NOVA Chemicals®

Pipeline Operations

Emergency Response Plan

Joffre Pipeline Emergency Line

1-800-780-6682

Responsible Care®
Our commitment to sustainability.

1.1 EMERGENCY PLAN PURPOSE AND OBJECTIVE

1.1.1 PURPOSE

The purpose of this emergency response plan is to minimize the effect of potential hazardous situations and bring them under control in order to prevent them from developing into a full-scale emergency. This is accomplished by outlining procedures whereby personnel and equipment can be mobilized rapidly and efficiently in order to facilitate a prompt, coordinated and safe response to any emergency incident.

This plan defines:

- The organization, roles and responsibilities for designated personnel during emergencies,
- The guidelines for emergency response actions as they relate to the pipeline operations; and
- The resources available/accessible for emergency response operations.

This plan is not intended to provide procedures for the following which are captured separately in different emergency response plans:

- Transportation (Corporate Transportation Emergency Response Plan),
- Community (County Emergency Response Plan),
- Site emergencies (Joffre Site Emergency Response Plan); and
- Crisis Management – Corporate Crisis Management Plan.

1.1.2 OBJECTIVES

The objectives of this plan are to:

- Identify the NOVA Chemicals Pipeline Emergency Planning Philosophy and Policy,
- Identify authority, organization, roles and responsibilities for designated personnel during emergencies; and
- Define procedures for emergency response actions as they relate to the NOVA Chemicals.

1.1.2 OBJECTIVES continued. . .

To ensure a competent response to an emergency, any required actions will be conducted under the following priorities:

1.2 PLAN SCOPE & POLICY

The health and safety of all workers, the public and environment are integral to NOVA Chemicals business planning. Emergency response ensures a timely and appropriate response to emergencies, compliance with applicable laws (domestic and/or international) and industry / legal codes of practice.

This shall be done through provision and availability of:

- Effective Emergency Response plans, which encompass necessary on and off-site responses that support the Public Awareness and Emergency Response Program,
- Competent Emergency Response personnel,
- Reliable and effective Emergency Response equipment,
- Training of personnel and an effective drill program,
- Effective emergency preplans; and
- Inside controls and systems such as; automatic and remotely activated product isolation valves and pump station shutdown systems.

1.3 EMERGENCY RESPONSE PHILOSOPHY

NOVA Chemicals will be responsible for the management of and response to, all loss of containment incidents with respect to its product and supply pipelines and will provide product information, technical advice and appropriate assistance to all applicable regulatory agencies, the public and the media. This manual is written in accordance with:

- Section 50.2(1) of the Alberta Pipeline Regulation.
- CAN/CSA Z-731-03 “Emergency Preparedness & Response” standard.
- AER - Directive 071 - Emergency Preparedness and Response Requirements for the Petroleum Industry (Alberta Pipeline Operations).

This plan also fulfills the requirements of NOVA Chemicals Responsible Care Standard 180 – Emergency Preparedness and Response.

1.4 DISCLAIMER

If a person is unsure if the information is correct, the NOVA Chemicals Responsible Care team should be contacted immediately:

Contact Name	Position	Office
Darryl Stebner	MW Responsible Care Team Leader	403-314-8552
Dennesa Guiseppi	MW Responsible Care Regulatory Specialist	403-314-7458

1.5 MANUAL DISTRIBUTION LIST

This manual is distributed and controlled as per the Document Control procedures. This ensures that all employees and government agencies that have responsibilities and require access to these procedures have the latest edition copy. The document control system also provides a tracking and audit system for all controlled manuals. The most current copy of this manual is located on the NOVA Chemicals Manufacturing West Intranet Site under Emergency Response.

1.5.1 INTERNAL ORGANIZATION

HC = Hard Copy, USB = Electronic Copy

MANUAL #	LOCATION OR ROLE	RESPONSIBLE	FORMAT
1	Master Copy, MW Intranet ER Page	Pipeline Unit Administrator	USB
2	Pipeline O&M Team Leader, RDPL Office	Pipeline O&M Team Leader	HC
3	Pipeline Coordinator, RDPL Office	Pipeline Coordinator	HC
4	Pipeline Technician Coordinator, RDPL Office	Pipeline Technician Coordinator	HC
5	Pipeline RC Regulatory Specialist, RDPL Office	Pipeline RC Regulatory Specialist	HC
6	Pipeline RC Safety Specialist, RDPL Office	Pipeline RC Safety Specialist	HC
7	Pipeline Technician, South (1)	Pipeline Technician	HC
8	Pipeline Technician, South (2)	Pipeline Technician	HC
9	Pipeline Technician, North (1)	Pipeline Technician	HC
10	Pipeline Technician, North (2)	Pipeline Technician	HC
11	Pipeline Technician, North (3)	Pipeline Technician	HC
12	Maintenance Technician, I/E South (1)	I/E Technician	HC
13	Maintenance Technician, I/E South (2)	I/E Technician	HC
14	Maintenance Technician, I/E North (1)	I/E/ Technician	HC
15	Maintenance Technician, I/E North (2)	I/E Technician	HC
16	Cloverlawn Pump Station	Pipeline Technician	HC

1.5.1 MANUAL DISTRIBUTION LIST continued. . .

MANUAL #	LOCATION OR ROLE	RESPONSIBLE	FORMAT
17	Sherwood Park Office	I/E Technician	HC
18	Joffre Emergency Operations Centre	Emergency & Security Services Coordinator	HC
19	Joffre Site Control Room	Control Room Operations Coordinator	HC
20	Red Deer Back-up Control Room	Pipeline Unit Administrator	HC
21	Spare, RDPL Office	Pipeline Unit Administrator	HC
22	Spare, RDPL Office	Pipeline Unit Administrator	HC
23	Spare, RDPL Office	Pipeline Unit Administrator	HC

1.5.2 GOVERNMENT AGENCIES

MANUAL #	LOCATION OR ROLE	RESPONSIBLE	FORMAT
40	Alberta Health Services Central Zone	Central Zone Manager	USB
41	Alberta Health Services Edmonton Zone	Edmonton Zone Manager	USB
42	Environmental Public Health Canada	Emergency Coordinator	USB

1.5.3 MUNICIPAL REGIONS

MANUAL #	LOCATION OR ROLE	RESPONSIBLE	FORMAT
50	Village of Clive	Director of Emerg. Management	USB
51	City of Edmonton	Duty Officer- Office of Emergency Preparedness	USB
52	County of Lacombe	Director of Emerg. Management	USB
53	Strathcona County	Assistant Chief Emergency Management	USB
54	Sturgeon County	Fire Chief / Manager Protective Services	USB
55	County of Wetaskiwin No. 10	Director of Emerg. Management	USB
56	City of Wetaskiwin	Manager of Protective Services	USB

1.5.4 FIRE AND POLICE DEPARTMENTS

MANUAL #	LOCATION OR ROLE	RESPONSIBLE	FORMAT
60	Bashaw RCMP	Detachment Commander	USB
61	City of Edmonton Police	Dispatch Sgt. 911 Section	USB
62	Edmonton RCMP - Operational Communications Centre	O.C.C. Admin Support	USB
63	Fort Saskatchewan RCMP	Detachment Commander	USB
64	City of Leduc Fire Department	Fire Chief	USB
65	Leduc RCMP	Detachment Commander – OPS N.C.O.	USB
66	Ponoka RCMP	Detachment Commander	USB
67	Strathcona County RCMP	Detachment Commander	USB

1.5.5 EXTERNAL INDUSTRY

MANUAL #	LOCATION OR ROLE	RESPONSIBLE	FORMAT
70	EMIC Corp - Spare	EMIC Corp.	HC
71	EMIC Corp	Truck 1	HC
72	EMIC Corp	Truck 2	HC
73	AlphaBow Energy Ltd.	Field Foreman	USB
74	Celanese - 4405 101 Ave Edmonton	E.H. & S. Manager	USB
75	Dow Chemical - Hwy 597 Prentiss Road	Emergency Service and Security Leader	USB
76	Dow Chemical - Hwy 15 Fort Saskatchewan	Wells Operation Manager	USB
77	Shell Canada Products Refinery/Upgrade /Scotford	Emergency Services Coordinator	USB

1.6 LANDOWNER / RESIDENT INFORMATION

Personal information is gathered and managed by Emergency Management International Consulting (EMIC Corp) on behalf of NOVA Chemicals. This information is governed by the privacy provisions of the Protection of Privacy Act (PIPA) and provided to key emergency responders in the event of an emergency.

Copies of the Landowner/Resident database are distributed and controlled as per the Document Control procedures. EMIC manages the most current copy of this database and provide a copy to NOVA Chemicals every quarter.

Proprietary Content

Although some information regarding NOVA Chemicals emergency response procedures is generally available, some information contained within this manual is proprietary. Contents of this manual will not be discussed or made available outside of NOVA Chemicals without permission from the NOVA Chemicals Pipeline Responsible Care Regulatory Specialist.

1.6 LANDOWNER / RESIDENT INFORMATION continued. . .

Personal information is gathered and managed by Emergency Management International Consulting (EMIC Corp) on behalf of NOVA Chemicals. This information is governed by the privacy provisions of the Protection of Privacy Act (PIPA) and provided to key emergency responders in the event of an emergency.

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1.7 MANUAL REVISIONS & REVIEW

The Emergency Response Plan will be reviewed semi-annually and updated as required, by the Pipeline Emergency Preparedness Team. Updates could be triggered by; changes to emergency information, new mapping information, new resident information, any changes to response staff information or response capabilities and/or facility additions that do not require submission of a supplement. This team is composed of the following:

- Responsible Care Team Leader
- Pipeline Operations & Maintenance Team Leader
- Pipeline Responsible Care Regulatory Specialist
- Emergency & Security Services Coordinator
- Pipeline Technician Coordinator
- Pipeline Unit Administrator

1.7 MANUAL REVISIONS & REVIEW continued. . .

Any changes identified in the review will be incorporated into the Emergency Response Plan and the training and exercise program.

NOVA Chemicals Emergency Response systems which include various emergency response plans, are audited every three to five years by NOVA Chemicals Corporate Responsible Care auditors. This audit is to the NOVA Chemicals Responsible Care Standard 180, which is based on the CAN/CSA Z-731 Standard, a recognized industry practice. This audit verifies not only the written plan, but the actual implementation and use. The audit results, findings and action items are comprehensive and documented. Detailed review/audit of this plan is also done internally on an annual basis to ensure compliance to AER - D-71 - Emergency Preparedness and Response for the Petroleum Industry.

Requests for revisions to the plan will be submitted to the Pipeline Emergency Preparedness Team and may be done so in one of two ways:

Electronically

Include “Pipeline Emergency Preparedness Team, Attention: “Pipeline Responsible Care Regulatory Specialist” in the subject line. Contact information is as follows:

E-mail: joffresite@novachem.com

Manually

Complete a Revision Request Form (See Section 13 Form 13.10)
Attach the suggested change(s)
Mail the request to:
Pipeline Emergency Preparedness Team, Attention: “Pipeline Responsible Care Regulatory Specialist”
#2, 4940 – 81 Street
Red Deer, Alberta, T4P 3V3

Approval

Each procedure is approved for use by the Pipeline Emergency Preparedness Team and the entire manual is similarly approved for distribution. This manual is under the approval of the Pipeline Emergency Preparedness Team.

2.1 NOVA CHEMICALS PIPELINE OVERVIEW

2.1.1 ALBERTA PIPELINE OPERATIONS

NOVA Chemicals operates two (2) pipeline systems in the Province of Alberta. These systems involve more than 400 kilometres of pipeline that safely transport the feedstocks and products essential to the operations of NOVA Chemicals and others in Alberta's petrochemical industry. Full description of the pipeline systems are contained within the Pipeline Operations & Maintenance manual. The two pipeline systems NOVA Chemicals owns and operates are:

1. **Ethylene Delivery System (EDS)** - NOVA Chemicals Joffre Site to Prentiss, NOVA Chemicals Joffre Site to Fort Saskatchewan, Fort Saskatchewan to Scotford, Scotford to Sturgeon County, Fort Saskatchewan to Edmonton.

DIAMETER	MATERIAL	ESTIMATED PEAK RELEASE RATE (KG/SEC)	EPZ (M)
4"	Ethylene	180	350
6"	Ethylene	600	550
8"	Ethylene	1100	750
12"	Ethylene	1584	1200

2. **Joffre Feedstock Pipeline (JFP)** – NGL feedstocks delivered from Fort Saskatchewan to Joffre Site.

DIAMETER	MATERIAL	ESTIMATED PEAK RELEASE RATE (KG/SEC)	EPZ (M)
10"	Ethane	1000	1000

NOVA Chemicals also owns, operates and maintains several smaller length pipelines adjacent to our Joffre facilities, including:

- **High-Pressure Hydrogen** - NOVA Chemicals Joffre Site to Nutrien Joffre Plant site.
- **Nitrogen** - Prentiss pipeline isolation valve to NOVA Chemicals Joffre Site.
- **High-Pressure Ethane** - Joffre Pump Station to NOVA Chemicals Joffre Site.
- **Natural Gas** - Plains Mainline valve site (NE of Penhold) to NOVA Chemicals Joffre site.
- **Raw water and effluent discharge –** Red Deer River Pump House to NOVA Chemicals Joffre site.

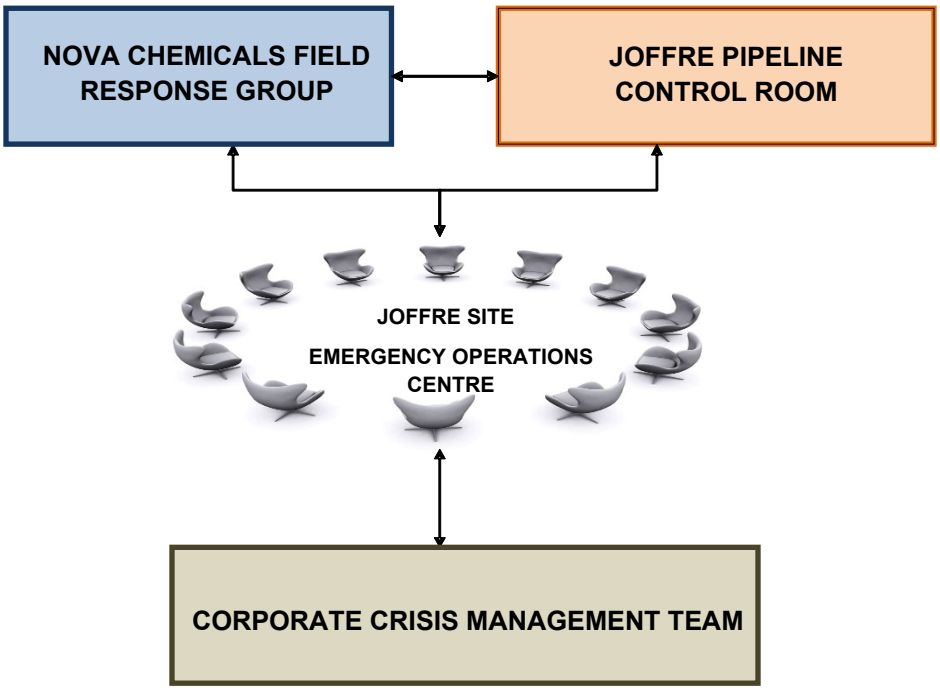
2.2 EMERGENCY RESPONSE ORGANIZATION

NOVA Chemicals Pipeline Emergency Response Organization (FIGURE 1) is based on the widely used Incident Command System (ICS). The Pipeline Emergency Response Organization is designed to manage all emergency response activities involving pipelines. It is composed of the following major elements:

- Field Response Group.
- NOVA Chemicals Emergency Operations Centre Group.
- NOVA Chemicals Corporation Corporate Level ERP Crisis Management Team.

It will be mobilized to the extent necessary to effectively deal with the situation. Every incident or event has certain major management activities or actions that must be performed. Even if the event is very small, with only one or two people involved, these activities will still apply to some degree.

FIGURE 1 NOVA CHEMICALS PIPELINE EMERGENCY RESPONSE ORGANIZATION



3.1 ALARMS AND INITIAL CALLS

Information indicating an emergency situation may arise from several different sources. These sources include:

- Process alarms (e.g. Leak Detection System)
- Gas detectors
- Fire detectors
- Equipment alarms (Flow Rate, Pressure, Temperature, etc.)
- Company personnel
- Regulatory personnel
- Police
- Public
- Reception / Switchboard
- Joffre Control Room

3.2 IMMEDIATE ACTIONS

The first employee “on-site” is designated as the On-Scene Incident Commander until a more senior employee arrives. Generally, the On-Scene Commander will be a NOVA Chemicals Pipeline Technician. All other support functions fall within the roles and responsibilities of all designated NOVA Chemicals employees who have a key role in the emergency response of an incident. – Refer to Section 8 Roles & Responsibilities.

The local authority of each municipality or county is responsible for the direction and control of the local authority’s emergency response. NOVA Chemicals will offer advisory support and technical advice to any and all Emergency Response Agencies who may be involved in response efforts for any pipeline incidents operated by of NOVA Chemicals, in their efforts to protect the public and environment.

Regardless of the magnitude of the emergency, the initial response should always be the same - refer to Section 5 – Incident Specific Plans. On notification of an emergency incident occurrence, follow emergency response procedures according to established Alert, Level 1, 2 and 3 Emergencies under NOVA Chemicals Pipeline Emergency Response Plan found in Section 3.3.

The sequence of events and responses described in the flowcharts and tables herein are a guideline only, and response may vary depending on the nature and circumstances of the emergency.

3.3 LEVELS OF EMERGENCIES

Emergency levels define the hazard to the public from a High Vapor Pressure (HVP) product release and NOVA Chemicals ability to handle the emergency response. Each level has a different impact on the response and amount of resources required to resolve incident. Refer to Tables 2 & 3 for designating emergency levels.

Table 1. Consequence of Incident

Rank	Category	Example of consequence in category
1	Minor	• No worker injuries. • Nil or low media interest. • Liquid release contained on lease. • Gas release impact on lease only.
2	Moderate	• First aid treatment required for on-lease worker(s). • Local and possible regional media interest. • Liquid release not contained on lease. • Gas release impact has potential to extend beyond lease.
3	Major	• Worker(s) requires hospitalization. • Regional and national media interest. • Liquid release extends beyond lease—not contained. • Gas release impact extends beyond lease—public health/safety could be jeopardized.
4	Catastrophic	• Fatality. • National and international media interest. • Liquid release off lease not contained—potential for, or is, impacting water or sensitive terrain. • Gas release impact extends beyond lease—public health/safety jeopardized.

Table 2. Likelihood of incident escalating*

Rank	Descriptor	Description
1	Unlikely	The incident is contained or controlled and it is unlikely that the incident will escalate. There is no chance of additional hazards. Ongoing monitoring required.
2	Moderate	Control of the incident may have deteriorated but imminent control of the hazard by the licensee is probable. It is unlikely that the incident will further escalate.
3	Likely	Imminent and/or intermittent control of the incident is possible. The licensee has the capability of using internal and/or external resources to manage and bring the hazard under control in the near term.
4	Almost certain or currently occurring	The incident is uncontrolled and there is little chance that the licensee will be able to bring the hazard under control in the near term. The licensee will require assistance from outside parties to remedy the situation.

* What is the likelihood that the incident will escalate, resulting in an increased exposure to public health, safety, or the environment?

Sum the rank from both of these columns to obtain the risk level and the incident classification

Table 3. Incident Classification

Risk level	Assessment results
Very low 2-3	Alert
Low 4-5	Level-1 emergency
Medium 6	Level-2 emergency
High 7-8	Level-3 emergency

Responses	Alert	Level 1 Emergency	Level 2 Emergency	Level 3 Emergency
Communications				
Internal	Discretionary depending on licensee policy.	Notification of off-site management.	Notification of off-site management.	Notification of off-site management.
External public	Courtesy, at licensee discretion.	Mandatory for individuals who have requested notification within the EPZ.	Planned and instructive in accordance with the specific ERP.	Planned and instructive in accordance with the specific ERP.
Media	Reactive, as required.	Reactive, as required.	Proactive media management to local or regional interest.	Proactive media management to national interest.
Government	Reactive, as required. Notify AER if public or media is contacted.	Alberta Pipeline Operations notify AER. Call local authority and AHS if public or media is contacted.	Alberta Pipeline Operations notify AER. Call local authority and AHS if public or media is contacted	Alberta Pipeline Operations notify AER. Call local authority and AHS if public or media is contacted
Actions				
Internal	On site, as required by licensee.	On site, as required by licensee. Initial response undertaken in accordance with the site-specific or corporate-level ERP.	Predetermined public safety actions are under way. Corporate management team alerted and may be appropriately engaged to support on-scene responders.	Full implementation of incident management system.
External	On site, as required by licensee.	On site, as required by licensee.	Potential for multiagency (operator, municipal, provincial or federal) response.	Immediate multiagency (Operator, municipal, provincial or federal) response.
Resources	Immediate and local. No additional personnel required.	Establish what resources would be required.	Limited supplemental resources or personnel required.	Significant incremental resources required.
Internal				
External	None	Begin to establish resources that may be required.	First responders and government agencies are likely to be directly involved.	Immediate and significant government agency involvement.
PIPELINE OWNERSHIP	Reactive, as required if AER or public or media is contacted.	Reactive, consider notifying depending on impact of incident	Notification to Pipeline Ownership	Notification to Pipeline Ownership

DOWNGRADING THE LEVEL OF EMERGENCY

Once the incident situation improves, the decision to downgrade an emergency will be made by the EOC Manager in consultation with the AER, local authority, Provincial /and or State Emergency Management Services authorities.

The EOC Manager will designate whether an emergency situation is appropriately assigned under the above table designation. The emergency level will then be communicated to all emergency responders and agencies as required.

3.4 INCIDENT ALERT & LEVEL 1 RESPONSE

			ACTIONS: All activities associated with an ALERT Level would be required supplemented by the following response procedures.	
Position	**ALERT - Internal Actions**	**ALERT - External Public**	**LEVEL 1 - Internal Actions**	**LEVEL 1 - External Public**
First On-Scene	• Assess the situation for safe approach. • Determine the appropriate emergency level. • Secure access. • Eliminate source of leak if possible. • Determine and communicate location of field command post. • Contact Joffre Pipeline Control Room to isolate if required. • Contact Pipeline Operations and Maintenance Team Leader. • Gather information for incident investigation.	• Determine immediate risk to public.	• Interface with Joffre Pipeline Control Room. • If leak has been validated, and is not able to be isolated at the field location, determine wind direction, speed, & dispersion characteristics • Maintain safety perimeters. • If leak has been slowed or stopped, downgrade the emergency level back to an Alert – only after consultation with the AER and EOC Manager.	• Take necessary actions to reduce any risk to the public or environment if release has potential to leave lease/site. • If leak is in Strathcona County, determine zones potentially impacted and communicate with EOC. • If leak increases the risk to the public – elevate to a Level 2 emergency.
NOVA Incident Commander (May be First on Scene)	• Establish or report to the field command post. • Take command of the command post. • Verify wind direction and speed and evaluate dispersion and risk to public. • Establish air monitoring requirements and assign monitoring duties to Pipeline Technicians. • Verify Emergency Level and communicate to Joffre Control Room. • Assess isolation options and request appropriate resources (flares etc.) through the Pipeline Operations and Maintenance Team Leader.	• Determine if required to notify Local Emergency Authorities.	• Communicate with the Municipal EOC on the nature and status of the incident and tactical response operations, i.e. wind direction, speed and relevant product size and dispersion characteristics. • Communicate recommendations to Pipeline Operations and Maintenance Team Leader.	• Liaison with external emergency support services if they are requested and arrive on site. • Determine need for filing message with EAPUOC IVR system if in greater Edmonton area.
Pipeline Operations and Maintenance Team Leader	• Contact EOC manager and apprise them of the situation. • Activate Pipeline Team Emergency Call in if warranted. • Determine flaring options if leak is validated. • Contact Environment and Regulatory Team and communicate the emergency level. • Dispatch other pipeline technicians if warranted. • Follow through with Incident investigation.	• Determine immediate risk to public. • Consider notifying Pipeline Ownership.	• Communicate with the EOC Manager and request activation of the EOC and advise them of the situation. • Activate the NOVA Chemicals Pipeline Communicator line if required • Verify closest isolation valves, requirements for roadblocks, and flaring if required. • Communicate to EOC Operations Section chief on resource requirements. • Communicate to EOC Operations Section chief on requirements for identifying landowners and any special needs through stakeholder database and contacting them.	• Ensure required contact is made with local authority, police, the local Health Services Agency, government agencies, and support services required to assist with initial response if the hazardous release goes off site and has the potential to impact the public or if NOVA Chemicals has contacted members of the public or the media. Consider notifying Pipeline Ownership.
Pipeline Technician	• Conduct scene survey, assess situation, report and prioritize activities and take required action to protect the safety of people, property and the environment. • Establish a safety perimeter through LEL detector monitoring. Refer to FIGURE 2, page 3-21. • Contact Joffre Pipeline Control Room Operator. • If leak cannot be isolated, establish On Scene Command Post. • If there is no risk to the public, maintain safety perimeter.	• Establish a safety perimeter through LEL detector monitoring.	• Take direction from NOVA On-Scene Incident Commander. • Close or verify closed, the closest upstream and downstream valves. • Set up flares and commence flaring if required. • Communicate status of incident to Pipeline Operations & Maintenance Team Leader.	• Set up road barriers as part of a safety perimeter to inform the public of potential for a dangerous situation. Maintain the safety perimeter through LEL detector monitoring. • Compile lists of individuals within the EPZ that are not included in the automation notification data base. • Identify any special needs. • Contact residents requesting early notification of Emergency in Progress within the EPZ.
Joffre Pipeline Control Room	• Isolate pipeline upstream and downstream if required. • Contact Pipeline Operations and Maintenance Team Leader or Designate. • If Leak is validated by Leak Warn, then call 222 and request EOC notification. • EOC designate will contact EOC Manager and apprise them of the situation. • Monitor leak detection system. • Maintain stable operations.		• Maintain stable operations and isolate as required. • Contact supply/customer plants and advise them of the situation and operational restrictions.	
Environment & Regulatory On-Call	• Calculate leak volumes for reporting to regulator.	• Contact regulator of product released. • Alert regulator of venting and/or flaring requirements.	• Assess additional Environmental or Regulatory team requirements. • If EOC is activated, support Responsible Care Section Chief role.	• Notify AER and local authority, i.e. Alberta Health Services, police, if required for initial response, and if public or media is contacted

			ACTIONS: All activities associated with an ALERT Level would be required supplemented by the following response procedures.	
Position	**ALERT - Internal Actions**	**ALERT - External Public**	**LEVEL 1 - Internal Actions**	**LEVEL 1 - External Public**
				nd after internal resources have been communicated with and activated to confirm the level of emergency and convey the specifics of the incident.
EOC Manager	• Determine support requirements and activate complete EOC if any potential for escalation exists above Alert level.	.	• Activate the EOC. • Determine EOC requirements. • Prepare to activate Communicator System for Strathcona County if required. • Determine availability of a NOVA representative to travel to Local Authority EOC if required.	• As requested by Incident Commander, activate emergency communications to impacted area residents who have requested early notification. • Coordinate media statement with Public Information Officer.
Operations Section Chief	• No responsibilities at ALERT level.		• Work with the EOC Communications Leader to ensure that all pertinent information is communicated. • Act as a fundamental resource to the EOC Manager to ensure all information has an appropriate action taken. • Acts as a liaison between the field activities and EOC management group. • Identify critical actions to protect critical assets. • Assist with development and execution of Incident Action Plan. • Develop and implement business continuity plans and business resumption plans.	
Emergency Response Section Chief	• No responsibilities at ALERT level.		• Is responsible for managing and supporting all emergency response operations, including rescue, fire suppression, hazardous materials, security, and environmental response. • Supervise / support EOC Communications Leader. • Manage security aspects of the incident. • Assist with development and execution of Incident Action Plan. • Contact Municipal Director of EMS / Emergency Management. • Prepare to send list of residents potentially requiring notification to the Municipal Director of EMS / Emergency Management.	
Planning Section Chief	• No responsibilities at ALERT level.		• Provides specific information related to the impacted areas. Specific Data related to design capacity. • Provides calculated rated flow based on known information. • Ensures appropriate incident documentation • Develops Incident Action Plan	• Continue plume tracking /monitor potentially impacted Public using Resident stakeholder database. • Maintain communication with regulatory bodies to validate emergency level.
EOC Administrator	• No responsibilities at ALERT level.		• Maintain an ongoing display of emergency status and actions taken by the EOC. • Supports all Sections of the EOC administratively. • Reports to the Planning Section Chief	
Logistics / Finance Section Chief	• No responsibilities at ALERT level.		• Is responsible for timely, cost-effective procurement, delivery, and staging of essential resources. • Manages all costs incurred during incident response.	• Manages Third Party claims.
Public Information Officer	• No responsibilities at ALERT level.		• Prepare standby statement for the media if required. • Prepare statement for individuals in the impacted EPZ.	• Coordinate any media releases with regulatory bodies prior to release. • Contact impacted residents who have requested early notification.
Responsible Care Section Chief	• No responsibilities at ALERT level.		• Coordinate contact with Environment & Regulatory On-Call member that has been in contact with the applicable Provincial / State / Federal regulatory agency.	

			ACTIONS: All activities associated with an ALERT Level would be required supplemented by the following response procedures.	
Position	**ALERT - Internal Actions**	**ALERT - External Public**	**LEVEL 1 - Internal Actions**	**LEVEL 1 - External Public**
EOC Communications	• No responsibilities at ALERT level.	• In Strathcona County, activate the communicator system with the resident data base to notify residents of incident and what appropriate actions to take. • Manages radio and telephone communication to and from EOC.	• Act as link to On Scene Incident Command and EOC.	• In Strathcona County, activate the communicator system with the resident data base to notify residents of incident and what appropriate actions to take. • Manages radio and telephone communication to and from EOC.

3.5 INCIDENT CLASSIFICATION LEVEL 2 & LEVEL 3 RESPONSE

	ACTIONS: All activities associated with Level 1 would be required supplemented by the following response procedures.		ACTIONS: All activities associated with Level 2 would be required supplemented by the following response procedures.	
Position	**LEVEL 2 - Internal Actions**	**LEVEL 2 External Public**	**LEVEL 3 - Internal Actions**	**LEVEL 3 External Public**
First On-Scene	• Interface with Joffre Pipeline Panel and call 911 requesting services.	• Determine immediate risk to public.	• Same as Level 2	• Same as Level 2.
NOVA Incident Commander (May be First on Scene)	• Establish contact with 911 Emergency Services and direct to site. • Communicate Level of Emergency to EOC. • Communicate recommendations to Pipeline Operations and Maintenance Team Leader.	• Incident Command will establish EOC interface as they deem required. • Develop a Unified Command Post or relinquish and support Local Authorities Command Post. • Work with Local Authorities to determine Shelter in Place or evacuate recommendation, block locations and determine plume ignition options. • If in Strathcona County communicate shelter in place or evacuate recommendations to EOC Manager. • Determine if Local Authorities require assistance in contacting residents if required. Assist in evacuation or notification as required.	• Communicate elevated level to EOC. • Request aircraft through EOC manager in accordance with the ERP. • Request Dispatch for Aircraft Ground Survey. • Support local EMS.	• Support Local Incident Command Post. • Continue to maintain safety perimeter. • Continue assisting with evacuation or notification. • Support in all aspects as with Level 2.
Pipeline Operations and Maintenance Team Leader	• Drive to site as required. • Maintain communication with the EOC Manager and advise them of the situation. • Act as resource of the NOVA Chemicals Incident Command.	• Manage on site media as required. • Verify all residents have been notified. • Notify Pipeline Ownership.	• Maintain communication with Local and NOVA Chemicals EOC. • Manage Media on site and direct to EOC. • Install N2 Pumper to sweep line. • Continue flaring if warranted.	• Manage on site media as required. • Verify all residents have been notified. • Notify Pipeline Ownership.
Pipeline Technician	• Take direction from on-site command post. • Ignite plume if authorized by Local Authorities. • Continue flaring or set up flares at the closest upstream and downstream location and begin flaring product as required. • Send list of residents requiring notification to the Incident Command Post.	• Set up roadblocks as required and maintain a safety perimeter through LEL detector monitoring. • Send list of residents requiring notification to the Municipal Director of EMS. • If Strathcona County rural area phone residents notifying them of Evacuation or Shelter in place requirements. • Notify NOVA Chemicals Incident Command of Strathcona County Rural Residents contacted and results. i.e. No response or special needs. • Determine need for filing with EAPUOC IVR system if in greater Edmonton area. Continue updates to EAPUOC IVR.	• Take direction from on-site command post. • Continue flaring as required. • Advise Incident Commander of any change of conditions. • Install N2 pump to sweep line if required.	• Maintain a safety perimeter and adjust if required. • Verify all rural Strathcona County residents have been notified. • Continue updates of EAPUOC IVR system if in greater Edmonton area.
Joffre Pipeline Control Room	• Maintain stable operations. • Activate secondary isolation as required.		• Maintain stable operations. • Monitor Pressures and manage system operations.	
Environment & Regulatory On-Call	• Interface with EOC Planning Coordinator. • Provide environmental technical advice to on scene as required.	• Liaison with external Government Environmental Agencies as required.		• Liaison with external Government Environmental Agencies as required.
EOC Manager	• Has overall accountability to ensure the emergency is managed. • Determine EOC requirements. • Provide direction to the EOC. • Contact Pipeline owners and apprise them of the situation. • Contact Corporate Crisis Management to inform them of incident classification.	• Dispatch NOVA Chemicals EOC representative to Local Authority EOC if requested. • As requested by Incident Command, activate emergency Communications System to impacted zones within the High-Density Area in Strathcona County. • Initiate Shelter in Place or evacuation as required. • Work with Strathcona County Emergency Management for Broadcast Message. • Contact Reception Centre through Strathcona County Emergency. • Update the AER and local Emergency Services Agencies for the Alberta Pipeline incident.	• Notify Corporate Crisis Management. • Determine EOC requirements. • Provide direction to the EOC. • Contact Pipeline owners and apprise them of the situation. • Dispatch aircraft as requested and if required. • Maintain media interface. • Update status of incident to pipeline owners. • Prepare for any back-up resources & accommodations. • Update the Municipal Director of Emergency Management.	• Dispatch NOVA Chemicals EOC representative to Local Authority EOC if requested. • As requested by Incident Command, activate emergency Communications System to impacted zones within the High-Density Area in Strathcona County. • Initiate Shelter in Place or evacuation as required. • Work with Strathcona County Emergency Management for Broadcast Message. • Contact Reception Centre through Strathcona County Emergency Management.

Emergency Response Section Chief	• Is responsible for managing and supporting all emergency response operations, including rescue, fire suppression, hazardous materials, security, and environmental response. • Supervise / support EOC Communications Leader. • Manage security aspects of the incident. • Assist with development and execution of Incident Action Plan.	• Call and maintain contact with Emergency Management Regional Field Officer responsible for contacting Regional Health Authority and all other Government Agencies and Emergency Broadcast notifications.	• Is responsible for managing and supporting all emergency response operations, including rescue, fire suppression, hazardous materials, security, and environmental response. • Supervise / support EOC Communications Leader. • Manage security aspects of the incident. • Assist with development and execution of Incident Action Plan.	• Maintain contact with Emergency Management Regional Field Officer responsible for contacting Regional Health Authority and all other Government Agencies and Emergency Broadcast notifications. • Provide NOVA Chemicals Occupational Health contact for Regional Health Authority interface.
Planning Section Chief	• Provides specific information related to the impacted areas. Specific Data related to design capacity. • Provides calculated rated flow based on known information. • Ensures appropriate incident documentation. • Develops Incident Action Plan.	• Continue plume tracking /monitor potentially impacted Public using Resident stakeholder database. • Maintain communication with regulatory bodies to validate emergency level.	• Provides specific information related to the impacted areas. Specific Data related to design capacity. • Provides calculated rated flow based on known information. • Ensures appropriate incident documentation. • Develops Incident Action Plan.	• Continue plume tracking /monitor potentially impacted Public using Resident stakeholder database. • Maintain communication with regulatory bodies to validate emergency level.
EOC Administrator	• Maintain an ongoing display of emergency status and actions taken by the EOC. • Supports all Sections of the EOC administratively. • Reports to the Planning Section Chief.		• Maintain an ongoing display of emergency status and actions taken by the EOC. • Supports all Sections of the EOC administratively. • Reports to the Planning Section Chief.	
Logistics / Finance Section Chief	• Is responsible for timely, cost-effective procurement, delivery, and staging of essential resources. • Coordinate with Pipeline team the dispatch of Nitrogen pumpers and tankage to assist in a nitrogen sweep of the line if requested. • Arrange on going back up to field resources and accommodations as required. • Manages all costs incurred during incident response.	• Dispatch aerial surveillance in accordance with the Pipeline ERP. • Assist Local authorities in arrangement of Public Transportation to reception areas if requested. • Manages Third Party claims.	• Is responsible for timely, cost-effective procurement, delivery, and staging of essential resources • Coordinate with Pipeline team the dispatch of Nitrogen pumpers and tankage to assist in a nitrogen sweep of the line if requested. • Arrange on going back up to field resources and accommodations as required. • Manages all costs incurred during incident response.	• Dispatch aerial surveillance in accordance with the Pipeline ERP. • Assist Local authorities in arrangement of Public Transportation to reception areas if requested. • Manages Third Party claims.
Public Information Officer	• Is responsible to communicate with employees, public and the media.	• Contact residents as requested from Pipeline Technicians and communicate the appropriate message. • Continue updates to EAPUOC IVR if in greater Edmonton area. • Provide and maintain media interface as required.	• Is responsible to communicate with employees, public and the media.	• Establish Communications with Local Authority Emergency Operations and verify resident information has been received. • Assist Local Authorities as requested. • Offer assistance in calling residents. • If the incident is in Strathcona County and if requested by the pipeline team, assist the phoning of the rural residents not covered in zones.
Responsible Care Section Chief	• Is responsible for all matters of safety (including safety of emergency responders, employees, and affected public), health, hygiene, environment, and regulatory compliance. • Obtains support as necessary from other RC functional areas. • Develops RC incident goals and strategic objectives. • Ensures adherence to RC policies and principles and regulatory requirements during response operations.	• Maintain communication with regulatory bodies. • Validate elevation of the emergency level with applicable regulatory agencies.	• Is responsible for all matters of safety (including safety of emergency responders, employees, and affected public), health, hygiene, environment, and regulatory compliance. • Obtains support as necessary from other RC functional areas. • Develops RC incident goals and strategic objectives. • Ensures adherence to RC policies and principles and regulatory requirements during response operations.	• Maintain communication with regulatory bodies. • Validate elevation of the emergency level with applicable regulatory agencies.
Occupational Hygiene	• Travel to site if required.	• Interface with Alberta Health Services If required.	• Travel to site if required.	• Interface with Alberta Health Services.
Corporate Crises Centre			• Initiate / monitor feedstock and customer commitments and adjustments based on emergency conditions.	• Develop a corporate media statement. • Determine public follow-up. • Manage pipeline owner interface and public response.
EOC Communications	• Act as link to On Scene Incident Command and EOC.	• In Strathcona County, activate the communicator system with the resident data base to notify residents of incident and what appropriate actions to take. • Manages radio and telephone communication to and from EOC.	• Act as link to On-Scene Incident Command and EOC.	• If in Strathcona County, as requested by Incident Commander. Activate emergency communication to impacted areas. • Utilize the communicator with the resident data base to notify residents of incident and what appropriate actions to take, complete notifications and track results. • Notify On-Scene Incident Commander of communicator results and outstanding notifications. • Manages radio and telephone communication to and from EOC.

FIGURE 2 DEFINING THE HAZARD AREA

DEFINING THE HAZARD AREA

EMERGENCY PLANNING AND RESPONSE ZONES

EMERGENCY PLANNING ZONE (EPZ)

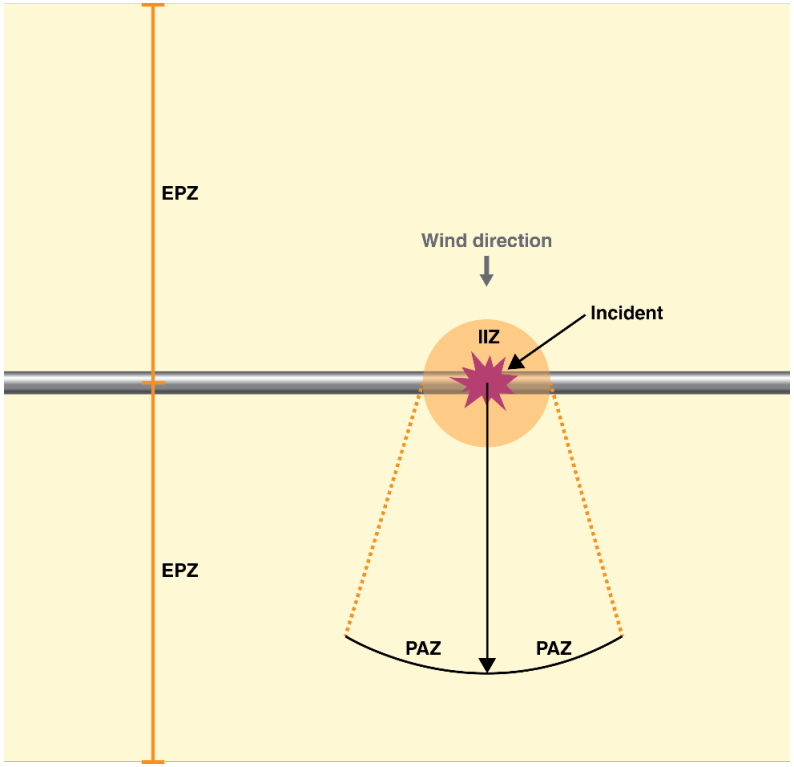
An Emergency Planning Zone (EPZ) is a geographical area surrounding the pipeline that requires specific emergency response planning. NOVA Chemicals has applied the technical parameters covered in the EPZ Analysis for HVP Pipelines and has determined that the following EPZ distances for the selected pipeline diameters be used:

Pipeline Size	*Ethane*	*Ethylene*
3”	*250 metres*	*250 metres*
4”	*300 metres*	*350 metres*
6”	*500 metres*	*550 metres*
8”	*700 metres*	*750 metres*
10”	*900 metres*	*1000 metres*
12”	*1100 metres*	*1200 metres*

The measurements to be used are from center point of the Pipeline to either side.

Initial Isolation Zone The initial isolation zone (IIZ) defines an area in close proximity to a continuous hazardous release where indoor sheltering may provide temporary protection due to the proximity of the release. If safe to do so, the licensee must attempt to evacuate the residents from the IIZ.

Protective Action Zone The estimated size of the protective action zone (PAZ) is calculated using modelling software. Immediately following a release of HVP product, the approximate size and direction of the PAZ can be determined using actual conditions at the time. Once monitoring equipment arrives, the actual size of the PAZ can be determined based on the monitored conditions.



4.1 NOTIFICATION / REPORTING RESPONSIBILITIES

This section indicates those contacts that may be required in the event of an emergency and lists the individual responsible to ensure that appropriate Provincial or State notification is made.

TABLE 4 NOTIFICATION RESPONSIBILITY

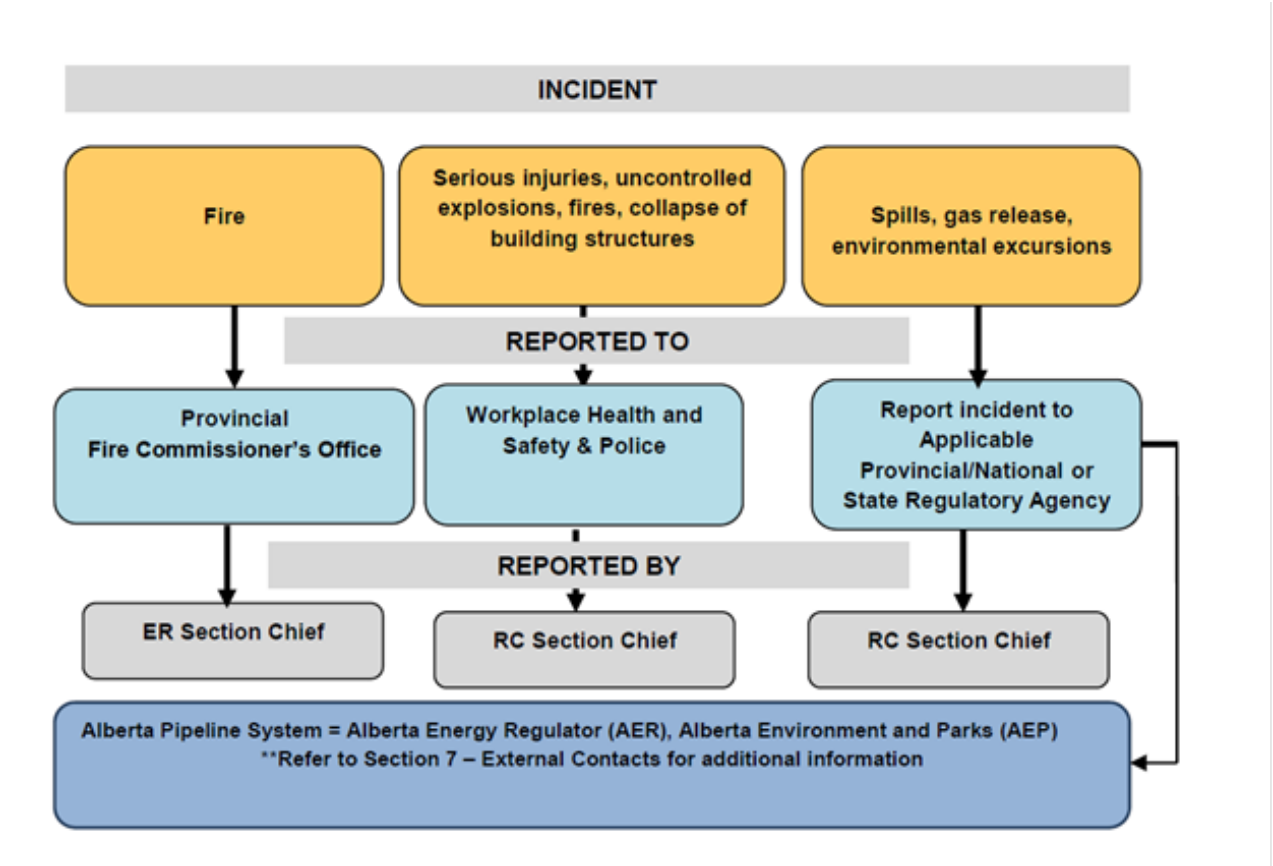
PIPELINE SYSTEM	CONTACT TO BE NOTIFIED	RESPONSIBILITY	TIMING
ALBERTA	Alberta Energy Regulator (AER)	Responsible Care Section Chief	Immediately
ALBERTA	Alberta Emergency Management Agency (AEMA)	Emergency Response Section Chief	As required
ALBERTA	Alberta Workplace Health and Safety	Responsible Care Section Chief	As soon as reasonable
ALBERTA	Alberta Health Services	Emergency Response Section Chief	As required
ALBERTA	Fire Commissioner	Emergency Response Section Chief	Next business day
ALBERTA	External Emergency Support (911)	Emergency Response Section Chief / Pipeine Control Room Operator	As required
ALBERTA	Canadian Industrial Risk Insurers	Corporate Crisis Management Team	Corp Risk Notification
ALBERTA	Community Follow-up	EOC Public Information Officer	As required
ALBERTA	Corporate Management	EOC Manger	Corporate Crisis Mgt Plan
ALBERTA	Public Emergency Notification	Emergency Response Section Chief/Local Municipalities	As required
ALBERTA	Unit Management	Tech Leader/UOL Responsibility	As required
ALBERTA	Employees immediate family	Public Information Officer / Human Resources	As required
ALBERTA	Police (Fatality)	Emergency Response Section Chief	Immediately

4.1 NOTIFICATION / REPORTING RESPONSIBILITIES continued. . .

4.1.1 REPORTING OF EMERGENCIES

Reporting Spills, Releases and Emergencies

Any spill, release or emergency that **may** cause an adverse effect to the environment or pose a risk to public health or safety must be immediately reported. Immediate reporting allows Provincial Regulatory Agencies to provide advice to take in a timely fashion and communicate to first response teams and the responsible party to ensure that actions are taken quickly and to protect safety and the environment. Governmental regulations require that reports of emergencies be submitted to them. These include:



4.2 CORPORATE CRITICAL / MAJOR INCIDENT NOTIFICATION

Corporate notification will be completed as determined by the EOC procedures.

4.3 REGULATORY NOTIFICATION

Serious Injury

Notification to OH&S will be by the Responsible Care Section Chief or an MW Safety Specialist. This notification will take place immediately when the Safety Specialist is informed of an occurrence, which warrants this action.

Fires

Any **fires** on the pipeline are to be reported to the Fire Commissioner (Alberta) by the Joffre Site EOC Emergency Response Section Chief function (Fire Safety Codes Officer) as soon as possible.

Workers Compensation Act Requirements (Alberta)

Under the Worker's Compensation Act, whenever a worker suffers personal injury on the work site or is entitled to medical aid because of an accident or is likely to be disabled for more than the day of the incident, you must:

- Report the accident to the Worker's Compensation Board within 72 hours.
- Notify the Board, within 24 hours, when you learn that the worker has returned to work or is able to do so.

4.3.1 ALBERTA ENERGY REGULATOR (AER)

The Joffre Site Emergency Operations Center (EOC) must ensure that someone is designated to orally report to the AER at the first available opportunity**.** (Form 13.6 contains the "AER First Call Communication") template.

IL 98-1 MOU between ALBERTA ENVIRONMENT AND PARKS (AEP) /AER

Purpose of this Informational Letter is the **one window approach** for those reporting requirements that overlap jurisdictions. As a result of the MOU, the two agencies do share a common emergency notification number. One call to this number will meet the reporting/notification requirements of both AER and AEP.

4.3.1 ALBERTA ENERGY REGULATOR (AER) continued. . .

HOW TO REPORT

Releases must be reported at the first available opportunity, as soon as the person responsible knows or should know about the release.

Reports can be made by phoning: **1-800-222-6514**

NOVA Chemicals shall immediately orally report to the emergency notification line for:

- A release more than 2 m^3 on lease.
- Any release off lease.
- Any release or break from a pipeline (including during pressure test).
- Pipeline hits.
- Uncontrolled gas release > 30,000 m^3.
- Any release that may cause, is causing, or has caused an adverse effect*.
- Any burning of effluent from a well or facility.
- Release of a substance into a water body.

*The AER will send a Release Report to be completed by the licensee to collect information for incident closure.

Note* that surface releases as a result of Horizontal Directional Drilling activities are considered non-emergency, as per the AER's *Bulletin 2017-09 Reporting Non-Emergency Releases from Pipeline Horizontal Directional Drilling:*

- There are no potential adverse impacts.
- Release volume is less than 2 m^3.
- Release is greater than 50 metres from a water body.
- The drilling fluid consists of bentonite, fresh water and non-toxic additives, products or chemicals.
- Release is contained on the right-of-way and any affected parties.
- Release is contained on the right-of-way and any affected parties (e.g., landowner, grazing lease holder, etc.) have been notified.

4.3.1 ALBERTA ENERGY REGULATOR (AER) continued. . .

- All the drilling fluid additives, products, or chemicals have guidelines listed in Alberta Tier 1 or Alberta Tier 2 Soil and Groundwater Remediation Guidelines or Canadian Environmental Quality Guidelines and do not exceed those guidelines; and
- Released material will be cleaned up completely.

If any of the above criteria are not met, the company must immediately report the incident to the AER.

4.3.2 ALBERTA ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT (EPEA)

The Release Reporting Regulations under EPEA deal with the release of substances into the environment and set out requirements for reporting of such releases to AEP. Reporting is required when a release of substance from the NOVA pipeline into the environment **may** cause, **is** causing or **has** caused an adverse effect or if the release has the potential to cause an adverse effect to the environment.

An adverse effect is impairment of, or damage to, the environment, human health or safety, or property.

HOW TO REPORT

As above, releases must be reported at the **first available opportunity,** as soon as the person responsible knows or should know about the release by calling the common AER/AEP emergency line at:

1-800-222-6514

WRITTEN REPORT

A written report may be required to be submitted to the appropriate Alberta Environment and Parks Director within seven days after the immediate report.

Written reports can be faxed to (780) 427-3178 or mailed to:

Alberta Environment and Parks
111 Twin Atria Building
4999 – 98 Avenue
Edmonton, AB T6B 2X3
Or emailed to: ERC.Environment@gov.ab.ca

4.4 NOTIFICATION BETWEEN COMMAND CENTRES

If notification is required between Command Centre's, the communication protocol will be by phone. Depending on the incident, the Joffre Site EOC manager may choose to send another NOVA Chemicals EOC manager to the Local Emergency Management EOC to facilitate communication and/or the Local Emergency Management may choose to send a local representative to the NOVA Chemicals EOC for the same purpose. NOVA Chemicals will provide if requested, one or more pipeline technicians to respond to the local EOC to enhance communication and understanding of the incident and associated progress for containment. The communication frequency will depend on the size and circumstances of the incident.

4.5 NOTIFICATION OF NEXT OF KIN

During a pipeline incident with an injury or fatality, the Joffre Site EOC will:

- Provide leadership and the local police authority with employee information as required (employee profile, emergency contact information).
- Ensure resources are prepared to meet the immediate needs and anticipated needs.
- Will restrict communication regarding any incident details as authorized by the PIO and EOC manager.

In the case of a fatality, the local police authority or medical examiner is responsible for notification of the next of kin. The Joffre Site EOC will establish the local police authority contact, provide information and coordinate appropriate company representation.

4.6 RECORD KEEPING

All record keeping of external and internal contacts / notification will be kept as per NOVA Chemicals retention schedule. Contacts with regulators are documented within the Responsible Care Learning System.

5.1 INCIDENT SPECIFIC PLANS

5.1.1 OVERVIEW

Effective emergency preparedness is dependent on knowledge of the types of situations that will cause emergencies affecting the NOVA Chemicals Pipeline operations. This information is used to develop the response actions and procedures. By identifying and acknowledging potential risks, NOVA Chemicals can take the necessary actions to plan and prepare for emergencies.

Comprehensive risk assessments have been conducted for the NOVA Chemicals pipeline systems using the NOVA Chemicals internal Quantitative Risk Assessment (QRA).

The results of these risk assessments have been utilized in identifying and developing mitigation strategies and response procedures for a variety of pipeline failures. Examples of the causes of pipeline / operational failure are shown below. Note: a failure will not necessarily require an activation of the Emergency Response Plan.

CAUSE	CAUSE OF FAILURE
Construction damage	Construction damage (improperly applied or damaged coatings, inadequate support.
Damage by others	Damage to the pipeline by other parties (third-party excavation or interference).
Earth movement	Earth movement (watercourse change, slope movement, heaves, subsidence).
External corrosion	Corrosion to the external surface of pipe and/or mechanical pipe damage (dents, scrapes, gouges leading to corrosion failure).
Internal corrosion	Corrosion to the internal surface of pipe and/or corrosion to the internal surface of girth weld.
Joint failure	Mechanical joint failure (gasket or O-ring failure, internal joint coating failure, mechanical couplings failure) Miscellaneous joint failure (butt fusion, interference joints, fiberglass bonded or threaded joints, explosive welding).

5.1.1 OVERVIEW continued. . .

CAUSE	CAUSE OF FAILURE
Overpressure	Overpressure failure: Operating over the limits of the license.
Pipe	Pipe failure (pipe body failure due to stress corrosion cracking [SCC], hydrogen induced cracking [HIC], fatigue, laminations, mechanical damage).
Valve/fitting	Valve failure (seal blowouts, pig trap failures, packing leaks).
Weld	Girth weld failure (not by corrosion), sulphide stress cracking at the girth weld, seam rupture (electrical resistance weld [ERW] or other seam weld failure), or other weld failures (weldolets, thermowells).
Miscellaneous	Installation failure (at compressor, pump, or meter station), Miscellaneous (erosion, vandalism, lightning, flooding, animals).
Operator error	Operator error (operating against closed valve or blind, etc.).

5.2 ACTIVATION OF THE EMERGENCY RESPONSE PLAN

The plan may be initiated as a result of:

- Low pressure alarm activated on pipeline,
- Any unplanned loss of product on pipeline,
- Pipeline product release resulting in ignition or explosion,
- Phone call from the public, police, fire authorities or other industrial company representative,
- Phone call from the NOVA Chemicals area pipeline operator;
- Phone call from a producer, customer, or from a regulator (AER); and/or
- Operational failure.

Rate of leakage, type of product and atmospheric conditions will determine the degree and extent of hazard from a pipeline failure.

Regardless of the magnitude of any emergency, the priorities for any responder remain the same:

1. Life Safety.
2. Incident Stabilization.
3. Environment and Property Protection.

5.3 CONTROL ROOM OPERATOR RESPONSE

In the event that either a low-pressure alarm is activated on pipeline from loss of product, an operational failure has occurred, or a call is received by an outside caller, the NOVA Chemicals Control Room Operator is required to initiate the following procedures to verify the existence of a pipeline emergency and safely isolate the required section of pipeline if required.

Implement NOVA Chemicals Pipeline Emergency Response Plan.

1. Complete the Pipeline Incident Call Sheet, refer to Section 13, Forms, getting as much information as possible.
2. Immediately notify NOVA Chemicals Pipeline Operations & Maintenance Team Leader.
3. Immediately dispatch NOVA Chemicals pipeline operator to area to verify possible incident.
4. Initiate callouts of additional NOVA pipeline support personnel if required. (Request the Pipeline Operations & Maintenance Team Leader to activate the NOVA Chemicals Pipeline Communicator line).
5. Dispatch personnel and equipment to incident site if this has not already been done, call 9-1-1.
6. Ensure that the pipeline has been shut down safely - close valves as required.
7. Record all details of leak - location - leak type vapor/liquid - caller's name/return phone number, etc.
8. Maintain communications with persons on the Scene if possible.
9. If warranted, notify designated personnel to have EOC activated.
10. Closes isolation valves (as appropriate) if required - Only NOVA Chemicals pipeline. company personnel will operate valves controlling product flow in all NOVA Chemicals pipelines.

5.4 PIPELINE TECHNICIANS IMMEDIATE ACTIONS

Response procedures within the initial 10 minutes of the incident will determine operations for the next 60 minutes, and the first 60 minutes will determine operations for the first 8 hours.

The Pipeline Technician assigned to an incident will be the On-Scene Incident Commander and has key responsibilities in responding to a major leak and bringing the incident under control.

Before traveling to a suspected leak site, ensure that you have a reliable method of communication (cell phone) and a Pipeline Emergency Response Manual. If cell coverage is not available in the area, and the incident is not located near a landline (available at all pump station locations), then radios should be rented from local suppliers (arrange through the EOC).

5.4.1 RESPONSE TIME

In some cases, it may be appropriate to utilize our aerial surveillance contractor(s) to conduct an initial investigation from the air. Refer to Section 7 - External Contacts.

NOTE: Warn pilot of possibility of flying into a vapour cloud.

5.4.2 SAFETY

Know where you are at all times and update the EOC periodically. Complete a visual hazard assessment, and assess for further hazards (e.g., subsequent explosions from gas migration). Remember the basics, the more time, distance and shielding between you and the material, the lower the risk will be, so ensure that you are a safe distance from the pipeline at all times – 1 km or more, as wind may be blowing a vapour cloud towards you. Make note of wind direction in planning approach. Take action (only is it can be done without risk) to minimize the impact of the release. Before entering the area check the atmosphere with an appropriate LEL monitoring device.

5.4.3 SIGHT & SOUND

A major leak will produce significant noise, which may be heard 1 km to 3 km away.

- Stop the vehicle.
- Roll down the window at 1 km intervals.
- Listen for escaping gas noise.

A large pipeline leak will produce a visible vapour cloud. This vapour cloud may reach significant downwind distances and may not be visible to the outer extremity of the explosive limit.

5.4.4 CONFIRMATION

When a leak location is confirmed, relay all information back to the EOC and restrict travel into the area where possible until local emergency response agencies arrive. The NOVA Chemicals pipeline technician who will be assuming the role of On-Scene Incident Commander will:

- Identify the scope and nature of the problem.
- Establish site management and control of the incident.
- Ensure the safety of all personnel from all hazards.
- Survey the incident - identify the nature and severity of the immediate problem.
- Determine materials involved.
- Control Ignition Sources.
- Establish On-Scene Command Post (OSCP) at least 500 metres upwind from the rupture or leak along a line at a right angle to the pipeline.
- Establish a hot zone.
- After assessing the situation, consider having an escape route out of the area if conditions should suddenly deteriorate.
- Secure access to emergency area to a minimum distance of 1 km in all directions from a leak site if a vapour cloud exists. Further evaluation to extend beyond 1 km will be made by the Pipeline Technician.
- Ensure that Emergency Level 1, 2 or 3 is communicated and that appropriate authorities have been notified.
- Initiate public protective actions (PPA).

Supply the local authorities with any resident information (i.e. telephone numbers) we have in the immediate area utilizing Pipeline Resident-Landowner Database and/or local resources for information.

5.4.5 CONTROLLING THE HAZARDS

Determine whether responders should intervene and what strategic objectives and tactical options should be pursued to control the problem at hand. HVP pipelines present hazards that warrant more specific response actions at the site. Take actions to minimize the impact of the release.

- **Shut off the flow to pipeline** (pipeline personnel).
- Allow fire to burn out if fire is contained and exposures are protected.
- Ensure that no one except trained NOVA Chemicals personnel operate (open or close) valves or other pipeline equipment.

Collect, prioritize and manage hazard data and information from all sources, as appropriate, including:

- Technical reference manuals and information sources (i.e., Emergency Response Manual).
- Technical Information Specialists (i.e., Pipeline Industry Or Facility Representatives).
- Safety Data Sheets.
- Air monitoring and detection equipment.

5.4.6 RESCUE

- Rescue any injured personnel only if it is safe to do so.
- Expose as few emergency professionals as necessary to meet rescue needs.
- Rescue those not beyond help.
- If air monitoring indicates SCBA is to be worn, do not enter hazard area until air packs are available and ensure that the “buddy system” is used.
- Move those rescued beyond containment / isolation area.
- Administer emergency first aid.
- Transfer people to medical care, as appropriate.

5.4.7 ELIMINATE IGNITION SOURCES

- Coordinate with supplying gas company operations to shut off all pilot lights at metres or curb boxes.
- Identify buildings where service has been shut off and residents notified.
- Do not start vehicles within danger area.
- Alert electrical utility for broad-based power shut off, if needed.

5.4.8 PUBLIC PROTECTION

Sheltering indoors for HVP releases is the preferred way of protecting residents. It is a viable public protection measure in circumstances when:

- There is insufficient time or warning to safely evacuate the public that may be at risk,
- Residents are waiting for evacuation assistance,
- The release will be of limited size and/or duration,
- The location of a release has not been identified, or
- The public would be at higher risk if evacuated.

5.4.9 TRAFFIC CONTROL

- In conjunction with local emergency services, establish traffic control to ensure access by emergency services personnel by blocking off roads leading to incident site.
- Law enforcement personnel should patrol the perimeter of hazardous area to ensure security of area and re-route traffic away from hazardous areas.
- Direct all support emergency services vehicles to a pre-determined staging area until they are needed at the scene.
- Trained pipeline personnel, equipped with gas or vapour detectors, should patrol danger areas to detect spread of gas and vapours and should inform local officials of concentrations detected. This will establish access control perimeter points.

5.5 PIPELINE TECHNICIANS SUSTAINED ACTIONS

- Establish communications controls to the Pipeline Operations and Maintenance Team Leader and/or EOC for use in coordinating response operations.
- Fulfill the role as technical advisor on NOVA Chemicals Pipeline system and product to responding agency.
- Use nitrogen to push product past the leak point. Product is to be flared at a block valve site or pushed through an open block valve. In the latter case, when the nitrogen/product interface reaches a block valve, gas testing will determine when this valve should be closed.
- Use of portable flare to reduce pressure in isolated section of pipeline.

5.5 PIPELINE TECHNICIANS SUSTAINED ACTIONS continued. . .

- Work cooperatively with other emergency response organizations. Most provincial, government and local emergency response agencies will not be familiar with any of NOVA Chemicals products. The Pipeline Technician must communicate and cooperate with these agencies to ensure safe, appropriate and timely response to the emergency. Ensure product SDS sheets are available upon request for all external agencies who are responding to the incident.

Ensure NOVA Chemicals Pipeline Operations and Maintenance Team Leader is called to act as a company spokesperson at the site. A leak on any of pipelines may take 24 hours before the situation becomes safe and repair can be considered. The media will appear at the scene.

5.6 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal Protective Equipment (PPE) rule says that you must "assess the incident site to determine what hazards are present, or are likely to be present, which necessitates the use of personal protective equipment."

Vapours, gases, and particulates from hazardous substance response activities place response personnel at risk. For this reason, response personnel must wear appropriate personal protective clothing and equipment whenever they are near the site. The more that is known about the hazards at a release site, the easier it becomes to select personal protective equipment.

If hazards are present that responders cannot eliminate or control without PPE, the On-Scene Incident Commander must:

- Select the PPE that protects responders from the hazards.
- Require responders to use their PPE when they're exposed to the hazards.
- Communicate the selection decisions to all responders.
- Ensure that the PPE fits each responder.

While these are general guidelines for typical equipment to be used in certain circumstances, other combinations of protective equipment may be more appropriate, depending upon specific site characteristics.

5.6 PERSONAL PROTECTIVE EQUIPMENT continued. . .

There are basically four levels of personal protective equipment:

- **Level A protection** is required when the greatest potential for exposure to hazards exists, and when the greatest level of skin, respiratory, and eye protection is required. Examples of Level A clothing and equipment include positive-pressure, full face-piece self-contained breathing apparatus (SCBA) or positive pressure supplied air respirator with escape SCBA, totally encapsulated chemical and vapour-protective suit, inner and outer chemical-resistant gloves, and disposable protective suit, gloves, and boots.

- **Level B protection** is required under circumstances requiring the highest level of respiratory protection, with lesser level of skin protection. At most abandoned outdoor hazardous waste sites, ambient atmospheric vapours or gas levels have not approached sufficiently high concentrations to warrant level A protection -- Level B protection is often adequate. Examples of Level B protection include positive-pressure, full face-piece self-contained breathing apparatus (SCBA) or positive pressure supplied air respirator with escape SCBA, inner and outer chemical-resistant gloves, face shield, hooded chemical resistant clothing, coveralls, and outer chemical-resistant boots.

- **Level C protection** is required when the concentration and type of airborne substances is known and the criteria for using air purifying respirators is met. Typical Level C equipment includes full-face air purifying respirators, inner and outer chemical-resistant gloves, hard hat, escape mask, and disposable chemical-resistant outer boots. The difference between Level C and Level B protection is the type of equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main criterion for Level C is that atmospheric concentrations and other selection criteria permit wearing an air-purifying respirator.

- **Level D protection** is the minimum protection required. Level D protection may be sufficient when no contaminants are present or work operations preclude splashes, immersion, or the potential for unexpected inhalation or contact with hazardous levels of chemicals. Appropriate Level D protective equipment may include gloves, coveralls, safety glasses, face shield, and chemical-resistant steel-toe boots or shoes.

5.7 RESPONSE TO A LINE RUPTURE / MAJOR PIPELINE LEAK

The purpose of this guideline is to define the response procedures when a pipeline leak is reported to the Control Room. Specific response actions are provided for the On-Site Command Post and the Pipeline Technician, who fills the role of the On-Scene Commander.

5.7.1 OBTAINING INFORMATION ON A REPORTED LEAK

When a leak is reported to the Control Room by telephone, the Control Operator will obtain the following information and record it on the Pipeline Emergency Incident Call Sheet found in Section 13 of this ERP.

5.7.2 RECEIVING NOTIFICATION OF A PIPELINE LEAK

INFORMATION TO OBTAIN FROM PERSON REPORTING LEAK	SAFETY INSTRUCTIONS GIVEN TO PERSON REPORTING THE LEAK
• Note time of call. • Name, address and telephone number of person calling. • Type of emergency. • Is the product burning? • Is frost apparent at the leak or is a gas cloud forming? • How incident occurred, e.g. construction. • Location by legal description of proximity to town or clearly observable landmark. • Section, township, range, etc. if known. • Surroundings, e.g. near dwellings, public roads, forestry or railroad. • Weather – particularly wind direction and velocity. • Surroundings at the leak site – proximity of houses and name of residents if known, other buildings, roads, railroad, power lines, etc. • Any injuries; emergency aid required, such as ambulance. • Any actions taken to reduce the hazard or warn others. • Have others been notified – police, local authorities, etc.? • Have caller move to safe location away from area prior to using cell phone (if used to call in the incident), as they become an ignition source.	Provide safety instructions to person reporting the leak.: • Keep the “immediate area” evacuated. Only qualified company personnel and those directly instructed by qualified personnel are to enter the area. • Move away from the leak in the upwind direction. Direct others in the vicinity to do the same. Evacuate people from the immediate area, including workers and public. • Remain at a safe distance from the spill; do not enter any area where there is any suspicion of vapour being present. • In the case of a vapour cloud stay at least 850 m (1/2 mile) away from the leak location. • Eliminate sources of ignition in this zone and **do not** attempt to remove any equipment where this movement could cause ignition.

5.8 RESPONSE TO A FIRE / EXPLOSION

Regardless of the magnitude of any emergency, the priorities for any responder remain the same:

1. Life Safety.
2. Incident Stabilization.
3. Environment and Property Protection.

Before travelling to a suspected leak site, ensure that you have a reliable method of communication (radio and/or cellular telephone) and Pipeline Emergency Response Manual. If cell coverage is not available in the area, and the incident is not located near a landline (available at all pump station locations, then radios should be rented from local suppliers (arrange through the EOC).

- Know where you are at all times and that you are a safe distance from the pipeline.
- Update the Joffre Site Pipeline Control Room periodically.
- Complete a visual hazard assessment; assess for further hazards (e.g., subsequent explosions from gas migration).
- Take action (only is it can be done without risk) to minimize the impact of the release - Eliminate all ignition sources in immediate area if incident is only in a vapour release stage.
- *A major leak will produce significant noise, which may be heard 1 km to 3 km (0.6 to 1.86 mi) away. Stop the vehicle, roll down the window at 1 km (0.6 mi) intervals and listen for escaping gas noise.*
- *A large high vapour pressure (HVP) leak will produce a visible vapour cloud. This vapour cloud may reach downwind 1 km (0.6 mi) and may not be visible to the outer extremity of the explosive limit. The lower flash point products will have vapour clouds that may be visible.*
- *Upon* arrival at incident location, relay all information back to the Control Room and restrict travel into the area where possible until external emergency services arrive.
    - Position upwind, account for personnel, keep unnecessary personnel away. Protect people, property and the environment.
    - Establish isolation zones and set up barriers far away from any radiant heat generated from the fire/explosion.
    - Isolate fuel source if possible.

5.8 RESPONSE TO A FIRE/EXPLOSION continued. . .

- Notify NOVA Chemicals Pipeline Operations & Maintenance Team Leader and provide details of incident to assist in determining appropriate Level of Emergency.
- Before entering the area check the atmosphere with an appropriate LEL monitoring device.
- Request 9-1-1 assistance immediately.
- Establish traffic control to ensure access by emergency services personnel by blocking off roads leading to incident site – guide fire-fighting personnel to the scene.
- Work cooperatively with external response agencies when they arrive on-scene to ensure safe, appropriate and timely response to the emergency. Ensure that no one except trained NOVA Chemicals personnel operate (open or close) valves or other pipeline equipment.
- Employ Incident Command System (ICS).
- Fulfill the role as technical advisor on NOVA Chemicals Pipeline system and product to responding agency.
- Begin public protection measures – Shelter-In-Place or evacuation, if necessary.
- Maintain continuous monitoring for impacts of release as it relates to environment and personal safety. The magnitude of the emergency will determine the resources required at the scene. Additional resources will be available if needed through the NOVA Chemicals EOC.

FIREFIGHTING PROCEDURES

PRODUCT IS AN EXTREMELY FLAMMABLE - colorless liquefied gas while under high pressure with a sweet hydrocarbon odor. It is highly volatile, when released; will form explosive mixtures with air and will disperse as a highly flammable vapour cloud. If leaking vapours ignite, **do not extinguish flames unless leak source can be isolated and shut off**.

The vapour cloud explosion will combust in such a rapid manner that a blast wave is generated. Even when the vapour release is atmospheric, trees, buildings, terrain, etc. can create partial confinement conditions. The explosive event can also have associated missiles and high-velocity debris causing dramatic damage, secondary fires and is very difficult to accurately model.

Flammable vapours may spread from leak, creating an explosive re-ignition hazard. Vapours are initially heavier than air and will spread along ground and may travel to source of ignition and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

5.8 RESPONSE TO A FIRE/EXPLOSION continued. . .

Refer to Section 15.2 PIPELINE PRODUCT DETAILS for additional information on Ethane and Ethylene product overview.

- Immediately evacuate all personnel from hazard area.
- Do not direct water at source of leak.
- On-site fire brigades (USA) must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.
- Use self-contained breathing apparatus (SCBA) and protective clothing.
- Only if it safe, attempt to extinguish any secondary fires (grass fires, trees) that may have been started by the primary fire or explosion where applicable. Fire extinguishers are carried on each NOVA Chemicals pipeline operator's motor vehicle.
- External emergency response fire personnel are trained in fire suppression and will concentrate on preventing the fire from spreading any further, cooling any exposures were the fire is affecting it directly or by radiant heat once they arrive on scene and will follow general firefighting guidelines for their responding units. Other exposures that could be affected, including the jurisdiction's infrastructure are bridges and or major highways.
- Because the incident may be in a remote area, water supply may be scarce or nonexistent. The responding fire department will need to have plans in place to establish water supplies. This may include water tanker shuttles or long hoselays with pumper relays.
- Stage apparatus and equipment based on atmospheric monitoring and weather conditions.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool and protect surrounding area.

Note Reference Emergency Response Guidebook, Guide # 116P (Ethylene) & Guide # 115 (Ethane) for additional details and instructions of Fire Fighting Equipment/Instructions.*

5.9 VAPOUR CLOUD IGNITION

All responders must be familiar with the following guidelines for ignition of vapour clouds.

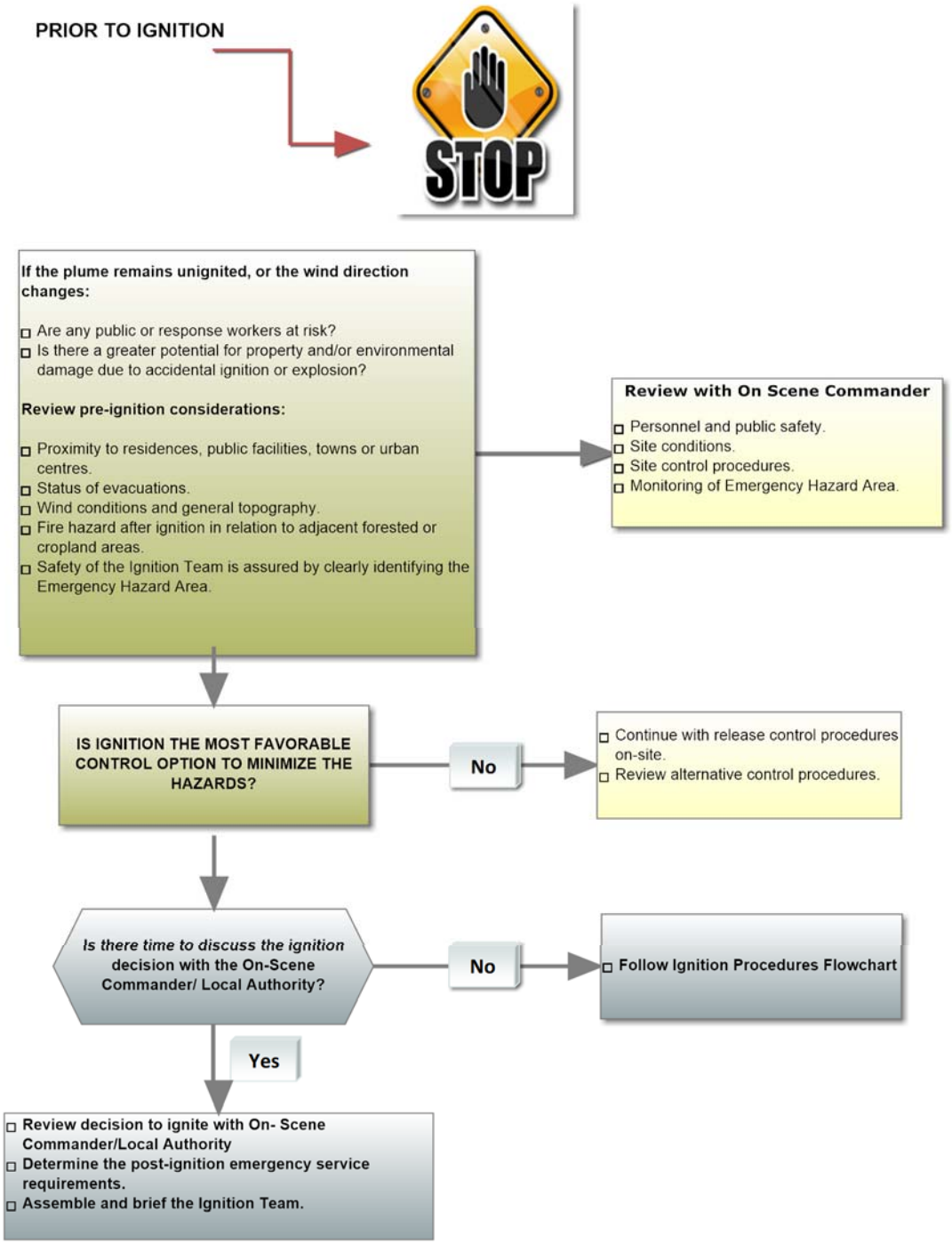
A vapour plume is the visible cloud or fog of hydrocarbon vapours emanating from an HVP pipeline leak site. It is a result of the hydrocarbon vapours condensing moisture out of the surrounding air. The visible vapours do not necessarily determine or indicate the extent of the hydrocarbon vapours. On a windy, dry day the visible portion may only exist for a short distance, while on a calm day it will be visible for a much greater distance.

The size of the leak and normal operating pressure of the line may also be a large factor in the size of the plume. A large break on a small line will produce a large cloud for a short time period after which it will reduce to the steady “boil off period”. If the line is large this “boil off period” may last several days.

It should be noted that the actual size and safe limits of a plume’s boundary would only be determined by using a combustible gas detector.

Refer to FIGURE 3 Pre-Ignition Criteria Flowchart to follow procedures prior to ignition of a vapour cloud.

FIGURE 3 PRE-IGNITION FLOWCHART



5.9.1 CRITERIA FOR IGNITION

SITUATIONS WHEN VAPOUR CLOUD WILL NOT BE IGNITED

- Injury and death to the public located inside and outside residences.
- Inability to control the resulting fire, especially with ripened crops or permanent, flammable structures.
- The expectation that the wind speed will increase and reduce the size of the flammable cloud, making ignition more attractive at a later time.
- Potential for employees or the public to inadvertently enter the cloud prior to or during the ignition.
- Heavily wooded areas, which may cause transition to explosion.

CONSIDERATION BEFORE IGNITION CAN TAKE PLACE

- Has the perimeter of the danger zone been secured with roadblocks?
- Have all personnel been evacuated from the area?
- Has the wind direction been established and is it being monitored?
- Is fire control equipment ordered and/or available at the site?
- Is personal protective equipment available?
- Have the proper authorities been notified and involved where appropriate?
- Are contingency plans in place to deal with the effects of ignition?
- Are all facilities, equipment, supplies, and medical response mobilized to look after the people?

RESPONSIBILITY

It is the responsibility of the Pipeline Technician to evaluate the merits of igniting the vapour cloud and, with the EOC Manager, make the decision regarding ignition. The Pipeline Technician will include the other responding agencies (such as the Regulators, County Officials, Fire Department, Police, etc.) in making the decision. The Pipeline Technician is responsible for assembling the ignition team that performs the ignition.

5.9.1 CRITERIA FOR IGNITION continued. . .

GENERAL GUIDELINES

All pipeline operators are equipped with vapour cloud ignition equipment and are trained to ignite a vapour release if deemed necessary. At the incident site, the Pipeline Technician must take measures to minimize the impacts of the emergency. One action that needs to be considered is igniting the vapour cloud. Prior to any plume ignition, a safety perimeter will be established using handheld monitors and will occur in cooperation with the Local Municipal Authorities.

Simulations indicate that vapour clouds reach their maximum size in less than two minutes. During this time, it is not possible to set up and ignite the vapour cloud. If the vapour has not reached a source of ignition downwind of the release point within this two-minute period, the chance of accidental ignition is reduced as long as the wind speed and direction remain essentially constant. This provides time for the Pipeline Technician to assess the situation and consider possible changes in release rates and atmospheric conditions, which might occur. Once this has been done, the normal procedure would include ignition of the vapour release unless there are good reasons not to do so.

The ignition must involve two people. The following must be considered by the ignition team:

1. **Ensure there is a safe retreat from the fire area.**
2. **Ensure there is protection from the initial blast by a distance of at least 300m or through the use of cover.**
3. **Ensure ignition team is in an upwind or crosswind direction from the vapour cloud.**

Ignition is an option that must be considered in the field in an emergency situation. Safety of the responders must not be compromised when considering this option.

5.10 BLOCK VALVE CLOSING

The Operating Technician must in all emergency situations use their experience and discretion. NOVA Chemicals Leadership understands that the decision to close a block valve carries enormous impact and this document confirms that management gives the decision to the Pipeline Control Room Panel Operating Technician and will support this decision. Leadership commits to providing the necessary training, simulations, drills, etc. to ensure that operating technicians are competent on pipeline operations.

The following steps for block valve opening, closing, and stopping in transition are to be used as a guideline for response.

The Manufacturing Infrastructure Leadership Team (MILT) supports and recommends the closing of appropriate block valves in the following situations:

- When a leak call is received from any NOVA Chemicals pipeline field technician or operations personnel.
- When a leak call is received from a recognized public authority such as the Police.
- County Emergency Response Authority.
- This call must be verified with a return phone call to a phone number identified in the Pipeline Emergency Response Manual.

When a leak alarm is identified on the computer-based leak detection system that is either:

- Verified on the Supervisory Control and Data Acquisition (SCADA) system, and one of the accumulated imbalances from the leak detection displays.

OR

- A combination of the two depending on the severity of the leak indication. Also, confirmed from a second accumulated leak detection imbalance.

The pipeline control centre operating technician must follow the appropriate operating procedure, notifying producer plants, derivative plants and other affected stakeholders of the situation.

5.10.1 SAFETY PRECAUTIONS

The operation of the pipeline mainlines and lateral block valves shall only be executed in emergency and turnaround conditions or during the Pipeline Preventative Maintenance program.

Except in emergency, block valves should not be opened at pressure differential greater than 1500 kPa, otherwise damage to seats and seals can occur. If the pressure differential across the valve is greater than 1500 kPa, the valve bypass should be opened first to equalize the pressure, before attempting to open the valve. Closing a valve can cause:

- Pressure increase upstream of the valve.
- Disruption of plants downstream of the closed valve.
- Sub-zero ambient temperature operation of block valves may result in seat and seal damage.

On the ethylene pipelines, decomposition may occur if a valve is opened too fast when there is considerable pressure difference between upstream and downstream pressures.

Operation of a block valve will cause line pressure transient, which may trip Pressure Deviation Alarms and cause Leak Detection System Alarms. Closure or opening of block valves voids the validity of Leak Detection Programs.

References

Terminal User's Guide for SCADA system (posted at P/L console).

Procedures

Refer to MI Operations procedure 0920.06 Opening / Closing / Stopping Pipeline Block Valve for specific instructions

5.11 RESPONSE TO A HYDROGEN PIPELINE LEAK

One of the pipelines that runs within the Joffre area is the Hydrogen Off Gas (HOG) pipeline, which runs from E2 to the Nutrien Site. In the case of a hydrogen pipeline leak, emergency procedures have been established to respond to this type of emergency. The Emergency Procedure for responding to a hydrogen pipeline leak is managed under E2 as Procedure 2 HE.073.

5.12 AIR MONITORING

All Pipeline Technicians are equipped with handheld Lower Explosive Limit (LEL) hydrocarbon monitoring equipment in their operations and maintenance vehicles. Also, the LEL detectors are capable of monitoring oxygen levels to alarm for low oxygen to warn of asphyxiation. The trucks carry calibration gases to allow for "bump testing" to ensure the equipment is functioning correctly. During the Mutual Understanding meetings with all the municipalities affected by NOVA Chemicals pipeline operations, LEL detection was determined as one of the roles of the Pipeline Operators providing support to the Local Incident Command.

In the event of an incident the LEL detection equipment will be used to:

- track the plume,
- determine if ignition criteria are met,
- determine whether evacuation and/or sheltering concentration criteria have been met,
- assist in determining when the emergency status can be downgraded,
- determine roadblock locations; and
- determine concentrations in areas being evacuated to ensure that evacuation is safe.

Monitoring will be completed on foot by a NOVA Chemicals designated employee, using handheld monitors with appropriate personal protective equipment (PPE). Each situation will require specific air monitoring requirements dependent on wind speed and direction, exposure to the public in the immediate area, traffic and road proximity etc. The Pipeline Technicians in cooperation with the Local Municipal Authorities will determine the appropriate monitoring dependent on the situation. Response Personnel/ and Public Protection will remain the primary priority throughout all monitoring activities.

It may be determined that further third-party air monitoring support is required and can be arranged by the EOC with potential sources listed in section 7, external contacts.

5.12.1 SAFETY PERIMETERS

A minimum safety perimeter of 50 - 100 metres would be established and continually monitored by patrol for small leaks. A safety perimeter of 1 kilometer would be established for large leaks. Roadblocks would be set up to maintain the safety perimeter. Any changes to the safety perimeter will be communicated immediately to the Local Municipal Authorities for adjustment to their restricted access containment.

5.12.1 SAFETY PERIMETERS continued. . .

If evacuation is required within the established safety perimeter, a pipeline operator with a handheld monitor will ensure the atmosphere is safe prior to completing the evacuation. If the edge of an unsafe environment is determined, then the Pipeline Technician will advise the Local Municipal Authorities of the hazardous atmosphere for considerations to either Shelter in Place or Evacuate. This decision will be deemed by the Local Municipal Authorities.

5.12.2 RESTRICTIONS TO AIR SPACE

NAV CANADA provides, maintains and enhances an air navigation service dedicated to the safe movement of air traffic throughout the country and through oceanic airspace assigned to Canada under international agreements.

It may be necessary for NAV CANADA to issue a Notice to Airmen (NOTAM) to advise pilots of restrictions in the airspace above the EPZ or to close the airspace for a certain radius from the release (a no-fly zone).

The EOC may recommend during a level 2 or level 3 emergency to the Provincial and/or State Regulatory Agencies to contact NAV CANADA. The phone number is listed in Section 7.2 – Federal Government Agencies.

5.13 FORT SASKATCHEWAN RIVER ROAD CLOSURE

PROTECTED FROM PUBLICATION – due to proprietary information on other operating companies, this section has been protected.

5.14 SECURITY

5.14.1 SECURITY ALARM FLOWCHART

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

5.15 BOMB THREAT

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

Bomb threats/incidents have the potential for creating a major emergency situation. These incidents will be managed in accordance with the procedure that follows. All bomb threats will be treated as real until proven otherwise.

In all cases of a bomb threat/incident the Police will be involved through Emergency & Security Services. In addition, if the threat is against the Alberta Pipeline System, the EOC Manager may communicate the threat to the Alberta Energy Regulator (AER).

5.15.1 BOMB THREAT FLOWCHART

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

5.16 VANDALISM OR BREAK-IN TO PIPELINE

Vandalism is any damage to the pipeline system designed to affect the operation of the pipeline, conducted with criminal intent.

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

5.17 SERIOUS INJURIES AND FATALITIES

5.17.1 SERIOUS INJURIES AND FATALITIES GENERAL RESPONSE

The nature of the emergency may be such that serious injuries and/or fatalities may occur as the result of a pipeline incident or in the course of any emergency response operation. These may be:

- Individuals in the emergency area at the time of the occurrence.
- Emergency response workers injured in the performance of their duties.

5.17.2 PROTECTION OF THE SCENE

Unless directed by a police officer, no one must disturb the scene of a reportable accident except to:

- attend to persons injured or killed.
- prevent further injuries or death.
- protect property that is endangered as a result of the accident.

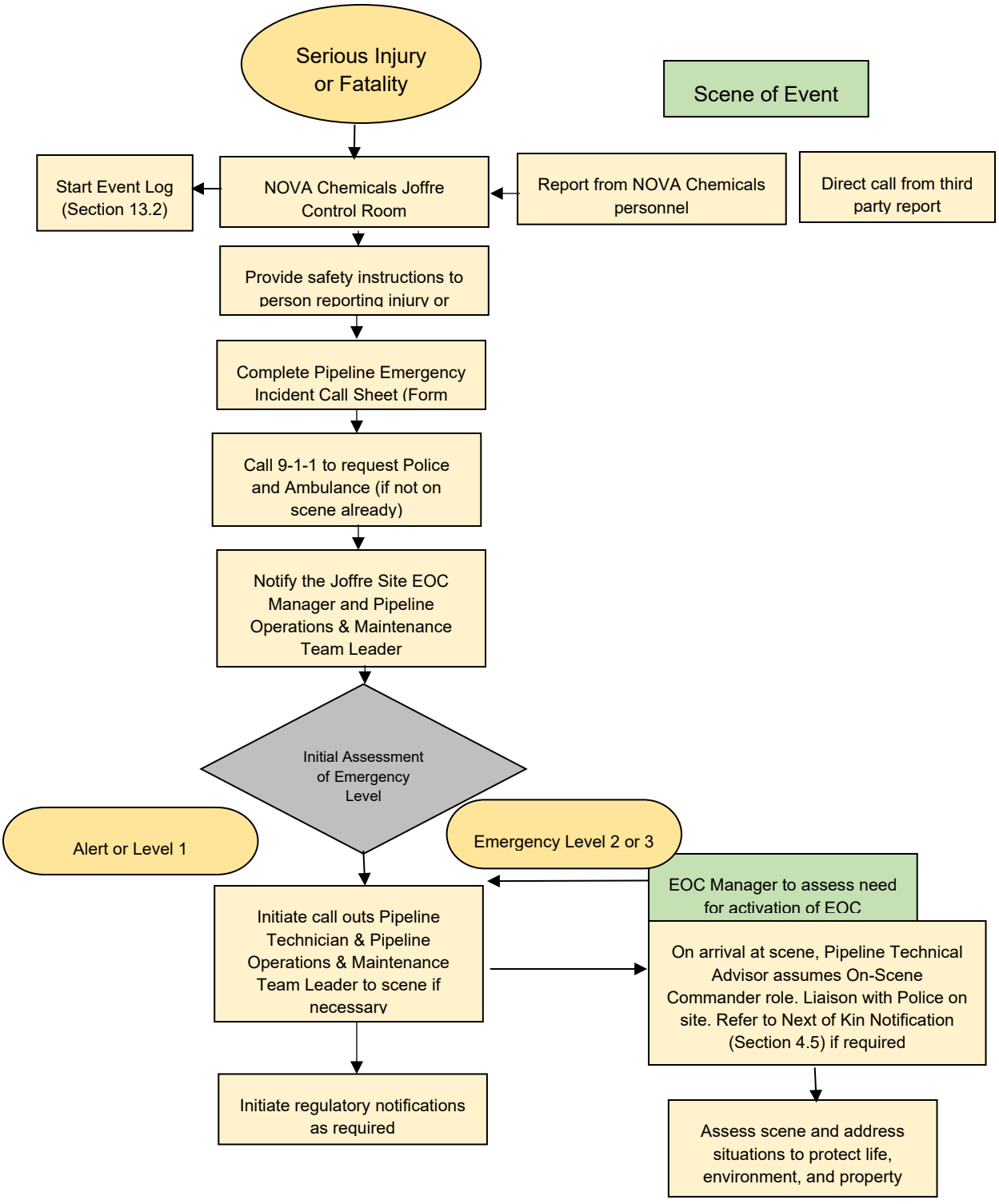
The Medical Examiner and the Police under the provisions of the Fatal Accidents Act, have jurisdiction over fatalities and the preservation of evidence. For the purpose of investigation, once it has been confirmed that a person is dead, the body should be left where it is unless:

- The Medical Examiner and/or the Police authorize movement of bodies.
- There is danger of further damage to the remains.

5.17.3 RESPONSE PROCEDURE

The following flowchart identifies the steps that should be followed once notification of a serious injury or fatality has been reported to the NOVA Chemicals Control Room.

5.17.4 SERIOUS INJURIES AND FATALITIES FLOWCHART



5.18 NATURAL DISASTERS

A natural disaster is a major adverse event resulting from natural processes of the earth; examples include floods, hurricanes, tornadoes, earthquakes, blizzards, wild land fires and other geologic processes. A natural disaster can cause loss of life or property damage and typically leaves some economic damage in its wake, the severity of which depends on the affected population's resilience, or ability to recover and also on the infrastructure available.

All field personnel should have the Alberta Emergency Alert on their individual cell phones receiving Alerts for the area that they are working in.

5.18.1 NOTIFICATION TO NOVA CHEMICALS CONTROL ROOM

If the NOVA Chemicals Control Room receives an emergency phone call, weather advisory notification, emergency alert, they need to ensure that they:

1. Implement NOVA Chemicals Pipeline Emergency Response Plan.
2. Notify On-Call Pipeline Operator for the area.
3. Notify NOVA Chemicals Pipeline Operations & Maintenance Team Leader.

5.18.2 ON-SITE PERSONNEL

1. Be prepared for any type of extreme weather conditions, stay informed to developing severe weather conditions.
2. If severe weather develops:
    - Ensure your own safety, seek shelter.
    - Account for personnel.
    - Notify NOVA Chemicals Pipeline Control Room of situation.
    - Secure facility shut in and isolate threatened facilities.
    - Be prepared in the event of a power failure.
    - After severe weather has passed, inform Control Room of conditions.
    - Deploy personnel and equipment to scene after disaster has passed, if necessary.

5.18.3 TORNADO

Personnel should also be aware of what to do if caught outdoors when a tornado is threatening. When the Alberta Emergency Alert issues a warning or other means, seek inside shelter, the protection and safety of personnel during severe weather is of the utmost importance.

If a shelter is not within walking distance, try to drive in a vehicle, using a seat belt, to the nearest shelter. If flying debris is encountered while in a vehicle, there are two options:

1. Stay in the vehicle with the seat belt on, keeping your head below the windows and covering it with your hands or a blanket.
2. If there is an area which is noticeable lower than the roadway, lie in that area and cover your head with your hands.

If you are in a building:

- Inform NOVA Chemicals Control Room of conditions and your location,
- Move to small interior rooms on the lowest floor and without windows, hallways on the lowest floor away from doors, windows, and skylights, rooms constructed with reinforced concrete, brick, or block with no windows,
- Stay away from outside walls and windows,
- Use arms to protect head and neck; and
- Remain sheltered until the tornado threat is announced to be over.

If you are travelling:

- Move your vehicle far to the side of the road (so as not to block emergency traffic).
- Inform NOVA Chemicals Control Room of conditions and your location.
- Find a sturdy shelter, if no sturdy shelter is nearby, getting low in a ditch is the next best option.
- Highway overpasses are one of the worst places to take shelter during tornadoes, as the constricted space can be subject to increased wind speed and funneling of debris underneath the overpass.

5.18.4 BLIZZARD

If stranded in a car or truck:

- Stay in vehicle!
- Inform NOVA Chemicals Control Room of conditions and your location.
- Run the motor about ten minutes each hour. Open the windows a little for fresh air to avoid carbon monoxide poisoning. Make sure the exhaust pipe is not blocked.
- Make yourself visible to rescuers
    - Turn on the dome light at night when running the engine.
    - - Tie a colored cloth to your antenna or door.
    - - Raise the hood after the snow stops falling.
    - - Exercise to keep blood circulating and to keep warm.
- Request to have personnel and equipment deployed to scene after disaster has passed, if necessary.

5.18.5 LIGHTNING

You are in danger from lightning if you can hear thunder. Lightning often strikes as far away as 10 miles from rainfall.

- Have all workers that are exposed on elevated structures such as, scaffolds, towers, tanks and in large open areas move to safe locations such as shops, lunchrooms, office buildings, etc. Although no place is absolutely safe from the lightning threat, some places are safer than others.
- Large enclosed structures (compressor buildings, sub-stations, pump houses, etc.) tend to be much safer than small or more open structures. The risk for lightning injury depends on whether the structure incorporates lightning protection, construction materials used, and the size of the structure.
- Inform NOVA Chemicals Control Room of conditions and your location
    - Park your vehicle away from trees and other tall structures.
    - In general, fully enclosed metal vehicles such as cars, trucks, etc. with the windows rolled up provide good shelter from lightning. Avoid contact with metal or conducting surfaces outside or inside the vehicle.

5.18.5 LIGHTNING continued. . .

- **Avoid** being in or near high places and open fields, isolated structures, communication towers, flagpoles, light poles, metal fences, and water.

Wait at least 30 minutes after the last flash before leaving the sheltered area. Research indicates that 50 percent of lightning related deaths occur after the storm has passed and most people think the storm is over.

If Thunder is heard. . .	The Lightning is. . .
5 seconds after a Flash	1 mile away
10 seconds after a Flash	2 miles away
15 seconds after a Flash	3 miles away
20 seconds after a Flash	4 miles away
25 seconds after a Flash	5 miles away
30 seconds after a Flash	6 miles away

5.18.6 WILD LAND FIRE

Always review conditions of the area you are travelling to prior to heading out in any situation.
If you have received information of a fire in a county that is in an area you are responsible for (irrespective of distance that the fire is away) you need to notify the Pipeline Operations & Maintenance Team leader to discuss the risks of going to your work area.

Considerations of that risk discussion should include:

- Understanding the local fire environment, daily weather conditions and current fire situation.
- Note that smoke generated from a wildfire also poses a serious health and safety risk. If you are caught in a smoke event and not at risk from an advancing fire, consider the following:
- Look for information on air quality in the area. The Air Quality Health Index provides a rating from 1 to 10 with low to high health risk. (Found at environment.alberta.ca/apps/aqhi/awhi.aspx.)

5.18.6 WILD LAND FIRE continued. . .

- Shelter in place, if there is a high risk of smoke from wildfires in a tightly closed, air-conditioned building.
- Shelter in vehicles can provide limited protection during a smoke event. For best results, keep windows closed and recirculate the inside air.
- If required to be outdoors during a smoke event, respirators should be worn, that have been fit- A decision to enter the area should consider – direction of the fire, wind speed.
- Monitor the wildfire situation through resources available, include local news, radio, website.
    - Wildfire.alberta.ca provides general status updates (ie. under control, being held, out-of-control) – however fire conditions can change quickly, and this should not be your only source of information.
- Engage with the local authority to find out location of fire and it's behavior.

5.19 OPERATIONAL FAILURE

Examples of Incorrect Operational Failure include mistakes that may occur when directing the flow of fluid, performing routine maintenance, or reacting to a condition on the pipeline.

An operator should consider the following:

- Upon receipt of an alarm or indication of a release condition – shut down pipeline segment (When in doubt, shut it down).
- Isolate the affected line segment where operational failure is believed to have occurred, either remotely or via direction to field responders (de-energize, and then sectionalize the line—close all valves around the suspected location as well as upstream and downstream).
- Notify designated NOVA Chemicals Pipeline Operations & Maintenance Team Leader Notify local emergency responders, as soon as possible to start mobilization of response support.

5a.1 PUBLIC AFFAIRS AND STAKEHOLDER RELATIONS

NOVA Chemicals emergency response public information communications objectives and strategies are outlined in the Corporate Crisis Management Plan.

Should an incident result in significant impact to stakeholders (e.g. land owners, the public, pipeline asset owners, customers), the Joffre Site EOC, together with Pipeline leadership, will outline timely next steps to keep these groups apprised of incident details, work with them to assess concerns/impacts to them or to determine their abilities to contribute to recovery efforts.

The priority is to minimize the impact of an incident on stakeholders and to demonstrate that NOVA Chemicals is concerned for the safety and interests of all stakeholders through the provision of timely and accurate information on:

- Incident details.
- Recovery activities.
- Effects on NOVA Chemicals services and operations.
- Expected timings for restoration of operations, and if appropriate.
- Actions that NOVA Chemicals is taking to prevent a recurrence.

Stakeholder engagement activities may include:

- Personal visits to determine the extent of impacts and discuss appropriate compensation.
- Business relationship consultation to address needs and ability to contribute to solutions.
- Other stakeholder consultations as appropriate for the incident (e.g. public information meeting).

5a.1.1 PUBLIC PROTECTION MEASURES

The type of public protection measures employed will depend on the severity of the incident and /or on the monitored results in the non-evacuated areas. Local authorities responding to the incident will determine the best public protection measures based on the incident.

Shelter-in-Place for HVP releases is the preferred way of protecting residents. It is a viable public protection measure in circumstances when:

- there is insufficient time or warning to safely evacuate the public that may be at risk,
- residents are waiting for evacuation assistance,
- the release will be of limited size and/or duration,
- the location of a release has not been identified, or
- the public would be at higher risk if evacuated.

5a.1.1 PUBLIC PROTECTION MEASURES continued. . .

NOVA Chemicals Pipeline Technicians will assist the local authorities to determine the best methods to protect the public based on parameters such as the magnitude of the incident, wind speed and direction, secondary fires, time of day, etc. Once resourced, the Joffre EOC may complete plume dispersion modeling to assist in determining evacuation or sheltering requirements. **Protection of the public is always the primary focus.** **Refer to Section 3.5 - FIGURE 2, page 3-21 for EPZ distances for selected pipeline diameters and definition of Initial Isolation / Protective Action Zones.**

All pipeline technicians, the Pipeline Team Leader, EOC and Joffre Security have the resident and landowner database and associated mapping software accessible. In the event of an incident, through discussions with the Local Authorities, the resident information can be sent electronically to the Local Emergency Management Services for contact use, as the Local Authorities deem appropriate. Affected residents will initially be contacted via telephone call with instructions to shelter in-place until it is deemed safe to evacuate or notice that incident is under control and safe for residents to resume normal activities. This has been discussed with each of the municipalities as part of the mutual understanding meetings and is consistent across all areas affected with the exception of Strathcona County. See Strathcona County Notification in section 5a.2. Only in the event that is has been deemed safe to evacuate residents within the EPZ, the following requirements will be activated:

1. **The most appropriate reception centers** will be decided by the Local Authorities at the time of the incident and will also be dependent on the incident, the number of people affected and the conditions. Residents will be required to register at the reception center with contact information as to where they can be reached should they decide to leave the reception area.

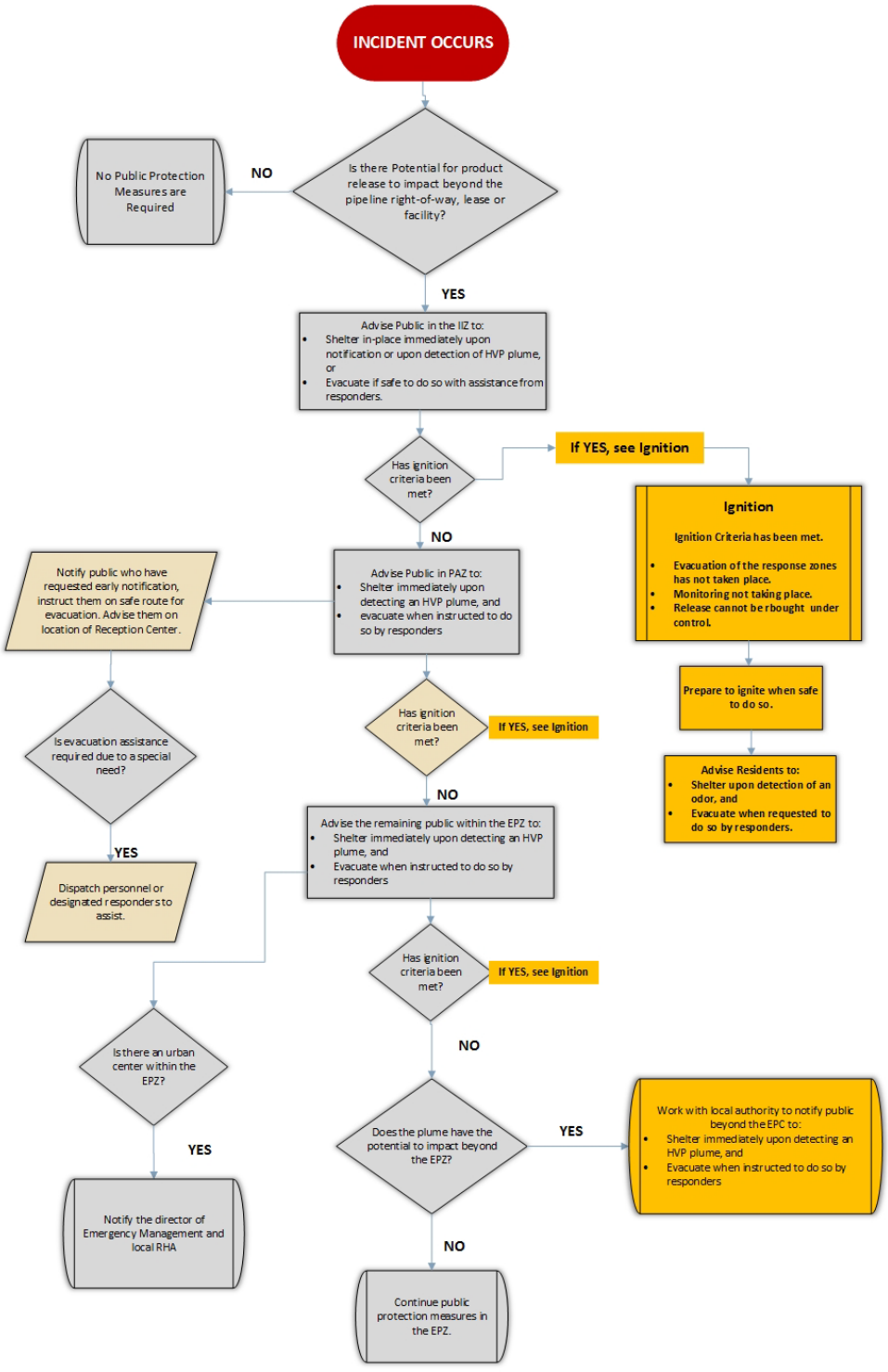
2. **Staffing of the reception centers** will be the responsibility of the municipalities until such time NOVA Chemicals resources may be required to assist.

3. **Transportation requirements** will be determined by the Local Municipalities and will be dependent on the incident. In most cases the school bus systems will be used to evacuate areas if required.

   Flagging or other methods deemed appropriate by the local authorities will be used to warn people not to return to evacuated residences as well as through the manned roadblocks restricting access within the safety perimeter (See Air Monitoring Section 5.8).

   Roadblock personnel will request residents to report to the reception center. Upon request by the local authorities an aircraft may be dispatched with instructions to fly at an altitude of no lower than 1500 metres to visibly check for agricultural activity, hunters, recreational vehicle users, and nonresident landowners who may be within the EPZ.

FIGURE 4 PUBLIC PROTECTION FLOWCHART FOR PLANNING AND RESPONSE



5a.2 STRATHCONA COUNTY NOTIFICATION

Sections of the EPZ within Strathcona County are highly populated. A communicator system has been developed to notify residents within these highly populated areas. All high-density areas where greater than 10 phone calls would be required have been identified and divided into zones. There are 9 zones south of Sherwood Park and two zones designated for the north of Strathcona County. The Zones are designated as follows:

- **Zone 2 – Ordze Park/Wye Road Gardens**
- **Zone 3 – Balmoral Heights and North Fountain Creek**
- **Zone 4 – Fountain Creek Estates**
- **Zone 5 – Aspen Heights/Victoria Park**
- **Zone 6 – Campbelltown Heights**
- **Zone 7 – Sherwood Park Golf & Country Club Estates**
- **Zone 8 – Chrenek Estates**
- **Zone 9 – Chrenek Acres**
- **Zone 10 – Lynley Ridge/Camelot Square**
- **Zone 11 – Galloway Park**
- **Zone 12 – Oldman Creek**

Predefined key messages have also been developed as follows:

A - "Emergency in Progress",

B - "Shelter in Place",

C - "Evacuate",

D - "All Clear",

E – System Test messages.

The scenarios have been entered into the system identified as Zone 1-12 and Message A – E.

Pipeline Technical Advisers working within a Unified Command with Strathcona County Emergency Management Services would select the appropriate zones and messages and the Joffre Emergency Operations Center (EOC) would trigger the appropriate automated emergency notification.

5a.2 STRATHCONA COUNTY NOTIFICATION continued. . .

If required, the Emergency Public Warning System would also be used in conjunction with this notification. See Section 7.1 for Alberta Emergency Management contact numbers.

In areas not reflected by the zone maps, (< 10 residents), individual contact would be made individually with each of the residents. This would be accomplished either through the Joffre EOC or by the Pipeline Operators from the other areas of the system. The Joffre EOC and the pipeline operators have the contact information available to them.

5a.3 COMMUNICATOR MESSAGES

5a.3.1 EMERGENCY IN PROGRESS

“This is an emergency message from Strathcona County Emergency Services in conjunction with NOVA Chemicals pipeline operations. An emergency situation that is in progress along our pipeline corridor and potentially impacting your location is under control. No action is required of you at this time. Should the situation change, you would receive an additional message through this automated communications system”.

5a.3.2 SHELTER IN PLACE

“This is an emergency message from Strathcona County Emergency Services in conjunction with NOVA Chemicals pipeline operations. There is an emergency situation in progress along the NOVA Chemicals transportation utilities pipeline corridor. We request that you shelter in place. Please go inside. Check local radio or T.V. or municipal website. Close all doors, windows and openings. Shut off ventilations systems that draw outdoor air inside (fans, air conditioning units, clothes dryers, turn down furnace and close fireplace dampers). Please avoid unnecessary use of your telephone, as you will be kept current as conditions change through this automated communications system”.

5a.3.3 EVACUATION

“This is an emergency message from Strathcona County Emergency Services in conjunction with NOVA Chemicals pipeline operations. There is an emergency situation in progress along the NOVA Chemicals transportation utilities pipeline corridor. We recommend that you immediately evacuate your residence away from the corridor in a crosswind direction and travel by best means of transportation to the Sherwood Park Millennium Centre and make contact with Strathcona County Emergency Management Services personnel who will stationed at the reception centre”.

5a.3 COMMUNICATOR MESSAGES continued. . .

5a.3.4 ALL CLEAR

"This is an all clear message from Strathcona County Emergency Services in conjunction with NOVA Chemicals pipeline operations. The emergency situation along the NOVA Chemicals pipeline right of way as been corrected. This message is to inform you that there is no longer a cause for concern and the emergency is over. We apologize for any inconvenience that we have caused".

5a.3.5 SYSTEM TEST

"This is a test. The Strathcona County Emergency Services in conjunction with NOVA Chemicals pipeline operations is testing their automated emergency notification system. If an emergency had occurred, you would be given specific information regarding the situation and what to do in the emergency. Direct inquiries about this test and our NOVA Chemicals pipeline operations to 1-800-780-6682."

System tests will occur annually on or about February 2, each year.

5a.4 HIGH DENSITY ZONE MAP – STRATHCONA COUNTY

PROTECTED FROM PUBLICATION – includes personal information

5a.4 HIGH DENSITY ZONE MAP – STRATHCONA COUNTY continued. . .

PROTECTED FROM PUBLICATION – includes personal information

6.1 IMMEDIATE CONTACTS - NOVA CHEMICALS

Joffre Pipeline Emergency Line - 1-800-780-6682

PROTECTED FROM PUBLICATION – includes personal contact information

6.1 IMMEDIATE CONTACTS-NOVA CHEMICALS continued. . .

PROTECTED FROM PUBLICATION – includes personal contact information

6.1 IMMEDIATE CONTACTS-NOVA CHEMICALS continued. . .

PROTECTED FROM PUBLICATION – includes personal contact information

6.2 NOVA CHEMICALS INTERNAL CONTACTS

PROTECTED FROM PUBLICATION – includes personal contact information

6.2 NOVA CHEMICALS INTERNAL CONTACTS continued. . .

PROTECTED FROM PUBLICATION – includes personal contact information

6.2 NOVA CHEMICALS INTERNAL CONTACTS continued. . .

PROTECTED FROM PUBLICATION – includes personal contact information

7.1 PROVINCIAL GOVERNMENT AGENCIES – ALBERTA

7.1.1 MEDIA CONTACTS

The Emergency Public Warning System (EPWS) gives warning to Albertans over the radio and the television to take action and protect themselves from disasters. This system is activated by trained users living throughout Alberta who, using their telephone, will deliver vital information regarding a threat to the safety of Albertans. To activate this system, contact Alberta Emergency Management Agency- (AEMA) Provincial Operations Centre phone number listed under Alberta Emergency Management.

Alberta Emergency Management Agency			
DEPARTMENT	**EMERGENCY TELEPHONE#**	**FAX**	**NON-EMERGENCY CONTACT**
Alberta Emergency Management Agency-Provincial Operations Centre	1-866-618-2362	780-644-7962	N/A
Central Region Emergency Management Field Officer	1-866-618-2362	403-297-4174	N/A
North Central Region Emergency Management Field Officer	1-866-618-2362	780-422-1549	N/A
Fire Field Officer	1-866-618-2362	403-382-4426	1-866-421-6929
Alberta Energy Regulator (AER)			
DEPARTMENT	**EMERGENCY TELEPHONE#**	**FAX**	**NON-EMERGENCY CONTACT**
AER	1-800-222-6514	403-297-7336	403-297-8311
Red Deer Field Office	403-340-5454 1-800-222-6514	403-340-5136	reddeer.fieldcentre@aer.ca
Edmonton Field Centre	780-642-9310 1-800-222-6514	780-642-9385	edmonton.fieldcentre@aer.ca

7.1 PROVINCIAL GOVERNMENT AGENCIES ALBERTA continued. . .

Alberta Environment and Parks (AEP)		
DEPARTMENT	**EMERGENCY TELEPHONE #**	**NON-EMERGENCY CONTACT**
Alberta Environment and Parks	**1-800-222-6514**	1-877-944-0313
Alberta Health Services		
DEPARTMENT	**EMERGENCY TELEPHONE#**	
Province-wide	**1-844-755-1788** **Email: edp@ahs.ca**	
DEPARTMENT	**EMERGENCY TELEPHONE#**	
Report a Poacher	1-800-642-3800	
Forest Fire Line	310-FIRE (3473)	
Alberta Transportation of Dangerous Goods		
EMERGENCY TELEPHONE#	**FAX**	**NON-EMERGENCY CONTACT**
1-800-272-9600 (24 hr)	780-427-1044	780-422-9600
Occupational Health and Safety		
EMERGENCY TELEPHONE#	**FAX**	**NON-EMERGENCY CONTACT**
1-866-415-8690	N/A	780-415-8690

7.2 FEDERAL GOVERNMENT AGENCIES

Environment and Climate Change Canada		
EMERGENCY TELEPHONE#	**FAX**	**NON-EMERGENCY CONTACT**
1-800- 222-6514	780-495-2615	780-951-8600

Health Canada			
DEPARTMENT	**EMERGENCY TELEPHONE#**	**FAX**	**NON-EMERGENCY CONTACT**
Public Health Protection First Nation Inuit Health	780-218-9929 (24hr cell)	780-495-6380	780-495-2712
Environment Public Health First Nation Inuit Health	780-719-8782 (24hr cell)	780-495-6380	780-495-2712

Public Safety Canada			
DEPARTMENT	**EMERGENCY TELEPHONE#**	**FAX**	**NON-EMERGENCY CONTACT**
Federal Government Operations Center	613-991-7000	613-996-0995	Alberta & NWT Region: 780-495-3005 www.publicsafety.gc.ca

Transport Canada			
DEPARTMENT	**EMERGENCY TELEPHONE#**	**FAX**	**NON-EMERGENCY CONTACT**
Canadian Transport Emergency Center (CANUTEC)	613-996-6666 (call collect) or *666 (cell phone) 1-888-226-8832	613-996-9439	613-992-4624 (call collect) canutec@tc.gc.ca

NAV Canada
EMERGENCY TELEPHONE#
1-866-541-4102 service@navcanada.ca

7.3 NOVA CHEMICALS PRODUCERS AND CUSTOMERS

PROTECTED FROM PUBLICATION – due to proprietary information on producers and customers.

7.4 RAILWAYS (WARNING OR STOPPING TRAINS)

RAILWAYS	TELEPHONE
CN Rail - Canada Wide Emergency Response	1-800-465-9239 (CN Police)
CP Rail - Canada Wide Emergency Response	1-800-795-7851 (Railway Emergency)

7.5 OTHER CONTACTS

COMPANY / NAME	TELEPHONE	SERVICE PROVIDED*
Alberta One Call	1-800-242-3447 / info@albertaonecall.com	Excavation Notification
AMA Road Report	1-800-222-4357	Road Conditions
ATCO Electric	1-800-668-5506	Power Provider
ATCO Gas Calgary and local areas Edmonton and local areas All other areas	 403-245-7222 780-420-5585 1-800-511-3447	Natural Gas Transmission
Baker Hughes	780-416-6440 403-537-3509	Nitrogen Provider
EnMax Power Calgary Red Deer City only	310-2010 403-514-6100 403-348-5700	Power Provider
Enviro-tech Aviation	1-587-400-2504 1-888-254-3731	Air Patrols
EPCOR	780-412-4500 / 1-800-667-2345	Power Provider
Fortis Inc.	403-310-9473	Power Provider
HSE Integrated	West 1-888-346-8260	Occupational Safety Providers/ Air Monitoring (1 mobile unit)
Jedco Energy Services	403-396-3736 403-348-8708	Mechanical Maintenance (Hydrovacs, track hoes, light plant, gen set)
Airborne Energy Solutions	780-778-3080	Air Patrols

7.5 OTHER CONTACTS continued. . .

COMPANY / NAME	TELEPHONE	SERVICE PROVIDED*
Poison and Drug Information Services	1-800-332-1414	Health Information
Praxair Canada Inc. – UCISCO	1-800-363-0042 (24 hr)	Nitrogen Provider
TD Williamson Industries	1-877-246-8827 780-440-6637	Stopple Installation
Trican	403-266-0202 (24 hr)	Nitrogen Provider
United Safety	1-800-432-1809	Air Monitoring (6 mobile units)

*Contractor approval process must be followed prior to engaging services.

7.6 CITY, TOWN AND COUNTY CONTACTS

IN ALL CASES OF AN EMERGENCY DIAL 911

PROTECTED FROM PUBLICATION – personal information removed from the table for confidentiality.

Village of Clive	PHONE NUMBER	FAX NUMBER
Village Office admin@clive.ca	403-784-3366	403-784-2012
Director of Municipal Emergency Management		
City of Edmonton	**PHONE NUMBER**	**FAX NUMBER**
Emergency Management Officer	911 (Call First)	780-496-3062
City of Fort Saskatchewan	**PHONE NUMBER**	**FAX NUMBER**
Town Office	780-992-6200	780-998-4774
Fire Chief		
County of Lacombe	**PHONE NUMBER**	**FAX NUMBER**
County Office	403-782-6601	403-782-3820
Director of Municipal Emergency Management		

7.6 CITY, TOWN AND COUNTY CONTACTS continued. . .

Leduc County	PHONE NUMBER	FAX NUMBER
County Office	780-955-3555	780-955-3444
Fire Chief Leduc County		780-955-9401
Director of Emergency Management		
City of Leduc	**PHONE NUMBER**	**FAX NUMBER**
City Office	780-980-7177	780-980-7127
Fire Chief		780-986-9441
County of Ponoka	**PHONE NUMBER**	**FAX NUMBER**
County Office	403-783-3333	403-783-6965
Deputy Director of Municipal Emergency Management		
Director of Municipal Emergency Management		
Strathcona County	**PHONE NUMBER**	**FAX NUMBER**
County Office	780-464-8111	780-464-8050
Asst. Chief Emergency Management		
Sturgeon County	**PHONE NUMBER**	**FAX NUMBER**
County Office	780-939-4321	780-939-3003
Fire Chief		

7.6 CITY, TOWN AND COUNTY CONTACTS continued. . .

Wetaskiwin County	PHONE NUMBER	FAX NUMBER
County Office	780-352-3321	780-352-3486
Director of Municipal Emergency Management		

8.1 JOFFRE PIPELINE CONTROL ROOM

Emergencies will be typically detected by or reported to the NOVA Chemical Control Room Operator at Joffre. If the emergency notification did not come from or through the Control Room, the Control Room Operator must be contacted as soon as possible.

Upon notification of an alarm, the Pipeline Control Room Operator will:

- Ascertain the authenticity of the alarm or notification.
- Complete the Pipeline Incident Call Sheet or the Bomb Threat Sheet, as appropriate. (refer to Section 13.1 or 13.8).
- Call the appropriate On-Call Pipeline Technician and report the Emergency details.
- Call 911 as required.
- Call Emergency & Security Services to contact On-Call NOVA Chemicals EOC Manager, who will remain on standby, pending the feedback of the Pipeline Technician.
- Shut down the pipeline or isolate the terminal, pump station or lateral as soon as it is determined to be appropriate. It is not necessary to call a supervisor before shutting down or blocking in all, or part, of the pipeline.
- Establish communication with On-Scene Command Post.
- Contacts producers/buyers, as required (refer to Section 7.3) and provide immediate hazard awareness information.
- Maintains a log of calls and activities relevant to this role.

Additional Control Room Operators will assist in communication to/from the field personnel and record details as required.

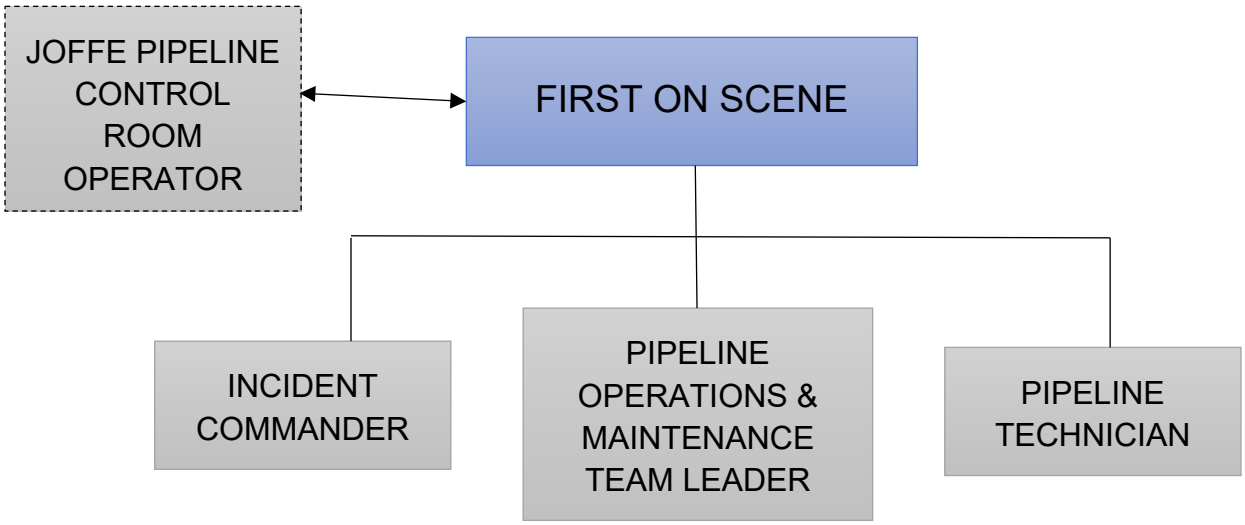
8.2 FIELD RESPONSE GROUP

The Field Response Group is the first level of decision-making within the NOVA Chemicals Pipelines emergency response organization and is responsible for all first line activities related to an emergency. They will assess the emergency situation and the need for control and / or containment at the emergency site. They will work with the Municipal Incident Command on rescue, first aid and evacuation. In some jurisdictions, incident command may have to be assumed by the On-Scene Incident Commander. The response actions of the Field Response Group will be limited to their training and equipment available.

8.2 FIELD RESPONSE GROUP continued. . .

The nature of the emergency will dictate the composition of the First Response Group. The Pipeline Technician will determine the level of staffing necessary to accomplish the First Response Group functions based on the scope of the emergency. Additional support personnel will be called upon to fulfill roles as required given the specifics of an emergency situation. FIGURE 5 illustrates the Field Response Group Organization.

FIGURE 5 FIELD RESPONSE GROUP ORGANIZATION



8.3 FIRST ON-SCENE

The Pipeline Technician first on-scene is to take all reasonable steps to safely bring the situation under control. Primary response activities for the First On-Scene are to:

- Give immediate attention to the protection of life and first aid to the injured, within one's capabilities.
- Conduct scene survey assess situation.
- Approach from an upwind or crosswind direction.
- Take required action to protect the safety of people, property and the environment.
- Evacuate all personnel to a safe location outside the hazardous zone.

8.3 FIRST ON-SCENE continued. . .

- Initiate rescue operations, if necessary and if safe to do so.
- If life and safety is assured and it is within one's capability, take actions to gain control / isolate incident following safe work procedures.
- First on scene will serve as interim Incident Commander (and all related duties) until relieved by a more qualified person or ultimately the designated Incident Commander (Pipeline Technician).
- Ensure that proper PPE is worn.
- Evaluate and verify the severity of the incident.
- Contact Joffre Pipeline Control Room Operator.
- Report full details of the following information to the Pipeline Operations and Maintenance Team Leader.
- The nature of the emergency.
- The location and the level of emergency.
- Name, location and contact number.
- Actions taken.
- Response resources required; equipment or personnel.
- Further action proposed.
- Prioritize Actions.
- Inform first responders, company and non-company personnel, about the hazards.
- Responders (company or external) should not attempt to battle any fire without site knowledge, risk assessment of factors, adequate firefighting equipment, training, and back-up personnel.
- Request and follow instructions for the next action.
- Any public statements or comments to the media regarding the incident are done under instructions from the Joffre Emergency Operations Centre (EOC).

8.4 INCIDENT COMMANDER – NOVA CHEMICALS EMPLOYEE

Regardless of the magnitude of the emergency, the priorities of the Incident Commander will remain the same:

- Life safety.
- Emergency Management.
- Environmental impacts and property loss.

8.4 INCIDENT COMMANDER – NOVA CHEMICALS EMPLOYEE continued. . .

This position is responsible for the overall management of the field emergency response process (organize and delegate) and directs the activities of the field response teams. The NOVA Chemicals Incident Commander will be located at the On-Scene Command Post (OSCP) and will ensure all communications on the nature and status of the incident and tactical response operations flow to and from the Joffre Emergency Operations Centre (EOC).

Primary response activities of the NOVA Chemicals Incident Commander are to:

- Organize an initial response group.
- Ensure that proper Personal Protective Equipment (PPE) is worn.
- Establish Initial On-Scene Incident Command Post (if required).
- Establish initial control zone if not already established by the Municipal Incident Commander.
- Secure access to emergency area.
- Confirm the pipeline and product.
- Verify and evaluate the severity of a leak.
- Confirm emergency level.
- Provide technical advice and support to the Municipal Incident Commander.
- Responsible for technical management of the emergency site.
- Provide pipeline isolation where remote activation devices fail.
- Investigate further to determine if it is necessary to initiate assistance from contractors and/or Mutual Aid partner.
- Recommend evacuations as required.
- Assist in evacuation of the area.
- Decide if ignition is appropriate (with consultation with other resources) and if so initiate or recommend to local authorities.
- Work cooperatively with other responding agencies in incident management.
- Communicate and liaise with NOVA Chemicals Joffre EOC Manager and the Joffre Pipeline Control Room.
- Take actions to minimize the impact of the release.
- Ensure a company spokesperson is designated at the site (typically the Pipeline Team Leader). Deliver prepared media statement, if required.
- Ensure environmental/personnel impacts of release are monitored.

8.4 INCIDENT COMMANDER – NOVA CHEMICALS EMPLOYEE continued. . .

- Manage resources and identify additional resource requirements to the NOVA Chemicals Joffre EOC Manager.
- In conjunction with municipal authorities, regulators and first responders, declare incident scene safe and stand down emergency operations.
- Secure the site for authority investigations.
- Maintains a log of calls and activities relevant to this role.

8.4.1 NOVA CHEMICALS ON-SCENE INCIDENT COMMAND POST LOCATION

The Incident Commander will establish a NOVA Chemicals On-Scene Incident Command Post in a location within close proximity to the incident without being in a dangerous area to provide:

- Good view of the incident and surrounding area.
- Central control over all NOVA Chemicals response activities.
- Communication with the NOVA Chemicals Joffre Site EOC.

Responding municipal emergency response agencies may establish their own Municipal Incident Command Post. Where practical, the NOVA Chemicals On-Scene Command Post should be established in close proximity to the Municipal Incident Command Post.

8.5 PIPELINE OPERATIONS AND MAINTENANCE TEAM LEADER

This position is responsible to provide direct support to the “On-Scene” personnel emergency response effort. Primary response activities are to:

- If additional pipeline personnel are required for a pipeline incident, take steps to activate the NOVA Chemicals Pipeline Communicator line.
- If required respond to the incident site or specified location for incident support.
- Liaise with the NOVA Chemicals EOC at Joffre site.
- Act as a liaison to the pipeline owner as required.
- Manage the media interactions at the incident site.
- Manages the Pipeline Rapid Repair Plan (RRP).
- Work with the On-Scene Incident Commander to institute a personnel identification and tracking system at the incident scene.
- Initiate the incident investigation.

8.6 PIPELINE TECHNICIAN

Primary response activities of the Pipeline Technician are to:

- Assists at the scene with evacuation, roadblocks and emergency service work.
- Assists in conducting assessments at the incident scene including sampling, damage, site survey, etc.
- Provides resident database information to Local Emergency Management Services.
- If in Strathcona County completes emergency notification to rural residents not within established ERP communicator zones.
- If in greater Edmonton area, files emergency message with EAUPOC IVR system.
- Provides pipeline isolation as required where remote devices failed, or only manual operation exists.
- Transports the emergency equipment from the pipeline office to the appropriate site.
- Provides support if ignition of the release is appropriate.
- Assists with documentation of actions during an emergency (refer to Section 13.2 Time and Event Log).
- Operates portable flare equipment.
- Provides manpower for the decommissioning of the affected pipeline.
- Liaise with Pipeline Control Room, as required.
- Conduct site clean up after site has been declared clear from investigation requirements.

8.7 EMERGENCY OPERATIONS CENTRE MANAGEMENT GROUP

Emergency operations are primarily directed out of the Emergency Operations Centre (EOC) which is located in the basement of Building 3.

The EOC Manager is notified of all site/pipeline emergencies. On initiation of an emergency, EOC members are assembled upon the EOC Manager's request. Their responsibility is to take such actions as necessary to support the mitigation of the emergency. These actions will include, but are not limited to, identifying critical issues, prioritizing and implementing objectives including resource allocation, liaisons with outside agencies and providing the necessary organization to manage the emergency properly.

8.7 EMERGENCY OPERATIONS CENTRE MANAGEMENT GROUP continued. . .

As well, the EOC will communicate to the employees, corporate, community and media in a timely and controlled fashion.

EOC Incident Command Positions are filled by the following positions:

- Emergency Operations Centre Manager (EOCM).
- Deputy EOC Manager.
- Responsible Care (Safety Officer).
- Public Information Officer.
- Site Operations Section Chief.
- ER Operations Section Chief.
- Planning Section Chief.
- Communications Leader.
- Logistics Section Chief.
- Finance Section Chief.

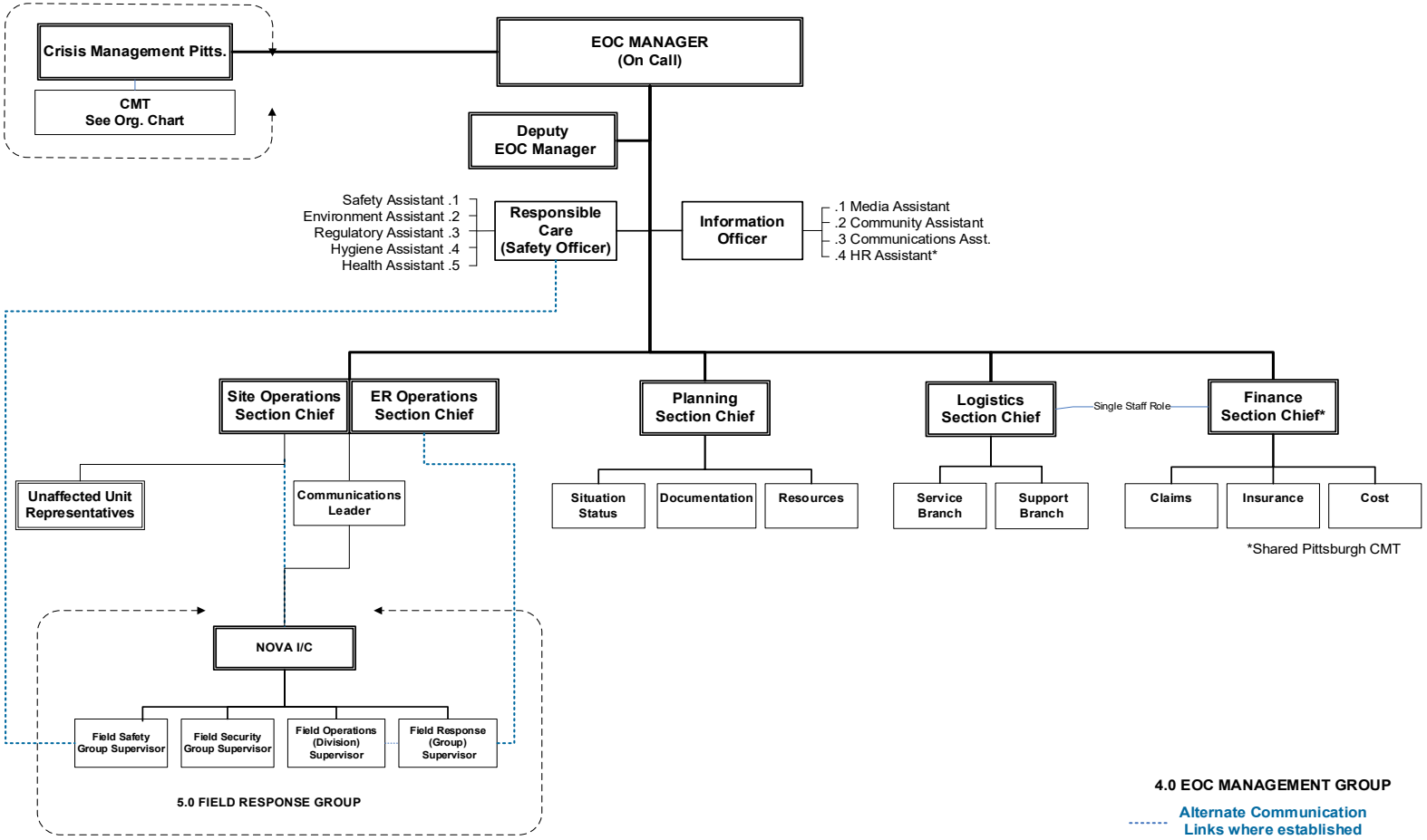
EOC Resource Group is filled by the following positions:

- Industrial Hygiene.
- Head Count Coordinator (site emergencies only).
- Site Security.
- Human Resources.
- Emergency Response Building Coordinator.
- Building Resident/General Site Population.

Additional information on Roles & Responsibilities for the above EOC positions can be found at the following:

http://ishare.novachem.com/mfg/sites/west/sites/er/SitePages/site.aspx

FIGURE 6 EMERGENCY OPERATIONS CENTRE MANAGEMENT GROUP



8.8 ENVIRONMENT & REGULATORY TEAM

During emergency situations, an On-Call Environmental Specialist is available to provide technical assistance and to contact other members of the site Environmental & Regulatory Team. Members of the site Environmental & Regulatory Team can provide expertise in:

- Environmental Impact Assessment (air, groundwater, soil, water impacts).
- Interpretation of current and historical air, groundwater, soil, water, and waste analytical monitoring data.
- Providing expertise with regard to interfacing with applicable pipeline system external regulatory agencies:
  - Alberta Environment and Parks (AEP)
  - Alberta Energy Regulator (AER)
  - Environment Canada
- Providing technical support to responders.
- Provide wildlife protection strategies.
- Compiling reports on incidents having an environmental impact and provides these reports to regulating bodies.
- Provide waste management support as required.

8.9 OCCUPATIONAL HYGIENE

During emergency situations, the identified Occupational Hygiene personnel will respond to the EOC and take directions from the Planning Section Chief in the EOC if requested. A call out procedure is in place to allow access to personnel during off-hours. This individual is responsible for:

- Advising on actions with respect to the following.
- Providing impact monitoring of the surrounding environment on human health.
- Monitoring exposure to people involved in the response.
- Advising on personal protective equipment to be used.
- Providing the EOC with information on exposures and acceptable limits as requested and advise on mitigation strategy (e.g. how to deal with radiation sources).
- Providing technical support, training and equipment to responders taking samples at the scene.
- Providing analysis/interpretation of samples taken by emergency responders.
- Providing interface with regulatory agencies.
- Providing equipment and trained personnel as required.
- Compiling reports on incidents and provide these reports to internal and external parties.
- Maintains a log of calls and activities relevant to this role.

8.10 CRISIS MANAGEMENT TEAM

It is the responsibility of the Crisis Management Team to take such actions as in its judgment that are necessary to respond to the crisis. These actions will include, but are not limited to; verification of the validity of the crisis, analyzing the crisis; handling all negotiations on behalf of NOVA Chemicals; coordinating all liaison with outside agencies; providing the necessary organization to manage the crisis properly; and making the necessary decisions to resolve the crisis.

The Crisis Management Team (CMT) is composed of designated members of Senior Management, all having the necessary authorization to make decisions during a crisis. The following functions are the primary roles represented in the CMT:

- Crisis Manager.
- Responsible Care.
- Risk Management.
- Communications.
- Human Resources.
- Legal.
- Business.
- Facilitator.

The following functions support the core CMT and are present in every CMT meeting:

- Scribe/Administrative Assistant.
- IT – in support of electronic equipment setup (not the entire meeting).

The Crisis Manager has the final decision authority. Each Crisis Management Team member has responsibilities, authorities and access to resources; and each must maintain open lines of communication with other team members. Additional expert support during a crisis is driven by the needs of the CMT and of the local EOC Manager.

It is acknowledged that Subject-Matter Experts and/or additional functional support personnel will be drawn from NOVA Chemicals sites/regions, or externally, as needed.

8.11 CRISIS MANAGER

The Crisis Manager is identified by the RC Director in consultation with the NMB member, at the onset of the crisis, prior to CMT activation.

In the event of a crisis, the Crisis Manager will:

- Convene and chair meetings of the team.
- Assume responsibility for team decisions.
- Ensure business leaders have been advised of the crisis and ensure NMB has been advised of the crisis.
- Ensure external stakeholders have been advised - as appropriate.
- Ensure responsibility has been assigned for follow-up action items.
- Ensure follow-up actions are implemented.
- Ensure Board of Directors has been advised of the crisis – if necessary.
- Approve activation of external NCC Website Crisis Information (Dark Web Site) by Communication Team.
- Act as the primary company spokesperson - if necessary - with support from Communications function.
- Facilitate expert support resources (business/facility) – as needed.
- Review preparedness and effectiveness of the team.
- Ensure sustainability of the team.
- Participate in crisis debriefing.
- Review and approve meeting minutes.
- Log all personally initiated activities and communications.

8.12 PUBLIC AFFAIRS

Support personnel will be drawn primarily from NOVA Chemicals' Public Affairs group, with possible support from other communications professionals within NOVA Chemicals; i.e., People Services. Investor Relations and Government Relations professionals may also support the development of external-facing communications.

It is acknowledged that communications during a crisis are driven by the needs of the Crisis Center and the on-site Incident Command. It is understood that the Public Affairs Team will contribute strategies and tactics through the Crisis Center, for consideration and approval by the Crisis Management Team. In the event of a crisis, the Public Affairs Team will:

- Log all personally initiated activities and communications.
- Coordinate communications strategy (beware of need to correct strategies).
- Develop initial media relations strategy.
- Develop news releases & standby statements (draft within the first hour).
- Develop backgrounders.
- Handle media calls.
- Manage media conferences/teleconferences.
- Manage on-site media relations.
- Monitor media coverage.
- Identify and facilitate expert support resources.
- Coordinate & arrange for distribution of communications. (e.g., employees, shareholders, customers, governments).
- Identify key community audiences (government, media, community, leaders, etc.).
- Provide update to Crisis Management Team.
- Provide an alternate NOVA Chemicals representative and participate in crisis debriefing.
- Establish and maintain liaison with Local authorities at the scene.
- Provide current family profiles and security risk assessments as needed.
- Coordinate security for assembly and transport of currency (see Corporate Finance).
- Provide updates to the team.
- Participate in crisis debriefing.

8.13 GOVERNMENT AGENCY SUPPORT

The various organizational partners fulfill specific roles and bring to bear their own specified action plans. Provincial Government departments may have a regulatory responsibility, expertise, or other resources available to support the licensee and / or local authority emergency response to a petroleum industry incident. These departments include, but are not limited to:

- **AER** - responsible for petroleum industry activities under its jurisdiction in Alberta and for all public messaging during a petroleum industry incident.
- **Environment & Parks** - responsible for the application of the Environmental Protection and Enhancement Act and the Water Act, and responsible for Crown lands and forestry areas.
- **Health** - provincial representative for public health and policy.
- **Labour** - responsible for workplace safety and investigations.
- **Transportation** – responsible for providing safe roads and water systems and dangerous goods.
- **Justice and Solicitor General** - responsible for the Alberta Security and Support Strategic. Intelligence Team (ASSIST) and the Alberta Counter-Terrorism Crisis Management Plan.
- **Alberta Municipal Affairs -** responsible for Emergency Management in Alberta, the Coordinating Agency for Government emergency management, for the Coordination and Information Centre (CIC), the 24 / 7 emergency call centre for AEMA.
- **Public Affairs Bureau (under the Ministry of Executive Council)** - responsible for all public messaging released by the provincial government other than the AER.

Provincial Government Emergency Management Personnel are required to support the response efforts of NOVA Chemicals and the local authority and therefore assignments depend on the nature and seriousness of the incident and its impact on the community and the environment. The titles, jurisdictions, mandates and roles of agencies are subject to change without notice.

For additional information refer to the Upstream Petroleum Incident Support Plan, available at through Alberta Municipal Affairs/Emergency Management Alberta at:

https://open.alberta.ca/publications/6512894

8.13 GOVERNMENT AGENCY SUPPORT continued. . .

While the organizations and positions involved vary depending on the type of incident and the level of impact from the incident, generally, the response may include participation as follows:

- Police
- Upstream Operator(s)
- AER
- AEP
- Local Authority Representative(s)
- Off-site Regional Emergency Operations Centre (REOC)
- Regional Health Authority (for toxic releases)
- Human Resources & Employment – Workplace Safety Representative.
- Municipal EOC (when activated)
- Local Director of Disaster Services
- Alberta Municipal Affairs, Emergency Management Alberta
- Industrial Operator Liaison Representative (when requested)
- Company Crisis Management Team
- Company Contracted Personnel
- Consequence Management Operations Centre (COMOC) (when activated)
- Appropriate Emergency Planning Officers (EPOs) from Provincial Government Departments
- Regional Director, Office of Critical Infrastructure

In most circumstances, the municipal response agencies, such as the Police and fire departments, will assume overall command of the incident and the On-Scene Incident Commander (NOVA Chemicals Pipeline Technician) will report to the Municipal Incident Commander.

In an effort to develop a clear understanding of the combined response effort between NOVA Chemicals and municipalities, municipal districts and counties, NOVA Chemicals conducts an on-going program of community liaison and exercises with communities along the NOVA Chemicals pipeline systems.

8.13.1 GOVERNMENT RESPONSE MANAGEMENT CENTRES

- **Off-Site Regional Emergency Operations Centre (REOC) -** AER is the coordinating agency - provides support to the OSCP activities and addresses issues that are too broad to be addressed by the OSCP. The REOC coordinates response activities within the region of emergency. The Public and Media Inquiry Room (PMIR) is established at the REOC.
- **Consequence Management Operations Centre (COMOC) -** Emergency Management AB is the coordinating agency with the AER taking the lead role. Activated to support the activities of the REOC and the local authority's MEOC. The COMOC is capable of accessing provincial and Federal resources necessary to support the emergency response. The COMOC keeps elected officials informed.

    1. Keeps elected provincial officials informed through personal contact and briefing notes.
    2. It may also deal with broader issues that cannot be dealt with by, or would overburden the local authority and the off- site REOC.
    3. Interface with the public and media addressing health, public and environmental concerns.
    4. Works collaboratively with the AER and others who have been requested to participate at the COMOC.
- **Municipal Emergency Operations Centre (MEOC) -** Municipal Affairs is responsible for the coordination, activation and takes the lead role. In some instances, the various EOCs may be combined. As a result, not all the EOCs may be activated.

8.13.2 ALBERTA ENVIRONMENT AND PARKS (AEP)

- Dispatch a representative if required.
- Assign a consequence management officer and alternatives as appropriate to the GEOC when requested by the agency.
- Provide flood and water-flow forecasting services and act as the provincial lead agency for flood response coordination operations.
- Provide technical expertise in matters relating to the environment, as required.
- Provide or coordinate air, water, and land monitoring and reporting as required.
- Provided support and advice on environmental emergency response, recover and remediation techniques, as required.

8.13.3 ALBERTA HUMAN RESOURCES & EMPLOYMENT

- Monitors the Health and Safety aspects of applicable occupations within the hazard area to ensure that necessary precautions are taken to protect the worker's safety;
- Inspector must be notified immediately in the event of a serious accident, or a death; and
- Investigate serious injuries or situations which have the potential to cause serious injury to workers.

8.13.4 ALBERTA EMERGENCY MANAGEMENT AGENCY (AEMA)

The AEMA is the coordinating agency for the Government of Alberta for all hazards—is responsible for safety and emergency preparedness in Alberta. It coordinates provincial emergency response for all types of emergencies, including upstream petroleum emergencies. In the event of an emergency, AEMA coordinates and links the response of all levels of government, the private sector, and other interested parties. AEMA provides support for local authorities through its district offices. During an emergency, Alberta Emergency Management Agency will:

- Confirm AER has been notified.
- Obtain a situation report from the **C**oordination and **I**nformation **C**entre (CIC), AER, NOVA, or the local authority and confirm the level of emergency.
- Activate the Government Emergency Operations Centre (GEOC) as required.
- Coordinate requests for provincial/federal resources.
- Provide ongoing situation reports or briefing notes to appropriate provincial officials.
- Notify partners and stakeholders when the event is over.

8.13.5 ALBERTA TRANSPORTATION & UTILITIES

- Implement the Government's telephone fan – out to alert all affected departs and agencies,
- Provide a liaison officer to the Emergency Operations Centre,
- Informs the telephone company of the priority emergency communication requirements,
- Coordinates plans for evacuees and the receiving municipalities,
- Activates the Provincial Government Consequence Management Operating Centre (COMOC), if required,
- Makes recommendations to the Government on assistance to disaster victims and cost sharing arrangements incurred during emergency or disaster operations,
- Provide advice and assistance in procurement of roadblock equipment; and
- Provides authorization / assistance for establishing road closures and emergency roadblock.

8.13.6 ALBERTA ENERGY REGULATOR (AER)

- Assign a consequence management officer and alternatives as appropriate to the GEOC when requested.
- Manage, with the assistance of AEP, oil spill control and clean – up operations.
- Assist AEP in the management of pollution problems related to the petroleum industry.
- Ensure remedial operations related to all problems of well control, pipeline failures, power interruption or oil, gas, oil sands and coal facilities, is carried out by operators as required by law.
- Provide professional expertise for all matters related to energy sources and energy as appropriate.
- Coordinate the provisions of information and support to and from the private energy sector as appropriate.
- Provide geosciences information and expertise, including geological monitoring services needed by government, industry, and the public for earth-resources stewardship and sustainable development in Alberta.
- Provide advice and assistance regarding (or if necessary, control of) the distribution of public gas utilities.

8.13.7 ALBERTA HEALTH SERVICES

Oil and Gas Industry Emergency Preparedness and Response

Alberta Health Services (AHS) - Environmental Public Health (EPH) roles and responsibilities in public health emergency preparedness and response to the oil and gas industry are outlined below. The provision of services during an emergency is contingent upon our assessment of legislative responsibilities, impact to services, and business continuity.

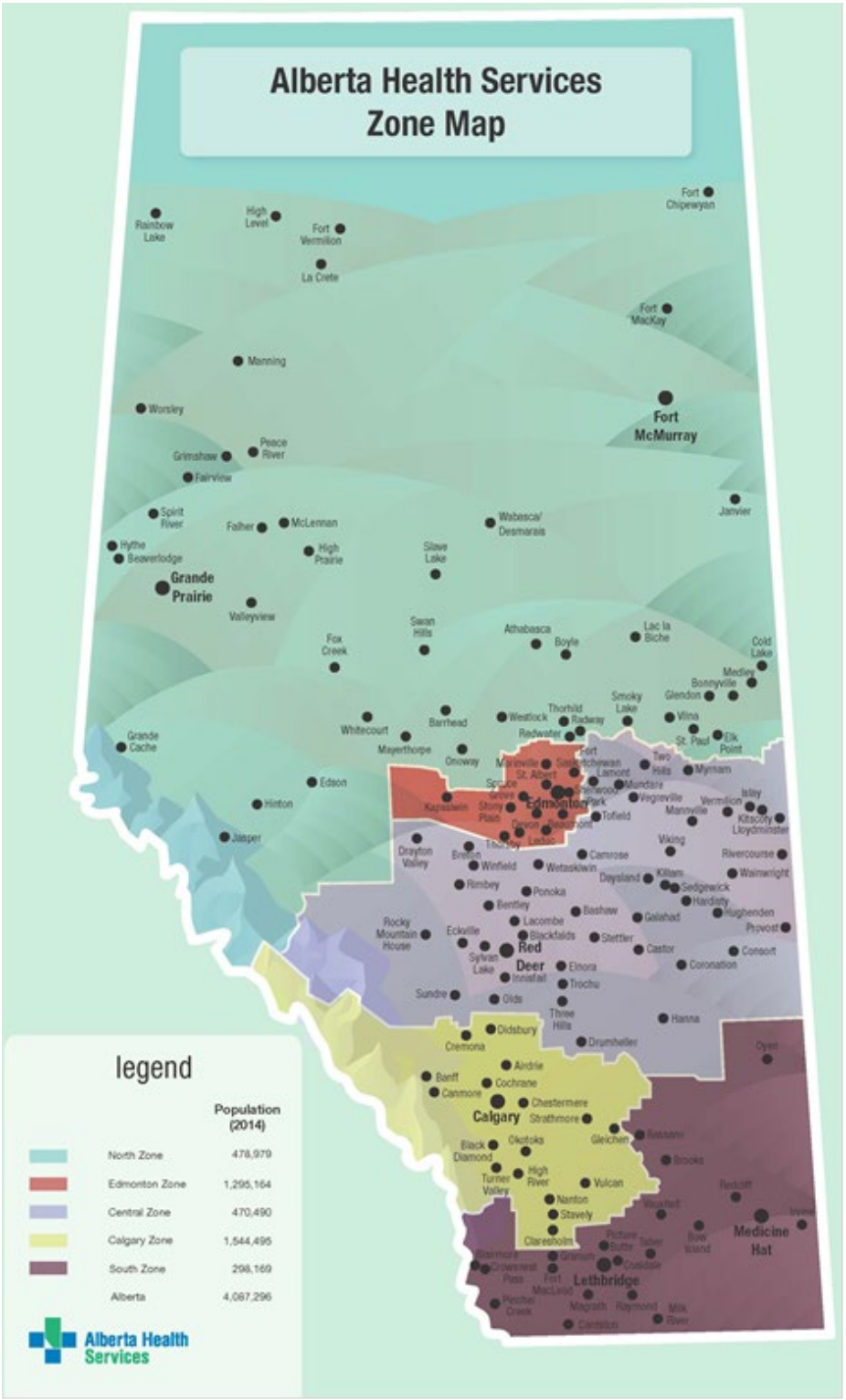
EPH will endeavor to:

- Participate with the Licensee in the development of their Emergency Response Plans as it relates to the Environmental Public Health Program's role and responsibility.
- Provide the AHS Zone Single-Point-of-Contact (SPOC) emergency phone number to enable the Licensee to notify and alert the Zone of an emergency. From the initial notification or alert, AHS emergency response will fan out to and coordinate with other AHS programs and facilities as necessary. 911 EMS services remain independent of the Zone SPOC notification/alert process.

8.13.7 ALBERTA HEALTH SERVICES continued. . .

- Participate with stakeholders in preparedness training and exercises associated with a Licensee's simulated activation of an Emergency Response Plan in which Environmental Public Health has a role and responsibility.
- Participate in public information sessions during the Licensee's Emergency Response Plan development process when appropriate and resources permit.
- Provide guidance to stakeholders and local municipal authorities in identifying sites suitable for establishing and operating an evacuation centre and/or reception centre, including operational requirements.
- In consultation with the Zone Medical Officer of Health (MOH) provide guidance to stakeholders on substances that may affect the public health, including Alberta Health and Wellness acute exposure health effects for hydrogen sulphide and sulphur dioxide (Appendix 5).
- Conduct assessments, inspections and give regulatory direction, when appropriate, to ensure the requirements of provincial legislation and EPH program areas of responsibilities for public health protection and disease prevention are maintained.
- Notify the Zone Medical Officer of Health of any incident affecting or potentially affecting the other AHS programs or facilities. The Zone MOH will notify and coordinate emergency response in other program areas and facilities as necessary.
- Establish EPH emergency management operations, when appropriate, to support regional response efforts and liaise with the Government Emergency Operations Centre, Municipal Emergency Operations Center and/or Industry Emergency Operations Centre, if needed.
- Assist the Zone Medical Officer of Health. local municipal authority and Public Information/Communication officers in the development, issuance, and rescinding of public health, public evacuation, and shelter-in-place advisories.
- Provide guidance to stakeholders on matters relating to evacuation of the public and/or public facilities, and the re-occupancy of those evacuated areas or facilities.
- Record and respond to health complaints or concerns from the public during and following an incident.
- Participate in stakeholder debriefings as necessary.

FIGURE 7 ALBERTA HEALTH SERVICES ZONE MAP



8.13.8 RCMP

*****An RCMP Detachment would provide a response in accordance with their Detachment Emergency Response Plan Protocols.***

- In the event the "Initial Incident" is reported to Police (i.e. 911), they will immediately follow their reporting procedures by contacting their Senior Management, the Pipeline Operator as well as the required Government Regulatory Agencies, (i.e. AER, Transportation Safety Board, AEMA).
- Will conduct a scene assessment and liaise with pipeline and/or Industry Officials.
- Establish an initial Incident Management structure until other responders arrive, i.e. Firefighters.
- Will secure the site and establish a secure perimeter at a safe distance.
- Will establish traffic checkpoints to control vehicles attempting to access the area in conjunction with company/operator officials.
- Will report on the situation, nature of casualties, degree of damage and requirement for additional resources as required.
- Protect life, secure property and provide assistance to the general public.
- Facilitate the triage of ill/injured.
- Perform any obvious, safe rescues as the incident permits.
- Protect the public by way of evacuation to guard against further casualties or assist as required with "sheltering in place".
- Will provide or assist in the emergency public instructions and information that must be provided to the public.
- When fatalities are involved, will deal with the Medical Examiner's Office.
- Will treat every scene as a crime scene, secure evidence and conduct a Criminal Investigation when warranted.

8.14 MUTUAL UNDERSTANDING PURPOSE

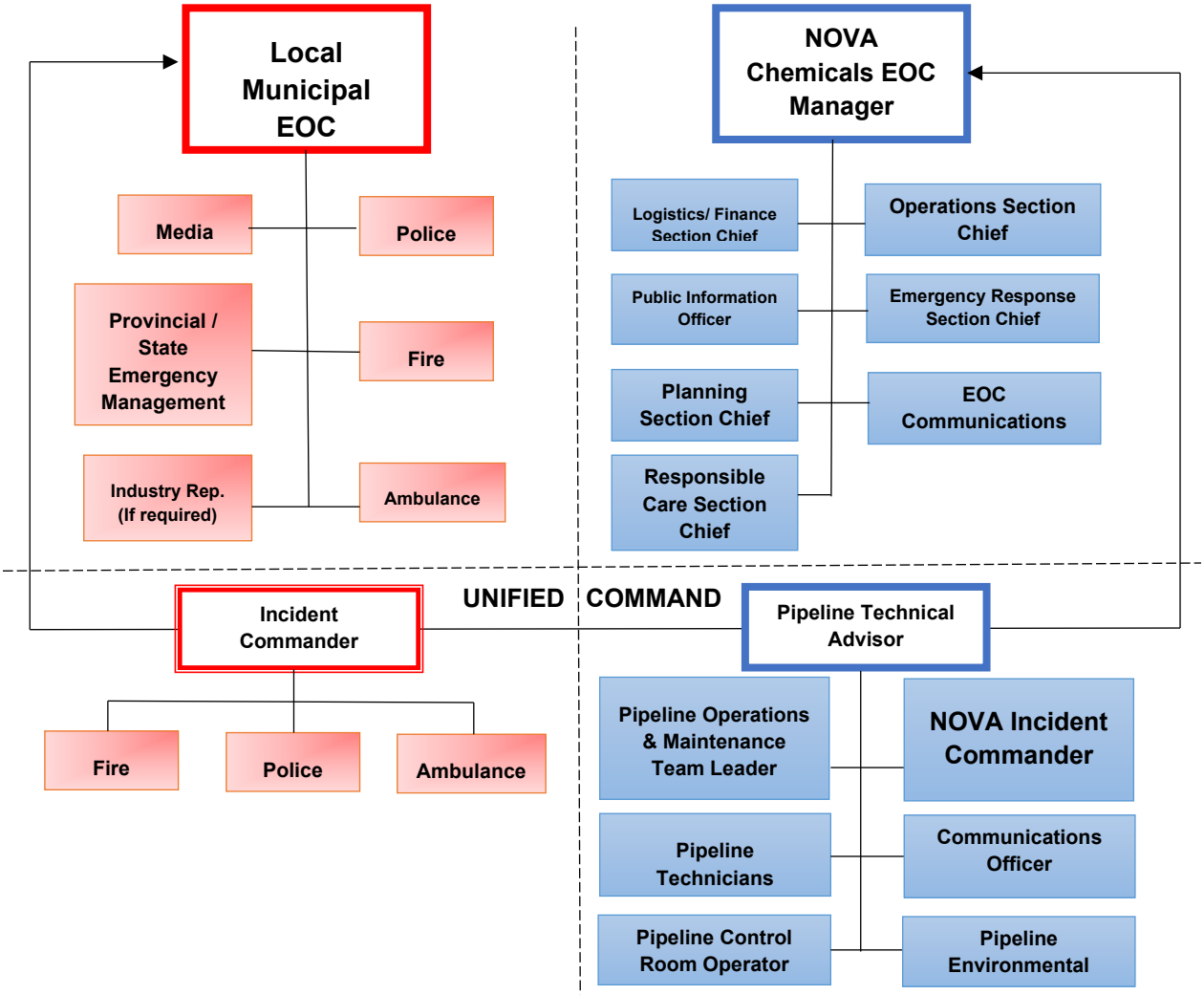
Mutual aid is an agreement among emergency responders to lend assistance across jurisdictional boundaries. This may occur due to an emergency response that exceeds NOVA Chemicals Pipeline Operations resources, Mutual aid may be *ad hoc*, requested only when such an emergency occurs.

It is essential that NOVA Chemicals Pipeline Emergency Plans are compatible with local Municipal Emergency Plans. FIGURE 8 illustrates the operational framework within which NOVA Chemicals and the municipal response agencies that would response to emergencies.

Provincial and, in some cases, federal government departments may be mobilized to support this response. Provincial authorities have operational responsibility for response activities outside of municipal jurisdictions and provide for coordination of provincial and federal resources in support of municipal and other agency response activities, including those of NOVA Chemicals.

Mutual understanding meetings have been held with the Directors of Emergency Management Services or equivalent for all municipalities associated with the pipeline operations in accordance with Directive 71.

FIGURE 8 MUTUAL UNDERSTANDING RELATIONSHIP



8.15 LACOMBE COUNTY MUTUAL AID ORGANIZATION

NOVA Chemicals is a member of the Lacombe County Mutual Aid Organization (LCMAO). The function of LCMAO is to provide mutual aid to members in case of an emergency beyond the resources of any one company.

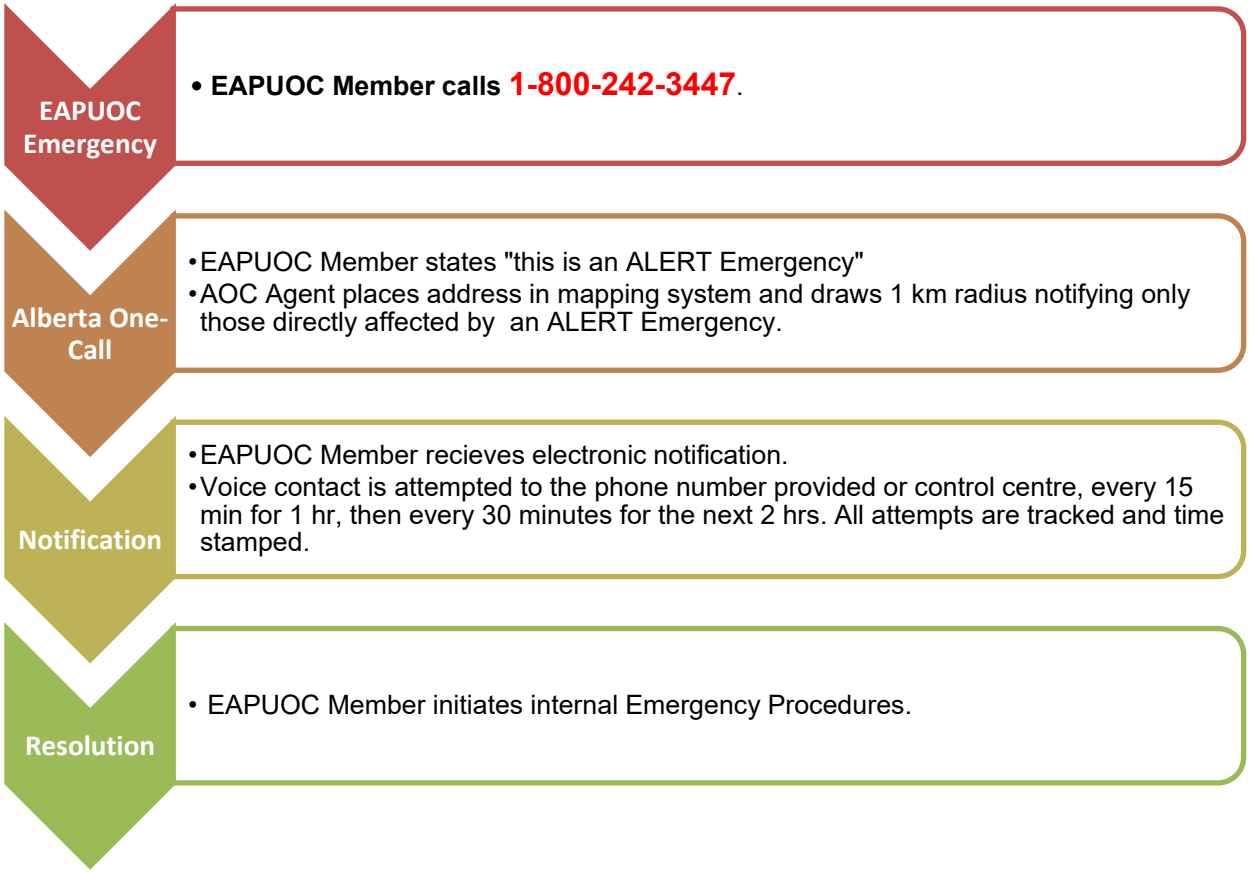
In the case Joffre Site requests Mutual Aid due to a pipeline related incident; the Pipeline Technician or alternate will coordinate and direct the personnel at the staging area. Additional information on LCMAO can be found in the Lacombe County Mutual Aid Plan (LCMAP) – located in the EOC.

8.16 EDMONTON AREA PIPELINE AND UTILITY OPERATORS COMMITTEE (EAPUOC)

This group represents all the pipeline and utility companies in the Edmonton area. An interactive voice response system (IVR) is maintained and regularly tested by EAPUOC. This system is to be tested in the Edmonton area to contact regulators, industry peers and emergency responders such as Alberta Health Services/Edmonton Area in an emergency. Considerable resources and equipment could be accessed through this group. The overall intent of the group is to rapidly inform all parties that could be involved in a pipeline emergency to ensure rapid and appropriate response.

EAPUOC has initiated an Emergency Response Transmission called the Alberta Emergency Response Transmission (ALERT) that notifies EAPUOC members when an emergency situation or anomaly is reported near their underground infrastructure. This immediate awareness allows EAPUOC members to respond accordingly, including the ability to provide mutual aid.

ALERT CALL DOWN SYSTEM



8.17 NORTHEAST REGION COMMUNITY AWARENESS EMERG RESPONSE (NR CAER)

This Association's plan provides members with access to and assistance of the combined resources of the region. The NR CAER plan promotes cooperative action between Industry, Governmental Agencies and the Community in the event that control and mitigation of an emergency is beyond the capability of local resources. Also, works to ensure that Emergency Response Plans of its members are compatible. A public information line is available through NR CAER.

9.1 EQUIPMENT IDENTIFICATION

Joffre site emergency response equipment would be available for pipeline incidents that could occur within close proximity of the plant site. Due to the requirement of the equipment in support of a Joffre site incident, the equipment would not be used for situations beyond the Lacombe County.

Information regarding the equipment availability and frequency of testing is maintained within the Joffre Site Emergency Response Plan.

9.2 VEHICLE EQUIPMENT

9.2.1 PIPELINE TECHNICIANS

All pipeline technicians responding to a pipeline incident as a first responder would be equipped with the following equipment. All other response equipment would be provided through external emergency services within the applicable County or Municipality.

DESCRIPTION	QUANTITY	INSPECTION FREQUENCY
Gas detector	1	annual
Safety vests	2	annual
Flashlight	1	annual
Roll “DO NOT ENTER” tape	1	annual
Emergency Manual	1	annual
Fire retardant clothing	2	annual
Set of keys for Block Valve and Pump Station access	1	annual
Fire extinguisher	1	annual
First aid kit	1	annual
Set of assorted hand tools	1	annual
Laptop computer with air card for remote access to NOVA Chemicals Intranet	1	annual
Portable Spot Light	1	annual
Binoculars	1	annual
Road Flares/Reflectors		annual
Flare pistol	1	annual
Winter clothing - socks, boots, insulated coveralls, gloves, head covering, blankets		annual
Magnetic amber flashing light	1	annual

9.2.2 PIPELINE OPERATIONS AND MAINTENACE TEAM LEADER

DESCRIPTION	QUANTITY	INSPECTION FREQUENCY
Pair binoculars	1	annual
Safety vest	1	annual
Flashlight	1	annual
Emergency manual	1	annual
Winter clothing - socks, boots, insulated coveralls, gloves, head covering, blankets		annual
Fire retardant coveralls	1	annual
Set of keys for Block Valve and Pump Station access	1	annual
Fire extinguisher	1	annual
First aid kit	1	annual
Magnetic amber flashing light (12 volt)	1	annual

9.2.3 ROAD BLOCK SIGNS

Alberta Pipeline System

Large fluorescent road block signs mounted on spring loaded bases are located at the Red Deer Pipeline Office, the Cloverlawn pump station and in the Sherwood Park office. The intent of this deployment is to allow pipeline technicians to pick up the signs enroute to an incident to assist local authorities with management of traffic.

10.1 EMERGENCY RESPONSE PLAN EXERCISES

The NOVA Chemicals Pipeline Emergency Preparedness Team will annually conduct a minimum of 2 exercises per year. At minimum, once every third year will be a "major" or "full scale" exercise. All exercises will include Pipeline Control Room Operations.

Whenever possible and appropriate, local emergency response agencies and regulatory representatives will be invited to participate and/or observe at the exercises.

10.1.1 TABLETOP and FUNCTIONAL EXERCISES

Tabletop Exercise - an informal group discussion centered on a scenario. Its purpose is to test existing plans, policies, and procedures without incurring the cost associated with deploying resources. It also allows participants to thoroughly work through a problem without feeling as much pressure as they would in an operations-based exercise. Participants will identify strengths and shortfalls, enhance understanding of new concepts, and seek to change existing attitudes and perspectives.

Functional Exercise – an activity designed to evaluate capabilities and multiple functions using simulated response. A functional exercise will simulate the deployment of resources and rapid problem solving. Participants will evaluate management of the command and coordination centers and assess the adequacy of emergency response plans and resources.

10.1.2 FULL SCALE (Major) EXERCISES

Major Exercise – a multi-agency, multi-jurisdictional activity involving actual deployment of resources in a coordinated response, as if a real emergency had occurred. The full-scale exercise includes the mobilization of units, personnel, and equipment. Participants will assess plans and procedures and evaluate coordinated responses under crisis conditions.

10.2 TRAINING

Training is a basic requirement of any effective emergency response system. Training is a continuous process and must be delivered in varying degrees to company personnel within key departments. NOVA Chemicals will conduct a training program for designated emergency responders, commensurate with their responsibilities. The elements that comprise the training program are:

- Basic plan familiarization.
- Emergency Operations Centre Training.
- Media and Public Communications.

Training is the joint responsibility of the Emergency Preparedness Team and the Joffre Site Learning Network. In addition to the basic training, NOVA Chemicals personnel will be provided with any specialized training deemed appropriate to specific job functions within the NOVA Chemicals Pipeline Emergency Response Plan. Table 5 (page 10-116) defines the training requirements and frequency of training for personnel assigned to the various components of the Pipeline Emergency Response Team. An annual review of training completion will be conducted to ensure all Pipeline Emergency Response Team members are current with their training. Furthermore, the training program itself will be reviewed annually and updated as necessary to reflect improvements in technology and/or knowledge or to address gaps identified in drills.

10.2.1 PLAN FAMILIARIZATION

Basic information about the emergency plan is provided to any NOVA Chemicals employee who may be affected by a pipeline emergency. The training consists of an overview of the plan itself and actions that are expected from the employees.

This training is generally no more than two hours in duration and is to be provided to applicable NOVA Chemicals employees, contractors and visitors. Refresher training is to be presented once a year.

Training is provided as required to:

- Identified departments.
- Contractors.
- External stakeholders such as:
    - Utility providers.
    - Industrial partners.
    - Municipal responders.

10.2.2 INCIDENT COMMAND

NOVA Chemicals personnel assigned responsibilities for pipeline emergency operations will be trained in the principles and terminology of the Incident Command System (ICS). The ICS is widely employed by municipal emergency response agencies and many of NOVA Chemicals industrial partners. This training will equip NOVA Chemicals personnel with enough knowledge of the ICS to enable them to work effectively with the municipal, government and industrial partners in response operations.

10.2.3 EMERGENCY OPERATIONS CENTRE

Persons assigned to the EOC will be trained in techniques and theories for managing emergency operations. Training will be provided to EOC members before being assigned to the task and every three years thereafter.

10.2.4 MEDIA AND PUBLIC COMMUNICATIONS

All pipeline employees will be provided with a basic level knowledge of how they are advised of an emergency, how communications are to be handled in an emergency situation, and who are the individuals that are assigned the responsibilities of dealing with the Public and Media.

Personnel that are designated with the responsibility of conducting communications with the Public or Media will be provided with specialized training appropriate to their assigned duties.

10.2.5 EXTERNAL RESOURCES AND CONTRACTORS

Joint training with other organizations, such as external contractors, municipal emergency services and off-site resources will be conducted whenever the opportunity presents itself. Personnel from these areas will be offered the opportunity to review the Pipeline Emergency Response Plan and participate in joint training activities and exercises.

Basic information about the layout and methods of conducting NOVA Chemicals response operation will be shared with off-site resources deemed applicable to this Emergency Response Plan

TABLE 5 PIPELINE EMERGENCY RESPONSE TEAM TRAINING REQUIREMENTS[1]

TRAINING	INITIALLY	REQUALIFICATION
First Aid/CPR	First year of employment	3 years
High Vapour Pressure Release[2]	Next available course	3 years
Incident Command System - 100 – 200	Next available course	N/A
Media Training	Next available course	N/A
Nitrogen Safety	First year of employment	3 years
Operator Fire Field Training[3]	First year of employment	3 years
Pipeline Emergency Response Manual[4]	First year of employment	1 year
Pipeline Resident Landowner Database	First year of employment	1 year
Process Fire Hazard Awareness	First year of employment	3 years
Process Safety Management Awareness	First year of employment	N/A
Responsible Care and Environmental Awareness	First year of employment	N/A
Test/Monitor Hazardous Atmosphere	First year of employment	3 years
WHMIS – Global Harmonized System	First year of employment	3 years

NOVA CHEMICALS JOFFRE EOC MANAGER PIPELINE SPECIFIC TRAINING

- Pipeline Emergency Response Manual familiarization
- Drill participation

[1] Supervisors (i.e. coordinators etc.) are required to take all the same training as the Pipeline Technicians.

[2] Learning to control accidental release of HVP to minimize potential for fire, explosion, toxicity, or environmental damage and appropriate plume ignition procedures.

[3] Potential causes, types, sizes, and consequences of fire and appropriate use of fire extinguishing equipment.

[4] Characteristics and Hazards of HVP transported (Section 15), Conditions likely to cause emergencies, their consequences, and appropriate corrective action (Section 5).

11.1 OVERVIEW

Post-incident recovery activities should be initiated as soon as possible, preferably **WHILE RESPONSE OPERATIONS ARE STILL UNDERWAY.** However, investigations and reviews should be held in abeyance until emergency response operations have been completed.

Post-incident recoveries include effecting permanent repairs or restorations to temporary repairs developed as part of the emergency response. Actions taken during response operations should be decided, whenever possible, with post-incident recovery in mind.

Recovery operations include:

- Initiation of Recovery Activities
- Repair & Clean Up Activities
- Public Affairs & Stakeholder Relations
- Critical Stress Incident Debriefing
- Notification of Next of Kin
- Reporting
- Post Incident Investigations
- Post Incident Appraisal
- Damage / Claims Assessment

11.1.1 INITIATION OF RECOVERY ACTIVITIES

For the most part, the Pipeline Team Leader and the EOC Manager will be responsible for co-coordinating the post incident activities. The EOC Manager and Public Information Officer will be responsible for notifying original contacts and for informing the media.

- After consultation with the Municipal Incident Commander, ensure all other members of the Field Response Group, including contract personnel, are notified of the emergency stand down status.
- The EOC Manager will co-ordinate the deactivation of all NOVA Chemicals emergency response operations and the Pipeline Technician will ensure deactivation of all Field Response Group team members, equipment and areas.
- Ensure all previous contacts, including Industrial Operators; Schools, Government Agencies, etc. are notified of the emergency status stand-down.
- Advise all response team members to document their stand-down notification calls.

There are a number of “recovery” activities listed in the following sections that may need to be initiated in addition to the above. The applicability and extent of action necessary to address these activities will vary, dependent on the type and severity of the incident.

11.2 REPAIR AND CLEAN-UP ACTIVITIES

Note: If a serious injury or death has occurred, the scene must be left undisturbed, as much as possible until an investigation of the site can be completed by the appropriate authorities.

The Pipeline Operations and Maintenance Team Leader and/or the EOC Manager will activate the Pipeline Rapid Repair Plan at an appropriate time.

During Subsequent Cleanup Operations:

- Cordon off the incident site for any subsequent investigations by the Police, insurance representatives, Company personnel or Government Agency personnel.
- Ensure priority is given to clearing debris and restoring the site to normal operating conditions after all internal and external investigations are complete.
- Ensure all safety equipment is cleaned and inspected prior to returning it to its normal storage location.

Utilize all available staff for the cleanup and repair activities and resumption of normal operations.

11.3 CRITICAL INCIDENT STRESS DEBRIEFING

Following a traumatic event, an individual may develop a number of physical, mental and emotional symptoms of stress directly related to that event or previous events which have resurfaced through this most recent traumatic event. These symptoms have come to be referred to as Critical Incident Stress. A process utilized by the company, which assists individuals in managing traumatic events, is called Critical Incident Stress Debriefing (CISD).

Critical Incident Stress Debriefing (CISD) can be obtained as follows:

1. Call Health Services (Section 6.2 Main Office Number); they normally arrange for this assistance.
2. Call Corporate Health Consultants (Section 6.2).
3. Call Police and request Victim Services. They will ask:
    - Your name & telephone number
    - Your company name & telephone number
    - Possible back-up number
    - Nature of the incident

11.4 POST INCIDENT INVESTIGATIONS

Every emergency involving a fatality, a serious injury, and loss or significant damage to NOVA Chemicals property or pipelines operated by NOVA Chemicals will be investigated based on the Responsible Care Learning System (RCLS). As soon as possible after an incident, personnel designated by leadership will mobilize and depart for the incident site to conduct an investigation into the incident.

PARTICULAR CARE MUST BE EXERCISED TO ENSURE THAT ALL EVIDENCE IS PRESERVED IN ITS ORIGINAL STATE. Where loss or damage to NOVA Chemicals property or pipelines operated by NOVA Chemicals, evidence will not be disturbed until permission has been received from the Insurance Company adjuster or any government agencies involved.

11.4.1 SERIOUS INJURY/FATALITY INVESTIGATIONS

Following an incident where a fatality or a serious injury has occurred, government agency representatives will likely decide to carry out an investigation into either the extent or cause of the injury/fatality. After presenting their credentials, the representatives are to be afforded full co-operation in the performance of their duties.

Work at the scene of the injury/fatality may not be resumed until permission has been obtained from the Medical Examiner's/Coroner's Office, the Local Police and any provincial government agency with jurisdiction. Resumption of work may be permitted on a restricted basis to facilitate rescue operations or when failure to resume operations may endanger the lives of others.

11.4.2 OTHER 3RD PARTY INVESTIGATIONS

Third party agencies, such as Police, Government and Insurance Companies may be required to investigate an incident site. It is important to cooperate with third party investigators. However, Company personnel should be aware of the corresponding Corporate guidelines.

- Obtain the name, title, address and telephone number of all inspectors and immediately inform the Site Leader before proceeding with the investigation.
- Ensure a Company representative accompanies the Inspector at all times. Never leave an Inspector unattended.
- Only give the Inspectors the information they request. Avoid offering additional information. Limit the tour to the specific area the inspector wishes to investigate.

11.4.2 OTHER 3RD PARTY INVESTIGATIONS continued. . .

- Always tell the truth.
- Document all items of evidence that the Inspector has retained. Where possible, keep copies of the evidence provided to the Inspectors.

Wait until legal counsel is present before answering questions where the Inspector indicates that any statements may be used as evidence or indicates that you have the right to counsel.

11.5 INCIDENT DEBRIEF PROCESS

The Incident Debrief Process is a tool to critique the Emergency Response activity. The intent of this critique is to look at what went well with the response so we will continue to do them as well as look for areas of improvement. Areas of improvement are opportunities to improve our response activities. The Emergency Response Debrief Checklist is used for this purpose (see 13.7 in Forms section).

11.5.1 RESPONDER DEBRIEFING

Immediately after the emergency, the Pipeline Operations and Maintenance Team Leader should review and evaluate the response with the personnel involved. This review should focus on improvements to emergency response procedures and equipment used, as well as, the effectiveness of the lines of communication. The review should include response agencies or other industry personnel who assisted with the emergency. Refer to Section 13.7 for the Pipeline Emergency Response Debrief Checklist.

The debriefing itself must include:

- Cause of the incident.
- Adequacy of resources responding to the incident.
- Whether personnel were properly trained and responded effectively and timely, according to predefined procedures.
- Whether the equipment was effective and adequate.
- How a reoccurrence can be prevented.
- Recommendations on procedures that will improve NOVA Chemicals emergency response efforts in the future.

11.5.2 POST INCIDENT APPRAISAL REPORT

The post incident appraisal report should include:

- A review of the events leading up to the incident.
- Description of the incident and its cause.
- An analysis of the on-scene response procedures, including an evaluation of the safety standards that were applied.
- An appraisal of the company's shelter / evacuation response for the affected public. (if applicable).
- An evaluation of the effectiveness of the coordination of incident activities with municipal responding agencies.
- An evaluation of the effectiveness of the notification and communication systems between the incident site and the NOVA Chemicals Joffre site.
- An appraisal of the effectives of any media or public relations efforts.
- An assessment of any potential legal or environmental issues that may be raised as a result of the incident or as a result of the company's response efforts.
- A summary of current and future costs.
- Recommendations for preventative or mitigative measures to prevent future incidents.
- Any changes that may be required in the ERP to improve future response.
- Any additional training of personnel required to improve response capability.

The post incident appraisal report should outline the strengths and weaknesses of NOVA Chemicals response. This report will be directed to the attention of the Leader – Manufacturing Infrastructure. It will be his/her responsibility to ensure all recommendations for improvements to the NOVA Chemicals Emergency Response Plans are incorporated where applicable and promptly communicated to the appropriate Company personnel.

11.6 DAMAGE CLAIMS / ASSESSMENT

In the event of an emergency, damage may cover a broad field including both damages to company property and to others. It is required that Risk Management is notified immediately so appropriate steps can be taken to engage the necessary resources to begin assessment of damage(s). Risk management has established Emergency Response procedures for these types of situations.

11.7 RECOVERY

Once the emergency incident has been handled and under control the “All Clear” will be sounded. Depending on the severity of damage, the Recovery Phase in the incident will be developed. This process is normally managed under the direction of the **Logistics** and **Planning Coordinators**.

12.1 GLOSSARY & ACRONYMS

Term	DEFINITION
Incident	An undesired and unplanned event that results in injury to people, damage to property, damage to the environment or loss to process.
Access Control Point	Various strategic locations such as roadblocks, main gate areas or bridges where access to and from the hazard area is controlled.
Activation	When all or a portion of the Emergency Response Plan has been put into motion.
AEMA	Alberta Emergency Management Agency.
AEP	Alberta Environment and Parks.
AER	Alberta Energy Regulator.
AHS	Alberta Health Services.
Alarms	Warning system put in place to notify people that an emergency has occurred or is about to occur. Can be used to mobilize Emergency Response Organization plus warn people of danger so that they can take steps to protect their own safety.
Alert	Notification that an emergency situation has occurred - stand by for possible activation of Emergency Response Plan.
ASSIST	Alberta Security and Support Strategic. Intelligence Team.
BLEVE	Acronym for Boiling Liquid Expanding Vapour Explosion.
Bomb	A device that contains explosive or incendiary material that may be fired by any means.
Bomb Incident	Any of the following situations: • Receipt of a threat or warning. • Discovery or location of a device suspected to be a bomb. • Actual detonation or ignition of a bomb.
Bomb Threat	An action taken by a person (usually anonymous) stating they have placed an explosive device somewhere on the premises. The person's purpose is usually to disrupt operations and cause fear among the work force.
Briefings	Means used to pass information to selected groups. Can be used to address members of the Emergency Response Organization, the media, government and the public. Used to facilitate decision making within the Emergency Response Organization.
CANUTEC	Canadian Transport Emergency Center.
CIC	Coordination and Information Centre.
COGOA	Canada Oil and Gas Operations Act.

12.1 GLOSSARY & ACRONYMS continued. . .

TERM	DEFINITION
Communications	Act of passing information between participants in Emergency Operations to facilitate management of resources. Entails the use of technical means such as telephones and radios plus employing policies and procedures designed to ensure effective passage of information.
Control Valve	A valve that will automatically maintain a pre-determined pressure upstream or downstream of the valve, or will maintain a controlled flow rate through the valve.
Critical Incident Stress	Psychological effects experienced by people who are involved in a crisis.
CISD	Critical Incident Stress Debriefing.
COMOC	Consequence Management Operations Centre.
CSA Z246.1	"CSA Z246.1" means CSA Standard Z246.1 entitled *Security Management for Petroleum and Natural Gas Industry Systems*, as amended from time to time.
Distribution List	List of each numbered copy of the Emergency Response Plan. Shows how many authorized copies are in circulation and who has them. Facilitates maintaining the currency of document.
Downstream	With reference to a pumping station, indicates the discharge side of that station.
EAPUOC	Edmonton Area Pipeline and Utility Operators' Committee.
EOCM	Emergency Operations Centre Manager.
Emergency	An unforeseen combination of circumstances or the resulting state outside the scope of normal operations requiring a prompt coordination of resources to protect the health, safety or welfare of people, or to limit damage to property and the environment.
Emergency Operations Centre (EOC)	The location set up at the NOVA Chemicals Joffre site that provides support to emergency site operations.
Emergency Operations	Actions taken to bring an emergency to an end. Descriptions of these actions are usually contained in the Emergency Response Plan. The goal of Emergency Operations is to protect the safety of the community and the facility's work force as well as to minimize any damage caused by an emergency.

12.1 GLOSSARY & ACRONYMS continued. . .

TERM	DEFINITION
Emergency Planning Zone	A geographical area surrounding a well, pipeline, or facility containing hazardous product that requires specific emergency response planning by the licensee.
Emergency Response Organization/Agency	A structure that assigns specific duties and responsibilities to all personnel involved in Emergency Operations.
Emergency Response Plan	Documented, structured approach to guiding facility personnel through the steps of managing response to emergency situations.
Emergency Preparedness	Activities, programs, and systems for response, recovery, and mitigation in anticipated emergencies.
Emergency Site	The actual location where the emergency has taken place.
EPA	Environmental Protection Agency.
EPH	Environmental Public Health.
EPO	Emergency Planning Officers.
EPWS	Emergency Public Warning System.
EPZ	Emergency Planning Zone.
ERP	Emergency Response Plan.
ERO	Emergency Response Officer.
ESD	Emergency Shut Down.
Evacuation	The departure of personnel from the on-site location in an orderly fashion to a designated safe location off site.
Exercise	Examination of potential emergency situations for the purpose of evaluating Emergency Response procedures. Also known as drills, simulations or tests. Exercises can be very simple or very complex, depending on the objectives of the exercise.
External Organization/Agency	A group who would have special knowledge or skills to assist in a specific area during an emergency. Not directly involved in Emergency Response.
Fatalities	Persons who die by other than natural causes.
Field Response Group	The first line resource for pipeline emergency operations. Operates under the direction of the Pipeline Technician.

12.1 GLOSSARY & ACRONYMS continued. . .

TERM	DEFINITION
GEOC	Government Emergency Operations Centre.
H_2S	Hydrogen Sulphide – a poisonous gas that is a gas that may be given off by sour condensate or crude oil. It is deadly and requires special safety procedures when working in areas where it is suspected to be present.
Hazard	A condition that exists which represents the potential for human danger, damage to property, damage to the environment, or some combinations of these.
Hazard Analysis	Subjective evaluation of factors that will create risk for NOVA Chemicals and what the impact of such an occurrence would be.
Hazard Area	The area impacted by the emergency event where hazardous conditions to people or the environment exists.
Hazardous Materials (Haz-Mat)	Products and materials that can cause injury or death if they come in contact with a living organism. Usually chemical in nature, they can harm people, animals or vegetation. Harm is caused by means of direct contact, inhalation or ingestion.
HVP or High Vapour Pressure	Hydrocarbons or hydrocarbon mixtures in the liquid (or quasi-liquid) state having a vapour pressure greater than 240 kPa (35 psi) at 38^0C (100^0F).
Initial Isolation Zone (IIZ)	An area in close proximity to a continuous hazardous release where indoor sheltering may provide temporary protection due to the proximity of the release.
Incident	Any event involving NOVA Chemicals facilities, equipment and/or personnel that could, or does, result in an emergency.
Incident Command Post	A location (field) selected from which the Municipal Emergency Response agencies will manage response and control procedures in the event of an emergency.
IC	Incident Commander.
IED	Improvised Explosive Device.
Incident Commander	The person, from, Municipal Emergency Response agencies which is in overall command and control for emergency operations at the incident site.
ICS	Incident Command System. A nationally used standardized On-Scene Emergency Management concept specifically designed to allow an integrated organizational structure equal to the complexity and demands of single or multiple incidents without being hindered by jurisdictional boundaries. ICS is the combination of facilities; equipment, personnel, procedures, and communications operating within a common organizational structure, with responsibility for the management of resources to effectively accomplish stated objectives pertinent to an incident.

12.1 GLOSSARY & ACRONYMS continued. . .

TERM	DEFINITION
IRAP	Integrated Risk Assessment Approach.
IVR	Interactive Voice Response System.
J-SOIL	Joffre Site Operations Information Line.
LCMAO	Lacombe County Mutual Aid Organization.
LCMAP	Lacombe County Mutual Aid Plan.
LEL (Lower Explosive Limit)	The minimum concentration (in % by volume) at which gas or vapour will explode or ignite.
Litigation	Legal action taken by a person or group of persons against NOVA Chemicals. Action may be for personal injury, loss of livelihood or damage to the environment.
Level 1 Emergency	There is no danger outside the licensee's property, there is no threat to the public, and there is minimal environmental impact. The situation can be handled entirely by licensee personnel. There will be immediate control of the hazard. There is little or no media interest.
Level 2 Emergency	There is no immediate danger outside the licensee's property or the right-of-way, but there is the potential for the emergency to extend beyond the licensee's property. Outside agencies must be notified. Imminent control of the hazard is probable but there is a moderate threat to the public and/or the environment. There may be local and regional media interest in the event.
Level 3 Emergency	The safety of the public is in jeopardy from a major uncontrolled hazard. There are likely significant and ongoing environmental impacts. Immediate multi agency municipal and provincial government involvement is required.
LPG	(Liquefied Petroleum Gas) LPGs are a mixture of heavier hydrocarbon gases that may include propane, butanes and pentanes plus liquids.
Local Authority	• The council of a city, town, village, or municipal district. • In the case of an improvement district or special area, the Minister of Municipal Affairs. • The settlement council of settlement under the Metis Settlement; or The band council of a First Nations reserve.

12.1 GLOSSARY & ACRONYMS continued. . .

TERM	DEFINITION
Management System	A management system is the framework of processes and procedures used to ensure that an organization can fulfill all tasks required to achieve its objectives.
MCI	Multiple Casualty Incident.
MEOC	Municipal Emergency Operations Centre.
MI	Manufacturing Infrastructure.
M.I.L.T.	Manufacturing Infrastructure Leadership Team.
Mitigation	To make an emergency less intense, serious or severe.
Mobilization	Transition from normal operations to emergency response. All resources needed to cope with the emergency situation are called out in this way.
MOH	Medical Officer of Health.
MOU	Memorandum of Understanding.
MOV	Motor Operated Valve.
MSDS	Material Safety Data Sheets.
Notification	The act of being informed of an emergency by an outside source i.e. local authorities, police, public; the act of informing neighbors of an emergency.
NRC	National Response Center.
NRCAER	Northeast Region Community Awareness Emergency Response.
NRCan	Natural Resources Canada.
OSC	On-Scene Commander.
On-Scene Incident Commander	The NOVA Chemicals person at the emergency site, who is in command and control of all NOVA Chemicals personnel and resources, including contractors. This individual is responsible for liaising and communicating with external agencies at the emergency site.
On-Scene Incident Command Post	A location such as a building or a vehicle where NOVA Chemicals will establish its' management and control of operations at the scene.

12.1 GLOSSARY & ACRONYMS continued. . .

TERM	DEFINITION
OSCP	On-Scene Command Post.
PAZ	Public Awareness Zone.
PIO	Public Information Officer.
Pipeline Right-of-Way	The pipeline easement (right-of-way) is an agreement between a landowner and a company in which the landowner receives financial compensation in return for allowing a company to create an easement, or right-of-way, for pipeline routes. Normally, a pipeline easement or facility surface agreement is obtained before the AER approves an application to construct a pipeline or facility, except in cases where a dispute between a landowner and a company exists.
Plume	A visible or measurable discharge of a contaminant from a given point of origin. Can be visible or thermal in water, or visible in the air as, for example, a plume of smoke. The area of radiation leaking from a damaged reactor. Area downwind within which a release could be dangerous for those exposed to leaking fumes.
Preparedness	A state of readiness for emergencies that NOVA Chemicals' maintains. Provides the capability to deal with emergencies when they arise.
PPE	Personal Protective Equipment.
RCLS	Responsible Care Learning System.
RCMP	Royal Canadian Mounted Police.
Reception Centre	A centre established to register evacuees from emergency shelter, to assess their needs, and, if temporary shelter is not required because evacuees will stay elsewhere, to ascertain where they can be contacted.
Residence	A dwelling that is occupied full or part time.
Release	"Release" includes spill, discharge, dispose of, spray, inject, inoculate, abandon, deposit, leak, seep, pour, emit, empty, throw, dump, place and exhaust.
REOC	Regional Emergency Operations Centre.

12.1 GLOSSARY & ACRONYMS continued. . .

TERM	DEFINITION
Resources	Materials, equipment and supplies used in Emergency Operations. Includes the skills and abilities of the people who will carry out Emergency Operations.
Risk	The likelihood of a specified undesired event occurring within a specified period or in specified circumstances. It may be either a frequency (the number of specified events occurring in unit time) or a probability (the probability of a specified event following a prior event), depending on the circumstances.
Risk Assessment	The quantitative evaluation of the likelihood of undesired events and the likelihood of harm or damage being caused together with the value judgments made concerning the significance of the results.
SCADA	Supervisory Control and Data Acquisition.
SCBA	Self-Contained Breathing Apparatus.
Shelter-In-Place	The life safety procedure for people to go inside a building or vehicle and utilize the clean air and structural engineering to provide them with a safe haven for protection from the natural elements or a chemical emergency.
Simulation	Same as exercise. A specialized type of exercise.
Suspect Device	A suspect device could include any type of container such as a box, bag, briefcase, etc. that you are unfamiliar with in your work area. The contents of the container will typically include explosives, power supply (battery or electrical cord), timing device or other triggering mechanism and the associated wiring.
SPOC	Single Point of Contact.
State of Local Emergency	A declaration by a local authority under the *Emergency Management Act* or by the medical officer of health under the *Public Health Act* providing the necessary authority, resources, and procedures at the municipal level to allow an emergency to be resolved effectively and efficiently.
Special Needs	Those persons for whom early response actions must be taken because they require evacuation assistance, requested early notification, do not have telephones require transportation assistance, have a language or comprehension barrier, or have specific medical needs. Special needs also include those who decline to give information during the public consultation process and any residences or businesses Where contact cannot be made.
Surface Development	Dwellings that are occupied full time or part time, publicly used development, public facilities, including campgrounds and places of business, and any other surface development where the public may gather on a regular basis. Surface development includes residences immediately adjacent to the EPZ and those from which dwellers are required to egress through the EPZ.

12.1 GLOSSARY & ACRONYMS continued. . .

TERM	DEFINITION
SRD	Sustainable Resource Development.
Threat Or Warning	A communication, in any form, that states or implies that a bomb will be placed or has been placed.
Upstream	With reference to a pump station, indicates the suction side of the station.
Uncontrolled Release	Any unrestricted flow, spill, or release that cannot be shut off.
Vapour	The gaseous form of a substance that is found in a solid or liquid state at normal atmospheric pressure.
WCB	Workers Compensation Board.
WHMIS	Workplace Hazardous Materials Information System.
WH & S	Workplace Health & Safety.

13.1 PIPELINE EMERGENCY INCIDENT CALL SHEET

Before transferring any telephone calls the following information must be obtained:

Call Back Name and Number:		
Location of Problem:		
Legal Land Description:		
Nearest Community (Directions)		
Clearly Observable Landmark		
Near Dwellings, Public Road or Railroad		
Is there a Fire?	Yes: ❒	No: ❒
Any Injuries?	Yes: ❒	No: ❒
Weather Conditions Fog?	Wind Direction	Velocity
Other Information:		

Advise Caller

ETHYLENE LEAK
1. Ethylene is similar to propane and will ignite easily (has a faint sweet gas-like smell). 2. You may see a vapour cloud near the ground. 3. If in the area of a vapour cloud leave immediately at right angles to the wind. 4. Do not start a vehicle and attempt to keep people out of the area.
ETHANE LEAK
1. Ethane is similar to propane and will ignite easily. 2. You may see a vapour cloud near the ground. 3. If in the area of a vapour cloud, leave immediately at a right angle to the wind. 4. Do not start a vehicle and attempt to keep people out of the area.
HYDROGEN LEAK
1. Hydrogen will ignite easily. 2. Leave immediate area of leak.
NITROGEN LEAK
1. Nitrogen will displace air and possibly cause asphyxiation. 2. Leave immediate area of leak.
NATURAL GAS LEAK
1. As an immediate precautionary measure, isolate spill or leak area for at least 100 metres (330 feet) in all directions. 2. Keep upwind and keep out of low or confined areas (sewers, basements, tanks). 3. Keep unauthorized personnel away. 4. Extremely flammable gas: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). 5. Acute and delayed symptoms and effects: may displace oxygen and cause rapid suffocation.

Call Received by: _____

Calls Made: **Person Spoke To:** **Date & Time:**

_____

_____

13.2 TIME AND EVENT LOG

Name_____ Position_____ Date:_____ Page ___of ____

#	TIME (24 HR)	EVENT / ISSUE/ CONTACT NAME / COMPANY	PHONE #	NOTES / ACTION / DECISION TAKEN

Document all key events, conversations, meetings, etc. on this form. Where lengthy notes are necessary, use the reverse of the page or attach and identify a separate sheet 2. Provide each separate action with a serial #.

13.3 JOFFRE PIPELINE OPERATOR CHECKLIST

Upon receipt of an emergency call or leak alarm:

- ☐ Obtain information from caller as per the Pipeline Emergency Incident Call Sheet (Section 9.1) to document time, etc.
- ☐ Maintain log (Section 13.2).
- ☐ Advise caller of hazards of ethylene, ethane, nitrogen, hydrogen or natural gas
- ☐ Call Pipeline 'On-Call' personnel.
- ☐ Call Emergency & Security Services (ext. 8767), advise them of the situation. Emergency & Security Services will then initiate EOC.
- ☐ ALERT: County or Municipality fire department that there is a suspected leak. (911)
- ☐ When sufficient evidence or confirmation of a leak is obtained, take appropriate control actions to minimize effects of the emergency. For example: Close block valves on each side of the leak as per the "Block Valve Closing Policy" Utilities Safe Operating Procedure (Section 7.2.3.3)
- ☐ Advise ethylene, ethane, nitrogen, hydrogen or natural gas buyers/producers of emergency and control actions taken, and actions required by them.
- ☐ Confirm appropriate valves are closed. If remote closure of valves from the control console is not possible, arrange for field personnel to do the isolation through field responders, i.e. Pipeline Technician, Emergency & Security Services.
- ☐ Respond to the pipeline emergency as directed by the Technical Advisor.
- ☐ Establish communication with field command post.

Call Back # _____

13.4 JOFFRE PIPELINE TECHNICIAN CHECKLIST

Upon Receipt of a call:

- ☐ Establish contact with Pipelines Operations & Maintenance Team Leader
- ☐ Organize an initial response group.
- ☐ Dispatch responders as required.
- ☐ Leave for the emergency site.
- ☐ Call back and confirm situation as per the Pipeline Emergency Incident Call Sheet (Section 13.1).
- ☐ Establish contact with local Emergency Response department.
- ☐ Maintain Log (Section 13.2).

At the Scene:

- ☐ Establish a site command post if not already completed.
- ☐ Take over communications with onsite personnel, agencies and media until Team Leader arrives.
- ☐ Communicate emergency needs/information to the EOC Manager (i.e. road closures equipment, communication, etc.).
- ☐ Confirm level of emergency and activate Emergency Plan as required.
- ☐ Are proper departments notified, arrangements made for N_2 truck and repairs? Is there construction equipment?
- ☐ Are valves verified closed?
- ☐ Are actions necessary to control the emergency being taken? (i.e. fire vapour cloud, close valves, building a fireguard, road closure, evacuating people, N_2 purge, etc.)
- ☐ Estimate length of leak.
  Estimated leak time = 3 hours per km based on 12” pipe with a 1” hole

Post Emergency:

- ☐ Investigations being undertaken. Pictures and documentation.
- ☐ Are provisions being made to repair pipeline quickly, 24-hour safety watch, replace people?
- ☐ Clean up

13.5 PIPELINE EMERGENCY INITIAL RESPONDER CHECKLIST

- ☐ Vehicle with communications equipment.
- ☐ Emergency manual containing maps, locating pipeline and block valve sites, as well as pertinent telephone numbers.
- ☐ Tape and/or pylons for road closure.
- ☐ Binoculars.
- ☐ Gas Detector.
- ☐ Confirm weather conditions.
- ☐ Approach site from upwind. Stay a safe distance from the leak, vapour cloud and low areas downwind.
- ☐ Report findings to Joffre EOC.
- ☐ Take actions deemed appropriate to reduce possible injury and/or damage. Bring the emergency under control until relieved by Team Leader or Pipeline Technician.
- ☐ Maintain log (Section 13.2).

13.6 AER FIRST CALL COMMUNICATION FORM

First Call Communication

Alberta Energy Regulator

This form is to be used when taking information for spills/releases. It will assist in consistent gathering of data and should be attached to the FIS record.

General Incident Information		
AER contact:	Field centre:	
Licensee:	Caller:	Phone:
E-mail address for release report:		
Licence #:	Pipeline line #:	Approval #:
Incident location: ____/_____ / _____ / ____ W___ M		
Emergency level:		
Serious event? ☐ Yes ☐ No		
If yes, what kind of serious event? ☐ Blowout ☐ Explosion ☐ Fire ☐ Other control loss ☐ Fracking ☐ Casing failure		
Land type (jurisdiction): ☐ Freehold ☐ First Nations ☐ Métis ☐ CFB ☐ Crown – Disposition #:		
Agencies notified:	Date:	
FIRST duty office (DO) contacted: ☐ Yes ☐ No If yes, date & time DO was contacted:		
DO contact name:		

Release Details			
Volumes			
Substance*	**Released (m^3/10^3 m^3)**	**Recovered (m^3/10^3 m^3)**	**Disposal/storage location**
* For emulsion, break down oil & water if possible.			
Description of how the release volume was determined and verified (including calculations; e.g., spill length × width × depth):			
Area affected (length × width): m^2			
How was the area affected determined? (Aerial survey, perimeter walk, range finder, samples taken,etc.):			
Who delineated the spill area (environmental technologist, operator, etc.) and what process was used?			

☐ Reminded licensee to update the AER immediately if release volumes or area changes from what was originally reported.
☐ Asked for the immediate submission of photos of the entire spill site to the AER and communicated that photos of the cleanup will need to be submitted with the release report.
Cause of release (suspected or actual):

Impact		
Release off lease? ☐ Yes ☐ No (pipeline right-of-way is off lease)		
If yes, was the landowner notified? ☐ Yes ☐ No Name of landowner/agency:		
Release within disposition boundary? ☐ Yes ☐ No		
Outside disposition – was leaseholder notified? ☐ Yes ☐ No Name of leaseholder:		
☐ If outside disposition, reminded licensee that they will need a TFA.		
Actual incident H_2S concentration (if applicable): % / ppm / mol/kmol		
Nearest town:	Distance and direction to town:	
Environment affected: ☐ Air ☐ Land ☐ Water		
Distance of release to the nearest water body, watercourse, or waterway: How was this distance determined?		
Wildlife/waterfowl/livestock affected: ☐ None ☐ Habitat affected ☐ Animals injured/killed		
Notes/description:		
Confirm how the release has been or will be contained:		
Confirm how the release has been or will be cleaned up:		
Evacuees (#):	People injured (#):	Fatalities (#):
Were members of the public affect? ☐ Yes ☐ No		
If yes, indicate if they were ☐ notified ☐ instructed to shelter in place ☐ advised to evacuate		

Notes/description:
Media interest? ☐ None ☐ Local ☐ Regional ☐ National
Damage to public property? ☐ Minor/no damage ☐ Substantial (home covered in oil) ☐ Extensive (home destroyed)

Pipeline Specific		
Hit? ☐ Yes ☐ No	Line #:	Test failure? ☐ Yes ☐ No
Normal operating pressure: kPa	Maximum operating pressure: kPa	
Is the pipeline shut in, depressured, and isolated? ☐ Yes ☐ No		
If yes, date & time:		
What is the total volume of liquid in the pipeline?		
Are there isolation valves? ☐ Yes ☐ No If yes, have they been activated? ☐ Yes ☐ No		
Are there any other pipelines that tie into the failed line? ☐ Yes ☐ No If yes, have they been shut in/isolated? ☐ Yes ☐ No		
☐ Reminded the company to contact the AER before excavating the pipeline.		
☐ Reminded, advised, or directed the company that the pipeline is not to be returned to service without the AER's permission.		
Right-of-way (ROW)		
☐ Licensee has confirmed when the pipeline ROW and well were last checked. Date:		
How was the ROW surveillance conducted (from the air, by quad, on foot, using infrared, etc.)?		
☐ Requested that daily production volumes for the well/pipeline be submitted within 24 hours.		
Investigation information		
What operations are currently taking place (containment, sampling, line locating, retaining contractors/consultants, pipeline excavation, repair, site access, EM survey, etc.)?		

13.7 PIPELINE EMERGENCY RESPONSE DEBRIEF CHECKLIST

DESCRIPTION / TITLE OF INCIDENT _____

Date of Incident _____ **ILP** _____

	WHAT WENT WELL	AREAS FOR IMPROVEMENT
Emergency Activation		
Initial Call In (Pipeline Emergency Phone)		
Information Received (clear, precise, location)		
Pipeline Technician Informed		
Notification		
Communicator: Pipeline Team Leader notified		
EOC call out		
Community		
Resource Mobilization		
Internal resources: Pipeline Technicians		
Environmental		
Hygiene		
Appropriate Response		
Accurate emergency assessment		
Hot/Cold zone establishment		
Proper personal protective equipment		
Strategies established		
Tactics established		
Ongoing emergency evaluation		
Reporting		
External agencies notified (Police, OH&S, etc)		
Corporate call down		
Corporate reporting (Fire)		
Communication		
EOC ←→ Incident Command		
Critical Stress Debriefing		
Other Comments:		

13.8 THREATENING PHONE CALL / BOMB THREAT REPORT FORM

Canadian Bomb Data Centre

When a bomb threat is received:

1 Listen.
2 Be calm and courteous.
3 Do not interrupt the caller.
4 Obtain as much information as possible.
5 Initiate call trace action (if available) while the call is ongoing.
6 Using a pre-arranged signal, notify your supervisor while the call is still ongoing. Your supervisor should contact the local police service.
7 Complete the form provided below and give it to your supervisor.

Telephone trace number:
Pour dépister l'appel, appelez :

Details to be recorded:

Date Time

A.M. ☐ P.M. ☐

Exact wording of the threat:

ROYAL CANADIAN MOUNTED POLICE

Bomb Threat Telephone Procedures

Canada

Questions to ask:

What time will the bomb explode?

Where is it?

What does it look like?

Where are you calling from?

Why did you place the bomb?

What is your name?

Identifying characteristics:

Sex	☐ Male	☐ Female	☐ Not sure	Estimated age:
Accent	☐ English	☐ French	☐ Other	
Voice	☐ Loud	☐ Soft	☐ Other	
Speech	☐ Fast	☐ Slow	☐ Other	
Diction	☐ Good	☐ Nasal	☐ Lisp	Other - Autre
Manner	☐ Emotional	☐ Calm	☐ Vulgar	Other - Autre

Background noises - Bruits de fond

Voice was familiar (specify)

Caller was familiar with the area (specify)

GENDARMERIE ROYALE DU CANADA

13.9 FIRE REPORT FORM

REPORT: 310-FIRE

Caller Information

Name:	Telephone Number:
Company:	Address:
LSD Section Twp Range Meridian	Reason for being in the area:

Location of Fire-(Other Description)

_____

_____

_____

On-Site Information (if caller is not at the fire site move down to smoke)

Fire is burning in the:			Rate of Spread is:		
Ground	❒		Not moving	❒	
Bush	❒		Moderate	❒	Less than a normal walk?
Agricultural land	❒		Fast	❒	More than a normal walk?
Other	❒				
Are any people in the fire?	Yes	❒	No	❒	Don't know ❒
Is property threatened?	Yes	❒	No	❒	Don't know ❒
Is road access available?	Yes	❒	No	❒	Don't know ❒
Is water readily available?	Yes	❒	No	❒	Don't know ❒
Any other observations? (Lightening, recreation, vehicles, children in area?)					

Smoke Information

Unable to see fire, only smoke visible:			
Color		Column:	
Light grey	❒	Intermittent	❒
Medium grey	❒	Scattered	❒
Dark grey	❒	Light	❒
Black	❒	Heavy	❒

Received 310-fire call:	Time:	Date:
Relayed to Duty Officer / PFFC	Time:	Date:
Relayed to Fire Management Area	Time:	Date:

13.10 REVISION REQUEST FORM

TO: **EMERGENCY PREPAREDNESS TEAM – Attn: Pipeline Regulatory Specialist**

NOVA Chemicals Red Deer Pipeline Office
#6, 4940 – 81 Street
Red Deer, AB T4P 3V3

PHONE: (403) 342-6461
FAX: (403) 346-9944
EMAIL: joffre@novachem.com

SECTION NUMBER:		**PARAGRAPH NUMBER:**	
DESCRIPTION OF REVISION:			
REQUESTED BY:			
ADDRESS:			
MANUAL NUMBERS:			

☐	**Date Request Acknowledgement**	☐	**Approval Date**	
☐	**Dated Request Numbered and Logged**	☐	**Revision Number**	
☐	**Date Request Reviewed**	☐	**Revision Date**	
☐	**Correspondence / Phone call required for Additional Clarification? : Y / N**	☐	**Issue Date**	

13.11 ICS Form 202

INCIDENT OBJECTIVES	1. Incident Name	2. Date	3. Time
4. Operational Period			
5. General Control Objectives for the Incident (include alternatives)			
6. Weather Forecast for Period			
7. General Safety Message			
8. Attachments (mark if attached)			
☐ Organization List - ICS 203	☐ Medical Plan - ICS 206	☐ Other	
☐ Div. Assignment Lists - ICS	☐ Incident Map	☐	
☐ Communications Plan - ICS 205	☐ Traffic Plan	☐	
9. Prepared by (Planning Section Chief)		10. Approved by (Incident Commander)	

13.12 ICS Form 214

UNIT LOG	1. Incident Name	2. Date Prepared	3. Time Prepared
4. Unit Name / Designators	5. Unit Leader (Name and Position)	6. Operational Period	

PERSONNEL ROSTER ASSIGNED

Name	ICS Position	Home Base

ACTIVITY LOG

Time	Major Events

9. Prepared by (Name and Position)

13.13 PIPELINE FAILURE INVESTIGATION REPORT

Pipeline System: _____ Operator: _____

Operator ID: _____ Unit Number:_____ Activity: _____

Number: Location:_____ Date of Occurrence: _____

Material Released: _____ Quantity: _____

Investigation Responsibility: _____ Total Damages $: _____

Provincial: _____ Other: _____

Company Reported Apparent Cause:	*Company Reported Sub-Cause :*
Corrosion	
Natural Force Damage	
Excavation Damage	
Other Outside Force Damage	
Material Failure (Pipe, Joint, Weld)	
Equipment Failure	
Incorrect Operation	
Other	

Accident/Incident Resulted in (check all that apply):	*Comments:*
Rupture	
Leak	
Fire	
Explosion	
Evacuation	Number of Persons:_____Area: _____

Narrative Summary
Short summary of the Incident/Accident scenario

Region/State: _____ **Reviewed by:** _____

Principal Investigator: _____ **Title:** _____

Date: _____ **Date:** _____

Pipeline Failure Investigation Report

Failure Location & Response

Location (City, Township, Range, County/Parish): (Acquire Map)

Address or M.P. on Pipeline: (1)

Type of Area (Rural, City): (1)

Coordinates of failure location (Latitude): (Longitude):

Date:

Time of Failure:

Time Detected:

Time Located:

How Located:

NRC Report #: (Attach Report)

Time Reported to NRC:

Reported by:

Type of Pipeline:

Gas Distribution	**Gas Transmission**	**Hazardous Liquid**	**___LNG**
___ LP	Interstate Gas	Interstate Liquid	
___ Municipal	Intrastate Gas	Intrastate Liquid	
___ Public Utility	Gas Gathering	Offshore Liquid	
___ Master Meter	Offshore Gas	Liquid Gathering	
	___ Offshore Gas - High H_2S	CO_2	
		___Low Stress Liquid	
		___HVL	

Pipeline Configuration (Regulator Station, Pump Station, Pipeline, etc.):

Operator/Owner Information

Owner:	Operator:
Address:	Address:
Company Official:	Company Official:
Phone No.: Fax No.:	Phone No. Fax No.

Drug and Alcohol Testing Program Contacts ___ N/A

Drug Program Contact & Phone:

Alcohol Program Contact & Phone:

1 Photo documentation

Pipeline Failure Investigation Report

Damages	
Product/Gas Loss or Spill[2] Amount Recovered Estimated Amount $	Estimated Property Damage $ Associated Damages[3] $
Description of Property Damage:	
Customers out of Service: ___Yes ___No Number: Suppliers out of Service: ___Yes ___No Number:	

Fatalities and Injuries ___N/A				
Fatalities: Yes ___No	Company:	Contractor:	Public:	
Injuries - Hospitalization: Yes ___No	Company:	Contractor:	Public:	
Injuries - Non-Hospitalization: Yes ___No	Company:	Contractor:	Public:	
Total Injuries (including Non-Hospitalization):	Company:	Contractor:	Public:	

Name	Job Function	Yrs. w/ Comp.	Yrs. Exp.	Type of Injury

Drug/Alcohol Testing ___N/A					
Were all employees that could have contributed to the incident, post-accident tested within the 2 hour time frame for alcohol or the 32 hour time frame for all other drugs? ___Yes ___No					
Job Function	Test Date & Time	Location	Results		Type of Drug
			Pos	Neg	

2 Initial volume lost or spilled

3 Including cleanup cost

Pipeline Failure Investigation Report

Pipe Failure Description	___*N/A*
Length of Failure (inches, feet, miles): (1)	
Position (Top, Bottom, include position on pipe, 6 O'clock): (1)	Description of Failure (Corrosion Gouge, Seam Split): (1)
Laboratory Analysis: ___Yes ___No Performed by:	
Preservation of Failed Section or Component: ___Yes ___No If Yes - Method:	
In Custody of:	
Develop a sketch of the area including distances from roads, houses, stress inducing factors, pipe configurations, direction of flow, etc. Bar Hole Test Survey Plot, if included, should be outlined with concentrations at test points.	

Component Failure Description	*N/A*
Component Failed: (1)	
Manufacturer:	Model:
Pressure Rating:	Size:
Other (Breakout Tank, Underground Storage):	

Pipe Data	___*N/A*
Material:	Wall Thickness/SDR:
Diameter (O.D.):	Installation Date:
SMYS:	Manufacturer:
Longitudinal Seam:	Type of Coating:
Pipe Specifications (API 5L, ASTM A53, etc.):	

Joining	*N/A*
Type:	Procedure:
NDT Method:	Inspected: ___Yes ___No

Pressure @ Time of Failure @ Failure Site	___*N/A*
Pressure @ Failure Site:	Elevation @ Failure Site:

Pipeline Failure Investigation Report

Pressure @ Time of Failure @ Failure Site			___*N/A*	
Pressure Readings @ Various Locations:			Direction from Failure Site	
Location/M.P./Station #	Pressure (psig)	Elevation (ft msl)	Upstream	Downstream

Upstream Pump Station Data	*N/A*
Type of Product:	API Gravity:
Specific Gravity:	Flow Rate:
Pressure @ Time of Failure [4]	Distance to Failure Site:
High Pressure Set Point:	Low Pressure Set Point:

Upstream Compressor Station Data	___*N/A*
Specific Gravity:	Flow Rate:
Pressure @ Time of Failure [4]	Distance to Failure Site:
High Pressure Set Point:	Low Pressure Set Point:

Operating Pressure	*N/A*
Max. Allowable Operating Pressure:	Determination of MAOP:
Actual Operating Pressure:	
Method of Over Pressure Protection:	
Relief Valve Set Point:	Capacity Adequate? ___Yes ___No

Integrity Test After Failure	___*N/A*
Pressure test conducted in place? (Conducted on Failed Components or Associated Piping): ___Yes ___No	
If No, tested after removal? ___Yes ___No	
Method:	
Describe any failures during the test.	

Soil/water Conditions @ Failure Site	*N/A*
Condition of and Type of Soil around Failure Site (Color, Wet, Dry, Frost Depth):	
Type of Backfill (Size and Description):	

4 Obtain event logs and pressure recording charts

Pipeline Failure Investigation Report

Soil/water Conditions @ Failure Site	___N/A
Type of Water (Salt, Brackish):	Water Analysis (5) ____ Yes ___No

External Pipe or Component Examination	___N/A
External Corrosion? _Yes ___No (1)	Coating Condition (Disbonded, Non-existent): (1)
Description of Corrosion:	
Description of Failure Surface (Gouges, Arc Burns, Wrinkle Bends, Cracks, Stress Cracks, Chevrons, Fracture Mode, Point of Origin):	
Above Ground: ___Yes ___No (1) Stress Inducing Factors: (1)	Buried: ___Yes ___No (1) Depth of Cover: (1)

Cathodic Protection	___N/A
P/S (Surface):	P/S (Interface):
Soil Resistivity: pH:	Date of Installation:
Method of Protection:	
Did the Operator have knowledge of Corrosion before the Incident? ____Yes ____No	
How Discovered? (Close Interval Survey, Instrumented Pig, Annual Survey, Rectifier Readings, ECDA, etc):	

Internal Pipe or Component Examination		___N/A
Internal Corrosion:_____Yes ___No	(1) Injected Inhibitors: __Yes ___No	
Type of Inhibitors:	Testing:_____Yes ___ No	
Results (Coupon Test, Corrosion Resistance Probe):		
Description of Failure Surface (MIC, Pitting, Wall Thinning, Chevrons, Fracture Mode, Point of Origin):		
Cleaning Pig Program:_____Yes ___No	Gas and/or Liquid Analysis	_____ Yes _____ No

5 Attach copy of water analysis report

Pipeline Failure Investigation Report

Internal Pipe or Component Examination ___N/A	
Results of Gas and/or Liquid Analysis [6]	
Internal Inspection Survey:_____Yes ___No	Results [7]
Did the Operator have knowledge of Corrosion before the Incident?_____Yes ___No	
How Discovered? (Instrumented Pig, Coupon Testing, ICDA, etc.):	

Outside Force Damage ___N/A	
Responsible Party:	Telephone No.:
Address:	
Work Being Performed:	
Equipment Involved: [1]	Called One Call System?_____Yes ___No
One Call Name:	One Call Report # [8]
Notice Date:	Time:
Response Date:	Time:
Details of Response:	
Was Location Marked According to Procedures? ___Yes ___No	
Pipeline Marking Type: [1]	Location: [1]
State Law Damage Prevention Program Followed?_____Yes ___No ___No State Law	
Notice Required:____Yes ___No	Response Required:_____Yes ___No
Was Operator Member of State One Call?_____Yes_____No	Was Operator on Site?____Yes ___No
Did a deficiency in the Public Awareness Program contribute to the accident?_____Yes_____No	
Is OSHA Notification Required?_____Yes ___No	

6 Attach copy of gas and/or liquid analysis report

7 Attach copy of internal inspection survey report

8 Attach copy of one-call report

Pipeline Failure Investigation Report

	__

Failure Isolation						***__N/A***
Squeeze Off/Stopple Location and Method: (1)						
Valve Closed - Upstream: Time:					I.D.: M.P.:	
Valve Closed - Downstream: Time:					I.D.: M.P.:	
Pipeline Shutdown Method:	Manual	Automatic	SCADA	Controller	ESD	
Failed Section Bypassed or Isolated:						
Performed By:					Valve Spacing:	

Odorization				***__N/A***
Gas Odorized: Yes No			Concentration of Odorant (Post Incident at Failure Site):	
Method of Determination: Yes No			% LEL: Yes No	% Gas In Air: Yes No
			Time Taken: Yes No	
Was Odorizer Working Prior to the Incident? __Yes No			Type of Odorizer (Wick, By-Pass):	
Odorant Manufacturer: Model:			Type of Odorant:	
Amount Injected:			Monitoring Interval (Weekly):	
Odorization History (Leaks Complaints, Low Odorant Levels, Monitoring Locations, Distances from Failure Site):				

Weather Conditions				***N/A***
Temperature:			Wind (Direction & Speed):	
Climate (Snow, Rain):			Humidity:	
Was Incident preceded by a rapid weather change? Yes No				
Weather Conditions Prior to Incident (Cloud Cover, Ceiling Heights, Snow, Rain, Fog):				

Pipeline Failure Investigation Report

Gas Migration Survey	*N/A*
Bar Hole Test of Area: Yes No	Equipment Used:
Method of Survey (Foundations, Curbs, Manholes, Driveways, Mains, Services [9]) [1]	

Environment Sensitivity Impact	*__N/A*
Location (Nearest Rivers, Body of Water, Marshlands, Wildlife Refuge, City Water Supplies that could be or were affected by the medium loss): [1]	
OPA Contingency Plan Available? Yes No	Followed? Yes No

Class Location/High Consequence Area	__N/A
Class Location: 1 2 3 4 __ Determination:	HCA Area? Yes No N/A Determination:
Odorization Required? Yes No N/A	

Pressure Test History **__N/A**

(Expand List as Necessary)

	Req'd [10] Assessment Deadline Date	Test Date	Test Medium	Pressure (psig)	Duration (hrs)	% SMYS
Installation	N/A					
Next						
Next						
Most Recent						
Describe any problems experienced during the pressure tests.						

Internal Line Inspection/Other Assessment History **__N/A**

(Expand List as Necessary)

	Req'd [10] Assessment Deadline Date	Assessment Date	Type of ILI Tool [11]	Other Assessment Method [12]	Indicated Anomaly If yes, describe below
Initial					__ Yes No
Next					__ Yes No
Next					__ Yes No
Most Recent					__ Yes No

9 Plot on site description page
10 As required of Pipeline Integrity Management regulations in 49CFR Parts 192 and 195
11 11 MFL, TFI, UT, Combination, Geometry, etc.
12 ECDA, ICDA, SCCDA, "other technology," etc.

Pre-Failure Conditions and Actions	___N/A
Was there a known pre-failure condition requiring [10] the operator to schedule evaluation and remediation? ___Yes (describe below or on attachment) No If there was such a known pre-failure condition, had the operator established and adhered to a required [10] evaluation and remediation schedule? Describe below or on attachment. Yes No N/A Prior to the failure, had the operator performed the required [10] actions to address the threats that are now known to be related to the cause of this failure? Yes No N/A List below or on an attachment such operator-identified threats, and operator actions taken prior to the accident. Describe any previously indicated anomalies at the failed pipe, and any subsequent pipe inspections (anomaly digs) and remedial actions.	

Pipeline Operation History	*N/A*
Description (Repair or Leak Reports, Exposed Pipe Reports):	
Did a Safety Related Condition Exist Prior to Failure? ___Yes ___No Reported? ___Yes ___No	
Unaccounted For Gas:	
Over & Short/Line Balance (24 hr., Weekly, Monthly/Trend):	

13 Obtain copies of maps and records

Pipeline Failure Investigation Report

Operator/Contractor Error					___*N/A*
Name:				Job Function:	
Title:				Years of Experience:	
Training (Type of Training, Background):					
Was the person "Operator Qualified" as applicable to a precursor abnormal operating condition?_____Yes_____No_____N/A					
Was qualified individual suspended from performing covered task_____Yes_____No____N/A					
Type of Error (Inadvertent Operation of a Valve):					
Procedures that are required:					
Actions that were taken:					
Pre-Job Meeting (Construction, Maintenance, Blow Down, Purging, Isolation):					
Prevention of Accidental Ignition (Tag & Lock Out, Hot Weld Permit):					
Procedures conducted for Accidental Ignition:					
Was a Company Inspector on the Job?_____Yes ___No					
Was an Inspection conducted on this portion of the job?_____Yes_____No					
Additional Actions (Contributing factors may include number of hours at work prior to failure or time of day work being conducted):					
Training Procedures:					
Operation Procedures:					
Controller Activities:					
Name	Title	Years Experience	Hours on Duty Prior to Failure	Shift	
Alarm Parameters:					
High/Low Pressure Shutdown:					
Flow Rate:					
Procedures for Clearing Alarms:					
Type of Alarm:					
Company Response Procedures for Abnormal Operations:					

Pipeline Failure Investigation Report

Operator/Contractor Error	___*N/A*
Over/Short Line Balance Procedures:	
Frequency of Over/Short Line Balance:	
Additional Actions:	

Pipeline Failure Investigation Report

Photo Documentation [(1)]			
Overall Area from best possible view. Pictures from the four points of the compass. Failed Component, Operator Action, Damages in Area, Address Markings, etc.			
Photo No.	Description	Photo No.	Description
1		16	
2		17	
3		18	
4		19	
5		20	
6		21	
7		22	
8		23	
9		24	
10		25	
11		26	
12		27	
13		28	
14		29	
15		30	
Camera Type:			

Pipeline Failure Investigation Report

Additional Information Sources			
Agency	Name	Title	Phone Number
Police:			
Fire Dept.:			
State Fire Marshall:			
State Agency:			
NTSB:			
EPA:			
USCG:			
FBI:			
ATF:			
OSHA:			
Insurance Co.:			
FRA:			
MMS:			
Television:			
Newspaper:			
Other:			

Persons Interviewed		
Name	Title	Phone Number

Pipeline Failure Investigation Report

Event Log

Sequence of events prior, during, and after the incident by time. (Consider the events of all parties involved in the incident, Fire Department and Police reports, Operator Logs and other government agencies.)

Time / Date	Event

Pipeline Failure Investigation Report

Investigation Contact Log			
Time	Date	Name	Description

Failure Investigation Documentation Log					
Operator:		Unit #:	CPF #:		Date:
Appendix Number	Documentation Description			Date Received	FOIA Yes No

13.14 MANUAL AMENDMENT LIST

Section	Sub-Section	Revisions Made	Date
Due to multiple revisions a new manual was created in 2015			
Cover Page	Cover Page	New Branding	July 2016
Table of Contents	Replace all Table of Contents	Changes to manual as listed below	July 2016
Section 2, page 2-2	Section 2, page 2-2 (replace all of section 2)	Addition of the West Spur Lateral (North Dakota) and 3 new pump stations (Saskatchewan) to the description. Addition of the EPZ for West Spur Lateral.	July 2016
Section 16, key map & legend	Section 16, key map & legend	Addition of the West Spur Lateral, 3 new pump stations and tie-in reference locations on the key map.	July 2016
Section 16	Replace all Section 16	Addition of the West Spur Lateral, 3 new pump stations, current tie-in reference and residence locations.	July 2016
Section 17	Replace all of Section 17	Addition of block valve locations for West Spur Lateral, 3 new pump station locations and all legal land descriptions.	July 2016
Section 1	Replace all of section 1	Updated terminology, updated contact info, updated manual distribution list, updated review timing.	Dec 2016
Section 3	Replace all of section 3	Updated terminology and jurisdictional references, updated FIGURE 2.	Dec 2016
Section 4	Replace all of section 4	Updated terminology, updated accident reporting section 4.5.	Dec 2016
Section 5	Replace all of section 5	Updated terminology, updated flow charts to align with Security Manual. Updates to incident specific plans including response to fire, natural disasters and operational failure.	Dec 2016
Section 5a	Replace all of section 5a	Updated maps.	Dec 2016
Section 6	Replace all of section 6	Updated contacts.	Dec 2016
Section 7	Replace all of section 7	Updated contacts, add services provided to external contacts, add fire department capabilities.	Dec 2016
Section 8	Replace all of section 8	Updated terminology, updated section 8.19 to include the EAPUOC ALERT call down system.	Dec 2016
Section 9	Replace all of section 9	Updated equipment locations and terminology.	Dec 2016
Section 10	Replace all of section 10	Updated training requirements.	Dec 2016
Section 11	Replace all of section 11	Updated terminology.	Dec 2016
Section 13	Replace all of section 13	Updated manual revision log, added PHMSA F-7000 form and PHMSA Form 11 – Pipeline Failure Investigation.	Dec 2016
Section 15	Replace all of section 15	Removed non-essential technical information.	Dec 2016
Section 17	Replace all of section 17	Removed non-essential technical information.	Dec 2016

Section	Sub-Section	Revisions Made	Date
Section 1	Replace all of section 1	Remove references to NEB & PHMSA. Update manual distribution list, updated review timing – remove AER manuals – submissions only required through digital data submission (DDS). Update membership of Pipeline Emergency Preparedness Team.	Nov 2017
Section 2	Replace all of section 2	Remove references to Vantage, NEB & PHMSA. Clarification within EOC roles at ALERT level.	Nov 2017
Section 3	Replace all of section 3	Updated terminology and jurisdictional references.	Nov 2017
Section 4	Replace all of section 4	Remove references to NEB & PHMSA. Added details on HDD releases and reporting requirements to the AER.	Nov 2017
Section 5	Replace all of section 5	Add additional communications methods. Add potential for third-party air monitoring support. Added details in the natural disasters' plans, including usage of Alberta Emergency Alert and plans for wild land fires.	Nov 2017
Section 5a	Replace all of section 5a	Remove reference to Zone 1 in the Strathcona County notification. This area was removed during the Anthony Henday construction and is no longer including in the communicator notifications. Updates maps.	Nov 2017
Section 6	Replace all of section 6	Updated contacts.	Nov 2017
Section 7	Replace all of section 7	Updated contacts.	Nov 2017
Section 8	Replace all of section 8	Remove NEB, TSB, PHMSA references. Updated government agency names.	Nov 2017
Section 9	Replace all of section 9	Updated equipment locations and terminology – remove Vantage references.	Nov 2017
Section 10	Replace all of section 10	Updated drill schedule.	Nov 2017
Section 11	Replace all of section 11	Updated terminology.	Nov 2017
Section 12	Replace all of section 11	Updated glossary & acronyms.	Nov 2017
Section 13	Replace all of section 13	Update AER response form. Removed NEB & PHMSA related forms. Updated manual revision log.	Nov 2017
Section 14	Replace all of section 14	Updated maps.	Nov 2017
Section 15	Replace all of section 15	Added approximate capacity of pipe. Added safety data sheets. Changed AEGS license 20034, lines 1-4 to abandoned. Changed license 13023, lines 12 through 19 for Pointe aux Pins line replacement project. Changed license 14763, lines 42 through 53 for Redwater lateral upgrade project.	Nov 2017
Remove sections 16 & 17	Add new section 16	Vantage details no longer required. Addition of product SDS's.	Nov 2017

Section	Sub-Section	Revisions Made	Date
Section 1	Replace Section 1.4, 1.5	Changed contact information for Responsible Care Team Leader. Removed locations and roles associated with AEGS.	Oct 2018
Section 2	Replace Section 2.1	Remove references to AEGS and change all ownership to NOVA.	Oct 2018
Section 6	Replace all of section 6	Updated contacts.	Oct 2018
Section 7	Replace all of section 7	Updated contacts.	Oct 2018
Section 9	Replace all of section 9	Added roadblock signs to Red Deer Pipeline Office.	Oct 2018
Section 10	Replace all of section 10	Updated ER drill frequency.	Oct 2018
Section 15	Replace all of section 15	Removed AEGS information.	Oct 2018
Section 1	Sections 1.4, 1.5.3,1.5.4,1.5.5	Changed contact information for Responsible Care Regulatory Specialist. Revised manual distribution list.	Oct 2019
Section 3	Section 3.4, FIGURE 2	Added note to activate the NOVA Chemicals Pipeline Communicator line if necessary. Removed propane references from EPZ.	Oct 2019
Section 4	Section 4.1, 4.3.1	Renamed TABLE 3 TO TABLE 4 to correct numbering. Changed verbiage of sentence pertaining to Horizontal Directional Drilling.	Oct 2019
Section 5	Section 5.3 Section 5a1.1	Added note to activate the NOVA Chemicals Pipeline Communicator line if necessary.	Oct 2019
Section 5a	Section 5a1.1	Renamed FIGURE 5 to FIGURE 4 and renumbered all FIGURES following it to be sequential.	Oct 2019
Section 6	Sections 6.1, 6.2	Updated contacts.	Oct 2019
Section 7	Replace all of section 7	Updated contacts.	Oct 2019
Section 8	Section 8.5	Added note to activate the NOVA Chemicals Pipeline Communicator line if necessary.	Oct 2019
Section 10	Section 10.2	Renumbered TABLE 4 to TABLE 5 to correct numbering.	Oct 2019
Section 13	Sections 13.1, 13.3, 13.11, 13.14	Removed propane references. Added natural gas references. Renamed Manual Revision Log, changed to Manual Amendment List and renumbered to 13.14. Renumbered forms 13.11, 13.12 and 13.13 to be in sequence. Removed references to State and PHSMA.	Oct 2019

Section	Sub-Section	Revisions Made	Date
Section 14	Replace all of section 14	Updated legend and isolating valve information on maps. Added Ventures Pipeline Map.	Oct 2019
Section 15	Sections 15.2.3; 15.5; 15.6, 15.7	Removed Propane Emergency Overview Section. Added Hydrogen, Nitrogen and Natural Gas Emergency Overview Sections. Removed table containing CO2 Technical Data. Added Table containing Natural Gas Technical Data. Removed CO2 Pipeline System and Block Valve Table. Updated valve identifier information. Added Natural Gas Pipeline System Data and Block Valve Table.	Oct 2019
Section 16	Sections 16.1.4, 16.1.5, 16.1.8	Added SDS's for Hydrogen, Nitrogen and Natural Gas.	Oct 2019
Entire Manual	Entire Manual	Entire ERP reformatted. All references from Agrium changed to Nutrien. All references from Sequioa changed to Alphabow.	Oct 2019

14.1 MAPS

PROTECTED FROM PUBLICATION – includes personal contact information

15.1 APPROXIMATE CAPACITY OF PIPE

The following tables give the approximate capacity of various sizes of pipe. The capacities are given in metres and barrels per kilometre and per mile. This data can be used to provide a conservative estimate of a release when more detailed information is not immediately available.

15.1.1 CAPACITY PER KILOMETER

NOM DIA mm	LENGTH OF PIPE km																			
	1		2		3		4		5		6		7		8		9		10	
	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls
89(3”)	5	34	11	68	16	102	22	136	27	170	33	205	38	239	43	273	49	307	54	341
114(4”)	9	57	18	114	27	171	36	229	45	286	55	343	64	400	73	457	82	514	91	571
168(6”)	20	127	40	253	60	380	81	507	101	634	121	760	141	887	161	1014	181	1141	202	1267
219(8”)	34	215	68	431	103	646	137	861	171	1076	205	1292	240	1507	274	1722	308	1938	342	2153
273(10”)	55	343	109	686	164	1028	218	1371	273	1714	327	2057	382	2400	436	2742	491	3085	545	3428
324(12”)	77	484	154	968	231	1452	308	1936	385	2420	462	2904	539	3388	616	3872	693	4356	770	4840
406(16”)	122	769	245	1538	367	2307	489	3076	616	3845	734	4614	856	5383	978	6153	1101	6922	1223	7691

15.1.2 CAPACITY PER MILE

NOM DIA inches	LENGTH OF PIPE miles																			
	1		2		3		4		5		6		7		8		9		10	
	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3	bbls	m^3
3(89mm)	55	9	110	17	165	26	220	35	274	44	329	52	384	61	439	70	494	79	549	87
4(114mm)	91	15	184	29	276	44	368	58	460	73	552	88	644	102	736	117	828	132	920	146
6(168mm)	204	32	408	65	612	97	816	130	1020	162	1224	195	1428	227	1632	259	1836	292	2040	324
8(219mm)	346	55	693	110	1039	165	1386	220	1732	275	2079	331	2425	386	2772	441	3118	496	3465	551
10(273mm)	552	88	1103	175	1655	263	2207	351	2758	439	3310	526	3862	614	4413	702	4965	789	5517	877
12(324mm)	779	124	1558	248	2337	372	3116	495	3895	619	4673	743	5452	867	6231	991	7010	1115	7789	1238
16(406mm)	1238	197	2475	394	3713	590	4951	787	6188	984	7426	1181	8664	1378	9902	1574	11139	1771	12377	1968

15.2 PIPELINE PRODUCT DETAILS

15.2.1 ETHYLENE - Emergency Overview

Extremely flammable liquefied gas. This product is a colourless liquefied gas while under high pressure with a sweet hydrocarbon odour. Ethylene is highly volatile, when released it will disperse as a highly flammable vapour cloud. Consider the need for immediate emergency isolation and evacuation. Vapours may travel to some distant source of ignition and flash back.

Contact with liquefied gas may cause frostbite. Excessive inhalation of this product causes headaches, fatigue, dizziness, nausea and loss of coordination and in extreme conditions - coma and possibly death. Exposure to very high levels in an enclosed space may cause suffocation due to lack of oxygen. Ethylene is not a human carcinogen*.

General Fire Hazards - Pipeline explosion hazards are extremely high when this product is exposed to heat or flame. May BLEVE explosively when heated or involved in a fire. **DO NOT ATTEMPT TO EXTINGUISH A GAS FIRE UNLESS LEAK SOURCE CAN BE ISOLATED AND SHUT OFF.**

15.2.2 ETHANE - Emergency Overview

This product is **extremely flammable!** Ethane is easily ignited by heat, sparks, or flames, Vapors may cause dizziness or asphyxiation without warning and may be irritating if inhaled at high concentrations. Contact with gas or liquefied gas may cause burns, severe injury, and/or frostbite. Refer to the North American Emergency Response Guide (NAERG) 115.

The burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, carbon dioxide, and inadequate oxygen levels, which may lead to unconsciousness, suffocation, and death. Exposure to very high levels in an enclosed space may cause suffocation due to lack of oxygen.

General Fire Hazards - Do not extinguish a fire unless the leak can be stopped. Vapors from liquefied gas are initially heavier than air and spread along ground. Vapors may travel to source of ignition and flash back. Vapors may be ignited rapidly when exposed to heat, spark, open flame, or other source of ignition, and may ignite explosively. Fire may produce irritating and/or toxic gases, and may also form explosive mixtures with air.

15.2.3 ETHANE/ETHYLENE Mix (OC2) – Emergency Overview

OC2 is an acronym for “Olefinic C2 blend”, with “C2” indicating a hydrocarbon molecule with two (2) carbon atoms. OC2 is derived from an off-gas stream at processing facilities in Oil Sands area in northeastern Alberta. It is currently being transported in the JFP line from Ft. Saskatchewan to Joffre.

This product is primarily **ethane** (>95%) with a small (<5%) presence of ethylene and other low-molecular weight hydrocarbons. The properties of OC2, therefore are virtually identical to those of ethane as described above.

15.2.4 HYDROGEN – Emergency Overview

The primary physical hazards associated with hydrogen gas are its explosiveness and flammability. This is because hydrogen can form a flammable mixture with air.

- Hydrogen gas vapours are colourless, odourless and tasteless,
- Hydrogen is flammable over a wide range of concentrations,
- The ignition energy for hydrogen is very low; and
- Hydrogen is able to reduce the performance of some containment and piping materials, such as carbon steel.

GENERAL FIRE HAZARDS

The potential for forming and igniting flammable mixtures containing hydrogen may be higher than for other flammable gases because:

- Hydrogen migrates quickly through small openings.
- The minimum ignition energy for flammable mixtures containing hydrogen is extremely low. Burns may result from unknowingly walking into a hydrogen fire.
- Careful evacuation and purge operations should be used to prevent the formation of flammable or explosive mixtures.

Hydrogen gases have a wide flammable range, 4 % to 74% in air; the most significant concern should be the physical hazard of flammability and the possibility of burns resulting from fires and explosions. The temperature of burning hydrogen in air is high (3,713□ F, as compared with 2,276□ F for gasoline), When working with liquid hydrogen, there is an additional health hazard of cryogenic burns.

15.2.5 NITROGEN – Emergency Overview

Nitrogen is a refrigerated gas that is stable under normal conditions but has properties that may;

- Cause severe frostbite, a burn-like injury.
- Displace oxygen and cause rapid suffocation (asphyxiant in high concentrations).
- Heat of fire can build pressure in a closed container and cause it to rupture. Venting vapors may obscure visibility.
- Air will condense on surfaces such as vaporizers or piping exposed to liquid or cold gas. Nitrogen, which has a lower boiling point than oxygen, evaporates first, leaving an oxygen-enriched condensate.

Hazardous decomposition products: Under certain conditions, nitrogen can react violently with lithium, neodymium, titanium (above 1472°F/800°C), or magnesium to form nitrides. At high temperature, it can also combine with oxygen and hydrogen.

GENERAL FIRE HAZARDS

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray.
Take care not to direct spray onto vents on top of container. Do not discharge sprays directly into liquid; cryogenic liquid can freeze water rapidly. Remove ignition sources if safe to do so.

15.2.6 NATURAL GAS – Emergency Overview

Extremely flammable gas that is easily ignited by heat, sparks or flames. Will form explosive mixtures with air. Natural Gas is primarily methane gas with other fossil fuels such as ethane, propane, butane and pentane.

GENERAL FIRE HAZARDS

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 100 metres (330 feet) in all directions. Stop leak if you can do it without risk. Keep unauthorized personnel away. Keep out of low areas. Stay upwind. Caution: methane is lighter than air and will rise. Vapors may travel to source of ignition and flash back. Do not extinguish a leaking gas fire unless leak can be stopped

15.3 LICENSING INFORMATION - EDS AND JFP PIPELINE SYSTEM

EDS

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
14763	1	HVP	05-32-038-25W4	06-04-039-25W4	1.53	323.90	5.79	9930	Operating
14763	3	HVP	07-04-039-25W4	02-01-040-25W4	11.10	323.90	5.79	9930	Operating
14763	5	HVP	02-01-040-25W4	09-33-040-24W4	10.66	323.90	5.79	9930	Operating
14763	7	HVP	09-33-040-24W4	03-23-041-24W4	6.52	323.90	5.79	9930	Operating
14763	9	HVP	03-23-041-24W4	11-30-045-22W4	44.82	323.90	5.79	9930	Operating
14763	10	HVP	11-30-045-22W4	11-30-045-22W4	0.11	323.90	6.93	9930	Operating
14763	11	HVP	11-30-045-22W4	03-19-046-22W4	7.20	323.90	5.79	9930	Operating
14763	19	HVP	03-19-046-22W4	14-22-049-23W4	32.59	323.90	5.79	9930	Operating
14763	21	HVP	13-03-050-23W4	04-15-050-23W4	1.99	323.90	5.79	0	Discontinued
14763	23	HVP	04-15-050-23W4	04-34-050-23W4	5.58	323.90	5.79	0	Discontinued
14763	24	HVP	05-34-050-23W4	05-02-051-23W4	10.75	323.90	6.93	9930	Operating
14763	26	HVP	05-02-051-23W4	07-33-051-23W4	9.44	323.90	6.93	9930	Operating
14763	28	HVP	07-33-051-23W4	06-28-052-23W4	8.01	323.90	6.93	9930	Operating
14763	30	HVP	06-28-052-23W4	02-16-053-23W4	6.80	323.90	6.93	9930	Operating
14763	32	HVP	13-24-053-23W4	06-31-053-22W4	3.99	323.90	6.93	9930	Operating

15.3 LICENSING INFORMATION - EDS AND JFP PIPELINE SYSTEM continued. . .

EDS

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
14763	34	HVP	06-31-053-22W4	02-28-054-22W4	8.64	323.90	6.93	9930	Operating
14763	36	HVP	02-28-054-22W4	16-11-055-22W4	8.30	323.90	6.93	9930	Operating
14763	37	HVP	06-26-048-23W4	06-26-048-23W4	0.05	323.90	14.30	9930	Operating
14763	38	HVP	06-26-048-23W4	06-26-048-23W4	0.05	323.90	14.30	9930	Operating
14763	39	HVP	14-22-049-23W4	05-34-050-23W4	12.37	323.90	7.10	9930	Operating
14763	40	HVP	14-22-049-23W4	13-03-050-23W4	4.40	323.90	5.79	0	Discontinued
14763	41	HVP	04-34-050-23W4	05-34-050-23W4	0.40	323.90	6.93	0	Discontinued
14763	46	HVP	01-16-053-23W4	01-16-053-23W4	0.15	323.90	6.93	9930	Operating
14763	48	HVP	05-15-053-23W4	13-24-053-23W4	4.70	323.90	6.93	9930	Operating
14763	49	HVP	02-16-053-23W4	01-16-053-23W4	0.23	323.90	7.10	9930	Operating
14763	50	HVP	01-16-053-23W4	05-15-053-23W4	0.58	323.90	7.10	9930	Operating

15.3 LICENSING INFORMATION - EDS AND JFP PIPELINE SYSTEM continued. . .

REDWATER LATERAL

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
14763	42	HVP	01-32-055-21W4	14-36-055-22W4	5.31	219.10	6.40	9930	Operating
14763	53	HVP	14-36-055-22W4	14-36-055-22W4	0.13	219.1	8.20	9930	Operating
14763	52	HVP	14-36-055-22W4	06-01-056-22W4	1.06	219.1	6.40	9930	Operating
14763	43	HVP	04-31-055-21W4	06-36-055-22W4	1.20	219.10	6.40	0	Discontinued
14763	44	HVP	04-31-055-21W4	06-36-055-22W4	1.20	219.10	6.40	0	Discontinued

HEARTLAND LATERAL

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
58194	1	HVP	01-32-055-21W4	05-34-055-21W4	3.94	219.10	6.40	9930	Operating

15.3 LICENSING INFORMATION - EDS AND JFP PIPELINE SYSTEM continued. . .

AT PLASTICS

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
16966	1	HVP	04-33-052-23W4	09-31-052-23W4	2.92	114.30	3.96	9930	Operating
16966	2	HVP	10-31-052-23W4	11-36-052-24W4	1.95	114.30	6.02	9930	Operating
16966	3	HVP	03-33-052-23W4	04-33-052-23W4	0.70	168.30	4.80	9930	Operating
16966	4	HVP	11-36-052-24W4	14-36-052-24W4	0.33	114.30	8.60	9930	Operating
16966	5	HVP	03-33-052-23W4	04-33-052-23W4	0.70	114.30	3.96	0	Abandoned
16966	6	HVP	11-36-052-24W4	14-36-052-24W4	0.33	114.30	6.02	0	Abandoned
16966	7	HVP	10-31-052-23W4	10-31-052-23W4	0.01	114.30	3.96	9930	Operating
16966	9	HVP	09-31-052-23W4	10-31-052-23W4	0.68	114.30	6.00	9930	Operating

6" RETURN

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
16967	1	HVP	16-11-055-22W4	16-11-055-22W4	0.06	168.30	4.78	9930	Operating
16967	9	HVP	03-04-053-23W4	03-33-052-23W4	1.98	168.30	4.78	9930	Operating

15.3 LICENSING INFORMATION - EDS AND JFP PIPELINE SYSTEM continued. . .

CEL

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
16968	1	HVP	11-09-053-23W4	15-08-053-23W4	1.50	114.30	3.96	0	Discontinued
16968	3	HVP	15-08-053-23W4	14-08-053-23W4	0.20	114.30	3.96	0	Discontinued
16968	5	HVP	03-17-053-23W4	03-17-053-23W4	0.41	114.30	3.96	0	Discontinued
16968	6	HVP	15-08-053-23W4	15-08-053-23W4	0.16	114.30	4.80	0	Discontinued
16968	7	HVP	14-08-053-23W4	03-17-053-23W4	0.30	114.30	4.80	0	Discontinued

PRENTISS

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
20029	1	Misc. Gases	06-30-039-25W4	15-19-039-25W4	1.16	219.10	4.78	4970	Operating
20029	2	Misc. Gases	15-19-039-25W4	15-19-039-25W4	0.07	219.10	4.78	4970	Operating
20029	3	Misc. Gases	15-19-039-25W4	09-31-038-25W4	7.32	219.10	4.78	4970	Operating
20030	1	HVP	13-32-038-25W4	14-30-039-25W4	9.80	60.30	3.91	0	Discontinued
20030	3	HVP	15-19-039-25W4	14-30-039-25W4	1.88	60.30	3.91	9930	Operating
20031	1	HVP	13-32-038-25W4	15-19-039-25W4	7.72	114.30	3.50	0	Discontinued
20031	2	HVP	15-19-039-25W4	15-19-039-25W4	0.08	114.30	3.50	0	Discontinued
20031	3	HVP	15-19-039-25W4	14-30-039-25W4	2.04	114.30	3.50	0	Discontinued
20031	4	HVP	13-32-038-25W4	03-04-039-25W4	0.59	168.30	4.40	0	Discontinued
20031	5	HVP	12-32-038-25W4	14-30-039-25W4	9.69	273.10	6.00	9930	Operating

15.3 LICENSING INFORMATION - EDS AND JFP PIPELINE SYSTEM continued. . .

SHELL

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
20185	1	HVP	15-12-055-22W4	01-32-055-21W4	7.77	323.90	7.90	9930	Operating
20185	2	HVP	01-32-055-21W4	03-05-056-21W4	2.30	168.30	4.40	9930	Operating

JFP

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
43179	1	HVP	16-11-055-22W4	06-35-048-23W4	73.79	273.10	6.40	9930	Operating
43179	2	HVP	06-35-048-23W4	05-32-038-25W4	107.14	273.10	5.60	9930	Operating

15.4 LICENSING INFORMATION - JOFFRE AREA PIPELINES

ETHANE

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
16631	1	Misc. Gases	04-29-038-25W4	05-29-038-25W4	0.73	323.90	6.93	9930	Operating
16631	3	Misc. Gases	05-29-038-25W4	12-29-038-25W4	0.25	323.90	6.93	9930	Operating
16631	4	Misc. Gases	03-29-038-25W4	12-29-038-25W4	0.80	323.80	9.53	9930	Operating

HYDROGEN

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
22269	1	Misc. Gases	09-31-038-25W4	07-03-039-25W4	3.56	273.10	4.80	3790	Operating

15.4 LICENSING INFORMATION – JOFFRE AREA PIPELINES continued. . .

WATER

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
33324	1	Fresh Water	01-18-038-25W4	12-29-038-25W4	4.10	610.00	9.50	2000	Operating
33324	2	Fresh Water	01-18-038-25W4	12-29-038-25W4	4.10	609.80	9.52	2000	Operating
33324	3	Fresh Water	04-17-038-25W4	12-29-038-25W4	4.10	508.00	7.93	420	Operating

NATURAL GAS

License	Line	Product	From LSD	To LSD	Length (km)	OD (mm)	WT (mm)	MOP (kPa)	Status
32784	1	Natural. Gas	05-08-037-27W4	12-29-038-25W4	27.2	406.4	7.5	8450	Operating

15.5 JFP, EDS, AND JOFFRE AREA PIPELINES SYSTEMS SCHEMATIC

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

15.6 EDS/JFP PIPELINE SYSTEM

The pipelines that are included in the ethylene distribution system (EDS) include:

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV-2001 J2000 MS SITE	Dow Caverns Fort Saskatchewan	170 km (105 miles)	12” - 324 mm

12” ETHYLENE PUMPSTATION

PUMPSTATION	LEGAL LAND DESCRIPTIONS	DIRECTIONS
Cloverlawn	SW 26-48-23 W4M	**From Wetaskiwin**, take Hwy 2A North to Junction to with HWY 616 approx. 19.2 km, travel East on HWY 616 for 13.5 km then turn North on Rge Rd 233 for 3.2 km and then East on TWP 484 for 2.53 km. ***Pumpstation on North side of road.***
		From Leduc, travel East on 623 for 15 km then turn South on RR233 for 9.6 km, then East on TWP 484for 2.53 km. ***Pumpstation on North side of road.***

12” ETHYLENE BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

12" ETHYLENE BLOCK VALVE continued. . .

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

12" ETHYLENE BLOCK VALVE continued. . .

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

6” SHELL LATERAL

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV-2500A SCOTFORD PT SITE	BV-2501 SCOTFORD MS SITE	2.3 km	6” - 168 mm

6” SHELL LATERAL BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

12” SHELL LATERAL

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV-2500 Site	BV-2500A SCOTFORD PT SITE	7.77 km	12” - 324 mm

12” SHELL LATERAL BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

12" SHELL LATERAL BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

8" REDWATER LATERAL

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV 2600 SCOTFORD PT SITE	BV-2601 SITE	6.5 km	8" – 219 mm

8" HEARTLAND LATERAL

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV-3100 SCOTFORD PT SITE	BV-3101 HEARTLAND MS SITE	3940 metres	8" – 219 mm

6" BASELINE LATERAL

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV-2700 BASELINE SITE	BV-2700A SITE	2003 metres	6" 168 mm

6” BASELINE LATERAL BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

4” BASELINE LATERAL

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV-2700A SITE	BV-2701 BASELINE MS SITE	7000 metres	4” 114 mm

4” BASELINE LATERAL BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

6” PRENTISS LATERAL (TRANSFERRED TO GLENCOE RESOURCES FOR CO2 SERVICE)

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV-3201 JOFFRE PT SITE	BV-3302 PRENTISS MS SITE	9.3 km	6” – 168 mm

6” PRENTISS LATERAL BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

10” JFP NATURAL GAS LIQUIDS

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV-4010 RIVER ROAD SITE	BV-4001A JOF PT SITE	181.6 km	10” - 273 mm

10” JFP BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

10" JFP BLOCK VALVE continued. . .

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

10" JFP BLOCK VALVE continued. . .

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

10" JFP BLOCK VALVE continued. . .

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

15.7 JOFFRE AREA PIPELINES

10" HYDROGEN PIPELINE SYSTEM

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV5200 SITE	BV-5202 SITE	3.6km	10" – 273 mm

10" HYDROGEN BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

8" NITROGEN PIPELINE SYSTEM

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
1 km South of Prentiss Site	Joffre Site	8.6km	8" – 219 mm

8" NITROGEN BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

ETHANE FEED PIPELINE

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
BV-5000 JOF PS SITE	BV-5001 SITE	1 km	10" –273 mm & 12" – 324 mm
BV-5100 JOF PS SITE	BV-5101 SITE	1 km	12"

ETHANE FEED BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

16" VENTURES NATURAL GAS PIPELINE SYSTEM

STARTS AT	TERMINATES AT	PIPELINE SEGMENT LENGTH	PIPELINE SIZE
3 km North East of Penhold	Joffre Site-High Pressure Natural Gas Area (ATCO)	27.2 km	16"

16" VENTURES NATURAL GAS BLOCK VALVE

PROTECTED FROM PUBLICATION – risk of disclosure will impair the security of the pipeline.

16.1 SAFETY DATA SHEETS

16.1.1 Ethane

PLAINS MIDSTREAM CANADA

SAFETY DATA SHEET

Ethane - Empress
Date of Preparation: June 1, 2016

Section 1: IDENTIFICATION

Product Name:	Ethane - Empress
Synonyms:	Not available.
Product Use:	Fuel.
Restrictions on Use:	Not available.
Manufacturer/Supplier:	Plains Midstream Canada ULC, and Affiliates Suite 1400, 607 – 8th Avenue SW Calgary, Alberta T2P 0A7
Phone Number:	1-866-875-2554
Emergency Phone:	USA - CHEMTREC 1-800-424-9300 / CANADA - CANUTEC 1-888-CAN-UTEC (226-8832), 613-996-6666 or *666 on a cellular phone
Date of Preparation of SDS:	June 1, 2016

Section 2: HAZARD(S) IDENTIFICATION

GHS INFORMATION

Classification: Flammable Gases, Category 1
Gases Under Pressure - Compressed Gas
Simple Asphyxiant

LABEL ELEMENTS

Hazard Pictogram(s):

Signal Word: Danger

Hazard Statements:
Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary Statements

Prevention: Keep away from heat, sparks, open flames, and hot surfaces. – No smoking.

Response: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Eliminate all ignition sources if safe to do so.

Storage: Store in a well-ventilated place.
Protect from sunlight.

Disposal: Not applicable.

Hazards Not Otherwise Classified: Not applicable.

Ingredients with Unknown Toxicity: None.

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Ethane - Empress
Date of Preparation: June 1, 2016

This material is considered hazardous by the OSHA Hazard Communication Standard, (29 CFR 1910.1200).

This material is considered hazardous by the Hazardous Products Regulations.

Section 3: COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient(s)	Common name / Synonyms	CAS No.	% vol./vol.
Ethane	Not available.	74-84-0	90 - 100
Propane	Not available.	74-98-6	1 - 5
Methane	Not available.	74-82-8	1 - 5

Section 4: FIRST-AID MEASURES

Inhalation: If inhaled: Call a poison center or doctor if you feel unwell.

Acute and delayed symptoms and effects: May displace oxygen and cause rapid suffocation. Central nervous system depression can occur if product is present in concentrations that will reduce the oxygen content of air below 18 % (vol). Symptoms may include headache, lightheadedness, drowsiness, disorientation, vomiting and seizures. Unconsciousness and death may occur with severe oxygen deprivation. May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Eye Contact: If in eyes: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.

Acute and delayed symptoms and effects: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. The pain after contact with liquid can quickly subside. Permanent eye damage or blindness could result. May cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin Contact: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. If on skin: Wash with plenty of soap and water. Get immediate medical advice/attention. Thaw frosted parts with lukewarm water. Do not rub affected area. Remove non-adhering contaminated clothing. Do not remove adherent material or clothing.

Acute and delayed symptoms and effects: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside. May cause skin irritation. Signs/symptoms may include localized redness, swelling, and itching.

Ingestion: Not a normal route of exposure.

Acute and delayed symptoms and effects: Not a normal route of exposure.

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

Note to Physicians: Symptoms may not appear immediately.

PLAINS MIDSTREAM CANADA

SAFETY DATA SHEET

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Section 5: FIRE-FIGHTING MEASURES

FLAMMABILITY AND EXPLOSION INFORMATION
Extremely flammable gas. Contains gas under pressure; may explode if heated. Will be easily ignited by heat, sparks or flames. Will form explosive mixtures with air. Vapors from liquefied gas are initially heavier than air and spread along ground. Vapors may travel to source of ignition and flash back. Cylinders exposed to fire may vent and release flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket. DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.

If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

Fire involving Tanks: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.
Sensitivity to Static Discharge: This material is sensitive to static discharge.

MEANS OF EXTINCTION
Suitable Extinguishing Media: Small Fire: Dry chemical or CO_2.

Large Fire: Water spray or fog. Move containers from fire area if you can do it without risk.

Unsuitable Extinguishing Media: Not available.

Products of Combustion: Oxides of carbon.

Protection of Firefighters: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Vapors may cause dizziness or asphyxiation without warning. Some may be irritating if inhaled at high concentrations. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite. Fire may produce irritating and/or toxic gases. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. Always wear thermal protective clothing when handling refrigerated/cryogenic liquids.

Section 6: ACCIDENTAL RELEASE MEASURES

Emergency Procedures: As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Keep out of low areas. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded.

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Personal Precautions:	Do not touch or walk through spilled material. Use personal protection recommended in Section 8.
Environmental Precautions:	Not normally required.
Methods for Containment:	Stop leak if you can do it without risk. If possible, turn leaking containers so that gas escapes rather than liquid. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. Do not direct water at spill or source of leak.
Methods for Clean-Up:	Prevent spreading of vapors through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed. CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.
Other Information:	See Section 13 for disposal considerations.

Section 7: HANDLING AND STORAGE

Handling:
Avoid breathing gas. Keep away from heat, sparks, open flames, and hot surfaces. – No smoking. Pressurized container: Do not pierce or burn, even after use. See Section 8 for information on Personal Protective Equipment.

Storage:
Store in a well-ventilated place. Protect from sunlight. Store away from incompatible materials. See Section 10 for information on Incompatible Materials. Keep out of the reach of children.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines
Component

Ethane [CAS No. 74-84-0]
ACGIH: Asphyxia
OSHA: No PEL established.

Propane [CAS No. 74-98-6]
ACGIH: Asphyxia
OSHA: 1000 ppm (TWA), 1800 mg/m³ (TWA)

Methane [CAS No. 74-82-8]
ACGIH: Asphyxia
OSHA: No PEL established.

PEL: Permissible Exposure Limit
TWA: Time-Weighted Average

Engineering Controls: Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapour, gas, etc.) below recommended exposure limits.

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PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection:	Wear safety glasses. Use equipment for eye protection that meets the standards referenced by CSA Standard CAN/CSA-Z94.3-92 and OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment.
Hand Protection:	Wear protective gloves. Wear cold insulating gloves. Consult manufacturer specifications for further information.
Skin and Body Protection:	Wear protective clothing.
Respiratory Protection:	If engineering controls and ventilation are not sufficient to control exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator that meets the requirements of CSA Standard CAN/CSA-Z94.4-11, or self-contained breathing apparatus must be used. Supplied air breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.
General Hygiene Considerations:	Handle according to established industrial hygiene and safety practices. Consult a competent industrial hygienist to determine hazard potential and/or the PPE manufacturers to ensure adequate protection.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Compressed gas.
Colour:	Colourless.
Odour:	Odourless.
Odour Threshold:	Not available.
Physical State:	Gas.
pH:	Not available.
Melting Point / Freezing Point:	-183 °C (-297.4 °F) (Ethane)
Initial Boiling Point:	Not available.
Boiling Range:	-89 °C (-128.2 °F) (Ethane)
Flash Point:	Not available.
Evaporation Rate:	Not available.
Flammability (solid, gas):	Extremely flammable gas.
Lower Flammability Limit:	3 % (Ethane)

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Upper Flammability Limit:	12.5 % (Ethane)
Vapor Pressure:	4000 to 6500 kPa
Vapor Density:	Not available.
Relative Density:	1.037 to 1.050 (Air = 1)
Solubilities:	Slightly soluble in water.
Partition Coefficient: n-Octanol/Water:	Not available.
Auto-ignition Temperature:	472 °C (881.6 °F) (Ethane)
Decomposition Temperature:	Not available.
Viscosity:	Not available.
Percent Volatile, wt. %:	100
VOC content, wt. %:	Not available.
Density:	Not available.
Coefficient of Water/Oil Distribution:	Not available.

Section 10: STABILITY AND REACTIVITY

Reactivity:	Contact with incompatible materials. Sources of ignition. Exposure to heat.
Chemical Stability:	Stable under normal storage conditions.
Possibility of Hazardous Reactions:	None known.
Conditions to Avoid:	Contact with incompatible materials. Sources of ignition. Exposure to heat.
Incompatible Materials:	Oxidizers.
Hazardous Decomposition Products:	Not available.

Section 11: TOXICOLOGICAL INFORMATION

EFFECTS OF ACUTE EXPOSURE

Product Toxicity

Oral:	Not available.
Dermal:	Not available.
Inhalation:	Not available.

Component Toxicity

Component	CAS No.	LD_{50} oral	LD_{50} dermal	LC_{50}
Ethane	74-84-0	Not available.	Not available.	Not available.
Propane	74-98-6	Not available.	Not available.	Not available.
Methane	74-82-8	Not available.	Not available.	Not available.

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Likely Routes of Exposure: Eye contact. Skin contact. Inhalation.

Target Organs: Skin. Eyes. Respiratory system. Central nervous system.

Symptoms (including delayed and immediate effects)

Inhalation: May displace oxygen and cause rapid suffocation. Central nervous system depression can occur if product is present in concentrations that will reduce the oxygen content of air below 18 % (vol). Symptoms may include headache, lightheadedness, drowsiness, disorientation, vomiting and seizures. Unconsciousness and death may occur with severe oxygen deprivation. May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Eye: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. The pain after contact with liquid can quickly subside. Permanent eye damage or blindness could result. May cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside. May cause skin irritation. Signs/symptoms may include localized redness, swelling, and itching.

Ingestion: Not a normal route of exposure.

Skin Sensitization: Not available.

Respiratory Sensitization: Not available.

Medical Conditions Aggravated By Exposure: Not available.

EFFECTS OF CHRONIC EXPOSURE (from short and long-term exposure)

Target Organs: Skin. Eyes. Respiratory system. Central nervous system.

Chronic Effects: Not available.

Carcinogenicity: This product does not contain any carcinogens or potential carcinogens as listed by ACGIH, IARC, OSHA, or NTP.

Mutagenicity: Not available.

Reproductive Effects: Not available.

Developmental Effects
Teratogenicity: Not available.

Embryotoxicity: Not available.

Toxicologically Synergistic Materials: Not available.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity: Not available.

Persistence / Degradability: Not available.

Bioaccumulation / Accumulation: Not available.

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Mobility in Environment: Not available.

Other Adverse Effects: Not available.

Section 13: DISPOSAL CONSIDERATIONS

Disposal Instructions: Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

Section 14: TRANSPORT INFORMATION

U.S. Department of Transportation (DOT)

Proper Shipping Name: UN1035, ETHANE, 2.1

Class: 2.1

UN Number: UN1035

Packing Group: Not applicable.

Label Code:

Canada Transportation of Dangerous Goods (TDG)

Proper Shipping Name: UN1035, ETHANE, 2.1

Class: 2.1

UN Number: UN1035

Packing Group: Not applicable.

Label Code:

Section 15: REGULATORY INFORMATION

Chemical Inventories

US (TSCA)
The components of this product are in compliance with the chemical notification requirements of TSCA.

Canada (DSL)
The components of this product are in compliance with the chemical notification requirements of the NSN Regulations under CEPA, 1999.

Federal Regulations

United States
This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

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SARA Title III

Component	Section 302 (EHS) TPQ (lbs.)	Section 304 EHS RQ (lbs.)	CERCLA RQ (lbs.)	Section 313	RCRA CODE	CAA 112(r) TQ (lbs.)
Ethane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Propane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Methane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000

State Regulations
Massachusetts
US Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Component	CAS No.	RTK List
Ethane	74-84-0	Listed.
Propane	74-98-6	Listed.
Methane	74-82-8	Listed.

New Jersey
US New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Component	CAS No.	RTK List
Ethane	74-84-0	SHHS
Propane	74-98-6	SHHS
Methane	74-82-8	SHHS

Note: SHHS = Special Health Hazard Substance

Pennsylvania
US Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Component	CAS No.	RTK List
Ethane	74-84-0	Listed.
Propane	74-98-6	Listed.
Methane	74-82-8	Listed.

California
California Prop 65: This product does not contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Section 16: OTHER INFORMATION

Disclaimer:
The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for their own particular use.

Date of Preparation of SDS: June 1, 2016
Version: 1.2
GHS SDS Prepared by: Deerfoot Consulting Inc.
Phone: (403) 720-3700

16.1.2 Ethylene

NOVA Chemicals®

Version: 6.2
Revision Date: 11/28/2017

SAFETY DATA SHEET

1. Identification

GHS Product identifier: Ethylene

Other means of identification

Common name(s), synonym(s): Ethylene, Ethene

SDS number: NOVA-0017

Recommended use and restriction on use

Recommended use: Feedstock for chemical and polymer synthesis.
Restrictions on use: All uses other than the identified.

Manufacturer/Importer/Supplier/Distributor Information

Manufacturer

Company Name:	NOVA Chemicals
Address:	P.O. Box 2518, Station M Calgary, Alberta, Canada T2P 5C6
Telephone:	Product Information: 1-412-490-4063
SDS Information Email:	msdsemail@novachem.com

Emergency telephone number:
1-800-561-6682, 1-403-314-8767 (NOVA Chemicals) (24 hours)
1-613-996-6666 (Canutec-Canada) (24 hours)

2. Hazard(s) identification

Hazard Classification

Physical Hazards

Flammable gas	Category 1
Simple asphyxiant	Category 1
Gases under pressure	Liquefied gas

Health Hazards

Specific Target Organ Toxicity - Single Exposure	Category 3

Label Elements

Hazard Symbol:

Signal Word: Danger

Hazard Statement:
Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.
May cause drowsiness or dizziness.

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Precautionary Statements:

Prevention: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Avoid breathing dust/fume/gas/mist/vapours/spray. Use only outdoors or in a well-ventilated area.

Response: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTRE/doctor if you feel unwell. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leakage, eliminate all ignition sources.

Storage: Store in a well-ventilated place. Keep container tightly closed. Store locked up. Protect from sunlight.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: Contact with liquefied gas may cause irritation and/or frostbite.

3. Composition/information on ingredients

Mixtures

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
Ethene	Ethylene	74-85-1	>99.9%

* All concentrations are percent by weight.

Additional Information: This product is considered hazardous by the Hazardous Products Regulations, 2015.

4. First-aid measures

Ingestion: Ingestion of this product is not a likely route of exposure. Do NOT induce vomiting. Seek medical attention.

Inhalation: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTRE/doctor if you feel unwell.

Skin Contact: Contact with liquefied gas may cause irritation and/or frostbite. Seek medical attention immediately in the event of frostbite. IF ON SKIN: Wash with plenty of soap and water. Thaw frosted parts with lukewarm water. Do not rub affected area. Remove non-adhering contaminated clothing. Do not remove adherent material or clothing.

Eye contact: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a doctor or poison control centre immediately.

Most important symptoms/effects, acute and delayed

Symptoms: Frostbite, headache, dizziness, nausea, confusion, loss of appetite, loss of consciousness, heartbeat irregularities, possible cardiac sensitization.

Indication of immediate medical attention and special treatment needed

Treatment:	For more detailed medical emergency support information, call 1-800-561-6682 or 1-403-314-8767 (24 hours, NOVA Chemicals Emergency Response). Treat unconsciousness, frostbite, nausea, hypotension, seizures and cardiac arrhythmia in the conventional manner. Sympathomimetics or catecholamines should be avoided or used with caution (lowest effective dose) because of possible cardiac sensitization. Administer oxygen by mask if there is respiratory distress.

5. Fire-fighting measures

General Fire Hazards:	Extremely flammable liquefied gas. May form an explosive vapour cloud with potential to detonate. Vapours may travel considerable distance to a source of ignition and flash back. DO NOT ATTEMPT TO EXTINGUISH A GAS FIRE UNLESS LEAK SOURCE CAN BE ISOLATED AND SHUT OFF. Be aware of possibility of reignition. Vapours may form explosive mixture with air. When pressure in a container needs to be controlled consider setting up emergency flaring. Consider need for immediate emergency isolation and evacuation for at least 800 metres (1/2 mile). If a pipeline or a storage vessel is involved in a fire, ISOLATE for 1600 metres (1 mile) in all directions. Keep containers away from source of heat or fire. Containers may explode when heated and rocket away.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media:	Dry chemical, foam, carbon dioxide, and water fog. Foam cover may help suppress evolution of flammable gas. Use water to cool fire-exposed containers and to protect personnel.
Unsuitable extinguishing media:	Do not use water jet as an extinguisher, as this will spread the fire. Adding water directly to pooled liquid will heat liquid and increase evolution of extremely flammable gas.
Specific hazards arising from the chemical:	Upon combustion, this product emits carbon monoxide, carbon dioxide, low molecular weight hydrocarbons.

Special protective equipment and precautions for firefighters

Special fire fighting procedures:	Keep upwind. Keep unauthorized personnel away. Move containers from fire area if you can do so without risk. Fight fire from maximum distance or use unmanned holders or monitor nozzles. Immediately withdraw in case of fire and container venting or heat discolouration of a container. Let uncontrolled fires burn off. Avoid inhaling any smoke and combustion materials. Remove and isolate contaminated clothing and shoes. Cool containers with flooding quantities of water until well after the fire is out. Prevent run-off from fire control or dilution from entering streams, sewers, or drinking water supply. Reference 2016 Emergency Response Guidebook, Guide No. 116P for additional details and instructions.
Special protective equipment for firefighters:	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	Isolate area. Keep unauthorized personnel away. Alert stand-by emergency and fire fighting personnel. Monitor surrounding area for buildup of flammable concentrations in air.

Methods and material for containment and cleaning up:	Wear appropriate personal protective equipment. Do not touch or walk through spilled material. In case of leakage, eliminate all ignition sources. Keep upwind. Keep out of low areas. Stop leak if safe to do so. All equipment used when handling the product must be grounded. Prevent run-off from fire control or dilution from entering streams, sewers, or drinking water supply. Small Spills: Isolate spill or leak area for 50 to 100 metres (164 to 330 feet). Isolate area until gas has dispersed. Large Spills: Consider initial downwind evacuation for at least 800 metres (1/2 mile). Evacuate personnel to upwind of the spill area, and position at a safe distance. Use water spray to reduce vapours or divert vapour cloud drift. A vapour-suppressing foam may be used to reduce vapours. Accumulations of gas may persist in low areas. Isolate area until gas has dispersed.

7. Handling and storage

Precautions for safe handling:	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof [electrical/ ventilating/lighting] equipment. Use non-sparking tools. Take action to prevent static discharges. These alone may be insufficient to remove static electricity. For additional information on equipment bonding and grounding, refer to the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity". Avoid breathing dust/fume/gas/mist/vapours/spray. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation, use respiratory protection. Where possible, collect and flare vents. Check for accumulation of liquids when breaking into pipelines. Liquid ethylene must first be drained and/or flared then the system depressured before opening pipes/equipment containing ethylene. If liquid ethylene is present when breaking flanges, the liquid will boil into a vapour cloud and will create severe cold temperatures (see Section 9). If used in refrigeration, check that drains are not plugged and valves are working and not plugged by ice formed from the vapourizing liquid.
Conditions for safe storage, including any incompatibilities:	This product can be stored as a flammable gas or liquid depending on the temperature and pressure. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Protect from sunlight. Only allow access to authorized persons. Store and handle in properly designed pressure vessels and equipment. Store and use away from heat, sparks, open flame, or any other ignition source. Have appropriate extinguishing capability in storage area (e.g. sprinkler system, portable fire extinguishers) and flammable gas detectors. Storage pressure vessels should be above ground and diked. Store away from incompatible materials. Store according to applicable regulations and standards for flammable materials. Keep cylinders secure while in storage or in transportation.

NOVA Chemicals

Version: 6.2
Revision Date: 11/28/2017

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Chemical Identity	type	Exposure Limit Values	Source
Ethene	TWA	200 ppm 229 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07.2009)
Ethene	TWA	200 ppm	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (05.2013)
Ethene	TWA	200 ppm	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (2013)
Ethene	TWA	200 ppm	US.ACGIH Threshold Limit Values (2017)

Appropriate Engineering Controls

Engineering methods to reduce hazardous exposure are preferred controls. Methods include mechanical ventilation (dilution and local exhaust) process or personal enclosure, remote and automated operation, control of process conditions, leak detection and repair systems, and other process modifications. Ensure all exhaust ventilation systems are discharged to outdoors, away from air intakes and ignition sources. Supply sufficient replacement air to make up for air removed by exhaust systems. Administrative (procedure) controls and use of personal protective equipment may also be required.

Individual protection measures, such as personal protective equipment

General information:

Personal protective equipment (PPE) should not be considered a long-term solution to exposure control. Employer programs to properly select, fit, maintain and train employees to use equipment must accompany PPE. Consult a competent industrial hygiene resource, the PPE manufacturer's recommendation, and/or applicable regulations to determine hazard potential and ensure adequate protection.

Eye/face protection:

Safety glasses. Chemical goggles under a full-face shield are recommended if contact with liquefied gas is possible.

Skin Protection

Hand Protection:

Wear protective gloves. Wear cold insulating gloves.

Other:

Wear appropriate clothing to prevent any possibility of skin contact. Wear work clothes with long sleeves and pants. Fire resistant (i.e., Nomex) or natural fibre clothing (i.e., cotton or wool) is recommended. Synthetic clothing can generate static electricity and is not recommended where a flammable vapour release may occur. Wear chemical-resistant safety footwear with good traction to prevent slipping. Static Dissipative (SD) rated footwear is also recommended.

Respiratory Protection:

Air supplied breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed OEL.

Hygiene measures:

Use effective control measures and PPE to maintain worker exposure to concentrations that are below these limits. Ensure that eyewash stations and safety showers are in close proximity to work locations.

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9. Physical and chemical properties

Appearance	
Physical state:	Gas
Form:	Liquefied gas
Colour:	Colourless
Odour:	Sweet odour, Faint
Odour threshold:	270 - 420 ppm (detectable)
pH:	not applicable
Melting point/freezing point:	-169 °C (-272 °F)
Initial boiling point and boiling range:	-103.8 °C (-154.8 °F)
Flash Point:	-136 °C (-213 °F)
Evaporation rate:	Immediate at 20 °C (68 °F).
Flammability (solid, gas):	Extremely flammable.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	28.6 - 36 %(V)
Flammability limit - lower (%):	2.3 - 3.02 %(V)
Vapour pressure:	609 psia (0 °C (32 °F)) 735 psia (10 °C (50 °F)) (critical point)
Vapour density:	0.974 (0 °C (32 °F)) 14 psia (Air=1)
Density:	568 kg/m3
Relative density:	0.568 (-103.8 °C (-154.8 °F))
Solubility(ies)	
Solubility in water:	0.131 g/l (20 °C) (68 °F)
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	1.13
Auto-ignition temperature:	425 °C (797 °F)
Decomposition temperature:	No data available.
Viscosity:	not applicable
Other information	
Minimum ignition energy:	0.07 mJ
Molecular weight:	28.05 g/mol (C2H4)

10. Stability and reactivity

Reactivity:	This product is moderately reactive and may polymerize, decompose or become self-reactive under certain conditions of high temperatures, high pressures or contamination. Rapid pressurization can lead to exothermic decomposition of the product; pressure shocks should be avoided.
Chemical Stability:	Stable under normal storage conditions.
Possibility of Hazardous Reactions:	Hazardous polymerization can occur at elevated temperatures and pressures in the presence of a catalyst. May polymerize explosively when heated or involved in a fire. Liquefied gas may explode on contact with hot water (45 °C to 75 °C) (113 °F to 167 °F).
Conditions to Avoid:	Keep away from heat, sparks and open flame.

Incompatible Materials:	Acids, oxidizing agents, chlorine, halogens, organic peroxides, ozone and nitrogen dioxide. Product can react with water to form hydrates. **Caution:** Evaluate the compatibility of the molecular sieve with the vendor if it is to be in ethylene service. There is a risk of runaway polymerization under certain conditions. Many materials become brittle after contact with liquefied gases and may fail without warning. Carefully select and test equipment, gaskets and hoses periodically to ensure integrity and compatibility.
Hazardous Decomposition Products:	Upon decomposition, this product emits carbon monoxide, carbon dioxide low molecular weight hydrocarbons.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	Ingestion of this product is not a likely route of exposure.
Inhalation:	Product is not acutely toxic. May cause drowsiness or dizziness.
Skin Contact:	Ethylene gas is not irritating to the skin. The liquefied form will cause freezing burns (frostbite).
Eye contact:	Ethylene gas is not irritating to the eyes. The liquefied form will cause freezing burns (frostbite).

Symptoms related to the physical, chemical and toxicological characteristics

Ingestion:	No adverse effects due to ingestion are expected.
Inhalation:	Headache, dizziness, nausea, confusion.
Skin Contact:	Frostbite.
Eye contact:	Frostbite.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral	
Product:	Not relevant, due to the form of the product.
Dermal	
Product:	Not relevant, due to the form of the product.
Inhalation	
Product:	LC 50 (Rat, 4 h): > 57,000 ppm
Repeated dose toxicity	
Product:	Ethylene has low chronic toxicity and no risk to human health has been identified from occupational exposure below the OEL. In rodents exposure to ethylene produces nasal lesions but no similar lesions are observed in lungs. It is not known whether the effects seen in rodents are relevant to humans. Inhalation of ethylene by Sprague Dawley rats, in concentrations of 0, 300, 1000, 3000 and 10,000 ppm, 6 hours/day, 5 days/week for 14 weeks, did not cause any toxic effects.
Skin Corrosion/Irritation	
Product:	Not likely, due to the form of the product.
Serious Eye Damage/Eye Irritation	
Product:	No data available.

Respiratory or Skin Sensitization
Product: No data available.

Carcinogenicity
Product: All tests on ethylene for genotoxicity and carcinogenicity were negative indicating that ethylene should not be considered a risk for cancer in humans.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

ACGIH Carcinogen List:
No carcinogenic components identified

Germ Cell Mutagenicity

In vitro
Product: There are no known or reported genetic effects.

In vivo
Product: There are no known or reported genetic effects.

Reproductive toxicity
Product: There are no known or reported reproductive effects.

Specific Target Organ Toxicity - Single Exposure
Product: May cause drowsiness or dizziness.

Specific Target Organ Toxicity - Repeated Exposure
Product: Not classified.

Aspiration Hazard
Product: Not classified.

Other effects: Narcotic effect.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: LC 50 (Various, 96 h): 126.012 mg/l QSAR

Aquatic Invertebrates
Product: EC 50 (Water flea, 48 h): 62.482 mg/l
This product is not considered harmful to aquatic life.

Toxicity to aquatic plants
Product: EC 50 (Green Algae): 72 mg/l
This product is not considered harmful to aquatic life.

Chronic hazards to the aquatic environment:

Fish
Product: LC 50 : 126.012 mg/l

Aquatic Invertebrates
Product: EC 50 (Water flea, 96 h): 53.402 mg/l
This product is not considered harmful to aquatic life.

Toxicity to aquatic plants
Product: This product is not considered harmful to aquatic life.

Persistence and Degradability

Biodegradation
Product: The lifetime of ethylene in the atmosphere ranges from 0.4 to 4 days, with an average of 1.5 days, and is strongly dependent on the amount of sunlight.

BOD/COD Ratio
Product: No data available.

Bioaccumulative Potential
Bioconcentration Factor (BCF)
Product: Bioconcentration potential is low.

Partition Coefficient n-octanol / water (log Kow)
Product: Log Kow: 1.13

Mobility in Soil: Low potential.

Other Adverse Effects: Several species of flowers (orchids, carnations, etc.), and vegetables such as tomatoes, potatoes, peppers, beans and peas are sensitive to ethylene exposure.

13. Disposal considerations

Disposal instructions: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal. Waste generator is advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste.

Contaminated Packaging: Check local, federal and provincial environmental regulations prior to disposal.

14. Transport information

TDG

UN Number:	UN 1962
UN Proper Shipping Name:	ETHYLENE
Class	2.1
Packing Group	–
Label(s)	2.1
Subsidiary risk label	–
Special precautions for user:	2016 Emergency Response Guidebook, Guide No. 116P.

15. Regulatory information

Significant New Activity (SNAc):
This product does not contain any components subject to a SNAc Notice.

Inventory status

Canada DSL Inventory List:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory

NOVA Chemicals

Version: 6.2
Revision Date: 11/28/2017

16.Other information, including date of preparation or last revision

Issue Date: 11/28/2017

Revision Information: 11/28/2017: SDS Update – phrasing edits
11/07/2017: SDS Update – phrasing edits, density added

Version #: 6.2

Abbreviations and acronyms: ACGIH = American Conference of Governmental Industrial Hygienists; BOD = Biochemical Oxygen Demand; C = Ceiling; CAS = Chemical Abstracts Service; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; COD = Chemical Oxygen Demand; DOT = Department of Transportation; DSL = Domestic Substances List; EC50 = Effective Concentration 50%; EPA = Environmental Protection Agency; GHS = Globally Harmonized System for the Classification and Labelling of Chemicals; HPV = High Production Volume; IARC = International Agency for Research on Cancer; LC50 = Lethal Concentration 50%; LD50 = Lethal Dose 50%; NFPA = National Fire Protection Association; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit; PMCC = Pensky-Martens Closed Cup; PPE = Personal Protective Equipment; RCRA = Resource Conservation and Recovery Act; SARA = Superfund Amendments and Reauthorization Act; SCBA = Self Contained Breathing Apparatus; SDS = Safety Data Sheet; STEL = Short Term Exposure Limit; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

Further Information: For additional information on properties, hazards, spill response, transportation equipment maintenance, inspection and repair procedures, please refer to, "Handling and Transportation Guide for Ethylene, Refrigerated Liquid (Cryogenic Ethylene)", published April 2004, by the Cryogenic Ethylene Transportation Safety Panel and the American Chemistry Council. This Guide is posted on the American Chemistry Council's website, www.americanchemistry.com, type in "Handling and Transportation Guide for Ethylene" in the "Search" field.

For additional information on equipment bonding and grounding, refer to the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity".

Disclaimer:

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UNLESS SPECIFICALLY AGREED OTHERWISE, NOVA CHEMICALS DOES NOT TAKE RESPONSIBILITY FOR USE, TRANSPORTATION, STORAGE, HANDLING OR DISPOSAL OF THE PRODUCT/MATERIALS DESCRIBED HEREIN.

16.1.3 Ethane/Ethylene (OC2)

interpipeline

SAFETY DATA SHEET

Ethane/Ethylene Mix
Date of Preparation: March 10, 2017

Section 1: IDENTIFICATION

Product Name:	Ethane/Ethylene Mix
Synonyms:	OC2; Olefinic Ethane; Ethane/Ethene Mix
Product Use:	Feed stock for petrochemical production.
Restrictions on Use:	Not available.
Manufacturer/Supplier:	Inter Pipeline Offgas Ltd. #3200 215 2nd Street SW Calgary, Alberta T2P 1M4
Emergency Phone:	CANUTEC (Canada) 1-613-996-6666 CHEMTREC (USA) 1-800-424-9300 / +1 703-527-3887 CCN819328
Date of Preparation of SDS:	March 10, 2017

Section 2: HAZARD(S) IDENTIFICATION

GHS INFORMATION

Classification: Flammable Gases, Category 1
Gases Under Pressure - Liquefied Gas
Simple Asphyxiant

LABEL ELEMENTS

Hazard Pictogram(s):

Signal Word: Danger

Hazard Statements:
Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary Statements

Prevention: Keep away from heat, sparks, open flames, and hot surfaces. No smoking.

Response: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Eliminate all ignition sources if safe to do so.

Storage: Store in a well-ventilated place.
Protect from sunlight.

Disposal: Not applicable.

Hazards Not Otherwise Classified: Not applicable.

Ingredients with Unknown Toxicity: None.

This material is considered hazardous by the OSHA Hazard Communication Standard, (29 CFR 1910.1200). This material is considered hazardous by the Hazardous Products Regulations.

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SAFETY DATA SHEET

Ethane/Ethylene Mix
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Section 3: COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient(s)	Common name / Synonyms	CAS No.	% vol./vol.
Ethane	Not available.	74-84-0	75 - 99
Ethylene	Ethene	74-85-1	0 - 0.1, 0.1 - 1, 1 - 5, 5 - 10, 10 - 12 *
Methane	Not available.	74-82-8	0.1 - 1
Propylene	Not available.	115-07-1	< 0.1
Carbon dioxide	Not available.	124-38-9	< 0.1
Hydrogen sulphide	Not available.	7783-06-4	< 0.01

* Multiple ranges are provided due to batch-to-batch variability.

Section 4: FIRST-AID MEASURES

Inhalation:

If inhaled: Call a poison center or doctor if you feel unwell. If breathing or the heart stops, trained personnel should immediately begin artificial respiration (AR) or cardiopulmonary resuscitation (CPR) respectively. Get medical attention immediately.

Acute and delayed symptoms and effects: May displace oxygen and cause rapid suffocation. May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Eye Contact:

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.

Acute and delayed symptoms and effects: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. The pain after contact with liquid can quickly subside. Permanent eye damage or blindness could result. May cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin Contact:

Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. If on skin: Wash with plenty of soap and water. Get immediate medical advice/attention. Remove non-adhering contaminated clothing. Do not remove adherent material or clothing.

Acute and delayed symptoms and effects: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside. May cause skin irritation. Signs/symptoms may include localized redness, swelling, and itching.

Ingestion:

Not a normal route of exposure.

Acute and delayed symptoms and effects: Not a normal route of exposure.

General Advice:

In case of accident or if you feel unwell, seek medical advice immediately (show the label or this MSDS where possible).

Note to Physicians:

Symptoms may not appear immediately.

Section 5: FIRE-FIGHTING MEASURES

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Ethane/Ethylene Mix

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FLAMMABILITY AND EXPLOSION INFORMATION

Extremely flammable gas. Contains gas under pressure; may explode if heated. Will be easily ignited by heat, sparks or flames. Will form explosive mixtures with air. Vapors from liquefied gas are initially heavier than air and spread along ground. Vapors may travel to source of ignition and flash back. Cylinders exposed to fire may vent and release flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket. DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.

If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

Fire involving Tanks: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.
Sensitivity to Static Discharge: This material is sensitive to static discharge.

MEANS OF EXTINCTION

Suitable Extinguishing Media: Small Fire: Dry chemical or CO2.

Large Fire: Water spray or fog. Move containers from fire area if you can do it without risk.

Unsuitable Extinguishing Media: Not available.

Products of Combustion: Oxides of carbon.

Protection of Firefighters: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Vapors may cause dizziness or asphyxiation without warning. Some may be irritating if inhaled at high concentrations. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite. Fire may produce irritating and/or toxic gases. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. Always wear thermal protective clothing when handling refrigerated/cryogenic liquids.

Section 6: ACCIDENTAL RELEASE MEASURES

Emergency Procedures: As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Keep out of low areas. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded.

Personal Precautions: Do not touch or walk through spilled material. Use personal

protection recommended in Section 8.

Environmental Precautions: Not normally required.

Methods for Containment: Stop leak if you can do it without risk. If possible, turn leaking containers so that gas escapes rather than liquid. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. Do not direct water at spill or source of leak.

Methods for Clean-Up: Prevent spreading of vapors through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed. CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and may break without warning.

Other Information: See Section 13 for disposal considerations.

Section 7: HANDLING AND STORAGE

Handling:
Avoid breathing gas. Keep away from heat, sparks, open flames, and hot surfaces. – No smoking. Pressurized container: Do not pierce or burn, even after use. See Section 8 for information on Personal Protective Equipment.

Storage:
Store in a well-ventilated place. Protect from sunlight. Store away from incompatible materials. See Section 10 for information on Incompatible Materials. Keep out of the reach of children.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines
Component

Ethane [CAS No. 74-84-0]
- **ACGIH:** 1000 ppm (TWA); (2001)
- **OSHA:** No PEL established.
- **Alberta OEL:** 1000 ppm (TWA)
- **Ontario OEL:** 1000 ppm (TWA)

Ethylene [CAS No. 74-85-1]
- **ACGIH:** 200 ppm (TWA); A4 (2001)
- **OSHA:** No PEL established.
- **Alberta OEL:** 200 ppm (TWA); 229 mg/m³ (TWA)
- **Ontario OEL:** 200 ppm (TWA)

Methane [CAS No. 74-82-8]
- **ACGIH:** 1000 ppm (TWA); (2001)
- **OSHA:** No PEL established.
- **Alberta OEL:** No OEL established.
- **Ontario OEL:** 1000 ppm (TWA)

Propylene [CAS No. 115-07-1]

ACGIH: 500 ppm (TWA); A4 (2005)
OSHA: No PEL established.
Alberta OEL: 500 ppm (TWA); 860 mg/m³ (TWA)
Ontario OEL: 500 ppm (TWA)

Carbon dioxide [CAS No. 124-38-9]

ACGIH: 5000 ppm (TWA); 30000 ppm (STEL); (1983)
OSHA: 5000 ppm (TWA), 9000 mg/m³ (TWA);
Alberta OEL: 5000 ppm (TWA); 9000 mg/m³ (TWA); 30000 ppm (STEL); 54000 mg/m³ (STEL)
Ontario OEL: 5000 ppm (TWA); 30000 ppm (STEL)

Hydrogen sulphide [CAS No. 7783-06-4]

ACGIH: 1 ppm (TWA); 5 ppm (STEL); (2009);
OSHA: 20 ppm (C); 50 ppm (Peak) (Maximum duration: 10 mins. once only if no other meas. exp. occurs.)
10 ppm (TWA); 15 ppm (STEL) [Vacated];
Alberta OEL: : 10 ppm (TWA), 14 mg/m³ (TWA); 15 ppm (C); 21 mg/m³ (C)
Ontario OEL: 10 ppm (TWA); 15 ppm (STEL)

PEL: Permissible Exposure Limit
TWA: Time-Weighted Average
STEL: Short-Term Exposure Limit
OEL: Occupational Exposure Limit
C: Ceiling

Engineering Controls: Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapour, gas, etc.) below recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection: Wear safety glasses, and full face shield. Use equipment for eye protection that meets the standards referenced by OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment.

Hand Protection: Wear protective gloves. Wear cold insulating gloves. Consult manufacturer specifications for further information.

Skin and Body Protection: Wear protective clothing.

Respiratory Protection: If engineering controls and ventilation are not sufficient to control exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator or self-contained breathing apparatus must be used. Supplied air breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

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General Hygiene Considerations: Handle according to established industrial hygiene and safety practices.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Liquefied gas.
Colour:	Colourless.
Odour:	Odourless.
Odour Threshold:	Not available.
Physical State:	Gas.
pH:	Not available.
Melting Point / Freezing Point:	Not available.
Initial Boiling Point:	Not available.
Boiling Point:	-89 °C (-128.2 °F) (Ethane)
Flash Point:	-135.15 °C (-211.3 °F) (Closed Cup) (Ethane) -136.11 °C (-213 °F) (Ethylene)
Evaporation Rate:	Not available.
Flammability (solid, gas):	Extremely flammable gas.
Lower Flammability Limit:	2.7 % (Ethylene)
Upper Flammability Limit:	12.4 % (Ethane)
Vapor Pressure:	38.3 bar at 21 °C (70 °F) (Ethane) 47.7 bar at 5 °C (41 °F) (Ethylene)
Vapor Density:	Not available.
Relative Density:	Not available.
Solubilities:	Very slightly soluble in water.
Partition Coefficient: n-Octanol/Water:	Not available.
Auto-ignition Temperature:	472 °C (881.6 °F) (Ethane) 490 °C (914 °F) (Ethylene)
Decomposition Temperature:	Not available.
Viscosity:	0.1183 cSt
Percent Volatile, wt. %:	100
VOC content, wt. %:	Not available.
Density:	1.28 g/cm³ (Ethane gas) 1.18 g/cm³ (Ethylene gas) 546.49 kg/m³ (Ethane, liquid phase) 567.92 kg/m³ (Ethylene, liquid phase)
Coefficient of Water/Oil	Not available.

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Distribution:

Section 10: STABILITY AND REACTIVITY

Reactivity: Contact with incompatible materials. Sources of ignition. Exposure to heat.

Chemical Stability: Stable under normal storage conditions.

Possibility of Hazardous Reactions: None known.

Conditions to Avoid: Contact with incompatible materials. Sources of ignition. Exposure to heat.

Incompatible Materials: Oxidizers.

Hazardous Decomposition Products: Not available.

Section 11: TOXICOLOGICAL INFORMATION

EFFECTS OF ACUTE EXPOSURE

Product Toxicity

Toxicity values are not available because the product is an acute asphyxiant. As such, toxicity values cannot be determined.

Oral: Not available.

Dermal: Not available.

Inhalation: Not available.

Component Toxicity

Component	CAS No.	LD_{50} oral	LD_{50} dermal	LC_{50}
Ethane	74-84-0	Not available.	Not available.	Not available.
Ethylene	74-85-1	Not available.	Not available.	Not available.
Methane	74-82-8	Not available.	Not available.	Not available.
Propylene	115-07-1	Not available.	Not available.	86000 mg/m³ (rat), 4H
Carbon dioxide	124-38-9	Not available.	Not available.	Not available.
Hydrogen sulphide	7783-06-4	Not available.	Not available.	444 ppm (rat); 4H

Likely Routes of Exposure: Eye contact. Skin contact. Inhalation.

Target Organs: Skin. Eyes. Respiratory system.

Symptoms (including delayed and immediate effects)

Inhalation: May displace oxygen and cause rapid suffocation. May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Eye: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. The pain after contact with liquid can quickly subside. Permanent eye damage or blindness could result. May cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside. May cause skin irritation.

Signs/symptoms may include localized redness, swelling, and itching.

Ingestion: Not a normal route of exposure.

Skin Sensitization: Not available.

Respiratory Sensitization: Not available.

Medical Conditions Aggravated By Exposure: Not available.

EFFECTS OF CHRONIC EXPOSURE (from short and long-term exposure)

Target Organs: Skin. Eyes. Respiratory system.

Chronic Effects: Not available.

Carcinogenicity: Product is not classified as a carcinogen. See Component Carcinogenicity table below for information on individual components.

Component Carcinogenicity

Component	ACGIH	IARC	NTP	OSHA	Prop 65
Ethylene	A4	Group 3	Not listed.	Not listed.	Not listed.
Propylene	A4	Group 3	Not listed.	Not listed.	Not listed.

Mutagenicity: Not available.

Reproductive Effects: Not available.

Developmental Effects

Teratogenicity: Not available.

Embryotoxicity: Not available.

Toxicologically Synergistic Materials: Not available.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity: Not available.

Persistence / Degradability: Not available.

Bioaccumulation / Accumulation: Not available.

Mobility in Environment: Not available.

Other Adverse Effects: Not available.

Section 13: DISPOSAL CONSIDERATIONS

Disposal Instructions: Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

Section 14: TRANSPORT INFORMATION

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Ethane/Ethylene Mix
Date of Preparation: March 10, 2017

U.S. Department of Transportation (DOT)

Proper Shipping Name:	UN1075, PETROLEUM GASES, LIQUEFIED, 2.1
Class:	2.1
UN Number:	UN1075
Packing Group:	Not applicable.
Label Code:	

Canada Transportation of Dangerous Goods (TDG)

Proper Shipping Name:	UN1075, PETROLEUM GASES, LIQUEFIED, 2.1
Class:	2.1
UN Number:	UN1075
Packing Group:	Not applicable.
Label Code:	

Section 15: REGULATORY INFORMATION

Chemical Inventories

US (TSCA)
The components of this product are in compliance with the chemical notification requirements of TSCA.

Canada (DSL)
The components of this product are in compliance with the chemical notification requirements of the NSN Regulations under CEPA, 1999.

Federal Regulations

United States
This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SARA Title III

Component	Section 302 (EHS) TPQ (lbs.)	Section 304 EHS RQ (lbs.)	CERCLA RQ (lbs.)	Section 313	RCRA CODE	CAA 112(r) TQ (lbs.)
Ethane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Ethylene	Not listed.	Not listed.	Not listed.	313	Not listed.	10000
Methane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Propylene	Not listed.	Not listed.	Not listed.	313	Not listed.	10000
Hydrogen sulfide	500	100	100	313s	U135	10000

State Regulations

Massachusetts

US Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Component	CAS No.	RTK List
Ethane	74-84-0	Listed.
Ethylene	74-85-1	Listed.
Methane	74-82-8	Listed.
Propylene	115-07-1	Listed.
Carbon dioxide	124-38-9	Listed.
Hydrogen sulfide (H2S)	7783-06-4	E

Note: E = Extraordinarily Hazardous Substance

New Jersey

US New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Component	CAS No.	RTK List
Ethane	74-84-0	SHHS
Ethylene	74-85-1	SHHS
Methane	74-82-8	SHHS
Propylene	115-07-1	SHHS
Carbon dioxide	124-38-9	Listed.
Hydrogen sulfide (H2S)	7783-06-4	SHHS

Note: SHHS = Special Health Hazard Substance

Pennsylvania

US Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Component	CAS No.	RTK List
Ethane	74-84-0	Listed.
Ethylene	74-85-1	E
Methane	74-82-8	E
Propylene	115-07-1	E
Carbon dioxide	124-38-9	Listed.
Hydrogen sulfide (H2S)	7783-06-4	E

Note: E = Environmental Hazard

California

California Prop 65: This product does not contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Section 16: OTHER INFORMATION

Disclaimer: The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for his own particular use.

Date of Preparation of SDS: March 10, 2017

Version: 1.0

GHS SDS Prepared by: **Deerfoot Consulting Inc.**

Phone: (403) 720-3700

16.1.4 Hydrogen Off Gas

NOVA Chemicals®

Version: 4.1
Revision Date: 11/29/2018

SAFETY DATA SHEET

1. Identification

GHS Product identifier: Hydrogen Off Gas (HOG) - Joffre

Other means of identification
Common name(s), synonym(s): Off Gas
SDS number: NOVA-MW08

Recommended use and restriction on use
Recommended use: Feed stream to HOG Plant.
Restrictions on use: All uses other than the identified.

Manufacturer/Importer/Supplier/Distributor Information

Manufacturer
Company Name: NOVA Chemicals
Address: 38430 Highway 815
Lacombe, Alberta, Canada T4L 2N2
Telephone: Product Information: 1-412-490-4063
SDS Information Email: msdsemail@novachem.com

Emergency telephone number:
1-800-561-6682, 1-403-314-8767 (NOVA Chemicals) (24 hours)
1-613-996-6666 (Canutec-Canada) (24 hours)

2. Hazard(s) identification

Hazard Classification

Physical Hazards

Flammable gas	Category 1
Gases under pressure	Compressed gas
Simple asphyxiant	Category 1

Label Elements

Hazard Symbol:

Signal Word: Danger

Hazard Statement:
Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

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Precautionary Statements:

Prevention: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Use only outdoors or in a well-ventilated area.

Response: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leakage, eliminate all ignition sources

Storage: Protect from sunlight. Store in a well-ventilated place.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: Contact with pressurized gas may cause irritation and/or frostbite.

3. Composition/information on ingredients

Mixtures

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
Hydrogen	Hydrogen gas	1333-74-0	75 - 90%
Methane	Methyl hydride	74-82-8	10 - 25%
Ethene	Ethylene	74-85-1	0 - 1%
Carbon monoxide	Carbonic oxide	630-08-0	0.02 - 0.04%

* All concentrations are percent by weight.

Additional Information: This product is considered hazardous by the Hazardous Products Regulations, 2015.

4. First-aid measures

Ingestion: Ingestion of this product is not a likely route of exposure. Do NOT induce vomiting. Seek medical attention.

Inhalation: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Seek medical attention.

Skin Contact: Contact with pressurized gas may cause irritation and/or frostbite. Seek medical attention immediately in the event of frostbite IF ON SKIN: Wash with plenty of soap and water. Seek medical attention.

Eye contact: Contact with pressurized gas may cause irritation and/or frostbite. Seek medical attention immediately in the event of frostbite IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical attention.

Most important symptoms/effects, acute and delayed

Symptoms: Frostbite or burns, at high concentration - suffocation.

Indication of immediate medical attention and special treatment needed

Treatment:	For more detailed medical emergency support information call 1-800-561-6682 or 1-403-314-8767 (24 hours, NOVA Chemicals Emergency Response). Treat unconsciousness, frostbite, nausea, hypotension, seizures and cardiac arrhythmias in the conventional manner. Sympathomimetics or catecholamines should be avoided or used with caution (lowest effective dose) because of possible cardiac sensitization. Administer oxygen by mask if there is respiratory distress.

5. Fire-fighting measures

General Fire Hazards:	Extremely flammable gas. Hydrogen gas has an extremely wide flammability range. Hydrogen burns with an invisible to pale blue flame that is often very difficult to see. Gas may travel considerable distance to a source of ignition and flash back. DO NOT ATTEMPT TO EXTINGUISH A GAS FIRE UNLESS LEAK SOURCE CAN BE ISOLATED AND SHUT OFF. Be aware of possibility of reignition. Gas may form explosive mixture with air. Consider need for immediate emergency isolation and evacuation. If a pipeline or a storage vessel is involved in a fire, ISOLATE for 1600 metres (1 mile) in all directions. Keep containers away from source of heat or fire. Contains gas under pressure; may explode if heated.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media:	Use dry chemical, foam, carbon dioxide (CO_2), water spray or fog to extinguish. Use water to cool fire-exposed containers and to protect personnel.
Unsuitable extinguishing media:	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical:	None known.

Special protective equipment and precautions for firefighters

Special fire fighting procedures:	DO NOT ATTEMPT TO EXTINGUISH A GAS FIRE UNLESS LEAK SOURCE CAN BE ISOLATED AND SHUT OFF. Hydrogen burns with an invisible to pale blue flame that is often very difficult to see. Keep upwind. Keep unauthorized personnel away. Move containers from fire area if you can do so without risk. Fight fire from maximum distance or use unmanned holders or monitor nozzles. Immediately withdraw in case of fire and container venting or heat discolouration of a container. Let uncontrolled fires burn off. Avoid inhaling any smoke and combustion materials. Remove and isolate contaminated clothing and shoes. Cool containers with flooding quantities of water until well after the fire is out. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Reference 2016 Emergency Response Guidebook, Guide No. 115 for additional details and instructions.
Special protective equipment for firefighters:	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:
Methods and material for containment and cleaning up:

Isolate area. Keep unauthorized personnel away. Alert stand-by emergency and fire fighting personnel. Monitor surrounding area for buildup of flammable concentrations in air.
Wear appropriate personal protective equipment. Do not touch or walk through spilled material. In case of leakage, eliminate all ignition sources. Keep upwind. Keep out of low areas. Stop leak if safe to do so. Released gas will rapidly dissipate upwards into the atmosphere. All equipment used when handling the product must be grounded. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Keep area isolated until any detectable flammable gas has been fully dispersed. Check oxygen and flammable gas levels prior to entering confined spaces or buildings. Check for gas pockets under roofs or at high ends of equipment.

Small Spills: Isolate spill or leak area for 50 to 100 metres (164 to 330 feet).

Large Spills: Consider initial downwind evacuation for at least 800 metres (1/2 mile). Evacuate personnel to upwind of the spill area, and position at a safe distance. Use water spray to reduce gas or divert gas cloud drift.

7. Handling and storage

Precautions for safe handling:

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. For additional information on equipment bonding and grounding, refer to the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity". Take special precautions when cold cutting or breaking into lines, or when cleaning and disposing of empty containers. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.

Conditions for safe storage, including any incompatibilities:

Protect from sunlight. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Only allow access to authorized persons. Store and handle in properly designed pressure vessels and equipment. Store and use away from heat, sparks, open flame, or any other ignition source. Have appropriate extinguishing capability in storage area (e.g. sprinkler system, portable fire extinguishers) and flammable gas detectors. Storage pressure vessels should be above ground and diked. Store away from incompatible materials. Store according to applicable regulations and standards for flammable materials. Keep cylinders secure while in storage or in transportation.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Chemical Identity	type	Exposure Limit Values	Source

Hydrogen			Simple asphyxiant	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (06 2018)
Hydrogen			Simple asphyxiant	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (2015 ACGIH TLV)
Hydrogen		Simple asphyxiant	Explosion hazard	ACGIH: US.ACGIH Threshold Limit Values (2018)
Methane	TWA	1,000 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (05 2013)
Methane			Simple asphyxiant	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (2015 ACGIH TLV)
Methane		Simple asphyxiant	Explosion hazard	ACGIH: US.ACGIH Threshold Limit Values (2018)
Ethene	TWA	200 ppm	229 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (06 2018)
Ethene	TWA	200 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (05 2013)
Ethene	TWA	200 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (2015 ACGIH TLV)
Ethene	TWA	200 ppm		ACGIH: US.ACGIH Threshold Limit Values (2018)
Carbon monoxide	TWA	25 ppm	29 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (06 2018)
Carbon monoxide	TWA	25 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (05 2013)
	STEL	100 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (05 2013)
Carbon monoxide	TWA	25 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (2015 ACGIH TLV)
Carbon monoxide	STEL	200 ppm	230 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (09 2017)
	TWA	35 ppm	40 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (09 2017)
Carbon monoxide	TWA	25 ppm		ACGIH: US.ACGIH Threshold Limit Values (2018)
Carbon monoxide	TWA	35 ppm	40 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	Ceiling	200 ppm	229 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	IDLH	1200 ppm		US. NIOSH: Pocket Guide to Chemical Hazards (2010)

Biological Limit Values

Chemical Identity	Exposure Limit Values	Source
Carbon monoxide (Carbon monoxide: Sampling time: End of shift.)	20 ppm (End-exhaled air)	ACGIH BEI (03 2014)
Carbon monoxide (Carboxyhemoglobin: Sampling time: End of shift.)	3.5 % (Hemoglobin in blood)	ACGIH BEI (03 2014)

Appropriate Engineering Controls

Engineering methods to reduce hazardous exposure are preferred controls. Methods include mechanical ventilation (dilution and local exhaust) process or personal enclosure, remote and automated operation, control of process conditions, leak detection and repair systems, and other process modifications. Ensure all exhaust ventilation systems are discharged to outdoors, away from air intakes and ignition sources. Supply sufficient replacement air to make up for air removed by exhaust systems. Administrative (procedure) controls and use of personal protective equipment may also be required.

Individual protection measures, such as personal protective equipment

General information:

Personal protective equipment (PPE) should not be considered a long-term solution to exposure control. Employer programs to properly select, fit, maintain and train employees to use equipment must accompany PPE. Consult a competent industrial hygiene resource, the PPE manufacturer's recommendation, and/or applicable regulations to determine hazard potential and ensure adequate protection.

Eye/face protection:

Safety glasses. Chemical goggles under a full-face shield are recommended when handling hydrogen under pressure.

Skin Protection

Hand Protection:

Wear protective gloves. Wear cold insulating gloves.

Other:

Wear appropriate clothing to prevent any possibility of skin contact. Wear work clothes with long sleeves and pants. Fire resistant (i.e., Nomex) or natural fibre clothing (i.e., cotton or wool) is recommended. Synthetic clothing can generate static electricity and is not recommended where a flammable vapour release may occur. Wear chemical-resistant safety footwear with good traction to prevent slipping. Static Dissipative (SD) rated footwear is also recommended.

Respiratory Protection:

Air supplied breathing apparatus must be used when oxygen concentrations are low.

Hygiene measures:

Use effective control measures and PPE to maintain worker exposure to concentrations that are below these limits. Ensure that eyewash stations and safety showers are in close proximity to work locations.

9. Physical and chemical properties

Appearance	
Physical state:	Gas
Form:	Compressed gas
Colour:	Colourless
Odour:	Faint hydrocarbon odour
Odour threshold:	No data available.
pH:	not applicable
Melting point/freezing point:	-259 °C (-434 °F) (Hydrogen)
Initial boiling point and boiling range:	-252.8 °C (-423.0 °F) (Hydrogen)
Flash Point:	< -50 °C (< -58 °F) (Hydrogen)
Evaporation rate:	not applicable
Flammability (solid, gas):	Extremely flammable.

Upper/lower limit on flammability or explosive limits

Flammability limit - upper (%):	15.4 %(V) (Methane) 74.5 %(V) (Hydrogen)
Flammability limit - lower (%):	5.0 %(V) (Methane) 4.0 %(V) (Hydrogen)
Vapour pressure:	not applicable
Vapour density:	0.07 (15 °C (59 °F)) 101.3 kPa
Density:	not applicable
Relative density:	not applicable
Solubility(ies)	
Solubility in water:	Slightly soluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	0.45 (estimated) Log P(oct) (Hydrogen)
Auto-ignition temperature:	570 °C (1058 °F) (Hydrogen)
Decomposition temperature:	not applicable
Viscosity:	not applicable

10. Stability and reactivity

Reactivity:	May react explosively with halogen compounds, finely divided platinum, lithium, chlorine trifluoride, nitrogen trifluoride, oxygen difluoride.
Chemical Stability:	Material is stable under normal conditions.
Possibility of Hazardous Reactions:	May react explosively with halogen compounds, finely divided platinum, lithium, chlorine trifluoride, nitrogen trifluoride, oxygen difluoride.
Conditions to Avoid:	Keep away from heat, sparks and open flame.
Incompatible Materials:	Strong oxidizing agents. Carefully select and test equipment, gaskets and hoses periodically to ensure integrity and compatibility.
Hazardous Decomposition Products:	None known.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	Ingestion of this product is not a likely route of exposure.
Inhalation:	Product is not acutely toxic. A very high concentration of hydrogen may displace oxygen and cause rapid suffocation.
Skin Contact:	Hydrogen gas is not irritating to the skin. The compressed form will cause freezing burns (frostbite).
Eye contact:	Hydrogen gas is not irritating to the eyes. The compressed form will cause freezing burns (frostbite).

Symptoms related to the physical, chemical and toxicological characteristics

Ingestion:	No adverse effects due to ingestion are expected.
Inhalation:	At high concentration, suffocation.
Skin Contact:	Frostbite or burns.

Eye contact: Frostbite or burns.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: Not classified for acute toxicity based on available data.

Dermal
Product: Not classified for acute toxicity based on available data.

Inhalation
Product: Not classified for acute toxicity based on available data.

Repeated dose toxicity
Product: No data available.

Skin Corrosion/Irritation
Product: No data available.

Specified substance(s):
Methane — Frostbite hazard - rapidly expanding gas or liquid may cause frostbite.

Ethene — Not likely, due to the form of the product.

Serious Eye Damage/Eye Irritation
Product: No data available.

Specified substance(s):
Methane — Frostbite hazard - rapidly expanding gas or liquid may cause frostbite.

Respiratory or Skin Sensitization
Product: No data available.

Carcinogenicity
Product: No data available.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

ACGIH Carcinogen List:
No carcinogenic components identified

Germ Cell Mutagenicity

In vitro
Product: There are no known or reported genetic effects.

In vivo
Product: There are no known or reported genetic effects.

Reproductive toxicity
Product: There are no known or reported reproductive effects.

Specific Target Organ Toxicity - Single Exposure
Product: No data available.

Specific Target Organ Toxicity - Repeated Exposure
Product: No data available.

Aspiration Hazard
Product: Not classified.

Other effects: A very high concentration of hydrogen may displace oxygen and cause rapid suffocation.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
Ethene — LC 50 (Various, 4 d): 50 - 119.5 mg/l QSAR
Ethene is not considered harmful to aquatic life.

Aquatic Invertebrates
Product: No data available.

Specified substance(s):
Ethene — EC 50 (Daphnia magna, 48 h): 53 - 152.9 mg/l QSAR
Ethene is not considered harmful to aquatic life.

Toxicity to aquatic plants
Product: No data available.

Specified substance(s):
Ethene — EC 50 (Green algae (Selenastrum capricornutum), 72 h): 40 mg/l
Ethene is not considered harmful to aquatic life.

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
Ethene — NOEC (Fathead minnow, 28 d): 13 mg/l QSAR
Ethene is not considered harmful to aquatic life.

Aquatic Invertebrates
Product: No data available.

Specified substance(s):
Ethene — NOEC (16 d): 37.4 mg/l
Ethene is not considered harmful to aquatic life.

Toxicity to aquatic plants
Product: No data available.

Specified substance(s):
Ethene — NOEC (72 h): 13.9 mg/l (growth inhibition)
Ethene is not considered harmful to aquatic life.

Persistence and Degradability

Biodegradation
Product: No data available.

BOD/COD Ratio
Product: No data available.

Bioaccumulative Potential
Bioconcentration Factor (BCF)
Product: No data available.

Partition Coefficient n-octanol / water (log Kow)
Product: Log Kow: 0.45 (estimated) Log P(oct) (Hydrogen)

Mobility in Soil: not applicable

Other Adverse Effects: No data available.

13. Disposal considerations

Disposal instructions: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal. Waste generator is advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste.

Contaminated Packaging: Check local, federal and provincial environmental regulations prior to disposal.

14. Transport information

TDG

UN Number:	UN 1954
UN Proper Shipping Name	COMPRESSED GAS, FLAMMABLE, N.O.S. (Hydrogen, Methane)
Class	2.1
Packing Group	–
Label(s)	2.1
Subsidiary risk label	–
Special precautions for user:	2016 Emergency Response Guidebook, Guide No. 115.

15. Regulatory information

Canada Federal Regulations

List of Toxic Substances (CEPA, Schedule 1)

Chemical Identity
Methane

Export Control List (CEPA 1999, Schedule 3)
Not regulated

National Pollutant Release Inventory (NPRI)
Canada. Canadian Environmental Protection Act (CEPA). National Pollutant Release Inventory (NPRI) (Parts 1-4)

NPRI	Methane Ethene Carbon monoxide

Canada. National Pollutant Release Inventory (NPRI) Substances, Part 5, VOCs with Additional Reporting Requirements

NPRI PT5	Ethene

Greenhouse Gases

Chemical Identity
Methane

Precursor Control Regulations
Not regulated

Canada. Substances Subject to Significant New Activity (SNAc) Reporting Requirements
Not regulated

Inventory status

Canada DSL Inventory List:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory

16.Other information, including date of preparation or last revision

Issue Date:	11/29/2018
Revision Information:	11/21/2018: SDS Update – OEL updates, added Section 15 information
Version #:	4.1
Abbreviations and acronyms:	ACGIH = American Conference of Governmental Industrial Hygienists; BOD = Biochemical Oxygen Demand; CAS = Chemical Abstracts Service; CEPA = Canadian Environmental Protection Act; COD = Chemical Oxygen Demand; DSL = Domestic Substances List; EC50 = Effective Concentration 50%; EPA = Environmental Protection Agency; GHS = Globally Harmonized System for the Classification and Labelling of Chemicals; IARC = International Agency for Research on Cancer; IDLH = Immediately Dangerous to Life or Health; Kow = Octanol/water partition coefficient; LC50 = Lethal Concentration 50%; LD50 = Lethal Dose 50%; LEL = Lower Explosive Limit; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OEL = Occupational Exposure Limit; OSHA = Occupational Safety and Health Administration; PNOC = Particulates Not Otherwise Classified; PPE = Personal Protective Equipment; REL = Recommended Exposure Limit; SCBA = Self Contained Breathing Apparatus; SDS = Safety Data Sheet; STEL = Short Term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average
Further Information:	For additional information on equipment bonding and grounding, refer to the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity".

NOVA Chemicals

Version: 4.1
Revision Date: 11/29/2018

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16.1.5 Nitrogen

PRAXAIR

Nitrogen

Safety Data Sheet E-4631

according to the Hazardous Products Regulation (February 11, 2015)

Date of issue: 10-15-1979 Revision date: 08-03-2016 Supersedes: 10-15-2013

SECTION 1: Identification

1.1. Product identifier

Product form	:	Substance
Name	:	Nitrogen
CAS No	:	7727-37-9
Formula	:	N2
Other means of identification	:	Dinitrogen, Refrigerant R728, Nitrogen, Medipure® Nitrogen, Extendapak Nitrogen, Nitrogen - Diving Grade
Product group	:	Core Products

1.2. Recommended use and restrictions on use

Recommended uses and restrictions	:	Medical applications Industrial use Diving Gas (Underwater Breathing)

1.3. Supplier

Praxair Canada inc.
1200 – 1 City Centre Drive
Mississauga - Canada L5B 1M2
T 1-905-803-1600 - F 1-905-803-1682
www.praxair.ca

1.4. Emergency telephone number

Emergency number	:	1-800-363-0042 Call emergency number 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier or Praxair sales representative.

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS-CA classification

Simple asphyxiant H380
Compressed gas H280

2.2. GHS Label elements, including precautionary statements

GHS-CA labelling

Hazard pictograms :

GHS04

Signal word : WARNING

Hazard statements : CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION

Precautionary statements : Do not handle until all safety precautions have been read and understood
Use and store only outdoors or in a well-ventilated area
Protect from sunlight when ambient temperature exceeds 52°C (125°F)
Use a back flow preventive device in the piping
Close valve after each use and when empty
Use only with equipment rated for cylinder pressure
Obtain special instructions before use

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EN (English) SDS ID : E-4631 1/8

PRAXAIR

Nitrogen

Safety Data Sheet E-4631

according to the Hazardous Products Regulation (February 11, 2015)

Date of issue: 10-15-1979 Revision date: 08-03-2016 Supersedes: 10-15-2013

2.3. Other hazards

Other hazards not contributing to the classification : Asphyxiant in high concentrations. May cause suffocation by reducing oxygen available for breathing.

2.4. Unknown acute toxicity (GHS-CA)

No data available

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	CAS No.	% (Vol.)	Common Name (synonyms)
Nitrogen (Main constituent)	(CAS No) 7727-37-9	100	Nitrogen (liquified) / Nitrogen gas / Nitrogen, liquefied / Nitrogen, compressed / NITROGEN

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Immediately remove to fresh air. If not breathing, clear airways of any slurry or caked material and give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

First-aid measures after skin contact : Adverse effects not expected from this product.

First-aid measures after eye contact : Adverse effects not expected from this product. In case of eye irritation: Rinse immediately with plenty of water. Rinse immediately with plenty of water. Consult an ophthalmologist if irritation persists.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects (acute and delayed)

No additional information available

4.3. Immediate medical attention and special treatment, if necessary

Other medical advice or treatment : None.

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

5.2. Unsuitable extinguishing media

No additional information available

5.3. Specific hazards arising from the hazardous product

Explosion hazard : PRESSURISED CONTAINER: MAY BURST IF HEATED.

Reactivity : Under certain conditions, nitrogen can react violently with lithium, neodymium, titanium (above 1472°F/800°C), or magnesium to form nitrides. At high temperature, it can also combine with oxygen and hydrogen.

5.4. Special protective equipment and precautions for fire-fighters

Firefighting instructions : Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with their provincial and local fire code regulations.

Protection during firefighting : Compressed gas: asphyxiant. Suffocation hazard by lack of oxygen.

Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

PRAXAIR **Nitrogen**
Safety Data Sheet E-4631
according to the Hazardous Products Regulation (February 11, 2015)
Date of issue: 10-15-1979 Revision date: 08-03-2016 Supersedes: 10-16-2013

Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems

Stop flow of product if safe to do so

Use water spray or fog to knock down fire fumes if possible.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Evacuate area. Ensure adequate air ventilation. Wear self-contained breathing apparatus when entering area unless atmosphere is proven to be safe. Stop leak if safe to do so.

6.2. Methods and materials for containment and cleaning up

6.3. Reference to other sections

For further information refer to section 8: Exposure controls/personal protection

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

Safe use of the product : **The suitability of this product as a component in underwater breathing gas mixtures** is to be determined by or under the supervision of personnel experienced in the use of underwater breathing gas mixtures and familiar with the physiological effects, methods employed, frequency and duration of use, hazards, side effects, and precautions to be taken.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 125°F (52°C). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Appropriate engineering controls

Appropriate engineering controls : Use a local exhaust system with sufficient flow velocity to maintain an adequate supply of air in the worker's breathing zone. Mechanical (general): General exhaust ventilation may be acceptable if it can maintain an adequate supply of air.

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8.3. Individual protection measures/Personal protective equipment

Personal protective equipment	:	In case of splash hazard: safety glasses. Face shield. Gloves.
		
Hand protection	:	Wear work gloves when handling containers. Wear heavy rubber gloves where contact with product may occur.
Eye protection	:	Wear goggles when transfilling or breaking transfer connections. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.
Skin and body protection	:	As needed for welding, wear hand, head, and body protection to help prevent injury from radiation and sparks. (See ANSI Z49.1.) At a minimum, this includes welder's gloves and protective goggles, and may include arm protectors, aprons, hats, and shoulder protection as well as substantial clothing.
Respiratory protection	:	**Respiratory protection:** Use respirable fume respirator or air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below TLV. Select in accordance with provincial regulations, local bylaws or guidelines. Selection should be based on the current CSA standard Z94.4, "Selection, Care, and Use of Respirators." Respirators should also be approved by NIOSH and MSHA. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
Environmental exposure controls	:	Refer to local regulations for restriction of emissions to the atmosphere.
Other information	:	**Other protection :** Safety shoes for general handling at customer sites. Metatarsal shoes and cuffless trousers for cylinder handling at packaging and filling plants. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines. For working with flammable and oxidizing materials, consider the use of flame resistant anti-static safety clothing.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Gas
Appearance	:	Colourless gas.
Molecular mass	:	28 g/mol
Colour	:	Colourless.
Odour	:	No odour warning properties.
Odour threshold	:	No data available
pH	:	Not applicable.
pH solution	:	No data available
Relative evaporation rate (butylacetate=1)	:	No data available
Relative evaporation rate (ether=1)	:	Not applicable.
Melting point	:	-210 °C
Freezing point	:	No data available
Boiling point	:	-195.8 °C
Flash point	:	No data available
Critical temperature	:	-149.9 °C
Auto-ignition temperature	:	Not applicable.
Decomposition temperature	:	No data available
Vapour pressure	:	Not applicable.
Vapour pressure at 50 °C	:	No data available
Critical pressure	:	3390 kPa
Relative vapour density at 20 °C	:	0.00115 (≥ 21.1)
Relative density	:	No data available
Relative density of saturated gas/air mixture	:	No data available
Density	:	1.16 kg/m³
Relative gas density	:	0.97

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Solubility	:	Water: 20 mg/l
Log Pow	:	Not applicable.
Log Kow	:	Not applicable.
Viscosity, kinematic	:	Not applicable.
Viscosity, dynamic	:	Not applicable.
Viscosity, kinematic (calculated value) (40 °C)	:	No data available
Explosive properties	:	Not applicable.
Oxidizing properties	:	None.
Flammability (solid, gas)	:	Non flammable

9.2. Other information

Gas group	:	Compressed gas
Additional information	:	None

SECTION 10: Stability and reactivity

10.1. Reactivity

Reactivity	:	Under certain conditions, nitrogen can react violently with lithium, neodymium, titanium (above 1472°F/800°C), or magnesium to form nitrides. At high temperature, it can also combine with oxygen and hydrogen.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	May occur.
Conditions to avoid	:	None under recommended storage and handling conditions (see section 7).
Incompatible materials	:	None.
Hazardous decomposition products	:	None.

SECTION 11: Toxicological information

Likely routes of exposure : Inhalation.

11.1. Information on toxicological effects

Acute toxicity (oral)	:	Not classified
Acute toxicity (dermal)	:	Not classified
Acute toxicity (inhalation)	:	Not classified
Skin corrosion/irritation	:	Not classified pH: Not applicable.
Serious eye damage/irritation	:	Not classified pH: Not applicable.
Respiratory or skin sensitization	:	Not classified
Germ cell mutagenicity	:	Not classified
Carcinogenicity	:	Not classified
Reproductive toxicity	:	Not classified
Specific target organ toxicity (single exposure)	:	Not classified
Specific target organ toxicity (repeated exposure)	:	Not classified
Aspiration hazard	:	Not classified

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SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : No ecological damage caused by this product.

12.2. Persistence and degradability

Nitrogen (7727-37-9)	
Persistence and degradability	No ecological damage caused by this product.

12.3. Bioaccumulative potential

Nitrogen (7727-37-9)	
Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.

12.4. Mobility in soil

Nitrogen (7727-37-9)	
Mobility in soil	No data available.
Log Pow	Not applicable.
Log Kow	Not applicable.
Ecology - soil	No ecological damage caused by this product.

12.5. Other adverse effects

Effect on the ozone layer : None

Effect on global warming : None

SECTION 13: Disposal considerations

13.1. Disposal methods

Waste disposal recommendations : Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

SECTION 14: Transport information

14.1. Basic shipping description

In accordance with TDG

TDG

UN-No. (TDG) : UN1066

TDG Primary Hazard Classes : 2.2 - Class 2.2 - Non-Flammable, Non-Toxic Gas.

Proper shipping name : NITROGEN, COMPRESSED

Explosive Limit and Limited Quantity Index : 0.125 L

Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index : 75 L

14.3. Air and sea transport

IMDG

UN-No. (IMDG) : 1066

Proper Shipping Name (IMDG) : NITROGEN, COMPRESSED

Class (IMDG) : 2 - Gases

MFAG-No : 121

IATA

UN-No. (IATA) : 1066

Proper Shipping Name (IATA) : Nitrogen, compressed

Class (IATA) : 2

SECTION 15: Regulatory information

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Nitrogen

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according to the Hazardous Products Regulation (February 11, 2015)

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15.1. National regulations

Nitrogen (7727-37-9)
Listed on the Canadian DSL (Domestic Substances List)

15.2. International regulations

Nitrogen (7727-37-9)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on INSQ (Mexican national Inventory of Chemical Substances)

SECTION 16: Other information

Date of issue : 15/10/1979

Revision date : 03/08/2016

Supersedes : 15/10/2013

Indication of changes:

Training advice : The hazard of asphyxiation is often overlooked and must be stressed during operator training.

Other information : Praxair asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information

The opinions expressed herein are those of qualified experts within Praxair Canada Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair Canada Inc, it is the user's obligation to determine the conditions of safe use of the product. Praxair Canada Inc, SDSs are furnished on sale or delivery by Praxair Canada Inc, or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your Praxair sales representative, local distributor, or supplier, or download from www.praxair.ca. If you have questions regarding Praxair SDSs, would like the document number and date of the latest SDS, or would like the names of the Praxair suppliers in your area, phone or write Praxair Canada Inc, (Phone: 1-888-257-5149; Address: Praxair Canada Inc, 1 City Centre Drive, Suite 1200, Mississauga, Ontario, L5B 1M2).

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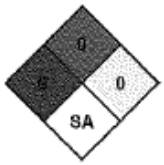
NFPA health hazard : 0 - Exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.

NFPA specific hazard : SA - This denotes gases which are simple asphyxiants.



HMIS III Rating

Health : 0 Minimal Hazard - No significant risk to health

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 3 Serious Hazard - Materials that may form explosive mixtures with water and are capable of detonation or explosive reaction in the presence of a strong initiating source. Materials may polymerize, decompose, self-react, or undergo other chemical change at normal temperature and pressure with moderate risk of explosion

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SDS Canada (GHS) - Praxair

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

16.1.6 Natural Gas

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SAFETY DATA SHEET

Natural Gas (Sweet)
Date of Preparation: December 12, 2017

Section 1: IDENTIFICATION

Product Name:	Natural Gas (Sweet)
Synonyms:	Marsh Gas; Methane (CH4); Fuel Gas.
Product Use:	Fuel Gas.
Restrictions on Use:	Not available.
Manufacturer/Supplier:	TransCanada Pipelines Limited 450 – First Street S.W. P.O. Box 1000, Station M Calgary, Alberta, CANADA, T2P 4K6
Emergency Phone:	Canada: 1-888-982-7222 US: 1-800-447-8066 Portland Natural Gas: 1-800-830-9865 Columbia Gas Transmission: 1-800-835-7191
Date of Preparation of SDS:	December 12, 2017

Section 2: HAZARD(S) IDENTIFICATION

GHS INFORMATION

Classification: Flammable Gases, Category 1
Gases Under Pressure - Compressed Gas
Simple Asphyxiant, Category 1

LABEL ELEMENTS

Hazard Pictogram(s):

Signal Word: Danger

Hazard Statements: Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary Statements

Prevention: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
In case of leakage, eliminate all ignition sources.

Storage: Store in a well-ventilated place.
Protect from sunlight.

Disposal: Not applicable.

Hazards Not Otherwise Classified: Not applicable.

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Natural Gas (Sweet)
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Ingredients with Unknown Toxicity: None.

This material is considered hazardous by the OSHA Hazard Communication Standard, (29 CFR 1910.1200).
This material is considered hazardous by the Hazardous Products Regulations.

Section 3: COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient(s)	Common name / Synonyms	CAS No.	% vol./vol.
Natural gas	Not available.	8006-14-2	100
Methane	Not available.	74-82-8	90 - 99
Ethane	Not available.	74-84-0	0 - 6
Propane	Not available.	74-98-6	0 - 3
Butane	Not available.	106-97-8	0 - 3
Propane, 2-methyl-	Isobutane	75-28-5	0 - 3
Pentane	Not available.	109-66-0	0 - 3
Butane, 2-methyl-	Isopentane	78-78-4	0 - 3
Nitrogen	Not available.	7727-37-9	0 - 3
Carbon dioxide	Not available.	124-38-9	0 - 3
Helium	Not available.	7440-59-7	0 - 3

Section 4: FIRST-AID MEASURES

Inhalation:

If inhaled: Call a poison center or doctor if you feel unwell.

Acute and delayed symptoms and effects: May displace oxygen and cause rapid suffocation. Central nervous system depression can occur if product is present in concentrations that will reduce the oxygen content of air below 18 % (vol). Symptoms may include headache, lightheadedness, drowsiness, disorientation, vomiting and seizures. Unconsciousness and death may occur with severe oxygen deprivation. May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Eye Contact:

If in eyes: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.

Acute and delayed symptoms and effects: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. The pain after contact with liquid can quickly subside. Permanent eye damage or blindness could result.

Skin Contact:

Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. If on skin: Wash with plenty of water. Get immediate medical advice/attention. Thaw frosted parts with lukewarm water. Do not rub affected area. Remove non-adhering contaminated clothing. Do not remove adherent material or clothing.

Acute and delayed symptoms and effects: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after

	contact with liquid can quickly subside.
Ingestion:	Not a normal route of exposure.
General Advice:	**Acute and delayed symptoms and effects:** Not a normal route of exposure. In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).
Note to Physicians:	Symptoms may not appear immediately.

Section 5: FIRE-FIGHTING MEASURES

FLAMMABILITY AND EXPLOSION INFORMATION

Extremely flammable gas. Contains gas under pressure; may explode if heated. Will be easily ignited by heat, sparks or flames. Will form explosive mixtures with air. Vapors from liquefied gas are initially heavier than air and spread along ground. Methane is lighter than air and will rise. Vapors may travel to source of ignition and flash back. Cylinders exposed to fire may vent and release flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket. DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.

If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

Fire involving Tanks: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Sensitivity to Mechanical Impact:	This material is not sensitive to mechanical impact.
Sensitivity to Static Discharge:	This material is sensitive to static discharge.

MEANS OF EXTINCTION

Suitable Extinguishing Media:	Small Fire: Dry chemical or CO2. Large Fire: Water spray or fog. Move containers from fire area if you can do it without risk.
Unsuitable Extinguishing Media:	Not available.
Products of Combustion:	Oxides of carbon.
Protection of Firefighters:	Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leakage, eliminate all ignition sources. Vapors may cause dizziness or asphyxiation without warning. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite. Fire may produce irritating and/or toxic gases. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. Always wear thermal protective clothing when handling refrigerated/cryogenic liquids.

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SAFETY DATA SHEET

Natural Gas (Sweet)
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Section 6: ACCIDENTAL RELEASE MEASURES

Emergency Procedures:	As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Keep out of low areas. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded.
Personal Precautions:	Do not touch or walk through spilled material. Use personal protection recommended in Section 8.
Environmental Precautions:	Not normally required.
Methods for Containment:	Stop leak if you can do it without risk. If possible, turn leaking containers so that gas escapes rather than liquid. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. Do not direct water at spill or source of leak.
Methods for Clean-Up:	Prevent spreading of vapors through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed.
Other Information:	See Section 13 for disposal considerations.

Section 7: HANDLING AND STORAGE

Handling:
Avoid breathing gas. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not pierce or burn, even after use. See Section 8 for information on Personal Protective Equipment.

Storage:
Store in a well-ventilated place. Protect from sunlight. Store away from incompatible materials. See Section 10 for information on Incompatible Materials. Keep out of the reach of children.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines
Component

Natural gas [CAS No. 8006-14-2]
ACGIH: Simple asphyxiant; Explosion hazard
OSHA: No PEL established.

Methane [CAS No. 74-82-8]
ACGIH: Simple asphyxiant; Explosion hazard
OSHA: No PEL established.

Ethane [CAS No. 74-84-0]
ACGIH: Simple asphyxiant; Explosion hazard
OSHA: No PEL established.

Propane [CAS No. 74-98-6]
ACGIH: Simple asphyxiant; Explosion hazard
OSHA: 1000 ppm (TWA), 1800 mg/m³ (TWA);

Butane [CAS No. 106-97-8]
ACGIH: 1000 ppm (STEL); Explosion hazard (2012)
OSHA: 800 ppm (TWA) [Vacated];

Isobutane [CAS No. 75-28-5]
ACGIH: 1000 ppm (STEL); Explosion hazard (2012)
OSHA: No PEL established.

Pentane [CAS No. 109-66-0]
ACGIH: 1000 ppm (TWA); (2013)
OSHA: 1000 ppm (TWA), 2950 mg/m³ (TWA);
600 ppm (TWA); 750 ppm (STEL) [Vacated];

Isopentane [CAS No. 78-78-4]
ACGIH: 1000 ppm (TWA); (2013)
OSHA: No PEL established.

Nitrogen [CAS No. 7727-37-9]
ACGIH: Simple asphyxiant
OSHA: No PEL established.

Carbon dioxide [CAS No. 124-38-9]
ACGIH: 5000 ppm (TWA); 30000 ppm (STEL); (1983)
OSHA: 5000 ppm (TWA), 9000 mg/m³ (TWA);

Helium [CAS No. 7440-59-7]
ACGIH: Simple asphyxiant
OSHA: No PEL established.

PEL: Permissible Exposure Limit
TLV: Threshold Limit Value
TWA: Time-Weighted Average
STEL: Short-Term Exposure Limit

Engineering Controls: Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapour, gas, etc.) below recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection: Wear safety glasses. Use equipment for eye protection that meets the standards referenced by CSA Standard CAN/CSA-Z94.3-92 and OSHA regulations in 29 CFR

	1910.133 for Personal Protective Equipment.
Hand Protection:	Wear protective gloves. Wear cold insulating gloves. Consult manufacturer specifications for further information.
Skin and Body Protection:	Wear protective clothing. Flame resistant clothing that meets the NFPA 2112 and CAN/CGSB 155.20 standards is recommended in areas where material is stored or handled.
Respiratory Protection:	If engineering controls and ventilation are not sufficient to control exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator that meets the requirements of CSA Standard CAN/CSA-Z94.4-11, or self-contained breathing apparatus must be used. Supplied air breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.
General Hygiene Considerations:	Handle according to established industrial hygiene and safety practices. Consult a competent industrial hygienist to determine hazard potential and/or the PPE manufacturers to ensure adequate protection.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Colourless gas.
Colour:	Colourless.
Odour:	Slight hydrocarbon odour not detectable by all people.
Odour Threshold:	Not available.
Physical State:	Gas.
pH:	Not available.
Melting Point / Freezing Point:	-187 to -182 °C (-304.6 to -295.6 °F)
Initial Boiling Point:	Not available.
Boiling Range:	-162 °C (-259.6 °F)
Flash Point:	Not available.
Evaporation Rate:	> 1 (n-BuAc = 1) at 20 °C (68 °F)
Flammability (solid, gas):	Extremely flammable gas.
Lower Flammability Limit:	5 % (Methane)
Upper Flammability Limit:	15 % (Methane)
Vapor Pressure:	> 1000 mmHg at 20 °C (68 °F)
Vapor Density:	0.6 (Air = 1) at 20 °C (68 °F) (Methane)
Relative Density:	Not available.

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Solubilities:	Negligible solubility in water.
Partition Coefficient: n-Octanol/Water:	Not available.
Auto-ignition Temperature:	537 °C (998.6 °F)
Decomposition Temperature:	Not available.
Viscosity:	Not available.
Percent Volatile, wt. %:	100
VOC content, wt. %:	Not available.
Density:	Not available.
Coefficient of Water/Oil Distribution:	Not available.

Section 10: STABILITY AND REACTIVITY

Reactivity:	Contact with incompatible materials. Sources of ignition. Exposure to heat.
Chemical Stability:	Stable under normal storage conditions.
Possibility of Hazardous Reactions:	None known.
Conditions to Avoid:	Contact with incompatible materials. Sources of ignition. Exposure to heat.
Incompatible Materials:	Strong oxidizers.
Hazardous Decomposition Products:	Not available.

Section 11: TOXICOLOGICAL INFORMATION

EFFECTS OF ACUTE EXPOSURE

Product Toxicity

Oral:	Not available.
Dermal:	Not available.
Inhalation:	Not available.

Component Toxicity

Component	CAS No.	LD_{50} oral	LD_{50} dermal	LC_{50}
Natural gas	8006-14-2	Not available.	Not available.	Not available.
Methane	74-82-8	Not available.	Not available.	Not available.
Ethane	74-84-0	Not available.	Not available.	Not available.
Propane	74-98-6	Not available.	Not available.	Not available.
Butane	106-97-8	Not available.	Not available.	658000 mg/m³ (rat); 4H
Isobutane	75-28-5	Not available.	Not available.	570000 ppm (rat); 15M
Pentane	109-66-0	400 mg/kg (rat)	Not available.	364000 mg/m³ (rat); 4H
Isopentane	78-78-4	Not available.	Not available.	Not available.
Nitrogen	7727-37-9	Not available.	Not available.	Not available.

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Carbon dioxide	124-38-9	Not available.	Not available.	Not available.
Helium	7440-59-7	Not available.	Not available.	Not available.

Likely Routes of Exposure: Eye contact. Skin contact. Inhalation.

Target Organs: Skin. Eyes. Respiratory system. Cardiovascular system. Bone marrow. Liver. Kidneys. Central nervous system.

Symptoms (including delayed and immediate effects)

Inhalation: May displace oxygen and cause rapid suffocation. Central nervous system depression can occur if product is present in concentrations that will reduce the oxygen content of air below 18 % (vol). Symptoms may include headache, lightheadedness, drowsiness, disorientation, vomiting and seizures. Unconsciousness and death may occur with severe oxygen deprivation. May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Eye: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. The pain after contact with liquid can quickly subside. Permanent eye damage or blindness could result.

Skin: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside.

Ingestion: Not a normal route of exposure.

Skin Sensitization: Not available.

Respiratory Sensitization: Not available.

Medical Conditions Aggravated By Exposure: Not available.

EFFECTS OF CHRONIC EXPOSURE (from short and long-term exposure)

Target Organs: Skin. Eyes. Respiratory system. Cardiovascular system. Bone marrow. Liver. Kidneys. Central nervous system.

Chronic Effects: Prolonged exposure to Natural gas can lead to hypoxia, bluish colouration to the skin, numbness, damage to the nervous system, heart sensitization, reduced consciousness and death. Prolonged or repeated inhalation of Isopentane may cause dizziness, weakness, weight loss, anemia, nervousness, pains in the limbs and peripheral numbness.

Carcinogenicity: This product does not contain any carcinogens or potential carcinogens as listed by ACGIH, IARC, OSHA, or NTP.

Mutagenicity: Not available.

Reproductive Effects: Not available.

Developmental Effects Teratogenicity: Not available.

Embryotoxicity: Not available.

Toxicologically Synergistic Materials: Not available.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity:	Not available.
Persistence / Degradability:	Not available.
Bioaccumulation / Accumulation:	Not available.
Mobility in Environment:	Not available.
Other Adverse Effects:	Not available.

Section 13: DISPOSAL CONSIDERATIONS

Disposal Instructions: Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

Section 14: TRANSPORT INFORMATION

U.S. Department of Transportation (DOT)

Proper Shipping Name:	UN1971, NATURAL GAS, COMPRESSED, 2.1
Class:	2.1
UN Number:	UN1971
Packing Group:	Not applicable.
Label Code:	

Canada Transportation of Dangerous Goods (TDG)

Proper Shipping Name:	UN1971, NATURAL GAS, COMPRESSED, 2.1
Class:	2.1
UN Number:	UN1971
Packing Group:	Not applicable.
Label Code:	

Section 15: REGULATORY INFORMATION

Chemical Inventories

US (TSCA)
The components of this product are in compliance with the chemical notification requirements of TSCA.

TransCanada
In business to deliver

Natural Gas (Sweet)
SAFETY DATA SHEET
Date of Preparation: December 12, 2017

Canada (DSL)
The components of this product are in compliance with the chemical notification requirements of the NSN Regulations under CEPA, 1999.

Federal Regulations

United States
This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SARA Title III

Component	Section 302 (EHS) TPQ (lbs.)	Section 304 EHS RQ (lbs.)	CERCLA RQ (lbs.)	Section 313	RCRA CODE	CAA 112(r) TQ (lbs.)
Methane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Ethane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Propane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Butane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Isobutane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Pentane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000
Isopentane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	10000

State Regulations
Massachusetts
US Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Component	CAS No.	RTK List
Natural gas	8006-14-2	Listed.
Methane	74-82-8	Listed.
Ethane	74-84-0	Listed.
Propane	74-98-6	Listed.
Butane	106-97-8	Listed.
Isobutane	75-28-5	Listed.
Pentane	109-66-0	Listed.
Isopentane	78-78-4	Listed.
Nitrogen	7727-37-9	Listed.
Carbon dioxide	124-38-9	Listed.
Helium	7440-59-7	Listed.

Note: E = Extraordinarily Hazardous Substance

New Jersey
US New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Component	CAS No.	RTK List
Methane	74-82-8	SHHS
Ethane	74-84-0	SHHS
Propane	74-98-6	SHHS
Butane	106-97-8	SHHS
Isobutane	75-28-5	SHHS

Pentane	109-66-0	SHHS
Isopentane	78-78-4	SHHS
Nitrogen	7727-37-9	Listed.
Carbon dioxide	124-38-9	Listed.
Helium	7440-59-7	Listed.

Note: SHHS = Special Health Hazard Substance

Pennsylvania
US Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Component	**CAS No.**	**RTK List**
Natural gas	8006-14-2	Listed.
Methane	74-82-8	Listed.
Ethane	74-84-0	Listed.
Propane	74-98-6	Listed.
Butane	106-97-8	Listed.
Isobutane	75-28-5	Listed.
Pentane	109-66-0	Listed.
Isopentane	78-78-4	Listed.
Nitrogen	7727-37-9	Listed.
Carbon dioxide	124-38-9	Listed.
Helium	7440-59-7	Listed.

California
California Prop 65: This product does not contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Section 16: OTHER INFORMATION

Disclaimer:
The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for their own particular use.

Date of Preparation of SDS: December 12, 2017

Version: 2.0

GHS SDS Prepared by: **Deerfoot Consulting Inc.**
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