group: II
DOT reportable quantity (lbs): 1000 pounds.

TDG (Canada):

Proper shipping name: Toluene
UN/Identification No: UN 1294
Hazard Class: 3
Packing group: II
Regulated substances: 1000 pounds.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Toluene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Toluene	= 0.454 kg final RQ = 1 lb final RQ = 10 lb final RQ = 100 lb final RQ = 1000 lb final RQ = 4.54 kg final RQ = 45.4 kg final RQ = 454 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard.
Fire Hazard.

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Toluene	= 1.0 percent de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Toluene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	developmental toxicity; initial date 1/1/91
New Jersey Right-To-Know:	sn 1866
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable; skin
Michigan critical materials register list:	Annual usage threshold = 100 pounds
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 1866
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Toluene	B2; D2A	1% (English Item 1578, French Item 1622)

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Ashland Petroleum LLC (MAPLLC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MAPLLC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Material Safety Data Sheet

MSDS ID NO.: 0158MAR019
Revision date: 02/02/2004

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: MAPLLC Xylene
Synonyms: Xylene; Mixed Xylenes, Dimethyl Benzene; Methyl Toluene
Chemical Family: Aromatic Hydrocarbon
Formula: C6H4(CH3)2

Supplier:
Marathon Ashland Petroleum LLC
539 SOUTH MAIN STREET
FINDLAY OH 45840

Other information: 419-421-3070
Emergency telephone number: 877-627-5463

2. COMPOSITION/INFORMATION ON INGREDIENTS

Xylene is an mixture of C8 aromatic petroleum hydrocarbons composed of the three isomers of xylene (ortho, meta & para) and ethylbenzene. Contains trace amounts of toluene, C9 hydrocarbons and benzene (<50 ppm).

Product information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
MAPLLC Xylene	1330-20-7	100	= 100 ppm TWA = 150 ppm STEL	= 100 ppm TWA = 150 ppm STEL = 435 mg/m³ TWA = 655 mg/m³ STEL	

Component Information

Name	CAS Number	Weight %	ACGIH Exposure Limits:	OSHA - Vacated PELs - Time Weighted Ave	Other:
Xylene	1330-20-7	85	= 100 ppm TWA = 150 ppm STEL	= 100 ppm TWA = 150 ppm STEL = 435 mg/m³ TWA = 655 mg/m³ STEL	
Ethyl Benzene	100-41-4	15	= 100 ppm TWA = 125 ppm STEL	= 100 ppm TWA = 125 ppm STEL = 435 mg/m³ TWA = 545 mg/m³ STEL	

Notes: The manufacturer has voluntarily elected to reflect exposure limits contained in OSHA's 1989 air contaminants standard in its MSDS's, even though certain of those exposure limits were vacated in 1992.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

XYLENE IS A COLORLESS LIQUID WITH A STRONG HYDROCARBON ODOR. IT IS A VOLATILE AND EXTREMELY FLAMMABLE LIQUID THAT MAY CAUSE FLASH FIRES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. CONTAINS ETHYLBENZENE THAT HAS PRODUCED CANCER IN LABORATORY ANIMALS. NEVER SIPHON THIS PRODUCT BY MOUTH. IF SWALLOWED, THIS PRODUCT MAY GET SUCKED INTO THE LUNGS (ASPIRATED) AND CAUSE LUNG DAMAGE OR EVEN DEATH. CONTACT MAY CAUSE EYE AND SKIN IRRITATION.

OSHA WARNING LABEL:

DANGER!
FLAMMABLE LIQUID.
MAY CAUSE EYE OR SKIN IRRITATION.
CONTAINS ETHYLBENZENE THAT HAS CAUSED CANCER IN LABORATORY ANIMALS.
ASPIRATION (INADVERTENT SUCTION) OF LIQUID INTO THE LUNGS CAN PRODUCE CHEMICAL PNEUMONIA OR EVEN DEATH.

CONSUMER WARNING LABEL:

A CONSUMER WARNING LABEL IS NOT APPLICABLE FOR THIS PRODUCT.

Inhalation: Overexposure or prolonged exposure to lower concentrations can cause respiratory irritation. Gross overexposure can cause central nervous system depression, producing symptoms of headache, dizziness, narcosis, and muscular incoordination. Excessive product exposure may cause cardiac sensitization.

Ingestion: Liquid ingestion causes severe gastrointestinal pain, abdominal cramps, nausea, vomiting, narcosis and central nervous system depression. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin contact: Prolonged and repeated liquid contact can cause defatting and drying of the skin and can lead to irritation and/or dermatitis.

Eye contact: Liquid contact will produce a burning sensation and irritation in the eye. Eye irritation, photophobia and reversible corneal vacuolization may occur from vapor exposure above the TLV.

Carcinogenic Evaluation:

Product information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
MAPLLC Xylene 1330-20-7	NE		A4 - Not Classifiable as a Human Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for the carcinogenicity of xylene in either humans or animals (Group 3).

Component Information

Name	IARC:	NTP:	ACGIH - Carcinogens:	OSHA - Select Carcinogens:
Xylene 1330-20-7			A4 - Not Classifiable as a Human Carcinogen	
Ethyl Benzene 100-41-4	Monograph 77, 2000		A3 - Animal Carcinogen	

Notes: The International Agency for Research on Cancer (IARC) has concluded that ethyl benzene is possibly carcinogenic to humans (Group 2B).

4. FIRST AID MEASURES

Inhalation: If affected, move person to fresh air. If breathing is difficult, administer oxygen. If not breathing or if no heartbeat, give artificial respiration or cardiopulmonary resuscitation (CPR). Immediately call a physician.

Skin contact: Wash with soap and large amounts of water. Remove contaminated clothing. If symptoms or irritation occur, call a physician.

Ingestion: If swallowed, do not induce vomiting and do not give liquids. Immediately call a physician.

Eye contact: Flush eyes with large amounts of tepid water for at least 15 minutes. If symptoms or irritation occur, call a physician.

Medical conditions aggravated by exposure: Preexisting skin, eye and respiratory disorders may be aggravated by exposure to components of this product.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFT/ATC) can be used. Fire fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Specific hazards: This product has been determined to be a flammable liquid per the OSHA Hazard Communication Standard, and should be handled accordingly. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the North American Emergency Response Guide 130.

Special protective equipment for firefighters: Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Flash point: 86-93 F
Autoignition temperature: 867-984 F
Flammable limits in air - lower (%): 1.1
Flammable limits in air - upper (%): 7.0

NFPA rating:
Health: 2
Flammability: 3
Reactivity: 1
Other: -

HMIS classification:
Health: 2
Flammability: 3
Reactivity: 1
Special: *See Section 8 for guidance in selection of personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources. Advise authorities and National Response Center (800-424-8802) if substance has entered a watercourse or sewer. Notify local health and pollution control agencies, if appropriate. Contain liquid with sand or soil. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids.

7. HANDLING AND STORAGE

Handling:

Comply with all applicable EPA, OSHA, NFPA and consistent state and local requirements. Use appropriate grounding and bonding practices. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Never siphon this product by mouth. Avoid repeated and prolonged skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignitions without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

Engineering measures: Local or general exhaust required in an enclosed area or with inadequate ventilation.

Respiratory protection: Approved organic vapor chemical cartridge or supplied air respirators should be worn for exposures to any components exceeding the TLV or STEL. Observe respirator protection factor criteria cited in ANSI Z88.2.

Skin and body protection: Viton gloves should be used to prevent skin contact.

Eye protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields.

Hygiene measures: Use mechanical ventilation equipment that is explosion-proof.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	Colorless Liquid
Physical state (Solid/Liquid/Gas):	Liquid
Substance type (Pure/Mixture):	Mixture
Color:	Colorless
Odor:	Sweet Aromatic
Molecular weight:	106.1
pH:	Neutral
Boiling point/range:	280-291 F
Melting point/range:	Not determined.
Decomposition temperature:	Not applicable.
Specific gravity:	0.86 @ 60 F
Density:	7.2 lbs/ gal
Bulk density:	No data available.
Vapor density:	3.7
Vapor pressure:	6-16 mm Hg @ 68 F

Evaporation rate:	No data available.
Solubility:	Negligible
Solubility in other solvents:	No data available.
Partition coefficient (n-octanol/water):	No data available.
VOC content(%):	No data available.
Viscosity:	No data available.

10. STABILITY AND REACTIVITY

Stability:	The material is stable at 70 F, 760 mm pressure.
Polymerization:	Will not occur.
Hazardous decomposition products:	Carbon monoxide, xylene vapors
Materials to avoid:	Strong oxidizers such as nitrates, chlorates, peroxides.
Conditions to avoid:	Sources of heat or ignition.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Product information

Name	CAS Number	Inhalation:	Dermal:	Oral:
MAPLLC Xylene	1330-20-7	LC50 = 5,267-6,700 ppm 4-6 hrs [Rats/Mice]	LD50 > 4 gm/kg [Rabbits]	LD50 = 2.5 - 10 ml/kg [Rats]

Laboratory animals exposed to high doses of xylene showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylene produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations have shown impairment of performance abilities (behavioral tests) in animals and man. Xylene produced a mid frequency hearing loss in rats subchronically exposed to high concentrations of xylene.

Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances.

The product contains >1.0% ethyl benzene (EB). Rats and mice exposed to 750 ppm EB for 6 hours/day, 5 days/week for two years developed kidney tumors in male and femmale rats and lung tumors in male mice and liver tumor in female mice.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: The 96 hour LC50 for xylene isomers range from 2.6-28 mg/l in flathead minnow and rainbow trout. The 24 hour ED50 for xylene ranges from 1.0-3.6 mg/l in daphnia. The 192 hour EC50 for xylene ranges from 3.9-4.4 mg/l in algae. This product does not concentrate or accumulate in the food chain.

13. DISPOSAL CONSIDERATIONS

Cleanup Considerations: This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of an "ignitable" hazardous waste (D001). This product could also contain benzene at >0.5 ppm and could exhibit the characteristics of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

14. TRANSPORT INFORMATION

49 CFR 172.101:

DOT:

Transport Information: This material when transported via US commerce would be regulated by DOT Regulations.

Proper shipping name:	Xylenes
UN/Identification No:	UN 1307
Hazard Class:	3
Packing group:	III
DOT reportable quantity (lbs):	1000 pounds.

TDG (Canada):

Proper shipping name:	Xylenes
UN/Identification No:	UN 1307
Hazard Class:	3
Packing group:	III
Regulated substances:	1000 pounds.

15. REGULATORY INFORMATION

Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

OSHA Hazard Communication Standard: This product has been evaluated and determined to be hazardous as defined in OSHA's Hazard Communication Standard.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product contains the following component(s) that have been listed on EPA's Extremely Hazardous Substance (EHS) List:

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Xylene	NA
Ethyl Benzene	NA

SARA Section 304: This product contains the following component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	CERCLA/SARA - Hazardous Substances and their Reportable Quantities
Xylene	= 100 lb final RQ = 45.4 kg final RQ
Ethyl Benzene	= 100 lb final RQ = 1000 lb final RQ = 45.4 kg final RQ = 454 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

Acute Health Hazard.
Fire Hazard.
Chronic Health Hazard.

SARA Section 313: This product contains the following component(s) that may be subject to reporting on the Toxic Release Inventory (TRI) From R:

Name	CERCLA/SARA 313 Emission reporting:
Xylene	= 1.0 percent de minimis concentration
Ethyl Benzene	= 0.1 percent de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Xylene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 2014
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Annual usage threshold = 100 pounds (all isomers)
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 2014
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Ethyl Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	sn 0851
Pennsylvania Right-To-Know:	environmental hazard
Massachusetts Right-To Know:	Present
Florida substance List:	Not Listed.
Rhode Island Right-To-Know:	Toxic, Flammable
Michigan critical materials register list:	Not Listed.
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	flammable - third degree

New Jersey - Environmental Hazardous Substances List:	SN 0851
Illinois - Toxic Air Contaminants	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	= 1 lb Land/Water RQ = 1,000 lbs Air RQ

Canadian Regulatory Information:

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or the Non Domestic Substance List (NDSL).

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Xylene	B2; D2A; D2B	
Ethyl Benzene	B2; D2A; D2B	0.1% (English Item 697, French Item 854)

16. OTHER INFORMATION

Additional Information: No data available.

Prepared by: Craig M. Parker Manager, Toxicology and Product Safety

The information and recommendations contained herein are based upon tests believed to be reliable. However, Marathon Ashland Petroleum LLC (MAPLLC) does not guarantee their accuracy or completeness nor shall any of this information constitute a warranty, whether expressed or implied, as to the safety of the goods, the merchantability of the goods, or the fitness of the goods for a particular purpose. Adjustment to conform to actual conditions of usage maybe required. MAPLLC assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

APPENDIX C

Job Safety Analysis (JSA) Form

APPENDIX D

Safety Task Analysis Review (STAR) Form

Identify Potential Hazards

- ☐ Abrasions
- ☐ Biological Hazards (plants, animals, insects)
- ☐ Cave-in (trench/excavation work)
- ☐ Chemical/Thermal Burn
- ☐ Cuts
- ☐ Dermatitis
- ☐ Dropping Materials/Tools to lower level
- ☐ Drowning/Flowing water
- ☐ Dust
- ☐ Electrical Shock
- ☐ Elevated/Overhead Work
- ☐ Energized Equipment
- ☐ Fire
- ☐ Flammability
- ☐ Foreign body in eye
- ☐ Hazardous materials (exposure or release)
- ☐ Heat or Cold Stress
- ☐ Heavy Equipment Operation
- ☐ Heavy Lifting
- ☐ High Noise Levels
- ☐ Impact Noise
- ☐ Inability to maintain communication
- ☐ Inclement weather
- ☐ Overhead work
- ☐ Overhead utilities
- ☐ Underground Utilities
- ☐ Pinch points
- ☐ Pressurized lines
- ☐ Slips, Trips, Falls
- ☐ Sprains/Strains
- ☐ Traffic
- ☐ Confined Space
- ☐ New or Rental Equipment
- ☐ Surface Water Run-On/Run-Off
- ☐ Odor/VOC Emissions
- ☐ Compressed Gas Cylinders
- ☐ Generated Wastes (solids/liquids)
- ☐ Known/Unknown Visitors
- ☐ Visibility
- ☐ New Personnel
- ☐ Hoists/Rigging/Slings/Wire Rope
- ☐ Special Operations/Instructions (attach)
- ☐ Ergonomics

Identify Controls

- ☐ Air Monitoring
- ☐ Barricades/Fencing/Silt Fencing
- ☐ Buddy System
- ☐ Appropriate Clothing/Monitoring of Weather
- ☐ Confined Space Procedures
- ☐ Decontamination
- ☐ Drinking Water/Fluids
- ☐ Dust abatement Measures
- ☐ Equipment inspection
- ☐ Exclusion zones
- ☐ Exhaust ventilation
- ☐ Fall Protection
- ☐ Fire extinguisher/Fire watch
- ☐ Flotation Devices/Lifelines
- ☐ Grounds on Equipment/Tanks
- ☐ Ground Fault Interrupter
- ☐ Ground Hydraulic Attachments
- ☐ Hand signal communication
- ☐ Hazardous/Flammable material storage
- ☐ Hazardous Plant/Animal Training
- ☐ Hearing Protection (Specify)
- ☐ Hoses, Access to water
- ☐ Hot Work Procedures
- ☐ Insect Repellent or Precautions
- ☐ Isolation of Equipment or Process (LO/TO)
- ☐ Storm-water Control Procedures/Methods
- ☐ Machine/Equipment Guarding
- ☐ Manual Lifting Equipment (Chain Falls)
- ☐ Protective Equipment (specify)
- ☐ Proper lifting techniques
- ☐ Proper tool for Job
- ☐ Radio Communication
- ☐ Respirator, (specify type)
- ☐ Safety Harness/Lanyard/Scaffold
- ☐ Sloping, Shoring, Trench Box
- ☐ Vehicle Inspection
- ☐ Spill Prevention Measures/Spill Kits
- ☐ Equipment Manuals/Training
- ☐ Emergency Procedures/Incident Management Plan
- ☐ Appropriate Labels/Signage
- ☐ Derived Waste Management Plan
- ☐ Visitor Escort/Orientation/Security
- ☐ Window Cleaning/Defrost
- ☐ Proper Work Position/Tools

Pre-Task Review (Yes/No/NA)

1. Has Job Hazard Analysis been completed and reviewed? _____
2. Is Job Scope understood by all Personnel? _____
3. Proper Safety Equipment on job site? ___
4. Permit Issues?
   What type? ☐ Hot Work
   ☐ Confined Space ☐ Excavation
   ☐ Other:_____
5. Proper Tools for Job on site? _____
6. Oxygen/Flammability checked? _____
7. Reviewed MSDSs for any hazardous substance that might be present? _____
8. Proper training for all personnel? _____
9. Are there any planned deviations from set procedures for equipment modifications? __ If so, contact supervisor to check applicability of MOC procedures.
10. Is there any work planned that could cause activation of emergency procedures? ___ If so, have these procedures been discussed and communicated?

Post-Task Review

1. Work area cleaned up?_____
2. All locks and tags removed and signed off by individuals?_____
3. Have Permits been turned in? _____
4. STAR submitted to EHS Department?
5. Were there any unplanned deviations from set procedures or equipment modifications? _____
   If so, contact supervisor to check applicability of MOC procedures.

Safety Task Analysis Review

Task Description:_____

_____

_____

List Tasks:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Company: _____

Completed By: _____

Date: _____

Job Location:_____

_____

List Additional Hazards (Hazards Not Shown with Check Box)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

List Additional Contorls (Controls Not Shown with Check Box)

_____

_____

_____

Tailgate Meeting Topic

_____

_____

_____

_____

Signatures of Personnel on Task Analysis Review/Tailgate Meeting:

_____

_____

_____

_____

_____

_____

Mentor Assigned to Work

_____

_____

_____

Lessons Learned (Based on changes in conditions (Near-Incidents/ Observations, Potential Emergencies)

Is there a better/safer way to perform the work/task?

_____

_____

_____

Supervisor Review (date/Time): _____

EHS Review (date/time):_____

Comments:_____

_____

_____

APPENDIX E

Air Monitoring Forms

Air Quality Monitoring Record

Client:_____ **Project No.**:_____
Location:_____ **Site Eng.**:_____
Project Mgr.:_____ **Site H&S Ofcr.**:_____

Date	Initial	Time	Location	PID/FID PPM	O_2%	LEL%	Dräeger Tubes			Other
							_____ _____	_____ _____	_____ _____	

Field Equipment Calibration/Maintenance Log

Client:_____ **Project No.**:_____
Location:_____ **Site Eng.**:_____
Project Mgr.:_____ **Site EHS Off.**:_____

Date	Type of Equipment[1]	Equipment ID Number	Procedure[2]	Reference Standards[3]	Initials of Individual	Company	Calibration OK Yes/No

Maintenance Required/Procedures:_____
_____
_____
_____
_____
_____

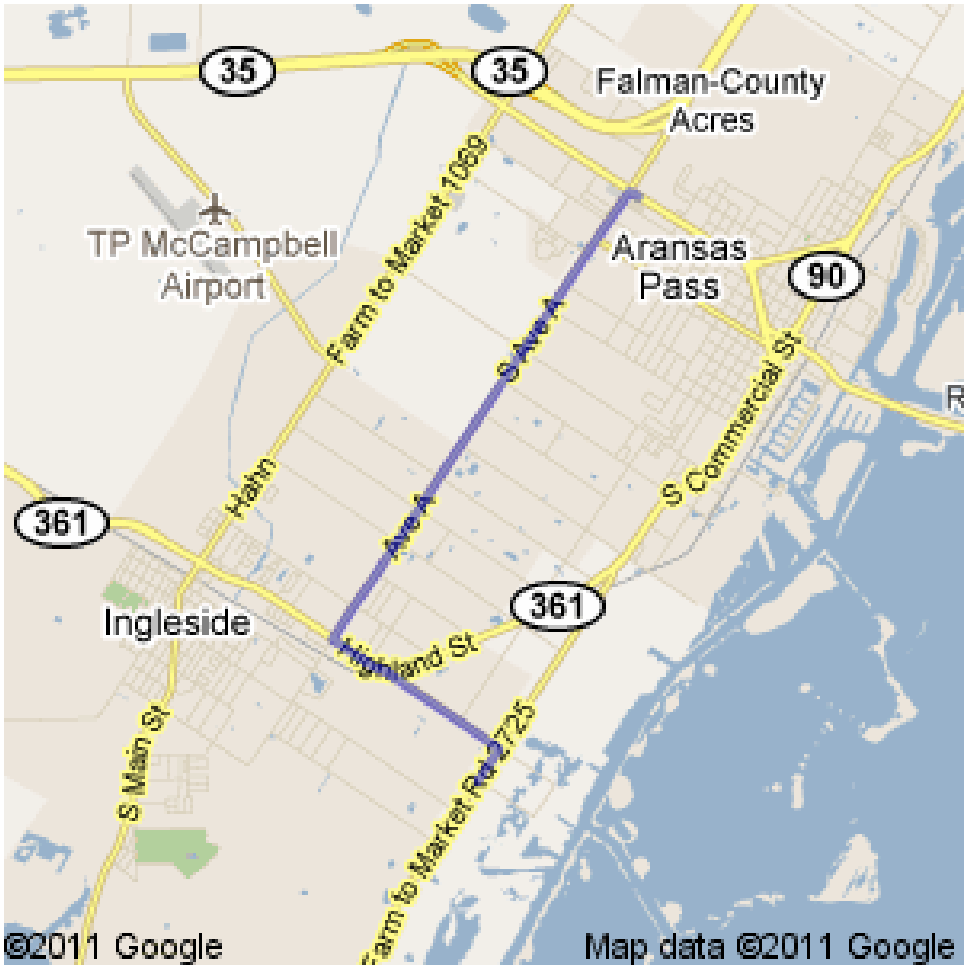
[1]Certifications or statements of manufacturer calibration can be obtained from RETEC office files.
[2] Use space below if necessary
[3] Type of calibration gas used and concentration; buffer solutions, etc.

APPENDIX F

Map/Route to the Nearest Hospital

Driving Directions from the Site (Former Falcon Refinery (1.7 miles southeast of State Highway 361 near the intersection of FM 2725 and Bishop Road, Ingleside, San Patricio County, Texas) to Care Regional Medical Center, 1711 West Wheeler Avenue, Aransas Pass, Texas 78336. Phone: (361) 758-8585

1. Head northeast on Farm to Market Rd 2725 toward Co Rd 146/Sunray Rd. 0.3 mi
2. Take the 1st left onto Co Rd 146/Sunray Rd. 0.9 mi
3. Continue onto Highland St. 0.4 mi
4. Turn right onto Ave A. 3.5 mi
5. Turn right onto W Wheeler Ave Destination will be on the right. 367 ft



APPENDIX G

TRC Incident Report Form

DATE OF INCIDENT (D.O.I.):_____
(Month/Day/Year)
(xx/xx/xx)

TRC
Incident Report

(To be completed by Employee's Supervisor and by Employee involved in the Incident/Accident immediately after an Injury or Illness/Incident/Accident)

Incident Category:

☐ Employee Injury ☐ Property Damage ☐ Vehicle Damage ☐ Fire ☐ Near Miss ☐ Other	
Incident Location:	
Site Identification/Project No./WNO No:	
Site Address:	
Date Incident Occurred:	
Time Incident Occurred:	
Date Incident Reported:	
Time Incident Reported:	
Customer Project Manager:	

Employee Information:

Name:		
Field Office/Address:		
Supervisor Name/Phone:		
Employee Phone/Cell:		
Title or Occupation:		
Department:		

Type of Employee Injury or Illness:

☐ First Aid Only ☐ Medical Treatment Only ☐ Restricted Work-case ☐ Lost Workday ☐ Extended Time Away From Work (3 days or more) ☐ Fatality	
Estimated Number of Days on Restricted Work:	
Estimated Number of Days Away from Work:	

Employee Injury or Illness Description:

Describe the Injury or Illness:
First Aid/Medical Treatment Administered:
Name of Doctor's Office, Clinic, or Hospital:
Address and Phone Number:

Incident Description:

Equipment Involved:
Site Type: (Marketing, Refinery, etc.)
What task was being performed at time of incident?
Describe Incident in Detail :
Conditions at time of Incident: (weather, lighting):

Non-TRC Involvement:

Subcontractor Involved: ☐ No ☐ Yes
Name of Company:
Address:
Contact Name and Phone Number:
Additional Information:
Witnesses(s) to Incident: ☐ No ☐ Yes
Name(s) and Address(s):
Phone Number(s):
Additional Information:

Personal Protective Equipment (PPE):

List PPE required to complete the task: (glasses, safe. shoes, hard hat, respirator, hearing protection, etc.)
Was the employee using the proper PPE at the time of the Incident?

Safety Violation ☐ No ☐ Yes (Explain):

State the company safety rule, OSHA regulation, or specific training that was violated:
Describe the training the employee received to prevent this violation:

Immediate Corrective Actions:

Describe the immediate corrective actions taken:	
Signature of Investigating Supervisor:	**Date:**
Signature of Employee:	**Date:**

TRC Safety Manager/Director Signature: _____Date:_____

TRC
FORM ANALYSIS (JSA)

JOB SAFETY ANALYSIS (JSA) **JOB:** Phase II Remedial Investigation/Feasibility Study **DATE:** August 24, 2011
SITE: Falcon Refinery, Ingleside, Texas **JSA#** 1

PROJECT COORDINATOR:
Alonzo Arredondo

CONTRACTOR(S): TRC
SUBCONTRACTORS: GAINCO

JSA TEAM:
Project Manager/Supervisor: _Stephen Halaz_____ Phone: _____
EHS Field Safety Advisor: _____ Phone: _____
Site Safety Officer: _____ Phone: _____
Alternate Site Safety Officer: _____ Phone: _____

PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIRED: Hard Hat, Steel-Toed Boots, Safety Glasses, Leather Gloves, Nitrile Gloves, and Hearing Protection. Tyvek and Respiratory Protection (if required).
ADDITIONAL PPE: Reflective safety vests are required if working around heavy equipment or areas where traffic hazards exists.

[1]JOB STEPS	[2]POTENTIAL HAZARDS	[3]CRITICAL ACTIONS TO MITIGATE HAZARDS
1. Pre-Job Safety Meeting		1. All employees assigned to this task will attend a pre-job safety meeting, which will include the pertinent JHAs, review of the health and safety plan, Standard Operating Procedures, types of potential hazards, and actual hazards present and controls for those hazards.
2. General Work Activities	1. Accidental exposure or injury to individual not working on the project	1. Clearly mark the EZ and CRZ with fencing, flagging, and/or signage. Limit access to EZ and CRZ to authorized personnel only. Provide appropriate space/buffer between the EZ and CZ so the exposure to individuals from potential air contaminants outside the work area cannot occur.
	2. Injury to hearing from noise	2. Wear approved hearing protection when working close enough to equipment that you have to speak louder than your normal voice to someone standing next to you.
	3. Inhalation of dirt, dust, or vapors during work activities	3. Complete air monitoring in the project area as specified in the HASP. If action levels are exceeded, notify the SHSO immediately. Upgrade to Level C or Level B if necessary to resume work.
	4. Inhalation and dermal contact with impacted soils	4. Wear nitrile gloves to prevent contact with hands. To avoid inhalation or dermal contact from dirt and dust that can accumulate on clothing, When necessary, wear appropriate PPE to protect from vapors and/or dust. This is usually a half-face air-purifying respirator with appropriates cartridges. Use air monitoring equipment to evaluate atmospheric conditions in respect to air monitoring action levels.
	5. Slips, Trips, and Falls	5. All personnel should constantly watch for trip hazards such as uneven terrain, holes, ditches, stretched wires or ropes, or any other materials or pieces of equipment in their path. Mark significant below-grade hazards (e.g., holes or trenches) with flagging, fencing or other appropriate means to make the obstacle easily identifiable.
	6. Back, Hand, or Foot Injuries	6. Wear steel-toed boots for protection of the feet. Wear the appropriate protective gloves (e.g. nitrile or leather, etc.) for the task performed. Inspect materials for slivers, jagged or sharp edges, and rough or slippery surfaces. Greasy, wet, slippery, or dirty objects should be wiped clean before handling. Be aware of pinch and

		shear points.
	7. Unsafe Conditions	7. Routes should be surveyed for obstacles prior to moving materials from one location to another. Muddy, snowy, and icy conditions will warrant a more cautious work attitude. Employees should change work speed and style to fit the weather conditions.
	8. Heavy Lifting	8. All three main factors in manual lifting (load location, task repetition, and load weight) must be considered when evaluating what is safe or unsafe to lift. All manual handling of heavy or bulky objects should be carefully planned to avoid injuries and damage to equipment. Before lifting a relatively heavy object, approach the object by bending a t the knees, keeping your back vertical and unarched while obtaining a firm footing. Grasp the object firmly with both hands and stand slowly and squarely while keeping your back vertical and unarched. In other words, perform lifting with muscles in your legs, not muscles in your lower back. If the object is in excess of 50 pounds, request assistance.
	9. Heavy Equipment	9. Personnel working around heavy equipment (i.e., excavators, trucks, etc.) must always be aware of what equipment is operating in their work area. Do not approach heavy equipment without. first establishing eye contact with the operator. Wear reflective vests in areas where heavy equipment is operating.
	10. Housekeeping	10. Where a situation presents a hazardous condition, the exposed employee will be removed from the hazardous area until all necessary precautions have been taken to eliminate the hazard and ensure their safety. Work areas should be kept free of materials, obstructions, and substances such as ice, water, mud, excess grease, or oil that could cause a surface to become slick or otherwise hazardous. The use of additional footing safeguards should be evaluated on a case-by-case basis.
3. Sampling	1. Inhalation of dirt, dust, or vapors during work activities	1. Complete air monitoring in the project area as specified in the HASP. If action levels are exceeded, notify the SHSO immediately. Upgrade to Level C or Level B if necessary to resume work.
	2. Inhalation, ingestion and dermal contact with impacted soils	2. Wear nitrile gloves to prevent contact with hands. To avoid inhalation or dermal contact from dirt and dust that can accumulate on clothing, wear required PPE (e.g., tyvek suits) that protects regular work clothes from exposure to dust and dirt. Remove PPE when leaving the CRZ. Do not eat or drink in the CRZ. Remove PPE when leaving the CRZ.

	3. Chemical burn from sample preservatives	3. Wear protective gloves and safety glasses or goggles when handling sample containers with preservatives or when required to transfer preservative from storage container to sample container. Ensure that gloves are appropriate for acids to be handled.
	4. Physical Injury from being struck by moving vehicles	4. Always face traffic when working in or near street (establish eye contact with drivers). Use cones/delineators and caution tape/signs to alert pedestrians and traffic. Place work vehicle between oncoming traffic and work area to provide additional traffic barrier.
	5. Biological hazards (poison oak, allergies, snake/insect bites)	5. Know what poisonous plants and insects look like. Follow procedures to avoid these animals/insects such as making noise when walking through tall grass. Wear shirts with sleeves and long pants to prevent dermal contact with poisonous plants. Periodically check for insects, particularly ticks; check for ticks after completion of the task.
	6. Heat stress/exhaustion	6. Stay hydrated Avoid direct sunlight as much as possible Wear light colored clothing Be familiar with the early symptoms of heat stress and heat exhaustion. Take a break if symptoms are recognized.
	7. Potential cross-contamination of soil sampling equipment.	7. Ensure soil samples are capped and placed in a clean, secure area after collection.
4. Drilling	1. Fire and explosion	1. Do not smoke or use an open flame. Periodically monitor ambient air concentrations with PID Meter. Shut down job and move personnel and equipment upwind if action levels are exceeded. Have fire extinguishers installed on drilling rig in accordance with the HASP.
	2. Heavy Equipment	2. Inspect drill rig to determine if in good condition. Perform all equipment and safety checks prior to event startup (per operating manual). Do not stand directly in front of the drill rig while machinery is operating. Stand off to the side by driller's platform or opposite side of drill rig. Always communicate with the driller before approaching the operating rig.
	3. Traffic	3. Always wear safety vest, establish eye contact with operators utilizing flag men where appropriate. Use cones/delineators and caution tape/signs to alert pedestrians and traffic. Place work vehicle between oncoming traffic and work area to provide additional traffic barrier.
	4. Bad organization creating confusion and hazard	4. Identify staging area with good access lateral and vertical for loading and unloading of trucks.
	5. Subsurface Utilities	5. Follow the hole clearance and drilling procedures outlined in the HASP. If unknown lines or obstructions are encountered, stop drilling and notify the project manager. Do not undermine any utilities.

	6. Cut/Pinched fingers or toes; and strained muscles.	6. Wear the appropriate protective gloves (e.g. nitrile, leather, etc.) for the task performed. Consider the three main factors in manual lifting (load location, task repetition, and load weight) when evaluating what is safe or unsafe to lift. Carefully plan all manual handling of heavy or bulky objects to avoid injuries and damage to equipment. Before lifting a relatively heavy object, approach the object by bending a t the knees, keeping your back vertical and unarched while obtaining a firm footing. Grasp the object firmly with both hands and stand slowly and squarely while keeping your back vertical and unarched. In other words, perform lifting with muscles in your legs, not muscles in your lower back. If the object is in excess of 50 pounds, request assistance.
	7. Injury to hearing from noise	7. Wear approved hearing protection when working close enough to equipment that you have to speak louder than your normal voice to someone standing next to you.
	8. Inhalation of dirt, dust, or vapors during work activities	8. Complete air monitoring in the project area as specified in the HASP. If action levels are exceeded, stop work and notify the SHSO immediately. Upgrade to Level C or Level B if necessary to resume work.
	9. Dermal Contact from Impacted Soils	9. Wear nitrile gloves to prevent contact with hands. To avoid inhalation or dermal contact from dirt and dust that can accumulate on clothing, wear required PPE (e.g., tyvek suits) that protects regular work clothes from exposure to dust and dirt. Remove PPE when leaving the CRZ. Do not eat or drink in the CRZ. Remove PPE when leaving the CRZ.
5. Well Installation	1. Being struck by moving vehicles or equipment onsite.	1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate.
	2. Bad Organization causing cross-contamination of soil, groundwater, or personnel	2. Identify and delineate soil stockpile area or storage area if soil cuttings/purge water sre to be be drummed.
	3. Heavy Lifting	3. Use proper lifting techniques. Get assistance for moving heavy objects and mixing grout/concrete. Use mechanical aids to move objects or mix grout/concrete
	4. Opening/Closing/Moving Drums	4. Wear leather gloves during the opening and closing of drums to protect fingers. Use only a drum dolly to move drums with soil, hydrated bentonite grout, or concrete.
	5. Slips, Trips, and Falls	5. Place all removed auger piping, well casing and well screen to side, so as not to become a trip hazard
	6. Heavy Equipment	6. Inspect drill rig to determine if in good condition. Perform all equipment and safety checks prior to event startup (per operating manual). Do not stand directly in front of the drill rig while machinery is operating. Stand off to the side by driller's

		platform or opposite side of drill rig. Always communicate with the driller before approaching the operating rig.
6. Drum Transport	1. Slips, Trips, and Falls 2. Drum Condition 3. Cut/pinched fingers or toes 4. Physical injury (back strain, moving vehicles, pinch points) 5. Environmental Hazard 6. Security	1. Maintain a clean, unobstructed work area by good house keeping. Move unused equipment away from designated work area. 2. Inspect all drums prior to use. Make sure that drums do not have any defect and lids fit tightly. 3. Utilize proper PPE (nitrile, leather or HyFlex Kevlar gloves, safety shoes and safety glasses at minimum) when opening, closing or transporting drums. 4. Utilize a drum dolly when handling drums with soil, grout, concrete or water (or any other material). When moving a drum on an uneven, inclined or declined surface, utilize a spotter to assist. When transporting a drum near traffic, utilize a spotter to watch traffic during the transport. 5. Once material is placed in drum, inspect for leaks. Before transporting/handling a drum, make sure that the lid is fully secure. 6. Properly label all drums (i.e., hazardous, non-hazardous labels, etc.). Store drums in a safe location (i.e., away from traffic, pedestrian walkways, etc.). If drums are stored in an accessible area, delineate storage area with caution tape.
7. Decontamination	1. Pressurized Water and Heat	1. Follow decontamination procedures for personnel and heavy equipment as described in the HASP. If necessary, use face shield, rain suit, tyvek, and gloves, rubber boots, etc., to prevent physical contact with potential contaminants and debris. Check hose for possible weakness or potential break points prior to use. Do not point spray nozzle at any body part while in use. Properly dispose of decontamination equipment and fluids per RCRA requirements.

[1] Each Job or Operation consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the associated hazards in Column 2

[2] A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

[3] Aligning with the first two columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

LIMITATION: As part of TRC's EHS Policy, a JHA is provided by TRC for its employees. The purpose of a JHA is NOT to identify all hazards associated with a task, but to identify some potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JHA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JHA if required. The JHA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JHA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JHA is ultimately the direct responsibility of the person or entity performing the work.

Field Changes:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Approvals:

Site Safety Officer	**Date:**	**Project Manager**	**Date:**
EHS Field Safety Advisor	**Date:**	**EHS Supervisor (or Designee)**	**Date:**