SUPPLEMENTAL PLAN B:
TUMBLER RIDGE GAS PLANT

Revised:
September 2022

PACIFIC NORTHERN GAS

PNG Emergency 24-hour Number:
1-800-663-1173
Oil & Gas Commission (OGC) Reporting Number:
1-800-663-3456

Pacific Northern Gas Ltd.

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Vancouver, BC V6C 3K4

Phone: 604-691-5680

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DOCUMENT MANAGEMENT

The Manager, Environment, Health & Safety (EH&S) is responsible for the development and maintenance of *Pacific Northern Gas Tumbler Ridge Gas Plant Supplemental Plan*. Responsibilities include:

- Developing the plans and managing any future revisions
- Ensuring the systems and response structures are in place, and are able to meet the requirements set out in the plan
- Ensuring the plan is updated as soon as a deficiency in the plan that risks the safety of emergency response staff, employees, or the public arises
- Ensuring an annual review of the plan is conducted for completeness

Plan Revisions

Initiating Revisions

All requests for change must be made through the Manager, EH&S using the *Revision Request Form*.

Distribution of Revisions

Revised plans and/or sections are distributed, with a brief description of the changes by the Manager, EH&S. All revisions should be documented in the *Revision Log*.

Revisions After Exercises or Incidents

In the event Pacific Northern Gas (PNG) conducts an exercise or training session, or experiences an incident, the effectiveness of the plan will be evaluated and updated thereafter as necessary.

Changes in Operating Conditions

If new or different operating condition(s) would substantially affect the implementation of the ERP, PNG will modify the plan to address such changes.

Revision Request Form

A Revision Request Form allows requests for changes to be made to the PNG Emergency Response Plan (ERP). All requests for change must be coordinated through the PNG Manager, EH&S using the Revision Request Form.

REVISION REQUEST FORM		
Requested By:	**Date:**	
Department/Agency:		
Email:	**Phone Number:**	
Plan Name:	**Revision Type:** ❑ Addition ❑ Deletion ❑ Correction	
Section:	**Page Number:**	
Description of Revision (attach separate sheet if necessary):		
Name of Requestor:		
Send to: Manager, EH&S Pacific Northern Gas 888 Dunsmuir Street Suite #750 Vancouver, BC V6C 3K4	**OR**	ehs@png.ca Fax: 604-697-6210
This section to be completed by Manager, EH&S.		
Date Received:	**Date Reviewed:**	
Issued as Revision: ❑ Yes ❑ No		
If revisions not accepted, explain reason:		

Revision Log

The Revision Log ensures all changes made to the PNG ERP are accounted for and easily referenced. The Revision Log is managed by the PNG Manager, EH&S. All fields in the Revision Log must be completed.

REVISION LOG				
Annual Update & Submission Due: September 30				
Revision No.	**Date**	**Section No.**	**Page No.**	**Summary of Revisions**
001	Nov. 2010	all	all	
002	July 2013	all	all	
003	March 2015	select	select	
004	April 2015	all	all	
005	May 2015	all	all	
006	June 2016	all	all	
007	July 2017	all	all	
100	11 September 2018	all	all	New format with updates to all sections
101	10 September 2019 (Annual Update)	Document Management	Select	Updated Director, Operations and Customer Service title throughout
		all	Select	Minor updates to flow, grammar, and accuracy
		4	Select	Restructured
		5	Select	Restructured
		7	7-1	Added procedure table of contents
		7.6.1	7-13	Enhanced Speaking Notes: Instructions for Evacuation
101	10 September 2019 (Annual Update)	7.10	7-17	Added Environmental Spill or Release Procedures
		7.12	7-20, 7-21, 7-22	Enhanced Wildland Fire Advance Planning and Response Procedure
		10	Select	Updated contact lists
102	17 September 2020 (Annual Update)	Document Management	Select	Updated Manager, EH&S title throughout
		Document Management	Select	Updated Vice President, Operations and Engineering title throughout

REVISION LOG				
Annual Update & Submission Due: September 30				
Revision No.	**Date**	**Section No.**	**Page No.**	**Summary of Revisions**
		Disclaimer page	Select	Updated address
		All Images	Select	Updated all images, graphs with new PNG branding
		All	Select	Removed and replaced AltaGas with TriSummit Utilities where appropriate
		Revision Request Form	Page ii	Updates to addresses and general formatting
		6.3	6-2, 6-3	Updated titles and clarified process
		6.3	6-3	Update chart with new position titles
		7.12	7-20, 7-21, 7-22	Updated procedure with minor content additions
		8.3	8-4	Updated section with correct membership partners, position titles and formatting
		10.1	10-1, 10-2, 10-3, 10-4	Updated with new contact information
103	17 September 2021	Distribution List	viii – ix	Updated Distribution List
		All	Select	Added in Director, Asset Management and Projects as Designate for Director, Operations and Customer Service.
		6.3	6-2	Clarified notification process
			6-3	Updated flow chart
		6.4.3	6-8	Removed reference to drilling kicks
		10.0	10-1, 10-2, 10-3, 10-4	Updated Contact Information

REVISION LOG				
Annual Update & Submission Due: September 30				
Revision No.	**Date**	**Section No.**	**Page No.**	**Summary of Revisions**
104	26 September 2022	Revision Log	ix	Updated Revision Log
		All	All	Update Pages to all sections
		10	Select	Updated contact lists
		11	Select	EPZ map

Distribution List

Title	Location	Copy No.
Fort St. John EOC	Fort St John, BC	1
Terrace EOC	Terrace, BC	2
Dawson Creek EOC	Dawson Creek, BC	3
Vancouver Office	Vancouver, BC	4
Summit Lake Comp Station Op/Technician	Summit Lake, BC	5
Tumbler Ridge Gas Plant	Tumbler Ridge, BC	6
Tumbler Ridge Office	Tumbler Ridge, BC	7
Manager, Operations NE	Dawson Creek, BC	8
Manager Construction Maintenance NE	Fort St John, BC	9
Coordinator, Lands - Rights & Third Party Management	Fort St John, BC	10
Director, Asset Management and Project Delivery	Terrace, BC	11
Director, Operations and Customer Service	Terrace, BC	12
Manager Customer Service	Smithers, BC	13
Maintenance Coordinator	Terrace, BC	14
Manager Customer Care	Terrace, BC	15
Coordinator, Lands – Permitting & Indigenous Relations	Smithers, BC	16
Service Group Leader – Dawson Creek	Dawson Creek, BC	17
Service Group Leader – Terrace	Terrace, BC	18
Service Group Leader – Prince Rupert	Prince Rupert, BC	19
Service Group Leader – Kitimat	Kitimat, BC	20
Service Group Leader – Smithers	Smithers, BC	21
Service Group Leader – Burns Lake	Burns Lake, BC	22
Service Group Leader – Vanderhoof	Vanderhoof, BC	23
Service Group Leader – Fort St John	Fort St John, BC	24
Senior Plant Operator – Tumbler Ridge	Tumbler Ridge, BC	25
Plant Operator – Tumbler Ridge	Tumbler Ridge, BC	26
President	Vancouver, BC	27
VP Operations & Engineering	Vancouver, BC	28
VP Regulatory Affairs & Gas Supply	Vancouver, BC	29
VP Finance	Vancouver, BC	30
Manager, Environment, Health & Safety	Vancouver, BC	31

Title	Location	Copy No.
Director, Business Development & Stakeholder Relations	Vancouver, BC	32
Manager Human Resources	Vancouver, BC	33
Burns Lake Office	Burns Lake, BC	34
Customer Care (Floor)	Terrace, BC	35
Utility Group Leader – Burns Lake	Burns Lake, BC	36
Utility Group Leader – Fort St. John	Fort St John, BC	37
Utility Group Leader – Dawson Creek	Dawson Creek, BC	38
Utility Group Leader – Terrace	Terrace, BC	39
Utility Group Leader – Terrace	Terrace, BC	40
Project Engineer – Terrace	Terrace, BC	41
Senior Project Manager	Terrace, BC	42
Senior Measurement Tech – Terrace	Terrace, BC	43
Manager Operations Administration	Terrace, BC	44
Project Engineer – Terrace	Terrace, BC	45
Project Engineer – Fort St. John	Fort St John, BC	46
Manager Construction Maintenance	Smithers, BC	47
Procurement/Warehouse Leader – Terrace	Terrace, BC	48
Asset Integrity Engineer	Vancouver, BC	49
Manager, Engineering and Projects	Terrace, BC	50
Senior Measurement Tech – Fort St John	Fort St John, BC	51
Construction Manager	Terrace, BC	52
Health, Safety & Environmental Field Lead	Terrace, BC	53
Environmental Lead	Terrace, BC	54
External Distribution	**Location**	**Copy No.**
ATCO Control Centre	Edmonton, AB	101
ATCO Control Centre	Edmonton, AB	102

1 INTRODUCTION

The PNG Tumbler Ridge Gas Plant is situated in the Peace River District, approximately 45 km southeast of the town of Tumbler Ridge via Highway 52. Located on Crown land, the plant receives sour gas under the Canadian Natural Resources LTD (CNRL) gas supply contract, sweetens it, then supplies the natural gas to residential and commercial customers in Tumbler Ridge. The CNRL gas supply contract allows the hydrogen sulphide (H_2S) content in the gas delivered to the plant inlet to be as high as 2.2%.

PNG operates its gas distribution facilities in the Tumbler Ridge area pursuant to a certificate of public convenience and necessity issued by the British Columbia Utilities Commission.

The plant is operated by Pacific Northern Gas (PNG) Ltd., a wholly-owned subsidiary of TriSummit Utilities. PNG does not own or operate the gathering system that supplies gas to this facility.

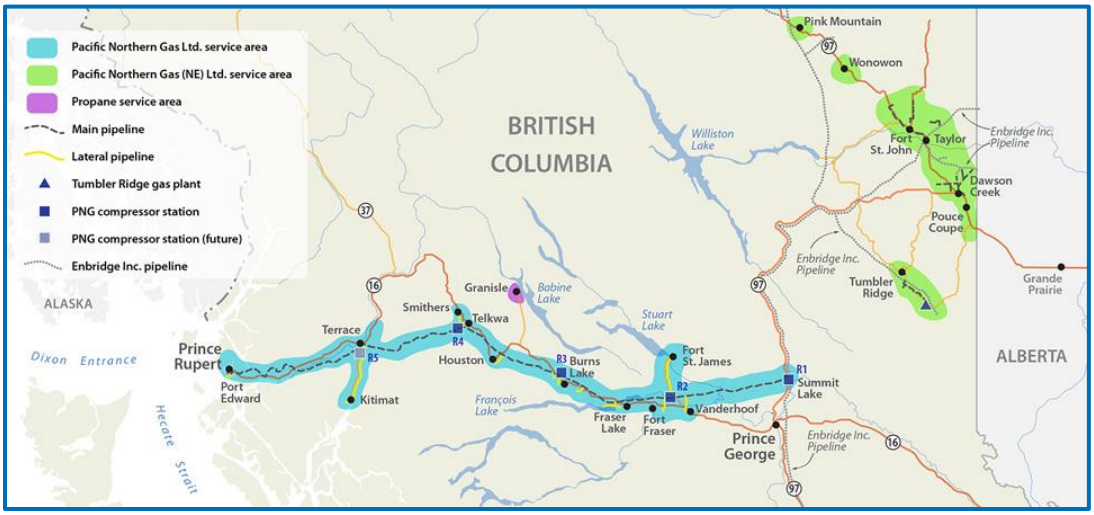


Figure 1 - PNG Service Areas Map

1.1 Scope

This supplemental plan encompasses operations and assets regulated by the BC Oil and Gas Commission (OGC), specifically the Tumbler Ridge Gas Plant. When an incident occurs involving the plant, this supplemental plan should be activated and appropriate reporting to designated authorities will be initiated.

1.2 Audience

This document is intended for all PNG personnel who have received Incident Command System (ICS) training and incident response training. This plan has been made available to first responders, responding and supporting agencies and communities, local and regional governments, and First Nation communities, as well as the public, for their reference.

1.3 How to Use this Plan

The *PNG Tumbler Ridge Gas Plant Supplemental Plan* is an operational guide, designed to be used by staff, in conjunction with the *Pacific Northern Gas (PNG) Core Emergency Response Plan (ERP)* to effectively prepare for, respond to, and recover from emergencies and disasters.

This supplemental plan provides site-specific information as well as hazard and response procedures related to Tumbler Ridge Gas Plant and its infrastructure.

Reference the Core ERP for the processes, policies, and procedures associated with activation of the ERP, the ICS structure, and the establishment of an Emergency Operations Centre (EOC). Additionally, the ERP explains protocols and processes for incident response, including notifications and communications.

The supplemental plan is divided into two sections: non-confidential and confidential. The confidential section captures sensitive company information and will be made available, as needed, to agency representatives associated with the response, at the time of an incident.

2 SITE LOCATION AND FACILITY DESIGN

LOCATION: b-074-G/093-I-15

Facility ID Number: 00000303

The Tumbler Ridge Gas Plant receives sour gas from the CNRL system at 74-G/93-I-15. The CNRL gas supply contract allows the H_2S content in the gas delivered to the plant inlet to be as high as 2.2%. The last segment of 4-inch pipeline connected to the PNG (NE) facility runs from CNRL's Meter Station to Enbridge's Pigging Station (approximately 120 m).

The Tumbler Ridge Gas Plant can process approximately 250 e^3m^3/day of sour gas.

Facility Design and Operating Parameters

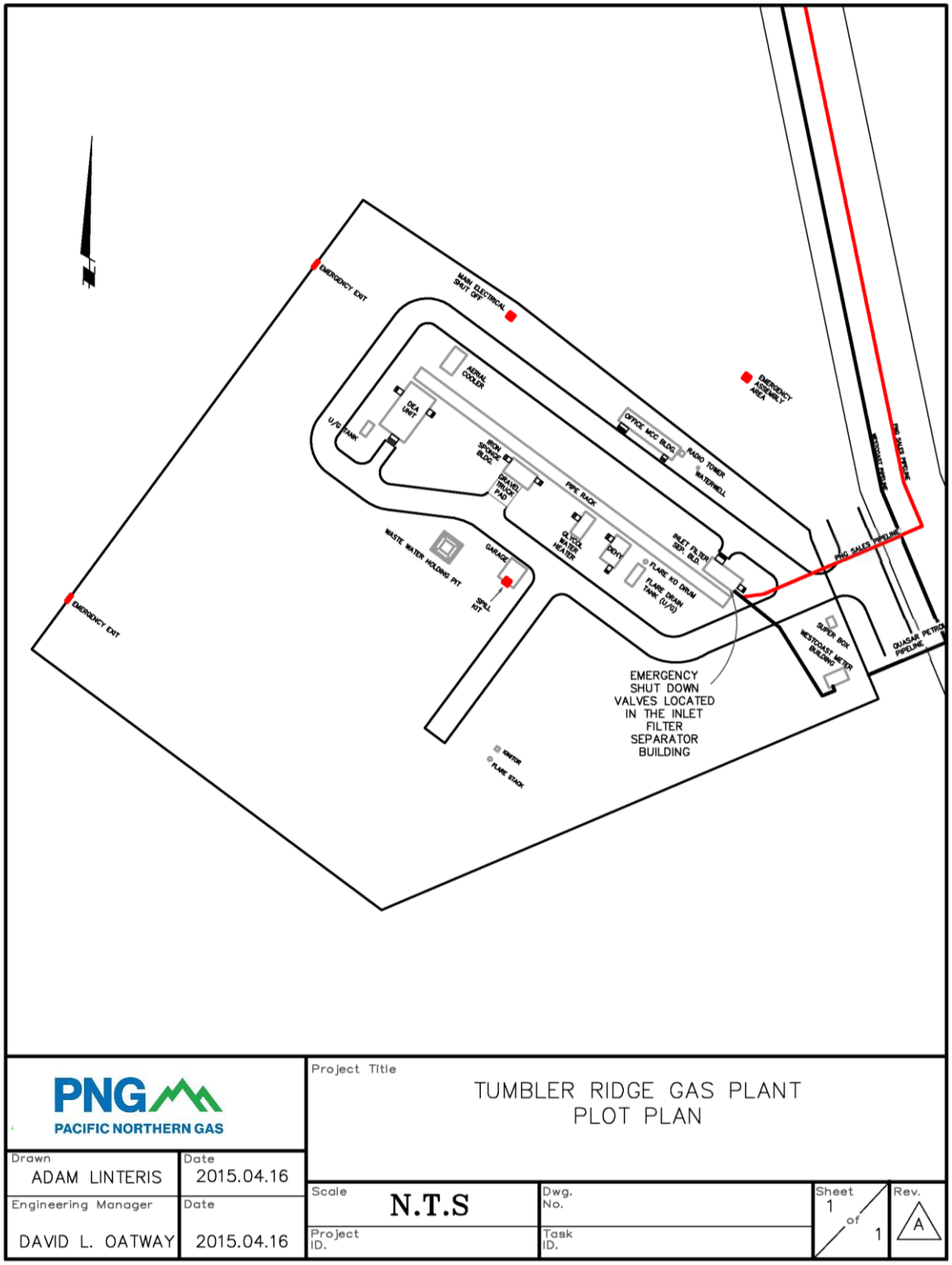
Inlet Pipeline OD:	114.3	mm
Inlet Pipeline ID:	102.3	mm
Maximum Operating Pressure (MOP):	7000	kPa
Temperature:	0	^{0}C
Super-compressibility Factor:	0.8184	
Maximum H_2S Concentration:	0 to 2.2	%
Normal H_2S Concentration:	65	ppm
H_2S Release Rate:	0.05	m^3/sec
H_2S Release Volume:	16.33	m^3

Products:

- Natural Gas (Methane) (CH_4)
- Hydrogen Sulphide (H_2S)
- Sulphur Dioxide (SO_2)
- OASE purple enriched
- Mercaptan (Methanethiol) (CH_4S)

PROCESSES AT TUMBLER RIDGE GAS PLANT					
Sour facility	✓	Steam generation	✓	Waste H_2O tank	✓
Inlet separation	✓	Acid gas injection		Methanol tank	
Dehydration	✓	Acid gas flare	✓	Amine tank	
Amine sweetening	✓	Vent stack		Condensate tank	
Compression		Iron sponge	✓	U/G flare knockout	✓
Refrigeration		Mercaptan system	✓	Sales gas pipeline	✓

2.1 Site Layout



2.2 Driving directions to Gas Plant

From Tumbler Ridge

Travel approximately 44 km southeast on Highway 52. There are signs marking a turnoff on a gravel road (North Grizzly Road). Follow the gravel road for about 2 km to reach CNRL's office and camp. Turn right just before the office and camp. Continue driving until you reach a fork in the road; stay right. The Tumbler Ridge Gas Plant is about 300 m past the fork in the road.

From Dawson Creek

Travel west on Highway 97 for 18 km, then turn south on Highway 52 for 94 km to Tumbler Ridge. Follow directions (above) from Tumbler Ridge.

From Fort St. John

Travel southeast towards Dawson Creek on Highway 97 for 51 km. From Dawson Creek, continue west on Highway 97 for 18 km, then turn south on Highway 52 for 94 km to Tumbler Ridge. Follow directions (above) from Tumbler Ridge.

From Grande Prairie

Travel northwest on Alberta Highway 43, which becomes British Columbia Highway 2. Just inside the British Columbia boundary, turn south on Highway 52 and drive 138 km. There are signs marking a turnoff on a gravel road (North Grizzly Road). Follow the gravel road for about 2 km to reach CNRL's office and camp. Turn right just before the office and camp. Continue driving until you reach a fork in the road; stay right. The Tumbler Ridge Gas Plant is about 300 m past the fork in the road.

3 HAZARDS AND RISKS

The types of hazards in which this supplemental plan may be activated include:

- Natural disasters
- Human-caused (accidental or intentional) incidents
- Information technology incidents

Hazards in the vicinity of the Tumbler Ridge Gas Plant include:

- Wildfire
- Incident at CNRL Gas Plant
- Malicious intent
- Technical and/or structural failures resulting in the release of sour gas or sweet gas

PNG identifies hazards and manages associated risk within the scope of the *Transmission Integrity Management Plan*. During an incident, regardless of assumed trigger(s), a Hazard Planning Zone (HPZ) needs to be reviewed and confirmed.

4 HAZARD PLANNING ZONE

The **Hazard Planning Zone (HPZ)** is the geographical area within which persons, property, or the environment may be affected by an incident based on the hazards associated with the product being released. The HPZ is used for planning purposes and as the basis, in the event of an incident, to identify where immediate response actions are required. The Incident Commander and EOC Director will work together to identify and determine the HPZ of the incident.

The HPZ is dictated by the type of product (gas) being transported, the size of the pipe impacted, and the quantity and pressure of the gas.

During an incident, the HPZ is the minimal area that needs to be considered when responding to an incident.

The **Emergency Planning Zone (EPZ)** is the geographical area that encompasses all the hazard planning zones (HPZ) identified for an incident. If only one HPZ exists for the plant or the incident, then the EPZ will have the same boundary as the HPZ. For facilities with the potential for the release of multiple products, and thus multiple HPZs, the EPZ will share a boundary with the largest HPZ identified.

Any infrastructure that contains multiple hazardous substances, such as the Tumbler Ridge Gas Plant that contains methane, H_2S, and other products, could involve multiple HPZs (one per substance). The largest HPZ identified would be used to define the EPZ boundary. The pre-defined Hazard Planning Distance used when planning for incidents involving the Tumbler Ridge Gas Plant is **200 m.**

4.1 Determining the HPZ

The Incident-Specific HPZ must be evaluated and confirmed. The procedure to determine the HPZ can be found in *Section 7.1 Defining the Incident-Specific HPZ*. Additional information can be found in the *Core Emergency Response Plan, Section 3.2.5 Hazard Planning Zone Determination.*

The HPZ may be adjusted once incident-specific data and influencing factors have been collected, collated, and analyzed.

Emergency Services should respond with the CANUTEC guidelines in mind until the HPZ can be identified by PNG and reviewed and confirmed by emergency services and PNG (Unified Command), when established.

Re-evaluate the HPZ regularly, or upon a change in the circumstances, to expand or contract the zone in consultation with emergency services and the EOC.

4.2 Tumbler Ridge Gas Plant Map

GPS coordinates for the Tumbler Ridge Gas Plant and roadblock locations are available in *Section 11 Maps* (confidential section).

The flare stack is 350 meters from Hwy 52.

5 PUBLIC PROTECTION MEASURES

The safety of responders and the public is always PNG's first priority in any emergency. PNG will work in coordination with first responders to protect people. The extent to which public protection measures will be taken depends on the hazards that are present. There must also be consideration to ensure protection measures are outside of any area that may present a safety concern.

Public protection measures will start immediately surrounding the incident site and then move to those downwind of the incident before expanding to the rest of the HPZ.

5.1 Restricting Access – Land and Air

Immediately upon arrival, cordon off the incident site to ensure the safety of the attending responders and the public. This can be done using cones, flags, sawhorses, or any other equipment available to indicate restricted access.

In addition, roadblocks may need to be established to ensure the safety of the public. PNG personnel will work with emergency services (fire, police) to determine when this is required, and where specific access should be restricted.

It may also be necessary for other transportation routes to be restricted to protect public safety, including airspace. Contact NAV CANADA to issue a Notice to Airmen (NOTAM) to advise pilots of restrictions in the airspace above the incident site or to close the airspace for a certain radius from the release. See *Section 7.4 Notice to Airmen (NOTAM) Request*.

5.2 Notification of Potentially Affected Parties

The Tumbler Ridge Gas Plant is situated on Crown land. No residents, businesses, or public facilities are within the Gas Plant emergency planning zone. Backcountry recreationalists are potentially present in the area.

PNG will notify potentially affected parties that an incident has occurred, to explain the risks, and to provide safety instructions. Potentially affected parties are those who may be in danger because of an incident. Potentially affected parties include the following:

- CNRL Gas Plant neighbours the Tumbler Ridge Gas Plant. CNRL also operates a camp about 600 m from the Tumbler Ridge Gas Plant at a-75-G/93-I-15. The camp can accommodate 14 workers.
- One trapper has been identified as using a trapping area that overlaps with the Tumbler Ridge Gas Plant.

Contact information for Potentially Affected Parties be found in *Section 10.2 Potentially Affected Parties.*

Depending on the type and status of the incident, the area affected, and surrounding conditions, potentially affected parties will be informed to stand by, shelter-in-place, or evacuate. When the area is once again safe for the resumption of normal activities, the parties will be notified.

A copy of the Public Information Package provided to Potentially Affected Parties is available in *Section 10.2.1.*

5.3 Public Evacuation (Support) Procedure

An evacuation will depend on the type of incident, meteorological conditions, ignition sources, and potential exposure of the public.

To ensure public safety, the attending fire department and/or RCMP will decide if an evacuation is necessary. The local authority will be engaged through Unified Command and/or the PNG EOC in conjunction with the Local Authority's own EOC.

The PNG Incident Commander may provide technical advice and recommendations on public safety measures to Emergency Services, including the need to evacuate, and the suggested areas, which would be determined by the HPZ. PNG employees may participate in door-to-door evacuations if imminent danger exists to the public or when requested by the local authority.

If the situation requires immediate public safety measures be taken, defined as those actions that must be taken "now", without any delay, to save lives from extreme risk, the PNG Incident Commander is authorized to begin notifying and evacuating the public without consulting the EOC Director or emergency services. Notifications to emergency services and/or the local authorities of the tactical evacuation will be made by the EOC.

The detailed evacuation procedure can be found in *Section 7.5 Evacuation*. Additional information can be found in the *Core Emergency Response Plan, Section 3.2.6 Public Protection Measures.*

PNG personnel do not have the authority to order residents to evacuate their homes. If a resident chooses not to evacuate, the police should be notified.

5.3.1 Shelter-in-Place

Alternatively, the public may be required to take refuge (shelter) within a building or vehicle in order to minimize risks to their health and safety. This is typically required during sour gas releases.

The decision to issue a shelter-in-place order is made by the attending fire department and/or RCMP. Local authorities have a responsibility to protect lives. The local authority will be engaged through Unified Command and/or the PNG EOC in conjunction with the local authority's own EOC.

The PNG Incident Commander may provide technical advice and recommendations on public safety measures, including the need to shelter-in-place, and the suggested areas (HPZ) that should be sheltered. PNG may participate in the notification of shelter-in-place if imminent danger exists to the public or when requested by emergency services, through phone calls from the Contact Centre and media/social media announcements.

If the situation requires immediate public safety measures be taken, defined as those actions that must be taken "now", without any delay, to save lives from extreme risk, the PNG Incident Commander is authorized to begin notifying the public without consulting the EOC Director. Notification to emergency services and/or the local authority of the tactical declaration of shelter-in-place will be made by the EOC.

PNG personnel do not have the authority to order residents to shelter-in-place. If a resident chooses not to take shelter, the police and fire department should be notified.

The shelter-in-place procedure can be found in *Section 7.6 Shelter-in-Place*. Additional information can be found in the *Core Emergency Response Plan, Section 3.2.6 Public Protection Measures.*

6 INITIAL ACTIONS AND NOTIFICATIONS

The **First on Scene** is responsible for the initial actions until relieved by a more senior or qualified PNG employee, or until support from emergency services or other response agencies arrive at the incident site. A coordinated response will be carried out between PNG, emergency services, and other involved agencies.

6.1 Initial Assessment of Incident

Operations personnel will evaluate all incidents and investigate alarms (where applicable). Many incidents may not be considered emergencies after an investigation is conducted. Upon completion of the incident evaluation, operations personnel will determine the incident level and then implement the appropriate immediate actions.

The severity of the situation defines the level of emergency, the potential hazards to the public and the environment, and the appropriate response.

6.2 Immediate Actions Checklist ("Make Safe")

When following incident management protocols for PNG, the overarching idea is to make the site of the incident "safe" again as quickly as possible while protecting the PNG employees and emergency personnel responding to the incident, the public, and the environment.

PNG FIRST ON THE SCENE:	
❑	Ensure personal safety: o Don all necessary personal protective equipment (PPE). o Remove any sources of ignition. o Evacuate all non-essential personnel from the area.
❑	Call 9-1-1, if necessary, to request assistance from emergency services.
❑	Assist injured persons within the capabilities of your training and if safe to do so.
❑	Check in with your Manager or the Manager On-Call.
❑	Initiate appropriate control measures to manage the situation.
❑	Transfer command to the senior trained person on-scene upon arrival, to assume the role of Incident Commander.

INCIDENT COMMANDER:	
❑	If other responders on site, receive briefing of situation; assume control of the incident site.
❑	If an incident command post (ICP) has been established by first responders (fire/police), join Unified Command.
❑	If not already done, establish the ICP at a safe location.
❑	Assess and confirm the emergency situation.
❑	Assess and confirm personnel safety measures; implement additional safety measures, as required.
❑	Recommend evacuation be carried out by the fire department, if appropriate. Delegate rovers to assist, or if fire department is unavailable, conduct immediate notifications to evacuate.
❑	Make initial internal notifications.
❑	Determine initial incident level.
❑	In conjunction with the EOC Director, determine the initial HPZ.
❑	Implement required public protection measures.

6.3 Internal Notification Process

At the onset of an incident, the Incident Commander (or delegate) will notify the Manager On-Call and/or Director, Operations and Customer Service, or their designate, the Director, Asset Management and Projects, as soon as possible. The Manager On-Call will notify the Director, Operations and Customer Service, or their designate, the Director, Asset Management and Projects, if not already notified.

Having multiple points of contact and backups ensures the internal notification process at the start of an incident is seamless and prevents confusion if individual points of contact are unavailable.

The Incident Commander and the Manager On-Call (and/or Director, Operations and Customer Service, or their designate, the Director, Asset Management and Projects) will together:

i. Confirm the incident level.

ii. Activate the ERP.

iii. Determine the appropriate activation of the ICP and EOC.

iv. Notify the OGC of the incident level.

The Manager On-Call mobilizes the initial resources for the site and the ICP.

The Director, Operations and Customer Service, or their designate, the Director, Asset Management and Projects, notifies the Vice President, Operations and Engineering.

The Vice President, Operations and Engineering notifies key stakeholders within PNG and TriSummit Utilities. Notifications to the Manager, the Director, Operations and Customer Service, or their designate, the Director, Asset Management and Projects, and the Vice President, Operations and Engineering will likely be made by telephone. Resource notifications can be made via telephone or email. Text message remains an option.

The Director, Operations and Customer Service, or their designate, the Director, Asset Management and Projects, mobilizes the initial resources for the EOC.

Situation updates will be made through the ICP or, if activated, the EOC.

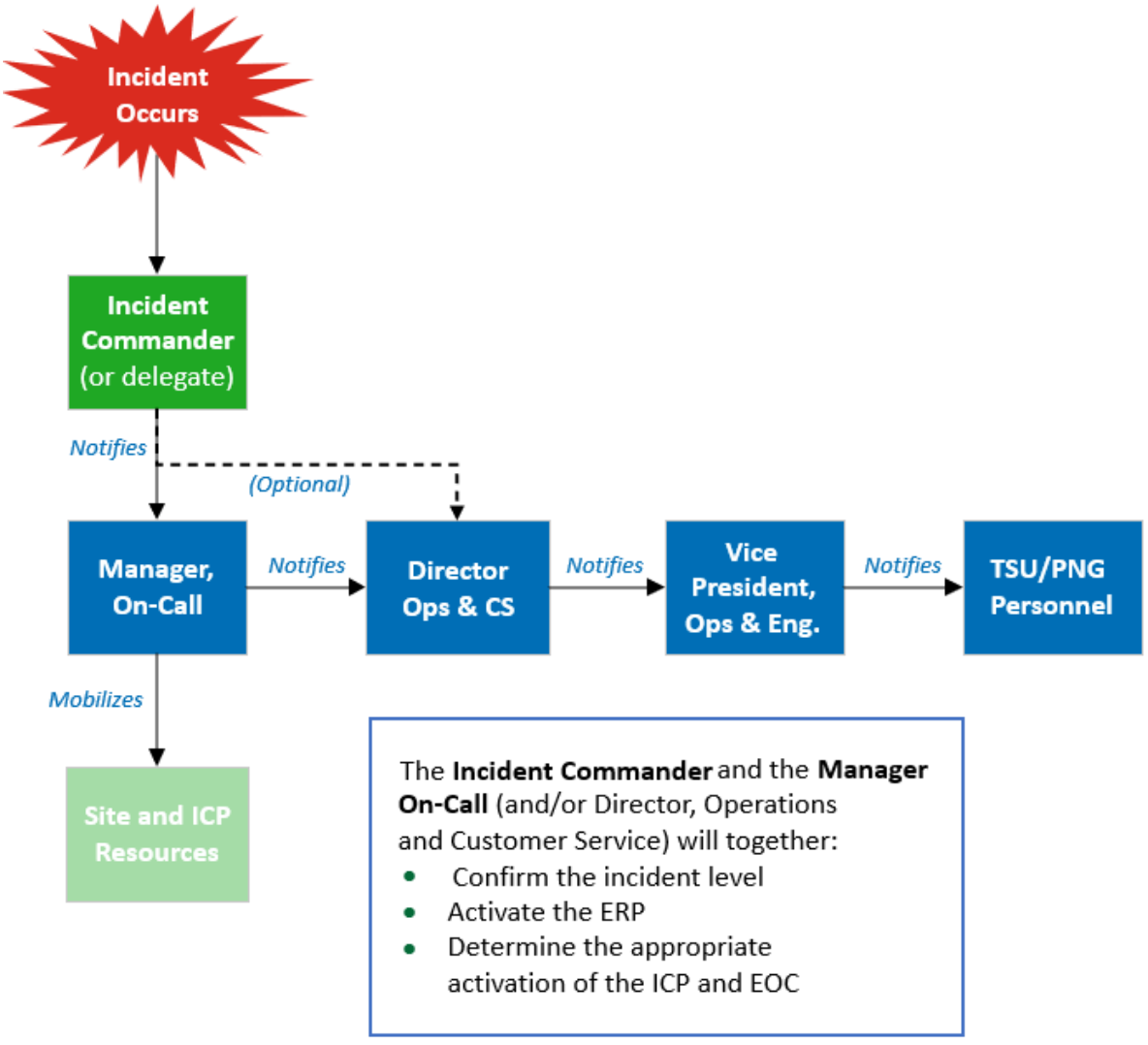


Figure 2 – Internal Notification Flowchart

6.4 Incident Classification

6.4.1 Incident Levels

The classification of an incident is determined using the *OGC Incident Classification Matrix*. The matrix is used to calculate the probability that the incident may escalate from the time that it is discovered. The nature and scope of an incident may not immediately be clear, and an adjustment to the incident level may be required as more information becomes available or the incident evolves.

Incident levels define the severity of an incident, based on the potential hazards or impacts to personnel, the public, and the environment, and indicate the appropriate organizational response, notifications, and activations.

The OGC's Incident Classification Matrix identifies four incident levels, with Minor categorized as low-risk and Level 3 as a high-risk emergency:

- Minor
- Level 1
- Level 2
- Level 3

A higher level is assigned when the incident meets one or more conditions of the higher level.

Minor

A Minor incident has a risk score of 1-2 and has no consequential impacts on an organization.

Level 1

A Level 1 incident has a risk score of 3-4 (moderate).

Factors to consider may include:

- Are personnel at immediate risk?
- Is there immediate danger to the public or environment?
- Is the release of a hazardous substance confined to the PNG property?
- Is there low risk for incident escalation?
- Can it be exclusively handled by PNG personnel?
- Is the incident likely to create little or no media interest?

Level 2

A Level 2 incident has a risk score of 5-6 (major). Factors to consider may include:

- Is there a potential for risk to the public and environment?
- Is the control of hazardous substances still possible?
- Is the incident likely to require the involvement of external emergency services or local or provincial agencies?
- Has the incident generated local or regional media attention?

Level 3

A Level 3 incident has a risk score of 7-8 (serious). Factors to consider may include:

- Is there immediate danger to the public or environment?
- Is there an uncontrolled release of a hazardous substance?

- Does the response require extensive involvement of external emergency services or local or provincial agencies?
- Has the incident generated media interest: local, provincial, or national?

6.4.2 Using the Incident Classification Matrix

The Incident Classification Matrix is used to determine the level of any incident, from Minor to a Level 3 emergency. The steps for determining the incident level risk score are:

1. Read through the descriptions under Consequence Ranking and check off the first description that best matches the situation. There can be multiple checks; however, only the highest ranked item is used in the calculation of an incident level.
2. The probability level is the likelihood that an incident can escalate. Review the Probability Chart and select the best choice based on what you know about the incident at the time of scoring.
3. Calculate the risk score by adding the consequence and probability values together. Compare the value to the Incident Classification table to determine the incident level.

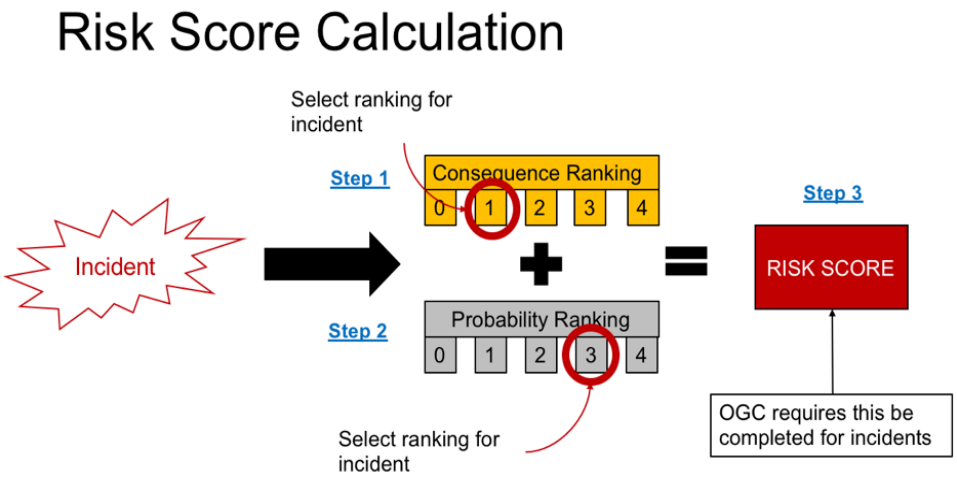


Figure 3 – Calculating the Risk Score

6.4.3 OGC Incident Classification Matrix

Instructions: Start at the top and continue down until you check off any one box in both consequence and probability to determine the incident classification. *This matrix is required as an attachment upon submission of an incident through the Online Minor Incident Reporting System.*

TABLE 1. CONSEQUENCE RANKING

RANK	CONSEQUENCE (any one of the following)
4	❑ Major on-site equipment or infrastructure loss ❑ Major act of violence, sabotage, or terrorism which impacts permit holder assets ❑ Reportable liquid spill beyond site, uncontained and affecting environment ❑ Gas release beyond site affecting public safety
3	❑ Threats of violence, sabotage, or terrorism ❑ Reportable liquid spill or gas release beyond site, potentially affecting public safety, environment, or property ❑ HAZMAT worker exposure exceeding allowable limits ❑ Major on-site equipment failure
2	❑ Major on-site equipment damage ❑ A security breach that has potential to impact people, property or the environment ❑ Reportable liquid spill or gas release potentially or beyond site, not affecting public safety, environment, or property
1	❑ Moderate on-site equipment damage ❑ A security breach that impacts oil and gas assets ❑ Reportable liquid spill or gas release on location ❑ **Occurrence of magnitude 4.0 or greater induced earthquake within 3 km of oil and gas operations or any earthquake which is felt on surface within a 3 km radius of oil and gas operations
0	❑ No consequential impacts
** For this consequence criteria, a probability score of 2 or higher must be used	

TABLE 2. PROBABILITY RANKING

RANK	PROBABILITY (any one of the following)
4	❑ Uncontrolled, with control unlikely in near term
3	❑ Escalation possible; under or imminent control
2	❑ Escalation unlikely; controlled or likely imminent control
1	❑ Escalation highly unlikely; controlled or imminent control
0	❑ Will not escalate; no hazard; no monitoring required

TABLE 3. INCIDENT RISK SCORE AND CLASSIFICATION

CONSEQUENCE ____+ PROBABILITY ___ = RISK SCORE ____ (this must be completed)

Risk Score	Incident Level
Score of 1-2	**Minor** *Form A: Minor Incident Notification Form*
Score of 3-4	**Level 1 Incident** *ERP*
Score of 5-6	**Level 2 Incident** *ERP*
Score of 7-8	**Level 3 Incident** *ERP*

			Probability				
			4	3	2	1	0
			☐ Uncontrolled, with control unlikely in near term	☐ Escalation possible; under or imminent control	☐ Escalation unlikely; controlled or likely imminent control	☐ Escalation highly unlikely; controlled or imminent control	☐ Will not escalate; no hazard; no monitoring required
Consequence	4	☐ Major on-site equipment or infrastructure loss ☐ Major act of violence, sabotage, or terrorism which impacts permit holder assets ☐ Reportable liquid spill beyond site, uncontained and affecting environment ☐ Gas release beyond site affecting public safety	**Level 3**	**Level 3**	**Level 2**	**Level 2**	**Level 1**
	3	☐ Threats of violence, sabotage, or terrorism ☐ Reportable liquid spill or gas release beyond site, potentially affecting public safety, environment, or property ☐ HAZMAT worker exposure exceeding allowable ☐ Major on-site equipment failure	**Level 3**	**Level 2**	**Level 2**	**Level 1**	**Level 1**
	2	☐ Major on-site equipment damage ☐ A security breach that has potential to impact people, property or the environment ☐ Reportable liquid spill or gas release potentially or beyond site, not affecting public safety, environment, or property	**Level 2**	**Level 2**	**Level 1**	**Level 1**	**Minor Notification Form**
	1	☐ Moderate on-site equipment damage ☐ A security breach that impacts oil and gas assets ☐ Reportable liquid spill or gas release on location ☐ **Occurrence of magnitude 4.0 or greater induced earthquake within 3 km of oil and gas operations or any earthquake which is felt on surface within a 3 km radius of oil and gas operations. Probability score of 2 or higher must be used.	**Level 2**	**Level 1**	**Level 1**	**Minor Notification Form**	**Minor Notification Form**
	0	☐ No consequential impacts	**Level 1**	**Level 1**	**Minor Notification Form**	**Minor Notification Form**	**No Notification Required**

** For this consequence criteria, a probability score of 2 or higher must be used.

Spill Reporting Criteria

Where the permit holder holds or maintains rights, the permit holder must report to the BC Oil and Gas Commission all spills of materials as identified below:

- A spill or release of any amount of materials that impacts waterways
- Hydrocarbons; 100 L where the hydrocarbon contains no toxic materials and does not impact waterways
- Produced/salt water; 200 L where the fluid contains no toxic materials
- Fresh water; 10,000 L
- Drilling or invert mud; 100 L
- Sour natural gas; 10 kg or 15 m^3 by volume where operating pressure is >100 PSI
- Condensate; 100 L
- Any fluid including hydrocarbons, drilling fluids, invert mud, effluent, emulsions, etc. which contain toxic substances; 25 L

Please refer to the BC Environmental Management Act; *Spill Reporting Regulation*, Schedule "Reporting Levels for Certain Substances" for determining reportable spillage amounts of other substances.

Other Reportable Incidents

The Commission's Incident Risk Classification Matrix is designed to assist permit holders in determining which incidents must be reported. However, some incidents may not meet the criteria outlined in the Incident Classification Matrix but still require notification to the Commission as a minor notification. These include the following:

- Spills or release of hazardous substances that are not provincially regulated, such as radioactive substances
- Major damage to oil and gas roads or road structures
- Pipeline incidents, such as spills during construction phase, exposed pipe caused by flooding, pipeline over pressure, or failure (without release) of any pressure control or electrostatic-sensitive device (ESD) device during operations
- Security-related issues that are relatively minor; such information may be required for tracking and monitoring purposes only

6.4.4 Plan Activation

Any incident that requires the prompt coordination of action to protect the health, safety, or welfare of people, or to minimize the impact to the environment, property, and infrastructure, will warrant the activation of the ERP. Most often these will be incidents of a Level 2 or 3.

In consultation with the Incident Commander, the EOC Director will confirm the incident level.

The activation of the appropriate Supplemental Response Plan, and subsequently the EOC, is determined at the onset of an incident based on the information available at the time and may change (escalate/de-escalate) throughout the duration of the incident. This is authorized by the EOC Director, in conjunction with the Incident Commander, and will be driven by evolving conditions and information. In cases where the exact nature and consequences of the event is unknown at the time of notification, the general approach is to gather as much information as possible to make the best judgement.

Activation of the ERP, particularly when there is potential for escalation, will enable the mobilization of resources and support evolving response requirements.

A re-assessment within each operational period (new IAP), or after significant events affecting the incident (e.g., gas under control, escalating event), will be conducted to determine if the incident has escalated or can be downgraded. An update to the probability score and a review and confirmation of current state consequences will generate an updated incident level.

The EOC Director, in consultation with the OGC, will make the determination to increase or downgrade the incident level, or to terminate the incident.

7 HAZARD AND RESPONSE GUIDELINES

PNG employees should use the following as guidance, as applicable, to inform their response. The checklists present the minimum requirements for task considerations that must be done. Additional tasks can be added as the incident demands. Some tasks are one-time actions, while others are ongoing or repetitive actions for the duration of the incident.

7.1 Defining the Incident-Specific HPZ

DEFINING THE INCIDENT-SPECIFIC HPZ

SCOPE

A Hazard Planning Zone (HPZ) is the geographical area determined by using the hazard planning distance as a radius, and within which persons, property, or the environment may be affected by an incident.

The HPZ is used to identify where prompt response actions are required in the event of an incident.

ACTIVITIES

- ❑ Confirm location of the incident site(s).
- ❑ Gather combustible gas indicator measurements to establish radius of gas readings.
- ❑ Establish the approximate radius of gas odour.
- ❑ Measure wind direction and wind speed.
- ❑ Identify (and mitigate) possible ignition sources.
- ❑ Consider the possible risks of exposure; considerations may include:
  - Transportation routes (roadways, airspace, etc.)
  - The possibility of the gas migrating (surrounding buildings, sewers, underground ducts, enclosed areas, etc.)
- ❑ Consider parties that may be impacted:
  - CNRL Plant
  - Trapline
  - Hunters
  - Backcountry recreationalists
  - Phone numbers can be found in *Section 10 Contact Information*
- ❑ Review infrastructure at risk, including:
  - Roadways
  - Airspace by requesting NOTAM
  - CNRL buildings and camp
- ❑ Confirm ETA of resources:
  - Delays will influence the time for bringing the incident under control.
- ❑ Contact CANUTEC (1-888- 226-8832) to develop a plume model; if able and appropriate.
- ❑ Prepare map of the HPZ; include in the map the above noted data, along with locations of:
  - Radiuses
  - Wind direction
  - Potentially affected parties (buildings, traplines)
  - Staging area(s)
  - Roadblocks
  - Ignition sources
  - Infrastructure

DEFINING THE INCIDENT-SPECIFIC HPZ

- ❑ Share plume model/HPZ map with First Responder's Incident Commander(s).
- ❑ Share HPZ map with appropriate agencies.
- ❑ Assess the situation for the potential for escalation and other possible complicating factors.
- ❑ Re-evaluate regularly or upon a change in circumstances to expand or contract the zone in consultation with emergency services and the EOC.

7.2 Implementing Public Protective Measures Based on the Incident-Specific HPZ

IMPLEMENTING PUBLIC PROTECTIVE MEASURES BASED ON THE INCIDENT-SPECIFIC HPZ

SCOPE

The Hazard Planning Zone (HPZ) is used to identify where immediate response actions are required in the event of an incident.

Depending on the incident-specific HPZ, some or all the noted activities may be actioned.

Procedure is referenced after Initial Make Safe Actions (immediate actions) are completed and the Incident-Specific HPZ is identified.

ACTIVITIES

- ❑ Communicate need for public protective measures (evacuation or shelter-in-place) to emergency services and community.
  - Support the notification of neighbours and potentially affected parties that evacuation or shelter-in-place is advised.
  - See *Section 7.5 Evacuation* and *Section 7.6 Shelter-in-Place.*
- ❑ If gas is escaping, identify sources of ignition and remove them if possible and safe to do so.
- ❑ Establish a safety perimeter based on the HPZ.
- ❑ Consider the request of closure airspace.
- ❑ Identify roadblock leader.
- ❑ Identify rovers.
- ❑ Notify neighbours of the incident:
  - Trapline
  - CNRL lant
  - Crown land
  - Phone numbers can be found in Section 10 Contact Information *(Confidential Section).*
- ❑ Coordinate the elimination of hazards from damaged property and/or utilities on site.
- ❑ Obtain frequent meteorological updates, particularly wind direction and speed.
- ❑ A shift in wind direction requires immediate re-evaluation of the HPZ.
- ❑ Request security resources to maintain safety perimeter, and, if required, protection of PNG and neighbouring property.
- ❑ Communicate to ICP and/or EOC Scribe all actions taken and ensure that a log of all activities and decisions is maintained.

IMPLEMENTING PUBLIC PROTECTIVE MEASURES BASED ON THE INCIDENT-SPECIFIC HPZ

***Air Monitoring*[1]**

- ❑ Equip <u>all personnel</u> in the area of a H_2S release with H_2S detection monitors and self-contained breathing apparatus (SCBA).
- ❑ Conduct air monitoring to support the establishment of the initial HPZ.
- ❑ Select appropriate air monitoring device(s):
  - ○ Utilize handheld air monitors for *initial* and continuous monitoring to aid in the definition of the HPZ and the expansion/contraction of the plume.
  - ○ Request mobile air monitoring units to supplement handheld readings of lower explosive limit (LEL) and H_2S, during the release and following the ignition of a release.
  - ○ When requesting the number and specific type of air monitoring units consider:
    - □ Population density
    - □ Local conditions
    - □ Access and egress points
- ❑ Continue air monitoring to track the presence and levels of LEL and H_2S in maintaining the parameters of the HPZ.
  - ○ Monitor the plume movement, dispersion, or rising levels.
  - ○ Maintain awareness of levels in context of responder safety, including rovers and those staffing roadblocks.
- ❑ Maintain a record of the air monitoring results using the *Ambient Air Monitoring Form* available in the Core ERP (*Appendix C.2 – Response Support Forms*).
- ❑ Deploy units downwind and upwind depending on how the plume is tracking:
  - ○ Prioritize the nearest un-evacuated residence or area where people may be present.
  - ○ For ground level emissions, including unignited, uncontrolled releases, utilize the mobile monitor and take near ground wind direction into consideration.
  - ○ For emissions from a flare or an ignited uncontrolled release, consider the wind aloft (elevated windsock) rather than near ground level winds.
  - ○ For gases heavier than air, such as H_2S, the gas prefers to hug the ground and follow topographic features:
    - □ Consult with topographic maps to estimate likely trajectory for plume.
  - ○ In calm winds, sampling should be used to determine where the concentration is strongest:
    - □ Consider the wind direction aloft, rather than near ground level wind.
  - ○ An elevated release may travel for some distance before touching down.
- ❑ Monitor wind direction and speed from Environment Canada, actual and forecasted, as well as site.

[1]Odorized methane transported by the transmission pipeline system does not contain H_2S. PNG does not transport product with H_2S or SO_2 concentrations; only the Tumbler Ridge Gas Plant has the hazard of an H_2S release, thus there is no potential for an H_2S release near an urban centre.

IMPLEMENTING PUBLIC PROTECTIVE MEASURES BASED ON THE INCIDENT-SPECIFIC HPZ

- ❑ Assess H_2S concentrations to identify need for consideration to ignite (See *Section 7.7 Ignition Guidelines*).
- ❑ Re-assess the boundaries of the HPZ as air monitoring data evolves.
- ❑ Provide OGC air monitoring measurements during the OGC briefings.

Roadblocks

- ❑ Establish roadblocks to limit access.
- ❑ Consider access/egress of responders and evacuees.
- ❑ Position vehicle in a highly visible area to oncoming traffic.
- ❑ Use intersecting crossroads where possible to maximize the monitoring of traffic flow.
- ❑ Do not completely block road.
- ❑ Engage the four-way flashers on vehicle.
- ❑ Wear traffic vest to maintain visibility to traffic.
- ❑ Record names, addresses, and contact information of evacuees leaving the area.
- ❑ Ensure that only resources and equipment approved by the Incident Commander are allowed to enter the secured area.
- ❑ Record names, contact information, and location for those entering the area.
- ❑ If an evacuation is underway, **only** first responders and approved response personnel are permitted to enter the area.
- ❑ Attend to the roadblock until relieved.

Rovers

- ❑ Monitor gas migration; verify boundary of the safety perimeter.
- ❑ Support first responders (fire, police, etc.) in instigating and communicating protective measures.
- ❑ Advise impacted public to evacuate if emergency services not present on site.
- ❑ Begin notification of public with those in closest proximity to the incident location and downwind of the location.
    - Proceed to those located within the remainder of HPZ.
    - Utilize messaging in *Section 7.5.1 Speaking Notes: Instructions for Evacuation* or *Section 7.6.1 Speaking notes: Instructions to Shelter-in-Place*.
    - PNG personnel do not have authority to order the public to evacuate the premises. If evacuation is refused, record name and address and notify the police.
- ❑ If contact cannot be made through a personal visit (or phone call if shelter-in-place is ordered), request resources to conduct a thorough survey of the area.
- ❑ Check on an ongoing basis for gas migration and for accumulation in nearby buildings and fixtures.
- ❑ Repeat until gas is controlled and accumulations are vented.
- ❑ Follow Site Safety Plan, i.e., monitor gas levels, check in, etc. **Responder safety is the first priority.**

7.3 Notification of Potentially Affected Parties

NOTIFICATION OF POTENTIALLY AFFECTED PARTIES GUIDELINES

SCOPE

Two (2) parties have been identified within the HPZ of Tumbler Ridge Gas Plant and would require to be notified if an incident occurred at the Tumbler Ridge Gas Plant. The parties include:

- Trapline
- CNRL Plant

ACTIVITIES

- ❑ Evacuation is the primary public protection measure during a release of sour gas, if the public can be safely removed from the area.
- ❑ Evacuation of members of the public within the HPZ is based on the following monitored levels of H_2S.
  - See *Section 7.5 Evacuation* and *Section 7.6 Shelter-in-Place.*
- ❑ Notify CNRL by telephone or in person and provide information on appropriate protective measures determined by PNG's assessment of the incident.
  - Advice will depend on the incident, and may involve sheltering-in-place or evacuation.
- ❑ Notify trapline owner by telephone; determine if trapper is in the vicinity. Provide information on the incident:
  - If trapper is near the incident, or within HPZ, immediately dispatch authorized personnel (rover and/or helicopter) to locate:
    - Rovers to be dispatched only if safe to do so.
  - If trapper is not in the vicinity, request trapper avoid area until notified of resolution of incident.
- ❑ If contact cannot be made, a thorough survey of the area will be conducted by authorized personnel (rover and/or helicopter) to ensure that all persons are advised of the incident and protective measures.
- ❑ Continuously assess and act on the need to expand the evacuation/shelter area.
- ❑ Immediate ignition may be required if ignition criteria are met.
  - A shift in wind direction requires immediate re-evaluation of the situation.

H_2S CONCENTRATIONS IN UNEVACUATED AREAS	REQUIREMENT
1 ppm–9 ppm	Individuals must be informed of the concentrations and advised to leave the area. All other individuals should consider leaving the area and seek medical advice if health symptoms develop.
10 ppm	Immediate shelter-in-place must take place and/or evacuation.
>10 ppm (3-minute average)	If monitored levels in successive 3-minute intervals **are declining**, and shelter-in-place is occurring, evacuation may not be necessary. Release is to be ignited.

7.4 Notice to Airmen (NOTAM) Request

NOTICE TO AIRMEN (NOTAM) REQUEST PROCEDURE

SCOPE

If airspace is impacted by the incident, it may be necessary to contact NAV CANADA to request that a Notice to Airmen (NOTAM) be issued to inform aircraft of the potential dangers. NAV CANADA is responsible for the collection, evaluation, and dissemination of NOTAMs.

It is the responsibility of the Emergency Operations Centre (EOC) to assess the likelihood of risk to aircraft. This assessment should be conservative since aircraft such as low-flying helicopters and hot-air balloons may be at significant risk from gas plumes or fires.

ACTIVITIES

- ❑ The Planning Section and Operations Section work together to determine:
  - Location of incident in latitude and longitude
  - Radius of plume
  - Estimate of altitude of plume in feet above ground level
  - Estimate of speed and direction of plume (in knots and degrees if possible)
- ❑ **Contact NAV CANADA Flight Information Centre at 1-866-992-7433:**
  - Inform the duty officer that PNG requests a NOTAM due to significant release of natural gas/ gas fire/gas explosion.
  - Give the location, radius, altitude, and movement information above.
  - Clearly communicate units of measure of information shared.
  - Provide the EOC's contact information. If there are any further questions, the duty officer MUST be able to contact PNG to confirm.
  - Record the NOTAM number for future reference if provided.
  - Do not hang up until the duty officer does so.
- ❑ Inform the NAV CANADA Information Centre (1-866-992-7433) if the location, radius, altitude, or movement information changes significantly, as the NOTAM must be amended:
  - Quote the NOTAM number and provide the amended information.
- ❑ Inform the NAV CANAD Information Centre (1-866-992-7433) when gas is determined under control or fire has dispersed:
  - Quote the NOTAM number and request that the NOTAM be cancelled.

7.5 Evacuation

EVACUATION PROCEDURE

SCOPE

The following provides guidance to supporting, and where necessary, conducting an evacuation.
Depending on the specific incident, some or all the noted activities may be actioned.
**The following is to be referenced after Initial Make Safe Actions (immediate actions) are completed and the incident-specific HPZ is identified.*

Note:

If the situation requires immediate public safety measures be taken, defined as those actions that must be taken "now", without any delay, to save lives from extreme risk, the PNG Incident Commander is authorized to begin notifying and evacuating the public without consulting the EOC Director.

Notification to emergency services and/or the local authority of the tactical evacuation will be made by the EOC.

ACTIVITIES

- ❑ Assess incident, identify hazard (gas, heat, etc.), and determine current/potential risk to responders and public.
- ❑ Determine if immediate public safety measures are needed.
- ❑ Determine appropriate initial public safety measures, i.e., evacuation or shelter-in-place, within the pre-determined zone.
- ❑ Communicate public safety measure information to emergency services and/or local authority.
- ❑ Support first responders (fire, police, etc.) in instigating and communicating evacuation, as required.
- ❑ Identify exit route.
  - Establish access control (roadblocks) to the HPZ.
- ❑ Advise impacted public to evacuate if emergency services are not present on site:
  - PNG personnel do not have authority to order the public to evacuate the premise. If evacuation is refused, record name and address and notify the police.
- ❑ Identify a reception centre; communicate location to evacuees.
- ❑ Arrange rovers or a helicopter to search the area to locate transients, hunters, trappers, recreational users, and other area operators who may be at risk.
- ❑ Provide the Contact Centre with instructions to relay to residents to aid in the safe evacuation of individuals within the specified area(s):
  - Align with first responder/local authority messaging; if unavailable, see the sample messaging at the end of the procedure.
- ❑ Assist with the coordination of support services, inclusive of transportation to the reception centre, food, lodging, emotional support, information about the incident, and family reunification.
- ❑ Monitor environmental parameters for the specified area(s) to determine when an evacuation rescind can be issued.
- ❑ Update first responder/local authority frequently.
- ❑ Coordinate, with the local authority, the re-entry into the impacted area.

H_2S CONCENTRATIONS IN UNEVACUATED AREAS	REQUIREMENT
1 ppm–9 ppm	Individuals must be informed of the concentrations and advised to leave the area. All other individuals should consider leaving the area and seek medical advice if health symptoms develop.
10 ppm	Immediate shelter-in-place must take place and/or evacuation.
>10 ppm (3-minute average)	If monitored levels in successive 3-minute intervals **are declining**, and shelter-in-place is occurring, evacuation may not be necessary. Release is to be ignited.

7.5.1 Speaking Notes: Instructions for Evacuation

Prior to alerting residents of an evacuation:

- Determine whether it is safe to leave the area in their vehicles, or whether evacuation by foot is required.
- Identify a designated safety meeting area or muster point for evacuees to gather and wait, particularly if it is not safe to travel by vehicle and/or they require transportation assistance to the identified reception centre.
- Ensure you have a detailed safe travel route to the safety meeting area, muster point, or reception centre (as applicable).

If evacuation is recommended, communicate the following to residents and members of the public in the hazard area. The EOC will provide you with the information required to “fill in the blanks” for the specific incident you are responding to.

- *Hi, my name is [insert name], I work with Pacific Northern Gas.*
- *We are responding to an incident in the area. For your safety, we recommend you evacuate the area immediately.*
- *Please inform your family or anyone else in your home/building, gather your pets, and evacuate the area immediately.*
- *[Hand them the Evacuated Resident’s Checklist AND Safe Travel Route] These documents provide suggestions on what to do and detailed instructions for evacuating.*

If you have confirmed it is safe to travel by vehicle:

- *It is still safe for you to evacuate in your own vehicle. If you could please safely make your way in your vehicle (if driving), to the identified safe meeting area or muster point at [provide location of safe meeting area, and any instructions for a specific route they should take] and wait for me to arrive. I will need to provide you with additional information, so you can stay updated regarding the incident and for further instructions.*

Once you have met the evacuees at the safe meeting area or muster point:

- Confirm who has been evacuated and from where.

For individuals going to the reception centre, advise:

- *A reception centre has been set up at [reception centre facility name and address]. It Is recommended that you head to the reception centre as soon as possible and register yourself and your family.*

If you have confirmed it is unsafe to travel by vehicle, and residents are required to evacuate by foot:

- *For your safety, because of the nature of the incident, it is unsafe for you to travel by vehicle. Please make your way by foot to the identified safe meeting area or muster point and wait for me to arrive. This is where we will be picked up and taken to the reception centre.*
- *I will need to provide you with a few additional details so you can stay updated regarding the incident and evacuation instructions.*

Once you have met the evacuees at the safe meeting area or muster point, collect the following details:

- Who has been evacuated and from where?

7.6 Shelter-in-Place

SHELTER-IN-PLACE PROCEDURE

SCOPE

The following provides guidance to supporting, and where necessary, communicating shelter-in-place measures.

Depending on the specific incident, some or all the noted activities may be actioned.

**The following is to be referenced after Initial Make Safe Actions (immediate actions) are completed and the Incident-Specific HPZ is identified.*

Note:

If the situation requires immediate public safety measures be taken, defined as those actions that must be taken "now", without any delay, to save lives from extreme risk, the PNG Incident Commander is authorized to begin notifying the public to shelter-in-place without consulting the EOC Director. Notification to emergency services and/or the local authority of the tactical evacuation will be made by the EOC.

ACTIVITIES

- ❑ Assess incident, identify hazard (gas, heat), and determine current/potential risk to responders and public.
- ❑ Determine if immediate public safety measures are needed.
- ❑ Determine appropriate initial public safety measures i.e., evacuation or shelter-in-place, within the pre-determined zone.
- ❑ Communicate public safety measure information to emergency services and/or local authority.
- ❑ Support first responders (fire, police, etc.) in instigating and communicating shelter-in-place order, as required.
- ❑ Advise impacted public to shelter-in-place if emergency services not present on site.
- ❑ Establish access control (roadblocks) to the HPZ.
- ❑ Arrange rovers or a helicopter to search the area to locate transients, hunters, trappers, recreational users, and other area operators who may be at risk.
- ❑ Provide instruction to the Contact Centre to relay to residents to aid in the safe sheltering of individuals within the specified area(s):
  - Align with first responder/local authority messaging; if unavailable, see the sample messaging at the end of the procedure.
- ❑ Monitor environmental parameters for the specified area(s) to determine when to rescind the shelter-in-place order.
- ❑ Update first responder/local authority frequently.
- ❑ Coordinate with the local authority to rescind shelter-in-place order and if subsequent public safety measures such as evacuation are required.

H_2S CONCENTRATIONS IN UNEVACUATED AREAS	REQUIREMENT
1 ppm–9 ppm	Individuals must be informed of the concentrations and advised to leave the area. All other individuals should consider leaving the area and seek medical advice if health symptoms develop.
10 ppm	Immediate shelter-in-place must take place and/or evacuation.
>10 ppm (3-minute average)	If monitored levels in successive 3-minute intervals **are declining**, and shelter-in-place is occurring, evacuation may not be necessary. Release is to be ignited.

7.6.1 Speaking notes: Instructions to Shelter-in-Place

If recommending shelter-in-place, provide the following instructions:

- Gather everyone indoors and stay there until further notice.
- Close all windows and external doors securely, taping gaps around doors if necessary.
- Open all inside doors.
- Move to the upper floors of your home and stay away from windows.
- Extinguish indoor wood fires and close flue damper if possible.
- Turn off appliances that use or blow out indoor air (e.g., bathroom fans, kitchen vent fans, built-in vacuums, clothes dryers, gas stoves and ovens, gas fireplaces).
- Shut down the furnace and exhaust fans.
- Lower thermostats to the minimum level and turn off air conditioners.
- Do not use the telephone unless you need emergency services.
- Do not smoke or operate electrical appliances.
- Call PNG's Gas Emergency 24-Hour Number (1-800-663-1173) or 9-1-1 if you smell odours or notice anything else unusual. Call 9-1-1 if you experience symptoms.
- Listen to local radio and television stations for possible updates.
- Do not leave shelter until told to do so by emergency services or a PNG representative, even if you see others outside.
- Notify emergency services if you are unable to follow these instructions.
- Notify emergency services or PNG if there are other residents in your home who are not home at the moment and provide any information you have regarding their whereabouts and contact information.
- Follow instructions when you receive PNG's "All Clear" message.

7.7 Ignition Guidelines

IGNITION GUIDELINES

SCOPE

The following provides guidance on the option to ignite H_2S, should the incident involve H_2S and people and/or the environment at risk from an uncontrolled release, AND when there is insufficient time to evacuate the HPZ.

Depending on the specific incident, some or all the noted activities may be actioned.

**The following is to be referenced after Initial Make Safe Actions (immediate actions) are completed and the incident-specific HPZ is identified.*

Note: Odorized methane transported by the transmission pipeline system does not contain H_2S. PNG does not transport product with H_2S concentrations; only the Tumbler Ridge Gas Plant has the hazard of a H_2S release, thus there is no potential for an H_2S release near an urban centre.

If the situation requires immediate public safety measures be taken, defined as those actions that must be taken "now", without delay, to save lives from extreme risk, the PNG Incident Commander is authorized to confirm ignition without consulting the EOC Director. Notification to emergency services and/or the local authority of the safety measure will be made by the EOC.

Hazards which may activate this procedure include:

- Technical and/or structural failures
- Malicious intent

ACTIVITIES

*See **Air Monitoring** in Section 7.2 Implementing Public Protective Measures for process leading to the consideration to ignite.*

- ❑ Analyze H_2S levels.
- ❑ Consider ignition if:
  - Known release of H_2S but air monitoring is not taking place due to unforeseen circumstances (i.e., weather, unavailability of equipment); OR
  - H_2S levels >10ppm for a three (3) minute average in an un-evacuated area; OR
  - Release cannot be brought under control in the short term.
    - □ If monitored levels in successive 3-minute intervals are declining, and shelter-in-place is occurring, evacuation may not be necessary.
- ❑ Consult with authority with jurisdiction and use proper judgement in determining if evacuation should replace shelter-in-place as the recommended safety response.
- ❑ Consult with the OGC on the decision to ignite.
- ❑ Instigate ignition within 15 minutes of confirmation to ignite.
- ❑ Move personnel at site to a safe distance.
- ❑ Action the certified ignition strike team.

7.8 Product Release Guidelines

PRODUCT RELEASE GUIDELINES

SCOPE

The following provides guidance to address a product release at the plant.

Depending on the specific incident, some or all the noted activities may be actioned.

**The following is to be referenced after Initial Make Safe Actions (immediate actions) are completed and the Incident-Specific HPZ is identified.*

Hazards which may activate this procedure include:

- Technical and/or structural failures;
- Malicious intent.

ACTIVITIES

- ❑ Deploy field observers to gather damage intelligence as soon as possible.
- ❑ Monitor gas migration; establish boundary of the safety perimeter.
- ❑ Remove sources of ignition.
- ❑ Do not extinguish burning gas from a break unless the fire poses a hazard:
  - Assume safe position and allow controlled burn out.
  - Direct the fire department to use water spray to protect surrounding property.
- ❑ Assess the situation to determine if a shutdown is required.
- ❑ Evaluate requirements if authorized and permission is given to isolate the plant:
  - Manually close valve if permission has been granted to isolate the plant.
  - Operate valves only after authorization from Manager On-Call.
- ❑ Check on an ongoing basis for gas migration; including for accumulation in nearby buildings and fixtures:
  - Repeat until gas is controlled and accumulations are vented.

7.9 Plant Shutdown Guidelines

PLANT SHUTDOWN GUIDELINES

SCOPE

The following provides guidance to the shutdown of the plant.

Depending on the specific incident, some or all the noted activities may be actioned.

**The following is to be referenced after Initial Make Safe Actions (immediate actions) are completed and the incident-specific HPZ is identified.*

Hazards which may prompt the need for a plant shutdown include:

- Imminent arrival of wildfire to plant site
- Incident at CNRL plant
- Malicious intent
- Technical and/or structural failures

ACTIVITIES

- ❑ Assess damage to determine if shutdown is required; consider:
  - Immediacy of public hazard
  - Decay of system pressures
  - Degree shutdown will affect supply to the utility
  - Options if pressure reduced
- ❑ Determine the required valve operation and sequencing.
- ❑ Document and review the shutdown procedure, if life and property are not threatened, before initiating it.
- ❑ Shut down, isolate, and depressurize additional or related process piping/equipment.
- ❑ Reduce pressure, or vent to atmosphere through blow-down stacks.

7.10 Environmental Spill

ENVIRONMENTAL SPILL OR RELEASE PROCEDURES

SCOPE

The following provides guidance to responding to an environmental spill (defined as any event that has the potential to adversely affect the natural environment and/or human health and safety).

Depending on the specific incident, some or all the noted activities may be actioned.

**The following is to be referenced after Initial Make Safe Actions (immediate actions) are completed and the incident-specific HPZ is identified.*

Note:

Any environmental damage shall be remedied in consultation with relevant stakeholders and third parties.

ACTIVITIES

- ❑ Implement additional control measures, beyond standard emergency procedures, to limit migration of the spill into culverts or drains that could carry the material into a waterbody:
  - Contain liquids with earthen berms or other material if necessary to prevent such migration.
- ❑ Reference product Safety Data Sheets (SDS).
- ❑ Consult *SPI 11.4.2 Environmental Incident Response* for additional guidance on actions and reporting.

7.11 Procedure if Incident at CNRL Plant

CNRL PLANT INCIDENT PROCEDURE

SCOPE

The following provides response guidance to emergencies at the CNRL Plant which neighbours the Tumbler Ridge Gas Plant.

Depending on the specific incident, some or all the noted activities may be actioned.

**The following is to be referenced after Initial Make Safe Actions (immediate actions) are completed and the incident-specific HPZ is identified.*

ACTIVITIES

Receive notice of an incident at the CNRL Plant via telephone call or personal visit at the PNG Plant from CNRL representative.

If on-site (Tumbler Ridge Gas Plant)

- ❑ Follow the instructions being provided by CNRL on personal protective measures (shelter-in-place or evacuate):
  - Implement additional safety measures, as required.
  - Note instructions or requests regarding operation of the Tumbler Ridge Gas Plant; action if safe and appropriate to do so.
- ❑ Notify PNG supervisor or Manager On-Call:
  - Maintain communication with PNG supervisor or Manager On-Call.
  - Make internal notifications and activate the PNG EOC.
    - □ Receive updates to the situation from CNRL Liaison Officer.
- ❑ Expect to evacuate the area if H_2S Concentrations are 1 ppm – 10 ppm within the CNRL defined planning zone.
- ❑ Expect to shelter-in-place if H_2S Concentrations are above 10 ppm within the within the CNRL defined planning zone.
- ❑ Identify additional hazards arising to the PNG plant or to personal safety because of the CNRL incident:
  - Implement additional safety measures.
  - Inform CNRL and/or first responders and PNG supervisor of the emerging risk.

Do not alter protective measures until instructed by CNRL personnel or first responders.

If off-site (Tumbler Ridge Gas Plant)

- ❑ Receive incident briefing from CNRL representative:
  - Note any instructions or requests being provided by CNRL regarding:
    - □ Personal protective measures (shelter-in-place or evacuate)
    - □ Operation of the Tumbler Ridge Gas Plant
  - Identify and communicate additional hazards arising to the plant or to personal safety because of the CNRL incident.

CNRL PLANT INCIDENT PROCEDURE

- Establish point of contact, contact information, and timing of next incident briefing.

❑ Notify PNG supervisor or Manager On-Call:

- Share incident details and requests being made by CNRL.

❑ Make additional internal notifications.

❑ Generate plan to monitor the CNRL incident.

- Identify additional hazards arising to the PNG plant or to personal safety because of the CNRL incident.
- Mitigate and address risks to the Tumbler Ridge Gas Plant, responders, public, and the environment.

❑ Obtain regular incident briefings from CNRL Liaison Officer.

Do not alter protective measures until instructed by CNRL personnel or first responders.

7.12 Wildland Fire in Vicinity of PNG Assets

WILDLAND FIRE ADVANCE PLANNING AND RESPONSE PROCEDURE

SCOPE

The following provides guidance to mitigate impacts to PNG infrastructure in the event of a wildland fire in the vicinity (advance planning), as well as response and recovery activities.

Depending on the specific incident, some or all the noted activities may be actioned.

Note:

PNG infrastructure includes, but is not limited to, above-ground assets such as plants, pump stations, radio towers, etc.

Considerations for risk of underground assets include potential for earth-moving equipment creating berms and fire breaks, and potential for heat impacts in presence of variable depth of cover.

Protective activities should only be used if the projected time of fire impact at site allows for sufficient time to safely leave the site.

ADVANCE PLANNING ACTIVITIES

- ❑ Obtain and assess current wildfire location and forecasts from BC Wildfire Service and Emergency Management BC (EMBC).
- ❑ Activate the EOC to support advance planning activities and communications internally and externally.
- ❑ Review safe working procedures with personnel, including requirements located in the Wildfire Regulation related to working near wildfires or when wildfire risk is high:
  - If an area is under the threat of fire activity, work as appropriate to ensure minimum personal risk; evacuate all unnecessary personnel.
  - Suspend site projects and maintenance work not critical to operations.
- ❑ Assess and identify risk to infrastructure.
- ❑ Monitor, through EMBC coordination calls and local contacts, risks to communications both to PNG assets and locations, and to personnel working from home; such risks include, but are not limited to, interruption to radio, cellular, land line, and internet fiber.
  - Assess, prepare, and communicate plans to address interruptions in advance, if and as possible.
- ❑ Consider appropriate protective and precautionary activities to protect the system before the wildfire reaches the area:
  - Increase transmission line patrols in the alert area.
  - Set up sprinklers.
  - Deploy dirt and sand to bury above-ground infrastructure.
  - Install fire blankets to above-ground valve sites.
  - Apply gel/foam to infrastructure (if approved and non-corrosive).
  - Coordinate, as required with FLNRORD (or other authority), permission to access restricted areas to implement protective measures to PNG infrastructure.

WILDLAND FIRE ADVANCE PLANNING AND RESPONSE PROCEDURE

- ❑ Monitor areas where BC Wildfire Services is responding for activities in the vicinity of the right-of-way (ROW), such as earth movement to generate berms and firebreaks adjacent and/or across the ROW, or moving equipment across the ROW; identify protective measures such as:
  - On-site supervising
  - Identification of locations and implementation of measures to enable safe ROW crossings
- ❑ Participate in EMBC Coordination Call to glean additional situational awareness and communicate impacts, if any, and possible or actual consequences (public safety and utility).
- ❑ Collaborate on protective strategies with external agencies, including FLNRORD and EMBC.
- ❑ Consider consequence management strategies.
- ❑ Issue public safety information regarding actions to be taken before, during, and after an evacuation.

EVACUATION ALERT/ORDER ISSUED

- ❑ Receive the issued Evacuation Alert or Evacuation Order for the area:
  - Review Evacuation Alert with FLNRORD to confirm safe and appropriate personnel presence at the site and protective strategies:
    - □ Station personnel at strategic locations.
    - □ Evacuate non-essential personnel from high-risk areas as soon as practical and as directed to ensure personnel safety.
    - □ Contact Call Centre or PNG Check-In Line and EOC when clear of site and in the safe zone.
  - If Evacuation Order declared, re-confirm protective strategies with FLNRORD:
    - □ Communicate evacuation order to all PNG personnel in the area; ensure evacuation of all PNG personnel to a safe area.
    - □ Contact Call Centre or PNG Check-In Line and EOC when clear of site and in the safe zone.
- ❑ Areas will continue to be served by gas until it is safe to assess the situation post-fire.
- ❑ Identify and communicate safe pipeline crossing locations.
- ❑ Prepare plan for re-entry once authorities have approved access to the area.
  - Detail activities, such as inspection, survey, repair, regasification, and relight activities.
- ❑ Reiterate public safety information regarding actions to be taken before, during, and after an evacuation.

POST-WILDLAND FIRE ACTIONS

- ❑ Await instruction from BC Wildfire Incident Commander when it is safe to return to the area:
  - Coordinate working in the area.
  - Conduct recovery and restoration activities in collaboration with the local government EOC and the Provincial Regional Emergency Operations Centre (PREOC).
- ❑ Conduct an air and/or ground patrol of affected areas; deploy qualified personnel to gather damage intelligence as soon as possible.

WILDLAND FIRE ADVANCE PLANNING AND RESPONSE PROCEDURE

- ❑ Instruct all personnel on possible hazards in the area before entering.
- ❑ Inspect the area affected and/or previously threatened by the wildfire for fire damage to stations, mains, services, and meters.
  - Ensure communications have been established at the site.
  - Accompany outside agency inspectors when the premises are being inspected.
  - Ensure appropriate firefighting equipment is available at the site and the site is safe.
  - Check area for any open or smoldering fires that should then be extinguished.
  - Inspect each distribution installation to determine the extent of damage.
- ❑ Coordinate the elimination of hazards from damaged property and/or utilities on site:
  - Assess any fire damaged trees around the work area and remove any that are deemed potentially hazardous.
- ❑ Review and confirm isolation strategies and relight plan.

RECOVERY ACTIVITIES

- ❑ Implement isolation plans as required.
- ❑ Repair any damaged infrastructure.
- ❑ Implement regasification and relight plans:
  - Ensure electrical services have been re-established; electrical service must be available before service will be restored to individual premises.

7.13 Security Threat

SECURITY THREAT GUIDELINES

SCOPE

The following provides guidance to responding to a security threat or incident.

Depending on the specific incident, some or all the noted activities may be actioned.

Situations that may activate this procedure include:

- Threat or suspicious activity
- Trespassing
- Vandalism
- Sabotage (including terrorism consequences)
- Cyber attack/control systems security threat (e.g., SCADA)

Note:

If a threat against PNG infrastructure is received, it will be assumed as valid until the RCMP have investigated and determined otherwise. If any person is in immediate danger or could become in immediate danger as a result of a threat to PNG personnel or property, contact RCMP immediately.

ACTIVITIES

- ❑ Notify the control centre immediately of any suspicious activities, such as:
  - Suspicious individuals
  - Suspicious vehicles parked at or near the incident site
  - Suspicious packages located at or near infrastructure or an incident site
  - Signs of unauthorized access including vandalism or breach of security
- ❑ If the situation is judged to be UNSAFE in any way:
  - Withdraw to what is judged to be a safe distance.
  - Immediately contact RCMP (9-1-1).
  - Do not engage any individuals in any way.
  - Await the arrival of the RCMP at the incident site.
- ❑ If the situation is considered SAFE:
  - Request that RCMP (9-1-1) be called to the site.
  - Try to preserve any possible evidence found which may indicate malicious activity.
- ❑ Do not touch or move suspicious devices.
- ❑ Remain on site to serve as a point of contact for the authorities.
- ❑ Cooperate and support the RMCP investigation of the site:
  - The decision to remain on site to assist the investigations is voluntary. PNG does not expect its personnel to assist if they prefer not to do so.
- ❑ Inventory damages/property loss and estimate cost of repair or replacement.
- ❑ Make notes of evidence obtained.
- ❑ Obtain duplicate photos taken during the investigation.
- ❑ Support documentation and reporting.

7.14 Decontamination

DECONTAMINATION GUIDELINES

SCOPE

The following provides guidance on the establishment of a Decontamination Area and the safe removal and cleansing of contaminated PPE tools and equipment during the response and/or recovery from the incident.

Depending on the specific incident, some or all the noted activities may be actioned.

ACTIVITIES

- ❑ Locate the Decontamination Area to be:
  - Outside, but adjacent to, the area where spill cleanup activities will take place
  - Accessible by response vehicles, transport vehicles, and equipment
  - Placed on higher ground and upwind of the incident site, if possible
  - Clearly marked with separate entry and exit points
- ❑ Stock Decontamination Area with brushes, decontamination detergents, wash pools or tubs, and other cleaning materials; confirm access to water for cleaning purposes.
- ❑ During spill clean up, and as required, decontaminate PPE, tools, and/or equipment within the Decontamination Area:
  - Ensure personnel enter the Decontamination Area at the designated entry point and leave at the designated exit point.
  - Wear appropriate PPE, including goggles, when engaged in decontamination activities.
  - Clean heavily contaminated areas of PPE first with cloths or brushes when standing in a wash pool; then, wipe residual contaminants off with additional cloth.
  - Ensure personnel step out of and away from heavily contaminated boots and clothing.
  - Place disposable clothing and used cleaning materials into designated containers within the Disposal Staging Area.
  - Transfer all liquids used in decontamination to storage containers in the Disposal Staging Area.
- ❑ Monitor to ensure that decontamination procedures take place only within the Decontamination Area:
  - Assign monitoring to the Site Safety Assistant.

7.15 Waste Management

WASTE MANAGEMENT GUIDELINES

SCOPE

The following provides guidance to management of waste should the need be identified as a consequence of the response and recovery to an incident. The appropriate handling, storage, transport, disposal, and tracking of waste associated with a spill is essential for effective response and recovery to an incident.

Depending on the specific incident, some or all the noted activities may be actioned

ACTIVITIES

- ❑ Identify types of waste generated during an incident response that would require controlled management and disposal.
- ❑ Treat and dispose hazardous and non-hazardous waste in a manner which complies with, or exceeds, the BC *Environmental Management Act,* the *Hazardous Waste Regulation*, the *Federal Transportation of Dangerous Goods Act* and regulations, and the WHMIS guidelines.
- ❑ Obtain appropriate permits for the storage, handling, and disposal of hazardous or special wastes.
- ❑ Secure appropriate contractors/service providers for waste transportation and disposal.
- ❑ Establish a Disposal Staging Area adjacent to the Decontamination Area for the temporary storage of:
  - Contaminated PPE, tools, and equipment that require more thorough cleaning than can be carried out on site.
  - Contaminated materials such as earth, mud, disposable decontamination aids (e.g., rags or sorbent pads).
- ❑ Equip the Disposal Staging Area with trash bags, bins, or drums to hold contaminated material, tools, or PPE.
- ❑ Process waste within the Disposal Staging Area:
  - Pump contaminated liquid waste into storage tanks.
  - Secure solid waste (e.g., earth) in poly bags or designated disposal bins.
  - Non-contaminated waste to be collected in bags, totes, or drums.
  - Place soiled re-usable PPE within poly bags.
- ❑ Position transport vehicle(s) directly adjacent to the Disposal Staging Area prior to loading.
- ❑ Load waste containers and bags into a transport vehicle(s), ensuring no contaminated materials fall outside the Disposal Staging Area.
- ❑ Ensure proper transport manifesting is completed.
- ❑ Transport contaminated materials to the appropriate disposal site, obeying all appropriate provincial regulations.
- ❑ Complete and submit all required documentation to the EOC for filing.

7.16 Serious Injury/Fatality

SERIOUS INJURY/FATALITY PROCEDURE

SCOPE

Guidance on managing serious injury or fatality occurring to individuals who are in the HPZ at the time of the incident, or responders are injured while performing their duties.

ACTIVITIES

Refer to PNG HR policies and guidelines.

8 RESPONSE RESOURCES & CONTRACTORS

8.1 Equipment

8.1.1 Personal Equipment

PNG Operations personnel who could be dispatched as a responder to a gas incident should have the following as standard personal equipment

PERSONAL EMERGENCY EQUIPMENT	
• Combustible gas indicator	• Gloves
• Fire-resistant coveralls	• Hearing protection
• Hard hat	• First Aid Kit
• Safety eyewear	• Cell phone
• Safety footwear	• Flashlight (with extra batteries)
• High-visibility apparel	• Notepad, pen, pencil

8.1.2 Ignition Equipment

The following equipment is available at the Tumbler Ridge Gas Plant to support the ignition process.

IGNITION EQUIPMENT
• Flame-retardant coveralls
• Hearing protection
• Hard hats with face shields and flame-retardant liners
• Positive pressure self-contained breathing apparatus (SCBA) with 30-minute air supply
• Gas detector (LEL and H_2S)
• Flare pens and flares

8.1.3 Tumbler Ridge Gas Plant Emergency Equipment

There is emergency equipment stored at Tumbler Ridge Gas Plant that can be utilized during the response to an incident. The following table describes the various locations where items that may be utilized during an incident are kept.

EMERGENCY EQUIPMENT	LOCATION
Emergency shut-offs	Office trailer • Main breaker for electrical shut-off Inlet Filter Separator Building • Emergency gas shut-down valve
Detection equipment	Inlet Building: • Fire (2) • LEL (2) • H_2S (1) Dehy Building: • Fire (2) • LEL (2) • H_2S (1) Iron Sponge: • Fire (2) • LEL (2) • H_2S (2) DEA Building: • Fire (4) • LEL (2) • H_2S (4)
First aid kits	Office (No.1, ETV Kit, spine board) Shop (Level 1 first aid kit) Vehicles (Level 1 first aid kit)
Eye wash stations	Office (tamper-proof sealed unit) Inlet Building (two bottle unit) Dehy Building (tamper-proof sealed unit) Iron Sponge (one bottle unit) DEA Building (tamper-proof sealed unit) Shop (tamper-proof sealed unit)
Emergency shower	Dehy Building
AED (automated external defibrillator)	TBD

EMERGENCY EQUIPMENT	LOCATION
Fire extinguisher (30lbs)	Office (1) carbon dioxide Inlet Building (1) powder Dehy Building (1) powder Iron Sponge (1) powder DEA Building (2) powder Shop (1) powder
Fire extinguisher (150lbs)	Dehy Building (1 wheeled unit) DEA Building (1 wheeled unit)
Fire blankets	Office (1) Dehy Building (1) DEA Building (1) Inlet Building (1)
Person gas monitors	1 for each employee - should be worn at all times
SCBA	Office (2) • 3 spare bottles are also stored DEA Building (1)
Hands-free cell phone booster	1 kept in each truck
2-way radio	1 kept in each truck
Cellular booster	Office
Satellite text messaging devices	Office (2)
Warning horn • Blue beacon, used for all alarms	On each process building
Ignition equipment • Flare pens (2) (rim fire and centre fire) • Flares (4 boxes x 18 flares)	Office
Spill containment kits	BBI unit in shop Vehicle unit in truck
Safety harnesses (front D-Ring) and/or safety belts (rear D-Ring) with 30 metres of flame-retardant ropes	TBD

8.2 Suppliers & Services

Agreements have been established between PNG and major contractors to provide assistance during emergency conditions. Pre-qualified contractors will follow PNG standard practices so safety is not compromised. Specific contact information can be found in Section 10 Contact Information.

8.3 Mutual Aid

In the event additional resources are required to support the response and/or recovery, PNG has signed mutual assistance agreements with other utility companies. PNG will attempt to mobilize its own and contract staff before calling upon mutual aid.

PNG has membership in the following mutual assistance agreements:

- TriSummit Utilities
- Canadian Gas Association (CGA) Mutual Assistance Agreement
- Northwest Mutual Assistance Agreement (NWMAA) (Gas Supply)

The Mutual assistance agreements are stored in the Corporate Office in Vancouver. Copies can be obtained through the Manager, EH&S or the VP, Operations and Engineering.

When discussing the option to activate a mutual aid agreement, impacts and considerations regarding the following should be assessed:

- Operations
- Human resources/labour relations
- Logistics
- Communications
- Legal
- Regulatory
- Insurance
- Finance

PNG may also be requested to provide mutual assistance to another utility when they encounter an emergency event that requires additional resources to support their response and/or recovery.

9 SAFETY DATA SHEETS

As part of day-to-day functions, there are a variety of hazardous chemicals used at the Tumbler Ridge Gas Plant. Each of the following products has a Safety Data Sheet (SDS) to explain who supplies the material, its recommended use, and measures to be taken if there is an accidental release or if first aid is required.

- Natural Gas
- OASE purple SDS
- Scentinel® S-20 Gas Odorant SDS

9.1 Natural Gas

SUBSTANCE	NATURAL GAS (METHANE)
	Natural Gas SDS
CAS No.	74-82-8
Chemical Formula:	CH_4
Appearance:	colourless, odourless gas
Flash Point:	-221^0C
Auto Ignition Temp:	537^0C
Lower Explosive Limit:	5% (will vary with composition of the gas)
Upper Explosive Limit:	15% (will vary with composition of the gas)
Location:	The distribution and transmission pipelines operated by PNG contain sweet natural gas. Fugitive emissions and equipment failures may result in the release of natural gas to the atmosphere.
Hazard:	Extremely flammable. Simple asphyxiant - high concentrations can displace oxygen in air and cause suffocation.
BC Exposure Limit:	STEL/Ceiling 1000 ppm
Precautions:	Natural gas will usually dissipate harmlessly in the air, but it is highly combustible and will displace oxygen. Ignition sources must be eliminated in processing areas. Gas detection equipment should be maintained and calibrated as recommended by the manufacturer.

PACIFIC NORTHERN GAS

Natural Gas
Revision date: July 31, 2017

SAFETY DATA SHEET

Section 1: Identification

1.1 Product identifier:

Natural Gas

Other means of Identification: Aliphatic hydrocarbon mixture (Alkanes C_1 - C_4); primarily Methane (C_1)

1.2 Recommended use:

Identified uses: Natural gas in distribution pipeline as fuel for household uses.

Restrictions on use: For use only within regulated transmission pipelines.

1.3 Supplier:

Pacific Northern Gas Ltd.
Suite 2550 – 1066 West Hastings Street
Vancouver, British Columbia
Canada V6E 3X2
Tel.: (604) 691-5680 Fax: (604) 697-6210

1.4 Emergency telephone number (24-hour):

1 800 663-1173

Section 2: Hazard Identification

2.1 Classification:

Flammable Gas, Cat. 1; H220
Gases under pressure – Compressed gas; H280
Simple asphyxiant Cat. 1

2.2 Label elements:

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

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.

2.3 Other hazards:

Compressed gas rapidly releasing from containment can cause freezing of tissue (frostbite).

Section 3: Composition / Information on Ingredients

Chemical Name	CAS No.	Wt.%
Natural gas	8006-14-2	100
Mixture of the following components:		
Methane	74-82-8	95 – 99.9
Ethane	74-84-0	1 - 3
Propane	74-98-6	1
Butane	106-97-8	<1
Mercaptan odourant	Mixture 74-93-1 + 75-01-8	0.0003 (3 ppm)

PNG PACIFIC NORTHERN GAS

Natural Gas
Revision date: July 31, 2017

SAFETY DATA SHEET

Section 4: First-Aid Measures

4.1 Description of first-aid measures:

This material is an extremely flammable gas. First aid providers should take precautions to ensure their safety before attempting rescues (e.g. remove any source of ignition, use a buddy system, wear a respirator). A smell of rotten eggs from the odourant (mercaptan) is a warning to the presence of a gas leak.

Inhalation: If symptoms develop move victim to fresh air and keep comfortable for breathing. If breathing has stopped, call 911, trained personnel should begin rescue breathing or if the heart has stopped, immediately start cardiopulmonary resuscitation (CPR). Immediately call a poison center or doctor.

Eye Contact: If eye irritation develops, move victim to fresh air. Flush eyes with clean water or eye-wash saline. In case of freezing or frostbite from rapidly releasing compressed gas: get emergency medical attention.

Skin Contact: In case of freezing or frostbite from rapidly releasing compressed gas: Remove source of exposure. For brief contact with a small amount: Rewarm with body heat. For extensive contact with a large amount: Call 911 to get immediate medical attention.

Ingestion: Not an applicable route of exposure.

4.2 Most important symptoms and effects, acute and delayed:

Inhalation: Natural gas in high concentrations in the air displaces oxygen and may cause suffocation. Symptoms of exposure may include increased breathing and pulse rate, loss of muscular coordination, emotion upset, abnormal fatigue from exertion, dizziness, nausea, gasping and possible loss of consciousness.

Eye and Skin Contact: Gas leak in air, may cause reversible eye irritation. Close contact with compressed gas rapidly releasing from containment can cause freezing of tissue (frostbite).

4.3 Indication of any immediate medical attention and special treatment needed:

In case of asphyxiation or loss of consciousness emergency medical attention is required.

4.4 Medical Conditions Aggravated by Exposure:

Not available

Section 5: Fire-fighting Measures

5.1 Extinguishing media:

Do not extinguish a leaking gas fire unless leak can be stopped. Shut off flow of gas from a safe location.
Small fire: Dry chemical or CO_2.
Large fire: Water spray or fog.
Unsuitable extinguishing media: Not available

5.2 Special hazards arising from the product:

Extremely flammable gas. Will be easily ignited by heat, sparks or flames. Will form explosive mixtures with air.
Ignition of a large volume of gas vapour mixed with air causes sudden expansion and turbulence resulting in an explosion known as vapour cloud explosion.
Natural gas can accumulate in confined spaces and low areas, resulting in an explosion and asphyxiation hazard.

SAFETY DATA SHEET

5.3 Special protective equipment and precautions for fire-fighters:

Shut off flow of gas from a safe location.
For public safety, isolate the spill or leak area for at least 100 meters in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas.
Wear positive pressure self-contained breathing apparatus and thermal-protective fire-fighter's clothing.
Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
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.
For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
If a tank is involved in a fire, isolate for 1600 m in all directions; also consider initial evacuation for 1600 m in all directions.

Section 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures:

Evacuate the area. Shut off flow of gas from a safe location. Extinguish all sources of ignition (sparks, flames and internal combustion engines). No smoking. Remove sources of heat. Move to a safe location and stay upwind of the gas leak.

If a leak is suspected:

1. Do not start your vehicle or any equipment that could be a potential ignition source near the suspected leak.
2. Do not turn on lights or appliances powered by electricity, batteries (including portable phones) or natural gas.
3. Do not use a match or lighter.
4. Report gas leak incidents immediately.

6.2 Environmental precautions:

Prevent spreading of flammable gases through sewers, ventilation systems and into confined spaces.

6.3 Methods and material for containment and cleaning up:

Isolate the area until the gas has dispersed. Monitor workplace air for levels of oxygen and flammable gas before anyone is allowed into area. Pay special attention to low-lying areas where the gas may have accumulated.

Section 7: Handling and Storage

7.1 Precautions for safe handling:

Must be handled only by trained personnel under approved operating procedures that comply with the codes, regulations, technical standards and specifications for gas distribution systems of the municipality, province and Government of Canada.
Observe handling regulations for compressed flammable gases in distribution systems.

7.2 Conditions for safe storage:

Comply with regulations for compressed flammable gases in pipelines.

Section 8: Exposure Controls / Personal Protection

8.1 Control parameters:

Ingredient	ACGIH® TLV®	Other Exposure Limits
Aliphatic hydrocarbon gases – Alkane [C1 – C4]	Minimal oxygen content (appendix F) Explosion hazard	TWA: 1000 ppm British Columbia, Alberta, Ontario

8.2 Exposure controls:

Engineering controls: Methods include mechanical ventilation (dilution and local exhaust). Provide sufficient local exhaust and general (dilution) ventilation to maintain the gas concentration below one tenth of the lower explosive limit. Use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Administrative controls and personal protective equipment may also be required.
For large-scale operations handling compressed flammable gas, consider installation of leak and fire detection equipment and a suitable automatic fire suppression system.

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8.3 Individual protection measures:

Eye/Face protection: Wear safety glasses with side-shields.

Skin protection: Wear thermal protective gloves. Wear fire-retardant work clothing.

Respiratory protection: In workplaces where airborne vapour concentrations exceed exposure limits, use a combination of engineering controls (e.g. ventilation) and personal protection (e.g. wear an approved supplied-air respirator). Consult safety supplier for respirator specifications.

Other protection: A respiratory protection program that meets the regulatory requirement, such as Canadian Standards Association (CSA) Standard Z94.4, must be followed whenever workplace conditions warrant a respirator's use.

Section 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties:

Appearance:	Gas. Colourless, invisible.
Odour:	Odour of rotten eggs from added odourant (mercaptan)
Odour threshold:	Not available
pH:	Not applicable
Melting point/freezing point:	-182°C (-296°F) for methane
Initial boiling point and boiling range:	-162°C (-259°F) for methane
Flash point:	Not available
Flammability (solid, gas):	Extremely flammable gas.
Upper/lower flammability or explosive limits:	LEL: 5% for methane UEL: 15.4% for methane
Evaporation rate:	Evaporates rapidly at room temperature
Vapour pressure:	Not available
Vapour density:	0.055 (air = 1)
Relative density:	Not applicable
Solubility (ies):	Insoluble in water
Partition coefficient (n-octanol/water):	Not available
Auto-ignition temperature:	537°C (999°F) for methane
Decomposition temperature:	Not available
Viscosity:	Not applicable

Section 10: Stability and Reactivity

10.1 Reactivity:

Reactions with strong oxidizing agents and halogen compounds increase the risk of fire and explosion.

10.2 Chemical stability:

Stable. Releases of compressed gas to air are extremely flammable or explosive in the presence of an ignition source. May cause a flash fire.

10.3 Possibility of hazardous reactions:

Contact with strong oxidizing agents and halogens increase the risk of fire and explosion.

10.4 Conditions to avoid:

Avoid releases of natural gas to air.
Avoid exposure to heat and ignition sources.
Avoid contact with incompatible materials.

10.5 Incompatible materials:

Avoid contact with oxygen and strong oxidizing agents (e.g. chlorine, fluorine, peroxides, nitrates and perchlorates) which can increase risk of fire and explosion. Incompatible with halogen compounds (e.g. chlorine gas), contact may cause an explosion.

Pure Methane gas is corrosive to acrylonitrile butadiene styrene (ABS) and high density polyethylene (HDPE). Slightly corrosive to polypropylene.

10.6 Hazardous decomposition products:

Combustion produces carbon dioxide and carbon monoxide.

Section 11: Toxicological Information

11.1 Information on toxicological effects:

Likely routes of exposure

Inhalation; Skin contact; Eye contact.

Acute toxicity

Inhalation: Natural Gas in high concentrations in the air displaces oxygen and can cause symptoms of oxygen deprivation (asphyxiation). Natural gas concentration of greater than 14% (140 000 ppm) will displace oxygen (O_2) to 18% in air and cause oxygen deprivation.
Symptoms of oxygen deficiency are:
O_2=12-16% - breathing and pulse rate are increased, with slight loss of muscular coordination;
O_2=10-14% - emotional upsets, abnormal fatigue from exertion, disturbed respiration;
O_2=6-10% - nausea and vomiting, inability to move freely, collapse, possible loss of consciousness;
O_2=below 6% - convulsive movements, gasping, possible respiratory collapse and death.

Exercise increases the body's need for oxygen, symptoms will occur more quickly during exertion in an oxygen-deficient environment.
Ingestion: Not a likely route of exposure.

Skin: Not absorbed through the skin.

Skin corrosion / irritation

Close contact with compressed gas rapidly releasing from containment can cause freezing of tissue (frostbite).

Serious eye damage / irritation

Close contact with compressed gas rapidly releasing from containment can cause freezing of tissue (frostbite).

STOT (Specific Target Organ Toxicity) – Single exposure

Natural gas component propane, and some other closely related aliphatic hydrocarbons (isobutane and butane), are weak cardiac sensitizers in humans following inhalation exposures to high concentrations. Cardiac sensitizers may cause the sudden onset of an irregular heartbeat (arrhythmia) and, in some cases, sudden death, particularly when under stress.
At high concentrations, the components of Natural gas can cause depression of the central nervous system (CNS) based on animal and human information. Unconsciousness (narcosis) from inhalation of ethane has been observed due to CNS depression at approximately 130000 ppm (13%).
Unconsciousness (narcosis) from inhalation of butane has been observed due to CNS depression at approximately 17000 ppm (1.7%).

STOT (Specific Target Organ Toxicity) – Repeated exposure

Data not available

Aspiration hazard

Does not meet criteria for classification for aspiration toxicity.

Sensitization - respiratory and/or skin

Data not available.

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11.1 Information on toxicological effects (continued):

Carcinogenicity

This mixture does not contain any component that is considered a human carcinogen by IARC (International Agency for Research on Cancer), ACGIH (American Conference of Governmental Industrial Hygienists, OSHA (Occupational Safety and Health Administration) or NTP (National Toxicology Program).

Reproductive toxicity

Data not available

Germ cell mutagenicity

Not known to be mutagenic.

Interactive effects

Data not available

Section 12: Ecological Information

12.1 Toxicity:

Natural gas is not expected to result in any ecological damage to water or land. VOC gases are reportable to the National Pollutant Release Inventory, Environment Canada. Methane is regulated as a greenhouse gas.

12.2 Persistence and degradability:

Inherently bio-degradable.

12.3 Bioaccumulative potential:

Not applicable

12.4 Mobility in soil:

Data not available

Section 13: Disposal Considerations

13.1 Disposal methods:

An appropriate flare in a safe location. Dispose of waste natural gas in accordance with applicable local, provincial and federal regulations. Contact local authorities for disposal of large quantities of product.

Section 14: Transport Information

14.1 Canada Transportation of Dangerous Goods (TDG) Regulations:

UN1971, NATURAL GAS, COMPRESSED with high methane content, Class 2.1

Emergency Response Guide 115

Section 15: Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

Canada

National Pollutant Release Inventory: VOC gases are NPRI reportable substances.

NSNR status: All ingredients are listed on the DSL or are not required to be listed.

USA

TSCA status: All ingredients are on the TSCA Inventory or are exempt from TSCA Inventory requirements.

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Section 16: Other Information

Revision date:

July 31, 2017

References and sources for data:

CCOHS Cheminfo
HSDB® – Hazardous Substances Data Bank®
NIOSH Pocket Guide
CNESST – Commission des normes, de l'équité de la santé et de la sécurité du travail

Legend to abbreviations:

ACGIH – American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
TWA – Time weighted average
TLV - Threshold Limit Value
VEMP – Valeur d'exposition moyenne pondérée
WHMIS – Workplace Hazardous Materials Information System.

Additional information:

The Supplier (as identified in Section 1.3 of this SDS) and its affiliates make no representation or warranty (express or implied) of any kind, and without limiting the generality of the foregoing as to the completeness or accuracy of the information contained in this safety data sheet ("SDS"). This SDS is intended only as a guide to the appropriate handling of the product by properly trained personnel using suitable precautions. Individuals receiving this SDS must exercise their independent judgment in determining its appropriateness for a particular purpose. The Supplier. and its affiliates will not be liable for any damages or injuries which may result from the use of or reliance on this SDS. This SDS is only for the use of the customers (and their employees and agents) of the Supplier and its affiliates, and any distribution of this SDS by such customers to third parties is prohibited without the written consent of the Supplier.

9.2 OASE purple (Amine)

SUBSTANCE:	OASE PURPLE (AMINE)
CAS No.	105-59-9, 40% by weight, 2,2'-methyliminodiethanol
	110-85-0, ≥ 2.0 – ≤ 41.0% piperazine
Supplier:	Brenntag Canada Inc. Telephone: 289-360-1300, see SDS
Form:	liquid
Odour:	amine-like
pH value:	13-14
Flammability:	not flammable
Boiling Point:	> 100^0C
Location:	Amine is stored in barrels with secondary containment until used.
Hazard:	May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction. Suspected of damaging fertility. Suspected of damaging the unborn child. Causes severe skin burns and eye damage. Obtain special instructions before use. In case of inadequate ventilation, wear respiratory protection. Do not handle until all safety precautions have been read and understood. Contaminated work clothing should not be allowed out of the workplace. Wash with plenty of water and soap thoroughly after handling.
	Immediately remove contaminated clothing. If danger of loss of consciousness, place patient in recovery position and transport accordingly. Apply artificial respiration if necessary. First aid personnel should pay attention to their own safety.
Precautions:	Avoid inhalation. Avoid contact with the skin, eyes, and clothing. Wear protective gloves/protective clothing/eye protection/face protection. Do not breathe dust or mist.
	Ensure thorough ventilation of stores and work areas. Handle in accordance with good industrial hygiene and safety practices. When using, do not eat, drink, or smoke. Hands and/or face should be washed before breaks and at the end of the shift.
Environmental Impacts:	Avoid release to the environment. Harmful to aquatic life. If large amounts are released, pump off product. For residues, pick up with suitable absorbent material.
Spills:	Spill containment kits are stored in the shop and the operator's truck. In addition to the spill kits, earthen berms can be constructed on lease using the Bobcat to prevent spilled substances from getting to a water body. Spills will be reported immediately to the Manager of Operations and the Director, EOH&S. External resources will be activated without delay to control the spill. Rainwater or melting snow must not be allowed to accumulate in secondary containment as it will reduce its containment capacity.
***SEE* Brenntag SDS for OASE purple enriched**	

Brenntag Canada Inc.

BRENNTAG

OASE PURPLE

PRODUCT DISTRIBUTED BY / PRODUIT DISTRIBUÉ PAR

Brenntag Canada Inc.
43 Jutland Road.
Toronto, Ontario
M8Z 2G6
(416) 259-8231

WHMIS Number: 00072506
Index: BCi1647/15B
Effective Date: 2015 06 22
Date of Revision: 2015 06 22
Website: http://www.brenntag.ca

EMERGENCY TELEPHONE NUMBER (For Emergencies Involving Chemical Spills or Releases)

1 855 273 6824

NUMÉRO DE TÉLÉPHONE D'URGENCE (pour les urgences impliquant des rejets ou des déversements chimiques)

This document consists of an SDS in English and French in GHS format.

Le présent document est une FDS en anglais et en français en format SGH.

READ THE ENTIRE SAFETY DATA SHEET (SDS) FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT.

LIRE LA FICHE DE DONNÉES DE SÉCURITÉ (FDS) POUR UNE ÉVALUATION COMPLÈTE DES DANGERS QUE REPRÉSENTE CE PRODUIT.

BASF
We create chemistry

Safety Data Sheet
OASE purple

Revision date : 2015/06/22 Page: 1/11
Version: 1.0 (30551796/SDS_GEN_CA/EN)

1. Identification

Product identifier used on the label

OASE purple

Recommended use of the chemical and restriction on use
Recommended use*: Chemical

* The "Recommended use" identified for this product is provided solely to comply with a Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:
BASF Canada Inc.
100 Milverton Drive
Mississauga, ON L5R 4H1, CANADA

Telephone: +1 289 360-1300

Emergency telephone number

CANUTEC (reverse charges): (613) 996-6666
BASF HOTLINE: (800) 454-COPE (2673)

Other means of identification

2. Hazards Identification

According to Hazardous Products Regulations (HPR) (SOR/2015-17)

Classification of the product

Eye Dam./Irrit.	1	Serious eye damage/eye irritation
Resp. Sens.	1	Respiratory sensitization
Skin Sens.	1	Skin sensitization
Repr.	2 (fertility)	Reproductive toxicity
Repr.	2 (unborn child)	Reproductive toxicity

Label elements

Pictogram:

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Signal Word:
Danger

Hazard Statement:

H318	Causes serious eye damage.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317	May cause an allergic skin reaction.
H361	Suspected of damaging fertility. Suspected of damaging the unborn child.

Precautionary Statements (Prevention):

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P201	Obtain special instructions before use.
P284	[In case of inadequate ventilation] wear respiratory protection.
P202	Do not handle until all safety precautions have been read and understood.
P272	Contaminated work clothing should not be allowed out of the workplace.

Precautionary Statements (Response):

P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/physician.
P304 + P341 + P311	IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician.
P303 + P352	IF ON SKIN (or hair): Wash with plenty of soap and water.
P362 + P364	Take off contaminated clothing and wash before reuse.

Precautionary Statements (Storage):

P405	Store locked up.

Precautionary Statements (Disposal):

P501	Dispose of contents/container to hazardous or special waste collection point.

Hazards not otherwise classified

If applicable information is provided in this section on other hazards which do not result in classification but which may contribute to the overall hazards of the substance or mixture.

Labeling of special preparations (GHS):
The following percentage of the mixture consists of components(s) with unknown hazards regarding the acute toxicity: 96 - 98 % Inhalation - mist

3. Composition / Information on Ingredients

According to Hazardous Products Regulations (HPR) (SOR/2015-17)

CAS Number	Weight %	Chemical name

>= 91.8 - <= 92.5%	Proprietary Component 1
>= 3.6 - <= 3.9%	Proprietary Additive

4. First-Aid Measures

Description of first aid measures

General advice:
Remove contaminated clothing.

If inhaled:
If difficulties occur after vapour/aerosol has been inhaled, remove to fresh air and seek medical attention.

If on skin:
Wash off thoroughly with ample water.

If in eyes:
Immediately wash affected eyes for at least 15 minutes under running water with eyelids held open, consult an eye specialist.

If swallowed:
Rinse mouth immediately and then drink plenty of water, seek medical attention.

Most important symptoms and effects, both acute and delayed

Indication of any immediate medical attention and special treatment needed

Note to physician

Treatment:	Treat according to symptoms (decontamination, vital functions), no known specific antidote.

5. Fire-Fighting Measures

Extinguishing media

Suitable extinguishing media:
water spray, dry powder, alcohol-resistant foam, carbon dioxide

Special hazards arising from the substance or mixture

Hazards during fire-fighting:
nitrogen oxides, carbon oxides
The substances/groups of substances mentioned can be released in case of fire. Under certain conditions in case of fire other hazardous combustion products may be generated.

Advice for fire-fighters

Protective equipment for fire-fighting:
Wear self-contained breathing apparatus and chemical-protective clothing.

Further information:
Collect contaminated extinguishing water separately, do not allow to reach sewage or effluent systems.

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6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Avoid inhalation. Avoid contact with eyes.

Environmental precautions
Discharge into the environment must be avoided.

Methods and material for containment and cleaning up
For large amounts: Pump off product.
For residues: Pick up with suitable absorbent material (e.g. sand, sawdust, general-purpose binder, kieselguhr).
Clean contaminated floors and objects thoroughly with water and detergents, observing environmental regulations. Collect waste in suitable containers, which can be labeled and sealed. Incinerate or take to a special waste disposal site in accordance with local authority regulations.

7. Handling and Storage

Precautions for safe handling
Ensure thorough ventilation of stores and work areas. Handle in accordance with good industrial hygiene and safety practice. When using do not eat, drink or smoke. Hands and/or face should be washed before breaks and at the end of the shift.

Protection against fire and explosion:
Prevent electrostatic charge - sources of ignition should be kept well clear - fire extinguishers should be kept handy.

Conditions for safe storage, including any incompatibilities
Segregate from acids and acid forming substances.

Suitable materials for containers: glass, Stainless steel 1.4301 (V2), Stainless steel 1.4401, High density polyethylene (HDPE), Carbon steel (Iron), tinned carbon steel (Tinplate)

Further information on storage conditions: Store protected against freezing.

8. Exposure Controls/Personal Protection

Components with occupational exposure limits

No occupational exposure limits known.

piperazine

ACGIH TLV	TWA value 0.03 ppm Inhalable fraction and vapor (piperazine);

Personal protective equipment

Respiratory protection:
Suitable respiratory protection for lower concentrations or short-term effect: Combination filter for gases/vapours of organic compounds and solid and liquid particles (f.e. EN 14387 Type A-P2)
Suitable respiratory protection for higher concentrations or long-term effect: Self-contained breathing apparatus.

Hand protection:
Chemical resistant protective gloves (EN 374), e.g. nitrile rubber (0.4 mm), chloroprene rubber (0.5 mm), polyvinylchloride (0.7 mm) and other, Supplementary note: The specifications are based on tests, literature data and information of glove manufacturers or are derived from similar substances by analogy. Due to many conditions (e.g. temperature) it must be considered, that the practical usage of a chemical-protective glove in practice may be much shorter than the permeation time determined through testing.

Eye protection:
Tightly fitting safety goggles (splash goggles) (e.g. EN 166)

General safety and hygiene measures:
Avoid contact with eyes. Avoid inhalation of vapour. Wearing of closed work clothing is required additionally to the stated personal protection equipment. Females of childbearing age should not come into contact with the product.

9. Physical and Chemical Properties

Form:	liquid	
Odour:	amine-like	
Odour threshold:	Not determined due to breath way sensitizing properties.	
Colour:	colourless to yellow	
pH value:	11 - 12 (100 g/l, 20 °C)	
Melting point:	< -10 °C	
Boiling point:	approx. > 100 °C	
Flash point:	approx. 118 °C The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.	(DIN ISO 2592)
Flammability:	not flammable	
Lower explosion limit:	1.3 %(V)	
Upper explosion limit:	7.4 %(V)	
Autoignition:	265 °C The product has not been tested. The statement has been derived from the properties of the individual components.	
Vapour pressure:	< 1 mbar (20 °C) < 1 mbar (50 °C)	
Density:	approx. 1.04 g/cm3 (20 °C)	
Relative density:	1.04 (20 °C)	(calculated)
Information on: 2,2'-methyliminodiethanol		
Partitioning coefficient n-octanol/water (log Pow):	-1.08 (25 °C) -1.16 (23 °C)	(OECD Guideline 107) (OECD Guideline 107)
Information on: Diethylenediamine Use: Chemical used in synthesis and/or formulation of industrial products.		
Partitioning coefficient n-octanol/water (log Pow):	-1.24 (25 °C)	(OECD Guideline 107)

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Self-ignition temperature:	The value has not be determined because of the low risk of self-ignition in consequence of the high flash-point.
Thermal decomposition:	No decomposition if stored and handled as prescribed/indicated.
Miscibility with water:	(20 °C) miscible
Evaporation rate:	Value can be approximated from Henry's Law Constant or vapor pressure.
Other Information:	If necessary, information on other physical and chemical parameters is indicated in this section.

10. Stability and Reactivity

Reactivity

Oxidizing properties:
not fire-propagating

Chemical stability

Possibility of hazardous reactions
Strong exothermic reaction with acids.

Conditions to avoid

Incompatible materials
acids, acid chlorides, acid anhydrides

Hazardous decomposition products

Decomposition products:
Possible thermal decomposition products: carbon oxides, nitrogen oxides

Thermal decomposition:
No decomposition if stored and handled as prescribed/indicated.

11. Toxicological information

Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

Acute Toxicity/Effects

Oral

Information on: Proprietary Component 1
Type of value: LD50
Species: rat
Value: 4,680 mg/kg (BASF-Test)

Information on: Proprietary Additive
Type of value: LD50
Species: rat
Value: approx. 2,600 mg/kg (BASF-Test)

Inhalation

Information on: Proprietary Component 1
Species: rat
Value: (BASF-Test)
Exposure time: 8 h
Inhalation-risk test (IRT): No mortality within 8 hours as shown in animal studies. The inhalation of a highly saturated vapor-air mixture represents no acute hazard.

Dermal

Information on: Proprietary Additive
Type of value: LD50
Species: rabbit
Value: 4,000 mg/kg
Literature data.

Skin
Species: rabbit
Result: non-irritant
Method: OECD Guideline 404

Eye
Result: Risk of serious damage to eyes.

Sensitization

Information on: Proprietary Additive
Guinea pig maximization test
Species: guinea pig
Result: sensitizing
Literature data.

Aspiration Hazard
No aspiration hazard expected.

Chronic Toxicity/Effects

Repeated dose toxicity

Information on: 2,2'-methyliminodiethanol
Assessment of repeated dose toxicity: No adverse effects were observed after repeated dermal exposure in animal studies.

Genetic toxicity

Information on: 2,2'-methyliminodiethanol

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Assessment of mutagenicity: No mutagenic effect was found in various tests with bacteria and mammalian cell culture. The substance was not mutagenic in a test with mammals. Literature data.

Information on: Diethylenediamine Use: Chemical used in synthesis and/or formulation of industrial products.
Assessment of mutagenicity: In the majority of studies performed with microorganisms and in mammalian cell culture, a mutagenic effect was not found. A mutagenic effect was also not observed in in vivo tests. Literature data.

Carcinogenicity

Information on: 2,2'-methyliminodiethanol
Assessment of carcinogenicity: The whole of the information assessable provides no indication of a carcinogenic effect. Under certain conditions the substance can form nitrosamines. Nitrosamines are carcinogenic in animal studies.

Information on: Diethylenediamine Use: Chemical used in synthesis and/or formulation of industrial products.
Assessment of carcinogenicity: No data was available concerning carcinogenic activity. Under certain conditions the substance can form nitrosamines. Nitrosamines are carcinogenic in animal studies.

Reproductive toxicity

Information on: 2,2'-methyliminodiethanol
Assessment of reproduction toxicity: The potential to impair fertility cannot be excluded when given at maternally toxic doses. The results were determined in a Screening test (OECD 421/422). Because the relevance of the results to human health is unclear, further tests will be initiated. The product has not been fully tested. The statements have been derived in parts from products of a similar structure or composition.

Information on: Diethylenediamine Use: Chemical used in synthesis and/or formulation of industrial products.
Assessment of reproduction toxicity: The results of animal studies suggest a fertility impairing effect.

Teratogenicity

Information on: Proprietary Additive
Assessment of teratogenicity: Indications of possible developmental toxicity/teratogenicity were seen in animal studies.

Other Information
No experimental evidence available for genotoxicity in vitro (Ames test negative). The product has not been tested. The statement has been derived from the properties of the individual components.

Symptoms of Exposure

12. Ecological Information

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Toxicity

Toxicity to fish

Information on: Proprietary Component 1
LC50 (96 h) 1,466 mg/l, Leuciscus idus (DIN 38412 Part 15, static)
Nominal concentration. After neutralization no appreciable reduction in harmful effect can be observed.

Information on: Proprietary Additive
LC50 (96 h) > 1,800 mg/l, Poecilia reticulata (JIS K 0102-71, semistatic)
Nominal concentration. Literature data.

Aquatic invertebrates

Information on: Proprietary Component 1
EC50 (48 h) 233 mg/l, Daphnia magna (Directive 79/831/EEC, static)
Nominal concentration.

Aquatic plants

Information on: Proprietary Component 1
EC50 (72 h) 176 mg/l (growth rate), Scenedesmus subspicatus (DIN 38412 Part 9)
Nominal concentration.

Microorganisms/Effect on activated sludge

Toxicity to microorganisms

Information on: Proprietary Component 1
Directive 88/302/EEC, part C, p. 118 aerobic
activated sludge, domestic/EC20 (30 min): > 1,000 mg/l

Persistence and degradability

Elimination information

Information on: Proprietary Component 1
96 % DOC reduction (18 d) (OECD 301 A (new version)) (aerobic, activated sludge, domestic)

Information on: Proprietary Additive
65 % BOD of the ThOD (28 d) (OECD Guideline 301 F) (activated sludge, domestic)

Bioaccumulative potential

Bioaccumulation potential

Information on: Proprietary Component 1

Because of the n-octanol/water distribution coefficient (log Pow) accumulation in organisms is not to be expected.

Mobility in soil

Assessment transport between environmental compartments

Information on: Proprietary Additive

The substance will not evaporate into the atmosphere from the water surface.
Adsorption to solid soil phase is possible.

Additional information

Adsorbable organically-bound halogen (AOX):
This product contains no organically-bound halogen.

Other ecotoxicological advice:
Due to the pH-value of the product, neutralization is generally required before discharging sewage into treatment plants. The inhibition of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations. Do not release untreated into natural waters. The product has not been tested. The statement has been derived from the properties of the individual components.

13. Disposal considerations

Waste disposal of substance:
Incinerate in suitable incineration plant, observing local authority regulations.

Container disposal:
Contaminated packaging should be emptied as far as possible; then it can be passed on for recycling after being thoroughly cleaned.

14. Transport Information

Land transport
TDG

Not classified as a dangerous good under transport regulations

Sea transport
IMDG

Not classified as a dangerous good under transport regulations

Air transport
IATA/ICAO

Not classified as a dangerous good under transport regulations

15. Regulatory Information

Federal Regulations

Registration status:

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Chemical	DSL, CA	released / listed

According to Controlled Products Regulations (CPR) (SOR/88-66)

WHMIS classification:	D2B: Materials Causing Other Toxic Effects - Toxic material

16. Other Information

SDS Prepared by:
BASF NA Product Regulations
SDS Prepared on: 2015/06/22

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

END OF DATA SHEET

9.3 Scentinel® S-20 Gas Odorant

SAFETY DATA SHEET

Chevron Phillips Chemical Company LP

Scentinel® A Gas Odorant

Version 3.3 Revision Date 2020-06-16

According to Regulation (EC) No. 1907/2006, Regulation (EC) No. 2015/830

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1

Product information

Product Name : Scentinel® A Gas Odorant
Material : 1119674, 1119564, 1106807, 1098462, 1102596, 1086453, 1098407, 1086452, 1102264, 1072060, 1098463, 1103512, 1070006, 1024777, 1024776, 1024775, 1024774, 1029441, 1029442, 1029443, 1029444, 1029445

EC-No.Registration number

Chemical name	CAS-No. EC-No. Index No.	Legal Entity Registration number
Ethyl Mercaptan	75-08-1 200-837-3 016-022-00-9	Chevron Phillips Chemicals International NV 01-2119491286-30-0000

1.2

Relevant identified uses of the substance or mixture and uses advised against

Relevant Identified Uses Supported : Manufacture of Ethanethiol used under Strictly Controlled Conditions
Use at Industrial Site - Intermediate
Injection as odorant in Liquified Petroleum Gas under Strictly Controlled Conditions – Industrial
Injection as odorant in Liquified Petroleum Gas under Strictly Controlled Conditions – Consumer

1.3

Details of the supplier of the safety data sheet

Company : Chevron Phillips Chemical Company LP
10001 Six Pines Drive
The Woodlands, TX 77380

Local : Chevron Phillips Chemicals International N.V.
Airport Plaza (Stockholm Building)
Leonardo Da Vincilaan 19
1831 Diegem
Belgium

SDS Number:100000068741 1/19

SDS Requests: (800) 852-5530
Technical Information: (832) 813-4862
Responsible Party: Product Safety Group
Email:sds@cpchem.com

1.4

Emergency telephone:

Health:
866.442.9628 (North America)
1.832.813.4984 (International)
Transport:
CHEMTREC 800.424.9300 or 703.527.3887(int'l)
Asia: CHEMWATCH (+612 9186 1132) China: 0532 8388 9090
EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Mexico CHEMTREC 01-800-681-9531 (24 hours)
South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600
Argentina: +(54)-1159839431

Responsible Department	:	Product Safety and Toxicology Group
E-mail address	:	SDS@CPChem.com
Website	:	www.CPChem.com

ODOR-FADE WARNING

A GAS LEAK CAN CAUSE A FIRE OR EXPLOSION RESULTING IN SERIOUS INJURY OR DEATH.

Be aware that the stenching chemical added to gas to make it detectable may not warn of a gas leak or the presence of propane or natural gas to all persons in every instance.

Instances where the odorant in an odorized gas may be undetectable include:

• Odor intensity may fade or be eliminated for a variety of chemical and physical causes, including the oxidation of rusting pipes, adsorption into or sticking onto the interior of pipes or appliances, or absorption into liquids.
• Contact with soil in underground leaks may de-odorize or remove odorant from the gas.
• Some people have a diminished ability, or inability to smell the stench. Factors that negatively affect a person's sense of smell include age, gender, medical conditions, and alcohol/tobacco usage.
• The stench of odorized gas may not awaken sleeping persons.
• Other odors may mask or hide the stench.
• Exposure to the odor for even a short period of time, may cause nasal fatigue, where a person can no longer smell the stench.

Gas detectors listed by the Underwriters Laboratories (UL) can be used as an extra measure of safety for detecting gas leaks, especially under conditions where the odorant alone may not provide an adequate warning. Gas detectors emit a loud, shrill sound when gas is present and do not depend on sense of smell. Because the odor intensity can fade or people may have problems with their sense of smell, we recommend installing, per manufacturer's instructions, one or more combustible gas detectors, in suitable locations to ensure adequate coverage to detect gas leaks.

Educate yourself, your employees, and your customers with the content of this warning and other important facts associated with the so-called "odor-fade phenomenon."

SAFETY DATA SHEET

Scentinel® A Gas Odorant

Version 3.3 Revision Date 2020-06-16

SECTION 2: Hazards identification

2.1

Classification of the substance or mixture
REGULATION (EC) No 1272/2008

Flammable liquids, Category 1	H224: Extremely flammable liquid and vapor.
Acute toxicity, Category 4	H302: Harmful if swallowed.
Acute toxicity, Category 4	H332: Harmful if inhaled.
Skin sensitization, Sub-category 1B	H317: May cause an allergic skin reaction.
Short-term (acute) aquatic hazard, Category 1	H400: Very toxic to aquatic life.
Long-term (chronic) aquatic hazard, Category 1	H410: Very toxic to aquatic life with long lasting effects.

2.2

Labeling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal Word : Danger

Hazard Statements :

H224	Extremely flammable liquid and vapor.
H302 + H332	Harmful if swallowed or if inhaled.
H317	May cause an allergic skin reaction.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements :

Prevention:

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233	Keep container tightly closed.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.

Response:

P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.

Storage:

P403 + P235	Store in a well-ventilated place. Keep cool.

Hazardous ingredients which must be listed on the label:

- 75-08-1 Ethyl Mercaptan

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SAFETY DATA SHEET

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SECTION 3: Composition/information on ingredients

3.1 - 3.2
Substance or Mixture

Synonyms : ETSH
Ethanethiol
Ethyl Mercaptan

Molecular formula : C2H6S

Hazardous ingredients

Chemical name	CAS-No. EC-No. Index No.	Classification (REGULATION (EC) No 1272/2008)	Concentration [wt%]
Ethyl Mercaptan	75-08-1 200-837-3 016-022-00-9	Flam. Liq. 1; H224 Acute Tox. 4; H302 Acute Tox. 4; H332 Skin Sens. 1B; H317 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	99

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1
Description of first-aid measures

General advice : Move out of dangerous area. Show this material safety data sheet to the doctor in attendance. Material may produce a serious, potentially fatal pneumonia if swallowed or vomited.

If inhaled : If unconscious, place in recovery position and seek medical advice. If symptoms persist, call a physician.

In case of skin contact : If on skin, rinse well with water. If on clothes, remove clothes.

In case of eye contact : Flush eyes with water as a precaution. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.

If swallowed : Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5: Firefighting measures

Flash point : -48°C (-54°F)

Autoignition temperature : 295°C (563°F)

5.1
Extinguishing media

Suitable extinguishing media : Alcohol-resistant foam. Carbon dioxide (CO2). Dry chemical.

Unsuitable extinguishing media	:	High volume water jet.

5.2

Special hazards arising from the substance or mixture

Specific hazards during fire fighting	:	Do not allow run-off from fire fighting to enter drains or water courses.

5.3

Advice for firefighters

Special protective equipment for fire-fighters	:	Wear self-contained breathing apparatus for firefighting if necessary.
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.
Fire and explosion protection	:	Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.
Hazardous decomposition products	:	Carbon oxides. Sulfur oxides.

SECTION 6: Accidental release measures

6.1

Personal precautions, protective equipment and emergency procedures

Personal precautions	:	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

6.2

Environmental precautions

Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

6.3

Methods and materials for containment and cleaning up

Methods for cleaning up	:	Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4

Reference to other sections

Reference to other sections	:	For personal protection see section 8. For disposal considerations see section 13.

SECTION 7: Handling and storage

7.1

Precautions for safe handling
Handling

Advice on safe handling	:	Avoid formation of aerosol. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations. Persons susceptible to skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
Advice on protection against fire and explosion	:	Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

7.2

Conditions for safe storage, including any incompatibilities

Storage

Requirements for storage areas and containers	:	No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

SECTION 8: Exposure controls/personal protection

8.1

Control parameters
Ingredients with workplace control parameters

SK

Zložky	Podstata	Hodnota	Kontrolné parametre	Poznámka
Ethyl Mercaptan	SK OEL	NPEL priemerný	0,5 ppm, 1,3 mg/m3	
	SK OEL	NPEL krátkodobý	1 ppm, 2,6 mg/m3	

SI

Sestavine	Osnova	Vrednost	Parametri nadzora	Pripomba
Ethyl Mercaptan	SI OEL	MV	0,5 ppm, 1,3 mg/m3	
	SI OEL	KTV	1 ppm, 2,6 mg/m3	

RO

Componente	Sursă	Valoare	Parametri de control	Notă
Ethyl Mercaptan	RO OEL	STEL	1 mg/m3	

PT

Componentes	Bases	Valor	Parâmetros de controlo	Nota
Ethyl Mercaptan	PT OEL	VLE-MP	0,5 ppm,	

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PL

Składniki	Podstawa	Wartość	Parametry dotyczące kontroli	Uwaga
Ethyl Mercaptan	PL NDS	NDS	1 mg/m3	
	PL NDS	NDSch	2 mg/m3	

NO

Komponenter	Grunnlag	Verdi	Kontrollparametrer	Nota
Ethyl Mercaptan	FOR-2011-12-06-1358	GV	0,5 ppm, 1 mg/m3	

MK

Съставки	Основа	Стойност	Параметри на контрол	Бележка
Ethyl Mercaptan	MK OEL	MV	0,5 ppm, 1,3 mg/m3	

LV

Sastāvdaļas	Bāze	Vērtība	Pārvaldības parametri	Piezīme
Ethyl Mercaptan	LV OEL	AER 8 st	1 mg/m3	

LT

Komponentai	Šaltinis	Vertė	Kontrolės parametrai	Pastaba
Ethyl Mercaptan	LT OEL	IPRD	1 mg/m3	O,

O patekimas per nepažeistą odą

IS

Komponenter	Grunnlag	Verdi	Kontrollparametrer	Nota
Ethyl Mercaptan	IS OEL	TWA	0,5 ppm, 1 mg/m3	

IE

Components	Basis	Value	Control parameters	Note
Ethyl Mercaptan	IE OEL	OELV - 8 hrs (TWA)	0,5 ppm,	

HU

Komponensek	Bázis	Érték	Ellenőrzési paraméterek	Megjegyzés
Ethyl Mercaptan	HU OEL	AK-érték	1 mg/m3	i,
	HU OEL	CK-érték	1 mg/m3	i,

i Ingerlő anyag (izgatja a bőrt, nyálkahártyát, szemet vagy mindhármat)

HR

Sastojci	Temelj	Vrijednost	Nadzorni parametri	Bilješka
Ethyl Mercaptan	HR OEL	GVI	0,5 ppm, 1,3 mg/m3	
	HR OEL	KGVI	2 ppm, 5,2 mg/m3	

GR

Συστατικά	Βάση	Τιμή	Παράμετροι ελέγχου	Σημείωση
Ethyl Mercaptan	GR OEL	TWA	10 ppm, 25 mg/m3	
	GR OEL	STEL	10 ppm, 25 mg/m3	

GB

Components	Basis	Value	Control parameters	Note
Ethyl Mercaptan	GB EH40	TWA	0,5 ppm, 1,3 mg/m3	
	GB EH40	STEL	2 ppm, 5,2 mg/m3	

FR

Composants	Base	Valeur	Paramètres de contrôle	Note
Ethyl Mercaptan	FR VLE	VME	0,5 ppm, 1 mg/m3	Valeurs limites indicatives,

Valeurs limites indicatives Valeurs limites indicatives

FI

Aineosat	Peruste	Arvo	Valvontaa koskevat muuttujat	Huomautus
Ethyl Mercaptan	FI OEL	HTP-arvot 15 min	0,5 ppm, 1,3 mg/m3	

ES

Componentes	Base	Valor	Parámetros de control	Nota
Ethyl Mercaptan	ES VLA	VLA-ED	0,5 ppm, 1,3 mg/m3	

EE

Komponendid, osad	Alused	Väärtus	Kontrolliparameetrid	Märkused
Ethyl Mercaptan	EE OEL	Piirnorm	0,5 ppm, 1 mg/m3	C,

C Kantserogeensed ained

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DK

Komponenter	Basis	Værdi	Kontrolparametre	Note
Ethyl Mercaptan	DK OEL	GV	0,5 ppm, 1 mg/m3	

DE

Inhaltsstoffe	Grundlage	Wert	Zu überwachende Parameter	Bemerkung
Ethyl Mercaptan	DE TRGS 900	AGW	0,5 ppm, 1,3 mg/m3	

CH

Inhaltsstoffe	Grundlage	Wert	Zu überwachende Parameter	Bemerkung
Ethyl Mercaptan	CH SUVA	MAK-Wert	0,5 ppm, 1,3 mg/m3	
	CH SUVA	KZGW	1 ppm, 2,6 mg/m3	

BG

Съставки	Основа	Стойност	Параметри на контрол	Бележка
Ethyl Mercaptan	BG OEL	TWA	1 mg/m3	

BE

Bestanddelen	Basis	Waarde	Controleparameters	Opmerking
Ethyl Mercaptan	BE OEL	TGG 8 hr	0,5 ppm, 1,3 mg/m3	

AT

Inhaltsstoffe	Grundlage	Wert	Zu überwachende Parameter	Bemerkung
Ethyl Mercaptan	AT OEL	MAK-KZW	0,5 ppm, 1,3 mg/m3	
	AT OEL	MAK-TMW	0,5 ppm, 1,3 mg/m3	

DNEL : End Use: Workers
Routes of exposure: Inhalation
Potential health effects: Chronic effects, Systemic effects
Value: 14,5 mg/m3

DNEL : End Use: Workers
Routes of exposure: Skin contact
Potential health effects: Chronic effects, Systemic effects
Value: 2,06 mg/kg

DNEL : End Use: Workers
Routes of exposure: Inhalation
Potential health effects: Chronic effects, Local effects
Value: 18,6 mg/m3

PNEC : Fresh water
Value: 0,0001 mg/l

PNEC : Marine water
Value: 0,00001 mg/l

PNEC : Fresh water sediment
Value: 0,00049 mg/kg

PNEC : Marine sediment
Value: 0,000049 mg/kg

PNEC : Soil
Value: 0,000039 mg/kg

8.2 Exposure controls

Engineering measures

Adequate ventilation to control airborned concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

Respiratory protection	:	Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this material if exposure to harmful levels of airborne material may occur, such as:. Air-Purifying Respirator for Organic Vapors. Full-Face Air-Purifying Respirator for Organic Vapors, Dusts and Mists. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.
Hand protection	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Eye protection	:	Eye wash bottle with pure water. Tightly fitting safety goggles.
Skin and body protection	:	Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate:. Remove and wash contaminated clothing before re-use. Skin should be washed after contact. Footwear protecting against chemicals.
Hygiene measures	:	When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

For additional details, see the Exposure Scenario in the Annex portion

SECTION 9: Physical and chemical properties

9.1

Information on basic physical and chemical properties

Appearance

Form	:	Liquid
Physical state	:	Liquid
Color	:	Colorless
Odor	:	Repulsive

Safety data

Flash point	:	-48°C (-54°F)
Lower explosion limit	:	2,8 %(V)
Upper explosion limit	:	18 %(V)
Oxidizing properties	:	No
Autoignition temperature	:	295°C (563°F)
Molecular formula	:	C2H6S
Molecular weight	:	62,14 g/mol
pH	:	Not applicable
Pour point	:	No data available
Boiling point/boiling range	:	35°C (95°F)
Vapor pressure	:	16,20 PSI at 37,8°C (100,0°F)
Relative density	:	0,84 at 15,6 °C (60,1 °F)
Water solubility	:	Negligible
Partition coefficient: n-octanol/water	:	No data available
Viscosity, kinematic	:	No data available
Relative vapor density	:	2,1 (Air = 1.0)
Evaporation rate	:	1
Percent volatile	:	> 99 %

SECTION 10: Stability and reactivity

10.1

Reactivity : Stable under recommended storage conditions.

10.2

Chemical stability : This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3

Possibility of hazardous reactions

Hazardous reactions : Hazardous reactions: Hazardous polymerization does not occur.

Hazardous reactions: Vapors may form explosive mixture with air.

10.4
Conditions to avoid : Heat, flames and sparks.

10.5
Materials to avoid : May react with oxygen and strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

10.6
Hazardous decomposition products : Carbon oxides
Sulfur oxides

Other data : No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

11.1
Information on toxicological effects

Acute oral toxicity

Ethyl Mercaptan : LD50: 682 mg/kg
Species: Rat
Sex: male
Method: Fixed Dose Method

Acute inhalation toxicity

Ethyl Mercaptan : LC50: 11,23 mg/l
Exposure time: 4 h
Species: Rat
Sex: male
Test atmosphere: vapor

Skin irritation

Ethyl Mercaptan : slight irritation.

Eye irritation
Ethyl Mercaptan : slight irritation. Information given is based on data obtained from similar substances.

Sensitization

Ethyl Mercaptan : The product is a skin sensitizer, sub-category 1B.
Information given is based on data obtained from similar substances.

Repeated dose toxicity

Ethyl Mercaptan : Species: Rat, Male and female

Sex: Male and female
Application Route: Inhalation
Dose: 25, 100, 400 ppm
Exposure time: 13 wks
Number of exposures: 6 hr/d, 5 d/wk
NOEL: 100 ppm
Lowest observable effect level: 400 ppm
Method: OECD Guideline 413
Information given is based on data obtained from similar substances.

Species: Rat, Male and female
Sex: Male and female
Application Route: Oral
Dose: 0, 10, 50, 200 mg/kg
Exposure time: 42-53 days
NOEL: 50 mg/kg
Method: OECD Guideline 422
Information given is based on data obtained from similar substances.

Species: Rat, Male and female
Sex: Male and female
Application Route: Inhalation
Dose: 9, 97, 196 ppm
Exposure time: 13 wks
Number of exposures: 6 hr/d, 5 d/wk
NOEL: >=196 ppm
Method: OECD Guideline 413
Information given is based on data obtained from similar substances.

Species: Rat, Male and female
Sex: Male and female
Application Route: Inhalation
Dose: 0.03, 0.26, 0.55 mg/L
Exposure time: 13 wks
Number of exposures: 6 hr/d, 5 d/wk
NOEL: 0,03 mg/l
Method: OECD Test Guideline 413
Information given is based on data obtained from similar substances.

Genotoxicity in vitro

Ethyl Mercaptan	:	Test Type: Ames test Metabolic activation: with and without metabolic activation Method: Mutagenicity (Escherichia coli - reverse mutation assay) Result: negative Test Type: Mouse lymphoma assay Method: OECD Guideline 476 Result: Ambiguous Test Type: Sister Chromatid Exchange Assay Metabolic activation: with and without metabolic activation Result: positive

Genotoxicity in vivo

Ethyl Mercaptan	:	Test Type: Micronucleus test Species: Mouse Method: Mutagenicity (micronucleus test) Result: negative

Reproductive toxicity

Ethyl Mercaptan	:	Species: Rat Sex: male and female Application Route: Oral diet Dose: 0, 10, 50, 200 mg/kg Exposure time: 42-53 days Number of exposures: once daily Method: OECD Guideline 422 NOAEL Parent: 200 mg/kg NOAEL F1: 50 mg/kg Information given is based on data obtained from similar substances.

Developmental Toxicity

Ethyl Mercaptan	:	Species: Rat Application Route: Inhalation Dose: 0, 0.037, 0.28, or 0.56 mg/L Number of exposures: 6 hrs/d Test period: GD 6-19 Method: OECD Guideline 414 NOAEL Teratogenicity: > 0,56 mg/l Information given is based on data obtained from similar substances. Species: Rat Application Route: Inhalation Dose: 0, 10, 100, 200 ppm Number of exposures: 6 hrs/d Test period: GD 6-19 Method: OECD Guideline 414 NOAEL Teratogenicity: > 200 ppm NOAEL Maternal: > 200 ppm Information given is based on data obtained from similar substances.

Aspiration toxicity

Ethyl Mercaptan	:	May be harmful if swallowed and enters airways.

CMR effects

Ethyl Mercaptan	:	Carcinogenicity: Not available Mutagenicity: Not mutagenic in Ames Test. Teratogenicity: Animal testing did not show any effects on fetal development. Reproductive toxicity: Animal testing did not show any effects on fertility.

Scentinel® A Gas Odorant

Further information	:	Solvents may degrease the skin.

SECTION 12: Ecological information

12.1

Toxicity

Toxicity to fish

Ethyl Mercaptan	:	2,4 mg/l Exposure time: 96 h Species: Oncorhynchus mykiss (rainbow trout) Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates

Ethyl Mercaptan	:	EC50: < 0,1 mg/l Exposure time: 48 h Species: Daphnia magna (Water flea) static test Method: OECD Test Guideline 202

Toxicity to algae

Ethyl Mercaptan	:	EC50: 3 mg/l Exposure time: 72 h Species: Pseudokirchneriella subcapitata (green algae) Method: OECD Test Guideline 201

M-Factor

ethanethiol	:	M-Factor (Acute Aquat. Tox.)	10
		M-Factor (Chron. Aquat. Tox.)	10

12.2
Persistence and degradability

Biodegradability

Ethyl Mercaptan	:	aerobic Result: Not readily biodegradable. 0 % Testing period: 29 d Method: OECD Test Guideline 301F

12.3
Bioaccumulative potential
Elimination information (persistence and degradability)

Bioaccumulation	:	This material is not expected to bioaccumulate.

12.4
Mobility in soil

Mobility

Ethyl Mercaptan	:	The product will be dispersed amongst the various environmental compartments (soil/ water/ air).

12.5
Results of PBT and vPvB assessment

Results of PBT assessment	:	This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6
Other adverse effects
Ecotoxicology Assessment

Short-term (acute) aquatic hazard

Ethyl Mercaptan	:	Very toxic to aquatic life.

Long-term (chronic) aquatic hazard

Ethyl Mercaptan	:	Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1

Waste treatment methods

The information in this SDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product	:	The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

For additional details, see the Exposure Scenario in the Annex portion

SECTION 14: Transport information

14.1 - 14.7

Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)

UN2363, ETHYL MERCAPTAN, 3, I, MARINE POLLUTANT, (ETHYL MERCAPTAN)

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)

UN2363, ETHYL MERCAPTAN, 3, I, (-48°C), MARINE POLLUTANT, (ETHYL MERCAPTAN)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)

UN2363, ETHYL MERCAPTAN, 3, I

ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))

UN2363, ETHYL MERCAPTAN, 3, I, (D/E), ENVIRONMENTALLY HAZARDOUS, (ETHYL MERCAPTAN)

RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))

UN2363, ETHYL MERCAPTAN, 3, I, ENVIRONMENTALLY HAZARDOUS, (ETHYL MERCAPTAN)

ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)
UN2363, ETHYL MERCAPTAN, 3, I, ENVIRONMENTALLY HAZARDOUS, (ETHYL MERCAPTAN)

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

SECTION 15: Regulatory information

15.1

Safety, health and environmental regulations/legislation specific for the substance or mixture
National legislation

Commission Regulation (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

Water contaminating class (Germany) : WGK 3 highly water endangering

15.2

Chemical Safety Assessment

Components	:	ethanethiol	A Chemical Safety Assessment has been carried out for this substance.	200-837-3

Major Accident Hazard Legislation

: 96/82/EC Update: 2003
Highly flammable
7b
Quantity 1: 5.000 t
Quantity 2: 50.000 t

: 96/82/EC Update: 2003
Dangerous for the environment
9a
Quantity 1: 100 t
Quantity 2: 200 t

: ZEU_SEVES3 Update:
FLAMMABLE LIQUIDS
P5a
Quantity 1: 10 t
Quantity 2: 50 t

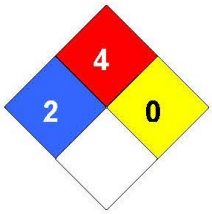
: ZEU_SEVES3 Update:
ENVIRONMENTAL HAZARDS
E1
Quantity 1: 100 t
Quantity 2: 200 t

Notification status

Europe REACH	:	This product is in full compliance according to REACH regulation 1907/2006/EC.
Switzerland CH INV	:	On the inventory, or in compliance with the inventory
United States of America (USA) TSCA	:	On or in compliance with the active portion of the TSCA inventory
Canada DSL	:	All components of this product are on the Canadian DSL
Australia AICS	:	On the inventory, or in compliance with the inventory
New Zealand NZIoC	:	On the inventory, or in compliance with the inventory
Japan ENCS	:	On the inventory, or in compliance with the inventory
Korea KECI	:	All substances in this product were registered, notified to be registered, or exempted from registration by CPChem through an Only Representative according to K-REACH regulations. Importation of this product is permitted if the Korean Importer of Record was included on CPChem's notifications or if the Importer of Record themselves notified the substances.
Philippines PICCS	:	On the inventory, or in compliance with the inventory
China IECSC	:	On the inventory, or in compliance with the inventory
Taiwan TCSI	:	On the inventory, or in compliance with the inventory

SECTION 16: Other information

NFPA Classification : Health Hazard: 2
Fire Hazard: 4
Reactivity Hazard: 0



Further information

Legacy SDS Number : 25580

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances	NFPA	National Fire Protection Agency

	List		
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%		

Full text of H-Statements referred to under sections 2 and 3.

H224	Extremely flammable liquid and vapor.
H302	Harmful if swallowed.
H317	May cause an allergic skin reaction.
H332	Harmful if inhaled.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

9.4 Hydrogen Sulphide (H_2S) Characteristics

Hydrogen sulphide (H_2S) does not have a specific SDS as it is a product. It is a component of substance(s) found at the Tumbler Ridge Gas Plant. Safety information regarding H_2S is as follows:

SUBSTANCE	HYDROGEN SULPHIDE
CAS No.	7783-06-4
Chemical Formula:	H_2S
Appearance:	colourless gas with rotten egg odour
Auto Ignition Temp:	260^0C
Lower Explosive Limit:	4.0% (will vary with composition of the gas)
Upper Explosive Limit:	46% (will vary with composition of the gas)
Location:	The Tumbler Ridge Gas Plant processes natural gas, which is contained by the process vessels and piping. The natural gas is “sour”, meaning it contains H_2S. Fugitive emissions and equipment failures may result in the release of H_2S to the atmosphere.
Hazard:	H_2S is a very toxic gas. In larger amounts, it quickly blocks the sense of smell – odour should never be used to rate H_2S levels. The gas can irritate the eyes, nose, throat, and lungs. Too much H_2S can halt the breathing centre in the brain, which can cause death. It may be possible to revive the victim, but only if first aid is given right away. H_2S dissolves in water and oil, and it may be released when these liquids are heated, depressurized, or agitated. Because H_2S is heavier than air, it may settle in low spots. This can pose risks when entering areas where the gas may be present. H_2S burns and explodes easily. When it burns, H_2S gives off sulphur dioxide, another dangerous gas that is toxic, strong smelling, and irritating. H_2S levels of 100 ppm and higher are considered immediately dangerous to life and health (IDLH).
BC Exposure Limit:	Ceiling limit 10 ppm
Precautions:	Air-purifying respirators should not be used where H_2S levels are above the 10 ppm ceiling limit. These respirators — when fitted with the appropriate acid-gas cartridges — may be used for escape only. In areas with high H_2S levels workers must wear either 1) positive-pressure, self-contained breathing apparatus (SCBA) or 2) positive-pressure, supplied-air (airline) respirators. Take precautions to ensure your own safety before attempting to rescue someone overcome by H_2S: remove any sources of ignition, wear appropriate protective equipment, use the buddy system. Remove the source of the H_2S or move victim to fresh air.

9.5 Sulphur Dioxide (SO_2) Characteristics

Sulphur dioxide (SO_2) does not have a specific SDS as it is a product. It is a component of substance(s) found at the Tumbler Ridge Gas Plant. Safety information regarding SO_2 is as follows:

SUBSTANCE	SULPHUR DIOXIDE
CAS No.	7446-09-5
Chemical Formula:	SO_2
Specific Gravity:	0.00293
Appearance:	colourless gas
Location:	At Tumbler Ridge Gas Plant, a flare stack is used to dispose of waste gas containing hydrogen sulphide (H_2S). The flare also safely disposes of natural gas during emergencies, power failures, equipment failures, or other process "upsets". SO_2 is not stored or used at Tumbler Ridge Gas Plant; it is a by-product of the combustion of H_2S. From the flare stack, SO_2 disperses in the atmosphere.
Hazard:	Sulphur dioxide may cause death or permanent injury after short exposures to small quantities. Exposure at 1000 ppm can cause death in from 10 minutes to several hours by respiratory depression. It is an eye and respiratory tract irritant. Persons with asthma, subnormal pulmonary functions, or cardiovascular disease are at a greater risk.
BC Exposure Limit:	STEL/ceiling 5 ppm, TWA 2 ppm
Environmental Impacts:	Non-flammable gas. Sulphur dioxide may oxidize to sulphur trioxide, which then dissolves in water to produce sulfuric acid.
Planned Flaring Events:	Prior to planned flaring or incineration (as opposed to flaring as the result of a process upset or emergency), operators are required to provide 24 hours notice to the Oil and Gas Commission and all residents and administrators of incorporated centres when flaring will exceed four hours duration, or the gas rate will exceed a set volume (10,000 m^3/ day). The notification radius is: 1 km for sites where H_2S is less than 1%; 1.5 km for sites with H_2S between 1% and 5%; and 3 km for sites with greater than 5% H_2S.

CONFIDENTIAL SECTION

PNG's emergency response plan is available online to all external agencies and members of the public. Information in this confidential section is available to persons associate with emergency response.

10 CONTACT INFORMATION

Specific contact information in this section is available to persons associated with emergency response.

11 MAPS

Detailed infrastructure maps in this section are available to persons associated with emergency response.