OPERATIONAL HEALTH AND SAFETY PLAN

Marshall Area Oil Pipeline Release

Mile Post 608-630

Calhoun County, MI

—

PART 1 - GENERAL

1.01 Scope of Work

For the purposes of employee and contractor protection the following work categories have been developed:

Tasks:

- **Crude Oil Recovery (subtasks)**
  - Vacuum Truck Operations
  - Heavy Equipment Operations
  - Right of Way Work
  - Surface Water Recovery
- Pipeline Repair
- Observation/Documentation and Sampling related activity

The entire scope of work is located and maintained at the operations command center at 455 Leggitt Rd., Marshall, MI. An incident command organizational chart has been established and is being maintained at the Operations Command Center.

The following attachments provide additional contact, safety information, and Task Hazard Assessment.

1.02 Related Work

As appropriate

1.03 Applicable Standards

A. United States Department of Labor Publications
29 Code of Federal Regulations (CFR) Part 1910 Occupational Safety and Health
Standards for General Industry

29 CFR Part 1926 Occupational Safety and Health Regulations for Construction
49 CFR Part 195 Department of Transportation Pipeline and Hazardous Materials Safety

B. State and Local Publications
MIOSHA Regulations
MDEQ Regulations

C. Enbridge O&MPs
Book 1 – General Reference
Book 2 - Safety
Book 7 – Emergency Response / Region Specific / ERD

D. Contractor Safety Program
Safety and Environmental Guidelines for Contractors Handbook

1.04 Documentation

This Health and Safety Plan will be maintained in the Operations Command Center under the control of the incident commander and the safety officer.

A working copy shall be maintained in the Operations Command Center, these copies will be the working copies utilized in the field. The working copies will be signed by Enbridge employees and contractors during all on-site activities. Additionally, the Health and Safety Plan will be communicated to contractors during the contractor safety orientation so they may become familiar with the plan and site hazards.

PART 2 - PRODUCTS

MSDS (appendix A)
Heavy Crude Oil - Heavy Crude Oil/Diluent Mix – Christina Lake/Foster Creek

PART 3 - EXECUTION

3.01 Introduction

A. The plan purpose is to provide measures to prevent incidents and injuries to site workers from possible contamination that may be encountered during oil recovery activities. Any employee or contractor is responsible to stop any work that they believe places any worker in imminent danger. Surface contamination may be encountered in numerous areas under

assessment/recovery. The following information was completed by the Safety Officer:

B. Operational Dates: July 27, 2010 - TBD.

Incident Commanders:	Rich Adams – Day Shift; Tom Fridel – Night Shift
Office and Phone	Adams cell 218 269-1369; Fridel cell 219-793-5280
Site Owner:	Enbridge Energy, Inc.
Owner Phone	269-781-4434 office

The Incident Commanders shall discuss/delegate compliance with the Health and Safety Plan to all emergency response personnel who shall be working at the site(s) during assessment and recovery operations. All site workers shall sign the log (appendix B) to signify they understand the Health and Safety Plan through their management structure. Personnel shall not be allowed on-site until thoroughly briefed on anticipated hazards and any additional safety practices to be followed.

3.02 Potential Hazards

Some potential hazards that field personnel may be exposed to during field activities are chemical and physical. The potential chemical hazards at the site are petroleum vapors, hydrogen sulfide, benzene, and n-hexane. Exposure pathways to chemical hazards include skin contact, inhalation of vapors, and ingestion.

Potential physical hazards include excavation into buried utilities, contact with overhead power lines, all hazards associated with heavy equipment operations, vacuum trucks, and the recovery of contaminated soil, vegetation, and surface/groundwater. Additional physical hazards are manual lifting of booms and other containment equipment; slips, trips, and falls from uneven terrain; and fire.

Other hazards that employees and contractors may be exposed to at the site include heat stress; heat exhaustion, and heat stroke; hazards associated with

operating a motorized vehicle; and water hazards (i.e. drowning) associated with working adjacent to the river, including fast moving water.

A job task hazard assessment (appendix C) is developed to cover the overall job's hazards however, work site hazards will be identified with appropriate control measures documented and maintained on the field level hazard assessment/safe work permit at each site.

Cold work activities that do not agitate the crude oil may be exempt from FR clothing when accompanied by a hazard assessment.

3.03 Site Control

A. Only personnel with appropriate training may enter the hot work zones.

General Rules:

1. Contractors operating in the hot work zone that are recovering oil shall use caution tape/barricades/fencing, etc. to cordon off sufficient space around the work (minimum 50-feet from the last visible crude oil/free phase product) area to prevent unprotected or unauthorized personnel from entering the work area.
2. No eating, drinking, smoking, gum or tobacco chewing, or any other practice in the work area that increases the probability of hand-to-mouth transfer of contaminants. The site supervisor shall designate safe areas away from the work area where eating can be done. The entire site is designated a no smoking zone.
3. Hands shall be thoroughly washed upon leaving the work area and before eating, drinking, or any other non-working activity.
4. During recovery activities, on site workers shall act as the safety backup to each other.
5. Entrance and exit locations shall be designated and emergency escape routes away from the operations areas shall be delineated by the site supervisor. The following hand signals will be used where verbal communications cannot occur or are not practical:

Signal	Translation
Hand gripping throat	**Out of air/can't breath**
Grip partners wrist or both hands around waist	**Leave area immediately**
Hands on top of head	**Need assistance**

Thumbs up	**O.K., I'm all right, I understand**
Thumbs down	**No, negative**
Raised clenched fist	**Stop**

6. Potable water shall be available on-site for drinking and cleaning purposes.
7. There shall be at a minimum of two 30#, or four 20# ABC dry-chemical fire extinguisher on-site at each operational area.
8. All excavations (if needed) shall be in accordance with OSHA and all applicable regulations. These regulations include that workers shall not enter any excavation deeper than 4 feet, unless acceptable sloping, shoring, or other means of protection are provided. Open excavations deeper than 4 feet shall not be entered unless appropriate entry precautions are taken with trained staff.
9. Employees will not be permitted to work alone in a deemed "hot zone" or adjacent (within six feet) to water.
10. When employees will be working during the night light plants will be utilized to ensure the site is appropriately illuminated.

Personal Protective Equipment:

Based on the evaluation of potential hazards, the level of protection deemed appropriate for this site is general level D for all operations as follows (unless air monitoring dictates that PPE upgrades or ventilation are required):

- Hard Hat
- Safety Glasses
- Steel-Toed Boots
- Disposable suits (e.g. Tyvek)/booties, as needed
- Rubber or Latex Gloves, as needed

The level of protection may be upgraded if monitoring results or other indications of increased levels of contamination become evident during any phase of work. Work within the hot zone requires FR clothing. The hot zone is identified as 50 feet within the visible product. The hot zone may be extended based on air monitoring results.

Any items that come into contact with contaminants shall either be disposed of properly or thoroughly washed before reuse.

Working Near Water:
OSHA Construction Industry Standards (1926) state: “employees working over or near water, where the danger of drowning exists, shall be provided a Coast Guard-approved PFD (Personal Flotation Device).” An approved PFD will be required to be worn any time an employee is in a boat. A PFD may also be required at the discretion of the site supervisor when working adjacent to swift moving water, or when entering slow moving water above the waist during daylight hours.

When working at night, all employees working on or adjacent (within six feet) to water shall wear a Coast Guard- approved PFD.

Monitoring:
Ambient air monitoring will be provided on a continuous basis with a personal four gas monitor (LEL, H_2S, CO, O_2). Periodic samples with be performed with a PID, Drager CMS, or Ultra Rae devices in the breathing zone and area of the recovery workers for benzene. The results shall be documented on the gas test record form, daily or field reports, or through computer data retrievable (download) methods.

Personal samples will be taken in representative locations using both passive methods, 3M badges, and active methods, sampling pumps and charcoal tubes for 25 contaminants.

The acceptable level for work on this site under level D protection is 0.5 ppm for benzene.

Permissible exposure limits (PEL)

Petroleum vapors	Not Established (500 ppm reference petroleum distillates)	Ing, Resp, Flam, Cont
Hydrogen Sulfide	10 ppm	Inhalation
Benzene	1 ppm	Inhalation, ingestion, absorption
n-hexane	500 ppm	Inhalation, absorption

Should levels exceed the established PELs all personnel shall move upwind, stop work activities, and contact the site supervisor and safety officer in that specific recovery area.

Respiratory Protection:

A respiratory protection program will be followed as per OSHA regulations in 1910.134.

Medical Evaluations

All new field employees who may be required to wear a tightfitting respirator must have an initial medical evaluation that is reviewed by a physician (i.e., baseline pulmonary function test or spirometry examination).

Respirator Fit

Physical conditions (e.g., facial hair or temple pieces on glasses) must allow an effective facial seal with the respirator.

All workers, including field and office employees, who may be required to wear respiratory protection that depends on an effective seal must be clean-shaven where the facepiece contacts the skin; this may require trimming or removing mustaches.

Fit-Testing

Before wearing a respirator, employees must be fit-tested for the brand and model used.

Before each use of a respirator, perform a positive and negative pressure field fittest to check the seal of the face mask.

Inspection and Maintenance

Inspect and maintain respiratory equipment in accordance with the manufacturer's specifications.

Visually inspect all respirators before and after each use.

For shared respiratory equipment, disinfect after each use and clean as necessary. For all other respirators, sanitize after each use and clean as necessary.

Workers may perform minor maintenance on hoseline breathing equipment (e.g., replace headbands, valves, gaskets, hoses, and clamps). Major maintenance and repairs must be performed by (a) a qualified worker (i.e., trained in cleaning, inspecting, and maintaining respirators), or (b) a certified technician from the supplier or manufacturer.

Cartridges

Replace organic vapor (OV) cartridges and organic vapor/acid gas (OV/AG) cartridges after a total of 6 hours of use.

Immediately replace OV/AG cartridges if:

- used for escape from H_2S concentrations >10 ppm
- damaged
- there is odor breakthrough
-

Replace filters when plugged, damaged, or soiled, or when breathing is difficult. If used in environments containing oil aerosols, replace oil-resistant filters after a total of 40-hrs use or 30 days, whichever comes first.

Enbridge
Respiratory Protection for Exposure Concentrations

Breathing Hazard	Exposure Concentration	Respiratory Protection	Model
Benzene	0 to 0.5 ppm	none	
	0.6 to 5 ppm	half-mask APR with OV cartridge	3M 6000 with 6003 cartridge
	6 to 25 ppm	full-face APR[1] with OV cartridge or SAR	3M 6000 or 7000 full-face with 6003 cartridge
	greater than (>) 25 ppm	SCBA or SAR	Scott Air-Pak
	greater than (>) 500 ppm (IDLH)[2]	planned work is not permitted[3]	
carbon monoxide	25 ppm to 500 ppm	SCBA or SAR	Scott Air-Pak
	greater than (>) 500 ppm	planned work is not permitted[3]	
hydrogen sulfide (H_2S) [4]	0 to 10 ppm	none	
	11 to 99 ppm	SCBA or SAR with escape pak[6]	Scott Air-Pak or Type C SAR
	greater than (>) 100 ppm (IDLH)	planned work is not permitted[3]	
oxygen deficiency	less than (<) 19.5%	SCBA	Scott Air Pak
petroleum vapors	less than (>) 3% LEL	none	
	greater than or equal to (≥) 3% LEL to less than (<) 10% LEL	half-mask APR with OV cartridge	3M 6000 with 6003 cartridge
	greater than or equal to (≥) 10% LEL to less than (<) 20% LEL	SCBA (or equivalent) for cold work; hot work is not permitted	Scott Air-Pak

	greater than or equal to (≥) 20% LEL	planned work is not permitted[3]	

NOTES

1 If quantitative fit test performed.
2 Immediately dangerous to life and health.
3 Emergency work is allowed if SCBA or SAR with escape pak is used and all ignition sources are eliminated.
4 If the concentration exceeds the maximum detection limit of the H_2S detector, planned work is not permitted until the concentration has been verified.
5 Where possible, reset gas detectors monitoring H_2S to alarm at 10 ppm (low level) and 100 ppm (high level).
6 A safety watch with SCBA or SAR must be present.

Hearing protection:

Hearing protection will be utilized during recovery operations when noise levels exceed 85- decibels.

3.04 Equipment

Bonding and Grounding:

All vac trucks and other similar equipment utilized when collecting crude will be appropriately grounded and bonded.

Operation of Boats:

When operating boats during the day, the following criteria must be met:

- Verification must be performed of the site to confirm understanding of site safety plan by the individual in charge of the site.
- A JHA/hazard assessment must be performed to identify specific hazards and controls at the site prior to work beginning.
- A shore watch with the responsibility of tracking hazards in the water, and to coordinate boats in the event an individual would fall overboard.
- A rope and buoy will be with the shore watch at all times.

Operation of Boats after Dusk:

Boats may be operated after dusk only if it is necessary to deploy boom, or in the event that damages to boom will need to be repaired. In the event a

boat is operated after dusk, all of the above items must be met in addition to the following conditions:

- Only sites that have already been confirmed to be free of underwater obstacles and other hazards through a job hazard assessment during daylight hours will be allowed to have boats operating on them at night.
- A minimum of two light plants will be utilized for each work crew
- A stable boat, preferably a flat bottom, will be utilized if possible
- A secondary manned boat must be in the water at the location to potentially act as a rescue boat.
- Boats must be equipped with running lights appropriate for night use and a spotlight
- All employees must wear appropriate PPE, including a Coast Guard-approved PFD
- Radio contact must be maintained between the shore watch and boats.

3.05 Emergency Procedures and First Aid

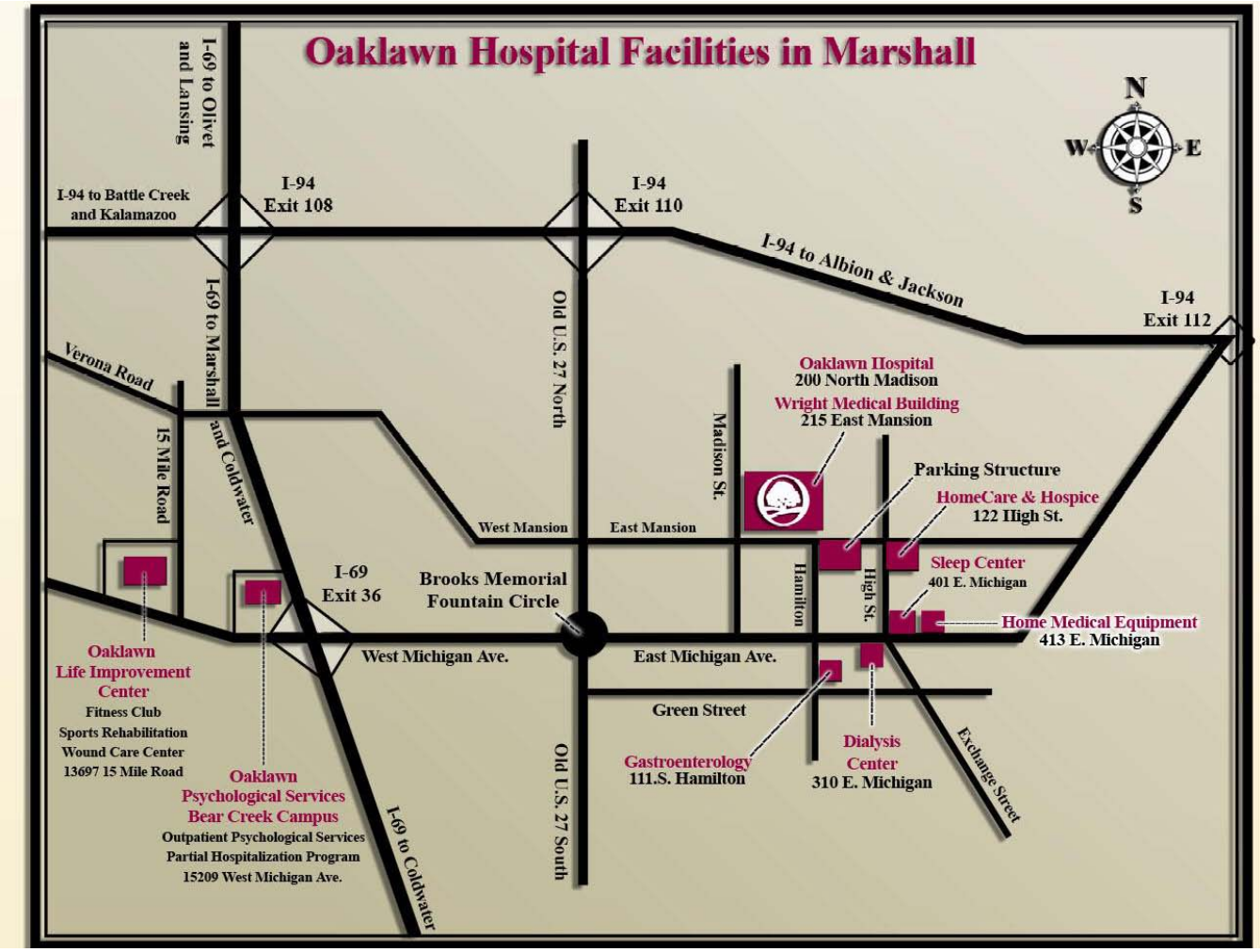
The following emergency contacts shall be maintained for problems at the site. Each respective site will have site specific safety plans (attachment A).

A. Emergency Communication:

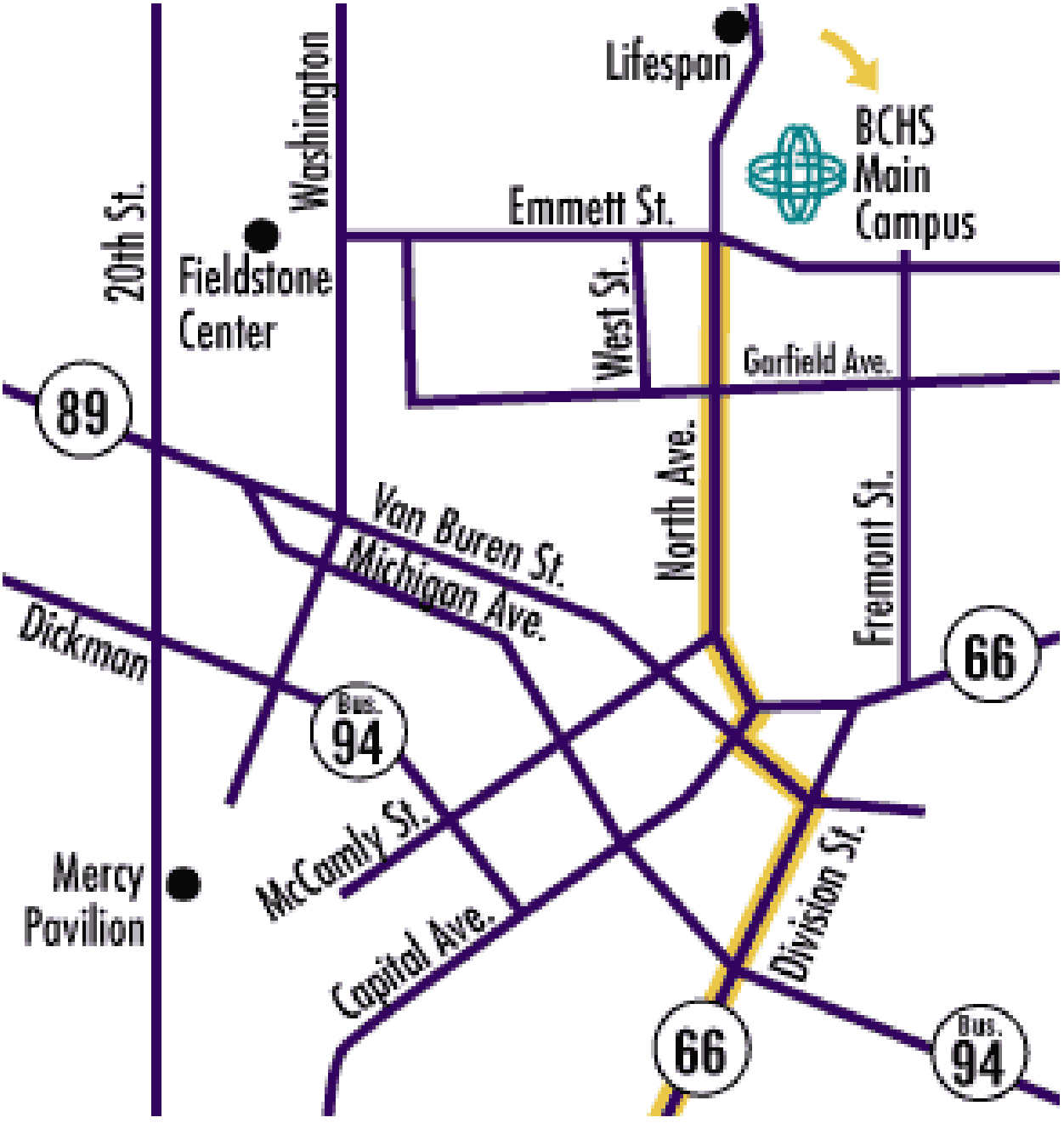
Fire Department 911
Ambulance 911
Police Department 911

Emergency Planning Coordinator: 911

Hospital: **Oaklawn Hospital (269) 781-4271**
200 N. Madison, Marshall, MI
Emergency Room (269) 789-3916


Oaklawn Hospital Facilities in Marshall
N
W
E
S
I-69 to Olivet and Lansing
I-94 to Battle Creek and Kalamazoo
I-94 Exit 108
I-94 Exit 110
I-94 to Albion & Jackson
I-94 Exit 112
I-69 to Marshall and Coldwater
Old U.S. 27 North
Verona Road
15 Mile Road
Oaklawn Hospital
200 North Madison
Wright Medical Building
215 East Mansion
Madison St.
Parking Structure
HomeCare & Hospice
122 High St.
West Mansion
East Mansion
Hamilton
High St.
Sleep Center
401 E. Michigan
I-69 Exit 36
Brooks Memorial Fountain Circle
Home Medical Equipment
413 E. Michigan
Oaklawn Life Improvement Center
Fitness Club
Sports Rehabilitation
Wound Care Center
13697 15 Mile Road
West Michigan Ave.
East Michigan Ave.
Green Street
Gastroenterology
111.S. Hamilton
Dialysis Center
310 E. Michigan
Exchange Street
Oaklawn Psychological Services Bear Creek Campus
Outpatient Psychological Services
Partial Hospitalization Program
15209 West Michigan Ave.
I-69 to Coldwater
Old U.S. 27 South

Battle Creek Health System 300 North Avenue
Battle Creek, MI 49017 269-966-8000



B. Incident Reporting:

In the event of any incident or close call, we will investigate to identify both the immediate and all underlying causes. Any incident resulting in personal injury, close call, or property damage shall be verbally reported immediately to the site supervisor. The site supervisor will communicate the information to the safety officer.

C. First Aid

Most injuries sustained shall be initially treated on-site if appropriate based on the nature of the illness/injury. A fully-stocked first aid kit shall be available to all recovery personnel to treat minor injuries. An ambulance (911) shall be called for emergencies and transportation to a hospital. All efforts will be made to ensure that there is at least one individual trained in first aid/CPR at each location. The following procedures shall be followed for correct first aid treatment on-site:

1. SKIN - Prolonged or repeated exposure may cause skin irritation. Repeated contact may cause drying or flaking of the skin.

If a worker's skin is irritated by coming into contact with contaminated soil or fluid, the area shall be washed for 15 minutes before applying dressings secured by adhesive tape.

Wash cuts and abrasions with water for 15 minutes before applying dressings secured by adhesive tape. Keep contaminated media away from open wounds.

2. BREATHING - Excessive inhalation of vapors can cause nasal and respiratory irritation; central nervous system effects including dizziness, weakness, fatigue, nausea, headache and possible unconsciousness, and even death.

If a worker experiences dizziness, headache, or nausea from inhalation of vapors, they shall leave the work area immediately. If breathing stops, administer CPR and obtain medical attention.

3. EYES - Liquid may cause pain and slight corneal injury. Vapors may irritate the eyes. Wash irritated eyes with abundant amounts of clean water by holding the eye open and flooding it with water (eye wash bottles will be available in all vehicles). All surfaces shall be washed thoroughly, then repeat the process. Seek medical attention.

4. SWALLOWING - Aspiration of material into the lungs can cause chemical pneumonitis which can be fatal. If aspirated, material may be rapidly absorbed through the lungs and result in injury to other body systems.

Medical attention shall be requested for all victims of sickness due to ingestion of contaminated materials. Do not induce vomiting. Drink two glasses of water.

5. GENERAL SAFETY - Immediately report all safety problems to the Site Supervisor. The Site Supervisor shall keep a permanent record of all such occurrences and shall report serious problems to the Health and Safety Coordinator. All occurrences shall be documented by the completion of an accident report.

D. Evacuation

If the site activities require evacuation because of fire, security purposes, personnel injury, excessive vapors, or lightning hazards, the site supervisor shall immediately direct the personnel along the evacuation routes. Workers shall observe wind direction such as smoke movement, and then proceed upwind for a sufficient distance to be out of range of the incident. All personnel shall assemble at a point established by the site supervisor, and await further instructions.

Inclement Weather

Check weather reports before issuing and approving safe work permits. If potential or imminent weather is in the forecast, these hazards need to be identified and controls implemented in the hazard assessment.

The 30-30 rule

- The 30-30 rule is recommended when working outside in with lightning in the area.
  - When you can count 30 seconds or less between lightning and thunder, head for safe shelter
  - Remain sheltered for 30 minutes after the last thunder.

If lightening is encountered, it is further recommended to:

- Go inside a fully enclosed building or vehicle
- Avoid water and boats
- Stay away from doors, windows, metal indoor fixtures and electrical devices
- Stay off the telephone
- Avoid open high ground and isolated large trees
- Avoid contact with metal objects, such as vehicles

Supporting Information and Sources
CCOHS Volume 5, Issue 6 - June 2007
~~Environment Canada~~
~~National Weather Service~~, US

Lightning incidents can be prevented by having a preparedness plan and taking some basic safety measures.
Lightning tends to strike higher ground and prominent objects, especially materials that are good conductors of electricity, such as metal. Thunder can be a good indicator of lightning - loud crackling means its close, whereas rumbling means it's further away.

Because light travels faster than sound, you will see lightning before you hear the thunder. Each second between the flash and the thunderclap represents about 1000 feet. As a rule of thumb, if you can count less than 30 seconds between the lightning strike and the thunder, the storm is less than 6 miles away. There is an 80% chance that the next strike will happen within that 6 miles, and if you can hear thunder, you are within striking distance. Run immediately to the nearest safe building or a fully enclosed, metal-topped vehicle … there is NO safe place to be outside in a thunderstorm.

Safe Shelters from Lightning
The safest place to be in a thunderstorm is in a safe building. A safe building is one that is fully enclosed and serviced. Keep as many walls as possible between you and the outside. Stay away from doors, windows, fireplaces, and anything that will conduct electricity such as radiators, stoves, sinks and metal pipes. Avoid handling electrical appliances and telephones. Use battery operated appliances only.

The next best source of shelter is an enclosed metal car, truck or van (but NOT a tractor, golf cart, topless or soft top vehicle). Make sure the vehicle is not parked near trees or other tall objects that could fall over during a storm. When inside a vehicle during a lightning storm, roll up the windows and sit with hands in lap, waiting out the storm. Don't touch any part of the metal frame or any wired device in the vehicle (including the steering wheel or plugged-in cell phone). A direct strike to your car will flow through the frame of the vehicle and usually jump over or through the tires to reach ground.

Be aware of downed power lines that may be touching your car. You are safe inside the car, but you may receive a shock if you step outside.

Unsafe Shelters
Buildings or structures without electricity or plumbing to ground the lightning do not provide any lightning protection. Shelters that are unsafe include covered picnic shelters, carports, tents, baseball dugouts as well as other small non-metal buildings (sheds and greenhouses).

If you absolutely can't get to safety …
There is no safe place to be outdoors during a thunderstorm. However, there are areas that might be less dangerous - and help reduce the risk of being struck by lightning outside.

Stay away from things that are tall (trees, flagpoles or posts), water, and other objects that conduct electricity (tractors, metal fences, lawnmowers, golf clubs).

You do not want to become a prime target by being the highest object on the landscape. Take shelter in low-lying areas such as valleys or ditches but watch for flooding.

If you are in a group in the open, spread out several feet apart from one another.

If you get caught in a level field far from shelter and you feel your hair stand on end, lightning may be about to hit you. Crouch down on the balls of your feet immediately, with feet together, place your arms around your knees and bend forward. Be the smallest target possible, and minimize your contact with the ground. Don't lie flat.

Lightning is an electrical discharge caused when static electricity builds up between thunderclouds, or thunderclouds and the ground. Lightning strokes carry up to 100 million volts of electricity and leap from cloud to cloud, or cloud to ground and vice versa. Lightning tends to strike higher ground and prominent objects, especially good conductors of electricity such as metal.

Thunder is the noise caused by the explosive expansion of air due to the heat generated by a lightning discharge. Thunder may have a sharp cracking sound when lightning is close by, compared to a rumbling noise produced by more distant strokes.

Because light travels at a faster speed than sound, you can see a lightning bolt before the sound of thunder reaches you.

Lightning may strike several miles away from the parent cloud and precautions should be taken even if the thunderstorm is not directly overhead.

If caught outdoors:
Keep a safe distance from tall objects, such as trees, hilltops, and telephone poles.

Avoid projecting above the surrounding landscape. Seek shelter in low-lying areas such as valleys, ditches and depressions but be aware of flooding.

Stay away from water. Don't go boating or swimming if a storm threatens and land as quickly as possible if you are on the water. Lightning can strike the water and travel some distance from its point of contact. Don't stand in puddles even if you are wearing rubber boots.

Stay away from objects that conduct electricity, such as tractors, golf carts, golf clubs, metal fences, motorcycles, lawnmowers and bicycles.

Avoid being the highest point in an open area. Swinging a golf club or holding an umbrella or fishing rod can make you the tallest object and a target for lightning. Take off shoes with metal cleats.

You are safe inside a car during lightning, but don't park near or under trees or other tall objects which may topple over during a storm. Be aware of downed power lines which may be touching your car. You are safe inside the car, but you may receive a shock if you step outside.

In a forest, seek shelter in a low-lying area under a thick growth of small trees or bushes.

Keep alert for flash floods, sometimes caused by heavy rainfall, if seeking shelter in a ditch or low-lying area.
If caught in a level field far from shelter and you feel your hair stand on end, lightning may be about to hit you.

Kneel on the ground immediately, with feet together, place your hands on your knees and bend forward. Don't lie flat.

If you are in a group in the open, spread out, keeping people several yards apart.

Indoor Precautions:
Before the storm hits, disconnect electrical appliances including radios and television sets. Do not touch them during the storm.

Don't go outside unless absolutely necessary.

Keep away from doors, windows, fireplaces, and anything that will conduct electricity, such as radiators, stoves, sinks, and metal pipes. Keep as many walls as possible between you and the outside.

Don't handle electrical equipment or telephones. Use battery operated appliances only.

Note: Persons who have been struck by lightning receive an electrical shock but do not carry an electrical

charge and can be safely handled. Victims may be suffering from burns or shock and should receive medical attention immediately. If breathing has stopped, mouth-to-mouth resuscitation should be administered. If breathing and pulse are absent, cardio-pulmonary resuscitation is required.

In the United States, there are an ~~estimated 25 million lightning~~ flashes each year. During the past 30 years, ~~lightning killed an average of 58 people per year~~. This is higher than 57 deaths per year caused by tornadoes and average 48 deaths to hurricanes. Yet because lightning usually claims only one or two victims at a time and does not cause mass destruction of property, it is underrated as a risk. While documented lightning injuries in the United States average about 300 per year, undocumented injuries are likely much higher.

Watch for Developing Thunderstorms: ~~Thunderstorms are most likely to develop~~ on spring or summer days but can occur year round. As the sun heats the air, pockets of warmer air start to rise and cumulus clouds form. Continued heating can cause these clouds to grow vertically into towering cumulus clouds, often the first sign of a developing thunderstorm.

When to Seek ~~Safe Shelter~~: Lightning can strike as far as 10 miles from the area where it is raining. That's about the distance you can hear thunder. If you can hear thunder, you are within striking distance. Seek safe shelter immediately.

Outdoor Activities: Minimize the risk of being struck. Most lightning deaths and injuries occur in the summer. Where organized ~~outdoor~~ sports activities take place, ~~coaches, camp counselors~~ and other adults must stop activities at the first roar of thunder to ensure everyone has time to get to a large building or enclosed vehicle. Leaders of outdoors events should have a written plan that all staff are aware of and enforce.

Indoor Activities: ~~Inside~~ buildings, stay off corded phones, computers and other electrical equipment that put you in direct contact with electricity. Stay away from pools (indoor or outdoor), tubs, showers and other plumbing. Buy surge suppressors for key equipment. Install ground fault protectors on circuits near water or outdoors. When inside, wait 30 minutes after the last clap of thunder, before going outside again.

Helping a Lightning Strike Victim: Lightning victims do not carry an electrical charge, are safe to touch, and need urgent medical attention. Cardiac arrest is the immediate cause of death for those who die. Some deaths can be prevented if the victim receives the proper first aid immediately. Call 911 immediately and perform CPR if the person is unresponsive or not breathing. Use an Automatic External Defibrillator if one is available.
Summary: ~~Lightning is dangerous.~~ With common sense, you can greatly increase your safety and the safety of those you are with. At the first clap of thunder, go to a large building or fully enclosed vehicle and wait 30 minutes after the last clap of thunder before you to go back outside.

E. Training Requirements

All personnel shall be up-to-date on the requirements set forth in 29 CFR 1910.120. It is the responsibility of all recovery personnel to maintain the required training and annual 8 hours of refresher training for all personnel.

F. Decontamination Procedures

1. Personnel

Decontamination of personnel is to be provided with mild detergent and clean water rinse. Boot covers and gloves are to be rinsed prior

to removal or disposed of properly. Gloves are to be changed as needed or at a minimum at least daily.

Every site will have a poly area, cleaning detergent and absorbent materials to assist in decontamination processes.

15 decontamination units will be added throughout the work area.

2. *Equipment*

Following work activity, all other field/sampling equipment shall be properly decontaminated with a phosphate-free solution and water rinse.

Appendix A

MSDS for Crude Oil

EnCana Corporation Material Safety Data Sheet
Heavy Crude Oil/Diluent Mix – Christina Lake/Foster Creek Page 1 of 2

SECTION 1 – MATERIAL IDENTIFICATION AND USE
Material Name: HEAVY CRUDE OIL/DILUENT MIX (CHRISTINA LAKE/FOSTER CREEK)
Use: Process stream, fuels and lubricants production
WHMIS Classification: Class B, Div. 2, Class D, Div. 2, Sub-Div. A and B
NFPA: Fire: 2 **Reactivity**: 0 **Health**: 3
TDG Shipping Name: Petroleum Crude Oil
TDG Class: 3 **UN**: 1267
TDG Packing Group: II (boiling point 35 deg. C or above, and flash point less than 23 deg. C)
Manufacturer/Supplier: ENCANA CORPORATION
#1800, 855 - 2nd Street S.W., P.O. BOX 2850,
CALGARY, ALBERTA, T2P 2S5
Emergency Telephone: 403-645-3333
Chemical Family: Crude oil/condensate mix

SECTION 2 – HAZARDOUS INGREDIENTS OF MATERIAL
Hazardous Approximate C.A.S. LD50/LC50 Exposure
Ingredients Concentrations (%) Nos. Specify Species Limits
& Route
Crude oil 50 - 70 8002-05-9 LD50,rat, skin,>2 g/kg 5 mg/m3 (OEL,TLV)
Hydrocarbon Diluent 30 - 50 N.Av. N.Av. 900 mg/m3 (OEL)*
Benzene 0.03 - 0.3 71-43-2 LD50,rat,oral,930 mg/kg 1 ppm (OEL),
LC50,rat,4 hr,13200 ppm 0.5 ppm (TLV)
Hydrogen Sulphide <0.5 7783-06-04 LC50, rat, 4 hrs, 444 ppm 10 ppm (OEL,TLV)
OEL = 8 hr. Alberta Occupational Exposure Limit; TLV = Threshold Limit Value (8 hrs)
*OEL for gasoline

SECTION 3 – PHYSICAL DATA FOR MATERIAL
Physical State: Liquid **Vapour Pressure (kPa)**: 2.5 – 36.5 @ 20C
Specific Gravity: 0.65 – 0.75 **Odour Threshold (ppm)**: N.Av.
Vapour Density (air=1): 2.5 -5.0 **Evaporation Rate**: N.Av.
Percent Volatiles, by volume: 20 - 30 (estimated) **Boiling Pt. (deg.C)**: 40 - 180
pH: N.Av. **Freezing Pt. (deg.C)**: <0
Coefficient of Water/Oil Distribution: <0.1
Odour & Appearance: Brown/black liquid, hydrocarbon odour
(N.Av. = not available N.App. = not applicable)

SECTION 4 – FIRE AND EXPLOSION
Flammability: Yes **Conditions**: Material will ignite at normal temperatures.
Means of Extinction: Foam, CO2, dry chemical. Explosive accumulations can build up in areas of poor ventilation.

Special Procedures: Use water spray to cool fire-exposed containers, and to disperse vapors if spill has not
ignited. Cut off fuel and allow flame to burn out.
Flash Point (deg.C) & Method: <-35 (PMCC)
Upper Explosive Limit (% by vol.): 8 (estimated) **Sensitivity to Impact**: No
Lower Explosive Limit (% by vol.): 0.8 (estimated) **Sensitivity to Static Discharge**: Yes, at normal temperatures
Auto-Ignition Temp. (deg.C): 250 (estimated) **TDG Flammability Classification**: 3
Hazardous Combustion Products: Carbon monoxide, carbon dioxide, sulphur oxides

SECTION 5 – REACTIVITY DATA
Chemical Stability: Stable **Conditions**: Heat
Incompatibility: Yes **Substances**: Oxidizing agents (e.g. chlorine)
Reactivity: Yes **Conditions**: Heat, strong sunlight
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, sulphur oxides
EnCana Corporation Material Safety Data Sheet
Heavy Crude Oil/Diluent Mix – Christina Lake/Foster Creek Page 2 of 2

SECTION 6 – TOXICOLOGICAL PROPERTIES OF PRODUCT
Routes of Entry:
Skin Absorption : Yes **Skin Contact**: Yes **Eye Contact**: Yes
Inhalation: **Acute**: Yes **Chronic**: Yes **Ingestion**: Yes
Effects of Acute Exposure: Vapour may cause irritation of eyes, nose and throat, dizziness and drowsiness. Contact with
skin may cause irritation and possibly dermatitis. Contact of liquid with eyes may cause severe irritation/burns.
Effects of Chronic Exposure: Due to presence of benzene, long term exposure may increase the risk of anaemia and
leukemia. Repeated skin contact may increase the risk of skin cancer.
Sensitization to Product: No.
Exposure Limits of Product: 1 ppm (Alberta 8 hr OEL for benzene)
Irritancy: Yes
Synergistic Materials: None reported
Carcinogenicity: Yes **Reproductive Effects**: Possibly **Teratogenicity**: Possibly
Mutagenicity: Possibly

SECTION 7 – PREVENTIVE MEASURES
Personal Protective Equipment: Use positive pressure self-contained breathing apparatus, supplied air breathing
apparatus or cartridge air purifying respirator approved for organic vapours where concentrations may exceed exposure
limits (note: cartridge respirator not suitable for hydrogen sulphide, oxygen deficiency or IDLH situations) – see also
Storage below).
Gloves: Viton (nitrile adequate for short exposure to liquid)

Eye: Chemical splash goggles. **Footwear**: As per safety policy **Clothing**: As per fire protection policy
Engineering Controls: Use only in well ventilated areas. Mechanical ventilation required in confined areas. Equipment
must be explosion proof.
Leaks & Spills: Stop leak if safe to do so. Use personal protective equipment. Use water spray to cool containers.
Remove all ignition sources. Provide explosion-proof clearing ventilation, if possible. Prevent from entering confined
spaces. Dyke and pump into containers for recycling or disposal. Notify appropriate regulatory authorities.
Waste Disposal: Contact appropriate regulatory authorities for disposal requirements.
Handling Procedures & Equipment: Avoid contact with liquid. Avoid inhalation. Bond and ground all transfers.
Avoid sparking conditions.
Storage Requirements: Store in a cool, dry, well ventilated area away from heat, strong sunlight, and ignition sources.
Caution: hydrogen sulphide may accumulate in headspaces of tanks and other equipment, even when concentrations in the
liquid product are low. Overexposure to hydrogen sulphide may cause dizziness, headache, nausea and possibly knockdown
and death. Factors increasing this risk include heating, agitation and contact of the liquid with acids or acid salts.
Assess the exposure risk by gas monitoring. Wear air supplying breathing apparatus if necessary.
Special Shipping Provisions: N.App.

SECTION 8 – FIRST AID MEASURES
Skin: Flush skin with water, removing contaminated clothing. Get medical attention if irritation persists or
large area of contact. Decontaminate clothing before re-use.
Eye: Immediately flush with large amounts of luke warm water for 15 minutes, lifting upper and lower lids at
intervals. Seek medical attention if irritation persists.
Inhalation: Ensure own safety. Remove victim to fresh air. Give oxygen, artificial respiration, or CPR if needed.
Seek medical attention immediately.
Ingestion: Give 2-3 glasses of milk or water to drink. DO NOT INDUCE VOMITING.
Keep warm and at rest.
Get immediate medical attention.

SECTION 9 – PREPARATION DATE OF MSDS
Prepared By: EnCana Environment, Health and Safety (EHS)
Phone Number: (403) 645-2000 Preparation Date: October 15, 2008 Expiry Date: October 15, 2011

Appendix B

SITE HEALTH AND SAFETY PLAN

Company Name	Signature	Date

SITE HEALTH AND SAFETY PLAN

Company Name	Signature	Date

Appendix C

TASK HAZARD ASSESSMENT

Job Position &/or Task : Site Prep ,vacuum truck, Boom Deployment, Hydrocarbon Skimmer, Creek Diversion, Contaminated soil, contaminated material handling, Liquid waste holding, Tank set up and transfer operation.

Position Status : Company x Contractor X

Project & Site Location : Marshall Leak sites

Date Completed &/or Revised : July 29, 2010

KEY JOB FUNCTIONS &/OR TASKS	EQUIPMENT, MATERIALS,TOOLS & MACHINERY UTILIZED	RISKS (HEALTH & SAFETY HAZARDS)	HAZARD CONTROLS (PROTECTIVE DEVICES & EQUIPMENT, SAFE WORK PROCEDURES)
Access Site	Personnel, Trucks , Vacuum Trucks, Frac Tanks, and Tanker Trucks.	No Site contact. LEL 10%, H_2S 10 PPM, CO 35 ppm and Benzene 0.5 ppm levels to high	Security in place for access control. All personnel must have site contact; all personnel must have site orientation to access site. Safe work permit with Initial atmospheric testing required Equipment to meet spark arrestor / shut-off requirements. Site conditions to be checked for soft areas and gravel or matting in place for access to be maintained
Control zones	Cold zone Staging areas Hot zone	No site access approval No control of work zones	Cold zone- security, orientation decals, equipment tracing and assignment.

		No control of equipment Risk of spreading contaminated material	Staging area- Tool and equipment storage, PPE. Supplies. Hot zone area cordoned off restricted access - permit required area monitoring .
MSDS	Heavy Crude Diluent Mix (i.e. Cold Lake)	Fire , exposure to H_2S, Benzene Light hydrocarbons vapors will release from product at normal temperatures creating an explosive atmosphere.	Ventilation (natural or mechanical) may be required. Gas detection equipment for continuous LEL monitoring is required. Proper binding techniques to prevent static. Proper bins for hydrocarbon waste store as vapors may release from waste materials.
Labor Personnel	Response workers Personnel exposure to LEL, H_2S, benzene. Uneven ground Working with loose product. Vegetation clean up at stream banks Booms	No training records, Exposure greater than 3% LEL Strains, slips, trips falls, eye injuries, Worker exposed to crude oil, LEL, H_2S,CO, benzene No respirator fit testing.	Identify training requirements. Respirator fit testing required Fit testing records. Review Christina Lake (Cold Lake) MSDS for product leaked and surrounding area. Spill cleanup meets precautions higher risk of exposure for working with hydrocarbons. Continuous Atmospheric monitoring for LEL and H_2S and spot sample for benzene. Safe work permits required for all work in restricted areas.

			Life jackets when required.
Site excavation for culvert installation for stream diversion	Heavy equipment	Line strike , ignition source, excavation slough in	Excavation checklist, Line locates, stake out excavation. Spotters Continuous gas monitoring Proper rigging techniques High visibility vests
Dry shrub, grass area	Trucks	Fire	Vehicles equipped with fire extinguishers. Monitor area Check area for equipment staging to prevent ignition of dry grass. Smoking in designated areas only.
Staging vacuum trucks	Vacuum truck	Limited truck access, striking property, Backing incidents, static, hose rupture, gasket leaks, worker exposed to crude oil, LEL, H_2S, benzene, noise levels above 85DbA	Drive through preferable, Use spotters for backing and positioning, Trucks bond to ground. Check hose condition, ensure gaskets are the proper material and in good condition and use a spill pail for drip containment. Exhaust hose to safe location. Continuous gas monitoring. Ensure workers have current Hazard Communication training and respiratory fit testing. Hearing protection
Leak containment	Boom Deployment	Drowning, Slips, trips and falls. Potential to be pinned in current against dams or barrier in the stream. Manual	Stream, Booms/dams to be at checked for potential hazards, life jackets to be worn on boats and at night adjacent to waterways, in high

		lifting and carrying of equipment and supplies. Personnel exposure, Contaminated clothing. Unstable stream banks. Underwater hazards.	current areas. Booms to be checked for breech. Stages to be monitored to maintain containment and boom control. Area monitoring LEL H_2S. Proper PPE to be worn. Decontamination zone- remove outer layer of clothing to prevent spreading oil contamination. Fast currents by hidden underwater terrain – no entry (risk of someone getting pinned.)
Material transfer Tank farm operation	Skimmers, Vacuum Trucks, Tanker trucks.	Fire, over fill, vents overflow. Leaks. Workers not trained for tank loading or unloading. Exposure to LEL, H_2S, benzene. Tank overflow-spill Over pressure tank vacuum. Static build-up potential ignition source. Valve left open or closed or operated by unauthorized worker.	Personal protection standard leak site PPE. Continuous gas monitoring, open vents at all time to prevent over pressure/ vacuum. Exhaust vents hose to safe location. Valve to be in good operating order. Tank setup stable ground. Grounding in place for tanks. Known tank volume Level gage and log book. Tank transfer to be operated by tanker personnel at all time while truck loading and unloading. Proper bonding techniques to be used while transferring products.

			All personnel to be on Safe work permits. Safety eye wear, respirator fit testing, Hearing protection Proper PPE to worn at all times during transfers if required. Continuous gas monitoring and checks for benzene.
Contaminated soil and contaminated material.	Heavy haul trucks	Spill contaminated ground in clean zones. Hot material fire hazard, over exposure Containment area loading. Contaminated material in trucks. Contaminates Uneven loads on trucks Truck over turn, Jack knife. People walking in area No Identification on tank bins	100% containment. Soil testing to confirm soil characterization- Flash point- hydrocarbon content, area monitoring for LEL H_2S, benzene. Assess truck loading ramp for slope, slippage and turning radius for loading and unloading verify with test runs. Line trucks with poly Uneven loads on trucks Wind and weather conditions may effect -off loading. Proper bonding techniques to be used while transferring products. All personnel to be on Safe work permits. Safety eye wear, respirator fit testing, Hearing protection Proper PPE to worn at all times during transfers if required. Continuous gas monitoring and checks for benzene. No foot traffic on rig mats

			Waste manifest and labels if required.
Leak site excavation	Heavy equipment	Hazardous area, Chemical exposure, Fire, Trench walls unstable. Contact pipeline.	Soft terrain rig matting where required for unstable ground. Atmosphere monitoring for benzene, H_2S, LEL. Cordon off hot zone area applicable signage in place No smoking Wind socks in place Fire watch, spotters Fit testing requirement may apply for respirators.
Site Grading and material handling	Heavy equipment Culvert piping Transport trucks	Fire, Noise, equipment strike , underground cables, overhead line, towing vehicles, people traffic	Fire watch with reflective vests and fire extinguisher, Hearing protection, good communication practice to be followed between equipment operators for operating in congested areas. Continuous monitoring for LEL Spotters to wear high visibility vest. Proper rigging techniques. Proper signal persons, Proper use of tag lines. Transport trucks fit for transporting wet waste material.
Tank farm set up	Holding tank and Piping	Spill containment, static charge, truck loading, Fire, wrong valve operation in tank farm.	Lining for containment, piping off loading using proper rigging practices, Grounding in place for tanks and truck loading.

			Only workers in charge of operating tanks operate tank farm valve header and operate off loading pump. Only worker operating trucks operate truck valves. Vac unit must have drip pans in place spill containment.
Vehicle Maintenance	Heavy equipment	Worker not involved in clean up create hazard	All work at site to be permitted and authorized.
Air monitoring	Public concerns	Odors , fugitive emissions Vehicle traffic. Pedestrian traffic.	Maintain good communication with landowners, environment to set up perimeter air sampling for fugitive emission measurement. Drive within speed limits. Monitor roads for debris. Share awareness to work force. Limit parking alongside Leggitt Road leading to Marshall PLM shop.
Health	People	Mosquitoes Heat Stress	Use insect repellant with 10-25% DEET. Follow procedures for working in extreme temperatures (frequent water breaks)

Worker (Print Name) : _____

Worker Signature : _____

Site Supervisor : _____

Site Supervisor Signature : _____