

WESTRIDGE MARINE TERMINAL HAZARDOUS  
MATERIALS TECHNICAL REPORT

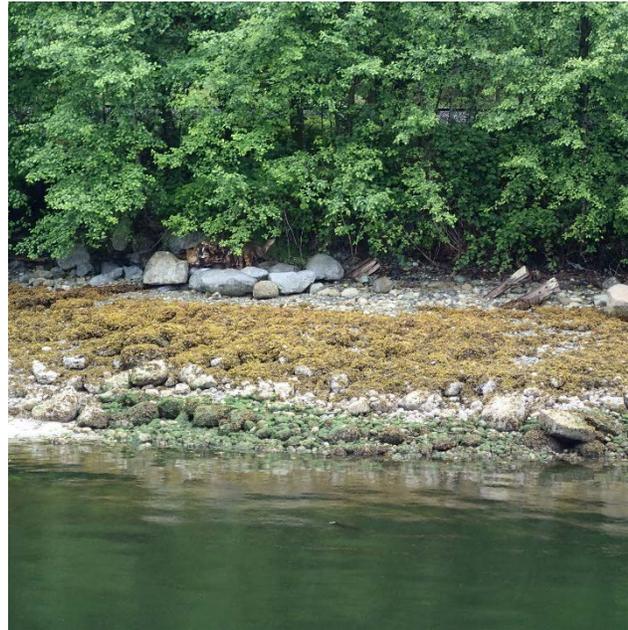
# WESTRIDGE MARINE TERMINAL UPGRADE AND EXPANSION PROJECT APPLICATION TO VANCOUVER FRASER PORT AUTHORITY



**TRANSMOUNTAIN**

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# Acronyms and Abbreviations

BC	British Columbia
BC MoE	BC Ministry of Environment
EHS	Environment, Health and Safety
KMC	Kinder Morgan Canada Inc.
JHA	Job Hazard Assessment
MSD	Musculoskeletal Disorder
MSDS	Material Safety Data Sheets
NEB	National Energy Board
SDS	Safety Data Sheets
TDG	Transportation of Dangerous Goods
TMEP/the Project	Trans Mountain Expansion Project
VFPA	Vancouver Fraser Port Authority
WMT	Westridge Marine Terminal

# Introduction

Trans Mountain Pipeline ULC (Trans Mountain) submitted a Facilities Application to the National Energy Board (NEB) in December 2013 for the Trans Mountain Expansion Project (the Project or TMEP). On November 29, 2016, the Government of Canada concluded the Project was in the public interest of Canada. A Certificate of Public Convenience and Necessity and other authorizations allowing the Project to proceed, subject to 157 conditions, was issued and became effective on December 1, 2016.

As part of the Project, the Westridge Marine Terminal (WMT) will require expansion, including construction of three new loading berths within an expanded water lot and infilling along the existing shoreline to accommodate new onshore infrastructure. It will also require the removal of existing marine structures is necessary to facilitate the expansion of the WMT facilities.

This report covers the information requirements listed by Vancouver Fraser Port Authority (VFPA) for a Hazardous Materials Technical Report:

- Inventory of any hazardous materials.
- Description of hazardous materials storage and handling methods.
- Applicable regulations.
- Copies of relevant Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS).

# Removal of Marine Structures

The removal of existing marine structures includes legacy piles/wooden fenders, spill barrier, and Pier 59 (Figure 2-1).

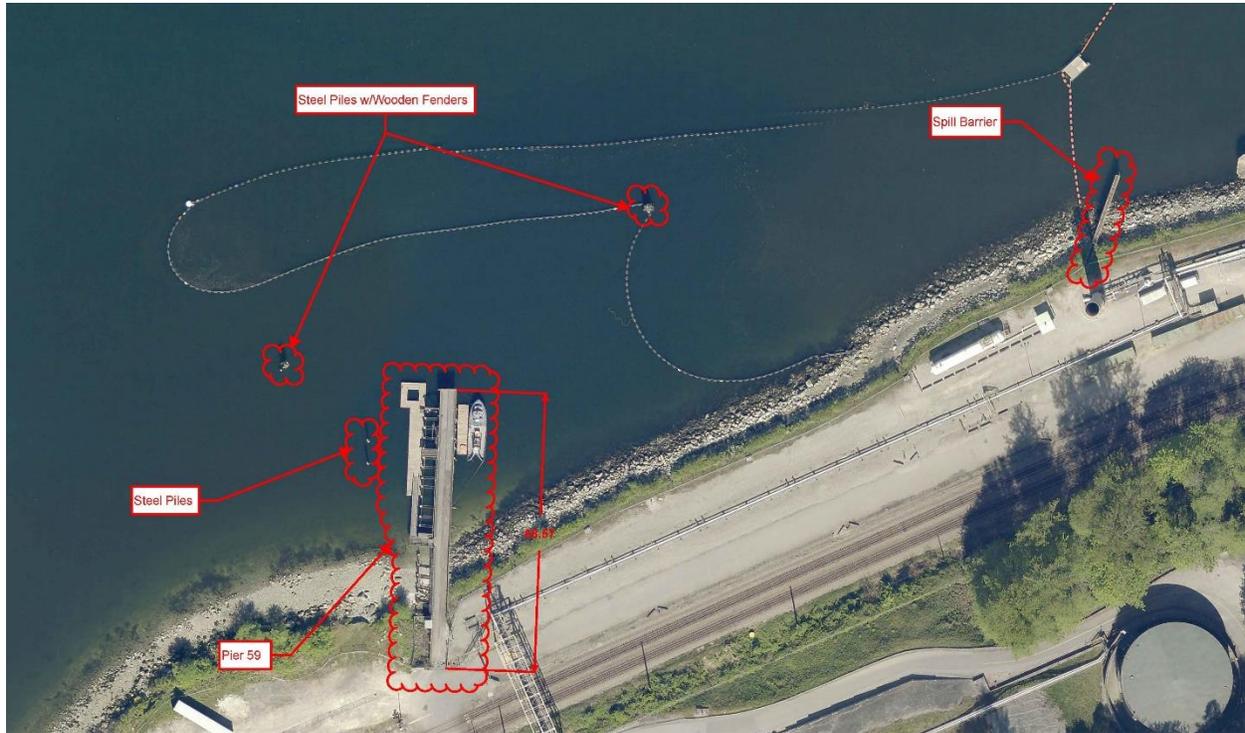


Figure 2-1. Existing Marine Structures

The removal will be performed using a derrick barge with a supporting materials barge and vibratory pile hammer (when needed). Prior to removal of the marine structures, a boom will be placed around the removal area to contain incidental debris.

The following sections provide details on the removal of the specific structures (Pier 59, spill barrier, and steel piles).

## 2.1 Pier 59

The access to Pier 59 (Figures 2-2 and 2-3) is located in line with the WMT railway crossing. The pier is approximately 70 meters (m) in length, constructed on wooden timber piles, and has a wooden superstructure.

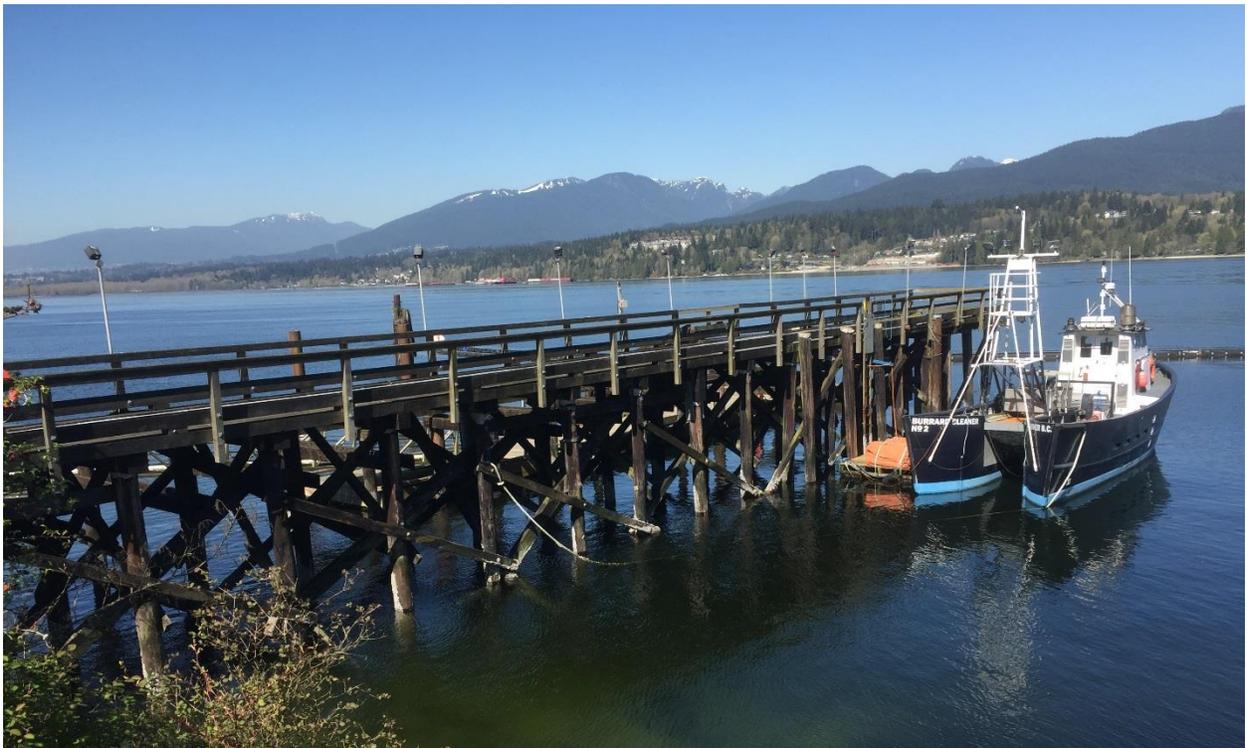


Figure 2-2. Pier 59



Figure 2-3. Access to Pier 59

The Pier 59 superstructure will be dismantled in large sections and placed on the material barge. Pier 59 piles will be removed by wrapping a choker around the pile and dead pulling the pile out of the water. In the event that this does not work, the vibratory hammer will be used to remove the piles.

## 2.2 Spill Barrier

The spill barrier (Figure 2-4) is located approximately 23 m (Figure 2-5) west of the westernmost mooring dolphin (Dolphin 1) of the existing berth. The spill barrier is approximately 20 m long. Its construction includes an access platform and vertical wooden planks supported from timber wales and 12 piles (Figure 2-6).



Figure 2-4. Spill Barrier

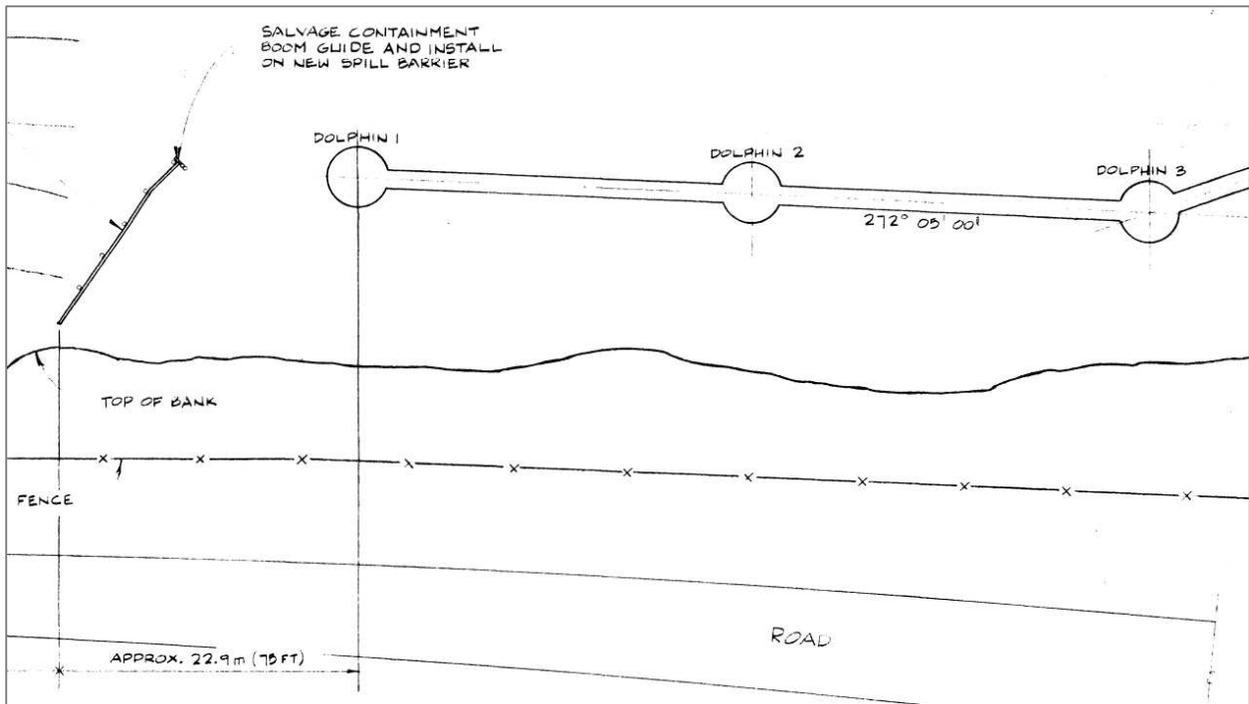


Figure 2-5. Spill Barrier Location

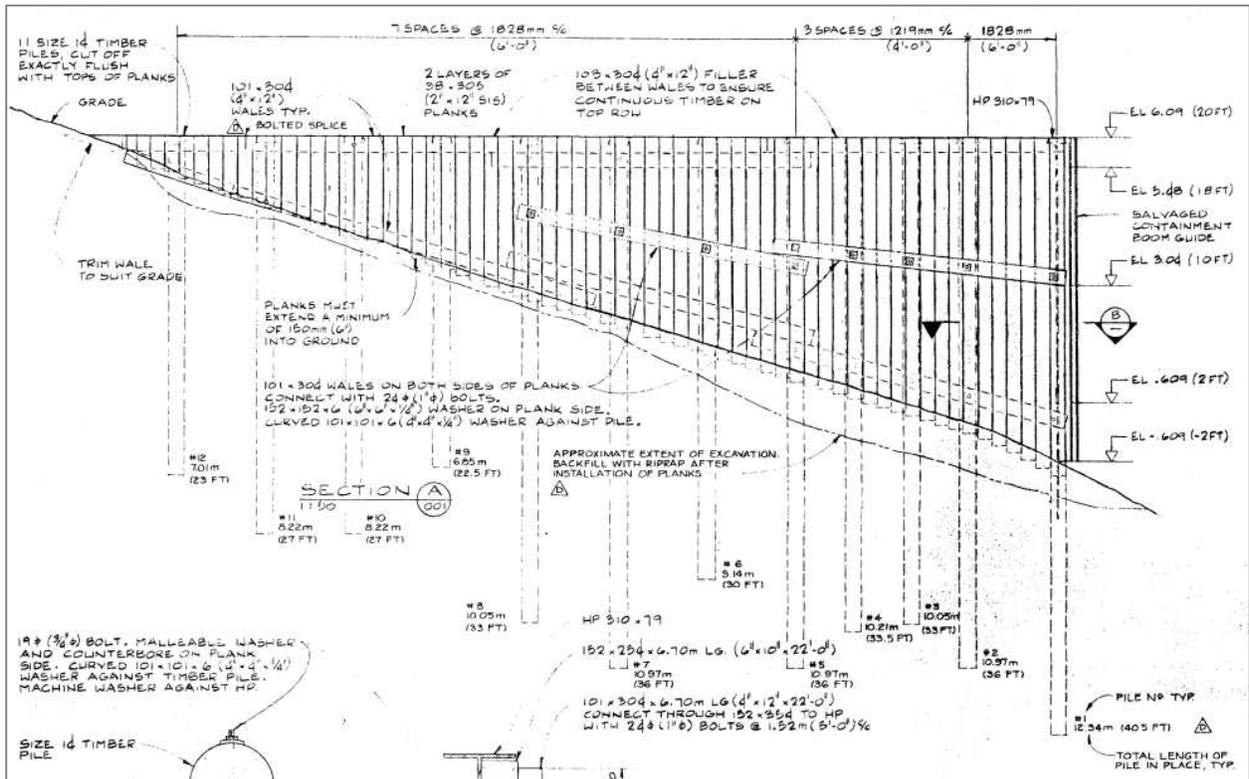


Figure 2-6. Spill Barrier Construction

The above water sections of the spill barrier will be dismantled in large sections and placed on the material barge. The spill barrier piles will be removed by wrapping a choker around the pile and dead pulling the pile out of the water. In the event that this does not work, the vibratory hammer will be used to remove the piles.

## 2.3 Steel Piles

Two groups of steel piles, with wooden fenders are located approximately 65 m northeast (Figure 2-7), and 35 m west (Figure 2-8), from the end of Pier 59. Two additional steel piles (Figure 2-9) are located approximately 10 m west from the midpoint of Pier 59.



Figure 2-7. Existing Pile Group

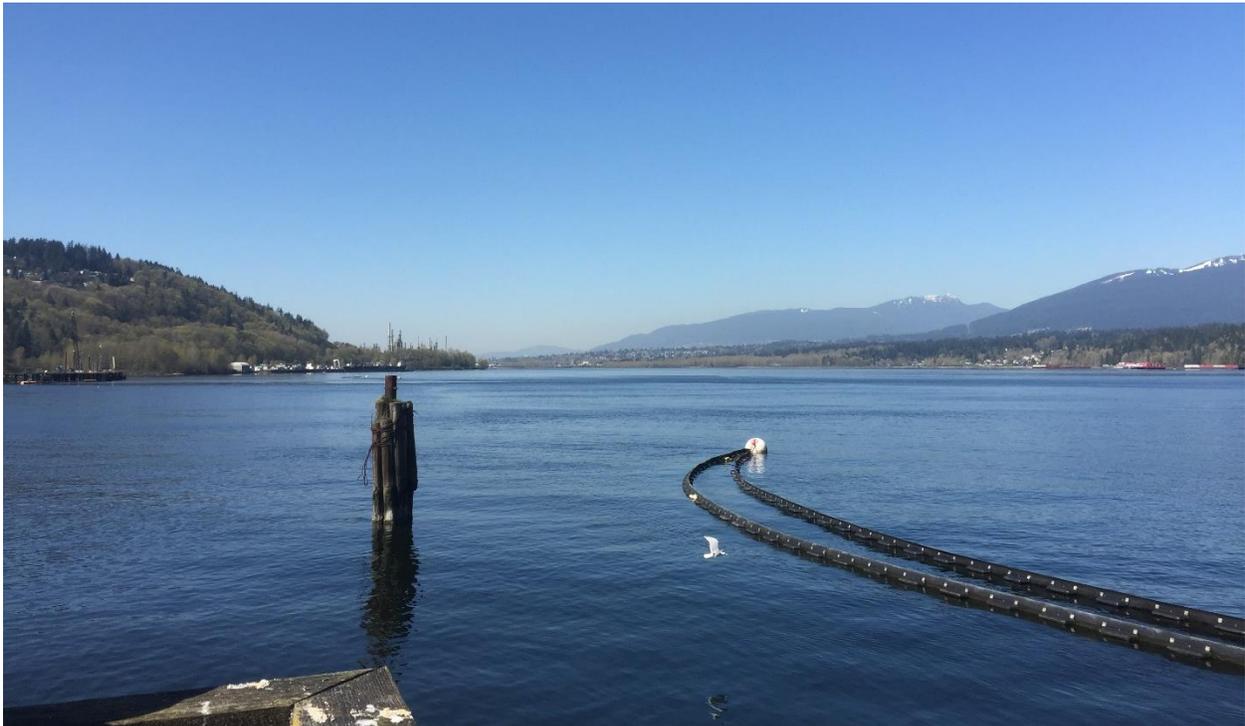


Figure 2-8. Existing Pile Group



Figure 2-9. Existing Steel Piles

The marine piles will be removed by wrapping a choker around the pile and dead pulling the pile out of the water. In the event that this does not work, the vibratory hammer will be used to remove the piles.

# Hazardous Materials Handling Plan

All Kinder Morgan Canada Inc. (KMC) staff must adhere to the standards and requirements outlined in KMC's Health and Safety Standards Manual. The Health and Safety Manual contains the Hazard Identification/Assessment and Control Program. KMC's utmost objectives with regard to the handling of hazardous materials are to keep the number of exposed personnel to a minimum and allow only competent personnel to address any hazards.

## 3.1 Hazard Identification/Assessment and Control Program

### 3.1.1 Preamble

KMC wants its employees and contractors to identify and control hazards to prevent and mitigate incidents and accidents. Legislation requires that KMC have a hazard recognition and control program and stresses the involvement of personnel directly involved in performing the work.

Federal legislation requires that the program include the following components:

- An implementation plan
- A hazard identification and assessment methodology
- A hazard identification and assessment
- Preventive measures
- Employee education
- Program evaluation

A hazard is a condition or practice with the potential for accidental loss. A workplace hazard assessment is an evaluation of a workplace or a worksite to identify existing and potential hazards that an employee may encounter while performing a job. Workplace hazards are generally recognized as follows:

- Chemical agents pose a wide range of potential health effects, such as irritation, sensitization (for example, an allergic reaction), asphyxiation and disease (such as, cancer). Exposure to chemical agents may occur during the course of the work from gases, vapours, solvents, or particulate.
- Physical agents may cause the body to become physically stressed (such as, hearing loss). Exposure to physical agents may occur during the course of the work from moving or rotating equipment, pinch points, falling objects, electric current, radiation, noise, vibration, and lighting.
- Biological agents are known to produce infection, allergenic or toxic reactions. Contact with biological agents during the course of the work may result from exposure to insects, plants, birds, animals and humans.
- Ergonomic work-related Musculoskeletal Disorders (MSDs) can occur when there is a mismatch between the physical capacity of an employee and the demands of the job. Tendonitis, carpal tunnel syndrome, and back injuries are examples of MSDs that may arise as a result of, or during the course of, work.
- Psychological hazards may include such things as working conditions, stress, fatigue, and workplace violence.

Hazards must be evaluated to determine the potential impact on employees and it includes learning past experiences, knowledge of the workforce, new research, advances in technology, and so forth.

There are three locations where hazards can be controlled. Most preferable is at the source of the hazard, secondly along the path where the hazard and the worker or environment interact, and thirdly at the worker.

Potential exposure to workplace hazards can be controlled by one or more of the following methods (in order of preference):

- Engineering controls provide the highest degree of control because they eliminate or control the hazard at its source. Engineering controls include:
  - Elimination – eliminating hazards posed by equipment and work processes at their source (for example, removal of lead from paint).
  - Substitution – substituting or replacing one substance or process with another (such as, using walnuts instead of silica as a blasting agent).
  - Redesign – trying to “engineer out” the hazard.
  - Isolation – trying to isolate the hazard through containment or enclosure.
  - Dilution – involves dilution or dissipation (for example, good ventilation that dilutes the concentration of a hazardous gas with clean air from the outside).
- Administrative controls are used when engineering controls are not possible or practical. Examples of administrative controls are safe work practices, job procedures, policies, and rules.
- Personal Protective Equipment (PPE) controls are the least effective method of hazard control and should be considered the last resort. PPE is used to reduce the potentially harmful effects of exposure to a hazard. The equipment must be used correctly and be of the proper type to be effective.

KMC uses the following means to identify, assess, and communicate hazards and hazard controls:

- Meetings – Crew, Region, Pre-Job, and Tailgate meetings.
- Tailgate Meeting/Hazard Assessment Form – designed to **assist** in identifying and prioritizing worksite hazards and controls. Once a hazard is identified on the Form, the steps to control the hazard (that is, “controls”) must be identified, discussed, and implemented.
- Workplace Hazard/Near Miss Form – designed to communicate substandard conditions, uncontrolled workplace hazards, and near miss incidents, as well as the anticipated potential for injury/damage and suggestions for corrective action.
- Observation Cards – designed as an easily accessible short form document to communicate safe observations, substandard conditions, uncontrolled workplace hazards, and near miss incidents, as well as the anticipated potential for injury/damage and suggestions for corrective action.
- Task Hazard Assessment – contains an assessment of all **routine** tasks performed by KMC field personnel. Employees are involved in creating the initial assessment as well as in updating it. This process provides an opportunity for employees to identify additional hazards and recommend additional hazard controls. For instance, employees identified the task of going below floor grating (a confined space) to take atmospheric readings, and made a recommendation to move instruments above grade to avoid entering a confined space. This recommendation was then implemented. Task Hazard Assessments for each District are located in E: Manuals.
- Job Hazard Assessment – Job Hazard Assessment (JHA) is a term used interchangeably with Job Hazard Analysis, Job Safety Analysis, Risk Assessment, and Critical Task Analysis. The methodologies are similar or identical and regardless of the term, the objective is to perform a systematic review of tasks in order to identify and control hazards before work begins. There are three templates that are often used for conducting JHAs.

- Tailgate Meeting/Hazard Assessment: A form used to identify if the scope of work involves hazards such as pinch points, and so forth. It allows the person completing the form to list controls for each identified hazard.
  - Safe Work Permit: A simple table used to assess hazards and controls associated with small jobs. It is limited in scope and does not serve the pre-job planning needs of larger jobs.
  - Job Hazard Assessment Template: A comprehensive document that is used for projects that are complex, unusual, difficult, or that require the interaction of many people or systems. This type of JHA should be initiated by the person responsible for the work and should be developed by the people who are responsible for planning, supporting and performing the work. The template is located in the Environment, Health and Safety (EHS) – Forms section of the KMC website.
  - Note: Contractors may use their own JHA templates. These are acceptable for use as long as the stakeholders have reviewed the information and are in agreement with the tasks, hazards, controls and responsibilities associated with the work.
- Benefits of completing a JHA include the identification of job steps along with the associated hazards and having stakeholders in agreement with the means to control each hazard. It also allows for the proper controls to be in place when the job starts.

If a JHA has been completed in the past for the same job and it is practical to use the existing document, every job step, hazard, and control must be reviewed and updated where required.

### 3.1.2 Inventory of Potential Hazardous Materials

The inventory of potential hazardous materials located at the WMT is outlined below:

- Benzene
- N- Butane, Iso-Butane
- Carbon Monoxide
- Crude Oil
- Chlorine
- Diesel, Kerosene, Heating and Fuel Oil (1, 2)
- Ethane
- Ethane – Propane Mix
- Ethylene
- Gas Oil
- Gasoline (Leaded Regular, Regular Unleaded, Premium Unleaded, Silver Lead-Free, Ultimate Lead-Free (Premium))
- Hydrogen Sulfide
- Hydrogen
- Jet Fuel (A), Jet Fuel (JP-4), Jet Fuel (JP-5)
- Liquid Petroleum Gas
- Methanol
- Methyl Tertiary Butyl Ether (MTBE)
- Natural Gas
- Natural Gas Liquids, Natural Gasoline
- Nitrogen
- Propane
- Triethylene Glycol
- Xylene

### 3.1.3 Relevant MSDS/SDS

Copies of relevant MSDS, which are now called Safety Data Sheets (SDS) are located in Appendix A.

### 3.1.4 Standards

Standards applicable to all staff include:

- Washing hands immediately after any activity or after removing gloves, whether there was skin contact or not (spray balms can be used in field locations).
- No eating, drinking, or storing food in work areas.
- Avoid personal habits such as nail-biting or eye/nose rubbing, as they are methods of ingestion and skin contact.
- If performing high risk work (such as, cleaning a tank), workers are to shower following their shift (on company time).

Specific responsibilities related to hazardous identification and control are outlined in Table 3-1.

**Table 3-1. Hazard Identification and Control Responsibilities**

<b>Department/Role</b>	<b>Responsibility</b>
EHS Department	Ensure that the Task Hazard Assessment is updated at least every 3 years.
Project Managers	<p>Ensure that a hazard assessment is scheduled and completed prior to construction or maintenance activities. The form used will be determined by the project manager.</p> <p>Involve contractors and employee representatives affected by the work in the hazard assessment.</p> <p>Ensure that the completed hazard assessment is provided to the site representative for reference and review with workers.</p>
Supervisors	<p>Ensure that employees and contractors are aware of identified workplace hazards.</p> <p>Ensure that the appropriate control methods are implemented.</p>
Field Personnel	<p>Identify workplace hazards and controls.</p> <p>Update hazard assessments:</p> <ul style="list-style-type: none"> <li>• At reasonably practical intervals to prevent the development of unsafe or unhealthy working conditions.</li> <li>• When a new work process is introduced.</li> <li>• When a work process or operation changes (new process, materials or chemicals, or piece of equipment).</li> </ul> <p>Report uncontrolled hazards, substandard conditions, and near misses using the Workplace Hazard/Near Miss form or Observation Card, and forward the completed form to the KMC EHS Department.</p> <p>Ensure personnel participate in the required field safety training as part of the KEEP Canada Training Program.</p>
Housekeeping and Maintenance	<p>Decontaminate work surfaces/wipe up spills as they occur.</p> <p>Do not use compressed air to clean clothing or remove dust from clothing.</p> <p>Dispose of soiled materials appropriately.</p> <p>Follow a regular cleaning schedule for shop areas, and so forth.</p>

## 3.2 Applicable Regulations

KMC operates pipeline facilities in Alberta, British Columbia, and Washington State.

In Canada, most waste management regulations fall under provincial jurisdiction.

Canadian federal waste management regulations typically apply to the transportation of dangerous goods and wastes that have the potential to impact federal lands and waters (that is, national parks, Aboriginal land, rivers, and lakes).

All removed materials will be transported to an approved facility for disposal on land.

The following information on Canadian and federal regulations is intended to identify which regulations apply to waste management at KMC and how compliance with these regulations can be achieved.

### 3.2.1 Canadian Federal Regulations

#### 3.2.1.1 National Energy Board

The NEB has regulatory authority over KMC's Trans Mountain pipeline system.

Since the NEB does not have specific waste management regulations, KMC facilities licensed by the NEB adhere to provincial waste management requirements (Alberta Environment and Sustainable Resource Development and British Columbia Ministry of Environment [BC MoE]).

According to Section 46 of the NEB's Onshore Pipeline Regulations 1999, companies must establish training programs for employees who are responsible for environmental practice and procedures in the daily operations of the pipeline.

According to Section 48 of the NEB's Onshore Pipeline Regulations 1999, an Environmental Protection Program must be in place to define the responsibilities, practices, procedures, processes, and resources for achieving, reviewing, and maintaining KMC's environmental performance.

#### 3.2.1.2 Transportation of Dangerous Goods

All wastes generated in Canada that are defined as dangerous goods must be transported in accordance with the requirements of the federal Transportation of Dangerous Goods (TDG) Regulations.

Primary requirements of the TDG Regulations focus on the type of packaging or containers that the waste is transported in, identifying markings/labels, and shipping documents.

There is no requirement to use a particular shipping document template for the transport of dangerous goods. However, information contained in the shipping document must adhere to the TDG shipping document content requirements.

### 3.2.2 Province of British Columbia Regulations

#### 3.2.2.1 BC Ministry of Environment

The BC MoE is the provincial regulatory agency that has jurisdiction over the handling and disposal of wastes generated from the BC portion of KMC's Trans Mountain Pipeline.

The *Environmental Management Act* Hazardous Waste Regulation is the BC MoE's primary piece of legislation regarding waste. In addition, they have issued a Hazardous Waste Legislation Guide to provide further guidance on hazardous waste management in BC.

Regulated wastes must be sent to government-licensed waste disposal facilities within or outside of BC.

The BC MoE has a designated movement document/waste manifest for the shipment of regulated wastes generated in BC.

Wastes generated from KMC's Albreda and Rearguard locations in BC are transported to Alberta for waste disposal. As a result, a federal waste manifest is required due to trans-provincial boundary waste shipment. The BC MoE's movement document/waste manifest adheres to the federal manifest information requirements so it can be used for Albreda and Rearguard waste transport into Alberta.

KMC is registered with the province as a generator of hazardous waste and has several provincial generator numbers. These include:

- BCG55211 (Rearguard, Albreda, Chappell, Blue River, Finn, McMurphy and Blackpool)
- BCG55210 (Darfield, Kamloops, Stump, Merritt, Kingsvale and Juliet)
- BCG46172 (Hope, Sumas Station, and Wahleach)
- BCG11175 (Burnaby, Westridge, Port Kells, and Airport)

# References

Alberta OHS Code, Part 2 “Hazard Assessment, Elimination and Control”.

British Columbia Ministry of Environment (BC MOE). Hazardous Waste Regulation.

British Columbia Ministry of Environment (BC MOE). 2016. Hazardous Waste Legislation Guide. October 2016. [http://www2.gov.bc.ca/assets/gov/environment/waste-management/hazardous-waste/hazardous-waste/legsregs/haz\\_waste\\_leg\\_guide.pdf](http://www2.gov.bc.ca/assets/gov/environment/waste-management/hazardous-waste/hazardous-waste/legsregs/haz_waste_leg_guide.pdf).

British Columbia Occupational Health and Safety Regulation, Part 3 Division 3 “General Duties of Employers, Workers and Others”; Part 4.13-4.17 “Emergency Preparedness and Response”.

Environment Canada, Interprovincial Movement of Hazardous Waste Regulations.

National Energy Board, Onshore Pipeline Regulations, 1999.

Plog, Barbara A. 2002. National Safety Council Fundamentals of Industrial Hygiene, 5th edition.

Transport Canada, Transportation of Dangerous Goods Regulations.

Appendix A  
Material Safety Data Sheets

## THE PIPELINE GROUP<sup>®</sup>

### DISCLAIMER

The fact sheets contained in this Emergency Response manual are a compilation of information from various MSDS sources. The material herein and the information it contains is offered to you in good faith and is believed to be accurate. We have reviewed each sheet which we received from sources outside our company and believe the data to be correct; however, we cannot guarantee its accuracy or completeness. Health and safety precautions in this data may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this information for reference purposes. **No warranty is made, either express or implied.**

# BENZENE

## Chemical Names:

Benzene, Benzol, Annulene, Cyclohexatriene, Phenyl Hydride, Phene, Pyrobenzol, "Coal Tar Naphtha"

## Chemical Family:

Aromatic Hydrocarbon

## Components - May Contain Variable Amounts of:

N/A - usually contains 99% Benzene

## Extinguishing Media:

Foam, dry chemical, Carbon Dioxide (CO<sub>2</sub>). Water spray/fog can cool the fire but may not achieve extinguishment. Do not use a direct stream of water since product will float and can be re-ignited on surface of water.

## Special Fire Fighting Procedures and Precautions:

Do not enter fire area without proper protective equipment including a positive pressure NIOSH approved self-contained breathing apparatus. Fight fire from safe distance and location. Heat may build pressure/rupture closed containers, spreading fire, increasing risk of burns/injuries. Apply waterspray/fog to cool containers. Do not use a solid water stream. Notify authorities if liquid enters sewers or public waters. Unignited vapors are extremely hazardous to health. **A concentration of 2000 PPM in air is immediately dangerous to life/health.**

## Unusual Fire and Explosion Hazards:

**EXTREMELY FLAMMABLE!** This material releases vapors at or below ambient temperatures. When mixed with air in certain proportions and exposed to an ignition source, these vapors can burn in the open or explode in confined spaces. Being heavier than air, flammable vapors may travel long distances along the ground before reaching a point of ignition and flashing back.

## Health Hazards:

Liquid and vapors are irritating to the eye and skin. Repeated or prolonged skin contact may result in absorption producing symptoms similar to inhalation exposure. Short-term exposure to high levels of vapors may cause CNS depression (headache, nausea, drowsiness, vertigo, fatigue, unconsciousness, convulsions), in extreme cases death may result from asphyxiation. Ingestion of product may result in vomiting; breathing of vomitus into the lungs may result in chemical pneumonia. **Benzene is a known carcinogen.**

# n- BUTANE, ISO-BUTANE

## Chemical Names:

### n-Butane:

"Normal" Butane  
Butyl Hydride  
LP Gas  
LPG  
Liquified Butane

### Iso-Butane:

2-Methylpropane  
Trimethyl Methane  
"Iso"

## Chemical Family:

Petroleum Hydrocarbon, Aliphatic Hydrocarbon, Alkane, Paraffin

## Components - May Contain Variable Amounts of:

Butane: n-Butane, Iso-Butane, Propane, Butylenes, Pentane and heavier Hydrocarbons  
Iso-Butane: Iso-Butane, n-Butane, Propane, Butylenes

## Extinguishing Media:

Water spray, dry chemical, CO<sub>2</sub> (Carbon Dioxide), halogenated extinguishing agent.

## Special Fire Fighting Procedures and Precautions:

**EXTREMELY FLAMMABLE!** Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus, shut off source, if possible. Water fog or spray may be used to cool exposed equipment and containers. Allow fire to burn until gas flow is shut off, if possible.

## Fire and Explosion Hazards:

Butanes give off vapors that are heavier than air which can travel considerable distances to a source of ignition and flashback. Extinguishment of fire before source of vapor is shut off can create an explosive mixture in air. Extremely flammable vapor/air mixtures form. May be explosive if allowed to enter into drains or sewers.

## Health Hazards:

Direct eye or skin contact with liquified gas can result in skin/eye burns (frostbite). Inhalation of butanes at high concentrations (10,000 ppm) may cause drowsiness, anesthesia and mild intoxication. Higher concentration (over 10,000 ppm) may cause loss of consciousness, asphyxiation and death.

# CARBON MONOXIDE

## Chemical Names:

Carbon Monoxide  
Carbon Oxide  
UN 1016  
CO  
MGI04290  
RTECS FG3500000

## Chemical Family:

Inorganic  
Gas

## Components - May Contain Variable Amounts of:

Carbon Monoxide

## Extinguishing Media:

This material is a severe explosion hazard. Vapor/air mixtures are explosive. Extinguish using carbon dioxide or regular dry chemical. For large fires use regular foam or flood with fine water spray.

## Special Fire Fighting Procedures and Precautions:

Move containers from fire area if without risk, or cool containers with water spray well after the fire is out. Stay away from ends of tanks. For fires in cargo or storage areas: 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.

## Health Hazards:

Short term inhalation causes changes in body temperature, changes in blood pressure, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, drowsiness, dizziness, hallucinations, hearing loss, eye damage, suffocation, convulsions, & coma. Long term is the same as above and causes loss of appetite, heart damage, nerve damage, birth defects, & brain damage.

# CHLORINE

## Chemical Names:

Chlorine  
Cl<sub>2</sub>

## Flash Point:

Non-Flammable

## Extinguishing Media:

Not Applicable.

## Special Fire Fighting Procedures and Precautions:

Firefighters must wear NIOSH approved, pressure demand, self-contained breathing apparatus with full face piece for possible exposure to hazardous gases. Chlorine containers should be immediately removed from the vicinity of a fire. If they cannot spray with water to cool containers. Do not spray water on leaking containers. Chlorine will support combustion, and it reacts readily with hydrocarbons, alcohols, ethers and some metals, possibly with explosive violence. It will react with (burn) steel containers at temperatures above 450° F.

## Health Hazards:

**Inhalation:** Immediately remove the exposed person upwind from contaminated area, and contact poison control center. Inhalation can cause coughing, sneezing, shortness of breath, sensation of tightness in the chest, as well as severe restlessness or anxiety, nausea, and vomiting. The nose and throat may become irritated; a stinging and burning sensation may be experienced. Immediate fatalities can occur as a result of suffocation. Delayed fatalities can occur as a result of pulmonary edema (fluid in the lungs). For this reason, rest and immediate attention after inhalation is important. Persons with known cardiovascular or lung problems should not risk chlorine exposure. If breathing has stopped, give artificial respiration; if breathing is difficult, give oxygen if equipment and trained personnel are available. If exposed person is breathing, place in a comfortable position and keep person warm and at rest until medical assistance becomes available.

**Eye/Skin Contact:** Liquid and concentrated gas could produce severe burns and injury on contact. **Eye:** Pour a gentle stream of warm water through the affected eye for at least 15 minutes. Contact poison control center, emergency room or physician right away as further treatment will be necessary. **Skin:** Run a gentle stream of water over the affected area for 15 minutes. A mild soap may be used if available. Contact poison control center, emergency room or physician right away as further treatment will be necessary.

**Chronic:** Repeated exposures can result in a loss of ability to detect the odor of chlorine. Long term exposures may cause damage to teeth and inflammation of ulceration of the nasal passages

**Ingestion:** Not applicable for gas. Liquid could produce severe burns and injury on contact.

# CRUDE OIL

## Chemical Names:

Crude Oil - "Sour" (**Contains H<sub>2</sub>S, please see Hydrogen Sulfide fact sheet**)

Crude Oil - "Sweet" (No H<sub>2</sub>S)

Petroleum, Mineral Oil, Rock Oil, Coal Oil, Seneca Oil, Earth Oil

## Chemical Family:

Petroleum Hydrocarbon Mixture: Chiefly of Paraffins (Alkanes), Cycloparaffins, Cyclic Aromatic Hydrocarbons, Benzene Hydrocarbons, Inorganic Compounds

## Components - May Contain Variable Amounts of:

Hydrocarbons (Aromatic & Paraffinic), Benzene, Hydrogen Sulfide, Nitrogen Compounds, Sulfur Compounds, Oxygenated Compounds

## Extinguishing Media:

Use water fog, foam, dry chemical or CO<sub>2</sub>. Do not use a direct stream of water. Product will float and can be re-ignited on surface of water.

## Special Fire Fighting Procedures and Precautions:

**EXTREMELY FLAMMABLE!!** Clear fire area of unprotected personnel. Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure NIOSH approved self-contained breathing apparatus. Cool fire exposed containers with water.

## Unusual Fire and Explosion Hazards:

Containers exposed to intense heat from fires should be cooled with water to prevent vapor pressure buildup/rupture. Sulfur oxides and hydrogen sulfide, both of which are toxic, may be released upon combustion. Product gives off vapors that are heavier than air, which can travel considerable distances to a source of ignition and cause flash fires. Runoff to sewer may cause a fire or explosion hazard.

## Health Hazards:

**"SOUR" crude oil contains H<sub>2</sub>S and poses an extreme hazard. Please see fact sheet on H<sub>2</sub>S.** Crude oil is moderately irritating to the skin and eyes. Natural gas, H<sub>2</sub>S and other hazardous vapors may evolve and collect in enclosed spaces, resulting in unconsciousness and death. Harmful or fatal if swallowed! Aspiration into the lungs from vomiting can cause chemical pneumonia. Inhalation of other light hydrocarbons may cause pulmonary irritation and result in CNS depression. **Benzene is a known carcinogen.**

# DIESEL, KEROSENE, HEATING & FUEL OIL (1, 2)

## Chemical Names:

Diesel Oil 1 & 2, Kerosene 1 & 2, Fuel Oil 1 & 2, Heating Oil 1 & 2

## Chemical Family:

Petroleum Hydrocarbons, Paraffins (Alkanes), Aromatic Hydrocarbons

## Components - May Contain Variable Amounts of:

Petroleum distillate (Predominately Hydrocarbons ranging from C10 -C16)

Naphthalene

Xylene

## Extinguishing Media:

Use water fog, foam, dry chemical or CO<sub>2</sub>. Do not use a direct stream of water. Product will float and can be reignited on surface of water.

## Special Fire Fighting Procedures and Precautions:

**HIGHLY COMBUSTIBLE!** Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure NIOSH approved self-contained breathing apparatus. Cool fire exposed containers with water. In the case of large fires, also cool surrounding equipment and structures with water.

## Unusual Fire and Explosion Hazards:

When heated above the flash point, this material will release flammable vapors which if exposed to an ignition source can burn in the open or be explosive in confined spaces. Mists or sprays may be flammable at temperatures below the normal flash point (130 F). Avoid contact with strong acids, alkalies and oxidizers such as liquid chlorine and oxygen.

## Health Hazards:

Liquid is moderately irritating to eyes/skin. Release during high pressure may result in injection of oil into the skin causing local necrosis. Inhalation of vapors or mist may cause mild irritation to the upper respiratory tract. High concentration may result in CNS depression, headache, dizziness and nausea. In extreme cases, unconsciousness and death may occur. Inhalation of high levels of mist may result in chemical pneumonitis. Ingestion of product may result in vomiting; aspiration (breathing) of vomitus into the lung must be avoided as even small quantities may result in aspiration pneumonitis, evidenced by coughing, labored breathing and cyanosis (bluish skin). In severe cases, death may occur.

# ETHANE

## Chemical Names:

Ethane, Bimethyl, Dimethyl, Methyl Methane, Ethyl Hydride

## Chemical Family:

Petroleum Hydrocarbon, Aliphatic Hydrocarbon, Paraffin, Alkane

## Components - May Contain Variable Amounts of:

Ethane	
Methane	Carbon Dioxide
Propane	Propylene
Ethylene	Iso-Butane
n-Butane	Higher Hydrocarbons

## Extinguishing Media:

Dry chemical, CO<sub>2</sub> (Carbon Dioxide), inert gas, Halon/N<sub>2</sub>. Water fog and spray can be used to cool containers and structures adjacent to the fire.

## Special Fire Fighting Procedures and Precautions:

**EXTREMELY FLAMMABLE!** Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus, shut off source, if possible. Water fog or spray may be used to cool exposed equipment and containers. Allow fire to burn until gas flow is shut off, if possible.

## Fire and Explosion Hazards:

Vapors form from this product and may travel or be moved by air currents and ignited by pilot lights, other flames, sparks, heaters, electrical equipment, static discharges or other ignition sources at locations distant from product handling point. Ethane vapors may settle in low or confined areas, or travel a long distance to an ignition source and flash back explosively. Alkane/Chlorine gas mixtures have produced explosions.

## Health Hazards:

Gas is generally non-irritating; but direct contact with liquified/pressurized gas or frost particles may produce severe and possible permanent eye/skin damage from freeze burns. Ethane vapor displaces oxygen, producing immediately hazardous atmospheres which can lead to rapid breathing, headache, dizziness, visual disturbances, muscular weakness, tremors, narcosis, unconsciousness and death from asphyxiation, depending on concentration and duration of exposure. **Ethane is an odorless, colorless gas - do NOT depend on sense of smell for warning of hazardous concentrations.**

# ETHANE - PROPANE MIX

## Chemical Names:

Ethane - Propane Mix, LP Gas, LPG, Liquefied Petroleum Gas

Ethane: Bimethyl, Dimethyl, Methyl Methane, Ethyl Hydride

Propane: Propyl Hydride, Dimethyl Methane

## Chemical Family:

Petroleum Hydrocarbons, Paraffins, Alkanes

## Components - May Contain Variable Amounts of:

Ethane

Propane

Possibly: Methane, Iso Butane, n-Butane, Propylene and higher hydrocarbons.

## Extinguishing Media:

Dry chemical, foam, or carbon dioxide (CO<sub>2</sub>). Stop flow of gas.

## Special Fire Fighting Procedures and Precautions:

Gas fires should not be extinguished unless the gas flow can be stopped immediately. Shut off gas source and allow the fire to burn itself out. If the source cannot be shut off immediately, all equipment and surfaces exposed to the fire should be cooled with water to prevent over-heating, flash-backs or explosions. Fireman must use proper protective equipment including NIOSH/MSHA approved self-contained breathing apparatus and other protective equipment including respiratory apparatus to protect against hazardous combustion products/oxygen deficiencies.

## Fire and Explosion Hazards:

**EXTREMELY FLAMMABLE!!** Carbon oxides are formed when burned. Highly flammable vapors are formed and may travel or be moved by air currents and ignited by pilot lights, other flames, sparks, heaters, electrical equipment, static charges or other ignition sources at locations distant from product handling point. Vapors may settle in low or confined areas, or travel a long distance to an ignition source and flash back explosively.

## Health Hazards:

Solid and liquid forms of this material and pressurized gas may cause freeze burns to skin/eyes. Exposure to high concentrations may produce rapid breathing, headache, dizziness, visual disturbances, muscular weakness, tremor, narcosis, unconsciousness and death by asphyxiation.

# ETHYLENE

## Chemical Names:

Ethylene  
Ethene  
Elayl  
Etherine

## Chemical Family:

Petroleum Hydrocarbon, Olefin, Alkene

## Components - May Contain Variable Amounts of:

Ethylene  
Ethane  
Methane

## Extinguishing Media:

Carbon Dioxide, dry chemical, foam or water spray.

## Special Fire Fighting Procedures and Precautions:

Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus, shut off source, if possible. Water fog or spray may be used to cool exposed equipment and containers. Allow fire to burn until gas flow is shut off, if possible.

## Fire and Explosion Hazards:

**EXTREMELY FLAMMABLE!** Material will readily ignite at ambient temperatures. High temperature, high pressure and contamination with other chemicals may cause vigorous polymerization and decomposition. Vapors heavier than air may accumulate, travel and reach a source of ignition causing flash fires.

## Health Hazards:

Contact with liquid gas may cause freeze burns to eyes and/or skin. High vapor concentrations may cause CNS depressions (headaches, dizziness, giddiness and nausea). Extremely high concentrations (confined spaces) may produce unconsciousness and death by asphyxiation.

# GAS OIL

## Chemical Names:

Vacuum Gas Oil Mix  
Vacuum Gas Oil Blend  
Cat Feed  
Cat Naphtha

## Chemical Family:

Petroleum Hydrocarbon Mix: Paraffins (Alkanes), Olefins (Alkenes), Aromatic Hydrocarbons

## Components - May Contain Variable Amounts of:

Heavy Petroleum Distillate (C5 to C10 Hydrocarbons)  
Light Naphtha (C5 & C6 paraffins & cycloparaffins)  
Pour Point Remover - N/A

## Extinguishing Media:

Foam, CO<sub>2</sub>, water spray and dry chemical. Use water spray to keep fire exposed containers cool.

## Special Fire Fighting Procedures and Precautions:

**COMBUSTIBLE LIQUID!** Do not enter fire area without proper protection. Wear SCBA with full face-piece, operate in pressure demand or positive pressure. Use water spray to keep fire exposed containers cool. Do not use solid water stream. This may spread the fire. Carbon Monoxide may be formed if burned with insufficient air. Avoid contact with strong oxidizing agents.

## Fire and Explosion Hazards:

At ambient temperatures this product releases vapors. When these are mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Vapors may be heavier than air and travel long distances along ground before igniting, then flashing back to vapor source.

## Health Hazards:

Material is slight to moderately irritating to the eyes and skin. Practically non-toxic when ingested; however, a pulmonary aspiration hazard exists if swallowed and vomiting occurs. Inhalation may cause muscular weakness, impaired coordination, headache, nausea, respiratory irritation, loss of balance with high vapor concentrations leading to possible unconsciousness and/or respiratory failure.

# GASOLINE

## (\*LEADED REGULAR, REGULAR UNLEADED, PREMIUM UNLEADED, SILVER LEAD-FREE, ULTIMATE LEAD-FREE (PREMIUM))

Chemical Names: Gasoline, Petrol, Petroleum Naphtha, Light Petroleum Distillate, Benzin

Chemical Family: Petroleum Hydrocarbon Mix: Paraffins (Alkanes), Olefins (Alkenes), Cycloalkanes, Aromatic Hydrocarbons, Naphthenes, Alcohols and Ethers

Components - May Contain Variable Amounts of:

Alkanes	n-Hexane
Cycloalkanes	t-Butyl Methyl Ether
Alkenes	Pseudocumene (1,2,4 - Trimethylbenzene)
Aromatic Hydrocarbons	Cyclohexane
Xylenes (ortho, meta & para)	Ethylbenzene
Toluene	Naphthalene
Benzene	*Contains lead

Extinguishing Media:

Use water fog, foam, dry chemical or CO<sub>2</sub>. Do not use a direct stream of water. Product will float and can be re-ignited on surface of water.

Special Fire Fighting Procedures and Precautions:

**DANGER! EXTREMELY FLAMMABLE!** Clear fire area of unprotected personnel and isolate. Do not enter confined fire space without full bunker gear including a positive pressure NIOSH/MSHA approved self-contained breathing apparatus. Cool fire exposed containers with water. Extinguishment of fire before source of vapor is shut off can create an explosive mixture in air.

Unusual Fire and Explosion Hazards:

Vapors may settle in low or confined areas, or travel a long distance to an ignition source and flash back explosively. In emergency situations that require drilling, only trained emergency personnel should drill.

Health Hazards:

Excessive exposure to vapors may produce headaches, dizziness, nausea, drowsiness, irritation of eyes, nose, throat and CNS depression. Ingestion of product may result in vomiting; aspiration (breathing) of vomitus into the lungs must be avoided as even small amounts can cause chemical pneumonia and/or death. **Benzene is a known carcinogen.**

# **HYDROGEN SULFIDE (H<sub>2</sub>S)**

## Chemical Names:

Hydrogen Sulfide, Hydrosulfuric Acid, "Sour Gas"

## Chemical Family:

Inorganic Acid Gas (Poisonous), Nonmetal Hydride

## Extinguishing Media for H<sub>2</sub>S fires:

Water spray, fog or regular foam. Small fires: let burn unless leak can be stopped immediately. Cool containers, surrounding equipment and structures with water.

## Special Fire Fighting Procedures and Precautions:

**EXTREMELY FLAMMABLE & POISONOUS! WEAR FULL PROTECTIVE CLOTHING INCLUDING NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS.**

## Unusual Fire and Explosion Hazards:

H<sub>2</sub>S vapor can travel considerable distances to a source of ignition and flash back explosively. Gives off corrosive and poisonous oxides of sulfur (SO<sub>2</sub>, SO<sub>3</sub>) upon combustion.

## Health Hazards :

**Extremely hazardous gas!** Do NOT depend on sense of smell for warning - H<sub>2</sub>S causes rapid deterioration of sense of smell.

0.02 ppm - Odor threshold

10.0 ppm - Eye irritation

100 ppm - Headache, dizziness, vomiting, coughing.

200 to 300 ppm - Eye inflammation, respiratory tract irritation after 1 hour exposure.

500 to 700 ppm - Loss of consciousness or possible death in 30 minutes to an hour.

700 to 900 ppm - Rapid loss of consciousness; death can result.

Over 1000 ppm - Unconsciousness in seconds; death in minutes unless victim is removed from contaminated area and breathing is restored.

# HYDROGEN

## Chemical Names:

Hydrogen, Protium

## Chemical Family:

Hydrogen Gas (Impure Hydrogen gas contains Hydrocarbons)

## Components - May Contain Variable Amounts of:

Hydrogen  
Methane  
Ethane  
Propane  
Butane

## Extinguishing Media:

Stop flow of gas if possible: if not, allow to burn. Dry chemical, CO<sub>2</sub> (Carbon Dioxide) or Halogenated extinguishing agents.

## Special Fire Fighting Procedures and Precautions:

**EXTREMELY FLAMMABLE!** Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus. Water fog or spray may be used to cool exposed equipment and containers. Allow fire to burn until gas flow is shut off, if possible.

## Fire and Explosion Hazards:

This gas releases flammable vapors at well below ambient temperatures and readily forms flammable mixtures with air. Exposed to an ignition source, it will burn in the open or be explosive in confined spaces. High pressure release to the atmosphere may cause spontaneous ignition. This product may burn with a practically invisible flame.

## Health Hazards:

Exposure to liquid or cryogenic gas vapor may cause freeze burns to skin and/or eyes. Inhalation of vapor may produce mild intoxication, drowsiness, rapid breathing, headache, dizziness, visual disturbances, muscular weakness, tremors and loss of coordination. High concentrations produce intoxication followed by a loss of consciousness, asphyxiation and death. **Do NOT depend on sense of smell for warning of high concentrations as Hydrogen is odorless, colorless and tasteless.**

# JET FUEL (A), JET FUEL (JP-4), JET FUEL (JP-5)

Chemical Names: Kerosene Mix

Chemical Family: Petroleum Hydrocarbon Mix: Alkanes, Alkenes, Aromatic HC's, Naphthenes

Components - May Contain Variable Amounts of:

<u>Jet Fuel (A)</u>	<u>Jet Fuel (JP-4)</u>	<u>Jet Fuel (JP-5)</u>
Kerosene	Kerosene	Kerosene
Naphthalene	Hydrotreated Naphtha (Heavy)	Naphthalene
Xylene	Naphtha (Light)	Xylene
Bicyclic & Tricyclic-Hydrocarbons	Minor Additives	Minor Additives
	Benzene	Glycol Ethers

Extinguishing Media:

Use water fog, foam, dry chemical or CO<sub>2</sub>. Do not use a direct stream of water. Product will float and can be re-ignited on surface of water.

Special Fire Fighting Procedures and Precautions:

**CAUTION - COMBUSTIBLE!** Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure NIOSH approved self-contained breathing apparatus. Cool fire exposed containers with water. In the case of large fires, also cool surrounding equipment and structures with water.

Unusual Fire and Explosion Hazards:

Containers exposed to intense heat from fires should be cooled with water to prevent vapor pressure buildup which could result in container rupture. Container areas exposed to direct flame contact should be cooled with large quantities of water as needed to prevent weakening of container structure. Surfaces that are sufficiently hot may ignite even liquid product in the absence of sparks or flame. Vapors may accumulate and travel to distant ignition sources and flash back explosively. Do not cut, drill, grind, weld or perform similar operations near containers. Burning causes Carbon Monoxide/Dioxide and other harmful products to be formed.

Health Hazards:

Liquid is moderately irritating to eyes/skin. Inhalation of vapors or mist may cause mild irritation to the upper respiratory tract; high concentrations may result in CNS depression, headache, dizziness and nausea. Inhalation of high levels of mist may result in chemical pneumonitis. Ingestion of product may result in vomiting; aspiration (breathing) of vomitus into the lung must be avoided as even small quantities may result in aspiration pneumonitis, evidenced by coughing, labored breathing and cyanosis (bluish skin). In severe cases, death may occur. **Benzene is a known carcinogen.**

# LIQUID PETROLEUM GAS

## Chemical Name:

Liquified Petroleum Gas, LP Gas, LPG, Y-Grade, Demethanized Gasoline, "Raw Feed", Demethanized "Raw Feed Mix"

## Chemical Family:

Petroleum Hydrocarbon Mix: Aliphatic Hydrocarbons, Paraffins (Alkanes), Cycloparaffins, Aromatic Hydrocarbons

## Components - May Contain Variable Amounts of:

Complex combination consisting primarily of saturated aliphatic hydrocarbons ranging from C1 to C12

Benzene, Cyclohexane, Xylene, Toluene

## Extinguishing Media:

Dry chemical, foam, or carbon dioxide (CO<sub>2</sub>). Stop flow of gas as soon as possible.

## Special Fire Fighting Procedures and Precautions:

**EXTREMELY FLAMMABLE!** Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus, shut off source, if possible. Water fog or spray may be used to cool exposed equipment and containers. Allow fire to burn until gas flow is shut off, if possible.

## Fire and Explosion Hazards:

Flames impinging on product storage vessels above the liquid level will cause sudden vessel failure in approximately 8 or more minutes, resulting in a BLEVE (Boiling Liquid Expansion Violent Explosion), unless surfaces are kept cooled with water. If this cannot be done, evacuate the area. Liquid product will change to vapor rapidly at well below ambient temperatures and readily forms flammable mixtures with air. If exposed to an ignition source, it will burn in the open or be explosive in confined spaces. The vapors are heavier than air and may travel long distances to a point of ignition and then flash explosively back. Vapors will seek low lying areas.

## Health Hazards:

Exposure to vapor may cause irritation to eyes, skin and respiratory system. Exposure to vapors may cause dizziness, disorientation, CNS depression or asphyxiation. Overexposure can cause loss of consciousness or death from asphyxiation or cardiac arrest. Exposure to liquid can cause frostbite and/or chemical burns. **Benzene is a known carcinogen.**

# METHANOL

## Chemical Names:

Methanol, Methyl Alcohol, Wood Alcohol, Carbinol, Methylol, Wood Spirit, Wood Naphtha, Columbia Spirit, Manhattan Spirits

## Chemical Family:

Aliphatic Alcohol

## Components - May Contain Variable Amounts of:

N/A - usually pure product

## Extinguishing Media:

Alcohol foam, dry chemical, CO<sub>2</sub> (Carbon Dioxide), Halon. Water spray may be used to cool the fire and surrounding equipment but may be ineffective to extinguish fire.

## Special Fire Fighting Procedures and Precautions:

**EXTREMELY FLAMMABLE!** Mixtures with water containing more than 21% volume of Methanol are flammable. Dike up fire control water for later disposal; do not scatter the material. Methanol fires may not be visible to the naked eye. Do not enter confined/enclosed fire space without proper protective equipment, including a NIOSH approved self-contained breathing apparatus. Water cool flame-exposed containers from the side until well after the fire is out. Evacuate immediately if there is a rising sound of venting safety devices or tank discolorization.

## Fire and Explosion Hazards:

Methanol releases vapors at or below ambient temperatures. When mixed with air in certain proportions and exposed to an ignition sources, these vapors can burn in the open or explode in confined spaces. Being heavier than air, flammable vapors may travel long distances along the ground before reaching a point of ignition and flashing back explosively.

## Health Hazards:

Poison - Class "B" **HARMFUL OR FATAL IF SWALLOWED OR ABSORBED THROUGH THE SKIN.** Ingestion of 1 to 4 ounces can cause irreversible injury to the nervous system, blindness or death. It cannot be made non-poisonous. Contact with liquid causes eye and respiratory system irritation and may cause skin irritation. Vapor inhalation or liquid penetration of the skin can cause CNS depression. Prolonged or repeated high inhalation exposure may cause optic nerve damage, pulmonary and/or cerebral edema, liver and/or kidney damage, coma, respiratory failure and death.

# METHYL TERTIARY BUTYL ETHER (MTBE)

## Chemical Names:

Methyl Tertiary Butyl Ether  
tert-Butyl Methyl Ether  
MTBE  
2-Methoxy-2-Methylpropane

## Chemical Family:

Alkyl Ether

## Components - May Contain Variable Amounts of:

N/A - Usually 97% pure product

## Extinguishing Media

Dry chemical, CO<sub>2</sub>, alcohol type foam. Use water fog/water spray for cooling.

## Fire and Explosion Hazards:

Releases flammable vapors below normal ambient temperatures. When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Flammable vapors may be heavier than air. May travel long distances along ground before igniting and flashing back explosively.

## Special Fire Fighting Procedures and Precautions:

**EXTREMELY FLAMMABLE!** Do not enter fire area without NIOSH/MSHA approved air-purifying or supplied air respirator. Burning may produce Carbon Monoxide and/or other toxic vapors. Water may be ineffective in firefighting due to low flash point. Notify authorities if liquid enters sewer/public waters.

## Health Hazards:

Slight irritant to eyes and/or skin. Prolonged inhalation may cause coughing, shortness of breath, dizziness and intoxication. If ingested in large quantities, possible slight health hazard. No skin absorption hazard found.

# NATURAL GAS

## Chemical Names:

Natural Gas, Methane, Marsh Gas, Well Head Gas, Fuel Gas, Lease Gas, **Sour Gas\***

## Chemical Family:

Petroleum Hydrocarbon Mix: Aliphatic Hydrocarbons (Alkanes), Aromatic Hydrocarbons, Inorganic Compounds

## Components - May Contain Variable Amounts of:

Methane	Iso-Hexane
Ethane	Heptanes
Propane	<b>Hydrogen Sulfide* (In "Sour" Gas)</b>
Iso-Butane	Carbon Dioxide
n-Butane	Nitrogen
Pentane	Benzene
Hexane	Octanes

## Extinguishing Media:

Class B Fire Extinguishing Media such as Halon, CO<sub>2</sub> or dry chemical. Fire fighting should be attempted only by those who are adequately trained.

## Special Fire Fighting Procedures and Precautions:

Stop the flow of gas and allow fire to burn out. Extinguishing the flame before shutting off the supply can cause the formation of explosive mixtures. In some cases it may be preferred to allow the flame to continue to burn. Keep the surrounding area cool with water spray and prevent further ignition of combustible material.

## Health Hazards:

**\*If H<sub>2</sub>S is present, an IMMEDIATE, EXTREME health hazard exists, please see Hydrogen Sulfide fact sheet.** Natural gas acts as an anesthetic at high concentrations (i.e. enclosed spaces causing displacement of oxygen), producing dizziness, headache, incoordination and narcosis; extremely high concentrations can cause asphyxiation by exclusion of oxygen. **Natural Gas may or may not contain Mercaptans to odorize, if it does not, natural gas is odorless, tasteless and colorless.** Benzene is a known carcinogen.

# NATURAL GAS LIQUIDS, NATURAL GASOLINE

Chemical Names: Natural Gas Liquids, Natural Gasoline, Casinghead Gasoline, Condensate, Drip Gas, "M" grade

Chemical Family: Petroleum Hydrocarbons, Aliphatic Hydrocarbons, Alkanes, Paraffins, Cycloparaffins, Aromatic Hydrocarbons

Components - May Contain Variable Amounts of:

Complex combination consisting primarily of saturated aliphatic hydrocarbons ranging from C4 to C12

Benzene, Cyclohexane, **Hydrogen Sulfide \***

Extinguishing Media:

Dry chemical, Halon, foam, CO<sub>2</sub>. Water spray of standard foam. Do not spray direct stream of water; water stream may splash flaming liquid.

Special Fire Fighting Procedures and Precautions:

Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus, shut off source, if possible. Water fog or spray may be used to cool exposed equipment and containers. Allow fire to burn until gas flow is shut off, if possible.

Fire and Explosion Hazards:

Flames impinging on product storage vessels above the liquid level will cause sudden vessel failure in approximately 8 or more minutes, resulting in a BLEVE (Boiling Liquid Expansion Violent Explosion), unless surfaces are kept cooled with water. If this cannot be done, evacuate the area. Liquid product will change to vapor rapidly at well below ambient temperatures and readily forms flammable mixtures with air. If exposed to an ignition source, it will burn in the open or be explosive in confined spaces. The vapors are heavier than air and may travel long distances to a point of ignition and then flash explosively back. Vapors will seek low lying areas.

Health Hazards:

**\*If H<sub>2</sub>S is present, an IMMEDIATE, EXTREME health hazard exists, please see Hydrogen Sulfide fact sheet.** Eye and skin irritation may result from contact with liquid or vapors. Inhalation may cause burning of the throat, nose and respiratory system, CNS depression (drowsiness, dizziness, coma) or even death, depending on the concentration and duration of exposure. Vapors may also act as a simple asphyxiant (displacement of oxygen). Ingestion can cause chemical pneumonia and pulmonary edema which can be fatal.

# NITROGEN

Chemical Names:

Nitrogen

Chemical Family:

Inert Gas

Components - May Contain Variable Amounts of:

N/A - usually pure product

Extinguishing Media:

Non Flammable

Special Fire Fighting Procedures and Precautions:

Non Flammable

Fire and Explosion Hazards:

None

Special Precautions:

Nitrogen is odorless and nontoxic, but may produce suffocation by diluting the concentration of oxygen in air below levels necessary to support life. Personnel, including rescue workers should not enter areas where the oxygen concentration is below 19%, unless provided with a self-contained breathing apparatus. **Caution: respirators will not function. Use may result in asphyxiation.**

Health Hazards:

Extensive tissue damage or freeze burns may result from exposure to liquid nitrogen or cold nitrogen vapors. Exposure to oxygen deficient atmospheres may produce dizziness, nausea, vomiting, loss of consciousness and death. Death may result from errors in judgment, confusion or loss of consciousness which prevents self-rescue. At low oxygen concentrations, unconsciousness and death may occur in seconds without warning. **Do NOT depend on sense of smell for high concentration warning - Nitrogen is odorless, colorless and tasteless.**

# PROPANE

## Chemical Names:

Propane, Propyl Hydride, Dimethylmethane, LP Gas, LPG, Liquefied Petroleum Gas, Commercial-Grade Liquefied Propane, "P-Rich Furnace Feed"

Chemical Family: Petroleum Hydrocarbon, Aliphatic Hydrocarbon, Paraffin, Alkane

## Components - May Contain Variable Amounts of:

Propane  
Propylene  
Butane  
Iso-Butane  
Ethane  
Ethyl Mercaptan  
Sulfur

## Extinguishing Media:

Dry chemical, foam, carbon dioxide (CO<sub>2</sub>), Halogenated extinguishing agent.

## Special Fire Fighting Procedures and Precautions:

**EXTREMELY FLAMMABLE!** Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus, shut off source, if possible. Water fog or spray may be used to cool exposed equipment and containers. Allow fire to burn until gas flow is shut off, if possible.

## Unusual Fire and Explosion Hazards:

This material releases flammable vapors at well below ambient temperature and will readily form flammable mixtures with air. Exposed to an ignition source, it will burn or be explosive in confined spaces. Its vapors are heavier than air and may travel long distances to an ignition source and then flash back explosively. Alkane and chlorine gas mixtures have produced explosions.

## Health Hazards:

Contact with liquefied gas may result in eye and/or skin freeze burns. Inhaling high vapor concentration may produce CNS depression evidenced by giddiness, headache, dizziness, visual disturbances, muscular weakness, tremors, drowsiness and nausea; in extreme cases, unconsciousness, asphyxiation and death may occur.

# TRIETHYLENE GLYCOL

## Chemical Names:

Diethylene Glycol  
Triethylene Glycol

## Extinguishing Media:

Water fog, alcohol resistant foam, CO<sub>2</sub>, dry chemical

## Fire Fighting Instructions:

No fire and explosion hazards expected under normal storage and handling conditions (e.i. ambient temperatures). However, triethylene glycol or solutions of triethylene glycol and water can form flammable vapors with air if heated sufficiently.

## Protective Equipment for Fire Fighters:

Wear positive pressure self-contained breathing apparatus. Use side shield safety glasses or mono goggles as minimum eye protection.

## Stability and Reactivity:

Chemical Stability: Will ignite in air at 700F.  
Conditions to Avoid: None known.  
Description: Colorless liquid. Slight odor.

## First Aid:

Flush eyes with plenty of water. Wash off skin in flowing water or shower. Induce vomiting if large amounts are ingested. Remove to fresh air if inhaled. Consult a physician.

## Health Hazards:

**EYE:** May cause slight transient (temporary) eye irritation. Mists may cause eye irritation.

**SKIN CONTACT:** Prolonged or repeated exposure may cause skin irritation. May cause more severe response if skin is abraded (scratched or cut).

**SKIN ABSORPTION:** A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Massive contact with damaged skin or of material sufficiently hot to burn skin may result in absorption of potentially lethal amounts.

**INGESTION:** Single dose oral toxicity is low. Ingestion of large amounts may cause injury.

**INHALATION:** At room temperature, vapors are minimal due to physical properties. Mists may cause irritation of upper respiratory tract.

# XYLENE

## Chemical Names:

Mixed Xylenes (limited Paraxylene content)  
Dimethylbenzene

## Chemical Family:

Aromatic Hydrocarbon

## Components - May Contain Variable Amounts Of:

Negligible - Chemical grade 99% pure product

## Extinguishing Media:

Foam, Dry Chemical, or Carbon Dioxide to extinguish fire. Use water spray to disperse the vapors and to keep containers and surroundings cool.

## Special Fire Fighting Procedures and Precautions:

Respiratory and eye protection required for fire fighting personnel. Avoid spraying water directly into storage containers due to danger of boilover.

## Fire and Explosion Hazards:

**FLAMMABLE LIQUID!** This material can release vapors that form flammable mixtures at temperatures at or above 81 degrees Fahrenheit. Xylene can accumulate static charges which can cause an incendiary electrical discharge. Empty containers or drums should be completely drained, properly bunged and promptly returned to a drum reconditioner, or properly disposed due to retaining product residue which could explode. Either the liquid or vapor may settle in low areas or travel some distance along the ground or surface to ignition sources where they may ignite or explode. Toxic gases will form upon combustion.

## Health Hazards:

Flammable, Harmful by inhalation and in contact with skin. Irritating to skin and eyes. Liquid may cause conjunctival irritation. Vapor at concentrations above 200 PPM will cause conjunctival irritation. Repeated and/or prolonged contact with skin may lead to dermatitis. Liquid may be absorbed through the skin but not in toxicologically significant amounts, unless the area of contact is large and exposure prolonged. Swallowing may have the following effects: irritation of mouth, throat, and digestive tract. A large dose may have the following effects: Central Nervous System depression. Aspiration during swallowing or vomiting may severely damage the lungs. Inhalation of vapor at concentrations of 200 PPM and above may have the following effects: irritation of nose, throat, and respiratory tract. Dizziness, coma, and death may occur at high concentrations.