

AltaGas

Suffield Pipeline

Emergency Response Plan

December 2016

AltaGas
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online copy

ERP REVISION REQUEST FORM

ERP Name: _____ ERP Date: _____

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Revisions requested by (print name): _____

Date: _____

Send to:
<name & email address removed>
Fax: 403-691-7576

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OVERVIEW

Introduction to the Suffield Pipeline

The Suffield transmission system, located in southeast Alberta, transports natural gas produced on and around the Canadian Forces Base (CFB) Suffield to the TransCanada Pipeline (TCPL) mainline at Burstall, Saskatchewan. AltaGas purchased the Suffield system in October 2002 from EnCana who constructed the pipelines between 1998 and 2001.

Suffield consists of two independent systems:

1. Suffield North (16 inch OD x 97 km): This pipeline includes four AltaGas owned receipt stations (A1, A2, AB, and B2). It commences at the A1 isolation valve (04-03-19-09 W4M), then travels northeast, and then straight east, crossing the South Saskatchewan River, and terminating at the Burstall Meter Station adjacent to the TCPL compressor station at 07-08-20-29 W3M.
2. Suffield South (10 inch OD x 19 km and 16 inch OD x 87 km): This pipeline includes eight AltaGas owned receipt stations (C, Ald 1, D, Ald 2, Channel Lake, Drowning Ford, Koomati, and GEX). The Koomati lateral line (6 inch OD x 13 miles and 12 inch OD x 13 miles) ties into Suffield South. Suffield South commences at Station C (01-04-15-08 W4M) and travels east, then northeast, crossing the South Saskatchewan River along the southern boundary of CFB Suffield. This is an active military training and research range controlled by the Department of Defense. All personnel entering the Suffield block must have authorization to do so. Once across the river, the pipeline continues to the termination point at the Burstall Meter Station adjacent to the TCPL compressor station (07-08-20-29 W3M).

Since purchasing the pipeline system, new connections to the pipeline have been added which AltaGas does not own. Suffield South had one receipt point added at CD, which has a meter station. Two receipt points have been added to Suffield North which do not have meter stations, and measurement is performed by utilizing the shipper's facility meters.

The Suffield Pipelines pass through Cypress County and Special Area No. 2 (and the CFB Suffield) in Alberta, and Deer Forks Rural Municipality in Saskatchewan. A map showing details of the Suffield Pipeline is contained in Section 8.

The pipeline transports sweet sales gas and operates from 1100 psig at the west ends to 600 psig at Burstall. There is no booster compression situated on the pipeline.

Operations

Cenovus Energy Inc. contract operates the pipeline and TCPL operates the Burstall meter station on behalf of AltaGas. Gathering system information is included in this Emergency Response Plan (ERP) to assist in the coordination of response activities between operators and producers to ensure public safety.

The pipeline design parameters are as follows:

Design Flow Rate	400 MMscf/day	Maximum Operating Pressure	8450 kPa
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Regulatory Jurisdiction

The Suffield Pipeline falls within the jurisdiction of the National Energy Board (NEB). All pipeline-related accidents/incidents governed by the NEB shall be reported to them via the Transportation Safety Board (TSB Occurrence Hotline: 819-997-7887). Because it crosses provincial boundaries, the Alberta Energy Regulator (AER) and Saskatchewan Ministry of the Economy (ECON) also have some jurisdiction.

Introduction to emergency response at AltaGas

It is the policy of AltaGas that:

- § An up-to-date Emergency Response Plan (ERP) will be maintained for all company operations.
- § Workers (including contractors) who may be expected to respond to emergencies will be provided with the appropriate training and equipment.
 - Employees and contractors (i.e. Cenovus Operators) will be given an emergency response orientation to introduce them to the ERP for their operating area.
 - Emergency preparedness exercises covering different scenarios and conditions are to be conducted for personnel (including contractors – i.e. Cenovus Operators) at each AltaGas operating area at least once each year.
- § Where required by legislation, accidents and incidents will be reported to the appropriate federal, provincial, territorial or municipal government agency on a timely basis.

AltaGas believes that having procedures readily available will lead to a more effective response in an emergency. It is the policy of AltaGas that workers will report all work-related injuries,

illnesses, environmental damage, property damage and near misses to their supervisor as soon as reasonably practical. The supervisor will conduct an incident investigation for all incidents, with the exception of incidents where the injury or damage, or potential injury or damage, was minor.

AltaGas has a 24 hour emergency telephone number (1-866-826-3830) that is posted at the entrance to all AltaGas sites. Dialing the 24 hour emergency telephone number will connect the caller to a manned answering service. The answering service staff has a list of the business, home and cellular telephone numbers for AltaGas personnel. Telephone numbers for AltaGas staff having emergency response responsibilities for the Suffield Pipeline are listed in Section 2. Other AltaGas personnel are available to assist when requested by the *Incident Commander*.

Potential Emergency Events

A Hazard, Risk, Vulnerability and Capability Assessment (HRVCA) was completed for the Suffield area. The highest risk hazard identified for the area is an explosion from military activity on Canadian Forces Base (CFB) Suffield, and the greatest impact would be on people and AltaGas assets. The following is a full list of the hazards that were identified and pose a degree of risk with the potential to become an emergency:

- § Explosions: military activity, other
- § Fire: wildland/grass/forest, industrial/facility
- § Transportation/Vehicle Incident
- § Flood: on ROW
- § Critical Infrastructure Failure: pipelines and valves
- § Medical Event
- § Sabotage
- § Liquid/Chemical Release: at facility, on ROW
- § Sweet Gas Release: at facility, on ROW
- § Weather: severe winter storm/blizzard, lightning strike, extreme cold, extreme heat, tornado, hail storm, dust storm
- § Pipeline Strike
- § Prolonged Power Outage
- § Bomb Threat
- § Terrorism Threat
- § Disgruntled Landowner/Employee/Contractor/Vendor

- § Pipeline Rupture
- § Wildlife Attack
- § Radiological Incident
- § Infectious Disease: Epidemic/Pandemic
- § Seismic Event: earthquake
- § Control Systems Security Threat
- § Theft of Sensitive Information
- § Airplane Crash
- § Building/Structural Failure
- § Vandalism
- § Animal Disease Outbreak
- § Cyber Attack
- § Erosion: wind

DEFINITION OF AN EMERGENCY

Definition of an Emergency

An emergency is defined as any situation that threatens the health or safety of employees, contractors or the general public, or that may cause harm to the environment or major property damage. There are three levels of emergencies based upon the degree of risk to people and the environment. AltaGas has also included an “Alert” status in this section.

Alert

An **Alert** is defined as a situation in which immediate control of a hazard is obtainable with progressive resolution of the situation. Control and relief systems are functioning correctly and the impact to public/worker safety and the environment is limited to the site only. Notification to the public may be provided as a courtesy if appropriate. If notification of the public takes place, the NEB will also be notified, along with ECON and the AER, as appropriate.

Please refer to the following table for a discussion of the three levels of an emergency.

INITIAL EMERGENCY LEVEL APPROPRIATE FOR THE MAGNITUDE OF THE INCIDENT		
Emergency Level	Criteria	Action
1 Low Impact	<p>A LOWER LEVEL EMERGENCY forces normal operations to be temporarily suspended or shut down. There is no immediate hazard to the public/environment and the situation can be controlled by on-site personnel and equipment. The following conditions constitute a Level 1 Emergency:</p> <ul style="list-style-type: none"> § Public concern; § Minor injury or accident; § Small, on-site spill or release; § Small contained fire or explosion; § Major field office disruption; or § Minor damage to public property. <p>If there is any doubt as to whether a Level 1 Emergency should be declared, consult with the appropriate regulatory agency.</p>	<ul style="list-style-type: none"> § Alert the Response Team Members (company, contract, and local authority and government agency personnel) required to implement the plan. § Notify transients, area operators and members of the public within the Emergency Planning Zone (EPZ) by telephone or visitation and inform them of the potential emergency situation. Priority will be directed to those located immediately downwind and those deemed sensitive or requiring assistance. § Alert a mobile air monitoring unit to deploy into area. § Mobilize company personnel to the Reception Centre if applicable. § Alert and mobilize emergency support services as required. <p>AT THIS LEVEL, EVACUATION OF THE EPZ IS A VOLUNTARY ACTION.</p>
2 Moderate Impact	<p>A MEDIUM LEVEL EMERGENCY causes a potential or limited hazard to the public/environment or has the potential to extend beyond the boundaries of company property. Operational control is maintained but the emergency could worsen and threaten the general public or the environment. The following conditions constitute a Level 2 Emergency:</p> <ul style="list-style-type: none"> § Controlled gas or liquid hydrocarbon release; § Bomb threat; § Serious fire or explosion; § Serious injury or accident; § Significant damage to public property; or § Significant media interest. 	<ul style="list-style-type: none"> § Inform the Response Team Members of the change to a Level 2 Emergency condition. § Notify residents and members of the public within the EPZ and request evacuation of the area, providing assistance as required. § Perform surveys of the EPZ and request all persons evacuate the area. § Ensure a mobile air monitoring unit is in the area and has commenced ambient air quality monitoring at the nearest downwind, unevacuated area. § Establish roadblocks to restrict access into the area. § Assemble the ignition equipment and team(s). <p>EVACUATION OF THE PUBLIC WITHIN THE EPZ MUST BE INITIATED AT THIS LEVEL.</p>
3 High Impact	<p>A HIGH LEVEL EMERGENCY occurs when safe operating control has been lost, cannot be controlled immediately by on-site personnel and equipment, has extended beyond the boundaries of company property or poses an immediate or major hazard to the public/environment. The following criteria constitutes a Level 3 Emergency:</p> <ul style="list-style-type: none"> § Uncontrolled gas or liquid hydrocarbon release; § Major fire or explosion; § Accident involving a fatality; or § Provincial or national media interest. 	<ul style="list-style-type: none"> § Inform the Response Team Members previously contacted of the change to a Level 3 Emergency condition. § Perform surveys of the EPZ to verify evacuations have been completed. § Verify roadblocks have been established. § Continue air monitoring downwind of the release. § Ignite the uncontrolled or partially controlled H₂S flow if the ignition criteria have been met. <p>EVACUATION AT THIS LEVEL IS MANDATORY.</p>

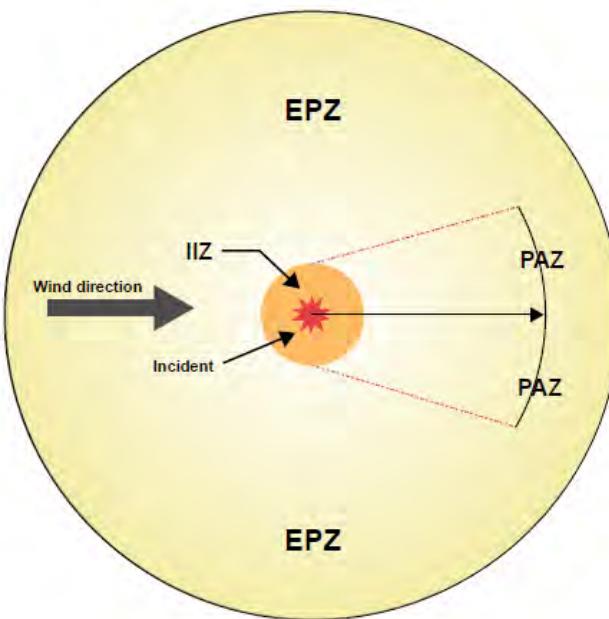
ASSESSMENT MATRIX FOR CLASSIFYING INCIDENTS

		Likelihood of Incident Escalating			
		Unlikely	Moderate	Likely	Almost certain or currently occurring
Incident Consequence	Minor	The incident is contained or controlled and it is unlikely that the incident will escalate. There is no chance of additional hazards. Ongoing monitoring is required.	Control of the incident may have deteriorated but imminent control of the hazard is probable. It is unlikely that the incident will further escalate.	Imminent and/or intermittent control of the incident is possible. It is possible to use internal and/or external resources to manage and bring the hazards under control in the near term.	Incident is uncontrolled and there is little chance that it will be brought under control in the near term. Require assistance from outside parties to remedy the situation.
		No worker injuries	ALERT	ALERT	LEVEL 1
		Liquid release contained on lease			
		Gas release impact on lease only			
	Moderate	No or low interest	ALERT	LEVEL 1	LEVEL 1
	First aid treatment required for on-lease worker(s)				
	Liquid release extends beyond lease – contained				
	Gas release impact has potential to extend beyond lease				
	Major	Local and possible regional interest	LEVEL 1	LEVEL 1	LEVEL 2
	Worker(s) requires hospitalization				
	Liquid release extends beyond lease – not contained				
	Gas release impact extends beyond lease – public health/safety could be jeopardized				
	Catastrophic	Regional and national interest	LEVEL 1	LEVEL 2	LEVEL 3
	Fatality				
	Liquid release off lease not contained – potential for, or is, impacting water or sensitive terrain				
	Gas release impact extends beyond lease – public health/safety jeopardized				
	National and international interest				

Incident Response

		Incident Classification			
		Alert	Level 1 emergency	Level 2 emergency	Level 3 emergency
Responses		Discretionary, depending on AltaGas policy.	Notification of off-site management.	Notification of off-site management.	Notification of off-site management.
		Courtesy, at AltaGas discretion.	Notification of affected members to the public as necessary.	Planned and instructive in accordance with the ERP communication plan.	Planned and instructive in accordance with the ERP communication plan.
		Reactive, as required.	Reactive, as required.	Proactively work with the media, as required.	Proactively work with the media, as required.
		Reactive, as required. Notify lead government agency if public or media is contacted.	Notify lead government agency immediately. Notify local and aboriginal authority (based on planning arrangement) and health authority if public or media is contacted.	Notify lead government agency immediately and local, aboriginal and health authorities.	Notify lead government agency immediately and local, aboriginal and health authorities.
Actions		On site, as required by Cenovus and AltaGas.	On site, as required AltaGas. Initial response undertaken in accordance with the ERP.	Predetermined public safety actions are under way. Corporate management team alerted and may be appropriately engaged to support on-scene responders.	Full implementation of incident management system.
		On site, as required by Cenovus and AltaGas.	Potential for multi-agency (municipal, provincial or federal) response.	Potential for multi-agency (municipal, provincial or federal) response.	Immediate multi-agency (municipal, provincial or federal) response.
		Immediate and local. No additional personnel required.	Establish what resources would be required.	Establish additional resources and personnel required.	Significant resources required.
Resources		None	Begin to establish resources that may be required.	Possible assistance from government agencies and external support services, as required.	Assistance from government agencies and external support services, as required.

EMERGENCY PLANNING & RESPONSE ZONES



Initial Isolation Zone (IIZ)

The Initial Isolation Zone (IIZ) defines an area in close proximity to an emergency incident, such as a continuous hazardous gas release. Indoor sheltering may provide temporary protection due to the proximity of the release.

Protective Action Zone (PAZ)

The Protective Action Zone (PAZ) is the downwind danger area from an emergency incident. This concept is illustrated in the figure above. Immediately following an emergency incident, the approximate size and direction of the PAZ can be determined using conditions at the time. Once monitoring equipment arrives, the actual size of the PAZ can be determined based on monitored conditions.

The *On-Scene Commander* at the incident site will review the details of the emergency with on-duty staff who shall assist in determining the size and location of the PAZ using monitored conditions and the information contained in the map provided in Section 8. The size of the PAZ will be related to the type and magnitude of the hazard.

The initiation of public protection measures in the PAZ is a coordinated response from the local authority, Cenvous, and AltaGas. The local authority response in the PAZ may be limited to what is contained in the municipal emergency plan and their response capability.

Emergency Planning Zone (EPZ)

The Emergency Planning Zone (EPZ) is a geographical area surrounding each pipeline which could become hazardous to people, property or the environment.

A Hazard, Risk, Vulnerability and Capability Assessment (HRVCA) was completed for the Suffield area, and as a result, an EPZ of 100 metres has been applied to each pipeline segment.

An area map showing the location of the pipelines, EPZ, road systems and the surrounding area is contained in Section 8 of this manual.

ISOLATION BLOCK VALVES

Suffield South Pipeline

#	Block Valve	Access	Description
1.	C Station 01-04-15-08 W4M	Off of South Boundary Road, just outside the south edge of CFB Suffield, approximately 8km east of Highway 884. Clearance must be obtained from SIRC (Alberta "O") prior to entering C Station.	This is a lateral block valve that will automatically close when set pressure limits cannot be achieved. There is also a manual block valve at this location.
2.	Alderson 1 Isolation Valve 01-04-015-08 W4M	Access valve is in C Station yard. C Station is off of South Boundary Road just outside the south edge of CFB Suffield, approximately 8 km east of Highway 884. Clearance must be obtained from SIRC (Alberta "O") prior to entering C Station.	This block valve is located on the lateral to the main line.
3.	CD Station 01-04-015-07 W4M	Travel west on #1 Hwy, then north on RR83, and then west on Scott's Road to C gate on CFB Suffield. Clearance must be obtained from SIRC (Alberta "O") prior to entering the range. Then travel east 8km on the inside boundary road. Or, from Box Springs Road, travel west on Scott's Road to D Gate. Clearance must be obtained from SIRC (Alberta "O") prior to entering the range. Then travel west 6.5km on the inside boundary road.	This is a lateral block valve that will automatically close when set pressure limits cannot be achieved. There is also a manual block valve at this location.
4.	D Station 01-04-15-06 W4M	Off of South Boundary Road, just outside the south edge of CFB Suffield, approximately 2km west of Box Springs Road. Clearance must be obtained from SIRC (Alberta "O") prior to entering D Station.	This is a lateral block valve that will automatically close when set pressure limits cannot be achieved. There is also a manual block valve at this location.
5.	Alderson 2 Isolation Valve 01-04-015-06 W4M	Access is in the D Station yard. D Station is off of South Boundary Road, just outside the south edge of CFB Suffield, approximately 2km west of Box Springs Road. Clearance must be obtained from SIRC (Alberta "O") prior to entering D Station.	This block valve is located to the west side of meter building on the lateral to the main line.
6.	Channel Lake 02-06-15-05 W4M	Access is the pipeline right-of-way from the east to D Station within CFB Suffield. Clearance must be obtained from SIRC (Alberta "O") prior to entering the range.	This block valve is located on the lateral to the main line.
7.	Drowning Ford Isolation Valve 02-25-015-05 W4M	Follow the Bowmantown Road north 24km, then turn west on Twp Rd 154 for 5.4km.	This block valve is located on the lateral to the main line.
8.	Isolation Valve (Future Tie-in) 13-33-015-04 W4M	Follow the Bowmantown Road north 27km, then turn west on Twp Rd 160 for 1.6 km and follow the fence line behind the PetroCanada Plant.	This block valve is located on the lateral to the main line.
9.	Koomati Junction 03-04-17-02 W4M	Access is off of Hwy 41, west on Twp Rd 160 and then north on RR 23 for 10km, then west on Twp Rd 170 for 1km and then a trail to site.	At this location there is a 406mm main line valve plus lateral block valves for the 323mm and 168mm pipeline to Koomati. The valves are located in the same general area as the GEX (#12) lateral block valve.

#	Block Valve	Access	Description
10.	Gas Alberta Farm Tap 08-28-016-03 W4M	Access is off of Hwy 41, west on Twp Rd 160 for 9km and then north on RR 33 for 8km.	This block valve is located on the lateral to the main line.
11.	Koomati Station 04-04-17-04 W4M	Follow Bowmanton Road until it ends at the Koomati Gate, approximately 40 kilometers west of Hwy 41. Clearance must be obtained from SIRC (Alberta "O") prior to entering the range.	This is a lateral block valve that will automatically close when set pressure limits cannot be achieved. There is also a manual block valve at this location.
12.	GEX Isolation Valve 04-14-17-03 W4M	Off of Hwy 41, then west on Twp Rd 160, then north on RR 23 for 10km, then west on Twp Rd 170 for 3 km, and then trail to site	This block valve is located on the lateral to the main line.
13.	TransCanada Burstall Compressor Station 07-08-20-29 W3M	Approximately 8km east of Hwy 41 on Hwy 545 (Saskatchewan) and then approximately 3km to the north. Valve installation is accessible through the TransCanada compressor station yard. Clearance must be obtained from TransCanada at <phone # removed>.	This block valve will automatically close when set pressure limits cannot be achieved. Manual block valves can be used to isolate the north and south lines.

Suffield North Pipeline

#	Block Valve	Access	Description
1.	A1 Station 04-03-19-09 W4M	Off Secondary Hwy 884 at Gate 12 of CFB Suffield. Clearance must be obtained from SIRC (Alberta "O") prior to range entry.	The block valve is manually operated.
2.	A1/Tide Lake Isolation Valve 04-03-19-09 W4M	Access to A1 Station is off Hwy 884 at Gate 12 of CFB Suffield. Clearance must be obtained from SIRC (Alberta "O") prior to range entry.	The block valve is manually operated.
3.	Princess Isolation Valve 12-17-20-08 W4M	Access to Princess IV is off the Kangaroo Rat Road on the north end of CFB Suffield, north of Gate 13. Clearance must be obtained from SIRC (Alberta "O") prior to range entry.	The block valve is manually operated
4.	A2 Meter Station 01-22-20-08 W4M	Access to A2 Station is off the Kangaroo Rat Road on the north end of CFB Suffield, 5 kilometers east of Gate 13. Clearance must be obtained from SIRC (Alberta "O") prior to range entry.	This is a lateral block valve that will automatically close when set pressure limits cannot be achieved. There is also a manual block valve at this location.
5.	East Coulee Isolation Valve 15-16-20-07 W4M	Access to Easy Coulee IV is off the Kangaroo Rat Road on the north end of CFB Suffield, 13 kilometers east of Gate 13. Clearance must be obtained from SIRC (Alberta "O") prior to range entry.	The block valve is manually operated.
6.	AB Meter Station 15-16-20-06 W4M	Access to AB Station is off the Kangaroo Rat Road, on the north end of CFB Suffield, 23 kilometers east of Gate 13. Clearance must be obtained from SIRC (Alberta "O") prior to range entry.	This is a lateral block valve that will automatically close when set pressure limits cannot be achieved. There is also a manual block valve at this location.
7.	B2 Station 14-15-20-04 W4M	Access to B2 Station is off the Kangaroo Rat Road on the north end of CFB Suffield, 45 kilometers east of Gate 13. Clearance must be obtained from SIRC (Alberta "O") prior to range entry.	The block valve is gas hydraulic operated and is located upstream of Station B2.
8.	B2 ESD Valve 13-15-20-04 W4M	Access to B2 Station is off the Kangaroo Rat Road on the north end of CFB Suffield, 45 kilometers east of Gate 13. Clearance must be obtained from SIRC (Alberta "O") prior to range entry. The ESD valve is located west of the facility.	The block valve is gas hydraulic operated and is located upstream of Station B2. Pressure falling to close
9.	TransCanada Burstall Station 07-08-20-29 W3M	Access to TransCanada Burstall is approximately 8 kilometers east of Highway 41 on Highway 545 (Saskatchewan) and approximately 3 kilometers north. Valve installation is accessible through the TransCanada Compressor station yard. Clearance must be obtained from TransCanada at <phone # removed>.	This block valve will automatically close when set pressure limits cannot be achieved. Manual block valves can be used to isolate the north and south lines.

EMERGENCY EQUIPMENT

The following emergency equipment is available in the Cenovus Operators' trucks, which are accessible on a 24 hour basis.

Gas Detection

§ Personal Monitors (Multi Gas)

First Aid Kits

§ #1 First Aid Kit

Fire Extinguishers

§ Portable extinguishers

Communications

§ Each Operator has a cellular telephone

§ 2-way Radios (specific to CFB Suffield)

Other Equipment

§ Flashlight

§ Work Alone GPS System (Geotrack)

ERP DISTRIBUTION LIST

Name	Title	Location	# of Copies	Manual No.
AltaGas				
Corporate Emergency Operations Centre (CEOCC)		Calgary	1	1
Operations	16 th Floor	Calgary	1	2
EOH&S	17 th Floor	Calgary	1	3
<name removed>	Operations Manager	Turin	1	4
<name removed>	Operations Supervisor	Turin	1	5
Cenovus Energy Inc.				
<name removed>	Production Coordinator	<i>Electronic</i>	1	6
<name removed>	Lead Operator	<i>Electronic</i>	1	7
Cenovus Pipeline Personnel	Operator	Redcliff	10	8-17
External				
National Energy Board	Emerg. Management Compliance	Calgary (cc. <i>Calgary</i>)	1	18
CFB Suffield	<name removed>, Oil & Gas Coordinator	Medicine Hat (cc. <i>Electronic</i>)	1	19
CFB Suffield	SIRC - <name removed>	Medicine Hat	1	20
Cypress County	<name removed>	<i>Electronic</i>	1	21
Special Areas Board	<name removed>	Youngstown	1	22
RM of Deer Forks	<name removed>	Burstall	1	23
Cypress Health Region	<name removed>	Swift Current	1	24
AB Health Services – South	<name removed>	<i>Electronic</i>	1	25
RCMP	NCO in Charge	Redcliff	1	26
RCMP	NCO in Charge	Leader	1	27
Benchmark Safety Inc.	Emergency Response Planning	Calgary	1	28

NOTE: Shaded ERP copy numbers indicate recipients receiving a confidential ERP containing resident information.

"*Electronic*" location= electronic copy of manual sent by email

Location in *italics* = electronic copy of manual sent on disc

REVISION LOG

DATE	COMMENTS
October, 2001	AEC
July 8, 2003	Revision #1 (AltaGas)
December 31, 2004	Revision #2 (AltaGas)
December 21, 2005	Revision #3 (AltaGas)
October, 2006	Revision #4 (AltaGas)
August, 2007	Revised
August 2008	Revised
April 2009	Revisions – Quick Reference, Sections 1, 2, 4, 5
October 2009	Revised
April 2010	Revisions – Quick Reference, Sections 1, 2, 3, 4
October 2010	Revised
October 2011	-Cenovus Personnel (Section 1, 2, 4, QR) -AltaGas Personnel (Section 1, 2, 4, QR) -Distribution list (Sect 1) -Map (Sect 8) -Pipeline Crossing Key List (Sect 8) -Residents (QR, Sect 7) -Overview (Sect 1)
April 2012	NEB revisions
December 2012	-Emergency Contacts (Sect 1, 2, 4, QR) -Landowner list (Sect 7) -Resident Information (Sect 7, QR)
April 2013	NEB revisions (Sect 1)
December 2013	-General Content Revisions (all sections) -Emergency Contacts (Sect 1, 2, 3, QR) -Resident Information (Sect 7, 8, QR)
December 2014	General revisions (Sect 1-5,7,QR)
December 2015	General revisions (all sections)
December 2016	General revisions (Sect 1-4,7,8,QR)

SUFFIELD PIPELINE PERSONNEL

Name	Position	Telephone Business	Telephone Residence	Telephone Cellular
Initial Emergency Call-out shall be to Suffield Industry Range Control (SIRC)				
24 Hour Number: <# removed>				
<i>Please note this is the AltaGas Suffield Pipeline operated by Cenovus Operations</i>				
CENOVUS Personnel (Responders and Potential On-Scene Commanders)				
<name removed>	Production Coordinator	<# removed>	n/a	<# removed>
<name removed>	Lead Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
ERP On-Call (ask for: 'Suffield Oil & Gas Team'): 1-877-458-8080				
ALTAGAS - Potential Incident Commanders or Technical Advisors				
<name removed>	Director Operations, Gas	<# removed>	n/a	<# removed>
<name removed>	Operations Manager	<# removed>	n/a	<# removed>
<name removed>	Operations Manager	<# removed>	n/a	<# removed>
<name removed>	Operations Manager	<# removed>	n/a	<# removed>
<name removed>	Div VP Operations - Gas	<# removed>	n/a	<# removed>
<name removed>	Operations Manager (Suffield)	<# removed>	<# removed>	<# removed>
ALTAGAS - Potential Technical Advisors				
<name removed>	Operations Supervisor (Suffield)	<# removed>	n/a	<# removed>
<name removed>	Senior Operations Engineer	<# removed>	n/a	<# removed>
<name removed>	Operations Engineer	<# removed>	<# removed>	<# removed>
ALTAGAS - Media / Communications Personnel				
<name removed>	VP, Stakeholder Relations	<# removed>	n/a	<# removed>
<name removed>	Senior Advisor, External Comm.	<# removed>	n/a	<# removed>
<name removed>	Senior Advisor, External Comm.	<# removed>	n/a	<# removed>
ALTAGAS - Other Potential Resources				
<name removed>	Supervisor Construction	<# removed>	<# removed>	<# removed>
<name removed>	VP EHS, Security & Sust., Comp.	<# removed>	n/a	<# removed>
<name removed>	Process Safety Manager, EHS	<# removed>	n/a	<# removed>
<name removed>	Executive Vice President	<# removed>	n/a	<# removed>
ALTAGAS 24 Hour Emergency: 1-866-826-3830				
PROVINCIAL TIME ZONE CHANGES				
Alberta Saskatchewan	Summer (Mar – Nov) DST		Winter (Nov-Mar)	
	Base	12 Noon	Base	12 Noon
	Same	12 Noon	1 Hr Later	1 PM

OTHER OPERATING FACILITIES

Operating Facilities on or near the Suffield Pipeline	Telephone	Other
TransCanada Burstall Compressor Station	<# removed>	
Cenovus C Station	<# removed>	
Cenovus Alderson 1	<# removed>	
Cenovus CD Station	<# removed>	
Cenovus D Station	<# removed>	
Cenovus Alderson 2	<# removed>	
Cenovus Koomati	<# removed>	
GEX	<# removed>	
Direct Energy Office	<# removed>	
Direct Energy Channel Lake	<# removed>	
Direct Energy Drowning Ford	<# removed>	
Cenovus E Station	<# removed>	
Cenovus A1 Station	<# removed>	
Cenovus AB Station	<# removed>	
Cenovus B2 Station	<# removed>	
Cenovus A2 Station	<# removed>	
Cenovus Tide Lake station – Cenovus Langevin Area	<# removed>	
Cenovus Princess West Station – Cenovus Langevin Area	<# removed>	
Cenovus Princess East Station – Cenovus Langevin Area	<# removed>	
Pine Cliff Energy	<# removed>	
Niska Gas Storage AECO C Hub Emergency #	<# removed>	<# removed>

CANADIAN GOVERNMENT

Canadian Government Agency	Telephone	Other
National Energy Board (NEB) - lead regulatory agency		
§ Pipeline Incident Reporting (TSB Hotline)	819-997-7887	
§ Head Office (Calgary)	403-292-4800	403-292-5503 (fax)
§ Online Event Reporting System (OERS)	https://apps.neb-one.gc.ca/ers	
§ Non-pipeline Incident Reporting	403-807-9473	
Transport Canada		
§ CANUTEC (dangerous goods emergency)	613-996-6666	*666 (via cell)
§ CANUTEC (dangerous goods information)	613-992-4624	613-954-5101
§ Transportation Safety Board (TSB) - incident reporting	819-997-7887	PipelineNotifications @tsb.gc.ca
Fisheries and Oceans Canada		
§ Marine Spill Response (AB & SK)	1-800-889-8852	
CFB Suffield		
§ Suffield Industry Range Control (SIRC)	<# removed>	

ALBERTA GOVERNMENT

Alberta Government Agency	Telephone	Other
Alberta Energy Regulator (AER) - not lead regulatory agency		
§ Energy & Environmental Emergency Response Line	1-800-222-6514	
§ Medicine Hat Field Centre	403-527-3385	
Alberta Environment & Parks (AEP)		
§ Wildfire Reporting	310-3473 (FIRE)	
§ Spill Reporting (E&E Emergency Response Line)	1-800-222-6514	
§ Wildlife Reporting	1-800-642-3800	
Alberta Emergency Management Agency (AEMA)		
§ Provincial Operations Centre (POC)	1-866-618-2362	
Alberta Transportation		
§ Coordination & Info Centre / TDG Emergency	1-800-272-9600	
Local Authorities		
§ Cypress County (Dunmore)	403-526-2888	
County Emergency Services Dispatch	403-529-8285	
§ Special Area No. 2 (Hanna)	403-854-5600	
<name removed>, Fire Chief / Emergency Operations	<# removed>	<# removed>
<name removed>, Director of Emergency Operations	<# removed>	<# removed>
<name removed>, Deputy Fire Chief/Dir of Emerg Ops	<# removed>	<# removed>
<name removed>, Deputy Dir of Emergency Ops (Area 2)	<# removed>	<# removed>
Alberta Health Services – South Zone		
§ East - Medicine Hat Area (ask for Public Health Inspector on call)	403-502-8300	
Occupational Health & Safety		
§ Incident Reporting	1-866-415-8690	
Workers' Compensation Board (WCB)		
§ Injury Reporting	1-866-922-9221	
Alberta Boilers Safety Association (ABSA)		
§ Medicine Hat	403-529-3514	
§ After Hours	780-437-9100	

SASKATCHEWAN GOVERNMENT

Saskatchewan Government Agency	Telephone	Other
Saskatchewan Ministry of the Economy (ECON) - not lead regulatory agency		
§ Emergency and Incident Support	1-844-764-3637	(Area 3)
§ Petroleum & Natural Gas (PNG) Support Line	1-855-219-9373	
Saskatchewan Ministry of Environment		
§ Spill Control Centre	1-800-667-7525	
§ FireWatch	1-800-667-9660	
§ Wildlife Reporting	1-800-667-7561	
Saskatchewan Emergency Management & Fire Safety		
§ Provincial Emergency Coordination	306-787-3774	
Saskatchewan Ministry of Highways and Infrastructure		
§ Southern Region	306-787-4969	
Local Authorities		
§ Rural Municipality of Deer Forks	306-679-2000	306-679-2275
Health Authority		
§ Cypress Health Region	306-778-5100	
§ Saskatchewan HealthLine (24/7 health support)	811	
SK Ministry of Labour Relations & Workplace Safety		
§ OHS WorkSafe Saskatchewan - Incident Reporting	1-800-567-7233	
Saskatchewan Workers' Compensation Board (WCB)		
§ Injury Reporting	1-800-787-9288	myaccount.wcbsask.com
Technical Safety Authority of Saskatchewan (TSASK)		
§ Boilers & Pressure Vessels Safety - incident reporting	1-866-530-8599	

EMERGENCY SERVICES

Emergency Service	Telephone	Other
Ambulances	911	
§ STARS Air Ambulance	1-888-888-4567	#4567 (via cell)
Fire Departments	911	
§ Medicine Hat Fire Dept.	403-529-8282	< <i># removed</i> >
§ Alberta Wildfire Reporting	310-3473 (FIRE)	
§ Saskatchewan Wildfire Reporting	1-800-667-9660	
Police	911	
§ Leader RCMP (SK)	306-628-4600	
§ Redcliff RCMP (AB)	403-548-2288	
Hospitals		
§ Medicine Hat Regional Hospital	403-529-8000	
Cypress County		
§ Emergency Services Dispatch	403-529-8285	

SUPPORT SERVICES

Services	Telephone	Other
Air Monitoring		
§ Maxxam Analytics	1-855-629-9261	
§ AGAT Labs	1-866-764-7554	
Firefighters - Oilfield Specialists		
§ HSE Integrated	1-888-346-8260	
§ Firemaster Oilfield Services	403-342-7500	
Communications Consultants		
§ Lovink Media (Calgary)	<# removed>	<email removed>
Construction Companies		
§ Corvet Construction (1977) Ltd. (Red Deer)	1-888-578-3535	
§ Pronghorn Controls Ltd.	403-720-2526	
Dangerous Goods Information		
§ CANUTEC	613-992-4624	
Environmental - spill response		
§ Secure Energy	1-877-663-9769	
§ Matrix Solutions	1-877-774-5525	
Helicopters		
§ Alpine Helicopters Ltd. (Calgary)	403-291-3100	
§ Canadian Helicopters	780-429-6900	
One-Call		
§ Alberta 1 Call	1-800-242-3447	
§ Saskatchewan 1st Call	1-866-828-4888	
Portable Flare Unit		
§ Precision Rentals (Redcliff)	403-526-4111	
Safety Services		
§ Absolute Safety Management (Brooks)	1-866-760-7100	
§ Benchmark Safety Inc. (Calgary)	403-717-2810	
Western Canada Spill Services (WCSS)		
§ Emergency Line	1-866-541-8888	
§ Area S:		
<name removed> - MidWest Pumps (Lethbridge)	<# removed>	<# removed>
<name removed> - Absolute SAFETY (Brooks & Med. Hat)	<# removed>	<# removed>

COMMUNICATIONS

If the ERP is activated, various company communication centres shall be established:

- § **On-Site Command Post (OSCP):** An operations centre established at the incident site by the *On-Scene Commander* to manage production/well control procedures and coordinate air monitoring, evacuation and roadblock procedures within the PAZ and beyond.
- § **Regional Emergency Operations Centre (REOC):** Should conditions at the emergency site warrant, an REOC will be established at a more appropriate location to support personnel at the OSCP. Depending on the severity of the emergency, the responsible AltaGas VP or Director and representatives from the NEB and other government agencies may be present at the REOC to support company personnel.
- § **Corporate Emergency Operations Centre (CEOCC):** A CEOC will be established at the Corporate Head Office location to accommodate the corporate emergency response team including the *Incident Commander* and other essential response personnel.
- § **Reception Centre:** A reception centre will be established by company representatives. It will be established to receive evacuees should evacuation procedures be implemented. The location of the reception centre will be at the discretion of the *On-Scene Commander*, dependent on the specifics of the emergency.
- § In addition to the above company communication centres, the municipal government may establish a **Municipal Emergency Coordination Centre (MECC)** and the NEB may establish their own **Emergency Coordination Centre(s) (ECC)**. The ECCs are government control centres set up at suitable locations to manage the larger aspects of the emergency including public relations and the provision of information and advice to affected citizens, agencies and the media. AltaGas may provide representatives to the ECCs to liaise between the company and government officials and to assist with public and media communications.

The Emergency Response Initial Communications Flowchart (page 4) shows the sequence of initial emergency communications to notify company and contract personnel, government agencies and emergency support services when activating the ERP.

All odour complaints, public concerns or abnormal operating situations reported to, or observed by, company/contract personnel shall be documented on the Initial Notification Report and

investigated and acted upon without delay. The most senior on-site personnel will investigate the initial report. They must follow safe work practices and procedures and record all pertinent information on the Incident Log (Section 6 – FORMS).

Approach a hazardous condition with a second person and with the proper Personal Protective Equipment (breathing apparatus [SCBA] and handheld H₂S detector). Always employ the buddy system and, if necessary, await the arrival of additional personnel and equipment.

Once the location and magnitude of the problem has been determined, the most senior on-site AltaGas representative (i.e. Cenovus Operator) will assume the duties of the *On-Scene Commander*. They will consult with the *Incident Commander* and activate the ERP if the situation warrants. Additional contacts are then made to fully implement the ERP.

AltaGas will supply the communication systems and equipment required to provide effective communications between the OSCP and:

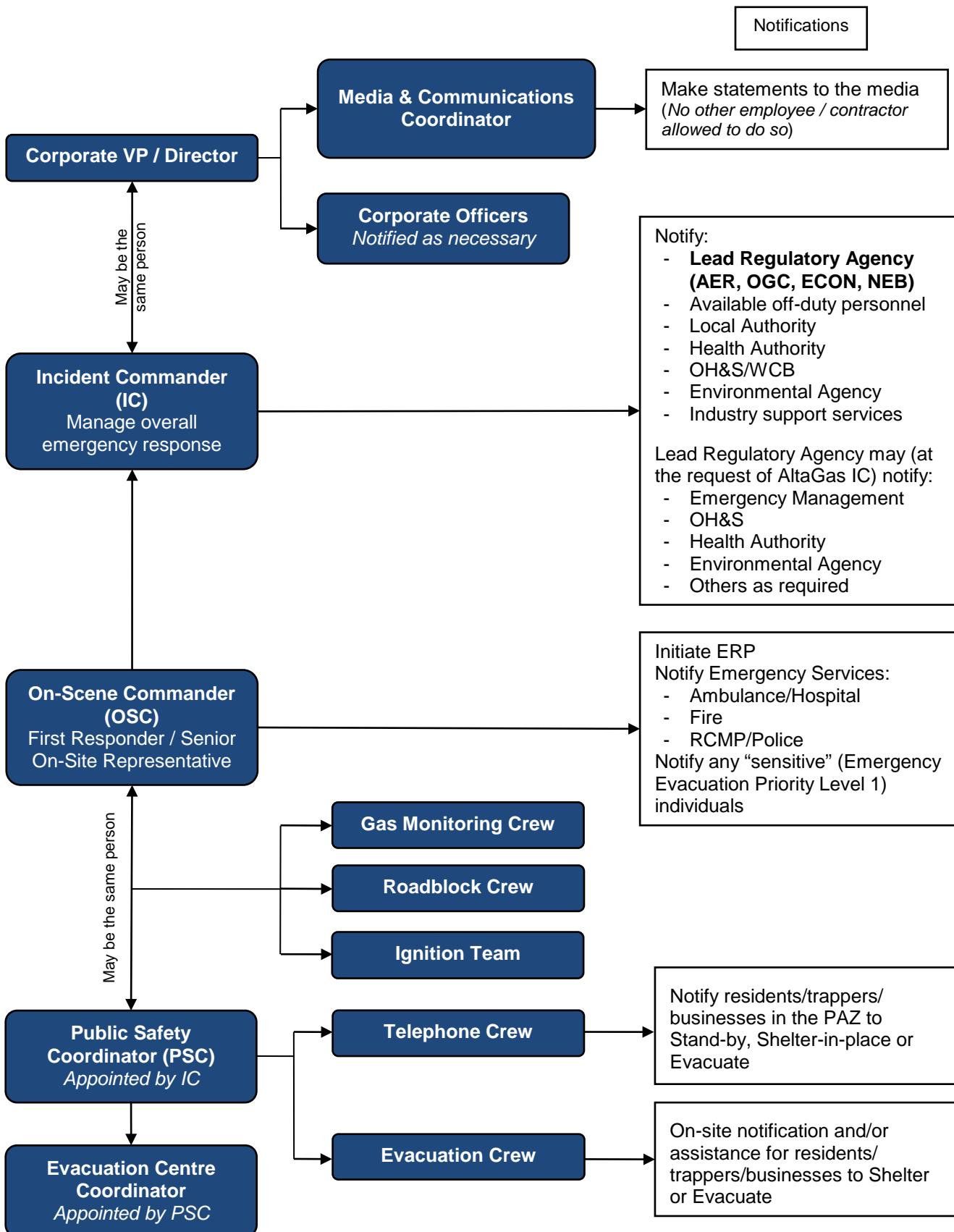
- § Evacuation Personnel/Rover(s) and Roadblock Personnel
- § Mobile Air Monitoring Unit(s)
- § REOC
- § CEOC
- § MECC
- § ECC
- § Reception Centre

Mobile telephones will be located in key personnel vehicles. Base radio stations will be located at the OSCP and REOC (if established). Portable radios with long range capabilities and on a common frequency with the base stations will be available for use by roadblock, evacuation and air monitoring personnel.

Company, contract employees and sub-contractors must not volunteer information or opinions regarding any emergency situation. If approached by the public or media, refer individuals to the designated *Media & Communications Coordinator*. The media should be advised a statement will be issued once all information has been received, reviewed and verified.

If an ECC is established by the NEB, all public and media inquiries are to be directed to the AltaGas representative and government personnel located at the ECC.

Emergency Response Initial Communications Flowchart



INJURIES

- § The first responder is the *On-Scene Commander* until relieved by a more senior worker.
- § Secure the area to prevent further injuries.
- § If the injuries are serious, the *On-Scene Commander* will contact an *Incident Commander* from the list in Section 2.
- § If necessary, the *On-Scene Commander* or *Incident Commander* will contact local emergency services such as EMS or the RCMP in order to request assistance.
- § The *On-Scene Commander* is authorized to contact the police and emergency services before an *Incident Commander* is established if circumstances require immediate action.
- § Do not move a seriously injured person unless it is necessary to prevent further injury. Administer first aid and wait for medical aid to arrive.
- § Do not leave an injured person alone.
- § In serious cases, the *Incident Commander* will notify the appropriate government agencies. The Suffield Pipeline is regulated by the National Energy Board (NEB) and they must be notified. Provincial Occupational Health & Safety must also be notified, and a Workers' Compensation Board claim report must be submitted within 3 days (Alberta) or 5 days (Saskatchewan).
- § The next-of-kin should be notified in person when someone is seriously injured. If possible, two people should do the notification.
- § The Operations Supervisor will conduct an incident investigation and submit a written report to the appropriate corporate personnel.

FATALITIES

Fatalities will be treated as serious injuries until a medical doctor has declared the victim to be deceased. The police and other government agencies will investigate workplace fatalities. AltaGas employees and contractors will cooperate fully with these investigations. It is essential that the accident scene be left undisturbed until the investigation is complete unless it is necessary to move something in order to rescue an accident victim or prevent further injuries.

- § The first responder is the *On-Scene Commander* until relieved by a more senior worker. The *On-Scene Commander* is authorized to contact the police and emergency services before an *Incident Commander* is established if circumstances require immediate action.
- § The *On-Scene Commander* will contact an *Incident Commander* from the personnel list in Section 2.
- § The next-of-kin must be notified in person and this must be coordinated with the AltaGas *Media & Communications Coordinator* and the police. The *Incident Commander* will notify the appropriate government agencies.
- § Notification in cases where the victim is a member of the general public will be referred to the local police.
- § If the victim is an employee of a contractor, the contractor should handle notification.

FIRE & EXPLOSIONS

Natural gas is highly flammable. Sparks, open flame, welding, lightning and hot surfaces can ignite it. NGLs are highly flammable and potentially explosive if ignited in a closed space. Depending on the circumstances, fires may be considered **Level 1, Level 2 or Level 3** emergencies. The Emergency Response Plan must be activated for **Level 2 or Level 3** emergencies:

- § The senior person on-site becomes the *On-Scene Commander*.
- § Contact an AltaGas representative who becomes the *Incident Commander*.
- § The *On-Scene Commander* is authorized to contact the police and emergency services before an *Incident Commander* is established if circumstances require immediate action.
- § DO NOT attempt to fight a fire that cannot be managed with the available equipment.
- § There are fire departments in Burstall, Leader and Medicine Hat. For serious fires, the Firemaster unit in Medicine Hat may be required. It should be noted the Firemaster response vehicle does not carry sufficient water to fight a major fire. Arrangements will be made to have a water truck at the emergency site prior to the Firemaster unit arriving.

NATURAL DISASTERS

Natural disasters are events that threaten lives, property, and other assets. Often, natural disasters can be predicted. They tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area. Natural disasters can take the form of floods, earthquakes, tornadoes, blizzards, hail, lightning, windstorms, forest fires and grass fires, etc. Depending on the damage after the disaster has occurred at the facility, natural disasters may be considered **Level 1, Level 2 or Level 3** emergencies. The Emergency Response Plan must be activated for **Level 2 or Level 3** emergencies:

- § The senior person on-site becomes the *On-Scene Commander*.
- § Contact an AltaGas representative who becomes the *Incident Commander*.
- § The *On-Scene Commander* is authorized to contact the police and emergency services before an *Incident Commander* is established if circumstances require immediate action.
- § Depending on the circumstances after the natural disaster, other response guidelines may come into effect (i.e. Fires & Explosions, Injuries, Environmental Damage, Gas Releases, etc.). In the event of a second emergency with the pipelines, personnel will follow the applicable procedures found in this section.
- § Proactive planning will help to minimize the damage due to a natural disaster. The Suffield Pipeline operations personnel, as part of the annual hazard assessment review, will discuss the relevant natural disasters that may affect the pipelines and surrounding area and the proper procedures to follow for each scenario.

MOTOR VEHICLE ACCIDENTS

Depending on the circumstances, motor vehicle accidents may be considered **Level 1**, **Level 2** or **Level 3** emergencies. The police must be contacted and the Emergency Response Plan activated for serious accidents involving company employees or vehicles:

- § The first responder is the *On-Scene Commander* until relieved by a more senior worker. If there are serious injuries, the *On-Scene Commander* will contact an *Incident Commander* from the AltaGas Personnel list in Section 2.
- § If necessary, the *On-Scene Commander* or *Incident Commander* will contact local emergency services such as an ambulance or the RCMP and request assistance.
- § The *On-Scene Commander* is authorized to contact the police and emergency services before an *Incident Commander* is established if circumstances require immediate action.
- § All accidents where there is an injury, fatality or damage that appears to be in excess of \$1,000 must be reported to the police.
- § Ask for and record the following information for non-AltaGas vehicles involved in the accident:
 - driver's name;
 - telephone number;
 - address;
 - driver's license number;
 - insurance company and insurance policy number;
 - year, make and model of vehicle; and
 - vehicle license number.
- § Record the name, address and telephone number of witnesses.
- § Injuries resulting from company vehicle accidents must be reported to the appropriate provincial Workers' Compensation Board if the worker requires medical attention or misses work beyond the day of the accident. This does not apply if the worker was using the vehicle for personal business.

- § An Incident Investigation Report must be completed for all motor vehicle accidents, with the exception of accidents where the injury or damage was minor.

THREATS

Although many threats have proven to be hoaxes, it is company policy that if a threat is received at any of its operations it will be assumed that the threat is real until the police have investigated and determined otherwise. Depending on the circumstances, threats will be considered **Level 2 or Level 3** emergencies. The RCMP must be contacted and the Emergency Response Plan activated if a threat is received. If a threat is received by telephone:

- § Remain calm.
- § Be courteous to the caller.
- § Listen carefully to everything you are told.
- § Do not interrupt the caller.
- § Obtain as much information as possible from the caller.
- § Record the information on the Threat Report (see Section 6 - FORMS).
- § The senior person on site becomes the *On-Scene Commander*.
- § Contact a senior management representative, who becomes the *Incident Commander*.
- § The *On-Scene Commander* is authorized to evacuate the area and contact the local police before contacting an *Incident Commander* if he or she believes that circumstances require immediate action.

Bomb Threats

- § Never try to move or disarm an object that may be a bomb. This is a job for experts.
- § Workers may be asked to assist the police if a bomb threat is received. Generally, this assistance would be limited to searching the site for suspicious objects and unlocking doors and cabinets. The decision to assist the police in the search for a bomb is voluntary. The company does not expect its workers to assist if they prefer not to do so.

WILDLIFE

While in areas where there may be wildlife, take the following precautions to avoid contact:

- § Be aware of your surroundings. Ensure that natural sounds, like flowing water, do not mask the sound of your approach. Make plenty of noise when approaching blind corners, dense shrubs and streams, and when walking into the wind.
- § Leave the area immediately if you come across any type of animal kill.
- § Ensure all food refuse is in an animal-proof container if not fenced-in.
- § Do not feed wildlife.
- § While outdoors, consider having available insect repellent, sunscreen, bear spray and an EpiPen.

During a wildlife encounter:

- § Stay calm. DO NOT RUN. Back away slowly. If your vehicle is nearby, get in as quickly as possible.
- § For predatory animals (such as cougars, wolves or coyotes), make yourself appear as large as possible, yell, stomp your feet and throw objects at it (not food). If the animal makes contact, fight back and use bear spray if available.
- § For bear encounters, back away slowly, talk softly and don't look it in the eye. If there are cubs in the area, move away from them. Make every effort to leave the bear an escape route. Climbing a tree is an option but offers no guarantee of safety (black bears are excellent climbers, and grizzlies have also been known to climb trees).
- § During a bear charge, stand your ground and identify yourself as human by speaking in a calm voice. Avert your eyes – a direct stare is perceived as a threat. If the bear continues its charge and gets closer, you can try to intimidate it by making direct eye contact, jumping up and down and shouting. Use bear spray if available.
- § While driving, pay attention to all wildlife warning signs and drive accordingly. Scan the road and ditches ahead for animals, especially when travelling at dawn or dusk. Follow the response guidelines for motor vehicle accidents, found in this section, if you hit an animal with your vehicle.
- § Follow the response guidelines for injuries or fatalities, found in this section, if an encounter with wildlife leads to either.
- § Contact the provincial wildlife office if you encounter an aggressive animal.

PANDEMIC

An epidemic occurs when a disease outbreak spreads rapidly to many people in a community or region or during a season, such as the SARS epidemic in 2003. A pandemic is a global disease outbreak which affects a large proportion of the population, such as the 2009 H1N1 (Swine Flu) pandemic. For the purposes of emergency response planning, the terms epidemic and pandemic may be used interchangeably.

Pandemics are potentially disruptive situations which can occur at any time and affect normal business processes. By keeping a close eye on alerts and messages from emergency organizations and local media reports, sufficient advance warnings should be possible. The focus here is on the level of operational disruption which could arise from a pandemic. Depending on the circumstances, a pandemic may be considered a **Level 1, Level 2 or Level 3** emergency.

Key trigger issues that would lead to activation of the ERP are:

- Escalating loss of staff due to illness, and
- The inability to adequately handle operations

The ERP must be activated for a **Level 2 or Level 3** emergency:

- § Contact appropriate medical and emergency services as well as the AltaGas head office.
- § The *Incident Commander* and other AltaGas Corporate Officers should assess the extent of the pandemic and its potential impact on business operations.
- § Establish and manage a pandemic support team to preserve and protect vital business operations and facilitate the return to normal operation.
- § Ensure employees and external organizations are notified, and assigned responsibilities and activities as required.

Recovering from a pandemic will rely principally on key members of management and staff who will provide the managerial and technical skills necessary to achieve and maintain uninterrupted business operations during a pandemic. Suppliers of critical goods and services, and other key supply chain organizations, must be regularly contacted to determine how the pandemic is

affecting their ability to deliver goods and services. Alternate suppliers may need to be contacted to provide backup resources.

In a pandemic, it is essential that all critical business functions are backed up in case assigned staff cannot perform their duties due to illness. Cross-training of employees within departments is highly recommended, and an inventory of all staff and their primary and backup skills should be maintained by department management.

Pandemic Support Team

The team will be assembled by the *Incident Commander*. Team responsibilities are to:

- § Assess the evolving situation and determine what impact there might be to the business.
- § Arrange to track the status of employees calling in sick.
- § Contact individual departments regularly to assess the impact of loss of staff.
- § Determine what level of backup staff will be needed.
- § Brief key senior management on the pandemic status regularly.
- § Notify appropriate emergency organizations of the situation (e.g. health services).
- § Maintain regular contact with affected staff to assess their condition.
- § Contact other relevant organizations, including other area operators, and brief them on the situation.
- § Monitor operations, infrastructure and systems to ensure they operate as usual.
- § Coordinate activities with other relevant teams.
- § Determine when affected staff may be able to work from home.
- § Based on staff returning to work, estimate the continued duration of the emergency.

Preventative Maintenance

Viruses can live up to 8 hours on soft surfaces and 2 days on hard surfaces. Basic rules of hygiene are best followed for the prevention of a pandemic. This includes washing your hands with soap and/or hand sanitizer frequently, and coughing into your elbow instead of your hand.

ENVIRONMENTAL DAMAGE

Depending on the circumstances, environmental spills and releases may be considered **Level 1, Level 2 or Level 3** emergencies. The Emergency Response Plan must be activated for **Level 2 and Level 3** environmental emergencies.

- § The senior person on-site becomes the *On-Scene Commander*.
- § Contact an AltaGas representative, who becomes the *Incident Commander*.
- § The *On-Scene Commander* is authorized to contact regulatory agencies and support services before an *Incident Commander* is established if circumstances require immediate action.
- § Generally, any release that may cause, is causing or has caused an adverse effect to the environment, must be reported to the NEB and the appropriate provincial environmental agencies. Specific release reporting requirements can be found in the following section.
- § AltaGas is a member of Western Canada Spill Services.
- § Cleanup of spills is to be done without delay.

RELEASE REPORTING REQUIREMENTS

It is AltaGas policy that all spills and releases be immediately reported to the appropriate government agencies. Spills and releases should also be reported to the AltaGas EOH&S group and affected landowners.

Chemical Class (as per TDG Act)	Examples	NEB Reporting Requirements NEB / TSB Reporting Hotline: 819-997-7887 & OERS: https://apps.neb-one.gc.ca/ERS/Home/Index/	Alberta Reporting Requirements Energy & Environmental Emergency Line: 1-800-222-6514	Saskatchewan Reporting Requirements ENV Spill Line: 1-800-667-7525 (for reporting release into water bodies, or releases which are causing or may cause an adverse effect)
Class 2.1 Flammable Gases	§ Natural Gas § Methane § Butane § Propane § H ₂ S § Ethane	§ A release resulting in a significant adverse effect on people, property or the environment § Unintended or uncontrolled release of LVP hydrocarbons >1.5 m ³ § Unintended or uncontrolled release of gas or HVP hydrocarbons	§ Any amount that may cause, is causing or has caused an adverse effect § Any release or break from a pipeline § Pipeline hits § Uncontrolled gas release >30 e ³ m ³	§ Any quantity that could pose a risk to the public or environment § Any sustained release of ≥10 minutes § H ₂ S: 1000 ppm or 1 mol/kmol
Class 2.2 Non-Flammable Gases	§ Compressed Air § CO ₂ § N ₂ § O ₂	A release resulting in a significant adverse effect on people, property or the environment	§ Any amount that may cause, is causing or has caused an adverse effect § Any release or break from a pipeline § Pipeline hits § Uncontrolled gas release >30 e ³ m ³	§ Any quantity that could pose a risk to the public or environment § Any sustained release of ≥10 minutes (non-Halocarbon containing) § 100 kg (Halocarbon containing)
Class 2.3 Toxic Gases	§ SO ₂ § Hydrogen Cyanide § Nitric Acid	A release resulting in a significant adverse effect on people, property or the environment	§ Any amount that may cause, is causing or has caused an adverse effect § Any release or break from a pipeline § Pipeline hits § Uncontrolled gas release >30 e ³ m ³	All releases
Class 3 Flammable Liquids	§ Methanol § Diesel § Gasoline	A release resulting in a significant adverse effect on people, property or the environment	§ Any amount that may cause, is causing or has caused an adverse effect § 200 L into the environment	§ Any subsurface loss § 500 L on lease § 200 L off lease
Class 3 Flammable Liquids	§ NG Liquids/Condensate § Crude Oil § Crude Emulsions	§ A release resulting in a significant adverse effect on people, property or the environment § Pipeline rupture	§ Any amount that may cause, is causing or has caused an adverse effect § >2 m ³ on lease § Any release off lease § Any release from a pipeline	§ Any subsurface loss § 500 L on lease § 200 L off lease

Chemical Class (as per TDG Act)	Examples	NEB Reporting Requirements NEB / TSB Reporting Hotline: 819-997-7887 & OERS: https://apps.neb-one.gc.ca/ERS/Home/Index/	Alberta Reporting Requirements Energy & Environmental Emergency Line: 1-800-222-6514	Saskatchewan Reporting Requirements ENV Spill Line: 1-800-667-7525 (for reporting release into water bodies, or releases which are causing or may cause an adverse effect)
Class 4 Flammable Solids	<ul style="list-style-type: none"> § Molten Sulphur § Activated Carbon § Calcium Carbide § Sodium 	A release resulting in a significant adverse effect on people, property or the environment	<ul style="list-style-type: none"> § Any amount that may cause, is causing or has caused an adverse effect § 25 kg into the environment 	<ul style="list-style-type: none"> § 100 kg on lease § 25 kg off lease
Class 5.1 Oxidizing Substances	<ul style="list-style-type: none"> § Ammonium Nitrate § Bleaches § Calcium Nitrate 	A release resulting in a significant adverse effect on people, property or the environment	<ul style="list-style-type: none"> § Any amount that may cause, is causing or has caused an adverse effect § 50 kg into the environment 	Groups I and II: <ul style="list-style-type: none"> § 50 kg or 50 L on lease § 2.5 kg or 2.5 L off lease Group III: <ul style="list-style-type: none"> § 100 kg or 100 L on lease § 100 kg or 100 L off lease
Class 5.2 Organic Peroxides	<ul style="list-style-type: none"> § Methyl ethyl Ketone § Peroxide § Succinic Acid § Peroxide 	A release resulting in a significant adverse effect on people, property or the environment	<ul style="list-style-type: none"> § Any amount that may cause, is causing or has caused an adverse effect § 1 kg into the environment 	<ul style="list-style-type: none"> § 2.5 kg or 2.5 L on lease § 1 kg or 1 L off lease
Class 6.1 Poisonous Toxic Substances	<ul style="list-style-type: none"> § Methanol § Arsenic § Lead Acetate § Mercuric Chloride 	A release resulting in a significant adverse effect on people, property or the environment	<ul style="list-style-type: none"> § Any amount that may cause, is causing or has caused an adverse effect § 5 kg into the environment 	Packing Group I: <ul style="list-style-type: none"> § 2.5 kg or 2.5 L on lease § 1 kg or 1 L off lease Packing Groups II and III: <ul style="list-style-type: none"> § 10 kg or 10 L on lease § 5 kg or 5 L off lease
Class 6.2 Infectious Substances	§ Infectious substances affecting humans/ animals	A release resulting in a significant adverse effect on people, property or the environment	Any amount that may cause, is causing or has caused an adverse effect	All releases

Chemical Class (as per TDG Act)	Examples	NEB Reporting Requirements NEB / TSB Reporting Hotline: 819-997-7887 & OERS: https://apps.neb-one.gc.ca/ERS/Home/Index/	Alberta Reporting Requirements Energy & Environmental Emergency Line: 1-800-222-6514	Saskatchewan Reporting Requirements ENV Spill Line: 1-800-667-7525 (for reporting release into water bodies, or releases which are causing or may cause an adverse effect)
Class 7 Radioactive Substances	§ NORM	A release resulting in a significant adverse effect on people, property or the environment	Any amount that may cause, is causing or has caused an adverse effect	§ Any quantity that could pose a risk to human health or the environment, on lease § Emission level > emission level established in Section 20 of <i>Packing & Nuclear Substances Regulations</i> , off lease
Class 8 Corrosives	§ Acids § Amines § Bases § Batteries § Caustics	A release resulting in a significant adverse effect on people, property or the environment	§ Any amount that may cause, is causing or has caused an adverse effect § 5 kg into the environment	§ 10 kg or 10 L on lease § 5 kg or 5 L off lease
Class 9 Misc. Products, Substances or Organisms	§ Gas Plant Filters § Used Motor Oil § Asbestos § Wastes that can release Hazardous Substances through Leaching	A release resulting in a significant adverse effect on people, property or the environment	Any amount that may cause, is causing or has caused an adverse effect	Any quantity that could pose a risk to the public or environment
Produced Water (not a defined chemical class)	§ Produced Water	A release resulting in a significant adverse effect on people, property or the environment	§ Any amount that may cause, is causing or has caused an adverse effect § >2 m ³ on lease § Any release off lease § Any release from a pipeline	§ 2000 L on lease § Any quantity off lease

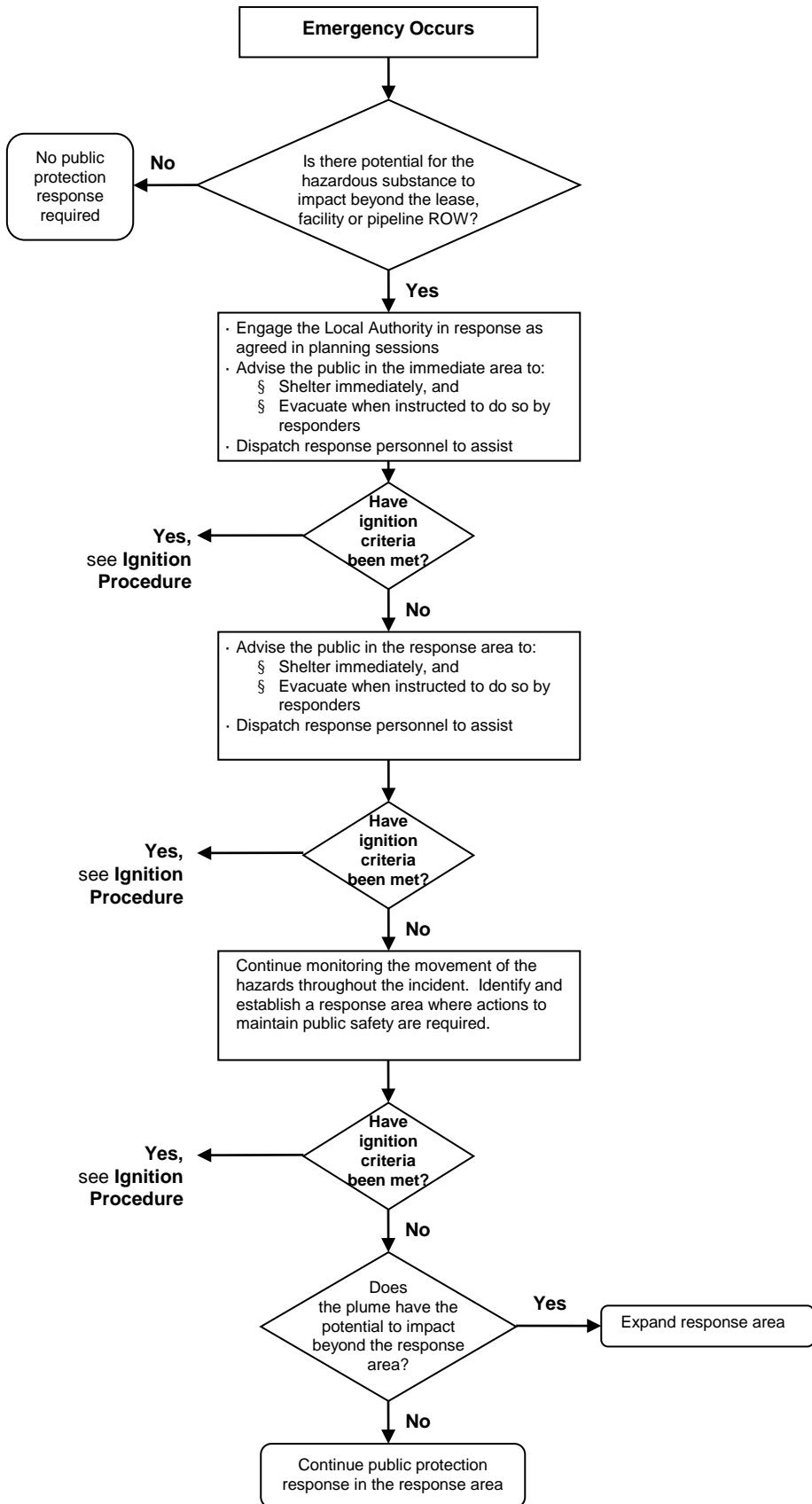
GAS RELEASES

The senior on-site person is the *On-Scene Commander*. If a release of gas occurs from a pipeline, the following actions should be taken:

- § Account for all personnel on site at the time.
- § Determine the nature of the release:
 - What is the source of the release?
 - Is the release sweet or sour gas?
 - What is the volume of the release?
 - Have any on-site personnel been injured?
 - Are the on-site personnel at risk?
 - Is the public at risk?
 - Can the available personnel control the release or is assistance required?
 - Is it necessary to begin evacuation of residents?
- § If the emergency is a **Level 1, 2 or 3** emergency activate the Emergency Response Plan. Immediately notify senior AltaGas management to establish an *Incident Commander* and report the release to the NEB. The *On-Scene Commander* is authorized to contact the police and emergency services before an *Incident Commander* is established if circumstances require immediate action.
- § Begin corrective action to control the release. The flow of gas to the release area must be shut off. If necessary, well owners should be contacted to shut in their wells.
- § If sour gas is present, all personnel in the area of the release must be equipped with H₂S monitors and SCBA.
- § Determine the extent of the Protective Action Zone (PAZ). **Evacuation must begin when a Level 2 emergency is declared.** Evacuation should begin with residents nearest or downwind of the release site.

- § Contact a service company to conduct continuous air monitoring for **Level 1, Level 2 and Level 3** gas releases.
- § Secure the PAZ. For **Level 2 and 3** emergencies, begin establishing roadblocks to prevent public access to the area. Contact the RCMP immediately if there is a gas release near a public road.
- § If the release is gas that may need to be ignited, refer to the following sections: *Ignition Criteria, Ignition Decision Flowchart* and *Ignition Procedure Flowchart*.
- § At a **Level 1** emergency, begin notifying any residents within the EPZ deemed “sensitive” (Emergency Evacuation Priority Level 1) in the event they wish to evacuate. AltaGas must provide transportation and temporary accommodation where needed. EVACUATION IS VOLUNTARY – AltaGas does not have the authority to order people to evacuate. The lead government agency (NEB) and the RCMP should be notified immediately if any residents are unwilling to evacuate a hazard area.
- § At a **Level 2** emergency, personnel, under the direction of the *Incident Commander*, will begin to make telephone contact with residents near the emergency area to alert them to the gas release and the potential need for evacuation or shelter (see *Shelter Procedure* and *Evacuation Procedure*). If circumstances do not justify immediate evacuation, residents should be asked to remain indoors and close doors and windows. It is the responsibility of the *Incident Commander* to ensure the residents are provided with updates as the emergency situation changes.
- § The NEB is the lead government agency in Suffield Pipeline gas release emergencies.
- § On the following page is a schematic of the public safety measures for a hazardous gas release in the form of a decision tree.

Public Safety Measures for Hazardous Gas Releases



AIR QUALITY MONITORING

Air quality monitoring is required to monitor and record the presence and concentrations of gas during a release and following an ignition of a release. The *On-Scene Commander* is responsible for ensuring effective air quality monitoring is performed.

Air quality monitoring is used to:

- § Track a gas plume;
- § Determine if ignition criteria are met;
- § Determine whether evacuation and/or sheltering criteria have been met (particularly beyond the PAZ);
- § Assist in determining when the emergency can be downgraded;
- § Determine roadblock locations; and
- § Determine gas concentrations in areas being evacuated to ensure safety of personnel and evacuees.

The type of air monitoring units and number of monitors required is determined by:

- § Access and egress points;
- § Population density and proximity of urban development; and
- § Local conditions.

Operators are equipped with personal monitors to track the air quality in the event of an emergency release. At a **Level 1** emergency a mobile air quality monitoring company will be contacted.

Mobile air monitors will be dispatched following notification of an emergency release. Monitoring equipment available to the operators is listed under Emergency Equipment (Section 1 – OVERVIEW).

Monitoring should occur downwind of the release with priority given to the nearest un-evacuated residence or location where people are present. Monitored information must be made available to Alberta Environment, the NEB and the public during the emergency.

Notification of members of the public deemed “sensitive” (Emergency Evacuation Priority Level 1) must begin with a **Level 1** emergency so they may decide whether to voluntarily evacuate.

Notification of all residents in the PAZ must begin when a **Level 2** emergency has been declared. The decision to begin notifying residents outside of the PAZ/EPZ will be based on the results of air quality monitoring.

IGNITION CRITERIA

Ignition of sweet gas, condensate or natural gas liquids (NGLs) may be necessary if people or the environment are at risk due to an uncontrolled release. If ignition is necessary because there is insufficient time to evacuate the EPZ, the *On-Scene Commander* is authorized to ignite the gas release and his decision will be fully supported by AltaGas. Ignition must occur within 15 minutes if any of the ignition criteria are met. The ignition team must be certified in sour well ignition.

Sweet Gas or Condensate Ignition Criteria

If time permits, the decision to ignite a sweet gas or condensate release will be made by the responsible AltaGas Director or Vice President (or his designated alternate) in consultation with the *Incident Commander* and the *On-Scene Commander*. It is recommended that the regulatory authority with jurisdiction be consulted prior to ignition. Ignition is mandatory if any of the following conditions exist:

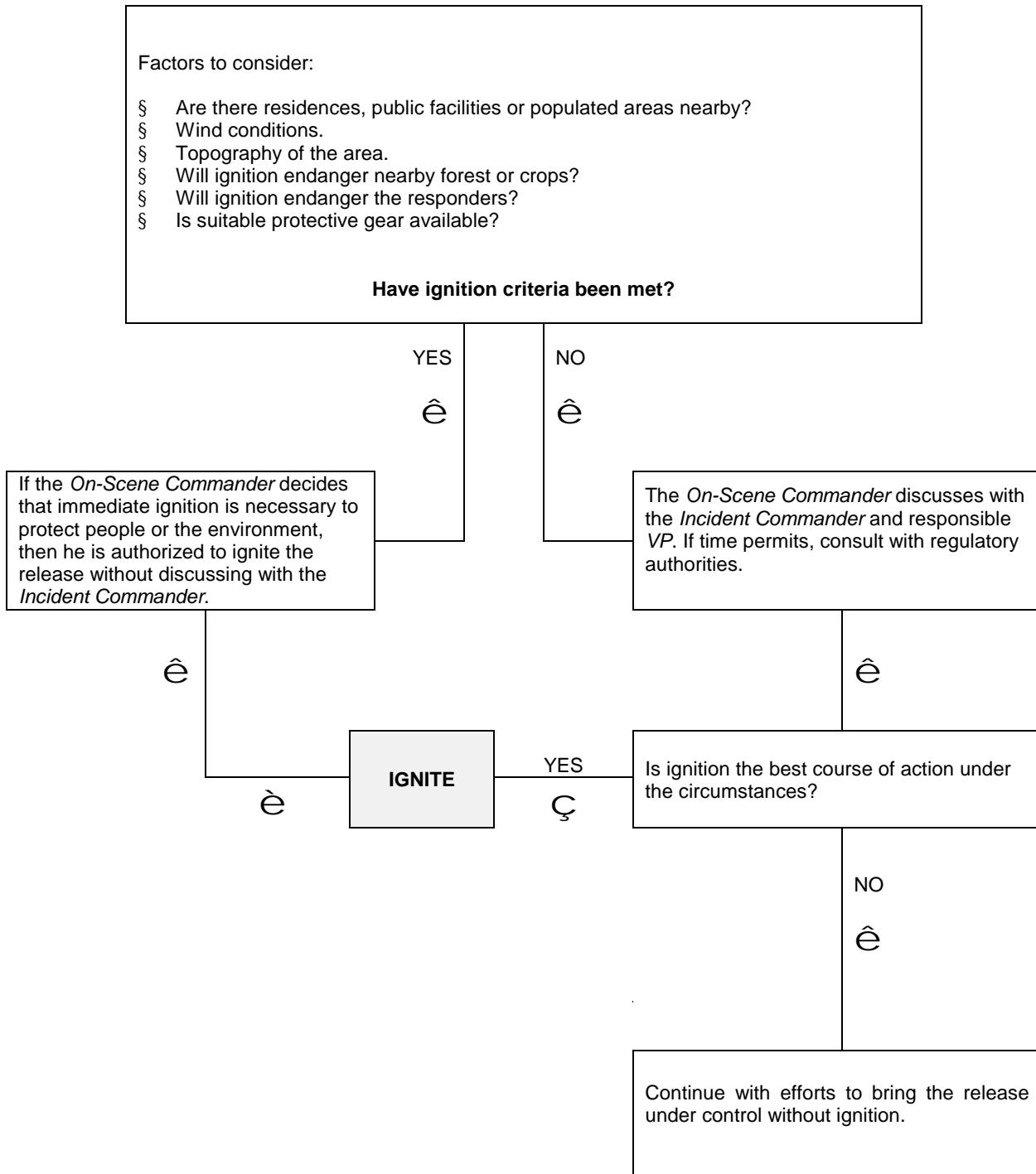
- § An immediate threat to human life exists and there is insufficient time to evacuate the PAZ.
- § An immediate and serious threat to the environment exists.

Ignition Equipment

The ignition team shall have the following equipment available before attempting to ignite a sour gas release:

- § Flare pistols and flares;
- § 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;
- § Safety harnesses (front D-Ring) or safety belts (rear D-Ring) with 30 metres of flame-retardant ropes;
- § Gas detector (LEL and H₂S); and
- § Communications (radios and/or cellular phones).

IGNITION DECISION FLOWCHART



IGNITION PROCEDURE FLOWCHART

If the decision is made to ignite a gas release, the *On-Scene Commander* will coordinate and supervise the ignition.

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Prior to the ignition:

- § Install manned roadblocks to prevent access to the hazard area.
- § Evacuate all non-essential personnel.
- § Designate an ignition team of two qualified people.
- § Ensure the ignition team has the appropriate protective gear.
- § The *Incident Commander* will discuss the ignition procedure with the ignition team.
- § Select a position from which the ignition will be attempted.
- § Selection of the ignition position should ensure a safe escape route.
- § Monitor the ignition position for the presence of combustible gas.
- § If time permits erect a windsock and streamers.

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The ignition position must:

- § Allow for a safe escape route.
- § Be free of combustible gas.
- § Be upwind of the vapour plume.
- § Be a minimum of 300 metres from the outer edge of the vapour plume.

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Attempt the ignition with a flare pistol. Aim for the ground at the outer edge of the vapour plume where the gas/air mixture is most likely to be in the combustible range.

YES

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Ignition Successful?

NO

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Advise the *Incident Commander* that the ignition has been successful. Continue to maintain roadblocks and monitor downwind for H₂S, SO₂ and combustible gas. Assist the fire crews.

Attempt ignition again – move closer if necessary, but no nearer to the vapour plume than 100 metres. Monitor for combustible gas at the new position before attempting ignition.

SHELTER PROCEDURE

If an emergency exists that threatens the general public, it may be necessary to advise residents in the EPZ or with egress issues to shelter themselves in their homes. The decision to advise residents to shelter themselves will be made by the *On-Scene Commander* in consultation with the *Incident Commander*. If the situation requires immediate action the *On-Scene Commander* is authorized to begin notifying the general public without consulting the *Incident Commander*. Sheltering should be considered the primary protective measure in limited circumstances when:

- § There is not enough time or warning to safely evacuate the public who may be at risk;
- § Residents are waiting for evacuation assistance;
- § During a gas release of limited duration (i.e. pipeline rupture);
- § The location of the release has not been identified; or
- § The public would be at higher risk if evacuated.

The *Public Safety Coordinator* is responsible for organizing the notification of residents in the PAZ and beyond. The *Public Safety Coordinator* will advise residents to:

- § Remain indoors and close all doors and windows;
- § Plug all air intakes into the building;
- § Extinguish all ignition sources (pilot lights on water heaters, stoves, etc.);
- § Refrain from smoking or operating electrical appliances;
- § Stay away from windows;
- § For sour gas (H_2S) releases move to the upper floors of the home; and
- § Await further instruction from AltaGas or Cenovus personnel.

EVACUATION PROCEDURE

Evacuation is the primary public protection measure for long term releases, assuming the public can be safely removed from the area either during or prior to a release of gas. If an emergency exists that threatens Suffield Pipeline personnel or the general public, it may be necessary to evacuate the EPZ. The decision to evacuate the EPZ will be made by the *On-Scene Commander* in consultation with the *Incident Commander*. Evacuation assembly areas shall be established upwind and at a safe distance from the EPZ. The *On-Scene Commander* will ensure that all personnel are accounted for. Area roads that may be used for evacuation purposes are shown on the map in Section 8, MAPS. The route taken will depend upon the location of the gas release and wind direction.

Evacuation begins in the immediate vicinity of the incident and expands outward downwind of the release so that members of the public are not exposed to hazards.

At a **Level 1** emergency, AltaGas will notify all persons deemed “sensitive” (Emergency Evacuation Priority Level 1) via telephone to suggest they evacuate. Rovers may be sent to advise those persons who cannot be reached via telephone that evacuation is recommended.

At a **Level 2** emergency, the company will notify all persons who may be in the affected area and the public in the surrounding area by:

- § Notification through telephone contact.
- § Acquiring helicopters to perform fly-overs to visually inspect for persons in the vicinity.
- § Dispatching rovers to locate persons and respond to sightings by the helicopter(s).

Evacuation of the general public may be necessary if an emergency occurs in close proximity to residences or public facilities. **Evacuation must begin when a Level 2 emergency is declared.** Persons deemed “sensitive” (Emergency Evacuation Priority Level 1) may be evacuated sooner. Evacuation should begin with residents nearest or downwind of the release site. The *Public Safety Coordinator* is responsible for organizing the notification and evacuation of residents in the EPZ.

To ensure personnel and public safety outside the PAZ, actions will be performed by Cenovus and AltaGas staff with the following priority guidelines:

- § Anyone located directly downwind or adjacent to the site;
- § Anyone located within the PAZ requiring assistance; and
- § Anyone who cannot be contacted by telephone.

Evacuation of residents is on a voluntary basis –**personnel do not have authority to order residents to evacuate their homes**. If a resident chooses not to evacuate, the police should be notified. If the situation requires immediate action, the *On-Scene Commander* is authorized to begin notifying and evacuating the general public without consulting the *Incident Commander*. A sample evacuation notification statement is included in Section 6. This evacuation notification statement is to be used for both **Level 1** (voluntary notification) and **Level 2 and 3** emergencies, as appropriate.

The company shall provide suitable transportation and accommodations if evacuation is necessary.

In the unlikely event that sheltering and/or evacuation are required beyond the initial PAZ, AltaGas will work with the local authority to notify the affected residents. The notification mechanisms outlined in the municipal emergency plan response framework may be used by the local authority to notify residents, based upon the monitored air quality and other information provided by AltaGas and Cenovus.

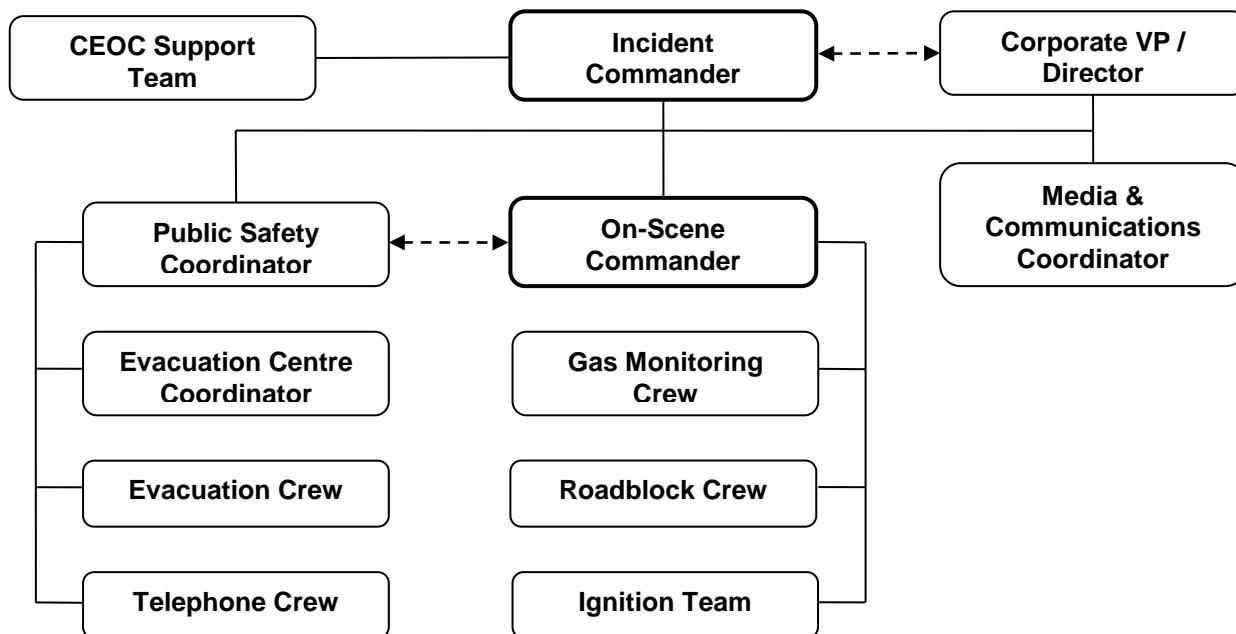
DOWNGRADING AN EMERGENCY

The emergency response may be downgraded once conditions have been stabilized - when there is no longer a threat to people, property or the environment. The decision to downgrade response activities must be based upon the specific circumstances of each emergency. The *Incident Commander*, before response activities are downgraded or terminated, must consult with the NEB and other government agencies that participated in the response. It is the responsibility of the *Incident Commander* to coordinate the post-emergency activities which may include:

- § Ensuring that all affected parties are notified that the emergency is over.
 - In consultation with the *On-Scene Commander*, the *Incident Commander* will (1) inform company and external resources that were needed to safely handle the emergency, (2) notify affected or evacuated area residents, (3) notify government agencies and (4) inform the *Media & Communications Coordinator* to issue a media statement.
- § Ensuring that residences in the PAZ are clear of gas before the residents return.
- § Providing transportation to residents who were evacuated.
- § If the emergency has resulted in serious injuries or fatalities it may be necessary to organize critical incident stress management assistance for the affected people.
- § Reimbursing costs incurred by residents due to the emergency.
- § Submitting incident reports to government agencies and AltaGas senior management.
- § Conducting a post-emergency debriefing to assess the effectiveness of the emergency response. Post-incident debriefings must be held within 30 days for all **Level 2 and 3** emergencies. A debriefing report must be submitted to the NEB within 30 days following the debriefing. The debriefing report must address the following:
 - The source and cause of the incident.
 - Adequacy of the resources available during the incident.
 - Whether personnel were properly trained and responded effectively and timely according to pre-defined procedures.
 - Whether the equipment was effective and adequate.
 - The response and recovery efforts including public protection measures taken.
 - The incident site rehabilitation program and timing.
 - Recommendations for preventive or mitigative measures to ensure non-recurrence.
 - Any changes to ERP to improve future responses.
 - Any additional training required for personnel to improve response capability.
 - A monitoring report.

SUFFIELD PERSONNEL

Incident Command Structure



Potential On-Scene Commander (and Alternates)

<name removed>	Cenovus Production Coordinator
<name removed>	Cenovus Lead Operator
<name removed>	Cenovus Operator
<name removed>	Cenovus Operator
<name removed>	Cenovus Operator
<name removed>	Cenovus Operator
<name removed>	Cenovus Operator

Potential Incident Commander (and Alternates)

<name removed>	AltaGas Director Operations, Gas
<name removed>	AltaGas Operations Manager, Central & Northeast
<name removed>	AltaGas Operations Manager, Northwest
<name removed>	AltaGas Operations Manager
<name removed>	AltaGas Divisional Vice President Operations - Gas
<name removed>	AltaGas Operations Manager, South

Public Safety Coordinator

Appointed by the *Incident Commander*.

The *On-Scene Commander* may also assume the role of *Public Safety Coordinator*.

Evacuation Centre Coordinator

Appointed by the *Public Safety Coordinator*.

Media / Communications Personnel

<name removed> AltaGas VP, Stakeholder Relations

<name removed> AltaGas Senior Advisor, External Communications

<name removed> AltaGas Senior Advisor, External Communications

On-Scene Commander

The *On-Scene Commander (OSC)* is the senior person on-site during the emergency and coordinates all emergency activities at the site. The OSC reports directly to the *Incident Commander*.

The OSC's responsibilities include:

- § Ensuring the safety of employees, contractors and the general public.
- § Logging all actions and responses.
- § Assessing the incident scene (assume First Responder role or dispatch as appropriate).
- § Establishing the location of the On-Site Command Post (OSCP) where appropriate (i.e. facility office, operator's truck, trailer).

The OSC may be relieved at any time if a more senior person arrives at the scene of the emergency. The OSC may also assume the role of *Public Safety Coordinator*.

Level 1 Emergency

- § Coordinate on-site response actions to immediately gain control of the emergency. Shut down/isolate gas or spill source, contain fluids and prevent entry into watercourse.
- § Ensure safety of all on-site personnel. Attend to medical requirements.
- § Immediately assess the level of emergency. **The OSC is authorized to evacuate the site and activate the ERP before contacting anyone if he/she believes the circumstances require immediate action.**
- § Contact a senior company representative to assume the *Incident Commander* role. If there is no time to attempt to locate an *Incident Commander*, call the AltaGas 24-hour emergency telephone number instead (1-866-826-3830).
- § Coordinate response actions with the *Incident Commander* by telephone.
- § Obtain and/or request response personnel, equipment and other emergency services (i.e. RCMP, ambulance, fire department, etc.) as needed from the *Incident Commander*.
- § Notify mobile air monitoring unit and place on standby if necessary.
- § Begin evacuation procedures for those persons in the PAZ deemed "sensitive" (Emergency Evacuation Priority Level 1), dependent upon the nature of the emergency.
- § Direct control and/or containment procedures.

Level 2 or 3 Emergency

- § Complete all actions required at a **Level 1** emergency.
- § Notify personnel of the change to a **Level 2 or 3** emergency.
- § Consult with the *Incident Commander* on public safety actions (sheltering, evacuation, ignition, etc.).
- § Determine the need for and appoint *Gas Monitoring Crews* and *Roadblock Crews*.
- § Assemble and place on standby well control personnel and equipment, as necessary.
- § Liaise with government on-site representatives as they arrive.
- § Proceed with ignition of a gas release if ignition criteria has been achieved (see *Ignition Procedure* in Section 3). The decision to ignite a gas flow will be made by the *Incident Commander* in consultation with the appropriate government agencies, the responsible AltaGas VP or Director and other AltaGas officers. However, the OSC is authorized to ignite a gas flow if the situation requires immediate action to protect employees, contractors, the public or the environment.
- § Assess the impact of hydrocarbon or chemical spills and consult with the *Incident Commander*.
- § Designate an individual to establish a “staging area” at a location removed from the OSCP to receive and direct contract equipment and personnel, if necessary.
- § Assist with the deployment of a helicopter (equipped with a siren and loud-hailer) to assess the EPZ, if required, to:
 - survey the hazards/damages
 - identify the magnitude of any spill
 - identify residents/transients/recreational users in the PAZ/EPZ
- § Request a Fire Hazard Closure Order from the *Incident Commander* if area isolation is required.
- § Maintain an Incident Log (Section 6 – FORMS) of the actions taken during the emergency.
- § Debrief all personnel once emergency is over.

Incident Commander

The *Incident Commander (IC)* is responsible for and manages the overall emergency response. The *IC* is the first person contacted by the OSC from the pre-determined list of potential *Incident Commanders*. They are the *IC* until relieved by a more senior AltaGas corporate representative on the list.

The *IC*, in consultation with the OSC, will assess the severity of the emergency and determine:

- what company and external resources are needed to safely handle the emergency
- whether it is necessary to begin notifying or evacuating area residents
- which government agencies should be notified
- whether the *Media & Communications Coordinator* should be activated

For all **Level 1, 2 and 3** emergencies the *IC* will, at the earliest opportunity, notify the responsible AltaGas VP or Director that an emergency exists. The responsible AltaGas VP or Director will decide if it is necessary to begin notifying other corporate officers that an emergency situation exists.

Level 1 Emergency

- § Acknowledge appointment by the OSC and provide response personnel and equipment as required.
- § Declare the Level of Emergency, in conjunction with the OSC.
- § Establish the location of the Corporate Emergency Operations Centre (CEOCC).
- § Notify the NEB and the Local Authority should their assistance be required to contain the emergency or aid with evacuation of those individuals within the EPZ deemed "sensitive" (Emergency Evacuation Priority Level 1).
- § Log actions and responses.

Level 2 or 3 Emergency

- § Complete all actions required at a **Level 1** emergency.
- § Define the PAZ from data supplied from *Gas Monitoring Crews* and in conjunction with the NEB.
- § Designate the *Public Safety Coordinator* and activate the *Media & Communications Coordinator*.
- § Proceed with the following public safety actions, in consultation with the OSC:

- . **SHELTER** public inside the PAZ until H₂S/LEL levels indicate the area is safe.
 - . **EVACUATE** public inside the PAZ if H₂S/LEL levels indicate the area is not safe.
 - . **IGNITE** gas release source if the ignition criteria have been met. See *Ignition Procedure* in Section 3.
- § Ensure appropriate government agencies have been notified and liaise with them.
- § Obtain additional response personnel and equipment necessary to assist the OSC and all other responders.
- § Establish the location of the Regional Emergency Operations Centre (REOC), if required, and request appropriate personnel to assemble at the REOC to assist the OSC.
- § Assist the OSC with the procurement of a Fire Hazard Order, if requested.
- § Prepare initial statements for a press/media release at the local level. Refer media inquiries to the *Media & Communications Coordinator*. Issue any required statements carefully, and make no reference to deceased victims until the next-of-kin have been notified. Document any statements made to the media (see Section 6 - FORMS).
- § Notify the contractor's head office to apprise them of the situation regarding any contract personnel.
- § Consult with the government agencies that participated before downgrading or terminating emergency response activities.
- § Coordinate the post-emergency activities (see Section 3 – *Downgrading an Emergency*).

Public Safety Coordinator

The *Public Safety Coordinator (PSC)* coordinates all aspects of the Shelter/Evacuation process whenever public safety is in jeopardy. The *Incident Commander* appoints the *PSC*, and the *PSC* may also be the *On-Scene Commander*.

Level 1, 2 or 3 Emergency

- § Assist the *IC* and *OSC* with:
 - Organizing *Roadblock Crews* (includes requesting assistance from the RCMP);
 - Organizing *Telephone Crews (Telephoners)* to contact residents;
 - Organizing *Evacuation Crews*; and
 - Procuring additional staff, equipment or resources as required.
- § Establish a prioritized resident list, beginning with anyone located downwind and closest to the emergency incident site (including homes and businesses).
- § Organize the *Telephoner(s)* to contact area users with the applicable public safety message (no more than 7 residents per *Telephoner*).
- § Assemble and dispatch the *Evacuation Crews* to help residents requiring assistance with evacuation.
- § Direct *Evacuation Crews/Telephoners* to proceed with one of the following safety actions (in consultation with the *IC*):
 - **SHELTER** residents inside the PAZ until H₂S/LEL levels indicate the area is safe.
 - **EVACUATE** residents inside the PAZ if H₂S/LEL levels indicate the area is not safe.
- § Appoint an *Evacuation Centre Coordinator* to establish a Reception Centre.
- § Maintain a record of the public's status, and communicate that status to the *IC*.
- § Liaise with the officials from government agencies if they are called upon to assist with the public safety actions.
- § Establish an air-to-ground communication link if a helicopter is dispatched to assist with the public safety actions,

Evacuation Centre Coordinator

In consultation with the *Incident Commander*, the *Public Safety Coordinator (PSC)* appoints the *Evacuation Centre Coordinator*. The *Evacuation Centre Coordinator* assists the *PSC* with public safety actions from the Reception Centre.

Level 1, 2 or 3 Emergency

- § Obtain an evacuation centre kit and a copy of the ERP manual.
- § Coordinate travel requirements for evacuees with the *PSC*.
- § Proceed to designated Reception Centre to receive evacuees.
- § Set up Reception Centre (tables/chairs) as needed.
- § Record the arrival of all members of the public on the Reception Centre Check-in Sheet (see Section 6).
- § Report status of evacuees to the *PSC* and record status on the Reception Centre Check-in Sheet.
- § Provide shelter and food to evacuees.
- § Contact additional personnel to assist as required (utilize *PSC* if necessary).
- § Liaise with the *PSC* to ensure resident concerns are addressed and answered promptly.
- § Assist evacuees with compensation issues.
- § Assist with post-emergency actions.

Telephone Crew

The *Telephone Crew (Telephoners)*, under the direction of the *Public Safety Coordinator (PSC)*, conducts resident call down when public safety actions are required.

Level 1, 2 or 3 Emergency

- § Prioritize resident call down according to the *PSC's* directions.
- § Confirm with the *PSC* which message is to be delivered to area residences/businesses (shelter or evacuate).
- § Fill in appropriate information on message form.
- § Proceed to contact residences/businesses deemed "sensitive" (Emergency Evacuation Priority Level 1) within the EPZ and deliver selected message (for a Level 1 Emergency). **No more than 7 residents per *Telephoners*.**
- § Proceed to contact all remaining residences/businesses within the designated PAZ and deliver selected message (for a Level 2 or 3 Emergency).
- § Maintain an accurate log of all telephone conversations, times, etc. on the Resident Contact Log (see Section 6).
- § Establish communication with the *Evacuation Centre Coordinator*, relaying resident and/or business statuses as they change.
- § Notify the *PSC* of any problems, issues or requirements arising from the contact process (i.e. no contact made, need for assistance, only children at home, etc.).
- § Assist with the post-emergency notifications when the emergency is downgraded by the *Incident Commander*.

Evacuation Crew

The *Evacuation Crew* is made up of field personnel who assist the *Public Safety Coordinator (PSC)* with evacuation of the PAZ as required.

Level 1, 2 or 3 Emergency

- § Proceed, in designated evacuation vehicles, to residents/businesses deemed “sensitive” (Emergency Evacuation Priority Level 1) to assist with evacuation (for a Level 1 Emergency).
- § Proceed, in designated evacuation vehicles, to all remaining residents/businesses to assist, as necessary, with evacuation (for a Level 2 or 3 Emergency).
- § Ensure the following information is delivered to evacuees:
 - the type of emergency and related dangers
 - directions for proceeding out of the area safely
- § Provide assistance to individuals requesting help.
- § Record all evacuation data on the Resident Contact Log (Section 6).
- § Report evacuation status to the *PSC*.
- § Assist the *Roadblock Crews* with securing the planning and response zones and manning roadblocks after evacuation procedures have been completed.

No one will take unnecessary risks or perform any task for which they have not been trained and properly equipped. The *Evacuation Crew* will be staffed with operating personnel. Where necessary, outside personnel may be required to perform some of these duties.

Roadblock Crew

The *Roadblock Crew* is made up of field personnel who establish and maintain roadblocks to isolate the designated planning and response zones, under the supervision of the *On-Scene Commander (OSC)*. The *Roadblock Crew* will attempt to correct the conditions that are threatening the safety of workers, the general public or the environment.

Level 1, 2 or 3 Emergency

Prior to Dispatch:

- § Assemble at designated site for a briefing by the OSC (if possible).
- § Obtain roadblock kits and establish roadblocks at the designated locations.
- § Establish schedule of report-in times to the OSC.

To Isolate the Protective Action Zone:

- § Establish a safe route to get to the roadblock location(s) and an escape route, should conditions warrant.
- § Record the vehicle information for vehicles stopping at the roadblock(s) on the Roadblock Log (see Section 6).
- § Monitor H₂S/LEL levels and relay that information to the OSC.
- § Be prepared to move the position of the roadblock(s) as conditions change.
- § Maintain the roadblock(s) until relieved or informed by the OSC to stand down.
- § Complete a final report.

No one will take unnecessary risks or perform any task for which they have not been trained and properly equipped. The *Roadblock Crew* will be staffed with operating personnel. Where necessary, outside personnel may be required to perform some of these duties. The *Roadblock Crew* may receive assistance from the RCMP or transportation officials.

Gas Monitoring Crew

It is the responsibility of the *On-Scene Commander* to determine the need for and appoint a *Gas Monitoring Crew*.

Level 1, 2 or 3 Emergency

Locating the Hazardous Area for a Gas Release:

- § Take a position downwind of the gas release at the nearest un-evacuated residence (c/w SCBA/gas detection and communication equipment).
- § Record H₂S/LEL readings on the Ambient Air Monitoring Log (see Section 6) and relay that information to the *On-Scene Commander* or *Incident Commander*.
- § Advance towards or retreat from the release according to the readings obtained. **Crews should always maintain their own safety.**
- § Expand or retract the PAZ based on air quality monitoring or other pertinent data.

Isolating the PAZ:

- § Under the instruction of the *On-Scene Commander*, dispatch *Roadblock Crews* (with applicable safety equipment) to selected locations outside the PAZ.

No one will take unnecessary risks or perform any task for which they have not been trained and properly equipped. The *Gas Monitoring Crew* will be staffed with operating personnel. Where necessary, outside personnel may be required to perform some of these duties.

Media & Communications Coordinator

AltaGas recognizes the need for effective and timely communication between the company and the general public if an emergency occurs. To facilitate the flow of information AltaGas has designated a corporate officer as its *Media & Communications Coordinator*.

The *Media & Communications Coordinator* is the AltaGas Corporate Communications Team designate. Only the *Media & Communications Coordinator*, or his designate, will make statements to the news media. No other employee, contract employee or employee of a contractor performing work for AltaGas shall provide any comments to the news media. If approached by the news media, provide them with the telephone number of the *Media & Communications Coordinator*.

The *Media & Communications Coordinator* will:

- § Lead strategic communications efforts in conjunction with the *Incident Commander*.
- § Direct the Communications Team to assist the *Incident Commander*, as required.
- § Create initial messaging framework and key messages.
- § Act as a liaison between the *Incident Commander* and external agencies, if required.
- § Develop and update communications strategies.
- § Co-ordinate and manage media issues.

Only the *Media & Communications Coordinator* will respond to requests for information from the news media and all information releases will be provided in cooperation with the NEB.

The Communications Team will assist the *Media & Communications Coordinator* and *Incident Commander* by performing the following tasks, as required:

- § Triage media inquiries.
- § Coordinate interviews with the approved spokesperson.
- § Ensure spokespeople and subject-matter experts are prepared for media interviews (messaging, background information, etc.).
- § Prepare news releases and other media collateral.
- § Post material on the Internet.
- § Log response actions (it is essential to keep accurate records and continuously track the order of responses).
- § Monitor media coverage and report developments, as well as all notification statuses, to the *Media & Communications Coordinator*.

Emergency Information Disseminated to the Public

The following information is to be provided, and updated regularly, by AltaGas to the public and others who have been asked to shelter-in-place or evacuate:

- type and status of the emergency
- location and proximity of the emergency to those who are sheltering-in-place or have been evacuated
- the public safety response to follow and the shelter/evacuation instructions
- any other emergency response actions to consider
- actions being taken to respond to the situation, including the anticipated time required
- contacts for additional information
- reception centre locations

The following information is to be provided to any interested members of the general public:

- type and status of the emergency
- location of the emergency
- areas affected by the emergency
- description of the products involved
- contacts for additional information
- actions being taken to respond to the situation, including the anticipated time required

Media Contact

If an employee, contract employee or employee of a contractor is approached by the media:

- § Respond with: "I can't answer your questions, but I will find someone who can."
- § Record their contact information (name, outlet, phone # and/or email)
- § Refer them to the designated media contact or Contact 3 on the AltaGas Crisis Communications Call Tree
- § Alert the Corporate Communications Team by using the Call Tree
- § Do:
 - be courteous
 - assure them a company spokesperson will follow up
 - pass along their contact information
 - remain positive

§ Don't:

- say "no comment"
- go off the 'record'
- speculate or be hypothetical
- offer a personal opinion
- lose your patience

Emergency Response Plan Administrator

The AltaGas *Emergency Response Plan (ERP) Administrator* is required to review and update the ERP on an ongoing basis.

GOVERNMENT OF CANADA

National Energy Board (NEB)

The main responsibilities of the NEB are established in the *National Energy Board Act (NEB Act)*, and include regulating:

- § The construction, operation, and abandonment of pipelines that cross international borders or provincial boundaries, as well as the associated pipeline tolls and tariffs;
- § The construction and operation of international power lines and designated inter-provincial power lines; and
- § Imports of natural gas and exports of crude oil, natural gas liquids, natural gas, refined petroleum products and electricity.

Additionally, the NEB has regulatory responsibilities for oil and gas exploration and production activities in Canada Lands not otherwise regulated under joint federal/provincial accords. These regulatory responsibilities are set out in the *Canada Oil and Gas Operations Act* and the *Canada Petroleum Resources Act*.

As lead regulatory agency, the NEB:

- § Monitors, observes and assesses the overall effectiveness of the company's emergency response in terms of:
 - emergency management
 - safety
 - security
 - environment
 - integrity of operations and facilities
 - energy supply
- § Investigates the incident, either in cooperation with the Transportation Safety Board of Canada, under the *Canada Labour Code*, or as per the *NEB Act* or *Canada Oil & Gas Operations Act* (whichever is applicable).
- § Inspects the pipeline or facility.
- § Examines the integrity of the pipeline or facility.
- § Requires appropriate repair methods be used.
- § Requires appropriate environmental remediation of contaminated areas be conducted.
- § Coordinates stakeholder and Aboriginal community feedback regarding environmental clean-up and remediation.
- § Confirms that AltaGas is following its ERP commitments, plans, procedures and NEB regulations, and identifies non-compliances.

- § Initiates enforcement actions as required.
- § Approves the restart of the pipeline.

All significant incidents involving NEB-regulated pipelines should be reported through the NEB/TSB single-window notification process – initial notification must be made to the TSB Reporting Hotline and then subsequently to the NEB's Online Event Reporting System (OERS). Significant incidents include the following:

- Death or serious injury (i.e. major bone fracture, amputation, loss of sight, internal hemorrhage, third degree burns, unconsciousness or loss of body function)
- A missing person
- A fire or explosion that causes a pipeline or facility to be inoperative
- An LVP hydrocarbon release in excess of 1.5 m³ that extends beyond the lease
- A pipeline rupture (an instantaneous release where the pressure of the pipeline segment cannot be maintained)
- A toxic plume as defined in CSA Z662

All other incidents involving areas under NEB jurisdiction must be reported within 24 hours to the OERS, including:

- All incidents under the *NEB Onshore Pipeline Regulations* (OPR), *NEB Processing Plant Regulations* (PPR), and *Canada Oil and Gas Drilling and Production Regulations* (DPR)
- Unauthorized activities under the *National Energy Board Pipeline Crossing Regulations Part II*
- Emergency burning or flaring under the PPR
- Hazard identification under the PPR
- Suspension of operations under the PPR
- Near-misses under the DPR
- Serious accidents or incidents under the *Canada Oil and Gas Geophysical Operations Regulations*
- Emergencies or accidents under the *Canada Oil and Gas Installation Regulations*
- Accidents, illnesses, and incidents under the *Canada Oil and Gas Diving Regulations*

If the OERS is unavailable, these incidents must be reported to the TSB Reporting Hotline.

For all other incidents, the NEB can be contacted at their 24/7 Incident Line.

TSB Reporting Hotline: 819-997-7887

OERS: <https://apps.neb-one.gc.ca/ERS>

NEB Incident Line: 403-807-9473

Transportation Safety Board (TSB)

The Transportation Safety Board of Canada is an independent agency that investigates marine, pipeline, railway and aviation transportation occurrences. When notified of an occurrence, the TSB will assess the circumstances to determine if an investigation is warranted; this assessment may involve the deployment of an investigation team to the occurrence site.

The TSB requires the following incidents resulting directly from operation of a pipeline to be reported to them:

- § A person is killed or sustains a serious injury.
- § The safe operation of the pipeline is affected by:
 - damage sustained when another object came into contact with it; or
 - a fire or explosion or an ignition that is not associated with normal pipeline operations.
- § An event or an operational malfunction results in:
 - an unintended or uncontrolled release of gas;
 - an unintended or uncontrolled release of HVP hydrocarbons;
 - an unintended or uncontained release of LVP hydrocarbons in excess of 1.5 m³; or
 - an unintended or uncontrolled release of a commodity other than gas, HVP hydrocarbons or LVP hydrocarbons.
- § A release of a commodity from the line pipe body.
- § Pipeline operations beyond design limits or any operating restrictions imposed by the NEB.
- § When a pipeline restricts the safety operation of any mode of transportation.
- § An unauthorized third party activity within the EPZ poses a threat to the safe operation of the pipeline.
- § A geotechnical, hydraulic or environmental activity posing a threat to the safe operation of the pipeline.

- § The operation of a portion of the pipeline is interrupted as a result of a situation or condition that poses a threat to any person, property or the environment.
- § An unintended fire or explosion has occurred that poses a threat to any person, property or the environment.

The OERS must be used to report all pipeline incidents. Significant incidents (as defined above under the NEB), however, must be reported immediately by phone to the TSB Reporting Hotline, and then subsequently reported online through the OERS.

TSB Reporting Hotline: 819-997-7887

OERS: <https://apps.neb-one.gc.ca/ERS/Home/Index/>

Fax: 819-953-7876

Email: PipelineNotifications@tsb.gc.ca

RCMP

- § The RCMP will assume responsibility with traffic control, evacuation and residence security if required.
- § In the event of an incident concerning the primary or secondary highways within the EPZ, Cenovus or AltaGas will inform the RCMP of the emergency.
- § The RCMP will assume responsibility with roadblocks on both primary and secondary highways, if required.
- § The RCMP will clarify responsibilities in the event fatalities occur.

GOVERNMENT OF ALBERTA

Alberta Energy Regulator (AER)

The AER is the regulator of energy development in Alberta for facilities that do not cross provincial or national borders.

During a significant emergency response event involving a gas plant and/or the associated gathering system in Alberta, the AER would, when acting as the lead government agency:

- § Determining the Level of Emergency with the AltaGas response team.
- § Providing an Alberta Government Agency Representative to the OSCP to maintain a communication link between AltaGas and the AER.
- § Determining the extent of the immediate hazard and issue a FH (Fire Hazard) Closure Order to keep the public and media out of the PAZ if the situation warrants.
- § Notify Transport Canada, inform them of the situation and recommend the issue of a Notice to Airmen (NOTAM) if appropriate.
- § Monitor operations and mitigate notification and evacuation activities within the PAZ.
- § Notify other government agencies (i.e. AEMA, OH&S, AEP & AHS) when necessary.

The NEB, not the AER, is the lead regulatory agency for incidents involving the Suffield Pipeline.

Alberta Emergency Management Agency (AEMA)

The Alberta Emergency Management Agency (AEMA) leads the coordination, collaboration and co-operation of all organizations involved in the prevention, preparedness and response to disasters and emergencies, including government, industry, municipalities and first responders, through their Provincial Operations Centre (POC).

The AEMA is responsible to the government, to Albertans, to communities and to industry for the protection of people, property and the environment from the effects of emergency events.

At all times, local authorities in Alberta's municipalities are responsible for managing the first response to an emergency event. When an emergency event exceeds the capabilities of a municipal response or there is a significant threat to life and property, the Alberta Emergency

Management Agency coordinates the Government of Alberta's support to the municipality by linking them with resources to help manage the event

Alberta Environment & Parks

Alberta Environment and Parks (AEP) oversees air, land, water and sustainable development of natural resources for Alberta. AEP's responsibilities and powers are outlined in the *Environmental Protection and Enhancement Act* (EPEA) and its accompanying regulations. AEP can use administrative penalties or prosecution to enforce compliance with environmental legislation.

Generally, AEP has jurisdiction in cases of off-lease spills and releases. Off-site spills and releases must be reported to AEP. In a major emergency response involving sour gas, AEP will monitor H₂S levels and identify areas of risk. They will also monitor discharges into watercourses, determine areas at risk and ensure adequate equipment is available and appropriate data is collected.

Wildfires should be reported to AEP through their wildfire reporting number, and incidents with wildlife should also be reported to AEP.

Energy & Environmental Emergency 24-Hour Response Line: 1-800-222-6514

Wildfire Reporting: 310-FIRE (3473)

Wildlife Reporting: 1-877-944-0313

Alberta Transportation

The Alberta Transportation's Co-ordination and Information Centre (CIC) operates 24 hours a day, 7 days a week to provide information to the general public and industries on dangerous goods compliance. The CIC is also an emergency response centre for all transportation of dangerous goods (TDG) incidents.

The CIC will provided the following technical information:

- § Compliance information related to the Federal and Provincial dangerous goods legislation

- § Federal and international requirements for the shipment of dangerous goods by air, road, rail or marine modes of transportation
- § Interpretive information for the on-highway enforcement process as well as awareness material for inspectors, industry and the general public

Emergency Reporting:

- § The CIC will manage all TDG emergency calls and assess the severity of dangerous goods incidents.
- § The CIC will provide assistance to emergency response personnel attending the scene of an incident in which dangerous goods are involved, or may become a matter for concern.
- § In the event of an incident concerning the primary or secondary highways within the planning and response zones, AltaGas will inform the RCMP and Alberta Transportation of the emergency.
- § The RCMP and Alberta Transportation will assume responsibility with roadblocks on both primary and secondary highways, if required.

Co-ordination and Information Centre (CIC): 1-800-272-9600

Alberta Local Authorities

Cypress County

Cypress County must be contacted at a Level 1 Emergency if any members of the public are notified or road blocks are established on any County road(s) or numbered provincial highways. Cypress County must be contacted automatically at a Level 2 or 3 Emergency.

Responsibilities:

In the event of a dangerous goods incident, where public safety, property or the environment are threatened, Cypress County's roles and responsibilities are as follows:

- § In consultation with AltaGas, implementing the initial local emergency response; i.e. securing the emergency site, taking appropriate emergency action or seeking additional information and/or advice on how to deal with dangerous goods.
- § Controlling and coordinating emergency response and other supporting emergency services personnel including setting up an on-site command post.
- § Informing, warning and instructing their citizens of the emergency, including using the

media for these purposes.

- § Implementing "Mutual Aid Agreements" with neighbouring municipalities, if required.
- § Maintaining contact with other authorities who may provide expertise to enhance prompt decision making by municipal authorities.

Special Areas Board

The Special Areas Board should be contacted at a Level 1 Emergency in Special Area No. 2, Alberta so they can react and respond if needed. The Special Areas Board must be contacted automatically at a Level 2 or 3 Emergency in Special Area No. 2.

Responsibilities:

The Special Areas Board may setup an MECC during a large event in their office and/or sit in on AltaGas' REOC in order to work with them during an incident.

Resources:

The Special Areas Board has rural fire departments in Bindloss, Buffalo and Jenner, which are able to respond to grass fires, help with road blocks and notify residents if need be; however, they are not trained for industrial incidents involving large fires or releases of gas. Both the Jenner and Buffalo departments have members trained in vehicle extrication, but only the Jenner department has extrication tools. The Jenner Fire Department has Medical First Responders that can be contacted through 911 as well.

Alberta Health Services (AHS)

From the initial notification of an emergency, AHS emergency response will fan out to and coordinate with other AHS programs and facilities as necessary. The 911 EMS services remain independent of the Zone Single Point of Contact (SPOC) notification/alert process.

Environmental Public Health (EPH) - Roles and Responsibilities:

- § Participate with stakeholders in preparedness training and exercises associated with AltaGas' simulated activation of an Emergency Response Plan in which EPH has a role and responsibility.
- § Provide guidance to stakeholders and local municipal authorities in identifying sites suitable for establishing and operating an evacuation centre and/or reception centre, including operational requirements.

- § In consultation with the Zone Medical Officer of Health (MOH), provide guidance to stakeholders on substances that may affect public health, including Alberta Health acute exposure health effects for hydrogen sulphide and sulphur dioxide.
- § Conduct assessments, inspections and give regulatory direction, when appropriate, to ensure the requirements of provincial legislation and EPH program areas of responsibilities for public health protection and disease prevention are maintained.
- § Notify the Zone Medical Officer of Health of any incident affecting or potentially affecting other AHS programs or facilities. The Zone MOH will notify and coordinate emergency response in other program areas and facilities as necessary.
- § Establish EPH emergency management operations, when appropriate, to support regional response efforts and liaise with the Government Emergency Operations Centre, Municipal Emergency Operations Centre and/or Industry Emergency Operations Centre, if needed.
- § Assist the Zone Medical Officer of Health, local municipal authority, and Public Information/Communication officers in the development, issuance, and rescinding of public health, public evacuation, and shelter-in-place advisories.
- § Provide guidance to stakeholders on matters relating to evacuation of the public and/or public facilities, and the re-occupancy of those evacuated areas or facilities.
- § Record and respond to health complaints or concerns from the public during and following an incident.
- § Participate in debriefings as necessary.

Alberta Occupational Health & Safety (OHS)

Occupational Health & Safety enforces the Alberta *Occupational Health and Safety Act* and Regulations. OHS officers are empowered to enter and inspect worksites to enforce the *Act*, including order work stopped, call for corrective actions if a worksite is dangerous and investigate serious incidents and worksite fatalities.

The Alberta *Occupational Health & Safety Act* requires that serious incidents be reported to Occupational Health & Safety without delay. If a fatality, serious injury or any accident that has the potential to cause serious injury to a person occurs at a worksite, the supervisor must conduct an investigation and a written report must be readily available for inspection by an OHS officer.

You must call in an injury or incident as soon as possible to OHS if it:

- results in a death
- results in a worker staying in hospital for more than 2 days
- involves an unplanned or uncontrolled explosion, fire or flood that causes or may cause a serious injury
- involves the collapse or upset of a crane, derrick or hoist
- involves the collapse or failure of any component of a building or structure

OHS Incident Reporting: 1-866-415-8690

Alberta Workers' Compensation Board (WCB)

The *Workers' Compensation Act and Regulation* are administered by the Alberta's Workers' Compensation Board. The Board collects assessment premiums from employers and makes appropriate payments to injured workers from a common fund. AltaGas must submit a report to WCB if the accident results in, or is likely to result in:

- lost time or the need to temporarily or permanently modify work beyond the date of accident
- death or permanent disability (amputation, hearing loss, etc.)
- a disabling or potentially disabling condition caused by occupational exposure or activity (poisoning, infection, respiratory disease, dermatitis, etc.)
- the need for medical treatment beyond first aid (assessment by physician, physiotherapy, chiropractic, etc.)
- incurring medical aid expenses (dental treatment, eyeglass repair or replacement, prescription medications, etc.).

Injury Reporting: 1-866-922-9221

Alberta Boilers Safety Association (ABSA)

The Province of Alberta has delegated responsibility for the administration of all boiler and pressure vessel programs in Alberta to the Alberta Boilers Safety Association. Serious accidents involving pressure equipment must be reported to ABSA.

Any accident involving pressure equipment must be reported to ABSA forthwith. The accident scene must remain undisturbed, except for actions to safely secure the scene, until an ABSA

Safety Codes Officer has had a chance to investigate. If you are uncertain if ABSA needs to be involved you may contact the Manager of Facility Integrity and Maintenance. If the Manager of Facility Integrity and Maintenance cannot be contacted, report the incident to ABSA.

24 hour Accident Reporting Line: 780-437-9100

GOVERNMENT OF SASKATCHEWAN

Saskatchewan Ministry of the Economy (ECON)

ECON is the regulator of energy development in Saskatchewan for facilities that do not cross provincial or national borders.

The NEB, not ECON, is the lead regulatory agency for incidents involving the Suffield Pipeline.

Saskatchewan Ministry of Environment

Saskatchewan Environment's mandate is to manage, enhance and protect Saskatchewan's natural and environmental resources (i.e. fish, wildlife, lands, forests, parks and protected areas, air, water and soil, etc.) for conservation, recreation, social and economic purposes and to ensure they are sustained for future generations.

Off-lease fires and spills of refined products and chemicals (including during transport) must be reported to Saskatchewan Environment's Spill Control Centre. Wildfires should be reported to Firewatch, and wildlife incidents should be reported to a provincial conservation officer.

Spill Control Centre: 1-800-667-7525

Firewatch: 1-800-667-9660

Wildlife Reporting: 1-800-667-7561

Saskatchewan Emergency Management & Fire Safety

The Government of Saskatchewan contributes to the safety of its residents and to the protection of property and the environment before, during and after an emergency or a disaster. The province also provides support and advice to local officials during an emergency event. Depending on the magnitude of an event, other levels of government may be requested to assist.

Provincial resources become involved at the point where local capacity is not sufficient to provide an adequate response and the jurisdiction has declared a Local State of Emergency. This response may include opening the Provincial Emergency Coordination Centre (ECC) to

provide a central point to coordinate the operational response of provincial government ministries, agencies and crown corporations.

When emergencies begin to escalate beyond the capacity of a local jurisdiction or are in a number of jurisdictions, the Provincial ECC may be activated - depending on level of the incident(s). The ECC remains operational 24 hours-a-day during an emergency. Resources including Emergency Services Officers and Rapid Response Teams as well as equipment and supplies are assigned by the province to assist communities in their response efforts and are coordinated through the ECC.

The first point of contact in any emergency is always the local municipal government. They will make the decision to ask for provincial support if the event is beyond local capacity.

Saskatchewan Local Authorities (Municipalities)

- § May dispatch representative to the OSCP.
- § May implement the municipal emergency plan to protect the health, safety and welfare of residents using any or all of the resources available to the municipality.
- § May, upon request, assist in the opening and operation of a Reception Centre.
- § May, if necessary, declare a state of emergency.

In Saskatchewan, municipalities are obligated to establish emergency plans by *The Emergency Planning Act, 1989* which also gives council the responsibility for the direction and control of a municipal emergency response in order to take action to implement the plan and to protect the property, health, safety and welfare of the public. It requires municipalities to:

- appoint a municipal planning committee
- establish an Emergency Measures (Management) Organization (EMO)
- appoint an Emergency Coordinator; and
- prepare an emergency plan.

Only council or a member of council in the absence of a quorum can officially declare a State of Local Emergency in a municipality and exercise the special powers the legislation confers on council.

The Government of Saskatchewan can also declare an emergency through an Order-in-Council and direct municipal resources or direct one municipality to assist another during the emergency.

Health Authority - Cypress Health Region

The Cypress Health Region's Medical Health Officer will:

- § Provide information on toxic chemicals to the OSCP and provide advice on potential health effects of a gas release.
- § Monitor the health effects of the incident/emergency and ensure appropriate data is collected.
- § Establish safe health levels of a release.

Saskatchewan Occupational Health & Safety (Ministry of Labour Relations & Workplace Safety)

Under *The Occupational Health and Safety Regulations, 1996*, employers and contractors are required to report incidents (that is, accidents and dangerous occurrences) at their place of employment to the Ministry of Labour Relations & Workplace Safety's Occupational Health and Safety Division. Including, a serious injury or fatality in situations where:

- the accident causes, or may cause the death of a worker; or
- will require a worker to be admitted to a hospital for 72 hours (3 days) or more.

A dangerous occurrence is any occurrence that did not result in, but could have resulted in, a worker being injured or killed.

Incident Reporting: 1-800-567-7233

Saskatchewan Workers' Compensation Board (WCB)

The *Workers' Compensation Act* is administered by the Saskatchewan's Workers' Compensation Board. The Board collects assessment premiums from employers and makes appropriate payments to injured workers from a common fund. The Saskatchewan workers' compensation system is a no-fault system for workers against the result of work injuries.

Injury Reporting: 1-800-787-9288

Technical Safety Authority of Saskatchewan

The Technical Safety Authority of Saskatchewan (TSASK) was established effective July 1, 2010 by legislation to perform most functions previously done by the Ministry of Corrections, Public Safety and Policing, Licensing and Inspections Branch. TSASK is a not-for-profit company that administers Saskatchewan's safety program for boilers, pressure vessels, elevating devices and amusement rides. They administer and enforce the *Boiler and Pressure Vessel Act and Regulations*.

TSASK operates at arm's length from the government and are governed by their own Board of Directors. The provincial government continues to be responsible for establishing safety standards, policies, legislation and regulatory requirements related to public safety.

TSASK does not provide emergency assistance, but boiler and pressure vessel incidents must be reported to them.

Boiler & Pressure Vessel Incident Reporting: 1-866-530-8599

WESTERN CANADA SPILL SERVICES

Western Canadian Spill Services Ltd. (WCSS) is a legally registered corporation managed by a Board of Directors representing the major petroleum industry stakeholders.

WCSS is managed by the petroleum industry's training arm, Enform. A key service provided by WCSS is the establishment and maintenance of regional spill response groups known as Oil Spill Cooperatives. Each co-op is managed by a group of petroleum industry volunteers. The cooperatives maintain spill contingency plans and strategically placed OSCARs (*oil spill containment and recovery trailers*) that are available to all member companies in the co-op's area. The equipment is maintained by Equipment Custodians. Annual training exercises are conducted by each co-op to ensure that equipment and staff are prepared for emergencies. AltaGas maintains its annual membership in the WCSS and personnel participate in the annual exercises. The equipment and staff of the spill co-ops are available to AltaGas in the event of a spill of liquids from pipelines.

MUTUAL ASSISTANCE

Coordination of AltaGas ERPs with Well Owners' ERPs

In the event of an emergency:

- § AltaGas will proceed to investigate in accordance with its own Emergency Response Plan (ERP). Where it appears likely that the event involves or will affect another producer or producers, AltaGas will immediately contact them at the emergency telephone number(s) in its ERP.
- § AltaGas will shut down the affected pipeline when an interruption in flow is detected, if it is possible to do so. The owners of the well will be notified by telephone at the emergency number listed in the AltaGas ERP.
- § AltaGas will not assume responsibility for initiating corrective actions for emergencies occurring with foreign pipelines connected to their facilities. The level of assistance AltaGas is prepared to give another company in an emergency will depend upon the circumstances in each case. In no case will AltaGas personnel respond to an emergency if to do so would unreasonably jeopardize the safety of its employees, the public or anyone else living or working in the area.

SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Natural Gas

Chemical names: Aliphatic hydrocarbon mixture (Alkanes C₁ - C₄); primarily Methane (C₁)**Product uses:**Raw material. Compressed gas or liquefied gas. Aliphatic hydrocarbon mixture (Alkanes C₁ - C₄); primarily Methane (C₁)**Supplier of the Safety Data Sheet:**

AltaGas Ltd.

1700, 355 4th Avenue SW

Calgary, AB

T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Classification of the substance according to GHS:**

Flammable Gases Cat. 1; H220

Gases Under Pressure, Compressed Gas or Liquefied Gas; H280

GHS Label elements:

Danger!

Extremely flammable gas.

Contains gas under pressure; may explode if heated.

Prevention:

Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Response:

Leaking gas fire: do not extinguish, unless leak can be stopped safely.

Eliminate all ignition sources of safe to do so.

Storage:

Protect from sunlight. Store in a well ventilated place.

WHMIS:

Controlled product by WHMIS criteria.



- A – Compressed Gas
- B1– Flammable Gas

Potential Health Effects**Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Contact with liquefied gas escaping from its cylinder may cause frostbite. The skin may become waxy white or yellow.**Eye contact:** Contact with liquefied gas escaping from its cylinder may cause freezing of the eye. Permanent eye damage or blindness could result.**Ingestion:** Not an applicable route of exposure.**Inhalation:** Natural gas in high concentrations in the air displaces oxygen and can cause symptoms of oxygen deprivation (asphyxiation). Symptoms of oxygen deficiency include increased breathing and pulse rate, slight loss of muscular coordination, emotional upsets, abnormal fatigue from exertion, disturbed respiration, nausea and vomiting, inability to move freely, collapse, possible loss of consciousness; extreme oxygen deficiency below 6% can induce 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.

SAFETY DATA SHEET**Section 2: Hazards Identification, continued**

High concentrations of Natural gas in air may cause central nervous system depression. Propane in air (>1 000 ppm), can cause CNS depression with symptoms such as headache, nausea, dizziness, drowsiness and confusion. Higher concentrations (>100 000 ppm) may cause unconsciousness, narcosis and CNS depression. 1% butane in air, 10 minute exposure, can cause CNS depression with symptoms such as headache, nausea, dizziness, drowsiness and confusion. High concentrations (1.7% butane in air) may cause unconsciousness, narcosis and CNS depression. Some components of Natural gas e.g. propane and butane are a weak cardiac sensitizers. Exposures by inhalation to high concentrations of these components may lead to cardiac sensitization; may cause the sudden onset of an irregular heartbeat. Sudden deaths have been reported in cases of substance abuse involving propane and butane. The asphyxiant effects of high concentrations of aliphatic gases in air may enhance cardiac sensitization.

Chronic Health Effects:

No human or animal information was located.

Medical Conditions Aggravated by Exposure:

None known

Interactions With Other Chemicals:

May be explosive in contact with oxygen, halogen gases and strong oxidizing agents. (Section 10)

Potential Environmental Effects:

Natural gas is not expected to result in any ecological damage to water, land. Regulated as a VOC in air.

Section 3: Composition/Information on Ingredients**Hazardous Substances:**

Natural gas is a naturally occurring gas mixture of aliphatic hydrocarbons, consisting mainly of methane. Natural gas is expected to have a typical composition reported in the table below. As a naturally occurring complex mixture, the composition will vary.

Other trace components may include pentanes, hexanes, nitrogen, carbon dioxide, oxygen, hydrogen sulfide and hydrogen.

<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>
Natural Gas	8006-14-2	100
<u>Typical composition:</u>		
Methane	74-82-8	70 - 90
Ethane	74-84-0	1 - 20
Propane	74-98-6	Not available
Butane	106-97-8	Not available

SAFETY DATA SHEET**Section 4: First Aid Measures****Description of first aid measures:**

Skin Contact: For liquefied / compressed gas: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm the affected area on site. DO NOT rub area or apply dry heat. Gently remove clothing or jewellery that may restrict circulation. Carefully cut around clothing that sticks to the skin and remove rest of the garment. DO NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Eye Contact: For liquefied / compressed gas: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. Do NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Inhalation: This material is extremely flammable. Take proper precautions (e.g. remove any sources of ignition, wear appropriate protective equipment). Remove source of contamination or move victim to fresh air. If breathing is difficult, oxygen may be beneficial if administered by trained personnel. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Immediately transport victim to an emergency care facility. Ensure that first aid providers are aware of the material involved and take precautions to protect themselves.

Ingestion: Not an applicable route of exposure.

Most important symptoms and effects, both acute and delayed:

Skin Contact: Frostbite.

Eye Contact: Freezing of eye tissue.

Inhalation: Nausea, dizziness, drowsiness and confusion, unconsciousness.

Ingestion: Not applicable

Section 5: Fire Fighting Measures**Flammable properties:**

Extremely flammable gas.

Readily forms explosive mixtures with air, which are easily ignited by heat, sparks or flame. Liquefied gas accumulates static charge. Liquefied Natural gas can accumulate electrostatic charge by flow, friction in pipes, splashing or agitation. Natural gas in the flammable range can be easily ignited by an electrostatic discharge of sufficient energy (e.g. brush discharge). Minimum Ignition Energy= 0.21 mJ for 8.5% by volume (for methane).

Liquefied gas rapidly vapourizes under normal conditions. 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 or asphyxiation hazard.

Extinguishing media:

Leaking gas fire: Do not extinguish unless leak can be stopped safely.

Dry chemical powder and high-expansion foam. Foam manufacturers should be consulted for recommendations regarding types of foams and application rates.

Unsuitable extinguishing media: Carbon dioxide, low expansion foams, and direct application of water on liquefied gas.

Under certain conditions, discharge of carbon dioxide produces electrostatic charges that could create a spark and ignite flammable gas.

Special hazards arising from the substance or mixture:

Natural gas can travel over long distances creating a flash back hazard.

Containers may rupture and explode if heated.

Material will readily ignite at normal temperatures.

The gas can accumulate in confined spaces, resulting in explosion and asphyxiation hazards.

Direct addition of water (or any other room temperature liquid) to the liquefied gas will cause flash vaporization resulting in an explosion (either immediately or delayed) known as a "boiling liquid, expanding vapour explosion."

During a fire, toxic gases may be generated.

Cylinders exposed to heat and/or fire may vent and release flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket.

SAFETY DATA SHEET**Section 5: Fire Fighting Measures, continued****Advice for firefighters:**

Evacuate the area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous gas and toxic decomposition products. Stop flow of gas before attempting to extinguish fire. If flow cannot be stopped, let the fire burn while protecting the surrounding area. Cool exposed containers with water.

Fires involving tanks:

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Cool containers with flooding quantities of water until well after fire is out.

Do not direct water at source of leak or safety devices; icing may occur.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

Always stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

If a tank or rail car 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**Personal precautions, protective equipment and emergency procedures:**

For a large spill or gas release, contact Fire/ Emergency Services immediately.

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).

All equipment used when handling the product must be grounded.

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

If possible, turn leaking containers so that gas escapes rather than liquid.

Use water spray to reduce vapours or divert vapour cloud drift. Avoid allowing water runoff to contact spilled material.

Do not direct water at spill or source of leak.

Prevent spreading of vapours through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed.

Environmental precautions:

Prevent releases to drains, sewers and natural waterways.

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.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

This material is an extremely flammable gas. Before handling, it is very important that engineering controls are operating and that protective equipment requirements are being followed. Eliminate all ignition sources (e.g., sparks, open flames, hot surfaces). Keep away from heat and welding operations. During transfer operations, cylinders and vessels should be electrically grounded and bonded to prevent the build up of a static charge. Post NO SMOKING signs. It is very important to keep areas where this material is used clear of other materials which can burn. If flammable gas is released in a confined space, immediately evacuate the area.

Compressed or liquefied gas cylinders, piping and fittings must be protected from damage during handling, filling, transportation and storage.

Ensure that compressed or liquefied gas cylinders are secured, preferably upright, and cannot fall or roll.

Storage

Store in a cool, dry, well-ventilated area out of direct sunlight and away from all ignition and heat sources. No part of a cylinder should be subjected to temperature exceeding 52°C (125°F).

Keep quantity stored as small as possible. Store away from incompatible materials, such as oxygen and strong oxidizing agents.

Storage of compressed gas cylinders must be in accordance with the appropriate provincial or regional Fire Code.

SAFETY DATA SHEET

Section 8: Exposure Controls / Personal Protection

Exposure guidelines:

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>Alberta (8-hr. TWA)</u>	<u>Ontario TWAEV</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Alkanes C ₁ - C ₄ (except Butane)	Asphyxia See Appendix F- Minimal Oxygen Content	1000 ppm	1000 ppm	1000 ppm
Butane-all isomers	1000 ppm	1000 ppm	800 ppm	800 ppm

Exposure controls:

Engineering Controls: Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. 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 and those handling liquefied gas, consider a closed handling system and the installation of leak and fire detection equipment and a suitable automatic fire suppression system.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear laboratory safety goggles or other appropriate eye protection. Wear a face shield when handling refrigerated liquefied gas.

Skin Protection: Wear thermal protective clothing when handling refrigerated/cryogenic liquids. Wear fire-resistant long-sleeved clothing and trousers worn outside boots or over top of shoes. Remove protective clothing immediately if it becomes wet with refrigerated liquefied gas. Wear appropriate foot protection when handling cylinders.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

Other: Workplaces should have a frostbite wash readily available in the work area. Any clothing which becomes wet with liquid or saturated with gas should be removed immediately.

Section 9: Physical and Chemical Properties

Information on basic physical and chemical properties:

Appearance:	Gas, colourless
Odour:	Odourless when pure, may have mercaptan odourant added.
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:	Flammable gas
Auto-ignition temperature:	537°C (999°F) for methane
Upper/lower flammability or explosive limits:	LEL: 5% for methane UEL: 15.4% for methane
Explosive properties:	Readily forms explosive vapour mixtures with air. Risk of vapour cloud explosion.
Oxidizing properties:	Not applicable
Sensitivity to mechanical impact:	Not applicable

SAFETY DATA SHEET**Section 9: Physical and Chemical Properties, continued**

Sensitivity to static discharge:	Sensitive, Minimum Ignition Energy methane=0.21 mJ for 8.5% by volume.
Evaporation rate:	Liquefied methane evaporates rapidly at room temperature.
Vapour pressure:	Not available
Vapour density:	Not available
Relative density:	Not applicable
Solubility:	Insoluble in water
Partition coefficient (n-octanol/water):	Log $P_{\text{oct}} = 1.09$ for methane
Critical temperature:	-82°C (-116°F) for methane
Critical pressure:	4640 kPa (45.9 atm) for methane
Decomposition temperature:	Not available
Viscosity:	Not applicable

Section 10: Stability and Reactivity**Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable. Releases of gas are extremely flammable and/or explosive in the presence of an ignition source.

Possibility of Hazardous Reactions:

Forms an explosive mixture with air. Direct addition of water, or any other room temperature liquid, to the liquefied gas will cause flash vaporization resulting in an explosion.

Hot containers may explode.

Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.

Avoid unintended contact with incompatible materials.

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.

Hazardous Decomposition Products:

Not applicable

SAFETY DATA SHEET**Section 11: Toxicological Information****Acute Toxicity Data:**

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Methane	Not applicable	Not applicable	>800000 ppm (80%) (mice) asphyxiant duration not reported

Chronic Toxicity Data:

No data available.

Sensitization:

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.

Neurological Effects:

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%). Note that butane is extremely flammable, lower explosive limit: 1.8-1.9%.

Genetic Effects:

Not available

Reproductive Effects:

None reported.

Developmental Effects:

None reported.

Target Organ Effects:

Central nervous system.

Other Adverse Effects:

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 (O₂) to 18% in air and cause oxygen deprivation.

Symptoms of oxygen deficiency are:

O₂=12-16% - breathing and pulse rate are increased, with slight loss of muscular coordination;

O₂=10-14% - emotional upsets, abnormal fatigue from exertion, disturbed respiration;

O₂=6-10% - nausea and vomiting, inability to move freely, collapse, possible loss of consciousness;

O₂=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.

Carcinogenicity:

This product does not contain any component at a concentration of greater than 0.1% 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).

Section 12: Ecological Information**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.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not applicable

Mobility in soil:

Not applicable

SAFETY DATA SHEET**Section 13: Disposal Considerations****Waste treatment methods:**

Dispose of material in accordance with applicable regulations. Empty containers retain product residue, adhere to warnings after container has been emptied.

Section 14: Transport Information**Transport symbol:****UN Number:**

UN1971

UN proper shipping name:

METHANE, compressed or NATURAL GAS, compressed

Or

UN1972, LIQUEFIED NATURAL GAS or LNG (cryogenic liquid) or NATURAL GAS, refrigerated liquid

Transport hazard class(es):

2.1

Packing group:

Not applicable

Emergency response guide:

115

Section 15: Regulatory Information**Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA****Toxic Substances Control Act 8(b) Inventory:** Substance listed on the TSCA inventory.**OSHA:** This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).**Canada**

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification: A - Compressed gas

B1 - Flammable and combustible material - Flammable gas.

New Substances Notification Regulations: Substances listed on the Domestic Substances List (DSL).**National Pollutant Release Inventory:** VOC gases are NPRI reportable substances.

Methane is regulated as a greenhouse gas.

SAFETY DATA SHEET**Section 16: Other Information**

Issue date: October 25, 2013

Revision summary: Previous version: December 1, 2010
Revised Sections 2, 4, 5, 6, 7, 8, 16

References and sources for data:

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine
Cheminfo – Canadian Centre for Occupational Health and Safety
RTECS – Registry of Toxic Effects of Chemical Substances

Manufacturer disclaimer

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Prepared by: LEHDER Environmental Services Limited (519) 336-4101

www.lehder.com

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Butane
Chemical names: n-butane, Butyl hydride

Product uses:

Saturated aliphatic hydrocarbon; compressed gas or liquefied gas. Raw material for industrial uses.

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Classification of the substance according to GHS:**

Flammable Gases Cat. 1; H220
Gases Under Pressure, Compressed Gas or Liquefied Gas; H280

GHS Label elements:

Danger!

Extremely flammable gas.

Contains gas under pressure; may explode if heated.

Prevention:

Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Response:

Leaking gas fire: do not extinguish, unless leak can be stopped safely.

Eliminate all ignition sources of safe to do so.

Storage:

Protect from sunlight. Store in a well ventilated place.

WHMIS:

Controlled product by WHMIS criteria.



- A – Compressed Gas
- B1– Flammable Gas

Potential Health Effects**Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Contact with liquefied gas escaping from its cylinder may cause frostbite. The skin may become waxy white or yellow.

Eye contact: Contact with liquefied gas escaping from its cylinder may cause freezing of the eye. Permanent eye damage or blindness could result.

Ingestion: Not an applicable route of exposure.

Inhalation: 1% butane in air, 10 minute exposure, can cause CNS depression with symptoms such as headache, nausea, dizziness, drowsiness and confusion. High concentrations (1.7% butane in air) may cause unconsciousness, narcosis and CNS depression.

SAFETY DATA SHEET**Section 2: Hazards Identification, continued**

Butane in high concentrations in the air displaces oxygen and can cause symptoms of oxygen deprivation (asphyxiation). Exercise increases the body's need for oxygen, symptoms will occur more quickly during exertion in an oxygen-deficient environment.

Butane is a weak cardiac sensitizer. Exposures by inhalation to high concentrations of butane may lead to cardiac sensitization; may cause the sudden onset of an irregular heartbeat. Sudden deaths have been reported in cases of substance abuse involving butane. The asphyxiant effects of butane may enhance cardiac sensitization.

Chronic Health Effects:

No human or animal information was located.

Medical Conditions Aggravated by Exposure:

None known

Interactions With Other Chemicals:

May be explosive in contact with oxygen, halogen gases and strong oxidizing agents. (Section 10)

Potential Environmental Effects:

Butane is not expected to result in any ecological damage to water, land. Regulated as a VOC in air.

Section 3: Composition/Information on Ingredients**Hazardous Substances:**

<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>
Butane	106-97-8	90-100

Section 4: First Aid Measures**Description of first aid measures:**

Skin Contact: GAS: No health effects expected. LIQUID: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm the affected area on site. DO NOT rub area or apply dry heat. Gently remove clothing or jewellery that may restrict circulation. Carefully cut around clothing that sticks to the skin and remove rest of the garment. DO NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Eye Contact: GAS: No health effects expected. LIQUID: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. Do NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Inhalation: This material is extremely flammable. Take proper precautions (e.g. remove any sources of ignition, wear appropriate protective equipment). Remove source of contamination or move victim to fresh air. If breathing is difficult, oxygen may be beneficial if administered by trained personnel. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Immediately transport victim to an emergency care facility. Ensure that first aid providers are aware of the material involved and take precautions to protect themselves.

Ingestion: Not an applicable route of exposure.

Most important symptoms and effects, both acute and delayed:

Skin Contact: Frostbite.

Eye Contact: Freezing of eye tissue.

Inhalation: Nausea, dizziness, drowsiness and confusion, unconsciousness.

Ingestion: Not applicable

SAFETY DATA SHEET**Section 5: Fire Fighting Measures****Flammable properties:**

Extremely flammable gas.

Readily forms explosive mixtures with air, which are easily ignited by heat, sparks or flame. Liquefied gas accumulates static charge. Liquefied Butane can accumulate electrostatic charge by flow, friction in pipes, splashing or agitation. Butane gas in the flammable range can be easily ignited by an electrostatic discharge of sufficient energy (e.g. brush discharge). Minimum Ignition Energy= 0.25 mJ for 4.7% by volume.

Liquefied gas rapidly vapourizes under normal conditions. 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.

Butane gas can accumulate in confined spaces and low areas, resulting in an explosion or toxicity hazard.

Extinguishing media:

Leaking gas fire: Do not extinguish unless leak can be stopped safely.

Dry chemical powder and high-expansion foam. Foam manufacturers should be consulted for recommendations regarding types of foams and application rates.

Unsuitable extinguishing media: Carbon dioxide, low expansion foams, and direct application of water on liquefied gas.

Under certain conditions, discharge of carbon dioxide produces electrostatic charges that could create a spark and ignite flammable gas.

Special hazards arising from the substance or mixture:

Gas is heavier than air and can travel over long distances creating a flash back hazard.

Containers may rupture and explode if heated.

Material will readily ignite at normal temperatures.

The gas can accumulate in confined spaces, resulting in explosion and asphyxiation hazards.

Direct addition of water (or any other room temperature liquid) to the liquefied gas will cause flash vaporization resulting in an explosion (either immediately or delayed) known as a "boiling liquid, expanding vapour explosion."

During a fire, toxic gases may be generated.

Cylinders exposed to heat and/or fire may vent and release flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket.

Advice for firefighters:

Evacuate the area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous gas and toxic decomposition products. Stop flow of gas before attempting to extinguish fire. If flow cannot be stopped, let the fire burn while protecting the surrounding area. Cool exposed containers with water.

Fires involving tanks:

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Cool containers with flooding quantities of water until well after fire is out.

Do not direct water at source of leak or safety devices; icing may occur.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

Always stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

If a tank or rail car 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**Personal precautions, protective equipment and emergency procedures:**

For a large spill or gas release, contact Fire/ Emergency Services immediately.

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).

All equipment used when handling the product must be grounded.

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

If possible, turn leaking containers so that gas escapes rather than liquid.

Use water spray to reduce vapours or divert vapour cloud drift. Avoid allowing water runoff to contact spilled material.

Do not direct water at spill or source of leak.

Prevent spreading of vapours through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed.

SAFETY DATA SHEET**Section 6: Accidental Release Measures, continued****Environmental precautions:**

Prevent releases to drains, sewers and natural waterways.

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.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

This material is an extremely flammable gas. Before handling, it is very important that engineering controls are operating and that protective equipment requirements are being followed. Eliminate all ignition sources (e.g., sparks, open flames, hot surfaces). Keep away from heat and welding operations. During transfer operations, cylinders and vessels should be electrically grounded and bonded to prevent the build up of a static charge. Post NO SMOKING signs. It is very important to keep areas where this material is used clear of other materials which can burn. If flammable gas is released in a confined space, immediately evacuate the area.

Compressed or liquefied gas cylinders, piping and fittings must be protected from damage during handling, filling, transportation and storage.

Ensure that compressed or liquefied gas cylinders are secured, preferably upright, and cannot fall or roll.

Storage

Store in a cool, dry, well-ventilated area out of direct sunlight and away from all ignition and heat sources. No part of a cylinder should be subjected to temperature exceeding 52°C (125°F).

Keep quantity stored as small as possible. Store away from incompatible materials, such as oxygen and strong oxidizing agents.

Storage of compressed gas cylinders must be in accordance with the appropriate provincial or regional Fire Code.

Section 8: Exposure Controls / Personal Protection**Exposure guidelines:**

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>Alberta (8-hr. TWA)</u>	<u>Ontario TWAEV</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Butane-all isomers	1000 ppm	1000 ppm	800 ppm	800 ppm

Exposure controls:

Engineering Controls: Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. 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 and those handling liquefied gas, consider a closed handling system and the installation of leak and fire detection equipment and a suitable automatic fire suppression system.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear laboratory safety goggles or other appropriate eye protection. Wear a face shield when handling refrigerated liquefied gas.

Skin Protection: Wear thermal protective clothing when handling refrigerated/cryogenic liquids. Wear fire-resistant long-sleeved clothing and trousers worn outside boots or over top of shoes. Remove protective clothing immediately if it becomes wet with refrigerated liquefied gas. Wear appropriate foot protection when handling cylinders.

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection, continued**

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

Other: Workplaces should have a frostbite wash readily available in the work area. Any clothing which becomes wet with liquid or saturated with gas should be removed immediately.

Section 9: Physical and Chemical Properties**Information on basic physical and chemical properties:**

Appearance:	Gas, colourless.
Odour:	Odourless Higher concentrations have faint odour natural gas or petroleum.
Odour threshold:	2591 ppm
pH:	Not applicable
Melting point/freezing point:	-138.4°C (-217.1°F)
Initial boiling point and boiling range:	-0.5°C (31.1°F)
Flash point:	- 74°C (- 101°F) (closed cup)
Auto-ignition temperature:	287°C (550°F)
Upper/lower flammability or explosive limits:	LEL: 1.8 – 1.9% UEL: 8.4 – 8.5%
Explosive properties:	Readily forms explosive vapour mixtures with air. Risk of vapour cloud explosion.
Oxidizing properties:	Not applicable
Sensitivity to mechanical impact:	Not applicable
Sensitivity to static discharge:	Sensitive, Minimum Ignition Energy=0.25 mJ for 4.7% by volume.
Evaporation rate:	Liquefied butane evaporates rapidly at room temperature.
Vapour pressure:	214.0 kPa (1614 mm Hg) at 21.1°C
Vapour density:	2.00 (air = 1) (calculated)
Relative density:	Not applicable
Solubility:	Insoluble in water, 61 mg/L @ 25°C
Partition coefficient (n-octanol/water):	Log P _{oct} = 2.89
Critical temperature:	152°C (305.6°F)
Critical pressure:	3797 kPa (37.47 atm)
Decomposition temperature:	Not available
Viscosity:	Not applicable

Section 10: Stability and Reactivity**Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable. Releases of gas are extremely flammable and/or explosive in the presence of an ignition source.

Possibility of Hazardous Reactions:

Forms an explosive mixture with air. Direct addition of water, or any other room temperature liquid, to the liquefied gas will cause flash vaporization resulting in an explosion.
Hot containers may explode.

Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.
Avoid unintended contact with incompatible materials.

SAFETY DATA SHEET**Section 10: Stability and Reactivity, continued****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 butane gas is corrosive to polypropylene, high density polyethylene (HDPE), polystyrene and polyurethane. Slightly corrosive to acrylonitrile butadiene styrene (ABS).

Hazardous Decomposition Products:

Not applicable

Section 11: Toxicological Information**Acute Toxicity Data:**

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Butane	Not applicable	Not applicable	658 mg/L (rat) 276000 ppm (27.6%) >140 000 ppm (14%) asphyxiant (duration not reported)

Chronic Toxicity Data:

Studies were conducted on rats exposed to 1000 or 4500 ppm n-butane:n-pentane (50:50 wt. %) for 13 weeks (6 hr/d; 5 d/wk). Possible treatment-related, but not dose-related, effects included transient hunched posture and/or reduced activity and intermittent tremor.

Sensitization:

Butane and some other closely related aliphatic hydrocarbons (isobutane and propane) 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.

Neurological Effects:

At high concentrations, it can cause depression of the central nervous system (CNS) based on animal and human information. Unconsciousness (narcosis) has been observed due to CNS depression at approximately 17000 ppm (1.7%). Note that n-butane is extremely flammable, lower explosive limit: 1.8-1.9%. No symptoms except drowsiness were experienced by human volunteers during a 10-minute exposure to 10000 ppm.

Genetic Effects:

Negative for mutagenic effects in short-term tests.

Reproductive Effects:

None reported.

Developmental Effects:

None reported.

Target Organ Effects:

Central nervous system.

Other Adverse Effects:

Butane in high concentrations in the air displaces oxygen and can cause symptoms of oxygen deprivation (asphyxiation). Butane concentration of greater than 14% (140 000 ppm) will displace oxygen (O₂) to 18% in air and cause oxygen deprivation.

Symptoms of oxygen deficiency are:

O₂=12-16% - breathing and pulse rate are increased, with slight loss of muscular coordination;

O₂=10-14% - emotional upsets, abnormal fatigue from exertion, disturbed respiration;

O₂=6-10% - nausea and vomiting, inability to move freely, collapse, possible loss of consciousness;

O₂=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.

SAFETY DATA SHEET**Section 11: Toxicological Information, continued****Carcinogenicity:**

This product does not contain any component at a concentration of greater than 0.1% 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).

Section 12: Ecological Information**Toxicity:**

Butane 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.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not applicable

Mobility in soil:

Not applicable

Section 13: Disposal Considerations**Waste treatment methods:**

Dispose of material in accordance with applicable regulations. Empty containers retain product residue, adhere to warnings after container has been emptied.

Section 14: Transport Information**Transport symbol:**

UN Number: UN1011

UN proper shipping name: BUTANE

Transport hazard class(es): 2.1

Packing group: Not applicable

Emergency response guide: 115

Section 15: Regulatory Information**Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA**

Toxic Substances Control Act 8(b) Inventory: Substance listed on the TSCA inventory.

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

Canada

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification: A - Compressed gas

B1 - Flammable and combustible material - Flammable gas.

New Substances Notification Regulations: Substances listed on the Domestic Substances List (DSL).

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

SAFETY DATA SHEET**Section 16: Other Information**

Issue date: October 24, 2013

Revision summary: Previous version: December 1, 2010
Revised Sections 2, 4, 5, 6, 7, 8, 16

References and sources for data:

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine
Cheminfo – Canadian Centre for Occupational Health and Safety
RTECS – Registry of Toxic Effects of Chemical Substances

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Prepared by: LEHDER Environmental Services Limited (519) 336-4101

www.lehder.com

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Propane
Chemical names: n-propane, Propyl hydride

Product uses:

Saturated aliphatic hydrocarbon; compressed gas or liquefied gas. Raw material for industrial uses.
Colourless gas, odourless. High concentrations may have a faint odour; fuel grades contain a foul-smelling
odourant, mercaptan.

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Classification of the substance according to GHS:**

Flammable Gases Cat. 1; H220
Gases Under Pressure, Compressed Gas or Liquefied Gas; H280

GHS Label elements:

Danger!

Extremely flammable gas.

Contains gas under pressure; may explode if heated.

Prevention:

Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Response:

Leaking gas fire: do not extinguish, unless leak can be stopped safely.

Eliminate all ignition sources of safe to do so.

Storage:

Protect from sunlight. Store in a well ventilated place.

WHMIS:

Controlled product by WHMIS criteria.



- A – Compressed Gas
- B1– Flammable Gas

Potential Health Effects**Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Contact with liquefied gas escaping from its cylinder may cause frostbite. The skin may become waxy white or yellow.

Eye contact: Contact with liquefied gas escaping from its cylinder may cause freezing of the eye. Permanent eye damage or blindness could result.

Ingestion: Not an applicable route of exposure.

Inhalation: Propane in air (>1 000 ppm), can cause CNS depression with symptoms such as headache, nausea, dizziness, drowsiness and confusion. Higher concentrations (>100 000 ppm) may cause unconsciousness, narcosis and CNS depression.

SAFETY DATA SHEET**Section 2: Hazards Identification, continued**

Propane in high concentrations in the air displaces oxygen and can cause symptoms of oxygen deprivation (asphyxiation). Exercise increases the body's need for oxygen, symptoms will occur more quickly during exertion in an oxygen-deficient environment.

Propane is a weak cardiac sensitizer. Exposures by inhalation to high concentrations of propane may lead to cardiac sensitization; may cause the sudden onset of an irregular heartbeat. Sudden deaths have been reported in cases of substance abuse involving propane. The asphyxiant effects of propane may enhance cardiac sensitization.

Chronic Health Effects:

No human or animal information was located.

Medical Conditions Aggravated by Exposure:

None known

Interactions With Other Chemicals:

May be explosive in contact with oxygen, halogen gases and strong oxidizing agents. (Section 10)

Potential Environmental Effects:

Propane is not expected to result in any ecological damage to water, land. Regulated as a VOC in air.

Section 3: Composition/Information on Ingredients**Hazardous Substances:**

<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>
Propane	74-98-6	90-100

Section 4: First Aid Measures**Description of first aid measures:**

Skin Contact: GAS: No health effects expected. LIQUID: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm the affected area on site. DO NOT rub area or apply dry heat. Gently remove clothing or jewellery that may restrict circulation. Carefully cut around clothing that sticks to the skin and remove rest of the garment. DO NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Eye Contact: GAS: No health effects expected. LIQUID: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. Do NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Inhalation: This material is extremely flammable. Take proper precautions (e.g. remove any sources of ignition, wear appropriate protective equipment). Remove source of contamination or move victim to fresh air. If breathing is difficult, oxygen may be beneficial if administered by trained personnel. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Immediately transport victim to an emergency care facility. Ensure that first aid providers are aware of the material involved and take precautions to protect themselves.

Ingestion: Not an applicable route of exposure.

Most important symptoms and effects, both acute and delayed:

Skin Contact: Frostbite.

Eye Contact: Freezing of eye tissue.

Inhalation: Nausea, dizziness, drowsiness and confusion, unconsciousness.

Ingestion: Not applicable

SAFETY DATA SHEET**Section 5: Fire Fighting Measures****Flammable properties:**

Extremely flammable gas.

Readily forms explosive mixtures with air, which are easily ignited by heat, sparks or flame. Liquefied gas accumulates static charge. Liquefied Propane can accumulate electrostatic charge by flow, friction in pipes, splashing or agitation. Propane gas in the flammable range can be easily ignited by an electrostatic discharge of sufficient energy (e.g. brush discharge). Minimum Ignition Energy= 0.25 mJ for 5.2% by volume.

Liquefied gas rapidly vapourizes under normal conditions. 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.

Propane gas can accumulate in confined spaces and low areas, resulting in an explosion or toxicity hazard.

Extinguishing media:

Leaking gas fire: Do not extinguish unless leak can be stopped safely.

Dry chemical powder and high-expansion foam. Foam manufacturers should be consulted for recommendations regarding types of foams and application rates.

Unsuitable extinguishing media: Carbon dioxide, low expansion foams, and direct application of water on liquefied gas.

Under certain conditions, discharge of carbon dioxide produces electrostatic charges that could create a spark and ignite flammable gas.

Special hazards arising from the substance or mixture:

Gas is heavier than air and can travel over long distances creating a flash back hazard.

Containers may rupture and explode if heated.

Material will readily ignite at normal temperatures.

The gas can accumulate in confined spaces, resulting in explosion and asphyxiation hazards.

Direct addition of water (or any other room temperature liquid) to the liquefied gas will cause flash vaporization resulting in an explosion (either immediately or delayed) known as a "boiling liquid, expanding vapour explosion."

During a fire, toxic gases may be generated.

Cylinders exposed to heat and/or fire may vent and release flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket.

Advice for firefighters:

Evacuate the area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous gas and toxic decomposition products. Stop flow of gas before attempting to extinguish fire. If flow cannot be stopped, let the fire burn while protecting the surrounding area. Cool exposed containers with water.

Fires involving tanks:

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Cool containers with flooding quantities of water until well after fire is out.

Do not direct water at source of leak or safety devices; icing may occur.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

Always stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

If a tank or rail car 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**Personal precautions, protective equipment and emergency procedures:**

For a large spill or gas release, contact Fire/ Emergency Services immediately.

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).

All equipment used when handling the product must be grounded.

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

If possible, turn leaking containers so that gas escapes rather than liquid.

Use water spray to reduce vapours or divert vapour cloud drift. Avoid allowing water runoff to contact spilled material.

Do not direct water at spill or source of leak.

Prevent spreading of vapours through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed.

SAFETY DATA SHEET**Section 6: Accidental Release Measures, continued****Environmental precautions:**

Prevent releases to drains, sewers and natural waterways.

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.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

This material is an extremely flammable gas. Before handling, it is very important that engineering controls are operating and that protective equipment requirements are being followed. Eliminate all ignition sources (e.g., sparks, open flames, hot surfaces). Keep away from heat and welding operations. During transfer operations, cylinders and vessels should be electrically grounded and bonded to prevent the build up of a static charge. Post NO SMOKING signs. It is very important to keep areas where this material is used clear of other materials which can burn. If flammable gas is released in a confined space, immediately evacuate the area.

Compressed or liquefied gas cylinders, piping and fittings must be protected from damage during handling, filling, transportation and storage.

Ensure that compressed or liquefied gas cylinders are secured, preferably upright, and cannot fall or roll.

Storage

Store in a cool, dry, well-ventilated area out of direct sunlight and away from all ignition and heat sources. No part of a cylinder should be subjected to temperature exceeding 52°C (125°F).

Keep quantity stored as small as possible. Store away from incompatible materials, such as oxygen and strong oxidizing agents.

Storage of compressed gas cylinders must be in accordance with the appropriate provincial or regional Fire Code.

Section 8: Exposure Controls / Personal Protection**Exposure guidelines:**

Consult regional/local authorities for acceptable exposure limits.

Ingredient	ACGIH TLV <u>(8-hr. TWA)</u>	Alberta <u>(8-hr. TWA)</u>	Ontario TWAEV	U.S. OSHA PEL <u>(8-hr. TWA)</u>
Propane and Alkanes C ₁ - C ₄	Asphyxia See Appendix F- Minimal Oxygen Content	1000 ppm	1000 ppm	1000 ppm

Exposure controls:

Engineering Controls: Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. 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 and those handling liquefied gas, consider a closed handling system and the installation of leak and fire detection equipment and a suitable automatic fire suppression system.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear laboratory safety goggles or other appropriate eye protection. Wear a face shield when handling refrigerated liquefied gas.

Skin Protection: Wear thermal protective clothing when handling refrigerated/cryogenic liquids. Wear fire-resistant long-sleeved clothing and trousers worn outside boots or over top of shoes. Remove protective clothing immediately if it becomes wet with refrigerated liquefied gas. Wear appropriate foot protection when handling cylinders.

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection, continued**

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

Other: Workplaces should have a frostbite wash readily available in the work area. Any clothing which becomes wet with liquid or saturated with gas should be removed immediately.

Section 9: Physical and Chemical Properties**Information on basic physical and chemical properties:**

Appearance:	Gas, colourless
Odour:	Odourless when pure, may have mercaptan odourant added.
Odour threshold:	Not available
pH:	Not applicable
Melting point/freezing point:	-187°C (-306°F)
Initial boiling point and boiling range:	-42°C (-44°F)
Flash point:	Extremely flammable gas
Auto-ignition temperature:	450°C (842°F)
Upper/lower flammability or explosive limits:	LEL: 2.1% UEL: 9.5%
Explosive properties:	Readily forms explosive vapour mixtures with air. Risk of vapour cloud explosion.
Oxidizing properties:	Not applicable
Sensitivity to mechanical impact:	Not applicable
Sensitivity to static discharge:	Sensitive, Minimum Ignition Energy=0.25 mJ for 5.2% by volume.
Evaporation rate:	Liquefied propane evaporates rapidly at room temperature.
Vapour pressure:	855 kPa (8.42 atm) at 21.1°C
Vapour density:	1.55 (air = 1)
Relative density:	Not applicable
Solubility:	Insoluble in water, 0.01% @ 25°C
Partition coefficient (n-octanol/water):	Log P _{oct} = 2.36
Critical temperature:	96.8°C (206.3°F)
Critical pressure:	4245 kPa (41.9 atm)
Decomposition temperature:	Not available
Viscosity:	Not applicable

Section 10: Stability and Reactivity**Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable. Releases of gas are extremely flammable and/or explosive in the presence of an ignition source.

Possibility of Hazardous Reactions:

Forms an explosive mixture with air. Direct addition of water, or any other room temperature liquid, to the liquefied gas will cause flash vaporization resulting in an explosion.

Hot containers may explode.

Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.

Avoid unintended contact with incompatible materials.

SAFETY DATA SHEET**Section 10: Stability and Reactivity, continued****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 Propane gas is corrosive to high density polyethylene (HDPE), polystyrene and polyurethane. Slightly corrosive to acrylonitrile butadiene styrene (ABS).

Hazardous Decomposition Products:

Not applicable

Section 11: Toxicological Information**Acute Toxicity Data:**

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Propane	Not applicable	Not applicable	>800000 ppm (80%) (rat) 15-minute exposure

Chronic Toxicity Data:

Studies were conducted on monkeys exposed to 750 ppm propane (50-65% propane in aerosol spray) for 90 days. No toxic effects were observed.

Sensitization:

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.

Neurological Effects:

At high concentrations, it can cause depression of the central nervous system (CNS) based on animal and human information. Unconsciousness (narcosis) has been observed due to CNS depression at approximately 47000 ppm (4.7%). Note that propane is extremely flammable, lower explosive limit: 2.1%. Human volunteers exposed to 10000 ppm (10%) for 2 minutes experienced slight dizziness (vertigo); exposure to 10000 ppm (1%) for 10 minutes produced no symptoms.

Genetic Effects:

Not mutagenic in a modified Ames Test with propane (99.9% pure) at concentrations of 5 – 50%. Not mutagenic to 5 strains of bacteria, with and without metabolic activation.

Reproductive Effects:

None reported.

Developmental Effects:

None reported.

Target Organ Effects:

Central nervous system.

Other Adverse Effects:

Propane in high concentrations in the air displaces oxygen and can cause symptoms of oxygen deprivation (asphyxiation). Propane concentration of greater than 14% (140 000 ppm) will displace oxygen (O₂) to 18% in air and cause oxygen deprivation.

Symptoms of oxygen deficiency are:

O₂=12-16% - breathing and pulse rate are increased, with slight loss of muscular coordination;

O₂=10-14% - emotional upsets, abnormal fatigue from exertion, disturbed respiration;

O₂=6-10% - nausea and vomiting, inability to move freely, collapse, possible loss of consciousness;

O₂=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.

SAFETY DATA SHEET**Section 11: Toxicological Information, continued****Carcinogenicity:**

This product does not contain any component at a concentration of greater than 0.1% 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).

Section 12: Ecological Information**Toxicity:**

Propane 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.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not applicable

Mobility in soil:

Not applicable

Section 13: Disposal Considerations**Waste treatment methods:**

Dispose of material in accordance with applicable regulations. Empty containers retain product residue, adhere to warnings after container has been emptied.

Section 14: Transport Information**Transport symbol:**

UN Number: UN1978

UN proper shipping name: PROPANE

Transport hazard class(es): 2.1

Packing group: Not applicable

Emergency response guide: 115

Section 15: Regulatory Information**Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA**

Toxic Substances Control Act 8(b) Inventory: Substance listed on the TSCA inventory.

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

Canada

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification: A - Compressed gas

B1 - Flammable and combustible material - Flammable gas.

New Substances Notification Regulations: Substances listed on the Domestic Substances List (DSL).

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

SAFETY DATA SHEET**Section 16: Other Information**

Issue date: October 24, 2013

Revision summary: Previous version: December 1, 2010
Revised Sections 2, 4, 5, 6, 7, 8, 16

References and sources for data:

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine
Cheminfo – Canadian Centre for Occupational Health and Safety
RTECS – Registry of Toxic Effects of Chemical Substances

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Prepared by: LEHDER Environmental Services Limited (519) 336-4101

www.lehder.com

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Molten sulphur
SDS record # 004
Chemical names: Liquefied sulphur ; Elemental sulphur

Product uses:

Raw material; industrial uses.

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Classification of the substance according to GHS:**

Flammable solid Cat. 2; H228
Acute toxicity Cat. 2 (inhalation); H330

GHS Label elements:

Danger!
Flammable solid.
Fatal if inhaled.

Prevention

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Ground/Bond container and receiving equipment.
Use explosion-proof electrical/ventilating/ lighting/... /equipment.
Wear protective gloves/eye protection/face protection
Do not breathe dust/fume/gas/mist/ vapors/spray.
Use only outdoors or in a well-ventilated area.
In case of inadequate ventilation wear respiratory protection.

Response

In case of fire: Use Water spray, fog or regular foam to extinguish
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Immediately call a poison center/doctor.

Storage

Store in a well-ventilated place. Keep container tightly closed.
Store locked up.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

WHMIS:

Controlled product by WHMIS criteria.



- B4 – Flammable solid
- D1A – Immediate and Serious Toxic Effects

SAFETY DATA SHEET**Section 2: Hazards Identification, continued****Potential Health Effects****Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Hot, yellow molten liquid, rapidly transforms to a solid when cooled. Direct contact with molten sulphur may cause severe thermal burns.

Eye contact: Direct contact with molten sulphur may cause severe burns and permanent corneal damage, which may result in blindness. Mist, vapours and dusts may cause irritation, conjunctivitis, and possible corneal damage. Hydrogen sulphide in concentrations of 10 - 50 ppm irritates the eyes.

Inhalation: Dusts, mists and vapours are irritating to the nose, throat and respiratory tract, and may cause chronic bronchitis with long-term exposure.

Danger! Hydrogen sulphide gas may be released if this material is overheated especially in the presence of water.

Hydrogen sulphide (H_2S) gas can be fatal if inhaled. High concentrations of H_2S cause breathing failure, coma and death without necessarily any warning odour being sensed.

Airborne concentrations 1-5 ppm have a moderately offensive odour, may cause nausea and/or headaches with prolonged exposure. Airborne concentrations of 20-50 ppm cause irritation to the nose, throat and lung, digestive upset and loss of appetite and the sense of smell starts to become "fatigued"; presence or absence of odour cannot be relied upon as a warning of exposure. Airborne concentrations of 100 -200 ppm cause severe nose, throat and lung irritation; the ability to smell odour completely disappears.

Airborne concentrations of 250-500 ppm cause pulmonary edema, a potentially fatal build-up of fluid in the lungs, in the absence of central nervous system effects (headache, nausea, dizziness) especially if exposure is prolonged. Airborne concentrations of 500 ppm cause severe lung irritation, excitement, headache, dizziness, staggering, sudden collapse ("knockdown"), unconsciousness and death within 4-8 hours, loss of memory for period of exposure. Exposures above 500 ppm rapidly cause unconsciousness and death.

Ingestion: Not an applicable route of exposure. Ingestion or direct contact with molten sulphur will cause severe thermal burns.

Chronic Health Effects:

Permanent or persistent nervous system effects following an acute overexposure to H_2S have included fatigue, anxiety, irritability, intellectual decline, reduced attention span, impaired learning and memory, altered sense of smell, and motor deficits.

Long-term occupational exposure to H_2S has generally been associated with nervous system, respiratory system and eye effects.

Medical Conditions Aggravated by Exposure:

Breathing of dust, vapours or sprays (mists) may aggravate acute or chronic asthma and chronic pulmonary disease such as emphysema and bronchitis.

Interactions With Other Chemicals:

H_2S is a strong reducing agent and is highly reactive. (Section 10)

Potential Environmental Effects:

Sulphur can cause adverse effects to aquatic and terrestrial environments. H_2S is regulated as an environmental pollutant.

Section 3: Composition/Information on Ingredients**Hazardous Substances:**

Chemical Name	CAS No.	Wt.%
Sulphur	7704-34-9	99 – 100
Hydrogen sulphide (H_2S)	7783-06-4	0.1-1.0

SAFETY DATA SHEET**Section 4: First Aid Measures****Description of first aid measures:**

Rescuers, attempting to save an unconscious co-worker, have entered a hazardous and/or confined area without respiratory protection or safety lines. They, in turn, have been overcome by H₂S. Victims who have been exposed to 500 ppm or higher may pose a threat to responders due to H₂S released from their clothing, skin and exhaled air. Risk of thermal burns.

Skin Contact: Quickly remove victim from source of contamination. Avoid direct contact. Wear chemical resistant protective clothing if necessary. Rinse exposed skin with plenty of water. Under running water, remove contaminated clothing, shoes and leather goods. Obtain medical advice immediately.

Eye Contact: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes or until the chemical is removed, while holding the eyelid(s) open. Take care not to rinse contaminated water into the unaffected eye or onto face. Obtain medical attention immediately.

Inhalation: This material is flammable and toxic. Rescuers must take proper precautions (e.g. remove any sources of ignition, wear appropriate respiratory protection) before attempting rescue. Remove source of contamination or move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Immediately transport victim to an emergency care facility.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. If vomiting occurs naturally, rinse mouth and repeat administration of water. Obtain medical advice immediately.

Most important symptoms and effects, both acute and delayed:

Skin Contact: Burns.

Eye Contact: Irritation and/or burns.

Inhalation: Sudden loss of consciousness, pulmonary edema, respiratory irritation, nausea, drowsiness and confusion. H₂S is fatal if inhaled. H₂S concentrations below 100 ppm, odour of rotten eggs; above 100 ppm, sense of smell can be impaired. Detection through odour is not a reliable indication of exposure.

Ingestion: Burns.

Section 5: Fire Fighting Measures**Flammable properties:**

Flammable solid. Both molten and solid forms of sulphur are flammable.

Extinguishing media:

Water fog, saturated stream, carbon dioxide. Small fires may be extinguished with sand. Avoid straight streams of water, which can scatter molten sulphur and dust.

Special hazards arising from the substance or mixture:

May be ignited by friction, heat, sparks or flames.

The decomposition and combustion products of sulphur (e.g., sulphur dioxide gas) are toxic and corrosive.

May re-ignite after fire is extinguished.

The vapour space over molten sulphur in enclosed tanks, tank cars, or other confined spaces may contain concentrations of Hydrogen sulphide gas (H₂S), which can be fatal if inhaled and which can form an explosive mixture with air.

Dust explosion possible if in powder or granular form, mixed with air.

Sulphur burns with a pale blue flame that may be difficult to see in daylight.

Advice for firefighters:

Evacuate the area and fight fire from a safe distance or protected location; consider initial downwind evacuation for at least 100 m. Approach fire from upwind to avoid hazardous gas and toxic decomposition products.

If a tank or rail car is involved in a fire, isolate for 800 m in all directions; also consider initial evacuation for 800 m in all directions.

Move containers from fire area if you can do it without risk.

Cool containers with flooding quantities of water until well after fire is out.

For massive, fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Withdraw immediately in case of rising sound from venting safety devices or discolouration of tank.

Always stay away from tanks engulfed in fire.

SAFETY DATA SHEET**Section 6: Accidental Release Measures****Personal precautions, protective equipment and emergency procedures:**

For a large spill or gas release, contact Fire/ Emergency Services immediately.

Wear appropriate respiratory protection and vapour protective clothing.

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

Environmental precautions:

Prevent releases to drains, sewers and natural waterways.

If molten sulphur is accidentally released into a confined or enclosed space, monitor for hydrogen sulphide build-up in the vapour space above the spill.

Methods and material for containment and cleaning up:

Small spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area

Large spills: When spilled in a molten form, contain if possible by forming barriers and let it solidify.

Shovel solid sulphur into containers with covers (avoid dusting) for recovery or disposal. If removal is not possible, let it solidify and apply a cover material, preferably inert and basic (limestone), to the spilled area until recovery procedures begin. This will reduce the possible release of sulphuric acid in the water.

Collect product and contaminated soil and water for recovery or disposal.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

Before handling, it is very important that engineering controls are operating and that protective equipment requirements are being followed. Workers must be trained regarding the hazards and safety procedures for molten sulphur and hydrogen sulphide gas.

Eliminate all ignition sources (e.g., sparks, open flames). Keep away from heat and welding operations. Post NO SMOKING signs.

Wear Personal Protection Equipment. Do not breathe dusts or mists. Do not ingest. Do not get in eyes, on skin or on clothing.

Liquid sulphur should not be put into any tank, rail car or truck that contains trace quantities of hydrocarbons, or more than a trace of moisture. When unloading tank cars or trucks, wear suitable protective equipment and stand to one side, upwind of the path of the escaping gas. Care should be taken against possible dangerous concentrations of hydrogen sulphide in the vicinity of the tank.

Avoid excessive dust generation, sparks or open flames. Avoid breathing fumes of molten sulphur. The hydrogen sulphide level in the vapour space in a storage vessel should be checked periodically for explosivity. Material can accumulate static charges that may cause a spark. Static charge build-up could become an ignition source. Use proper grounding and bonding procedures.

Storage

Liquid sulphur tanks should be ventilated to prevent accumulation of toxic and explosive quantities of hydrogen sulphide. Separate from chlorates, nitrates and other oxidizers.

Molten sulphur should be maintained at temperatures between 127°C - 149°C (260°F - 300°F).

SAFETY DATA SHEET

Section 8: Exposure Controls / Personal Protection

Exposure guidelines:

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>Canada-Provincial TWA</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Sulphur	Alberta <ul style="list-style-type: none"> 8-hr TWA: 10 mg/m³ 	Not listed	Not listed
Hydrogen sulphide	Alberta <ul style="list-style-type: none"> 8-hr TWA: 10 ppm 15-minute Ceiling: 15 ppm British Columbia <ul style="list-style-type: none"> 1 ppm; 5 ppm STEL Saskatchewan <ul style="list-style-type: none"> 8-hour TWA: 10 ppm 15 minute average contamination limit: 15 ppm 	1ppm STEL: 5 ppm	10 ppm STEL: 15 ppm Ceiling: 20 ppm

Exposure controls:

Engineering Controls: Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure. Use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Administrative controls and personal protective equipment may also be required.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear a face shield or safety goggles or other appropriate full-face protection (e.g. full-face respirator).

Skin Protection: Wear thermal protective gloves, clothing and boots when handling molten liquids.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

NIOSH Respirator Recommendations for H₂S:

Up to 100 ppm:

(APF = 25) An approved powered, air-purifying respirator with cartridge(s) providing protection against H₂S.

(APF = 50) An approved air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against H₂S.

(APF = 10) An approved supplied-air respirator.

(APF = 50) An approved self-contained breathing apparatus with a full facepiece.

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) An approved self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

(APF = 10,000) An approved supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape:

(APF = 50) An approved air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against H₂S.

An approved, appropriate escape-type, self-contained breathing apparatus.

Other: Remove contaminated clothing promptly. Keep contaminated clothing in closed containers. Discard or launder before rewear. Inform laundry personnel of contaminant's hazards. Do not smoke, eat or drink in work areas. Wash hands thoroughly after work and before eating, drinking or smoking.

SAFETY DATA SHEET**Section 9: Physical and Chemical Properties****Information on basic physical and chemical properties:**

Appearance:	Liquid
Odour:	Sulphur or rotten-egg odour.
Odour threshold:	H ₂ S: 0.001-0.13 ppm - odour threshold (highly variable). At concentrations below 100 ppm, odour of rotten eggs. Above 100 ppm, sense of smell can be impaired and no odour is detected.
pH:	Not available
Melting point/freezing point:	121°C
Initial boiling point and boiling range:	444°C
Flash point:	207°C (405°F)
Auto-ignition temperature:	232 – 266°C (450 – 511°F)
Upper/lower flammability/explosive limits:	LEL: 3.3% for H ₂ S UEL: 46% for H ₂ S
Explosive properties:	Not available
Oxidizing properties:	H ₂ S is a strong reducing agent.
Sensitivity to mechanical impact:	Not available
Sensitivity to static discharge:	Sensitive
Evaporation rate:	Not available
Vapour pressure:	0.11 mm Hg @ 25°C)
Vapour density:	8.9 (air = 1)
Relative density:	2.1
Solubility:	Insoluble in water
Partition coefficient (n-octanol/water):	Not available
Critical temperature:	Not available
Critical pressure:	Not available
Decomposition temperature:	Not available
Viscosity:	6.5 cP at 150°C

Section 10: Stability and Reactivity**Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable. H₂S is a strong reducing agent and is highly reactive.

Possibility of Hazardous Reactions:

Hydrocarbons in contact with molten sulphur generate hydrogen sulphide and carbon disulfide, which may accumulate in explosive concentrations.

Conditions to Avoid:

Avoid contact with water, sparks, flames and incompatible substances such as alkalis or oxidizing agents such as chlorine and fluorine.

Incompatible Materials:

May react explosively with ammonia; ammonium nitrate; chlorine dioxide; bromates, chlorates, and iodates of barium, calcium, magnesium, potassium, sodium or zinc; chlorate in presence of copper; chromic anhydride; silver bromate; lead dioxide; mercuric nitrate; all inorganic perchlorates; phosphorus trioxide; sodium nitrate and zinc.

Hazardous Decomposition Products:

Hydrogen sulphide. Produces oxides of sulphur on combustion.

SAFETY DATA SHEET**Section 11: Toxicological Information****Acute Toxicity Data:**

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Sulphur	> 8437 (rat)	Not available	Not available
Hydrogen sulphide (H ₂ S)	Not available	Not available	335 ppm (mouse)

Chronic Toxicity Data:

Repeated or prolonged contact with skin may cause dermatitis. Inhalation of Sulphur dust may have effects on the respiratory tract, resulting in chronic bronchitis.

Permanent or persistent nervous system effects following an acute overexposure to H₂S have included fatigue, anxiety, irritability, intellectual decline, reduced attention span, impaired learning and memory, altered sense of smell, and motor deficits.

Inhalation exposure to 30 ppm H₂S or above has produced signs of irritation of the nasal passages, including sensory neuron loss in male rats, in rats and mice for 10-13 weeks. Increased bronchial responsiveness was observed in individual rats exposed to 1-100 ppm for 5 weeks. Subtle evidence of mild brain dysfunction was observed in male rats exposed to 125 ppm for 11 weeks.

Sensitization:

No sensitization in human patch test with sulphur.

Neurological Effects:

None reported for Sulphur. H₂S is acutely toxic to the central nervous system. Permanent or persistent nervous system effects following an acute exposure to H₂S have included fatigue, anxiety, irritability, intellectual decline, reduced attention span, impaired learning and memory, altered sense of smell, and motor deficits.

Genetic Effects:

Sulphur was not mutagenic in *in-vitro* Ames test.

Reproductive Effects:

None reported for Sulphur. No significant reproductive effects were observed in one study with rats exposed to H₂S by inhalation up to 80 ppm.

Developmental Effects:

None reported for Sulphur. No significant developmental effects were observed in rat studies with inhalation exposures to H₂S of up to 100 ppm.

Target Organ Effects:

Skin – thermal burns

Exposure to H₂S: Central nervous system.

Carcinogenicity:

This product does not contain any component at a concentration of greater than 0.1% 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).

Section 12: Ecological Information**Toxicity:**

Sulphur can cause adverse effects to aquatic and terrestrial environments. H₂S is regulated as a hazardous pollutant.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not applicable

Mobility in soil:

Not applicable

Section 13: Disposal Considerations**Waste treatment methods:**

Dispose of material in accordance with applicable waste disposal and environmental regulations.
Empty containers retain product residue, adhere to warnings after container has been emptied.

SAFETY DATA SHEET**Section 14: Transport Information****Transport symbol:**

UN2448

UN Number:**UN proper shipping name:**

SULPHUR, MOLTEN

Transport hazard class(es):

4.1

Packing group:

III

Emergency response guide:

133

IATA

Forbidden from air transport

Section 15: Regulatory Information**Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA****Toxic Substances Control Act 8(b) Inventory:** Substance listed on the TSCA inventory.**OSHA:** This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).**Canada**This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.**WHMIS Classification:**

B4 – Flammable solid

D1A – Immediate and Serious Toxic Effects

New Substance Notification Regulations: Substances listed on the Domestic Substances List (DSL).**National Pollutant Release Inventory:** Total sulphur and H₂S gas are NPRI reportable substances.Hydrogen sulphide (H₂S) is regulated as an environmentally hazardous pollutant.**Section 16: Other Information****Issue date:** December 16, 2013**Revision summary:** Previous version: January 3, 2011
Revised Sections 2, 4, 8, 11, 16**References and sources for data:**

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine

Cheminfo – Canadian Centre for Occupational Health and Safety

RTECS – Registry of Toxic Effects of Chemical Substances

Manufacturer disclaimer

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Sour Natural Gas

Chemical names: Aliphatic hydrocarbon mixture (Alkanes C₁ - C₄); primarily Methane (C₁) with Hydrogen sulphide (H₂S).**Product uses:**

Raw material; fuel for industrial uses. Compressed gas.

Supplier of the Safety Data Sheet:

AltaGas Ltd.

1700, 355 4th Avenue SW

Calgary, AB

T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Classification of the substance according to GHS:**

Flammable Gases Cat. 1; H220

Gases Under Pressure, Compressed Gas; H280

Acute toxicity, inhalation Cat. 2; H330

Eye irritation Cat. 2B; H320

GHS Label elements:

Danger

Extremely flammable gas.

Contains gas under pressure; may explode if heated.

Fatal if inhaled.

Causes eye irritation.

Prevention:

Keep away from heat/sparks/open flames/hot surfaces. — No smoking.

Do not breathe gas/vapours.

Use only outdoors or in a well-ventilated area.

Wear respiratory protection.

Response

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Immediately call a POISON CENTER or doctor. Specific treatment is urgent; trained personnel should administer emergency oxygen or, if victim is not breathing, begin CPR immediately.

Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

Eliminate all ignition sources if safe to do so.

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Storage:

Protect from sunlight. Store in a well-ventilated place. Keep container tightly closed.

Store locked up.

WHMIS:

Controlled product by WHMIS criteria.



- A – Compressed Gas
- B1 – Flammable Gas
- D1A – Immediate and Serious Toxic Effects
- D2B – Material Causing other Toxic Effects – eye irritation

SAFETY DATA SHEET**Section 2: Hazards Identification, continued****Potential Health Effects****Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Contact with liquefied gas escaping from its cylinder may cause frostbite. The skin may become waxy white or yellow.

Eye contact: Contact with liquefied gas escaping from its cylinder may cause freezing of the eye. Permanent eye damage or blindness could result. Inflammation and irritation of the eyes has been reported at very low airborne concentrations of H₂S, as low as 10 ppm.

Inhalation: Danger! Contains Hydrogen sulphide (H₂S) gas which can be fatal if inhaled. High concentrations of H₂S cause breathing failure, coma and death without necessarily any warning odour being sensed. Airborne concentrations 1-5 ppm have a moderately offensive odour, may cause nausea and/or headaches with prolonged exposure. Airborne concentrations of 20-50 ppm cause irritation to the nose, throat and lung, digestive upset and loss of appetite and the sense of smell starts to become "fatigued"; presence or absence of odour cannot be relied upon as a warning of exposure. Airborne concentrations of 100 -200 ppm cause severe nose, throat and lung irritation; the ability to smell odour completely disappears.

Airborne concentrations of 250-500 ppm cause pulmonary edema, a potentially fatal build-up of fluid in the lungs, in the absence of central nervous system effects (headache, nausea, dizziness) especially if exposure is prolonged. Airborne concentrations of 500 ppm cause severe lung irritation, excitement, headache, dizziness, staggering, sudden collapse ("knockdown"), unconsciousness and death within 4-8 hours, loss of memory for period of exposure. Exposures above 500 ppm rapidly cause unconsciousness and death.

Ingestion: Not an applicable route of exposure.

Chronic Health Effects:

Permanent or persistent nervous system effects following an acute overexposure to H₂S have included fatigue, anxiety, irritability, intellectual decline, reduced attention span, impaired learning and memory, altered sense of smell, and motor deficits.

Long-term occupational exposure to H₂S has generally been associated with nervous system, respiratory system and eye effects.

Medical Conditions Aggravated by Exposure: None known**Interactions With Other Chemicals:**

H₂S is a strong reducing agent and is highly reactive. Natural gas may be explosive in contact with oxygen, halogen gases and strong oxidizing agents. (Section 10)

Potential Environmental Effects:

H₂S is regulated as an environmental pollutant. Methane is regulated as a greenhouse gas in air.

SAFETY DATA SHEET**Section 3: Composition/Information on Ingredients****Hazardous Substances:**

Natural gas is a naturally occurring gas mixture of aliphatic hydrocarbons, consisting mainly of methane. Natural gas is expected to have a typical composition reported in the table below. As a naturally occurring mixture, the composition will vary.

Other trace components may include pentanes, hexanes, nitrogen, carbon dioxide, oxygen, hydrogen sulfide and hydrogen.

Chemical Name	CAS No.	Wt.%
Natural Gas	8006-14-2	100
Hydrogen sulphide (H ₂ S)	7783-06-4	0.1-1.0
Methane	74-82-8	70 - 90
Ethane	74-84-0	1 - 20
Propane	74-98-6	Not available
Butane	106-97-8	Not available

Section 4: First Aid Measures**Description of first aid measures:**

Rescuers, attempting to save an unconscious co-worker, have entered a hazardous and/or confined area without respiratory protection or safety lines. They, in turn, have been overcome by H₂S. Victims who have been exposed to 500 ppm or higher may pose a threat to responders due to H₂S released from their clothing, skin and exhaled air.

Skin Contact: GAS: No health effects expected. LIQUID: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm the affected area on site. DO NOT rub area or apply dry heat. Gently remove clothing or jewellery that may restrict circulation. Carefully cut around clothing that sticks to the skin and remove rest of the garment. DO NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Eye Contact: GAS: If irritation occurs, immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 15-20 minutes, while holding the eyelid(s) open. Remove contact lenses if present and easy to do. Immediately obtain medical attention. Any eye contact will also involve significant inhalation exposure. LIQUID: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. Do NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Inhalation: This material is extremely flammable and toxic. Rescuers must take proper precautions (e.g. remove any sources of ignition, wear appropriate respiratory protection) before attempting rescue. Remove source of contamination or move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Immediately transport victim to an emergency care facility.

Ingestion: Not an applicable route of exposure.

Most important symptoms and effects, both acute and delayed:

Skin Contact: Frostbite.

Eye Contact: Irritation, soreness, light sensitivity, blurred vision, pain with a spasm of the eyelids.

Inhalation: Respiratory irritation, sudden loss of consciousness, pulmonary edema, nausea, dizziness, drowsiness and confusion, unconsciousness.

Ingestion: Not applicable.

SAFETY DATA SHEET**Section 5: Fire Fighting Measures****Flammable properties:**

Extremely flammable gas. Readily forms explosive mixtures with air, which are easily ignited by heat, sparks or flame. Liquefied gas accumulates static charge. Liquefied Natural gas can accumulate electrostatic charge by flow, friction in pipes, splashing or agitation. Natural gas in the flammable range can be easily ignited by an electrostatic discharge of sufficient energy (e.g. brush discharge). Minimum Ignition Energy= 0.21 mJ for 8.5% by volume (for methane). Liquefied gas rapidly vapourizes under normal conditions. 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 or asphyxiation hazard.

Extinguishing media:

Leaking gas fire: Do not extinguish unless leak can be stopped safely. Dry chemical powder and high-expansion foam. Foam manufacturers should be consulted for recommendations regarding types of foams and application rates. Unsuitable extinguishing media: Carbon dioxide, low expansion foams, and direct application of water on liquefied gas. Under certain conditions, discharge of carbon dioxide produces electrostatic charges that could create a spark and ignite flammable gas.

Special hazards arising from the substance or mixture:

Natural gas can travel over long distances creating a flash back hazard. Containers may rupture and explode if heated. Material will readily ignite at normal temperatures. The gas can accumulate in confined spaces, resulting in explosion, toxicity and asphyxiation hazards. Products of combustion may include toxic gases, including carbon monoxide and/or sulfur oxides. Sour Natural gas is an extremely toxic, flammable gas. The combustion products of hydrogen sulfide (e.g., sulfur dioxide) are skin contact and inhalation hazards.

Advice for firefighters:

Evacuate the area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous gas and toxic decomposition products. Stop flow of gas before attempting to extinguish fire. If flow cannot be stopped, let the fire burn while protecting the surrounding area. Cool exposed containers with water.
Fires involving tanks:
Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Always stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. If a tank or rail car 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**Personal precautions, protective equipment and emergency procedures:**

For a large spill or gas release, contact Fire/ Emergency Services immediately. Wear respiratory protection to protect against exposure to toxic hydrogen sulfide gas. Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. If possible, turn leaking containers so that gas escapes rather than liquid. Use water spray to reduce vapours or divert vapour cloud drift. Avoid allowing water runoff to contact spilled material. Do not direct water at spill or source of leak. Prevent spreading of vapours through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed.

Environmental precautions:

Prevent releases to drains, sewers and natural waterways.

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.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

SAFETY DATA SHEET

Section 7: Handling and Storage

Handling:

This material is an extremely flammable and toxic gas. Before handling, it is very important that engineering controls are operating and that protective equipment requirements are being followed. Workers must be trained regarding the hazards and safety procedures for sour natural gas.

Eliminate all ignition sources (e.g., sparks, open flames, hot surfaces). Keep away from heat and welding operations. During transfer operations, cylinders and vessels should be electrically grounded and bonded to prevent the build up of a static charge. Post NO SMOKING signs. It is very important to keep areas where this material is used clear of other materials which can burn. If Natural gas is released in a confined space, immediately evacuate the area. Compressed or liquefied gas cylinders, piping and fittings must be protected from damage during handling, filling, transportation and storage.

Ensure that compressed or liquefied gas cylinders are secured, preferably upright, and cannot fall or roll.

Storage:

Store in a cool, dry, well-ventilated area out of direct sunlight and away from all ignition and heat sources. Keep quantity stored as small as possible. Store away from incompatible materials, such as oxygen and strong oxidizing agents. Storage of compressed gas cylinders must be in accordance with the appropriate provincial or regional Fire Code.

Section 8: Exposure Controls / Personal Protection

Exposure guidelines:

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>Alberta (8-hr. TWA)</u>	<u>Ontario TWAEV</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Hydrogen sulphide	1ppm STEL: 5 ppm	10 ppm Ceiling: 15 ppm	10 ppm Ceiling: 15 ppm	10 ppm STEL: 15 ppm Ceiling: 20 ppm
Alkanes C ₁ - C ₄ (except Butane)	Asphyxia See Appendix F- Minimal Oxygen Content	1000 ppm	1000 ppm	1000 ppm
Butane-all isomers	1000 ppm	1000 ppm	800 ppm	800 ppm
Other Exposure guidelines:				
<ul style="list-style-type: none"> Hydrogen sulphide NIOSH REL: 10 ppm 10-minute. IDLH: 100 ppm 				

Exposure controls:

Engineering Controls: Hydrogen sulphide (H₂S) levels must be monitored where there is a risk of H₂S exposure in the workplace. Ventilate the workplace; methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. Provide sufficient local exhaust and general (dilution) ventilation to maintain the Natural 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 and those handling liquefied gas, consider a closed handling system and the installation of leak and fire detection equipment and a suitable automatic fire suppression system.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear laboratory safety goggles or other appropriate eye protection. Wear full-face respiratory protection when handling liquid Sour Natural gas. Workers who may be exposed to hydrogen sulphide gas should not wear contact lenses; soft contact lenses may absorb chemical irritants and hold them against the eye.

Skin Protection: Wear thermal protective clothing when handling refrigerated/cryogenic liquids. Wear fire-resistant long-sleeved clothing and trousers worn outside boots or over top of shoes. Remove protective clothing immediately if it becomes wet with liquefied Natural gas.

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection, continued**

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

NIOSH Respirator Recommendations for H₂S:

Up to 100 ppm: (APF = 25) An approved powered, air-purifying respirator with cartridge(s) providing protection against H₂S.

(APF = 50) An approved air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against H₂S.

(APF = 10) An approved supplied-air respirator.

(APF = 50) An approved self-contained breathing apparatus with a full facepiece.

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) An approved self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

(APF = 10,000) An approved supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape: (APF = 50) An approved air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against H₂S. An approved, appropriate escape-type, self-contained breathing apparatus.

Other: Workplaces should have a frostbite wash readily available in the work area.

Section 9: Physical and Chemical Properties**Information on basic physical and chemical properties:**

Appearance:	Gas, colourless
Odour:	Sulphur or rotten-egg odour.
Odour threshold:	0.001-0.13 ppm - odour threshold (highly variable). At concentrations below 100 ppm, odour of rotten eggs. Above 100 ppm, sense of smell can be impaired and no odour is detected.
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:	Flammable gas
Auto-ignition temperature:	537°C (999°F) for methane
Upper/lower flammability or explosive limits:	LEL: 5% for methane UEL: 15.4% for methane
Explosive properties:	Readily forms explosive vapour mixtures with air. Risk of vapour cloud explosion.
Oxidizing properties:	H ₂ S is a strong reducing agent.
Sensitivity to mechanical impact:	Not applicable
Sensitivity to static discharge:	Sensitive, Minimum Ignition Energy methane=0.21 mJ for 8.5% by volume.
Evaporation rate:	Liquefied methane evaporates rapidly at room temperature.
Vapour pressure:	Not available
Vapour density:	Not available
Relative density:	Not applicable
Solubility:	Insoluble in water
Partition coefficient (n-octanol/water):	Log P _{oct} = 1.09 for methane
Critical temperature:	-82°C (-116°F) for methane
Critical pressure:	4640 kPa (45.9 atm) for methane
Decomposition temperature:	Not available
Viscosity:	Not applicable

SAFETY DATA SHEET**Section 10: Stability and Reactivity****Reactivity:**

Not classified for reactivity hazards.

Chemical Stability:

Normally stable. Releases of gas are extremely flammable and/or explosive.
 H_2S is a strong reducing agent and is highly reactive.

Possibility of Hazardous Reactions:

Hazardous polymerization does not occur.

Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.
Avoid unintended contact with incompatible materials.

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.

Hazardous Decomposition Products:

Not applicable

Section 11: Toxicological Information**Acute Toxicity Data:**

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Methane	Not applicable	Not applicable	>800000 ppm (80%) (mice) asphyxiant duration not reported
Hydrogen sulphide (H_2S)	Not available	Not available	335 ppm (mouse)

Chronic Toxicity Data:

Permanent or persistent nervous system effects following an acute overexposure to H_2S have included fatigue, anxiety, irritability, intellectual decline, reduced attention span, impaired learning and memory, altered sense of smell, and motor deficits.

Inhalation exposure to 30 ppm H_2S or above has produced signs of irritation of the nasal passages, including sensory neuron loss in male rats, in rats and mice for 10-13 weeks. Increased bronchial responsiveness was observed in individual rats exposed to 1-100 ppm for 5 weeks. Subtle evidence of mild brain dysfunction was observed in male rats exposed to 125 ppm for 11 weeks.

Sensitization:

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.

Neurological Effects:

H_2S is acutely toxic to the central nervous system. Permanent or persistent nervous system effects following an acute exposure to H_2S have included fatigue, anxiety, irritability, intellectual decline, reduced attention span, impaired learning and memory, altered sense of smell, and motor deficits.

Genetic Effects:

H_2S was not mutagenic in rats and in bacteria.

Reproductive Effects:

No significant reproductive effects were observed in one study with rats exposed to H_2S by inhalation to up to 80 ppm.

SAFETY DATA SHEET**Section 11: Toxicological Information, continued****Developmental Effects:**

No significant developmental effects were observed in rat studies with inhalation exposures to H₂S of up to 100 ppm.

Target Organ Effects:

Central nervous system.

Carcinogenicity:

This product does not contain any component at a concentration of greater than 0.1% 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).

Other Adverse Effects:

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 (O₂) to 18% in air and cause oxygen deprivation.

Symptoms of oxygen deficiency are:

O₂=12-16% - breathing and pulse rate are increased, with slight loss of muscular coordination;

O₂=10-14% - emotional upsets, abnormal fatigue from exertion, disturbed respiration;

O₂=6-10% - nausea and vomiting, inability to move freely, collapse, possible loss of consciousness;

O₂=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.

Section 12: Ecological Information**Toxicity:**

H₂S is regulated as a hazardous pollutant. VOC gases are reportable to the National Pollutant Release Inventory, Environment Canada. Methane is regulated as a greenhouse gas.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not applicable

Mobility in soil:

Not applicable

Section 13: Disposal Considerations**Waste treatment methods:**

Dispose of material in accordance with applicable waste disposal and environmental regulations.

Empty containers retain product residue, adhere to warnings after container has been emptied.

Section 14: Transport Information**Transport symbol:****UN Number:**

UN1953

UN proper shipping name:

COMPRESSED GAS, TOXIC, FLAMMABLE N.O.S. (Sour Natural Gas)

Transport hazard class(es):

2.3 (2.1)

Packing group:

Not applicable

Emergency response guide:

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SAFETY DATA SHEET**Section 15: Regulatory Information****Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA**

Toxic Substances Control Act 8(b) Inventory: Substance listed on the TSCA inventory.

OSHA: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200, 2012).

Canada

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification:

A - Compressed gas

B1 - Flammable and combustible material - Flammable gas

D1A – Immediate and serious toxic effects – H₂S toxic if inhaled.

D2B – Material causing other toxic effects – eye irritation.

New Substance Notification Regulations: Substances listed on the Domestic Substances List (DSL).

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

Hydrogen sulphide (H₂S) is regulated as an environmentally hazardous pollutant. Methane is regulated as a greenhouse gas.

Section 16: Other Information

Issue date: October 28, 2013

Revision summary: Previous version: December 1, 2010
Revised Sections 2, 4, 5, 6, 7, 8, 16

References and sources for data:

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine

Cheminfo – Canadian Centre for Occupational Health and Safety

RTECS – Registry of Toxic Effects of Chemical Substances

Manufacturer disclaimer

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www.lehder.com

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Natural Gas Condensate
SDS record # 006

Chemical names:

- Natural gas condensates (petroleum);
- Low boiling point naphtha – unspecified.

Product uses:

Industrial by-product

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Classification of the substance according to GHS:**

Flammable liquid Cat. 2; H225
Skin Irritation Cat. 2; H315
Aspiration Hazard Cat. 1; H304
Toxic to Reproduction Cat. 2; H361
Mutagenicity Cat. 1B; H340
Carcinogenicity Cat. 1B; H350
Specific Target Organ Toxicity (Single Exposure), Cat. 3; H336

GHS Label elements:

Danger!
Highly flammable liquid and vapour.
Causes skin irritation.
Suspected of damaging the unborn child.
May be fatal if swallowed and enters airways.
May cause genetic defects.
May cause cancer.
May cause drowsiness or dizziness.

Prevention:

- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
- Keep container tightly closed.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical, ventilating, lighting, and other equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Avoid breathing vapours, gas, and spray.
- Wash exposed skin thoroughly after handling.
- Use only outdoors or in a well-ventilated area.

SAFETY DATA SHEET**Section 2: Hazards Identification, continued****Response**

- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower . If skin irritation occurs: Get medical advice/attention.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- Do NOT induce vomiting.
- IF INHALED: Remove person to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER of doctor if you feel unwell.

Storage

- Store in a well-ventilated place. Keep cool. Keep container tightly closed.

Disposal

- Dispose of contents/container in accordance with local, regional, national and international regulations.

WHMIS:

Controlled product by WHMIS criteria.



- B2 – Flammable Liquid
- D2A – Materials Causing Other Toxic Effects – carcinogenicity and embryotoxicity.
- D2B – Material Causing other Toxic Effects – skin and eye irritation.

Potential Health Effects**Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Contact causes drying of the skin and may cause a skin rash (dermatitis).

Benzene may be absorbed through the skin and may cause harm to blood or blood producing system.

Eye contact: Airborne vapours may be irritating to the eyes. Direct contact with the liquid may be irritating to the eyes.

Inhalation: Vapour concentrations above the recommended exposure guidelines are irritating to the eyes and respiratory tract and can cause headache, drowsiness and dizziness. Exposures to high levels of solvent vapours may cause narcosis; symptoms of narcosis include disorientation, euphoria, giddiness, confusion progressing to unconsciousness, paralysis, convulsion and death from respiratory or cardiovascular arrest.

Product may contain Hydrogen sulphide (H₂S) gas which can be fatal if inhaled. High concentrations of H₂S cause breathing failure, coma and death without necessarily any warning odour being sensed. Airborne concentrations 1-5 ppm have a moderately offensive odour, may cause nausea and/or headaches with prolonged exposure.

Ingestion: Small amounts of this liquid drawn into the lungs from swallowing or vomiting may cause severe health effects (e.g. bronchopneumonia or pulmonary edema).

Chronic Health Effects:

Contains benzene. Human health studies (epidemiological) indicate that prolonged and/or repeated exposures to benzene by inhalation, skin contact or ingestion may cause damage to the blood producing system (particularly the bone marrow) and serious blood disorders including leukemia.

Prolonged exposures to solvent vapours by inhalation, above the exposure guidelines may cause nerve damage, with symptoms including weakness and numbness in hands and feet.

Medical Conditions Aggravated by Exposure:

None known

Interactions With Other Chemicals:

Natural gas may be explosive in contact with oxygen, halogen gases and strong oxidizing agents. (Section 10)

Potential Environmental Effects:

Benzene is regulated as environmental pollutant.

SAFETY DATA SHEET**Section 3: Composition/Information on Ingredients****Hazardous Substances:**

A complex combination of hydrocarbons separated as a liquid from natural gas in a surface separator by retrograde condensation. It consists mainly of hydrocarbons having carbon numbers predominantly in the range of C₂ to C₂₀. It is a liquid at atmospheric temperature and pressure.

Other expected components may include benzene, toluene, xylenes, ethylbenzene and hydrogen sulphide. The composition and hazardous properties will vary depending on the source.

Chemical Name	CAS No.	Wt.%
Natural Gas Condensate	64741-47-5	100
Benzene	71-43-2	0 - 5
Toluene	108-88-3	0 - 5
Xylenes	1330-20-7	0 - 5
Ethylbenzene	100-41-4	0 - 5
Hydrogen sulphide (H ₂ S)	7783-06-4	0 - 0.1

Section 4: First Aid Measures**Description of first aid measures:**

Rescuers, attempting to save an unconscious co-worker, have entered a hazardous and/or confined area without respiratory protection or safety lines. They, in turn, have been overcome by H₂S. Victims who have been exposed to 500 ppm or higher may pose a threat to responders due to H₂S released from their clothing, skin and exhaled air.

Skin Contact: Quickly remove victim from source of contamination. Avoid direct contact. Wear chemical resistant protective clothing if necessary. Quickly and gently, blot or brush away excess chemical. Wash gently and thoroughly with water and non-abrasive soap for 5 minutes or until chemical is removed. Under running water, remove contaminated clothing, shoes and leather goods. Obtain medical advice immediately.

Eye Contact: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes or until the chemical is removed, while holding the eyelid(s) open. Take care not to rinse contaminated water into the unaffected eye or onto face. Obtain medical attention immediately.

Inhalation: This material is flammable and toxic. Rescuers must take proper precautions (e.g. remove any sources of ignition, wear appropriate respiratory protection) before attempting rescue. Remove source of contamination or move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Immediately transport victim to an emergency care facility.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Obtain medical advice immediately.

Most important symptoms and effects, both acute and delayed:

Skin Contact: Skin irritation and dryness. Absorption through the skin may cause long-term chronic effects (see inhalation).

Eye Contact: Irritation.

Inhalation: May cause drowsiness or dizziness. Prolonged exposures to solvent vapours may cause weakness and numbness in hands and feet. Contains benzene; exposures to benzene by inhalation, skin contact or ingestion may cause damage to the blood producing system and serious blood disorders including leukemia.

Ingestion: May be fatal if swallowed and enters airways.

SAFETY DATA SHEET**Section 5: Fire Fighting Measures****Flammable properties:**

Highly flammable liquid and vapour. Flashpoint will vary for this complex mixture. Forms vapour mixtures with air, which can be ignited by heat, sparks or flame. Spills of liquid can form flammable vapours, which will travel over long distances and will create a flash back hazard. The vapours can accumulate in confined spaces and low areas, resulting in an explosion or toxicity hazard.

Extinguishing media:

Fire-fighting foam, dry chemical powder, carbon dioxide or water fog. Foam manufacturers should be consulted for recommendations regarding types of foams and application rates. Unsuitable extinguishing media: Water may be ineffective to extinguish, but water should be used to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapours and to protect personnel attempting to stop a leak. Water spray may be used to flush spills away from areas of potential ignition.

Special hazards arising from the substance or mixture:

Will be easily ignited by heat, sparks or flames.
Vapors may form explosive mixtures with air.
Vapors may travel to source of ignition and flash back.
Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.
Containers may explode when heated.
Many liquids are lighter than water.
Fire may produce irritating, corrosive and/or toxic gases including oxides of carbon, sulphur and nitrogen.
Health effects (lung damage) may be delayed after exposure to exposure to combustion products.
Runoff from fire control or dilution water may cause pollution.
Products of combustion may include toxic gases, including carbon monoxide.

Advice for firefighters:

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Section 6: Accidental Release Measures**Personal precautions, protective equipment and emergency procedures:**

For a large spill contact Fire/ Emergency Services immediately.
Wear appropriate respiratory protection and vapour protective clothing.
As an immediate public safety precautionary measure; Isolate spill or leak area for at least 100 meters in all directions. Consider initial evacuation for 1600 meters in all directions.
ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
All equipment used when handling the product must be grounded.
Do not touch or walk through spilled material.
Stop leak if you can do it without risk.
Wear eye, skin and respiratory personal protective equipment.
Personnel cleaning up spills must be properly trained.
Isolate the area and restrict access. Ventilate the area.

Environmental precautions:

Prevent releases to drains, sewers and natural waterways.
A vapor suppressing foam may be used to reduce vapors.

Methods and material for containment and cleaning up:

Monitor workplace air for levels of oxygen and flammable gas before anyone is allowed into area.
Contain spills to water by booming. Contain spills to land by diking.
Absorb spills using a suitable absorbent such as commercial absorbent product, dry earth, sand or other non-combustible material.

SAFETY DATA SHEET

Section 7: Handling and Storage

Handling:

Follow the proper procedures for handling flammable liquids.

Keep away from heat, sparks and flames. Use with adequate ventilation. Avoid breathing vapours. Avoid generating oil mists or aerosols. Wash all exposed skin thoroughly with detergent and water after handling, before eating, drinking, smoking or using the toilet. Remove contaminated clothing and wash before reuse. Discard saturated leather goods.

Wear personal protective equipment appropriate to the workplace where this material is handled.

Eliminate all ignition sources (e.g., sparks, open flames, hot surfaces). Keep away from heat and welding operations. Post NO SMOKING signs.

During transfer operations containers and vessels should be electrically grounded and bonded to prevent the build-up of a static charge. Keep containers closed when not in use.

If gas or vapour is released in a confined space, immediately evacuate the area.

Empty containers may contain hazardous residues. Never perform any welding, cutting, soldering, drilling or other hot work on an empty vessel, container or piping until all liquid and vapours have been cleared.

Storage

Store in a cool, dry, well-ventilated area out of direct sunlight and away from all ignition and heat sources. Keep containers tightly closed. Avoid all possible sources of ignition (spark or flame).

Empty containers may contain hazardous residues. Keep closed.

Section 8: Exposure Controls / Personal Protection

Exposure guidelines:

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>Canada-Provincial TWA</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Benzene	Alberta: <ul style="list-style-type: none"> • 0.5 ppm; Skin • STEL: 2.5 ppm • Designated substance; requires code of practice • A1 Confirmed human carcinogen British Columbia <ul style="list-style-type: none"> • 0.5 ppm; Skin • STEL: 2.5 ppm • A1 Confirmed human carcinogen Saskatchewan <ul style="list-style-type: none"> • Designated substance 	0.5 ppm STEL: 2.5 ppm Skin; A1 Confirmed human carcinogen BEI	1 ppm STEL: 5 ppm OSHA Carcinogen
Toluene	Alberta: <ul style="list-style-type: none"> • 50 ppm British Columbia: <ul style="list-style-type: none"> • 20 ppm; R Saskatchewan: <ul style="list-style-type: none"> • 50 ppm; Skin • 15 minute average contamination limit: 60 ppm 	20 ppm A4; BEI	100 ppm STEL: 150 ppm
Xylene	Alberta: <ul style="list-style-type: none"> • 100 ppm • 150 ppm STEL British Columbia: <ul style="list-style-type: none"> • 100 ppm • 150 ppm STEL Saskatchewan: <ul style="list-style-type: none"> • 100 ppm • 150 minute average contamination limit: 60 ppm 	100 ppm STEL: 150 ppm A4; BEI	100 ppm STEL: 150 ppm
Ethylbenzene	Alberta: <ul style="list-style-type: none"> • 100 ppm • 125 ppm STEL British Columbia: <ul style="list-style-type: none"> • 20 ppm Saskatchewan: <ul style="list-style-type: none"> • 100 ppm; T20 • 125 minute average contamination limit: 60 ppm 	20 ppm A3; BEI	100 ppm STEL: 125ppm

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection, continued****Exposure controls:**

Engineering Controls: Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. 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 consider a closed handling system and the installation of leak and fire detection equipment and a suitable automatic fire suppression system.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear laboratory safety goggles or other appropriate eye protection. Wear a face shield or full-face respiratory protection for open handling of liquid.

Skin Protection: Wear chemical protective gloves for all conditions of handling. Wear chemical protective boots and clothing for open handling of liquid and when there is the risk of contact with the skin. Recommended glove materials are nitrile or neoprene.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

NIOSH Respirator Recommendations for Benzene:

(APF = 10,000) An approved self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) An approved supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) An approved air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister or an appropriate, approved escape-type, self-contained breathing apparatus

Other: Do not smoke in work areas. Remove contaminated clothing promptly. Keep contaminated clothing in closed containers. Discard or launder before rewear. Inform laundry personnel of contaminant's hazards. Do not smoke, eat or drink in work areas. Wash hands thoroughly after work and before eating, drinking or smoking.

SAFETY DATA SHEET**Section 9: Physical and Chemical Properties****Information on basic physical and chemical properties:**

Appearance:	Liquid, Varies from colourless to golden yellow.
Odour:	Mild hydrocarbon. Pungent rotten-egg odour indicates presence of H ₂ S.
Odour threshold:	0.001-0.13 ppm - odour threshold for H ₂ S. At concentrations below 100 ppm, odour of rotten eggs. Above 100 ppm, sense of smell can be impaired and no odour is detected.
pH:	Not applicable
Relative Density (water = 1):	0.626 – 0.707 at 25°C
Melting point/freezing point:	-54°C
Initial boiling point and boiling range:	36.1 – 125°C
Flash point:	Varies; approximately -13°C (CC)
Auto-ignition temperature:	257°C
Upper/lower flammability or explosive limits:	LEL: 1.4 for methane UEL: 7.4% for methane
Explosive properties:	Forms explosive vapour mixtures with air.
Oxidizing properties:	Not available
Sensitivity to mechanical impact:	Not applicable
Sensitivity to static discharge:	Sensitive.
Evaporation rate:	Not available
Vapour pressure:	53.4 to 133 mm Hg @ 25°C
Vapour density:	2.49 – 3.94
Relative density:	Not applicable
Solubility:	Insoluble in water
Partition coefficient (n-octanol/water):	Not available
Critical temperature:	Not available
Critical pressure:	Not available
Decomposition temperature:	Not available
Viscosity:	Not applicable

Section 10: Stability and Reactivity**Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable.

Possibility of Hazardous Reactions:

Hazardous polymerization does not occur.

Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.
Avoid unintended contact with incompatible materials.

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 strong acids.

Hazardous Decomposition Products:

Hydrocarbon vapour.

SAFETY DATA SHEET**Section 11: Toxicological Information****Acute Toxicity Data:**

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Natural Gas Condensate	14 000 (rat)	>2 000 (rabbit)	>5.2 mg/L (rat)

Chronic Toxicity Data:

Contains benzene; human experience and animal studies show that long-term benzene exposure causes harmful effects to the blood and blood-forming organs, as well as the immune system.

Sensitization:

No experimental data demonstrating occupational respiratory or skin sensitization.

Neurological Effects:

Over-exposure to petroleum vapours by inhalation may cause drowsiness and dizziness. Peripheral neurotoxicity has been reported in connection with over exposure to hexacarbon solvents (e.g. n-hexane). Prolonged exposures above the exposure guidelines may cause nerve damage, with symptoms including weakness and numbness in hands and feet.

Genetic Effects:

Benzene has demonstrated mutagenic effects in animal studies and in exposed workers.

Reproductive Effects:

Limited evidence that exposures to benzene may cause adverse reproductive effects.

Developmental Effects:

Toxicity to fetuses has been demonstrated for some components (xylanes, toluene).

Target Organ Effects:

Eyes, skin, respiratory system, blood, central nervous system, bone marrow, peripheral nervous system.

Carcinogenicity:

Contains a carcinogen according to IARC, NTP, ACGIH and OSHA. Contains benzene; a regulated human carcinogen. Benzene is recognized as having the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure.

Section 12: Ecological Information**Toxicity:**

Aquatic Chronic Cat. 2; H411: Toxic to aquatic life with long lasting effects.

Hydrocarbons will float on the surface of water.

Algae: 72 Hr EC₅₀ *Pseudokirchneriella subcapitata*: 56 mg/L.

Fish: 96 Hr LC₅₀ *Alburnus alburnus*: 119 mg/L [static]; 96 Hr LC₅₀ *Cyprinodon variegatus*: 82 mg/L [static].

Water flea: 24 Hr EC₅₀ *Daphnia magna*: 170 mg/L.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not available

Mobility in soil:

Not available

Section 13: Disposal Considerations**Waste treatment methods:**

Recover or dispose of waste material in accordance with applicable waste disposal and environmental regulations.

Empty containers retain product residue, adhere to warnings after container has been emptied.

SAFETY DATA SHEET**Section 14: Transport Information****Transport symbol:****UN Number:**

UN1268

UN proper shipping name:

PETROLEUM PRODUCTS, N.O.S. (natural gas condensate)

Transport hazard class(es):

3

Packing group:

II

Emergency response guide:

128

Section 15: Regulatory Information**Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA****Toxic Substances Control Act 8(b) Inventory:** Substance listed on the TSCA inventory or are exempt.**OSHA:** This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).**Canada**

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification:

B2 - Flammable and combustible material - Flammable liquid

D2A – Other toxic effects – Carcinogenicity, Embryotoxicity

D2B – Material causing other toxic effects – skin and eye irritation.

New Substance Notification Regulations: Substances listed on the Domestic Substances List (DSL) or are exempt.**National Pollutant Release Inventory:** Benzene, Toluene, Xylenes, Ethylbenzene and VOC gases are NPRI reportable substances.

Contains substances regulated as environmentally hazardous pollutants.

Section 16: Other Information**Issue date:** December 16, 2013**Revision summary:** Previous version: February 3, 2011
Revised Sections 2, 3, 4, 7, 8, 13, 16**References and sources for data:**

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine

Cheminfo – Canadian Centre for Occupational Health and Safety

RTECS – Registry of Toxic Effects of Chemical Substances

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Prepared by: LEHDER Environmental Services Limited (519) 336-4101
www.lehder.com

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Natural Gas Liquids

Chemical names: NGL; Aliphatic hydrocarbon mixture (Alkanes C₂ – C₈).**Product uses:**

A complex combination of hydrocarbons separated and/or condensed from natural gas during transportation and collected at the wellhead and/or from the production, gathering, transmission, and distribution pipelines in deeps, scrubbers, etc. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C₂ through C₈.

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Emergency Overview:**

Danger! Extremely flammable gas, compressed gas or refrigerated liquefied gas.
Colourless refrigerated liquid. May have mild gasoline-like or sweet odour depending on the impurities present.

WHMIS:

Controlled product by WHMIS criteria.



- A – Compressed Gas
- B1 – Flammable Gas, or B2 - Flammable Liquid

Potential Health Effects**Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Contact with liquefied gas escaping from its cylinder may cause frostbite. The skin may become waxy white or yellow.

Eye contact: Contact with liquefied gas escaping from its cylinder may cause freezing of the eye. Permanent eye damage or blindness could result.

Ingestion: Not an applicable route of exposure. Aspiration hazard, may be fatal if swallowed and enters airways.

Inhalation: High concentrations of alkane gases in air may cause central nervous system depression. High concentrations (>100000 ppm; 12 – 16% as methane in air) may cause unconsciousness and suffocation due to lack of oxygen. Symptoms of oxygen deficiency include increased breathing and pulse rate, slight loss of muscular coordination, emotional upsets, abnormal fatigue from exertion, disturbed respiration, nausea and vomiting, inability to move freely, collapse, possible loss of consciousness; extreme oxygen deficiency below 6% can induce convulsive movements, gasping, possible respiratory collapse and death. Since exercise increases the body's need for oxygen, symptoms will occur more quickly during exertion in an oxygen-deficient environment.

Very high concentrations (300000 ppm; 30% as methane) can cause CNS depression with symptoms such as headache, nausea, dizziness, drowsiness and confusion.

Propane and butane are weak cardiac sensitizers. Exposures by inhalation to high concentrations may lead to cardiac sensitization; may cause the sudden onset of an irregular heartbeat. See Section 11.

SAFETY DATA SHEET**Section 2: Hazards Identification, continued****Chronic Health Effects:**

No human or animal information was located.

Medical Conditions Aggravated by Exposure:

None known

Interactions With Other Chemicals:

May be explosive in contact with oxygen, halogen gases and strong oxidizing agents. (Section 10)

Potential Environmental Effects:

Natural gas liquid is not expected to result in any ecological damage to water or land. Methane is regulated as a greenhouse gas in air.

Section 3: Composition/Information on Ingredients**Hazardous Substances:**

The chemical composition of Natural Gas Liquids will vary depending on the source. Natural Gas Liquids is a complex mixture, consistent with the definition in the Canadian Controlled Products Regulations, Section 2.

Chemical Name	CAS No.	Wt.%
Natural Gas Liquids	68919-39-1	99 – 100
Some common hazardous components of Natural Gas Liquids are listed below. The product may also contain other naturally occurring hydrocarbons.		
Methane	74-82-8	Not available
Ethane	74-84-0	Not available
Propane	74-98-6	Not available
Butane	106-97-8	Not available

Section 4: First Aid Measures**Description of first aid measures:**

Skin Contact: GAS: No health effects expected. LIQUID: Quickly remove victim from source of contamination.

Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm the affected area on site. DO NOT rub area or apply dry heat. Gently remove clothing or jewellery that may restrict circulation. Carefully cut around clothing that sticks to the skin and remove rest of the garment. DO NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Eye Contact: GAS: No health effects expected. LIQUID: Quickly remove victim from source of contamination.

Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. Do NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Inhalation: This material is extremely flammable. Take proper precautions (e.g. remove any sources of ignition, wear appropriate protective equipment). Remove source of contamination or move victim to fresh air. If breathing is difficult, oxygen may be beneficial if administered by trained personnel. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Immediately transport victim to an emergency care facility.

Ingestion: Not an applicable route of exposure.

Most important symptoms and effects, both acute and delayed:

Skin Contact: Frostbite.

Eye Contact: Freezing of eye tissue.

Inhalation: Nausea, dizziness, drowsiness and confusion, unconsciousness.

Ingestion: Aspiration hazard.

SAFETY DATA SHEET**Section 5: Fire Fighting Measures****Flammable properties:**

Extremely flammable gas, compressed gas or refrigerated liquefied gas. Readily forms explosive mixtures with air, which are easily ignited by heat, sparks or flame. Liquefied gas accumulates static charge. Liquefied gas rapidly vapourizes under normal conditions and produces 600 volumes vapour for every one volume of liquid. 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. Large spills of liquefied natural gas form rapidly dense flammable vapours, which will travel over long distances and will create a flash back hazard. The gas can accumulate in confined spaces and low areas, resulting in an explosion or toxicity hazard.

Extinguishing media:

Dry chemical powder and high-expansion foam. Foam manufacturers should be consulted for recommendations regarding types of foams and application rates.

Unsuitable extinguishing media: Carbon dioxide, low expansion foams, and direct application of water on liquefied gas. Under certain conditions, discharge of carbon dioxide produces electrostatic charges that could create a spark and ignite flammable gas.

Special hazards arising from the substance or mixture:

Large spills of liquefied gases behave like dense flammable vapours and travel over long distances creating a flash back hazard. Containers may rupture and explode if heated. Vapour and air mixtures are explosive.

Material will readily ignite at normal temperatures. The gas can accumulate in confined spaces, resulting in explosion and asphyxiation hazards. Direct addition of water (or any other room temperature liquid) to the liquefied gas will cause flash vaporization resulting in an explosion (either immediately or delayed) known as a "boiling liquid, expanding vapour explosion." During a fire, toxic gases may be generated.

Cylinders exposed to heat and/or fire may vent and release flammable gas through pressure relief devices.

Containers may explode when heated. Ruptured cylinders may rocket.

Advice for firefighters:

Evacuate the area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous gas and toxic decomposition products. Stop flow of gas before attempting to extinguish fire. If flow cannot be stopped, let the fire burn while protecting the surrounding area. Cool exposed containers with water.

Fires involving tanks:

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Cool containers with flooding quantities of water until well after fire is out.

Do not direct water at source of leak or safety devices; icing may occur.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

Always stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

If a tank or rail car 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**Personal precautions, protective equipment and emergency procedures:**

For a large spill or gas release, contact Fire/ Emergency Services immediately.

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).

All equipment used when handling the product must be grounded.

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

If possible, turn leading containers so that gas escapes rather than liquid.

Use water spray to reduce vapours or divert vapour cloud drift. Avoid allowing water runoff to contact spilled material.

Do not direct water at spill or source of leak.

Prevent spreading of vapours through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed.

Caution: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

SAFETY DATA SHEET**Section 6: Accidental Release Measures, continued****Environmental precautions:**

Prevent releases to drains, sewers and natural waterways.

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.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

This material is an extremely flammable gas, or refrigerated liquefied gas. Before handling, it is very important that engineering controls are operating and that protective equipment requirements are being followed.

Eliminate all ignition sources (e.g., sparks, open flames, hot surfaces). Keep away from heat and welding operations. During transfer operations, cylinders and vessels should be electrically grounded and bonded to prevent the build up of a static charge. Post NO SMOKING signs. It is very important to keep areas where this material is used clear of other materials which can burn. If flammable gas is released in a confined space, immediately evacuate the area.

Compressed or liquefied gas cylinders, piping and fittings must be protected from damage during handling, filling, transportation and storage.

Ensure that compressed or liquefied gas cylinders are secured, preferably upright, and cannot fall or roll.

Storage

Storage temperature should not exceed 52°C (125°F).

Store in a cool, dry, well-ventilated area out of direct sunlight and away from all ignition and heat sources. Keep quantity stored as small as possible. Store away from incompatible materials, such as oxygen and strong oxidizing agents.

Storage of compressed gas cylinders must be in accordance with the appropriate provincial or regional Fire Code.

Section 8: Exposure Controls / Personal Protection**Exposure guidelines:**

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>Ontario TWAEV</u>	<u>ACGIH®</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Butane	800 ppm	1000 ppm STEL	800 ppm
Aliphatic hydrocarbon gases Alkanes C ₁ - C ₄	1000 ppm	Minimal oxygen content required (Appendix F 2014 TLVs® and BEIs®)	Not established

Exposure controls:

Engineering Controls: Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. 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 and those handling liquefied gas, consider a closed handling system and the installation of leak and fire detection equipment and a suitable automatic fire suppression system.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear laboratory safety goggles or other appropriate eye protection. Wear a face shield when handling refrigerated liquefied gas.

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection, continued**

Skin Protection: Wear thermal protective clothing when handling refrigerated/cryogenic liquids. Wear fire-resistant long-sleeved clothing and trousers worn outside boots or over top of shoes. Remove protective clothing immediately if it becomes wet with refrigerated liquefied gas.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

Other: Workplaces should have a frostbite wash readily available in the work area. Any clothing which becomes wet with liquid or saturated with gas should be removed immediately.

Section 9: Physical and Chemical Properties**Information on basic physical and chemical properties:**

Appearance:	Liquid, colourless.
Odour:	Odourless, or faint odour of gasoline.
Odour threshold:	Not available
pH:	Not applicable
Melting point/freezing point:	-180°C (-292°F) approximate
Initial boiling point and boiling range:	Not available
Flash point:	-15°C (5°F) approximate
Auto-ignition temperature:	450°C (842°F) for propane
Upper/lower flammability or explosive limits:	LEL: 1.5% UEL: 12.5% approximate
Explosive properties:	Readily forms explosive vapour mixtures with air. Risk of vapour cloud explosion.
Oxidizing properties:	Not applicable
Sensitivity to mechanical impact:	Not applicable
Sensitivity to static discharge:	Sensitive; can readily form explosive mixtures with air, which are easily ignited by a static charge. Liquefied methane can accumulate electrostatic charge by flow, friction in pipes, splashing or agitation.
Evaporation rate:	>1
Vapour pressure:	Not available
Vapour density:	Not available
Relative density:	Not applicable
Solubility:	Insoluble in water
Partition coefficient (n-octanol/water):	>1
Critical temperature:	Not available
Critical pressure:	Not available
Decomposition temperature:	Not available
Viscosity:	Not applicable
Percent volatile:	100%

SAFETY DATA SHEET**Section 10: Stability and Reactivity****Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable. Releases of gas are extremely flammable and/or explosive in the presence of an ignition source.

Possibility of Hazardous Reactions:

Hazardous polymerization does not occur.

Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.

Avoid unintended contact with incompatible materials.

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.

Hazardous Decomposition Products:

Not applicable

Section 11: Toxicological Information

Acute Toxicity Data: Acute toxicity data for Natural Gas Liquids is not available. The following data is for the component substances.

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Methane	Not applicable	Not applicable	>800000 ppm (80%) (mice), asphyxiant duration not reported

Chronic Toxicity Data:

No data available.

Sensitization:

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.

Neurological Effects:

At high concentrations, it can cause depression of the central nervous system (CNS) based on animal and human information.

Methane in air can cause central nervous system depression at very high concentrations (30% or 300 000 ppm).

Unconsciousness (narcosis) from inhalation of ethane has been observed due to CNS depression at approximately 130000 ppm (13%).

Propane in air can cause depression of the central nervous system (CNS) with symptoms such as headache, nausea, dizziness, drowsiness and confusion, based on animal information. It is expected to cause unconsciousness (narcosis) due to CNS depression at approximately 47000 ppm (4.7%).

Genetic Effects:

Not available

Reproductive Effects:

None reported.

Developmental Effects:

None reported.

Target Organ Effects:

Central nervous system.

SAFETY DATA SHEET**Section 11: Toxicological Information, continued****Carcinogenicity:**

This product does not contain any component at a concentration of greater than 0.1% 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).

Other Adverse Effects:

Alkane gases in high concentrations in the air displace oxygen and can cause symptoms of asphyxiation. Methane concentration of greater than 14% (140 000 ppm) will displace oxygen to 18% in air and cause oxygen deprivation.

Section 12: Ecological Information**Toxicity:**

Natural Gas Liquid 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.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not applicable

Mobility in soil:

Not applicable

Section 13: Disposal Considerations**Waste treatment methods:**

Dispose of material in accordance with applicable regulations. Empty containers retain product residue, adhere to warnings after container has been emptied.

Section 14: Transport Information**Transport symbol:****UN Number:**

UN1075

UN proper shipping name:

LIQUEFIED PETROLEUM GASES

Transport hazard class(es):

2.1

Packing group:

Not applicable

Emergency response guide:

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SAFETY DATA SHEET**Section 15: Regulatory Information****Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA**

Toxic Substances Control Act 8(b) Inventory: Substance listed on the TSCA inventory.

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

Canada

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification:

A - Compressed gas

B1 - Flammable and combustible material - Flammable gas or B2 – Flammable liquid.

New Substance Notification Regulations: Substances listed on the Domestic Substances List (DSL).

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

Methane is regulated as a greenhouse gas.

Section 16: Other Information

Issue date: March 12, 2015

Revision summary: Previous version: March 1, 2012
Revised Section 8

References and sources for data:

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine
Cheminfo – Canadian Centre for Occupational Health and Safety
RTECS – Registry of Toxic Effects of Chemical Substances

Manufacturer disclaimer

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Prepared by: LEHDER Environmental Services Limited (519) 336-4101
www.lehder.com

While LEHDER Environmental Services Limited believes that the data set forth herein is accurate, as of the date hereof, LEHDER makes no warranty with respect thereto and expressly disclaims all liability for reliance thereon. Such data is offered solely for your consideration, investigation and verification.

SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking**

Product identifier: Produced Water

Product uses: Produced water is a product extracted from processing of Natural Gas. It is primarily water with varying amounts and types of dissolved inorganic salts and may contain trace amounts of hydrogen sulphide at not more than 1%.

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:
1-866-826-3830

Section 2: Hazards Identification

Emergency Overview:

Product may contain hydrogen sulphide gas, H₂S. If present, H₂S is an extremely flammable gas which forms explosive mixtures with air over a wide concentration range. H₂S may accumulate in confined spaces, especially in low-lying, poorly ventilated areas, producing a fire, toxicity and explosion hazard. Take appropriate precautions to prevent or minimize exposure to this product. Follow procedures for handling materials of unknown hazards.

Appearance, Colour and Odour: Discoloured water, if hydrogen sulphide is present it may smell of rotten egg.

WHMIS:

Canada: This is not a controlled product under WHMIS.

While this product is not controlled under WHMIS, this SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other handlers of this product.

Potential Health Effects

Acute Health Effects:

Relevant Route(s) of Exposure: Skin contact, Eye contact. Possible inhalation if H₂S is present.

Skin contact: Frequent or prolonged contact may irritate the skin and cause a skin rash (dermatitis).

Eye contact: Liquid may cause eye irritation.

Inflammation and irritation of the eyes has been reported at low airborne concentrations of H₂S with symptoms of scratchiness, irritation, tearing, burning, sensitivity to light, rainbow-like halos around lights, blurred vision and ulceration.

Inhalation: Product may contain Hydrogen sulphide (H₂S) gas which can be fatal if inhaled. H₂S gas may be released from closed containers and from heated Produced water. H₂S may cause irritation to the respiratory tract. High concentrations of H₂S cause breathing failure, coma and death without necessarily any warning odour being sensed. Airborne H₂S concentrations 1-5 ppm have a moderately offensive odour, may cause nausea and/or headaches with prolonged exposure. Airborne concentrations of 100 -200 ppm cause severe nose, throat and lung irritation; the ability to smell odour completely disappears. Over-exposure to H₂S can cause pulmonary edema, a potentially fatal build-up of fluid in the lungs in the absence of central nervous system effects (headache, nausea, dizziness) especially if exposure is prolonged. Over-exposure to H₂S causes excitement, headache, dizziness, staggering and sudden collapse ("knockdown"). Exposures above 500 ppm rapidly cause unconsciousness and death.

Always exercise caution when working around closed bulk containers of this material.

Ingestion: May be harmful if swallowed.

Swallowing may cause irritation of the digestive tract, nausea, vomiting and diarrhea, and central nervous system effects. The oral toxicity of this product has not been evaluated. Its toxicity depends on the type and amounts of dissolved salts.

SAFETY DATA SHEET**Section 2: Hazards Identification, continued****Chronic Health Effects:**

No human or animal data is available.

Prolonged or repeated skin contact may cause dermatitis.

May contain Hydrogen sulphide (H₂S). Long-term occupational exposure to H₂S has generally been associated with nervous system, respiratory system and eye effects.

Medical Conditions Aggravated by Exposure:

Exposure by skin contact may aggravate pre-existing skin disorders. Inhalation of spray mists may aggravate chronic respiratory conditions such as asthma and bronchitis.

Interactions With Other Chemicals:

If present, H₂S is a strong reducing agent (see Section 10).

Potential Environmental Effects:

Not available

Section 3: Composition/Information on Ingredients

The chemical composition of Produced Water will vary depending on the source.

<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>
Water	7732-18-5	90 - 99
Inorganic Salts	Not applicable - Mixture	1 - 5

Hazardous Ingredients:

<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>
Hydrogen sulphide, H ₂ S	7783-06-4	0 – 0.1 or 0.1 – 1.0*

Section 4: First Aid Measures**Description of first aid measures:**

May contain unknown amounts of H₂S. Do not attempt the rescue of an H₂S poisoning victim without the use of an appropriate respirator.

Skin Contact: Wash gently and thoroughly with lukewarm, gently flowing water and non-abrasive soap for 5 minutes. If irritation persists, repeat flushing. Obtain medical advice. Completely decontaminate clothing, shoes and leather goods before re-use, or discard.

Eye Contact: Remove source of contamination or move victim to fresh air. Immediately flush the contaminated eye with lukewarm, gently flowing water for 5 minutes while holding the eyelids open. If irritation occurs obtain medical advice.

Inhalation: Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment). Remove source of contamination or move victim to fresh air. Obtain medical advice. Remove source of contamination or move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Obtain medical attention immediately.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Obtain medical attention immediately.

SAFETY DATA SHEET**Section 5: Fire Fighting Measures****Flammable properties:**

Aqueous mixture, not flammable or combustible.

H₂S (hydrogen sulphide), if present, may accumulate in the headspace of containers. H₂S is a highly flammable and toxic gas.

Extinguishing media:

Use extinguishing media suitable for the surrounding fire.

Special hazards arising from the substance or mixture:

H₂S gas (hydrogen sulphide), if present, may accumulate in the headspace of containers.

Advice for firefighters:

Evacuate area and fight fire from safe distance. Wear self-contained breathing apparatus (SCBA), eye protection and protective clothing. As with any fire, toxic gases, vapors and fumes can be generated.

Section 6: Accidental Release Measures**Personal precautions, protective equipment and emergency procedures:**

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

Wear eye, skin and respiratory personal protective equipment.

Personnel cleaning up spills must be properly trained.

Isolate the area and restrict access. Ventilate the area.

Environmental precautions:

Prevent releases to drains, sewers and natural waterways.

For large spills, dike ahead of liquid spill for later disposal.

Methods and material for containment and cleaning up:

Contain spills to land by diking. Absorb spills using a suitable absorbent such as commercial absorbent product, dry earth, sand or other non-combustible material. Use clean non-sparking tools to collect absorbed material. Put material in suitable, covered, labeled containers.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

Avoid contact with eyes and skin. Avoid breathing vapours. Wear personal protective equipment appropriate to the workplace where this material is handled.

Use with adequate ventilation. Wash thoroughly after handling.

Care must be taken when opening containers as extremely flammable and harmful H₂S may have accumulated in the container headspace. Only open in a well ventilated area free from heat, flame and ignition sources. Use appropriate bonding and grounding protocols and non-sparking equipment when opening and closing containers, handling or transferring. Take precautionary measures against static discharges, e.g. when opening drums use non-sparking tools.

Storage

Follow good hygiene and handling procedures to prevent any unnecessary contact. Keep away from heat, sparks and flames. Keep containers tightly closed. Store in a cool, well ventilated place away from incompatible materials.

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection****Exposure guidelines:**

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>Canada-Provincial TWA</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Hydrogen sulphide	Alberta <ul style="list-style-type: none">• 10 ppm• 15-minute Ceiling: 15 ppm British Columbia <ul style="list-style-type: none">• Ceiling: 10 ppm Saskatchewan <ul style="list-style-type: none">• 8-hour TWA: 10 ppm• 15 ppm 15 minute average contamination limit	1ppm STEL: 5 ppm	10 ppm STEL: 15 ppm Ceiling: 20 ppm

Other Exposure guidelines:

- NIOSH REL for H₂S: 10 ppm 10-minute. IDLH: 100 ppm

Exposure controls:

Engineering Controls: Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. Use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Administrative controls and personal protective equipment may also be required.

Monitor the workplace air for the presence of hazardous vapours of H₂S and to determine the effectiveness of ventilation and the necessity for personal respirators.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear chemical safety goggles or other appropriate eye protection.

Skin Protection: Wear chemical protective gloves, impermeable to water, for all conditions of handling. Wear chemical protective boots and clothing for open handling of liquid and when there is the risk of contact with the skin. Contact safety supplier for specifications.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

Other: Do not smoke in work areas. Remove contaminated clothing promptly. Keep contaminated clothing in closed containers. Discard or launder before rewear. Inform laundry personnel of contaminant's hazards. Do not smoke, eat or drink in work areas. Wash hands thoroughly after work and before eating, drinking, smoking or using the toilet.

SAFETY DATA SHEET**Section 9: Physical and Chemical Properties****Information on basic physical and chemical properties:**

Appearance:	Liquid. Discoloured water.
Odour:	If H ₂ S is present, may have rotten egg odour.
Odour threshold:	H ₂ S, if present, has a threshold of 0.001-0.13 ppm.
pH:	Not applicable
Relative Density (water = 1):	Not available
Melting point/freezing point:	Not available
Initial boiling point and boiling range:	Not available
Flash point:	Not available
Auto-ignition temperature:	Not available
Upper/lower flammability or explosive limits:	Not available
Explosive properties:	Not available
Oxidizing properties:	Not available
Sensitivity to mechanical impact:	Not available
Sensitivity to static discharge:	H ₂ S, if present, may be ignited by static discharge.
Evaporation rate:	Not available
Vapour pressure:	Not available
Vapour density:	Not available
Solubility:	Not available
Partition coefficient (n-octanol/water):	Not available
Critical temperature:	Not available
Critical pressure:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available

Section 10: Stability and Reactivity**Reactivity:**

Not dangerously reactive.

Chemical Stability:

Normally stable. H₂S, if present, is a strong reducing agent and is highly reactive.

Possibility of Hazardous Reactions:

Hazardous polymerization does not occur.

Conditions to Avoid:

Avoid prolonged exposure to extreme heat.

Incompatible Materials:

Avoid contact with oxygen and strong oxidizing agents (e.g. chlorine, fluorine, peroxides, nitrates and perchlorates).

Hazardous Decomposition Products:

May evolve toxic hydrogen sulphide (H₂S) gas or other sulfur containing gases.

SAFETY DATA SHEET**Section 11: Toxicological Information****Acute Toxicity Data:**

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (ppm, 4 hrs.)</u>
Hydrogen sulphide	Not available	Not available	335 (mouse)

Chronic Toxicity Data:

Product may evolve quantities of H₂S gas. Permanent or persistent nervous system effects following an acute overexposure to H₂S have included fatigue, anxiety, irritability, intellectual decline, reduced attention span, impaired learning and memory, altered sense of smell, and motor deficits.

Sensitization:

Not available

Neurological Effects:

H₂S, if present, is acutely toxic to the central nervous system. Permanent or persistent nervous system effects following an acute exposure to H₂S have included fatigue, anxiety, irritability, intellectual decline, reduced attention span, impaired learning and memory, altered sense of smell, and motor deficits.

Genetic Effects:

Not available

Reproductive Effects:

Not available

Developmental Effects:

Not available

Target Organ Effects:

Eyes, respiratory system, central nervous system.

Carcinogenicity:

Not available

Section 12: Ecological Information**Toxicity:**

Not available. Prevent release of this product to natural waterways.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not available

Mobility in soil:

Liquid, dispersible in water and soil.

Section 13: Disposal Considerations**Waste treatment methods:**

Recycle, recover or dispose of waste material in accordance with applicable waste disposal and environmental regulations.

Empty containers retain product residue, adhere to warnings after container has been emptied.

Section 14: Transport Information

UN proper shipping name: Not regulated as a dangerous good for transport.

SAFETY DATA SHEET**Section 15: Regulatory Information****Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA**

Toxic Substances Control Act 8(b) Inventory: Substances listed on the TSCA inventory or are exempt.

OSHA: This material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Canada

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification:

Not controlled

Hydrogen sulphide is present at less than 1% concentration cut-off (*Controlled Products Regulations* – Section 48).

New Substance Notification Regulations: Substances listed on the Domestic Substances List (DSL).

National Pollutant Release Inventory: If present, Hydrogen sulphide is a NPRI reportable substance.

Section 16: Other Information

Issue date: March 12, 2015

Revision summary: Previous version: March 1, 2012

References and sources for data:

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine

Cheminfo – Canadian Centre for Occupational Health and Safety

RTECS – Registry of Toxic Effects of Chemical Substances

Manufacturer disclaimer

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www.lehder.com

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Crude Oil

Chemical names: Crude Petroleum

Product uses:

A complex combination of hydrocarbons. It consists predominantly of aliphatic, alicyclic and aromatic hydrocarbons. It may also contain small amounts of nitrogen, oxygen and sulfur compounds. This category encompasses light, medium, and heavy petroleum, as well as the oils extracted from tar sands.

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**2.1 Classification of the substance or mixture:**Classification according to GHS

Flammable Liquid Cat. 2; H225
Acute toxicity Cat. 2; H330
Aspiration Toxicity Cat. 1; H304
Specific Target Organ Toxicity Single Exposure Cat. 3; H336
Germ Cell Mutagenicity Cat. 1B; H340
Carcinogenicity Cat. 1B; H350

2.2 Label elements:Label according to GHS

Danger.

H225: Highly flammable liquid and vapour.

H330: Fatal if inhaled

H304: May be fatal if swallowed and enters airways.

H336: May cause drowsiness or dizziness.

H340: May cause genetic defects

H350: May cause cancer.

Prevention

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P210: Keep away from heat, sparks, open flames and hot surfaces. – No smoking.

P233: Keep container tightly closed.

P240: Ground/bond container and receiving equipment.

P241: Use explosion-proof electrical, ventilating, lighting, and other equipment.

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P260: Do not breathe fume/gas/mist/vapours.

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P284: In case of inadequate ventilation wear respiratory protection.

Response

P301 +P310: IF SWALLOWED: Immediately call a POISON CENTRE/doctor. P331: Do NOT induce vomiting.

P303 +P361 +P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

SAFETY DATA SHEET**Section 2: Hazard Identification, continued****2.2 Label elements: (continued)**

P304 +P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing. P310: Immediately call a POISON CENTER or doctor.

P308 +P313: IF exposed or concerned: Get medical advice/attention.

P370 +P378: In case of fire: Use water spray or appropriate foam to extinguish.

Storage

P403 +P233: Store in a well-ventilated place. Keep container tightly closed.

P235: Keep cool.

P405: Store locked up.

Disposal

P501: Dispose of contents/containers in accordance with local/regional/national/ international regulations.

2.3 Other hazards:

May release Hydrogen sulphide an extremely flammable and very toxic gas; may accumulate in the head space of closed containers or in confined spaces.

Material can accumulate static charges which may ignite vapours.

High pressure injection of crude oil under the skin can cause serious injury.

Hot crude oil will cause thermal burns to the skin.

Repeated contact causes skin dryness and cracking.

2.4 Other hazard classifications:

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

Canada: This is a controlled product under WHMIS. Classification according to Controlled Products Regulations:

B2: Flammable Liquid

D1A – Immediate and Serious Toxic Effects

D2A/D2B: Material Causing Other Toxic Effects

Section 3: Composition/Information on Ingredients

The chemical composition of crude oils can vary greatly from different producing regions and even from within a particular geological formation. Crude oil is a complex mixture, consistent with the definition in the Canadian Hazardous Products Regulations. Crude oil contains highly flammable gases such as methane, ethane, propane, butane and other short-chain hydrocarbons that present an immediate flammability risk.

Crude oil contains hydrocarbons in the carbon number range from C1 to C60+. It also contains organometallic complexes, notably of sulfur and vanadium, and dissolved gases such as hydrogen sulfide. Crude oils range from thin, light colored oils consisting mainly of gasoline quality stock to heavy, thick tar-like materials. Crude oil has the following general composition:

Carbon 84%

Hydrogen 14%

Sulfur 1-3%

Nitrogen 1%

Oxygen 1%

Minerals and salts 0.1%

Hazardous Ingredients:

<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>
Crude oil, petroleum	8002-05-9	100
Common hazardous components of Crude Oil are listed below; concentrations vary depending on the source of the crude.		
Benzene	71-43-2	Not available
Toluene	108-88-3	Not available
Xylene	1330-20-7	Not available
Ethylbenzene	100-41-4	Not available
Polynuclear aromatic hydrocarbons	100-01-6	Not available
Hydrogen sulphide	7783-06-4	Not available

SAFETY DATA SHEET**Section 4: First Aid Measures****4.1 Description of first aid measures:**

Precautions: First aid providers should avoid direct contact with this chemical. Wear chemical protective gloves, if necessary. Take precautions to ensure your own safety before attempting rescue, (e.g. wear protective equipment).

Do not attempt the rescue of an H₂S poisoning victim without the use of an appropriate respirator.

Inhalation: This material is flammable and toxic. Rescuers must take proper precautions (e.g. remove any sources of ignition, wear appropriate respiratory protection) before attempting rescue.

Remove person to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell or if exposed or concerned call a POISON CENTRE or doctor.

If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Immediately obtain medical attention and transport victim to an emergency care facility.

Eye Contact: Rinse cautiously with water for several minutes or until the chemical is removed while holding the eyelid(s) open. Remove contact lenses if present and easy to do. Continue rinsing. If eye irritation persists get medical attention.

Skin Contact: As quickly as possible, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Quickly and gently blot or brush away excess chemical. Rinse skin with water or shower. Wash with plenty of soap and water. For hot crude, immediately flush affected area with large amounts of cold water and get medical attention immediately. Completely decontaminate clothing, shoes and leather goods before reuse or discard.

If skin irritation or rash occurs: Get medical attention.

If crude oil is injected under the skin or into the body, get immediate medical attention.

Ingestion: If swallowed, call a POISON CENTER or doctor/physician. Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing. Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Quickly transport victim to an emergency care facility.

4.2 Most important symptoms and effects, both acute and delayed:

Inhalation: May be harmful or toxic by inhalation. High vapour concentrations are irritating to the eyes, nose, throat and lungs; may cause headaches, drowsiness and dizziness. May cause cancer by inhalation of vapors containing benzene.

Hydrogen sulphide (H₂S) gas may be released from closed containers or if heated. Hydrogen sulfide may cause irritation to the eyes and respiratory tract. High concentrations of H₂S cause breathing failure, coma and death without necessarily any warning odour being sensed.

Eye Contact: Liquid, fumes and vapours cause eye irritation, symptoms include pain, tearing and blurred vision. Hot crude oil will cause thermal burns.

Skin Contact: Frequent or prolonged contact may irritate the skin and cause a skin rash (dermatitis).

Benzene may be absorbed through damaged skin and may cause blood or blood producing system disorder and/or damage.

Hot crude oil will cause thermal burns to the skin.

High pressure injection under the skin may cause serious damage.

Ingestion: Small amounts of this liquid drawn into the lungs from swallowing or vomiting may cause severe health effects such as bronchopneumonia or pulmonary oedema.

Swallowing may cause irritation of the digestive tract, nausea, vomiting and diarrhea, and central nervous system effects.

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

If H₂S is inhaled, immediately call a POISON CENTER or doctor.

High pressure injection under the skin or into the body requires immediate medical treatment.

4.4 Medical Conditions Aggravated by Exposure:

Individuals with liver disease may be more susceptible to toxic effects from exposure to crude oil containing benzene.

SAFETY DATA SHEET**Section 5: Fire Fighting Measures****5.1 Extinguishing media:****Small Fires**

Dry chemical, CO₂, water spray or appropriate foam. Crude oil products have a low flash point; use of water spray when fighting fire may be inefficient, alcohol-resistant foam may be more effective.

Large Fires

Water spray, fog or appropriate foam.

Use water spray or fog; do not use straight streams.

Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Cool containers with flooding quantities of water until well after fire is out.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

ALWAYS stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Foam suppliers should be consulted for recommendations regarding types of foams and application rates. Cover liquid spills with foam.

Some Crude oils have a low flash point; use of water spray when fighting fire may be ineffective to extinguish. Do not use a direct stream of water as it may spread the fire.

Move containers from fire area if you can do it without risk.

5.2 Special hazards arising from the substance or mixture:

Will be ignited by heat, sparks or flames.

Vapors may form explosive mixtures with air.

Vapors may travel to source of ignition and flash back.

Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

Vapor explosion hazard indoors, outdoors or in sewers.

Runoff to sewer may create fire or explosion hazard.

Containers may explode when heated.

Many liquids are lighter than water.

Fire may produce irritating, corrosive and/or toxic gases including oxides of carbon, sulphur and nitrogen. Health effects (lung damage) may be delayed after exposure to exposure to combustion products.

Runoff from fire control or dilution water may cause pollution.

May accumulate static charge by flow or agitation. Vapours in the flammable range may be ignited by a static discharge.

5.3 Advice for firefighters:

Wear positive pressure self-contained breathing apparatus (SCBA).

Structural firefighters' protective clothing will only provide limited protection

If tank, rail car or tank truck is involved in a fire, isolate for 800 meters in all directions; also, consider initial evacuation for 800 meters in all directions.

Section 6: Accidental Release Measures**6.1 Personal precautions, protective equipment and emergency procedures:**

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

All equipment used when handling the product must be grounded.

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

Wear eye, skin and respiratory personal protective equipment.

Personnel cleaning up spills must be properly trained.

As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.

Keep unauthorized personnel away.

Stay upwind.

Keep out of low areas.

Ventilate closed spaces before entering.

Short-chain hydrocarbon vapors will be emitted from the crude at the time of a spill, presenting an immediate flammability risk. Flashpoint of the spilled liquid rises following the flashing of the highly flammable vapors.

SAFETY DATA SHEET**Section 6: Accidental Release Measures****6.2 Environmental precautions:**

Prevent entry into waterways, sewers, basements or confined areas.

A vapor suppressing foam may be used to reduce vapors.

Large Spills:

Dike far ahead of liquid spill for later disposal.

Water spray may reduce vapor; but may not prevent ignition in closed spaces.

In the event of a release to the environment, notify relevant authorities in accordance with applicable local and national regulations.

6.3 Methods and material for containment and cleaning up:

Absorb or cover with dry earth, sand or other commercial absorbent material.

Use clean non-sparking tools to collect absorbed material.

Carefully scoop or shovel contaminated absorbent material and transfer into suitable, covered, labeled containers for reclamation or disposal. Do not touch spilled material. Contaminated absorbent material may pose the same hazards as the spilled product. Dispose of waste and contaminated absorbent according to the directions in Section 13 of this SDS.

6.4 Reference to other sections:

See Section 1 for emergency telephone numbers in case of spill or fire.

See Section 8 for information on selection of personal protective equipment.

See Section 13 for information on disposal of spilled product and contaminated absorbents.

Section 7: Handling and Storage**7.1 Precautions for safe handling:**

Follow the procedures for handling flammable liquids.

Obtain special instructions before use.

Do not handle until all safety precautions have been read and understood.

Keep away from heat, sparks, open flames, and hot surfaces. – No smoking. ELIMINATE all ignition sources.

Keep container tightly closed.

Ground/bond container and receiving equipment.

Use explosion-proof electrical, ventilating, lighting, and other equipment.

Use only non-sparking tools.

Take precautionary measures against static discharge.

Do not breathe fume/gas/mist/vapours.

Use only outdoors or in a well-ventilated area.

Wear protective gloves/protective clothing/eye protection/face protection.

In case of inadequate ventilation, or if H₂S is present, wear respiratory protection.

7.2 Conditions for safe storage, including any incompatibilities:

Follow applicable fire codes for storage of flammable liquids, e.g. NFPA 30 "Flammable and Combustible Liquid Code". Store in a well-ventilated area. Keep containers tightly closed and properly labeled. Ground/bond container and receiving equipment. Use explosion-proof electrical, ventilating, lighting and other equipment.

Follow guidelines for cleaning of storage tanks such as API Recommended Practice 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API Recommended Practice 2015 "Cleaning Petroleum Storage Tanks."

Crude oils may release very toxic and extremely flammable hydrogen sulfide gas (H₂S). In a tank, barge or other closed container, the vapor space above this material may accumulate H₂S. Check atmosphere for oxygen content, H₂S, and flammability prior to entry.

Empty containers contain explosive vapours and other hazardous substances. Do not cut, weld, braze, solder, drill, grind, pressurize crude oil containers or expose them to heat, flame, sparks, or other sources of ignition. Refer to occupational health and safety regulations or ANSI Z49.1, and other references for guidance pertaining to cleaning, repairing, cutting or welding.

SAFETY DATA SHEET

Section 8: Exposure Controls / Personal Protection

Exposure guidelines:

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>Canada-Provincial TWA</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Hydrogen sulphide	Alberta <ul style="list-style-type: none"> • 10 ppm • 15-minute Ceiling: 15 ppm British Columbia <ul style="list-style-type: none"> • Ceiling: 10 ppm Saskatchewan <ul style="list-style-type: none"> • 8-hour TWA: 10 ppm • 15 minute average contamination limit: 15 ppm 	1ppm STEL: 5 ppm	10 ppm STEL: 15 ppm Ceiling: 20 ppm
Benzene	Alberta <ul style="list-style-type: none"> • 0.5 ppm • STEL: 2.5 ppm • Designated substance; requires code of practice • A1 Confirmed human carcinogen • Substance readily absorbed through intact skin British Columbia <ul style="list-style-type: none"> • 0.5 ppm • STEL: 2.5 ppm • Skin notation • A1 Confirmed human carcinogen Saskatchewan <ul style="list-style-type: none"> • Designated substance 	0.5 ppm STEL: 2.5 ppm Skin; BEI A1 Confirmed human carcinogen	1 ppm STEL: 5 ppm OSHA Carcinogen
Toluene	Alberta: <ul style="list-style-type: none"> • 50 ppm British Columbia: <ul style="list-style-type: none"> • 20 ppm; R Saskatchewan: <ul style="list-style-type: none"> • 50 ppm; Skin • 60 ppm -15 minute average contamination limit 	20 ppm BEI	100 ppm STEL: 150 ppm
Xylene	Alberta: <ul style="list-style-type: none"> • 100 ppm • 150 ppm STEL British Columbia: <ul style="list-style-type: none"> • 100 ppm • 150 ppm STEL Saskatchewan: <ul style="list-style-type: none"> • 100 ppm • 60 ppm -150 minute average contamination limit 	100 ppm STEL: 150 ppm BEI	100 ppm STEL: 150 ppm
Ethylbenzene	Alberta: <ul style="list-style-type: none"> • 100 ppm • 125 ppm STEL British Columbia: <ul style="list-style-type: none"> • 100 ppm • 125 ppm STEL Saskatchewan: <ul style="list-style-type: none"> • 100 ppm; T20 • 60 ppm -125 minute average contamination limit 	20 ppm BEI	100 ppm STEL: 125ppm

Other Exposure guidelines:

- NIOSH REL for H₂S: 10 ppm 10-minute. IDLH: 100 ppm

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection, continued****Exposure controls:**

Engineering Controls: Provide ventilation sufficient to keep exposure to airborne substances below the exposure limits and below any explosive limits. Methods include a closed handling system with leak and fire detection equipment, and suitable automatic fire suppression system. For open handling methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. Use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Administrative controls and personal protective equipment may also be required.

Monitor the workplace air to determine the effectiveness of ventilation and the necessity for personal respirators.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear chemical safety goggles or full-face respirator when needed to prevent exposure to liquid, vapour or fume.

Skin Protection: Wear chemical protective gloves for all conditions of handling. Wear chemical protective boots and clothing for open handling of liquid and when there is the risk of contact with the skin. Recommended glove materials are nitrile or neoprene. Evaluate resistance under conditions of use and maintain protective clothing carefully. Consult safety supplier for glove, boot and clothing specifications.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

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.

Other: Do not smoke in work areas. Remove contaminated clothing promptly. Keep contaminated clothing in closed containers. Discard or launder before rewear. Inform laundry personnel of contaminant's hazards. Do not smoke, eat or drink in work areas. Wash hands thoroughly after work and before eating, drinking, smoking or using the toilet.

Section 9: Physical and Chemical Properties**Information on basic physical and chemical properties:**

Appearance:	Liquid. Appearance can vary from clear, light to dark viscous liquid.
Odour:	Hydrocarbon odour. May have sulphur or rotten egg (H_2S) odour.
Odour threshold:	Not available
pH:	Not applicable
Relative Density (water = 1):	0.7-0.95
Melting point/freezing point:	-60 to -20°C
Initial boiling point and boiling range:	Not available
Flash point:	Varies; approximately -20 to 93°C
Auto-ignition temperature:	Not available
Upper/lower flammability or explosive limits:	Not available
Explosive properties:	Vapour mixtures with air may be explosive.
Oxidizing properties:	Not available
Sensitivity to mechanical impact:	Not available
Sensitivity to static discharge:	Vapours in the flammable range may be ignited by a static discharge.
Evaporation rate:	Not available
Vapour pressure:	Not available
Vapour density:	Not available
Solubility:	Low solubility in water. Some components are soluble in water.
Partition coefficient (n-octanol/water):	Not available
Critical temperature:	Not available
Critical pressure:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available

SAFETY DATA SHEET**Section 10: Stability and Reactivity****10.1 Reactivity:**

Not classified for reactivity hazards.

10.2 Chemical Stability:

Normally stable. H₂S, if present, is a strong reducing agent and is highly reactive.

10.3 Possibility of Hazardous Reactions:

None known.

10.4 Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.

Avoid unintended 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.

10.6 Hazardous Decomposition Products:

Hydrocarbon vapours, carbon monoxide, carbon dioxide, aldehydes and ketones, Phosgene gas, sulphur oxides, nitrogen oxides and phosphorus oxides may form as products of decomposition or combustion.

Section 11: Toxicological Information**11.1 Information on toxicological effects:****Likely routes of exposure**

Inhalation; skin contact; skin absorption; eye contact.

Acute Toxicity

Inhalation: Breathing vapours may cause drowsiness and dizziness.

Danger! Product may contain Hydrogen sulphide (H₂S) gas which can be fatal if inhaled. H₂S gas may be released from closed containers and from heated crude oil. H₂S may cause irritation to the eyes and respiratory tract. High concentrations of H₂S cause breathing failure, coma and death without necessarily any warning odour being sensed. Airborne H₂S concentrations 1-5 ppm have a moderately offensive odour, may cause nausea and/or headaches with prolonged exposure. Airborne concentrations of 100 -200 ppm cause severe nose, throat and lung irritation; the ability to smell odour completely disappears. Over-exposure to H₂S can cause pulmonary edema, a potentially fatal build-up of fluid in the lungs in the absence of central nervous system effects (headache, nausea, dizziness) especially if exposure is prolonged. Over-exposure to H₂S causes excitement, headache, dizziness, staggering and sudden collapse ("knockdown"). Exposures above 500 ppm rapidly cause unconsciousness and death.

Ingestion: Aspiration hazard, small amounts of this liquid drawn into the lungs from swallowing or vomiting may cause severe health effects such as bronchopneumonia or pulmonary edema.

Swallowing may cause irritation of the digestive tract, nausea, vomiting and diarrhea, and central nervous system effects.

Skin: Some harmful components, such as benzene, may be absorbed through the skin.

Acute Toxicity Data

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (ppm, 4 hrs.)</u>
Crude oil, petroleum	>4 300 (rat)	>2 000 (rabbit)	Not available
Benzene	930 (rat)	>9400 (rabbit)	13700
Toluene	2600 (rat)	12225 (rabbit)	8800 (rat)
Xylene	5251 (mouse)	12180 (rabbit)	6350 (rat)
Ethylbenzene	3500 (rat)	Not available	4000 (rat)
Polynuclear aromatic hydrocarbons	750 (rat)	>500 (guinea pig)	Not available
Hydrogen sulphide	Not available	Not available	335 (mouse)

SAFETY DATA SHEET**Section 11: Toxicological Information, continued****Skin corrosion / irritation**

May cause skin irritation or a rash. Repeated contact may cause skin dryness or cracking. Hot crude oil will cause serious thermal burns to the skin.

Serious eye damage / irritation

Data are not available. Contact with vapours, liquid and mist may cause irritation with redness, swelling, pain and watering of the eyes.

STOT (Specific Target Organ Toxicity) – Single Exposure

Exposure to some hydrocarbon vapors, including toluene, may cause narcotic effects including drowsiness and dizziness. Narcotic effects may occur when exposed to low boiling point petroleum gases, gasoline and naphtha.

H₂S, if present, is acutely toxic to the central nervous system. Permanent or persistent nervous system effects following an acute exposure to H₂S have included fatigue, anxiety, irritability, intellectual decline, reduced attention span, impaired learning and memory, altered sense of smell, and motor deficits.

STOT (Specific Target Organ Toxicity) – Repeated Exposure

Contains benzene. Human health studies indicate that prolonged and/or repeated overexposures to benzene may cause damage to the blood producing system (particularly the bone marrow) and serious blood disorders including leukemia. The 90 day LOAEL for hematological effects from exposure to benzene is reported as 8050 mg/m³, which does not meet the classification criteria of the GHS for STOT RE effects (IPIECA 2010).

Aspiration hazard

May cause lung damage if aspirated based on physical and chemical properties. Small amounts of this liquid drawn into the lungs from swallowing or vomiting may cause severe health effects such as bronchopneumonia or pulmonary oedema.

Sensitization - respiratory and/or skin

Not known to cause respiratory or dermal sensitization.

Carcinogenicity

Contains benzene. Human health studies indicate that prolonged and/or repeated overexposures to benzene may cause damage to the blood producing system (particularly the bone marrow) and serious blood disorders including leukemia. Benzene is listed by the International Agency For Research on Cancer (IARC), ACGIH® and National Toxicology Program (NTP), as carcinogenic in humans.

Contains Ethylbenzene. The International Agency for Research on Cancer has evaluated ethylbenzene and classified it as a possible human carcinogen (Group 2B) based on sufficient evidence for carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed human.

Contains polynuclear aromatic hydrocarbons (PAHs). Animal tests have shown that prolonged and/or repeated exposure to certain PAHs can cause cancer of the skin, the lung and other organs. Several 3-7 fused-ring PAHs are classified as Group 1 or 2 carcinogens by IARC. Petroleum products containing PAH's present a carcinogenic hazard to skin.

Reproductive toxicity

Development of offspring: Contains Toluene. High exposures to toluene in some animal studies have been reported to cause health effects on the developing embryo/fetus. Fetotoxicity (reduced fetal weight), behavioral effects (effects on learning and memory) and hearing loss (in males) have been observed in the offspring of rats exposed by inhalation to 1200 or 1800 ppm toluene. These effects were observed in the absence of maternal toxicity.

IPIECA has evaluated Weight of evidence for developmental toxicity and recommends that petroleum products containing 3% or more of toluene be classified for developmental toxicity. These crude products contain less than 2% toluene and are not classified for developmental effects.

Sexual function and fertility: Conclusions cannot be drawn from the information available.

Effects on or via lactation: Conclusions cannot be drawn from the information available.

Germ cell mutagenicity

Data are not available. Data for Benzene: In vitro tests using human lymphocytes and animal cells exposed to benzene has resulted in chromosomal aberrations.

Interactive effects

Crude oils contain varying concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) which are known to produce a phototoxic reaction when contaminated skin is exposed to sunlight. Symptoms are similar to severe sunburn which reverse following removal of exposures. Continued exposure to sunlight may cause skin discoloration, skin eruptions and possible skin cancers.

SAFETY DATA SHEET**Section 12: Ecological Information****12.1 Toxicity:**

Ecotoxicology data specific to these crude oil products are not available. In general, Crude oil should be considered harmful to aquatic organisms and may cause long-term adverse effects in the aquatic, marine and terrestrial environments.

A wide variation in the response of organisms to oil exposures has been noted. The larvae of fish and crustaceans appear to be most susceptible to the water-soluble fraction of crude oil. Birds and other animals are susceptible to the physical fouling effects of oil.

12.2 Persistence and degradability:

Crude oils are considered not readily biodegradable.

Crude oil hydrocarbons are biodegraded at different rates. n-Alkanes are readily degraded in sea water, since many micro-organisms can utilize them. Branched-chain or iso-alkanes are less readily biodegraded but they do ultimately biodegrade. The degradation of cycloalkanes has not been extensively studied, but the ring structure is resistant to biodegradation.

Aromatic hydrocarbons are also resistant to biodegradation, but a few micro-organisms are able to utilize them. High molecular weight compounds, the tars and asphaltenes, degrade very slowly.

12.3 Bioaccumulative potential:

Not available

12.4 Mobility in soil:

Crude oils contain substances that may be mobile in soil and contaminate groundwater.

Section 13: Disposal Considerations**13.1 Waste treatment methods:**

Do NOT discard into any sewers, on the ground or into any body of water.

Store material for disposal as indicated in Section 7 Handling and Storage.

Empty containers may retain highly flammable and hazardous product residue, adhere to warnings after container has been emptied. Do not cut, weld, grind, drill or otherwise expose containers to sources of ignition such as heat, flame and spark as it may cause explosion.

Refer to regulatory guidance for risk management relating to drum and tank cleaning and disposal.

Dispose of waste in accordance with relevant national, regional and local environmental control provisions.

Section 14: Transport Information**14.1 UN Number:**

UN1267

14.2 Shipping name:

PETROLEUM CRUDE OIL

14.3 Transport hazard class(es):

Class 3

14.4 Packing group:

Not determined

Packing group is dependent on boiling point of the material.

14.5 Environmental hazards:

Harmful to aquatic life with long lasting effects.

14.6 Special precautions for user:

Emergency response guide 128

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

Not available

SAFETY DATA SHEET**Section 15: Regulatory Information****Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA**

Toxic Substances Control Act 8(b) Inventory: Substance listed on the TSCA inventory.

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

Canada

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification:

B2 - Flammable liquid

D1A – Immediate and serious toxic effects

D2A – Material causing other toxic effects – Carcinogenicity, Embryotoxicity

D2B – Material causing other toxic effects – skin and eye irritation.

New Substance Notification Regulations: Substances listed on the Domestic Substances List (DSL).

National Pollutant Release Inventory: Benzene, Toluene, Xylenes, Ethylbenzene and hydrogen sulphide are NPRI reportable component substances.

Section 16: Other Information

Issue date: March 11, 2015

Revision summary: Previous version: March 1, 2012
Updated SDS template. Revised in all sections

References and sources for data:

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine

Cheminfo – Canadian Centre for Occupational Health and Safety

RTECS – Registry of Toxic Effects of Chemical Substances

Agency for Toxic Substances and Disease Registry ATSDR-Toxicological Profile for Polycyclic Aromatic Hydrocarbons.

IPIECA-Guidance on the application of Globally Harmonized System (GHS) criteria to petroleum substances. June 2010

American Petroleum Institute API-Safety Data Sheets: Petroleum Industry Practices

Additional information:

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Prepared by:

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www.lehder.com

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Methanol
SDS record # 010
Alternate names: Methyl alcohol, Methyl hydrate, Methyl hydroxide, Wood alcohol

Product uses:

Raw material; industrial uses.
Intermediate SDS prepared for AltaGas Ltd. for Methanol used in various operations.

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Classification of the substance according to GHS:**

Flammable liquid - Category 2; H225
Acute toxicity (Oral, Dermal, Inhalation) - Category 3; H301+H311+H331
Serious eye damage/eye irritation - Category 2B; H320
Toxic to reproduction - Category 2; H361
Specific target organ toxicity (single exposure) - Category 1; H370

GHS Label elements:

Highly flammable liquid and vapour.

Toxic if swallowed, in contact with skin and if inhaled.

Causes damage to organs (eyes, nervous system) if inhaled, following skin contact and/or if swallowed.

Suspected of damaging the unborn child if inhaled, following skin contact and/or if swallowed.

Causes eye irritation.

Prevention:

- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
- Keep away from heat, sparks, open flames, and hot surfaces. – No smoking.
- Keep container tightly closed.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical, ventilating, lighting, and other equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Do not breathe fume, gas, mist, spray, vapours.
- Wash hands and skin thoroughly after handling.
- Do not eat, drink or smoke when using this product.
- Use only outdoors or in a well-ventilated area.
- Wear protective gloves/protective clothing/eye protection/face protection.

Response

- IF SWALLOWED: Immediately call a POISON CENTRE/doctor.
Rinse mouth.
- IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
Call a POISON CENTRE/doctor if you feel unwell.
- Take off immediately all contaminated clothing and wash it before reuse.
- IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Call a POISON CENTRE/doctor.

SAFETY DATA SHEET**Section 2: Hazards Identification, continued**

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.

Storage

Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal

Dispose of contents/container in accordance with local, regional, national and international regulations.

WHMIS:

Controlled product by WHMIS criteria.



- B2 – Flammable Liquid
- D1B – Immediate and Serious Toxic Effects
- D2A & D2B – Other Toxic Effects

Potential Health Effects**Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Toxic in contact with skin; can be absorbed through the skin and harmful effects have been reported by this route of exposure. In most cases, inhalation exposure would have also occurred at the same time. Symptoms of toxicity are expected to be the same as those described for Inhalation.

Eye contact: Methanol is a mild to moderate eye irritant.

Inhalation: Toxic by inhalation. Methanol can form high vapour concentrations at room temperature. Inhalation is the most common route of occupational exposure. Methanol causes mild central nervous system (CNS) depression with symptoms such as nausea, headache, vomiting, dizziness, loss of coordination and an appearance of drunkenness. A time period with no obvious symptoms follows (typically 8-24 hours, but may last several hours to 2 days). This latent period is then followed by development of metabolic acidosis and severe visual effects. Symptoms such as headache, dizziness, nausea and vomiting, followed in more severe cases by abdominal and muscular pain and difficult periodic breathing have been observed. Coma and death, usually due to respiratory failure, may occur if medical treatment is not received. Visual effects may include reduced reactivity and/or increased sensitivity to light, blurred, double and/or snowy vision, and blindness. Inhalation can cause adverse effects to vision, including increased sensitivity to light, blurred vision, optic nerve damage and permanent blindness.

Ingestion: Toxic if swallowed. Symptoms of toxicity are the same as those described for Inhalation. Methanol can be aspirated (breathed) into the lungs during ingestion or vomiting. Aspiration of methanol could cause a potentially fatal accumulation of fluid in the lungs (pulmonary edema).

Chronic Health Effects:

Long-term, high-level exposure may cause central nervous system (CNS) effects and visual disorders.

May cause harm to the unborn child; Methanol has caused fetotoxic or teratogenic effects, in the absence of maternal toxicity in animal studies.

Repeated contact may cause skin dryness and cracking.

Medical Conditions Aggravated by Exposure:

None known

Interactions With Other Chemicals:

Increased risk of explosion when in contact with strong oxidizing agents. (Section 10)

Potential Environmental Effects:

Methanol can cause adverse effects to aquatic and terrestrial environments. Regulated as a hazardous pollutant in air.

SAFETY DATA SHEET**Section 3: Composition/Information on Ingredients****Hazardous Substances:**

<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>
Methanol	67-56-1	60 – 100

Section 4: First Aid Measures**Description of first aid measures:**

Rescuers must take proper precautions (e.g. remove any sources of ignition, avoid direct contact with the victim and wear appropriate skin and respiratory protection) before attempting rescue.

Rapid medical treatment is needed following exposure to methanol by ingestion and inhalation.

Skin Contact: As quickly as possible, flush with lukewarm, gently flowing water for at least 20 minutes or until the chemical is removed. Under running water, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Obtain medical advice immediately. Completely decontaminate clothing before re-use or discard. Discard contaminated shoes and leather goods.

Eye Contact: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes or until the chemical is removed, while holding the eyelid(s) open. Take care not to rinse contaminated water into the unaffected eye or onto the face. Obtain medical attention immediately.

Inhalation: This material is toxic and flammable. Remove source of contamination or move victim to fresh air. If breathing is difficult, oxygen may be beneficial if administered by trained personnel. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Immediately transport victim to an emergency care facility.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Immediately transport victim to an emergency care facility.

Most important symptoms and effects, both acute and delayed:

Skin Contact: Nausea, dizziness, drowsiness, visual disturbances, unconsciousness. Skin dryness and cracking.

Eye Contact: If in eyes: may cause serious eye damage. May irritate or burn the eyes. Permanent damage including blindness may result.

Inhalation: If inhaled and/or swallowed and/or on skin: symptoms may include headache, nausea, dizziness, drowsiness and confusion. A severe exposure can cause unconsciousness. Delayed effects include metabolic acidosis, severe visual effects including blindness, abdominal pain and difficult breathing. Permanent blindness, coma and death may result if medical treatment is not received.

Ingestion: Nausea, dizziness, drowsiness, visual disturbances, unconsciousness.

Section 5: Fire Fighting Measures**Flammable properties:**

Flammable liquid and vapour [Flashpoint = 11°C (52°F)].

Extinguishing media:

Alcohol-resistant foam, carbon dioxide, dry chemical powder or water spray. Water may be ineffective because it will not cool methanol below its flash point. Use water spray or fog; do not use straight streams.

Special hazards arising from the substance or mixture:

Can readily form explosive mixtures with air, at or above 11°C over a wide concentration range, and may be ignited by a source of ignition of sufficient energy.

Burns with a clear, almost invisible light blue flame.

During a fire, irritating and toxic gases, such as formaldehyde may be generated.

Can accumulate in confined spaces, resulting in a toxicity and flammability hazard.

Runoff to sewer may create fire or explosion hazard.

Vapours may travel to source of ignition and flash back.

Vapor explosion and poison hazard indoors, outdoors or in sewers.

Containers may explode when heated.

SAFETY DATA SHEET**Section 5: Fire Fighting Measures, continued****Advice for firefighters:**

Evacuate the area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous gas and toxic decomposition products. Cool exposed containers with water.

Fires involving tanks:

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Cool containers with flooding quantities of water until well after fire is out.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

Always stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

If a tank or rail car is involved in a fire, isolate for 800 m in all directions; also consider initial evacuation for 800 m in all directions.

Section 6: Accidental Release Measures**Personal precautions, protective equipment and emergency procedures:**

Isolate the spill or leak area and prevent entry of unauthorized personnel. Ventilate closed spaces before entering. Wear personal protective equipment, including respiratory protection (e.g. chemical protection suit and SCBA, see Section 8)..

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).

All equipment used when handling the product must be grounded.

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

Prevent spreading of vapours through sewers, ventilation systems and confined areas.

A vapour suppressing foam may be used to reduce vapours.

Environmental precautions:

Prevent releases to drains, sewers and natural waterways.

Methods and material for containment and cleaning up:

SMALL SPILLS: Collect leaking liquid in sealable containers. Soak up spilled liquid with absorbent, non-combustible material which does not react with spilled chemical. Put material in suitable, covered, labeled containers. Flush area with water. Contaminated absorbent material may pose the same hazards as the spilled product.

LARGE SPILLS: Contact fire and emergency services for advice. Dike far ahead of liquid spill for later disposal. Water spray may reduce vapour but may not prevent ignition in closed spaces.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

Highly flammable liquid and vapour. Do not heat methanol container. Eliminate all ignition sources (e.g. sparks, open flames, hot surfaces). Prevent release of vapour and mist into workplace air. Never perform any welding, cutting, soldering, drilling or other hot work on an empty vessel, container or piping until all liquid and vapours have been cleared. Post "NO SMOKING" signs. Keep aisles and exits free of obstruction. It is very important to keep areas where this material is used clear of other materials which can burn. Do not use with incompatible materials such as strong oxidizing agents, mineral and organic acids and metals. Make sure containers are labeled clearly. Avoid damaging containers. Regularly check containers for evidence of corrosion or leakage. During transfer operations containers and vessels should be electrically grounded and bonded to prevent the build-up of a static charge. Never return contaminated material to its original container. Keep containers closed when not in use. Empty containers may contain hazardous residues. Keep suitable emergency equipment for fires, spills and leaks readily available. Practice good housekeeping.

Storage

Store this material in a cool, dry, well-ventilated area away from oxidizing materials and corrosive atmospheres, in a fireproof area. Keep amount in storage to a minimum. Keep storage area separate from work areas. Do not store below ground level, or in confined spaces. Ground floor storage facilities are usually recommended. Store away from work process and production areas, elevators, loading docks, building and room exits or main aisles leading to exits. Have appropriate fire extinguishers and spill clean-up equipment in or near storage area. Ground all containers and storage vessels. Store away from heat and ignition sources and out of direct sunlight.

SAFETY DATA SHEET**Section 7: Handling and Storage, continued**

Inspect all incoming containers to make sure they are properly labeled and not damaged. Always store in original containers. Keep containers tightly closed when not in use. Avoid bulk storage indoors.

Keep empty containers in separate storage area. Protect from damage. Empty containers may contain hazardous residues. Keep closed.

Storage facilities should be made of fire resistant materials. Use a grounded, non-sparking ventilation system, approved explosion-proof equipment and intrinsically safe electrical systems.

Section 8: Exposure Controls / Personal Protection**Exposure guidelines:**

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>Canada-Provincial TWA</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Methanol	Alberta <ul style="list-style-type: none">• 200 ppm TWA; 250 ppm STEL British Columbia <ul style="list-style-type: none">• 200 ppm TWA; 250 ppm STEL Saskatchewan <ul style="list-style-type: none">• 200 ppm TWA; 250 ppm STEL	200 ppm ; 250 ppm STEL Skin; BEI	200 ppm

Exposure controls:

Engineering Controls: Engineering methods include mechanical (local exhaust) ventilation, process or personnel enclosure and control of process conditions. Stringent measures such as enclosure should be considered because of the high potential hazard associated with this substance. For large-scale operations, consider the installation of leak and fire detection equipment along with a suitable, automatic fire suppression system. Use a non-sparking, grounded, ventilation system separate from other exhaust ventilation systems.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear safety goggles, a face shield or other appropriate full-face protection (e.g. full-face respirator).

Skin Protection: Skin absorption hazard; wear chemical protective gloves, clothing and boots. Remove protective clothing immediately if it becomes wet with methanol.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

Up to 2000 ppm: SAR (supplied-air respirator)

Up to 5000 ppm: SAR operated in a continuous-flow mode.

Up to 6000 ppm: SAR with a tight-fitting facepiece operated in a continuous-flow mode; or Full-facepiece SCBA (self-contained breathing apparatus) or Full-facepiece SAR.

Other: Workplaces should have a safety shower and eye-wash fountain readily available in the immediate work area. Keep contaminated clothing in closed containers; launder before rewearing or discard; inform laundry personnel of hazards. No eating, drinking or smoking in the work area.

SAFETY DATA SHEET**Section 9: Physical and Chemical Properties****Information on basic physical and chemical properties:**

Appearance:	Liquid, colourless
Odour:	Mild, characteristic alcohol odour, when pure. Crude methanol may have a repulsive, pungent odour.
Odour threshold:	Varies. Approx. 160 ppm
pH:	Not available
Melting point/freezing point:	-97.8 °C (-144 °F)
Initial boiling point and boiling range:	64.7 °C (148.5 °F)
Flash point:	11°C (52°F) (closed cup)
Auto-ignition temperature:	Reported values vary; 385 °C (725°F); 464-470 °C (867-878°F)
Upper/lower flammability or explosive limits:	LEL: 5.5% UEL: 36%
Explosive properties:	Readily forms explosive vapour mixtures with air. Risk of vapour explosion.
Oxidizing properties:	Not applicable
Sensitivity to mechanical impact:	Not available
Sensitivity to static discharge:	Sensitive, Minimum Ignition Energy = 0.14 millijoules at 14.7% by volume.
Evaporation rate:	4.1 (n-Butyl Acetate = 1)
Vapour pressure:	12.8 kPa (96 mm Hg) at 20°C
Vapour density:	1.1 (air = 1)
Relative density:	0.791 at 20°C
Solubility:	Soluble in water; soluble in ethanol, other alcohols and organic solvents.
Partition coefficient (n-octanol/water):	Log P _{oct} = -0.82 (estimated)
Critical temperature:	-0.82
Critical pressure:	-0.82
Decomposition temperature:	Not available
Viscosity:	0.75 mm ² /s (0.75 centistokes) at 20°C

Section 10: Stability and Reactivity**Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable. Decomposes on heating to produce carbon monoxide and formaldehyde.

Possibility of Hazardous Reactions:

Hazardous polymerization does not occur.

Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.
Avoid unintended contact with incompatible materials.

Incompatible Materials:

Incompatible with strong oxidizing agents, hydrogen peroxide, mineral acids, organic acids, acid anhydrides, acid chlorides, metals, carbon tetrachloride, alkali metals, acetyl bromide, dichloromethane, perchloric acid, metal perchlorates, potassium tert-butoxide, alkylaluminum solutions, beryllium hydride, cyanuric chloride, isocyanates, tetraphosphorus hexaoxide and diethyl zinc.

Methanol attacks some plastics and elastomers. Methanol is corrosive to some types of iron, steel, brass and aluminum.

Hazardous Decomposition Products:

Carbon monoxide, formaldehyde.

SAFETY DATA SHEET**Section 11: Toxicological Information**

Acute Toxicity Data: Evidence from accidental human exposures indicates that Methanol is more toxic to humans than to most experimental animal species.

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Methanol	5 628 (rat)	15 800 (rabbit)	64 000 ppm (rat)

Chronic Toxicity Data:

Case reports and human population studies have suggested that long-term, high-level exposure may cause central nervous system (CNS) effects and vision disorders.

Sensitization:

Not sensitizing in animal tests.

Neurological Effects:

Methanol causes mild central nervous system (CNS) depression with symptoms such as nausea, headache, vomiting, dizziness, loss of coordination and an appearance of drunkenness. Depending on the severity of poisoning, symptoms may be reversible or may cause permanent blindness, vision disturbances and/or nervous system effects.

Genetic Effects:

Not available

Reproductive Effects:

Not available

Developmental Effects:

Methanol has produced fetotoxicity in rats and teratogenicity in mice exposed by inhalation to high concentrations that did not produce significant maternal toxicity.

Target Organ Effects:

Eyes, central nervous system.

Carcinogenicity:

This product does not contain any component at a concentration of greater than 0.1% 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).

Toxicologically Synergistic Products:

In animals, high concentrations of methanol can increase the toxicity of other chemicals, particularly liver toxins like carbon tetrachloride.

Section 12: Ecological Information**Toxicity:**

Methanol may be harmful to aquatic and terrestrial organisms. Regulated as a hazardous pollutant in air.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not applicable

Mobility in soil:

Not available

Section 13: Disposal Considerations**Waste treatment methods:**

Dispose of material in accordance with applicable regulations. Empty containers retain product residue, adhere to warnings after container has been emptied.

SAFETY DATA SHEET**Section 14: Transport Information****Transport symbol:**

UN Number: UN1230
UN proper shipping name: METHANOL
Transport hazard class(es): 3 (6.1)
Packing group: II
Emergency response guide: 131

Section 15: Regulatory Information**Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA****Toxic Substances Control Act 8(b) Inventory:** Substance listed on the TSCA inventory.**OSHA:** This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).**Canada**

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification:

- B2 – Flammable Liquid
- D1B – Immediate and Serious Toxic Effects – toxic by inhalation, in contact with skin and if swallowed.
- D2A – Other Toxic Effects - fetotoxic and teratogenic effects observed in animals
- D2B – Other Toxic Effects – eye irritation

New Substance Notification Regulations: Substances listed on the Domestic Substances List (DSL).**National Pollutant Release Inventory:** Methanol is an NPRI reportable substance.**Section 16: Other Information****Issue date:** December 16, 2013**Revision summary:** Previous version: January 4, 2011
Revised Sections 2, 5, 6, 7, 8, 11.**References and sources for data:**

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine
Cheminfo – Canadian Centre for Occupational Health and Safety
RTECS – Registry of Toxic Effects of Chemical Substances

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SAFETY DATA SHEET

Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

Product identifier:

Naturally Occurring Radioactive Materials

SDS record # 011

Alternate names: NORM; Technically Enhanced Naturally Occurring Radioactive Materials (TENORM)

Product uses:

Oil and gas production and processing operations sometimes cause naturally occurring radioactive materials (NORM) to accumulate at elevated concentrations in by-product waste streams. The primary radionuclides of concern are isotopes of radium that originate from the decay of uranium and thorium naturally present in the subsurface formations from which oil and gas are produced. Process equipment (e.g., lines, filters, pumps and reaction units) may accumulate radioactive decay products and emit gamma radiation during operation. Equipment emitting gamma radiation may be presumed to be internally contaminated with alpha-emitting decay products that may be a hazard if inhaled or ingested. Consult applicable NORM regulations for worker protection guidelines and handling requirements before initiating maintenance operations that require opening contaminated equipment. In Canada, The NORM Working Group, of the Federal Provincial Territorial Radiation Protection Committee has assembled Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM).

Supplier of the Safety Data Sheet:

AltaGas Ltd.

1700, 355 4th Avenue SW

Calgary, AB

T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification

Emergency Overview:

The principle hazard from NORM is from ionizing radiation particularly the potential inhalation of airborne radioactive particles. Radioactive particles in air or radon gas attached to dust particles may be inhaled and deposited in the trachea, bronchial tree or lungs.

Radon is a radioactive gas produced by the decay of radium isotopes in both the uranium and thorium radioactive decay series. As it is a gas, radon can be carried away from its origin by air or water flows, and released into workplace air. Radon gas can accumulate in buildings.

Over-exposures to NORM may induce cancer, cause genetic damage, tissue damage and/or developmental effects in the unborn child.

NORM has no odour, colour or taste associated with its radioactivity and will have no immediate signs or symptoms of exposure.

The processing of raw materials by many resource-based industries may increase the concentration of radioactive substances in those materials, to levels at which special precautions are needed for handling, storing, transporting, and disposal of material, by-products, end-products or process equipment.

WHMIS:

Not regulated under WHMIS.

Refer to the Canadian Guidelines for the management of NORM and The Federal Provincial Territorial Radiation Protection Committee (FPTRPC).

Potential Health Effects**Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation. Ingestion

Skin contact: No symptoms of immediate adverse effects are expected. Skin contact to dusts containing NORM may cause long-term tissue damage.

Eye contact: No symptoms of immediate adverse are expected. Contact to dusts containing NORM may cause long-term tissue damage.

SAFETY DATA SHEET**Section 2: Hazards Identification, continued**

Inhalation: An individual may receive an "internal" exposure to a radioactive substance, by inhaling radioactive gas or particles suspended in the air. The material may remain in the body for some time after the intake. No symptoms of acute poisoning are expected.

Overexposure by inhalation to inhaled dusts containing radioactive uranium, thorium and radium may cause lung cancer.

Ingestion: An individual may receive an "internal" exposure to a radioactive substance by ingesting radioactive dust. No symptoms of acute poisoning are expected.

Chronic Health Effects:

Over-exposures to NORMs may induce cancer, cause genetic damage, tissue damage and/or developmental effects in the unborn child. Radiation to terminal airways may lead to emphysema and pulmonary fibrosis.

Medical Conditions Aggravated by Exposure: Not available**Interactions With Other Chemicals:**

Not available

Potential Environmental Effects:

Not available

Section 3: Composition/Information on Ingredients**Hazardous Substances:**

Chemical Name	CAS No.	Approximate Concentration
Long-lived radioactive elements of interest include uranium, thorium and potassium, and any of their radioactive decay products, such as radium and radon.	No Specific CAS	Radium 226 and Thorium 232 may range from less than 1 to 1800 picocuries per gram, or higher in infrequent instances. Radon is a radioactive gas produced by the decay of radium isotopes in both the uranium and thorium radioactive decay series.

Although the concentration of NORM in most natural substances is low, higher concentrations may arise as the result of human activities. For example, calcium scale precipitated from oil recovery brine may contain radium at greater concentrations than the water source itself.

Section 4: First Aid Measures**Description of first aid measures:**

Rescuers, should take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment).

Skin Contact: Wash the affected area thoroughly with soap and water.

Eye Contact: Remove source of contamination or move victim to fresh air. If irritation occurs, immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 15-20 minutes, while holding the eyelid(s) open. Obtain medical advice.

Inhalation: Remove source of contamination or move victim to fresh air.

Ingestion: Not an applicable route of exposure.

SAFETY DATA SHEET**Section 5: Fire Fighting Measures****Flammable properties:**

Not flammable

Extinguishing media:

Use appropriate media for the surrounding material.

Special hazards arising from the substance or mixture:

NORM is not flammable and does not support combustion.

Advice for firefighters:

Evacuate the area and fight fire from a safe distance or protected location.

Move containers from fire area if you can do it without risk.

Wear full protective gear including self-contained breathing apparatus.

Section 6: Accidental Release Measures**Personal precautions, protective equipment and emergency procedures:**

Restrict access to area until completion of cleanup.

Wear appropriate respiratory protection and protective clothing.

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

Environmental precautions:

If NORM material is released, steps should be taken to contain or prevent discharges to the environment and to control or stop release of NORM material into the air as dust.

Methods and material for containment and cleaning up:

Clean up should be continued until residual radioactivity levels return to background levels.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

Before handling, it is very important that engineering controls are operating and that protective equipment requirements are being followed. Workers must be trained regarding the hazards and safety procedures for NORM.

Areas where NORM is present or stored should be surveyed as often as necessary to ensure exposure limits are not exceeded. Assess the work site periodically to measure changes in conditions and to facilitate worker dose calculations.

Follow good hygiene and handling procedures to prevent any unnecessary contact with NORM.

Estimates should be made of the effective dose to workers and the public resulting from the following exposure pathways:

External gamma exposure.

Ingestion of NORM-containing materials.

Inhalation of NORM-containing dust.

Inhalation of radon gas and its radioactive decay products.

Storage

Store in isolated areas to which access can be controlled or limited. These areas should be clearly posted and identifiable.

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection****Exposure guidelines:**

Consult regional/local authorities for acceptable exposure limits.

The following dose limits were obtained from the Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM), referred to as "the Guidelines".

ICRP suggests that for the control of public exposure an appropriate value for the dose constraint is 0.3 mSv in a year. In keeping with this suggestion the Canadian NORM Guidelines have adopted 0.3 mSv/a as its first investigation level.

Investigation Threshold: An incremental dose of 0.3 mSv/a, the dose constraint value set in section 2.4.3, is adopted as the NORM Investigation Threshold. Where doses to workers or members of the public may exceed this value, a site-specific assessment should be carried out.

NORM Management Threshold: An assessed incremental dose to the public or workers of greater than 0.3 mSv/a, the dose constraint value set in section 2.4.3 and the Investigation Threshold, is adopted as the NORM Management Threshold.

Dose Management Threshold: An assessed incremental dose of 1 mSv/a to a worker is adopted as the Dose Management Threshold.

It is the recommendation of the Federal Provincial Territorial Radiation Protection Committee that the annual incremental effective dose to persons exposed to NORM as the result of a work practice be limited to the values given in the following table.

These dose limits are the foundation for all other radiation protection program recommendations contained in the *Guidelines*; are harmonized with the radiation dose limits recommended by the Canadian Nuclear Safety Commission for Nuclear Fuel Cycle; and incorporate the recommendations of ICRP Publication 60.

The sievert (Sv) is the unit of Effective Dose of radiation, and accounts for the total effect of different types of radiation on different parts of the body. Most occupational doses are in the millisievert range, or mSv. Regulations express the dose on a yearly basis, as millisieverts per annum or mSv/a. The life-time dose that will be received from an internal exposure is the "committed dose," also expressed in sieverts.

Table Radiation Dose Limits

Affected Group	Annual Effective Dose Limit (mSv) ^(a)	Five Year Cumulative Dose Limit (mSv)
Occupationally Exposed Workers ^(b)	20 ^(c)	100
Incidentally Exposed Workers and Members of the Public	1	5

Notes:

- a. These limits are exclusive of natural background and medical exposures. Refer to Appendix D of the Guidelines for guidance on dose limit calculations.
- b. For the balance of a known pregnancy, the effective dose to an occupationally exposed worker must be limited to 4 mSv as stipulated in the "Radiation Protection Regulations", Canadian Nuclear Safety Act.
This limit may differ from corresponding dose limits specified in current provincial legislation applicable for exposure to sources of x-rays.
- c. For occupationally exposed workers, a maximum dose of 50 mSv in one year is allowed, provided that the total effective dose of 100 mSv over a five-year period is maintained. This translates into an average limit of 20 mSv/a.

Occupationally Exposed Workers are employees who are exposed to NORM sources of radiation as a result of their regular duties. They are classified as NORM Workers working in an occupational exposure environment, and their average annual effective dose should not exceed 20 mSv (see Table 2.1 note c, for exception).

Incidentally Exposed Workers are employees whose regular duties do not include exposure to NORM sources of radiation. They are considered as members of the public who work in an occupational exposure environment and, as such, the annual effective dose limit for these workers is 1 mSv.

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection****Exposure controls:**

Engineering Controls: Use engineering controls at the source of airborne radioactive material. Controls include capture ventilation at the source to prevent escape into the air, and room ventilation rate increase.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled. Protective equipment (coveralls, gloves and a respirator with HEPA filters, or supplied-air) should be worn by personnel entering a vessel or working on contaminated process equipment to prevent skin contamination, ingestion or inhalation of any NORM contaminated residue.

Eye/Face Protection: Wear a face shield or safety goggles or other appropriate full-face protection (e.g. full-face respirator).

Skin Protection: Wear appropriate working clothes with long-sleeves and long-pants.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits/dose limits are exceeded then respiratory protection is required.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

Estimate doses to members of the public, and workers by conducting a radiation survey of the workplace/ worksite. The survey should be conducted by a person knowledgeable in radiation protection and should include evaluations of both gamma dose-rates and airborne radioactivity as required.

Other: Use good personal hygiene practices. If skin contact should occur, material should be washed away with a mild soap and water. Wash hands and other exposed areas thoroughly before eating, drinking, smoking or using toilet facilities. Do not smoke, drink or eat in areas where this product is stored or handled.

Section 9: Physical and Chemical Properties**Information on basic physical and chemical properties:**

Appearance:	Solid dust or gas
Odour:	Odourless
Odour threshold:	Not applicable
pH:	Not applicable
Melting point/freezing point:	Not applicable
Initial boiling point and boiling range:	Not applicable
Flash point:	Not applicable
Auto-ignition temperature:	Not applicable
Upper/lower flammability/explosive limits:	Not applicable
Explosive properties:	Not applicable
Oxidizing properties:	Not applicable
Sensitivity to mechanical impact:	Not applicable
Sensitivity to static discharge:	Not applicable
Evaporation rate:	Not available
Vapour pressure:	Not available
Vapour density:	Not available
Relative density:	Not available
Solubility:	Not applicable
Partition coefficient (n-octanol/water):	Not applicable
Critical temperature:	Not applicable
Critical pressure:	Not applicable
Decomposition temperature:	Not available
Viscosity:	Not applicable

SAFETY DATA SHEET**Section 10: Stability and Reactivity****Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable. Normal radioactive decay will occur.

Possibility of Hazardous Reactions:

Radioactive decay products.

Conditions to Avoid:

Not available

Incompatible Materials:

Not available

Hazardous Decomposition Products:

Radon gas

Section 11: Toxicological Information

Acute Toxicity Data: Acute toxicity data are not available for these materials.

Chronic Toxicity Data:

Over-exposures to NORM may induce cancer, cause genetic damage, tissue damage and/or developmental effects in the unborn child.

Sensitization:

Not available

Neurological Effects:

Not applicable

Genetic Effects:

Over-exposures to NORM may induce genetic damage.

Reproductive Effects:

Not available

Developmental Effects:

Over-exposures to NORM suspected of damaging the unborn child.

Target Organ Effects:

Lungs

Carcinogenicity:

Overexposure by inhalation to inhaled dusts containing radioactive uranium, thorium and radium may cause lung cancer.

Section 12: Ecological Information**Toxicity:**

Concentrated NORMs can cause adverse effects to aquatic and terrestrial environments.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not applicable

Mobility in soil:

Not applicable

Section 13: Disposal Considerations**Waste treatment methods:**

Dispose of material in accordance with applicable waste disposal and environmental regulations.

Empty containers retain product residue, adhere to warnings after container has been emptied.

SAFETY DATA SHEET**Section 14: Transport Information****Transport symbol:**

The transport of radioactive material, including NORM, with radioactivity below 70 Bq/g is not subject to federal transportation regulations. All NORM consignments must initially be analyzed for radioactive content to determine whether the material meets Unconditional Derived Release Limits, and if it does not, whether federal transport regulations apply.

NORM with activity above 70 Bq/g falls under federal jurisdiction and is therefore subject to the requirements of federal regulations, including the CNSC's Packaging and Transport Regulations (12) and the Transport of Dangerous Goods Regulations (13) for all dangerous goods shipments. The CNSC Packaging and Transport Regulations have been harmonized with the IAEA's Safety Series 6, Regulations for the Safe Transport of Radioactive Materials,

Refer to the Transportation of Dangerous Goods Regulations, the CNSC Packaging and Transportation Regulations and the IAEA Regulations for the Safe Transport of Radioactive Material for additional information on requirements for the transport of NORM.

Section 15: Regulatory Information**Safety, health and environmental regulations/legislation specific for the substance or mixture:****Canada**

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification:

Exempt from classification under WHMIS.

New Substance Notification Regulations: Naturally occurring substances.

Section 16: Other Information

Issue date: December 16, 2013

Revision summary: Previous version: January 3, 2011
Revised Sections: 16

References and sources for data:

Canadian Nuclear Safety Commission (CNSC)

The *Guidelines* are based on the most recent international standards recommended by the International Commission on Radiological Protection (ICRP) and CNSC regulations.

<http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/norm-mrn/index-eng.php>

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Ethane
Chemical names: Ethyl hydride

Product uses:

Saturated aliphatic hydrocarbon; compressed gas or refrigerated liquid. Petrochemicals (source of ethylene, halogenated ethanes), Refrigerant, Fuel.

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Emergency Overview:**

Danger!

Extremely flammable gas.

Contains refrigerated liquefied gas; may cause cryogenic burns or injury

Contains gas under pressure; may explode if heated.

Prevention:

Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Wear cold insulating gloves, face shield/eye protection.

Response:

Leaking gas fire: do not extinguish, unless leak can be stopped safely.
Eliminate all ignition sources of safe to do so.
Thaw frosty body parts with lukewarm water. Do not rub affected area.
Get immediate medical attention.

Storage:

Protect from sunlight. Store in a well ventilated place.

WHMIS:

Controlled product by WHMIS criteria.



- A – Compressed Gas
- B1 – Flammable Gas

Potential Health Effects**Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Contact with liquefied gas escaping from its cylinder may cause frostbite. The skin may become waxy white or yellow.

Eye contact: Contact with liquefied gas escaping from its cylinder may cause freezing of the eye. Permanent eye damage or blindness could result.

Ingestion: Not an applicable route of exposure.

Inhalation: Ethane in air is not expected to cause health effects below the lower explosive limit of 3% (30 000 ppm).

SAFETY DATA SHEET**Section 2: Hazards Identification, continued**

Inhalation: Ethane in air can cause central nervous system depression at concentrations of 13% or 130 000 ppm. Symptoms of central nervous system depression are headache, nausea, vomiting dizziness and possibly loss of consciousness,

Ethane in high concentrations in the air displaces oxygen and can cause symptoms of oxygen deprivation (asphyxiation). Ethane 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:

$O_2=12\text{--}16\%$ - breathing and pulse rate are increased, with slight loss of muscular coordination;

$O_2=10\text{--}14\%$ - emotional upsets, abnormal fatigue from exertion, disturbed respiration;

$O_2=6\text{--}10\%$ - nausea and vomiting, inability to move freely, collapse, possible loss of consciousness;

$O_2=\text{below } 6\%$ - 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. Survivors of oxygen deprivation may show damage to some or all organs including the central nervous system and the brain. These effects may or may not be reversible with time, depending on the degree and duration of the low oxygen and the amount of tissue injury.

Some closely related aliphatic hydrocarbons (propane, butane and isobutane) may be weak cardiac sensitizers in humans following inhalation exposures to high concentrations (greater than 5% for isobutane and greater than 10% for propane). Cardiac sensitizers may cause the sudden onset of an irregular heartbeat (arrhythmia) and, in some cases, sudden death. Sudden deaths have been reported in cases of substance abuse involving butane and propane. The asphyxiant effects of ethane may enhance cardiac sensitization.

Chronic Health Effects:

No human or animal information was located.

Medical Conditions Aggravated by Exposure:

None known

Interactions With Other Chemicals:

May be explosive in contact with oxygen, halogen gases and strong oxidizing agents. (Section 10)

Potential Environmental Effects:

Ethane is not expected to result in any ecological damage to water or land. Methane is regulated as a greenhouse gas in air.

Section 3: Composition/Information on Ingredients**Hazardous Substances:**

The chemical composition of Ethane will vary depending on the source.

<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>
Ethane	74-84-0	90-100
Carbon Dioxide	124-38-9	1 – 5 or 5 – 10*
Methane	74-82-8	0 – 1 or 1 – 2.5*
Propane	74-98-6	0 - 0.5*

Note: * These substances are impurities in the ethane product; the precise concentrations of the impurities will vary.

SAFETY DATA SHEET**Section 4: First Aid Measures****Description of first aid measures:**

Skin Contact: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water until the chemical is removed. DO NOT attempt to rewarm the affected area on site. DO NOT rub area or apply dry heat. Gently remove clothing or jewellery that may restrict circulation. Carefully cut around clothing that sticks to the skin and remove rest of the garment. DO NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Eye Contact: Quickly remove victim from source of contamination. Immediately and briefly flush with lukewarm, gently flowing water. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. Do NOT allow victim to drink alcohol or smoke. Quickly transport victim to an emergency care facility.

Inhalation: This material is extremely flammable. Take proper precautions (e.g. remove any sources of ignition, wear appropriate protective equipment). Remove source of contamination or move victim to fresh air. If breathing is difficult, oxygen may be beneficial if administered by trained personnel. If breathing has stopped, begin artificial respiration or, if the heart has stopped, give CPR immediately. Immediately transport victim to an emergency care facility.

Ingestion: Not an applicable route of exposure.

Most important symptoms and effects, both acute and delayed:

Skin Contact: Frostbite.

Eye Contact: Freezing of eye tissue.

Inhalation: Nausea, dizziness, drowsiness and confusion, unconsciousness.

Ingestion: Not applicable

Section 5: Fire Fighting Measures**Flammable properties:**

Extremely flammable gas, compressed gas or refrigerated liquefied gas.

Readily forms explosive mixtures with air, which are easily ignited by heat, sparks or flame. Liquefied gas accumulates static charge. Liquefied ethane can accumulate electrostatic charge by flow, friction in pipes, splashing or agitation.

Liquefied gas rapidly vapourizes under normal conditions. 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. The gas can accumulate in confined spaces and low areas, resulting in an explosion or toxicity hazard.

Extinguishing media:

Leaking gas fire: Do not extinguish unless leak can be stopped safely.

Dry chemical powder and high-expansion foam. Foam manufacturers should be consulted for recommendations regarding types of foams and application rates.

Unsuitable extinguishing media: Carbon dioxide, low expansion foams, and direct application of water on liquefied gas. Under certain conditions, discharge of carbon dioxide produces electrostatic charges that could create a spark and ignite flammable gas.

Special hazards arising from the substance or mixture:

Gas is heavier than air and travel over long distances creating a flash back hazard. Containers may rupture and explode if heated. Vapour and air mixtures are explosive. Material will readily ignite at normal temperatures. The gas can accumulate in confined spaces, resulting in explosion and asphyxiation hazards. Direct addition of water (or any other room temperature liquid) to the liquefied gas will cause flash vaporization resulting in an explosion (either immediately or delayed) known as a "boiling liquid, expanding vapour explosion." During a fire, toxic gases may be generated.

Cylinders exposed to heat and/or fire may vent and release flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket.

SAFETY DATA SHEET**Section 5: Fire Fighting Measures, continued****Advice for firefighters:**

Evacuate the area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous gas and toxic decomposition products. Stop flow of gas before attempting to extinguish fire. If flow cannot be stopped, let the fire burn while protecting the surrounding area. Cool exposed containers with water.

Fires involving tanks:

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Cool containers with flooding quantities of water until well after fire is out.

Do not direct water at source of leak or safety devices; icing may occur.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

Always stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

If a tank or rail car 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**Personal precautions, protective equipment and emergency procedures:**

For a large spill or gas release, contact Fire/ Emergency Services immediately.

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).

All equipment used when handling the product must be grounded.

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

If possible, turn leading containers so that gas escapes rather than liquid.

Use water spray to reduce vapours or divert vapour cloud drift. Avoid allowing water runoff to contact spilled material.

Do not direct water at spill or source of leak.

Prevent spreading of vapours through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed.

Caution: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

Environmental precautions:

Prevent releases to drains, sewers and natural waterways.

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.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

This material is an extremely flammable gas. Before handling, it is very important that engineering controls are operating and that protective equipment requirements are being followed. Eliminate all ignition sources (e.g., sparks, open flames, hot surfaces). Keep away from heat and welding operations. During transfer operations, cylinders and vessels should be electrically grounded and bonded to prevent the build up of a static charge. Post NO SMOKING signs. It is very important to keep areas where this material is used clear of other materials which can burn. If flammable gas is released in a confined space, immediately evacuate the area.

Compressed or liquefied gas cylinders, piping and fittings must be protected from damage during handling, filling, transportation and storage.

Ensure that compressed or liquefied gas cylinders are secured, preferably upright, and cannot fall or roll.

SAFETY DATA SHEET**Section 7: Handling and Storage, continued****Storage**

Storage temperature should not exceed 52°C (125°F).

Store in a cool, dry, well-ventilated area out of direct sunlight and away from all ignition and heat sources. Keep quantity stored as small as possible. Store away from incompatible materials, such as oxygen and strong oxidizing agents.

Storage of compressed gas cylinders must be in accordance with the appropriate provincial or regional Fire Code.

Section 8: Exposure Controls / Personal Protection**Exposure guidelines:**

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>Ontario TWAEV</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Aliphatic hydrocarbon gases Alkanes C ₁ - C ₄	1000 ppm	1000 ppm	1000 ppm
Carbon Dioxide	Refer to ACGIH TLV	5000 30 000 STEL Asphyxia	5 000 (9 000 mg/m ³)

Exposure controls:

Engineering Controls: Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. 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 and those handling liquefied gas, consider a closed handling system and the installation of leak and fire detection equipment and a suitable automatic fire suppression system.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear laboratory safety goggles or other appropriate eye protection. Wear a face shield when handling refrigerated liquefied gas.

Skin Protection: Wear thermal protective clothing when handling refrigerated/cryogenic liquids. Wear fire-resistant long-sleeved clothing and trousers worn outside boots or over top of shoes. Remove protective clothing immediately if it becomes wet with refrigerated liquefied gas. Wear appropriate foot protection when handling cylinders.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

Other: Workplaces should have a frostbite wash readily available in the work area. Any clothing which becomes wet with liquid or saturated with gas should be removed immediately.

SAFETY DATA SHEET**Section 9: Physical and Chemical Properties****Information on basic physical and chemical properties:**

Appearance:	Gas, colourless.
Odour:	Odourless, or faint odour of gasoline or sweet odour depending on impurities.
Odour threshold:	Not available
pH:	Not applicable
Melting point/freezing point:	-183°C (-297.4°F)
Initial boiling point and boiling range:	-88.1°C (-126.6°F)
Flash point:	-135°C (211°F)
Auto-ignition temperature:	472°C (882°F) for propane
Upper/lower flammability or explosive limits:	LEL: 2.9% UEL: 13%
Explosive properties:	Readily forms explosive vapour mixtures with air. Risk of vapour cloud explosion.
Oxidizing properties:	Not applicable
Sensitivity to mechanical impact:	Not applicable
Sensitivity to static discharge:	Sensitive; can readily form explosive mixtures with air, which are easily ignited by a static charge. Liquefied methane can accumulate electrostatic charge by flow, friction in pipes, splashing or agitation.
Evaporation rate:	3.85 (n-butyl acetate = 1)
Vapour pressure:	544 psi at 21°C
Vapour density:	1.04
Relative density:	0.45 at 0°C
Solubility:	Insoluble in cold water
Partition coefficient (n-octanol/water):	Log P(oct) = 1.81
Critical temperature:	32.4°C (90.3°F)
Critical pressure:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available
Percent volatile:	100%

Section 10: Stability and Reactivity**Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable. Releases of gas are extremely flammable and/or explosive in the presence of an ignition source.

Possibility of Hazardous Reactions:

Forms an explosive mixture with air. Direct addition of water, or any other room temperature liquid, to the liquefied gas will cause flash vaporization resulting in an explosion.
Hot containers may explode.

Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.
Avoid unintended contact with incompatible materials.

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 ethane gas is corrosive to acrylonitrile butadiene styrene (ABS), high density polyethylene (HDPE), polyvinyl chloride (PVC), polypropylene, polyamides, and polyurethane. Ethane gas is not corrosive to fluorinated plastics, ultra high molecular weight polyethylene, and polyacetals.

Hazardous Decomposition Products:

Not applicable

SAFETY DATA SHEET**Section 11: Toxicological Information**

Acute Toxicity Data: Acute toxicity data for Ethane are not available. The following data is for the component substances.

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Ethane	Not applicable	Not applicable	>140 000 ppm (14%) asphyxiant duration not reported

Chronic Toxicity Data:

No data available.

Sensitization:

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.

Neurological Effects:

At high concentrations, it 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%).
Propane in air can cause depression of the central nervous system (CNS) with symptoms such as headache, nausea, dizziness, drowsiness and confusion, based on animal information. It is expected to cause unconsciousness (narcosis) due to CNS depression at approximately 47000 ppm (4.7%).

Genetic Effects:

Not available

Reproductive Effects:

None reported.

Developmental Effects:

None reported.

Target Organ Effects:

Central nervous system.

Other Adverse Effects:

Ethane in high concentrations in the air displaces oxygen and can cause symptoms asphyxiation. Ethane concentration of greater than 14% (140 000 ppm) will displace oxygen to 18% in air and cause oxygen deprivation.

Carcinogenicity:

This product does not contain any component at a concentration of greater than 0.1% 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).

Other Adverse Effects:

Ethane in high concentrations in the air displaces oxygen and can cause symptoms asphyxiation. Ethane concentration of greater than 14% (140 000 ppm) will displace oxygen to 18% in air and cause oxygen deprivation.

SAFETY DATA SHEET**Section 12: Ecological Information****Toxicity:**

Ethane 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.

Persistence and degradability:

Not available

Bioaccumulative potential:

Not applicable

Mobility in soil:

Not applicable

Section 13: Disposal Considerations**Waste treatment methods:**

Dispose of material in accordance with applicable regulations. Empty containers retain product residue, adhere to warnings after container has been emptied.

Section 14: Transport Information**Transport symbol:****UN Number:**

UN1035

UN proper shipping name:

ETHANE

Transport hazard class(es):

2.1

Packing group:

Not applicable

Emergency response guide:

115

Transport symbol:**UN Number:**

UN1961

UN proper shipping name:

ETHANE, REFRIGERATED LIQUID

Transport hazard class(es):

2.1

Packing group:

Not applicable

Emergency response guide:

115

Section 15: Regulatory Information**Safety, health and environmental regulations/legislation specific for the substance or mixture:****USA**

Toxic Substances Control Act 8(b) Inventory: Substance listed on the TSCA inventory.

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

Canada

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification: A - Compressed gas
B1 - Flammable and combustible material - Flammable gas.

New Substance Notification Regulations: Substances listed on the Domestic Substances List (DSL).

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

Methane is regulated as a greenhouse gas.

SAFETY DATA SHEET**Section 16: Other Information**

Issue date: December 18, 2012

Revision summary: Previous version: April 19, 2010
Updated SDS template
Revised Sections 1, 2, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16

References and sources for data:

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine
Cheminfo – Canadian Centre for Occupational Health and Safety
RTECS – Registry of Toxic Effects of Chemical Substances

Manufacturer disclaimer

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Prepared by: LEHDER Environmental Services Limited (519) 336-4101

www.lehder.com

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SAFETY DATA SHEET**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****Product identifier:**

Used Motor Oil

Alternate Names:

Used Lubricating Oil
Used Engine Oil
Used Crank Case Oil
Used Machinery Oil

Chemical names:

Petroleum Hydrocarbon

Product uses:

An oil from industrial and non-industrial sources, which has been acquired for lubricating or other purposes and has become unsuitable for its original purpose due to the presence of impurities or the loss of original properties. The used oil is collected for re-refining (recycling).

Supplier of the Safety Data Sheet:

AltaGas Ltd.
1700, 355 4th Avenue SW
Calgary, AB
T2P 0J1

Emergency telephone number:

1-866-826-3830

Section 2: Hazards Identification**Emergency Overview:**

Used motor oil may contain contaminants which have adverse health and environmental effects. This product is expected to be combustible when heated. During a fire, irritating and/or toxic substances, such as sulfur, nitrogen and phosphorus oxides, reactive hydrocarbons and polycyclic aromatic hydrocarbons (PAHs) may be generated depending on fire conditions and the presence of additives or impurities. Used oils may contain carcinogenic polycyclic aromatic hydrocarbons.

WHMIS:

* WHMIS: Hazardous waste that is "intended for disposal" or is "sold for recycling or recovery" falls within the definition of hazardous waste and is thereby exempt from the WHMIS requirements of the Hazardous Products Act. While this product is not controlled under WHMIS, this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Potential Health Effects**Acute Health Effects:**

Relevant Route(s) of Exposure: Skin contact, Eye contact, Inhalation.

Skin contact: Prolonged or repeated contact may cause mild irritation, including redness, burning, temporary drying/cracking, and possibly dermatitis. Contact with hot material may cause thermal burns. It is possible for the oil to become injected under the skin when contained in a high pressure system; if this occurs, there can be considerable damage to the underlying tissues.

Eye contact: Contact may cause irritation, including burning, redness, and tearing. Contact with hot material may cause thermal burns.

Ingestion: Ingestion is not an expected route of occupational exposure. May cause irritation of the digestive tract, including cramping, diarrhea, nausea and vomiting. Aspiration into the lungs, by initial ingestion or vomiting, may cause pulmonary injury.

Inhalation: Not expected to cause adverse effects when the liquid is handled at normal temperatures (up to 38°C, 100°F). Exposure to oil mists or fumes from hot oil may be irritating to the respiratory tract, including nose and throat, and may cause difficulty breathing.

SAFETY DATA SHEET**Section 2: Hazards Identification, continued****Chronic Health Effects:**

Prolonged or repeated contact with skin may cause cracking, drying and chronic dermatitis. Prolonged and/or repeated contact with used motor oil has caused skin cancer in experimental animals; the relationship of these results to humans has not been fully established. Exposure to high levels of mist concentration may lead to chronic pulmonary conditions such as chronic bronchitis, pneumonia, and emphysema.

Medical Conditions Aggravated by Exposure:

Exposure to vapours and mists may aggravate existing respiratory disorders.

Interactions With Other Chemicals:

Incompatible with strong oxidizing agents.

Potential Environmental Effects:

Used motor oil is dangerous for the environment and may cause long-term adverse effects in the aquatic environment. This material presents environmental risks common to oil spills.

Section 3: Composition/Information on Ingredients**Hazardous Substances:**

This material is a complex mixture of paraffinic, naphthenic & aromatic petroleum hydrocarbons that may contain one or more of the following: carbon deposits, sludge, aromatic & non-aromatic solvents, water (as a water-in-oil emulsion), glycols, wear metals & metallic salts, silicon-based antifoaming compounds, and miscellaneous lube-oil additive materials.

The expected composition of used oils is summarized in the table below:

<u>Chemical Name</u>	<u>CAS No.</u>	<u>Wt.%</u>
Lubricating Oil	70514-12-4	60 - 100
Water	7732-18-5	Not available
Solids	Not applicable	Not available
Hydrocarbon solvents: May include gasoline, diesel fuel, jet fuel, mineral spirits and others.	Not applicable	Not available
Metals: May include lead, iron, zinc, copper, chromium, arsenic, nickel and others.	Not applicable	Not available
Polynuclear aromatic hydrocarbons: May include naphthalene, fluoranthrene, phenanthrene, pyrene and others.	Not applicable	Not available
Chlorinated solvents	Not applicable	Not available

Section 4: First Aid Measures**Description of first aid measures:**

Skin Contact: Avoid direct contact. Wear chemical protective clothing, if necessary. Remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Quickly and gently blot or brush away excess chemical. Wash gently and thoroughly with lukewarm, gently flowing water and non-abrasive soap for 5 minutes. If irritation persists, repeat flushing. Obtain medical advice. Completely decontaminate clothing, shoes and leather goods before re-use, or discard.

Eye Contact: Quickly and gently blot or brush chemical off the face. Immediately flush the contaminated eye with lukewarm, gently flowing water for 15 minutes while holding the eyelids open. Obtain medical advice.

Inhalation: If symptoms are experienced remove source of contamination or move victim to fresh air. Obtain medical advice.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Obtain medical attention immediately.

SAFETY DATA SHEET**Section 4: First Aid Measures, continued****Most important symptoms and effects, both acute and delayed:**

Skin Contact: Mild irritation. Thermal burns.

Eye Contact: Mild irritation. Thermal burns.

Inhalation: Fumes may cause irritation.

Ingestion: Nausea, vomiting.

Section 5: Fire Fighting Measures**Flammable properties:**

Product will burn when heated.

Extinguishing media:

Dry chemical powder and high-expansion foam. Foam suppliers should be consulted for recommendations regarding types of foams and application rates. Cover liquid spills with foam. Use water spray to cool fire-exposed containers.

Some oils have a low flash point; use of water spray when fighting fire may be ineffective to extinguish. Do not use a direct stream of water as it may spread the fire.

Special hazards arising from the substance or mixture:

Decomposition or combustion may generate irritating and very toxic fumes. Products of combustion may include carbon monoxide, carbon dioxide, phosgene, aldehydes, ketones, and oxides of metals, sulphur, nitrogen and phosphorus.

Advice for firefighters:

As for any fire, evacuate the area and fight the fire from a safe distance. Wear a pressure-demand, self-contained breathing apparatus and full protective gear. Fight fire from a protected location or a safe distance.

Section 6: Accidental Release Measures**Personal precautions, protective equipment and emergency procedures:**

Wear eye, skin and respiratory personal protective equipment as indicated in Section 8. Evacuate non-emergency personnel. Isolate the area and prevent access. Remove ignition sources. Notify management. Ventilate the area.

Environmental precautions:

Prevent releases to drains, sewers and natural waterways.

Methods and material for containment and cleaning up:

Stop leak if it can be done without risk. Use water spray to reduce vapours. Isolate area until harmful vapour has dispersed. Contain spill with clay, earth, sand, or absorbent material which does not react with spilled material. Do not use combustible material such as sawdust.

Do not touch spilled material. For small spills, soak up spill with absorbent material which does not react with spilled chemical. Large spills may be picked up using vacuum pumps, shovels, buckets, or other means. Put material in suitable, covered, labelled containers. Flush area with water. Contaminated absorbent material may pose the same hazards as the spilled product. Notify government occupational and environmental authorities.

Reference to other sections:

See Section 8 for information on selection of personal protective equipment.

Section 7: Handling and Storage**Handling:**

Keep away from heat, sparks and flames. Use with adequate ventilation. Avoid generating oil mists or aerosols. Wash all exposed skin thoroughly with detergent and water after handling, before eating, drinking, smoking or using the toilet. Remove contaminated clothing and wash before reuse. Discard saturated leather goods. Avoid contact with eyes and skin. Avoid breathing fumes and vapours.

Storage

Keep away from heat, sparks and flames. Keep containers closed. Store in a cool, well ventilated place away from incompatible materials. May be stored in steel tanks or drums.

SAFETY DATA SHEET**Section 8: Exposure Controls / Personal Protection****Exposure guidelines:**

Consult regional/local authorities for acceptable exposure limits.

<u>Ingredient</u>	<u>Ontario TWAEV</u>	<u>ACGIH TLV (8-hr. TWA)</u>	<u>U.S. OSHA PEL (8-hr. TWA)</u>
Used Motor Oil	Not established	Not established	Not established
Oil Mist, Mineral	5 10 STEV	5 (Inhalable)	5
Diesel Fuel	100	100	Not established
Gasoline	300 ppm 500 ppm STEV	300 ppm 500 ppm STEL	Not established

Exposure controls:

Engineering Controls: Provide ventilation sufficient to keep exposure to fumes, mists and vapours below the exposure limits listed above. Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions. Administrative controls and personal protective equipment may also be required. Use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems.

Personal Protection: Workers must comply with the Personal Protective Equipment requirements of the workplace in which this product is handled.

Eye/Face Protection: Wear chemical safety goggles.

Skin Protection: Wear chemical protective gloves, coveralls, boots, and/or other resistant protective clothing. Gloves should be made from Viton™, Nitrile, latex, neoprene.

Respiratory Protection: In workplaces where engineering controls and work practices are not effective in controlling exposure to this material, or where occupational exposure limits are exceeded then respiratory protection is required. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. Wear a positive pressure air supplied respirator for uncontrolled releases.

A respiratory protection program that meets Canadian Standards Association (CSA) Standard Z94.4-2002 must be followed whenever workplace conditions warrant a respirator's use.

Other: Have a safety shower and eyewash fountain readily available in the work area.

Do not smoke in work areas. Remove contaminated clothing promptly. Keep contaminated clothing in closed containers. Discard or launder before rewear. Inform laundry personnel of contaminant's hazards. Do not eat or drink in work areas. Wash hands thoroughly before eating, drinking, smoking or using the toilet.

SAFETY DATA SHEET**Section 9: Physical and Chemical Properties****Information on basic physical and chemical properties:**

Appearance:	Liquid. Dark brown to black viscous oil.
Odour:	Pronounced hydrocarbon odour.
Odour threshold:	Not available
pH:	Not applicable
Melting point/freezing point:	Not available
Initial boiling point and boiling range:	Not available
Flash point:	Not available
Auto-ignition temperature:	Not available
Upper/lower flammability or explosive limits:	Not available
Explosive properties:	Not available
Oxidizing properties:	Not applicable
Sensitivity to mechanical impact:	Not applicable
Sensitivity to static discharge:	Not available
Evaporation rate:	<1 (n-Butyl Acetate = 1)
Vapour pressure:	<0.1
Vapour density:	>1
Relative density:	0.8-1.0 @ 15°C (approximate)
Solubility:	Low water solubility
Partition coefficient (n-octanol/water):	Not available
Critical temperature:	Not available
Critical pressure:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available
Percent volatile:	Not available

Section 10: Stability and Reactivity**Reactivity:**

Not classified as dangerously reactive.

Chemical Stability:

Normally stable.

Possibility of Hazardous Reactions:

Not available.

Conditions to Avoid:

Avoid heat, flame, static discharge, sparks and other ignition sources.

Avoid unintended contact with incompatible materials.

Avoid formation of oil mist.

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

Hazardous Decomposition Products:

Carbon monoxide, carbon dioxide, aldehydes and ketones, Phosgene gas, oxides of sulphur, nitrogen and phosphorus may form as products of decomposition or combustion.

SAFETY DATA SHEET**Section 11: Toxicological Information**

Acute Toxicity Data: Acute toxicity data for Used Motor Oil are not available.

<u>Chemical</u>	<u>LD₅₀ Oral (mg/kg)</u>	<u>LD₅₀ Dermal (mg/kg)</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Motor oil	Not available	Not available	Not available

Chronic Toxicity Data:

No data available.

Sensitization:

No data available.

Neurological Effects:

Limited information from a report of health effects in mechanics and other auto workers suggests that headaches may be associated with occupational exposure to used motor oil. In addition, cattle that ingested used motor oil showed marked neurotoxicity, including blindness, muscle twitching, hyperirritability, depression, and convulsions which were attributed to lead toxicity. Muscle tremors and weakness were observed in another study; these effects may be associated with toxicity from metal contaminants.

Genetic Effects:

This product may contain contaminants which are known to cause Mutagenicity in bacterial tests.

Reproductive Effects:

This product may contain contaminants which are known to cause reproductive effects in animal studies.

Developmental Effects:

This product may contain contaminants which are known to cause developmental effects in animal studies.

Target Organ Effects:

Skin, eyes, lungs, digestive tract, central nervous system.

Other Adverse Effects:

Aspiration into the lungs, by initial ingestion or vomiting, may cause pulmonary injury.

Carcinogenicity:

Used lubricant oils have been associated with skin cancer. Long-term inhalation of high concentrations of oil mists may also be associated with lung cancer, but only with exposure conditions where skin cancer has also occurred.

This product may contain contaminants such as metals, polynuclear aromatic hydrocarbons and chlorinated solvents which are classified as known or possible human carcinogens 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).

Section 12: Ecological Information**Toxicity:**

Used motor oil is dangerous for the environment and may cause long-term adverse effects in the aquatic environment. This material presents environmental risks similar to oil spills.

Persistence and degradability:

Hydrocarbons from oil can move to the air or settle through water to bottom sediments, where they may persist for years.

Bioaccumulative potential:

Not available

Mobility in soil:

Used motor oils spilled on soil move downward by gravity through the soil and possibly to groundwater. Some metals and other harmful contaminant substances in used motor oil, will move through the soil easily and may contaminate surface water and groundwater.

SAFETY DATA SHEET**Section 13: Disposal Considerations****Waste treatment methods:**

Recycle or dispose of material in accordance with applicable regulations. Empty containers retain product residue, adhere to warnings after container has been emptied. Do NOT discard into any sewers, on the ground or into any body of water. Do NOT burn. Store material for disposal as indicated in Section 7 Handling and Storage.

Section 14: Transport Information

Canadian Transportation of Dangerous Goods (TDG): Not evaluated for transportation regulations.

May be regulated when shipped as a waste.

Marine Pollutants:

Not evaluated

Section 15: Regulatory Information**Safety, health and environmental regulations/legislation specific for the substance or mixture:****Canada**

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the SDS contains all the information required by the *Controlled Products Regulations*.

WHMIS Classification: Not controlled

By virtue of paragraph 12(e) of the Hazardous Products Act (HPA), hazardous waste is exempt from the WHMIS supplier labelling and MSDS requirements of the HPA. Controlled Products Regulations, 2(2) defines hazardous waste as "...a controlled product that is intended for disposal or is sold for recycling or recovery."

New Substance Notification Regulations: "Lubricating oils, refined used" is listed on Canada's Domestic Substances List (DSL).

National Pollutant Release Inventory: Not evaluated for NPRI reportable substances. Some contaminants may be listed.

Section 16: Other Information

Issue date: December 19, 2012

Revision summary: Previous version: January 7, 2010

Updated SDS template

Revised Sections 1, 2, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16

References and sources for data:

HSDB – Hazardous Substances Data Bank ; US National Library of Medicine

Cheminfo – Canadian Centre for Occupational Health and Safety

RTECS – Registry of Toxic Effects of Chemical Substances

Manufacturer disclaimer

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Prepared by: LEHDER Environmental Services Limited (519) 336-4101

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INITIAL NOTIFICATION REPORT

Caller Information

Date: _____ Time: _____ .am. pm.
Caller's Name: _____ Caller's Phone Number: _____

Location of Incident

Location of Incident:	Section	Township	Range	West	Meridian
_____	_____	_____	_____	_____	_____

Type of Incident

Sweet Gas Release	<input type="checkbox"/>	Liquid Spill	<input type="checkbox"/>	Explosion/Fire	<input type="checkbox"/>
Sour Gas Release	<input type="checkbox"/>	Vehicle Accident	<input type="checkbox"/>	Chemical Spill	<input type="checkbox"/>
Other (describe)	<input type="checkbox"/>	_____	_____	_____	_____

Victim Information

Has anyone been injured? Yes No Fatalities? Yes No

To which hospital were the victims taken? _____

Has anyone been evacuated? Yes No

If yes, how many people have been evacuated? _____

Where have they been evacuated to? _____

Weather Conditions

Clear Cloudy Fog Rain Snow Windy Temperature: _____ °C

Strong Wind Light Wind Gusts Steady Wind Estimated Wind Speed: _____ km/hr
Wind Direction: _____

Who Has Been Notified?

AltaGas 24-Hour Emergency Telephone #	<input type="checkbox"/>	Fish & Wildlife	_____	<input type="checkbox"/>
Alberta Energy Regulator (AER)	<input type="checkbox"/>	Health Authority	_____	<input type="checkbox"/>
Alberta Environment	<input type="checkbox"/>	Transportation Authority	_____	<input type="checkbox"/>
Alberta Emergency Management Agency	<input type="checkbox"/>	Local Police	_____	<input type="checkbox"/>
Emergency Management BC	<input type="checkbox"/>	Fire Department	_____	<input type="checkbox"/>
British Columbia Oil & Gas Commission	<input type="checkbox"/>	Ambulance	_____	<input type="checkbox"/>
British Columbia Ministry of Environment	<input type="checkbox"/>	Occupational Health & Safety	_____	<input type="checkbox"/>
Saskatchewan Ministry of the Economy (ECON)	<input type="checkbox"/>	Other	_____	<input type="checkbox"/>
Saskatchewan Environment	<input type="checkbox"/>	Other	_____	<input type="checkbox"/>
National Energy Board (NEB)	<input type="checkbox"/>	Other	_____	<input type="checkbox"/>
Environment Canada	<input type="checkbox"/>	Other	_____	<input type="checkbox"/>
Transportation Safety Board (TSB)	<input type="checkbox"/>	Other	_____	<input type="checkbox"/>
WCB	<input type="checkbox"/>	Other	_____	<input type="checkbox"/>

KEY RESPONDER ROLE LOG

Incident Name _____ Date _____

Role	Name	Contact No.
Corporate Emergency Operations Center (CEOCC) - Calgary		
Incident Commander (IC)		
Initial IC:		
Final IC:		
Media/Communications Coordinator:		
Public Safety Coordinator (PSC)*:		
Additional CEOCC Support Staff** (list Observers/Trainees on reverse):		
On-Site Command Post (OSCP)		
First Responder (1):		
First Responder (2):		
On-Scene Commander (OSC)		
Initial OSC:		
Final OSC:		
Roadblock Crew		
Location 1:		
Location 2:		
Location 3:		
Location 4:		
Gas Monitoring Crew		
Location 1:		
Location 2:		
Evacuation Crew		
Area 1:		
Area 2:		
Evacuation Center Coordinator		
Location 1:		
Location 2:		
Operations Supervisor/Foreman:		
Remedial Measures Advisor (LPGERC):		
[] REOC [] MECC [] ECC (List location, attendees & phone numbers for activated Centres on reverse)		

*May be the On-Scene Commander and may be located at the OSCP

**Additional EOC Roles may include:

- Engineering
- Internal Resource (Name)
- Telephoner/Contactor
- Legal Scribe
- Event Log
- Logistics/IT Support
- Executive Management (Title)
- Communications

INCIDENT LOG

AMBIENT AIR MONITORING LOG

Date: _____

THREAT REPORT

Date:	Time:	Site:							
Threat received by:									
1. <i>What did the caller say when making the threat (use the exact words if possible)?</i>									
2. <i>Did you notice anything else that might help the police identify the caller?</i>									
3. <i>Describe any background noises heard over the telephone.</i>									
Other information:									
4. Sex:	Male <input type="checkbox"/>	Female <input type="checkbox"/>							
5. Voice:	Loud <input type="checkbox"/>	Soft <input type="checkbox"/>	Accent <input type="checkbox"/>	Other _____					
6. Manner:	Nervous <input type="checkbox"/>	Calm <input type="checkbox"/>	Angry <input type="checkbox"/>	Vulgar <input type="checkbox"/>	Joking <input type="checkbox"/>				
7. <i>Did you recognize the caller's voice?</i>					Yes <input type="checkbox"/>	No <input type="checkbox"/>			
8. <i>Did the caller seem to be familiar with the site and company?</i>					Yes <input type="checkbox"/>	No <input type="checkbox"/>			
Questions to ask the caller if a bomb threat is received:									
2. <i>What time will the bomb explode?</i>									
3. <i>Where is the bomb?</i>									
4. <i>What does the bomb look like?</i>									
5. <i>Why did you place the bomb?</i>									
6. <i>Where are you calling from?</i>									
7. <i>What is your name?</i>									

PRELIMINARY MEDIA ANNOUNCEMENT

Date: _____	Time: _____ <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.
My Name Is: _____	
My Job Title Is: _____	
This is the information I can give you at this time:	
At approximately _____ <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. on _____ (date) there was a _____ (fire, explosion, spill, release of gas, etc.) involving the Suffield Pipeline approximately _____ kilometres <input type="checkbox"/> east <input type="checkbox"/> west <input type="checkbox"/> north <input type="checkbox"/> south of _____. This pipeline is owned by AltaGas of Calgary.	
At this time _____ people are being treated for injuries. The AltaGas <i>Media & Communications Coordinator</i> , through the police, can only release the names and condition of the injured.	
The facility <input type="checkbox"/> has been shut down <input type="checkbox"/> has not been shut down.	
Emergency response procedures have been activated and our first priority is to protect the public and the environment.	
The cause of the _____ (fire, explosion, spill, release of gas, etc.) is not yet known and no estimate of damage is available.	
Any further inquiries should be directed to the AltaGas <i>Media & Communications Coordinator</i> . Media releases will be issued whenever new information becomes available.	

ROADBLOCK LOG

Date	Time	Name of Driver	License Plate #	Province	Time Entered Hazard Area	Time Left Hazard Area	Resident of EPZ ?
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
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							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>
							Yes <input type="checkbox"/> No <input type="checkbox"/>

RESIDENT CONTACT LOG

Name	Date	Time	Successfully Contacted?	Reason For Contact	Contacted By
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		
			Yes <input type="checkbox"/> No <input type="checkbox"/>		

EVACUATION NOTIFICATION

Note: Evacuation is voluntary for Level 1 emergencies and required for Levels 2 and 3.

Hello Mr./Mrs./Ms. _____	
This is _____ of AltaGas calling to inform you that we have encountered problems at our Suffield Pipeline approximately _____ kilometres from _____. You are in no immediate danger, but as a safety precaution we are asking everyone to evacuate the area until we are able to correct the problem.	
Do you have any children now in school?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Do you require transportation or other assistance?	Yes <input type="checkbox"/> No <input type="checkbox"/>
If yes, then.....	
Please remain indoors and AltaGas will send someone to pick you up and transport you to a safe area.	
How many people will require transportation? _____	
AltaGas is establishing a reception centre at _____. You will be provided with meals and accommodations until the area is safe for return.	
If no, then.....	
AltaGas is establishing a reception centre at _____. Please check in at the reception centre and you will be provided with meals and accommodations if necessary.	
If you are evacuating the area on your own, please avoid _____ as this is the hazard area. We recommend you leave the area by the following route: _____	
If you are not going to the designated reception centre, do you have a telephone number where we can reach you to let you know when the emergency is over? _____	
Thank you very much for your cooperation and we do apologize for the inconvenience.	

SHELTER NOTIFICATION

Hello Mr./Mrs./Ms. _____		
This is _____ of AltaGas calling to inform you that we have encountered a problem at our Suffield Pipeline approximately _____ kilometres from _____. You are in no immediate danger, but as a safety precaution we are asking everyone to remain indoors until we are able to correct the problem.		
How many people are at your residence? _____		
Do you have any children now in school?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Is there anyone outside that you cannot contact easily?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Is there another telephone number where we can contact you? _____		
<i>For your safety, we recommend the following precautions.....</i>		
<ul style="list-style-type: none">§ Gather everyone in the residence and close the doors and windows.§ Shut down the furnace and exhaust fans (not possible in extremely cold weather).§ Plug any air intakes into your home.§ Extinguish all ignition sources (pilot lights on water heater, stove, etc.)§ Do not smoke or operate electrical appliances.§ Move to the upper floors of your home and stay away from windows.		
Do not leave your home or start a motor vehicle. A company representative or the police will contact you when the emergency is over. If you wish to contact us our telephone number is _____.		
Thank you very much for your cooperation and we do apologize for the inconvenience.		

RECEPTION CENTRE CHECK-IN SHEET

Name	Date	Arrival Time	Evacuation Centre	Number of People	Is Return Transportation Required?	Any Special Needs?	Date Resident Able To Return Home
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		
					Yes <input type="checkbox"/> No <input type="checkbox"/>		

EVACUATION EXPENSES COMPENSATION REQUEST

Resident's name:					Resident's Telephone Number:	
Date(s) Of Evacuation:					Resident's Address:	
EXPENSES						
Hotel/Motel	Transportation	Meals	Telephone	Other	TOTAL	Description of Expense
\$	\$	\$	\$	\$	\$	
\$	\$	\$	\$	\$	\$	
\$	\$	\$	\$	\$	\$	
\$	\$	\$	\$	\$	\$	
\$	\$	\$	\$	\$	\$	
\$	\$	\$	\$	\$	\$	
\$	\$	\$	\$	\$	\$	
\$	\$	\$	\$	\$	\$	
\$	\$	\$	\$	\$	\$	
\$	\$	\$	\$	\$	\$	
				TOTAL		

Note: Please attach receipts for expenses.

RESIDENT CONTACT INFORMATION

Thirteen (13) residences have been identified as either being within the Suffield EPZ or having to egress across the Suffield Pipeline. Additionally, portions of the Suffield Pipeline pass through the Canadian Forces Base (CFB) Suffield. Notification and evacuation of residents on CFB Suffield will be coordinated through Suffield Industry Range Control (SIRC). More detailed information on the residents follows at the end of this section (*confidential copies only*).

Residents

<resident information removed>

Schools

The following schools are attended by the residents listed above:

Name	Location	Phone
Schuler School	20 - 1 Ave W, Schuler, AB	403-839-3732
Eagle Butte High School	1150 Eagle Butte Rd, Dunmore, AB	403-528-1996
Rose Glen Colony School	SW 02-18-02 W4	403-878-3943

Trappers

The following trapper is a registered user of areas that overlap with the Suffield Pipeline EPZ:

<trapper information removed>

RECEPTION CENTRE

If an emergency occurs that poses a threat to the residents in the vicinity of the Suffield Pipeline it may be necessary to begin evacuating the residents to safety. Evacuation of the general public may be necessary if an emergency occurs in close proximity to residences or public facilities. The *Public Safety Coordinator* is responsible for organizing the notification and evacuation of residents in the PAZ. Evacuation of residents is on a voluntary basis – AltaGas personnel do not have authority to order residents to evacuate their homes. If a resident chooses not to evacuate, the police should be notified. Residents requiring temporary accommodations may be evacuated to the following hotels/motels in the area, dependent on the location of the emergency.

Reception Centres	Location	Telephone
Villager Motel	433 Martin Street, Burstall, SK	306-679-2044
Best Western	722 Redcliff Dr. SW, Medicine Hat, AB	403-527-3700
Travelodge Hotel	1100 Redcliff Dr. SW, Medicine Hat, AB	403-527-2275

AltaGas

Emergency Planning Zone

Suffield

County: Cypress County & Special Areas Board (Area No. 2)

(Sask) Deer Forks R.M.

Created: November 19, 2015

Revised: October 20, 2016

Comments: 4 points removed

EP2 Update: November 2015

Created By: Zee Solutions

Short ID: 105 January 2016

EP2 Update: November 2015

Legend

AltaGas - Sour

AltaGas - Sweet

AltaGas - Abandoned

AltaGas - Discontinued

AltaGas - Proposed

NEB Pipeline

Indicates NEB Regulated Pipeline

AltaGas Processing Plant

AltaGas Satellite

AltaGas Compressor

AltaGas Meter Station

Well Location

Gas

Abandoned Gas

Suspended Gas

Injection

Abandoned Injection

Abandoned

Oil

Abandoned Oil

Suspended Oil

ESDA Riser Site

Riser & Isolation Site

Burst Valve

Paved Road

Gravel Road/Trail

Winter Road

Railway

Airport

City/Town

First Nations

Park/National Area

Crown Land

Provincial/County Boundary

Main Access Route

Road Block

Dead End

Residence - Access Point

Residence - Unoccupied

Community Hall

Hospital

School

Church

Commercial Business

Other Public Facility

Post Office

Public Camp

Private Camp

Emergency Planning Zone (EPZ)

Gathering Pipeline EPZ Border

Gas Gathering Pipeline EPZ Border

Gas Injection Well EPZ Border

Gas Injection Well EPZ Border

Notes:

Closest Place: Bursall, Schuler & Hilda

Closest Town:

Closest Hamlet:

Closest Village:

Closest City: Medicine Hat

RCMP Detachment: Leader & Redcliff

EPZ Residence Locations:

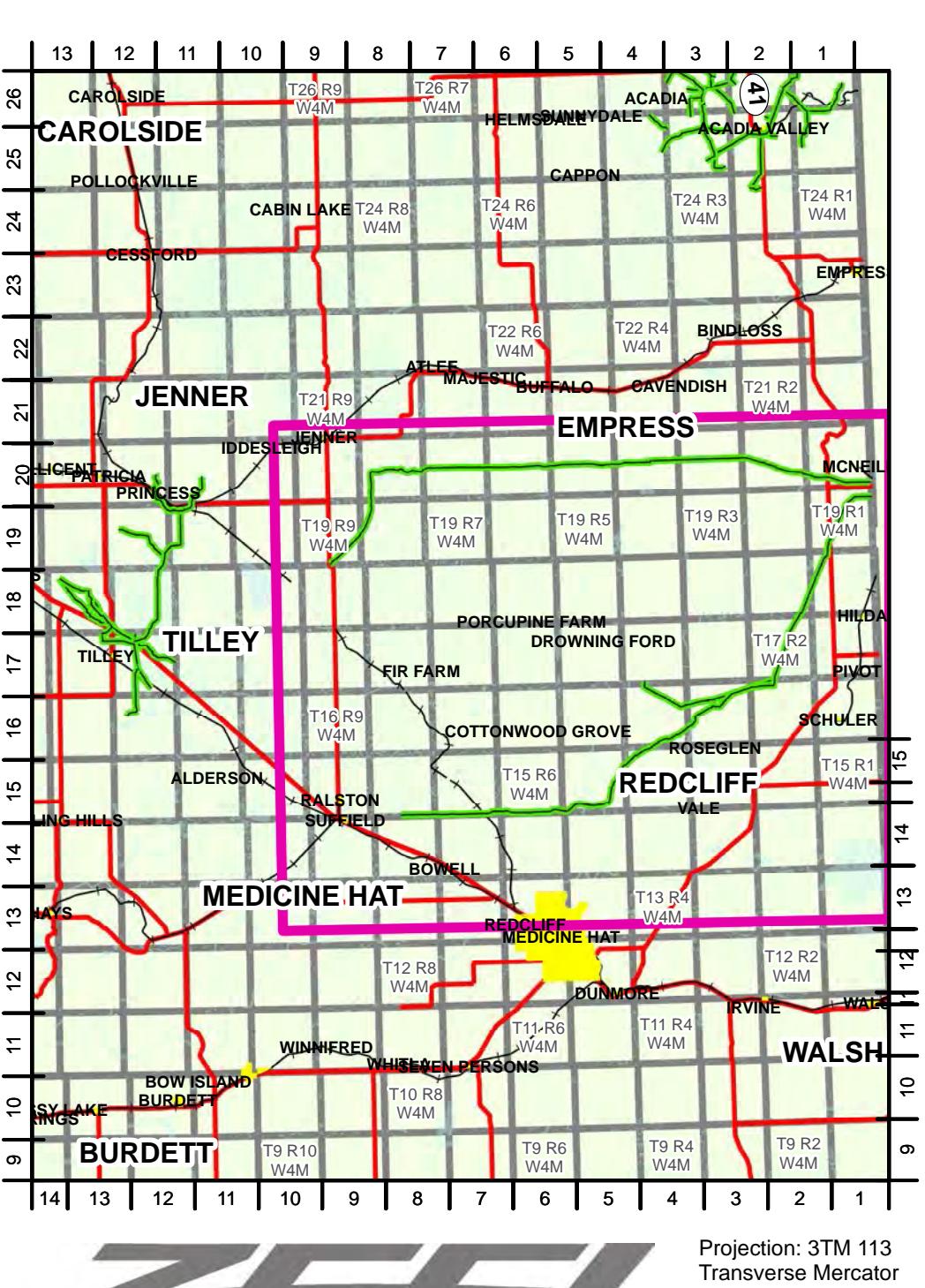
Map #	Location	Map #	Location
1	NE 01-16-05 W4	8	NE 09-18-02 W4
2	NW 03-16-04 W4	9	SE 14-18-02 W4
3	SE 24-16-04 W4	10	NW 13-18-02 W4
4	NW 22-17-02 W4	11	SE 30-18-01 W4
5	SE 02-18-02 W4	12	NE 30-19-01 W4
6	SW 02-18-02 W4	13	NE 35-19-01 W4
7	NE 09-18-02 W4		

Trappers:

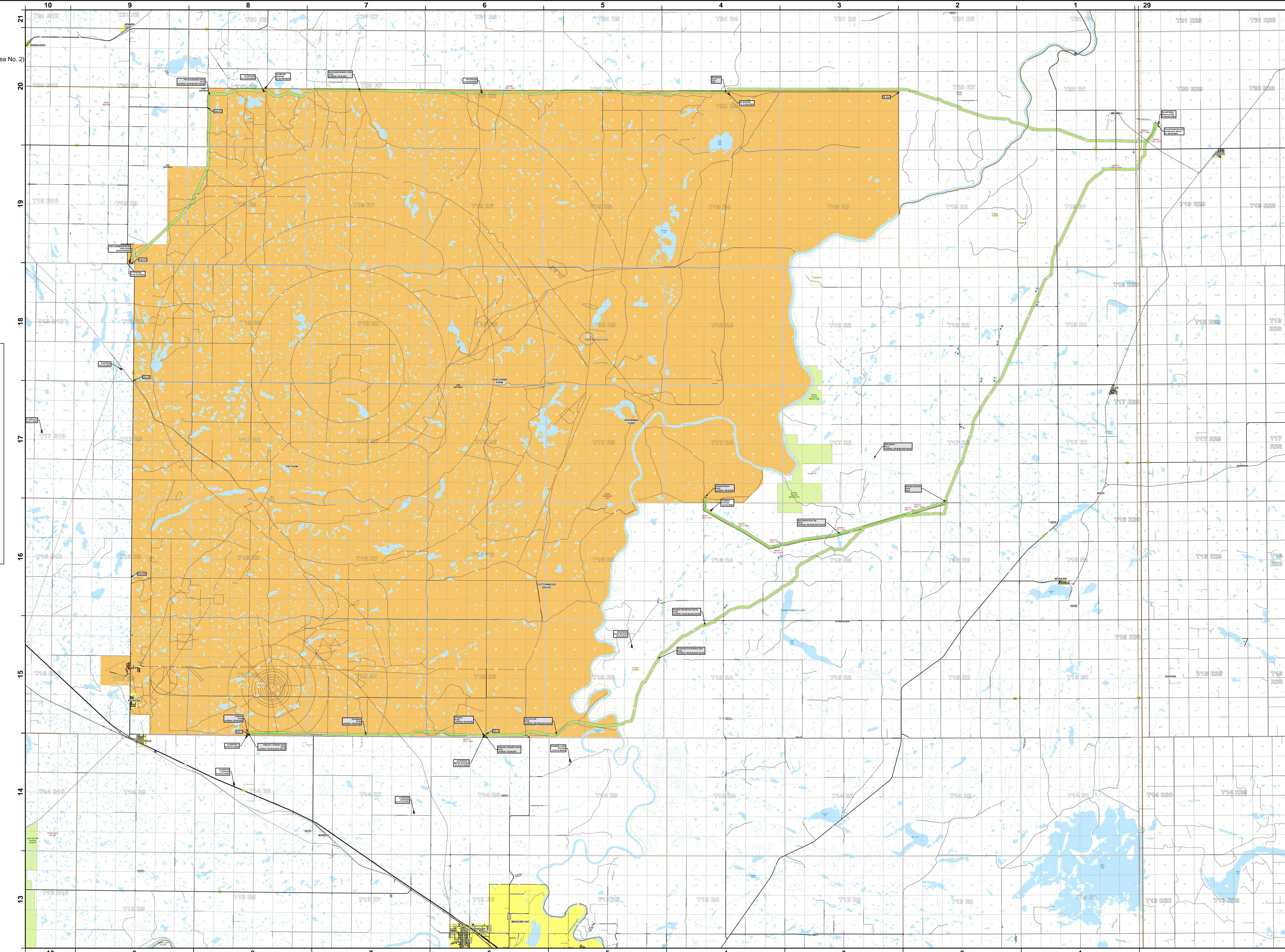
2897

See Quick Reference Pull-out and Section 7 for trapper contact information

10.50 1 2 3
Kilometers
1:80,000



Projection: STN 103
Transverse Mercator
False Easting: 0
False Northing: 0
Central Meridian: -113
Scale Factor: 0.9999



INITIAL RESPONSE

Key Responders – Log all actions as appropriate

- Step 1** The **First Responder** assesses the incident scene to determine the immediate impact.
Ensure personal protection by:
- Utilizing “buddy” system and/or following “Work Alone” protocol
 - Approaching with extreme caution from upwind direction
 - Having all necessary PPE (Gas detection, SCBA, FRC etc.)
- § For incoming calls, record information on the Initial Notification Report or Threat Report
The **First Responder** becomes the **On-Scene Commander** until or unless relieved by a more senior Company representative.
- Step 2** The **On-Scene Commander** assesses the emergency to determine the immediate and potential actions required. First response actions may include:
- § Establishing the Initial Isolation Zone (IIZ) and ensuring the safety of all personnel within
 - § Securing the incident scene
 - § Contacting and sheltering/evacuating residents if immediate danger exists
 - § Determining the initial Level of Emergency
 - § Establishing a field On-Site Command Post (OSCP) at or near the emergency site
- Step 3** The **On-Scene Commander** immediately contacts an **Incident Commander** (see list of potential *Incident Commanders* on the next page).
The **Incident Commander** assumes overall command of the incident.
- Step 4** The **Incident Commander** and **On-Scene Commander** affirm the Level of Emergency and develop and implement an action plan for responding to the emergency.
- § Review the Emergency Planning Zone (EPZ), if applicable, and establish the Protective Action Zone (PAZ) – Downwind Danger Area
 - § Begin public safety response actions, as appropriate, which may include:
 - Establishing perimeter roadblocks
 - Notifying sensitive residents (those classified at Emergency Evacuation Priority Level 1)
 - Evacuating/Sheltering residents
 - Igniting gas release
 - § Delineate the PAZ on an on-going basis through air monitoring
 - § Identify and contact all internal and external personnel (including Emergency Services) needed to respond to the emergency
- Step 5** The **Incident Commander** is responsible for establishing the Corporate Emergency Operations Centre (CEOCC) and assembling the appropriate corporate support staff including senior management.
The **Incident Commander** is also responsible for notifying regulatory agencies, including:
- § Regional Health Authority / Local Hospital
 - § Oil & Gas Regulatory Authority (AER/OGC/ECON/NEB)
 - § Environment Regulatory Authority (AEP/EMBC/SENV)
 - § Occupational Health & Safety Authority (AOHS/BCWCB/SOHS)
 - § Provincial Emergency Management Agency (AEMA/EMBC/SEM)
- Should the incident warrant, the **Incident Commander** is also responsible for establishing a Regional Emergency Operations Centre (REOC) – usually at the nearest urban centre.
- Step 6** The **Incident Commander**, in consultation with the **On-Scene Commander** and appropriate regulatory agencies, determines when the emergency response is to be terminated and notifies company, regulatory and emergency services personnel.

**For a comprehensive list of potential emergency response actions refer to the
Emergency Response Checklist
at the end of this section.**

EMERGENCY CONTACTS

Name	Position	Telephone Business	Telephone Residence	Telephone Cellular
Initial Emergency Call-out shall be to Suffield Industry Range Control (SIRC)				
24 Hour Number: <# removed>				
<i>Please note this is the AltaGas Suffield Pipeline operated by Cenovus Operations</i>				
CENOVUS Personnel (Responders and Potential On-Scene Commanders)				
<name removed>	Production Coordinator	<# removed>	n/a	<# removed>
<name removed>	Lead Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
<name removed>	Operator	n/a	n/a	<# removed>
ERP On-Call (ask for: 'Suffield Oil & Gas Team'): 1-877-458-8080				
ALTAGAS - Potential Incident Commanders or Technical Advisors				
<name removed>	Director Operations, Gas	<# removed>	n/a	<# removed>
<name removed>	Operations Manager	<# removed>	n/a	<# removed>
<name removed>	Operations Manager	<# removed>	n/a	<# removed>
<name removed>	Operations Manager	<# removed>	n/a	<# removed>
<name removed>	Div VP Operations - Gas	<# removed>	n/a	<# removed>
<name removed>	Operations Manager (Suffield)	<# removed>	<# removed>	<# removed>
ALTAGAS - Potential Technical Advisors				
<name removed>	Operations Supervisor (Suffield)	<# removed>	n/a	<# removed>
<name removed>	Senior Operations Engineer	<# removed>	n/a	<# removed>
<name removed>	Operations Engineer	<# removed>	<# removed>	<# removed>
ALTAGAS - Media / Communications Personnel				
<name removed>	VP, Stakeholder Relations	<# removed>	n/a	<# removed>
<name removed>	Senior Advisor, External Comm.	<# removed>	n/a	<# removed>
<name removed>	Senior Advisor, External Comm.	<# removed>	n/a	<# removed>
ALTAGAS - Other Potential Resources				
<name removed>	Supervisor Construction	<# removed>	<# removed>	<# removed>
<name removed>	VP EHS, Security & Sust., Comp.	<# removed>	n/a	<# removed>
<name removed>	Process Safety Manager, EHS	<# removed>	n/a	<# removed>
<name removed>	Executive Vice President	<# removed>	n/a	<# removed>
ALTAGAS 24 Hour Emergency: 1-866-826-3830				
PROVINCIAL TIME ZONE CHANGES				
Alberta Saskatchewan	Summer (Mar – Nov) DST		Winter (Nov-Mar)	
	Base	12 Noon	Base	12 Noon
	Same	12 Noon	1 Hr Later	1 PM

Emergency Service	Telephone
Energy Regulator - Incident Reporting National Energy Board (NEB)	819-997-7887
TransCanada - Burstall Compressor Station	<# removed>
Cypress County Emergency Services Dispatch	403-529-8285
Spill/Release Alberta Spill Reporting Western Canada Spill Services (AB) Saskatchewan Spill Reporting Fisheries & Oceans Canada – Marine Spill Response (AB & SK)	1-800-222-6514 1-866-541-8888 1-800-667-7525 1-800-889-8852
Fire Medicine Hat Fire Dept. Alberta Wildfire Reporting Saskatchewan Wildfire Reporting Firefighters – Oilfield Specialists: HSE Integrated Firemaster Oilfield Services	403-529-8282 1-800-310-3473 1-800-667-9660 1-888-346-8260 403-342-7500
Ambulance STARS Air Ambulance	911 1-888-888-4567
RCMP Leader RCMP (SK) Redcliff RCMP (AB)	911 306-628-4600 403-548-2222
Local Government Cypress County, AB Special Area No. 2, AB Rural Municipality of Deer Forks, SK	403-526-2888 403-779-3733 306-679-2000
Health Authority Alberta Health Services (<i>ask for Public Health Inspector on call</i>) Saskatchewan Cypress Health Region	403-502-8300 306-778-5100
Hospitals Medicine Hat Regional Hospital, AB	403-529-8000
Occupational Health & Safety - Incident Reporting Alberta OHS Saskatchewan OHS	1-866-415-8690 1-800-567-7233
Workers' Compensation Board - Injury Reporting Alberta WCB Saskatchewan WCB	1-866-922-9221 1-800-787-9288
TDG Emergency Transport Canada - CANUTEC Alberta Transportation Saskatchewan Highways & Infrastructure - Southern Region	613-996-6666 1-800-272-9600 306-787-4969

RESIDENT CONTACT INFORMATION

Thirteen (13) residences have been identified as either being within the Suffield EPZ or having to egress across the Suffield Pipeline. Additionally, portions of the Suffield Pipeline pass through the Canadian Forces Base (CFB) Suffield. Notification and evacuation of residents on CFB Suffield will be coordinated through Suffield Industry Range Control (SIRC). More detailed information on the residents can be found in Section 7 (*confidential copies only*).

Residents

<resident information removed>

Schools

The following schools are attended by the residents listed above:

Name	Location	Phone
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Eagle Butte High School	1150 Eagle Butte Rd, Dunmore, AB	403-528-1996
Rose Glen Colony School	SW 02-18-02 W4	403-878-3943

Trappers

The following trapper is a registered user of areas that overlap with the Suffield Pipeline EPZ:

<trapper information removed>

AltaGas EMERGENCY RESPONSE CHECKLIST		IGNITION PROCEDURES	LEVEL 1 EMERGENCY:	EMERGENCY RESPONSE SIDE 1
Rev. 14		<p>ON-SCENE COMMANDER (OSC) (Senior On-Site AltaGas Representative)</p> <p>Coordinates all On-Site response actions from the On-Site Command Post (OSCP)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Log actions & responses. <input type="checkbox"/> Assume First Responder role or designate as appropriate <ul style="list-style-type: none"> - Ensure First Responder personal safety (conduct hazard assessment) - Proper PPE: SCBA / Gas Monitor / FRC etc. - Work Alone protocol and/or "buddy" system (communication) <p><input type="checkbox"/> Dispatch First Responder to assess incident scene.</p> <ul style="list-style-type: none"> - Establish Initial Isolation Zone (IIZ) and ensure safety of all personnel within. - Attend to medical requirements. <p><input type="checkbox"/> Establish location of On-Site Command Post (OSCP) (i.e. facility office, operator's truck, trailer). Restrict access to essential personnel if necessary.</p> <p><input type="checkbox"/> Coordinate on-site response actions to immediately gain control of the emergency. Shut down/isolate release source, contain fluids & prevent entry into water course.</p> <p><input type="checkbox"/> Contact a senior company representative to assume the Incident Commander role.</p> <p><input type="checkbox"/> Discuss response actions with the Incident Commander.</p> <p><input type="checkbox"/> Determine "Level of Emergency." Re-assess with the Incident Commander.</p> <p><input type="checkbox"/> Obtain and/or request response personnel, equipment and other emergency services (RCMP, ambulance, fire department, etc.) as needed from the Incident Commander.</p> <p><input type="checkbox"/> Assemble and dispatch a Gas Monitoring Crew to delineate the Protective Action Zone (PAZ) – downwind danger area.</p> <p><input type="checkbox"/> Request/Procure a Mobile Air Monitoring Unit (Level 1 Sour Gas Release)</p> <p><input type="checkbox"/> Consult with Incident Commander on public safety actions (sheltering, evacuation, ignition, etc.). If ignition criteria has been achieved, proceed with ignition if deemed to be the best public safety action. See Ignition Procedure.</p> <p><input type="checkbox"/> Assume role of Public Safety Coordinator, if required (see PSC, side 2).</p> <p><input type="checkbox"/> Assemble and dispatch Roadblock Crew(s) to isolate PAZ/EPZ.</p> <p><input type="checkbox"/> Assess the impact of a hydrocarbon or chemical spill and consult with the Incident Commander.</p> <p><input type="checkbox"/> If applicable, designate an individual to establish a "staging area" at a location removed from the OSCP to receive and direct contract equipment and personnel (will require radio contact with OSCP).</p> <p><input type="checkbox"/> If required, assist with the deployment of a helicopter (equipped with a siren and loud-hailer) to assess the Emergency Planning Zone (EPZ) to: <ul style="list-style-type: none"> - survey the hazards/damages - identify magnitude of the spill - identify residents/transients/recreational users in the EPZ </p> <p><input type="checkbox"/> Place on standby/assemble well control company and/or equipment</p> <p><input type="checkbox"/> Liaise with government on-site representatives as they arrive.</p> <p><input type="checkbox"/> Request a fire hazard closure order from the Incident Commander if area isolation is required.</p> <p><input type="checkbox"/> Debrief all personnel once emergency is over.</p>	<p>INCIDENT COMMANDER (IC) (Senior Corporate AltaGas Representative)</p> <p>Manages overall aspects of the Emergency Response Process from the Corporate Emergency Operations Centre (CEOCC)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Log actions & responses. <input type="checkbox"/> Establish the Corporate Emergency Operations Center (CEOCC) if required. <input type="checkbox"/> Apprise Reception to direct incoming emergency calls to the CEOCC. <input type="checkbox"/> Acknowledge appointment by On-Scene Commander and provide response personnel and equipment as required. <input type="checkbox"/> In conjunction with the On-Scene Commander, declare the "Level of Emergency." <input type="checkbox"/> Notify the appropriate Oil & Gas regulatory authority. <input type="checkbox"/> Define the Protective Action Zone (PAZ) from data supplied from Gas Monitoring Crew. <input type="checkbox"/> Appoint Public Safety Coordinator, if needed (see PSC, side 2). <input type="checkbox"/> Contact Police and Local Authority. <input type="checkbox"/> Activate Media & Communications Coordinator at Corporate Head Office. <input type="checkbox"/> In consultation with the On-Scene Commander proceed with the following public safety actions: <ul style="list-style-type: none"> - "SHELTER" residents/businesses inside the EPZ/PAZ until H₂S / LEL levels indicate the area is safe. - "EVACUATION" of residents/business inside the EPZ/PAZ if H₂S/LEL levels indicate it is safe to proceed. - "IGNITION" of source if ignition criteria has been met. Refer to Ignition Procedure on this Checklist or in Section 3. <input type="checkbox"/> Contact additional Corporate Officers as appropriate and report situation. Request assistance as required (e.g.: Media / Legal / Executive Management). <input type="checkbox"/> Ensure appropriate govt agencies are notified and continue to liaise with them. <input type="checkbox"/> For a major H/C liquids emergency (Level 3), consider notifying/activating the LPGERC (see EERP – green tab). <input type="checkbox"/> If necessary, establish a Regional Emergency Operations Centre (REOC) and request assembly of appropriate personnel. <input type="checkbox"/> Obtain additional response personnel and equipment to assist the OSC and all other responders. <input type="checkbox"/> Assist the OSC with the procurement of a fire hazard order from Regulatory Authorities. <input type="checkbox"/> Prepare an initial statement for press/media release to the local level (see Preliminary Media Announcement in Section 6). Issue any needed statements carefully, making no reference to deceased victims until next-of-kin have been notified. Refer all subsequent media inquiries to Media & Communications Coordinator. <input type="checkbox"/> Notify contractor's head office(s) to apprise them of the situation regarding contract personnel. <input type="checkbox"/> Consult with government agencies that participated in the response before downgrading activities. 	
<p>GAS MONITORING CREW</p> <p>Conduct gas monitoring to determine release concentrations under the direction of the On-Scene Commander</p> <p>Locating the Emergency Hazard Area for a Gas Release:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Gas Monitoring Crew (c/w SCBA/gas detection and communication equipment) locate downwind at nearest un-evacuated residence. <input type="checkbox"/> Gas Monitoring Crews to record H₂S/LEL readings on form (Section 6) and relay to On-Scene Commander or Incident Commander. <input type="checkbox"/> Gas Monitoring Crews to advance toward or retreat from the release as determined by the readings obtained. Crews should always maintain their own safety. <p>The Protective Action Zone (PAZ) is:</p> <ul style="list-style-type: none"> <input type="checkbox"/> The initial calculated downwind geographical area at highest risk. <p>Delineating the Protective Action Zone:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Expand or retract the PAZ based on air quality monitoring or other pertinent data. 	<p>GOVERNMENT AGENCIES</p> <p>Oil & Gas Regulatory Authorities:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Oil & Gas Commission (OGC) – British Columbia <input type="checkbox"/> Alberta Energy Regulator (AER) – Alberta <input type="checkbox"/> Saskatchewan Energy & Resources (SER) – Saskatchewan <input type="checkbox"/> National Energy Board (NEB) – Federal and Northwest Territories <p>Royal Canadian Mounted Police (RCMP)/Local Police</p> <p>Provincial Public Safety Organization:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Alberta Emergency Management Agency (AEMA) <input type="checkbox"/> Emergency Management BC (EMBC) <input type="checkbox"/> Saskatchewan Emergency Management Organization (SaskEMO) <input type="checkbox"/> Emergency Measures Organization (EMO) – Northwest Territories <ul style="list-style-type: none"> <input type="checkbox"/> Local Government - Disaster Services <input type="checkbox"/> Workplace Health & Safety (WH&S) <input type="checkbox"/> Workers' Compensation Board (WCB) <input type="checkbox"/> Transportation Department <input type="checkbox"/> Provincial Environmental Agency <input type="checkbox"/> Provincial Fish & Wildlife Agency <p>See Emergency Contacts (Section 2) for telephone numbers</p>	<p>LEVEL 1 EMERGENCY:</p> <ul style="list-style-type: none"> <input type="checkbox"/> No immediate hazard to the public or environment exists but the situation has the potential to escalate to a Level 2 emergency. <input type="checkbox"/> Situation can be controlled by AltaGas. <p>Examples:</p> <ul style="list-style-type: none"> ▪ Situations in which an odour or leak has been detected. ▪ Small contained fire or explosion has occurred. ▪ Indication of product release. ▪ Security breach. ▪ External threat (bomb). ▪ Spill confined to lease / Limited quantity. <p>Actions:</p> <ul style="list-style-type: none"> ▪ Internal response to eliminate or control the emergency. ▪ Activation of ERP ▪ Standby notification to CEOC Team. ▪ External reporting requirements. ▪ Standby notification to sensitive public. 		
<p>MEDIA & COMMUNICATIONS COORDINATOR</p> <p>Facilitate communication between AltaGas, the media and the general public</p> <ul style="list-style-type: none"> <input type="checkbox"/> Dispatch company representative to the Government Emergency Coordination Centre (ECC), if activated. <input type="checkbox"/> Coordinate all statements with ECC representative and Incident Commander. <input type="checkbox"/> Gather detailed, factual information as quickly as possible. <input type="checkbox"/> Provide the following information to the media and any interested members of the general public: <ul style="list-style-type: none"> -type and status of emergency -location of incident -areas affected by the incident -description of products involved -contacts for additional information -actions being taken, including anticipated time required <input type="checkbox"/> Provide regular updates. <input type="checkbox"/> Keep media/public commitments. <input type="checkbox"/> Direct Corporate Communications Team to assist Incident Commander, as required. <p>Only the Media & Communications Coordinator, or his designate, may make statements to the media.</p>	<p>CORPORATE COMMUNICATIONS TEAM</p> <p>Assist the Media & Communications Coordinator.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Log response actions (essential to keep accurate records and continuously track order of responses). <input type="checkbox"/> Contact additional staff/equipment/services as required. <input type="checkbox"/> Contact mutual assistant groups as appropriate. <input type="checkbox"/> Notify and confer with appropriate government agencies. <input type="checkbox"/> Update weather reports if situation warrants. <input type="checkbox"/> Continuously report all notification statuses to Media & Communications Coordinator. 	<p>LEVEL 2 EMERGENCY:</p> <ul style="list-style-type: none"> <input type="checkbox"/> A Level 1 Emergency which has escalated to become a potential or limited hazard to the public or environment. <input type="checkbox"/> Local/Regional media interest. <input type="checkbox"/> Situation may be controlled by AltaGas, but could require external assistance. <p>Examples:</p> <ul style="list-style-type: none"> ▪ Confirmed release of gas/liquids with imminent control probable. ▪ Fire/explosion which remains out of control. ▪ External security breach or confirmed bomb threat. ▪ Substantial spill (probably off lease). <p>Actions - Level 1, Plus:</p> <ul style="list-style-type: none"> ▪ Public safety action as appropriate – Shelter/Evacuation/Ignition/Roadblocks (Evacuation Criteria >10 PPM of H₂S for 3 minutes). ▪ Activation of initial CEOC Team and assembly at CEOC. ▪ Activation of external resources as appropriate. 		
<p>LEVEL 3 EMERGENCY:</p> <ul style="list-style-type: none"> <input type="checkbox"/> A Level 2 Emergency which has escalated in scope and is an immediate or major hazard to the public or environment. <input type="checkbox"/> Significant media interest. <input type="checkbox"/> Situation is uncontrolled and will require external assistance to bring under control. <p>Examples:</p> <ul style="list-style-type: none"> ▪ Uncontrolled release from any source resulting in prolonged concentrations of H₂S/SO₂/LEL which exceed evacuation criteria. ▪ Ignition procedures implemented. ▪ Uncontrolled release from any source which may result in an environmental disaster (spill enters a water course). ▪ Ongoing breach or security or bomb threat. <p>Actions - Level 2, Plus:</p> <ul style="list-style-type: none"> ▪ Escalated response actions utilizing appropriate external resources. ▪ Enhanced CEOC Team membership. 	<p>LEVEL 3 EMERGENCY:</p> <ul style="list-style-type: none"> <input type="checkbox"/> A Level 2 Emergency which has escalated in scope and is an immediate or major hazard to the public or environment. <input type="checkbox"/> Significant media interest. <input type="checkbox"/> Situation is uncontrolled and will require external assistance to bring under control. <p>Examples:</p> <ul style="list-style-type: none"> ▪ Uncontrolled release from any source resulting in prolonged concentrations of H₂S/SO₂/LEL which exceed evacuation criteria. ▪ Ignition procedures implemented. ▪ Uncontrolled release from any source which may result in an environmental disaster (spill enters a water course). ▪ Ongoing breach or security or bomb threat. <p>Actions - Level 2, Plus:</p> <ul style="list-style-type: none"> ▪ Escalated response actions utilizing appropriate external resources. ▪ Enhanced CEOC Team membership. 	<p>ON-SCENE COMMANDER INCIDENT COMMANDER MEDIA & COMM. COORDINATOR GAS MONITORING CREW</p> <p>LEVELS OF EMERGENCY IGNITION PROCEDURES GOVERNMENT AGENCIES CORPORATE COMM. TEAM</p>		

EMERGENCY RESPONSE CHECKLIST

PUBLIC SAFETY COORDINATOR (PSC)

Coordinates all aspects of the Shelter/Evacuation process using available resources to protect Public Safety

- Assist Incident Commander and On-Scene Commander with organizing Roadblock Crews, Telephone Crews And Evacuation Crews.
- Establish a prioritized resident list beginning with residences/businesses located downwind close to the emergency site.
- Organize **Telephone Crew** to contact area users with the applicable public safety message (no more than 7 residents per Telephoner).
- Assemble and dispatch **Evacuation Crew(s)** to assist residents/businesses requiring assistance with evacuation.
- In consultation with the Incident Commander, direct Evacuation Crews/Telephoners to proceed with one of the following safety actions:
 - "**SHELTER**" residents/businesses inside/outside the EPZ/PAZ until H₂S/LEL levels indicate the area is safe.
 - "**EVACUATION**" of residents/businesses inside/outside the EPZ/PAZ if H₂S/LEL levels indicate area is not safe.
- Appoint & direct **Evacuation Centre Coordinator** to establish the Reception Centre.
- Maintain record of the public's status, both inside and outside the EPZ and communicate status to the On-Scene or Incident Commander.
- Liaise with the government officials if called upon to assist with public safety actions.
- If helicopter is dispatched to assist with public safety actions, establish air-to-ground communication link.

SHELTER/EVACUATION PROCEDURES

Alternatives for the protection of public safety should be considered on a site-specific basis, taking into account all pertinent factors

SHELTER-IN-PLACE:

Criteria for implementation:

- Not enough time to safely evacuate residents/businesses from the area.
- The product release will be of short duration (i.e. several minutes to half an hour).
- Release of limited duration or the location of release has not been identified.
- Waiting for evacuation assistance.
- Residences/businesses would be at higher risk if they were asked to evacuate.

Implementation by Public Safety Coordinator:

- Determine from maps which residents must be sheltered based on initial data from on-site responders.
- Assign personnel to contact residents by phone with emphasis on those downwind from the incident.
- Maintain record of all residents asked to take shelter using the Resident Contact Log in Section 6.

EVACUATION:

Criteria for Implementation:

- H₂S concentrations below 10 ppm (1 hour average):
 - "Sensitive" individuals should consider leaving the area.
 - All other individuals should consider leaving the area if health symptoms develop.
- If H₂S concentrations exceed 10 ppm (3 minute average), evacuation should be implemented immediately.
- If H₂S concentrations exceed 1 ppm (1 hour average) in an urban centre, evacuation should be implemented immediately.

Implementation by Public Safety Coordinator:

- Determine appropriate Reception Centre and direct Evacuation Centre Coordinator there.
- Determine from maps which residents must be evacuated.
- Assign personnel to contact residents by phone or proceed to residence if required (i.e. assistance required or no answer).
- Maintain a record of all evacuated persons.

EVACUATION CREWS

Assist with evacuation of the Emergency Planning & Response Zones

- Assemble at designated site for briefing by Public Safety Coordinator (if possible).
- Proceed, in designated evacuation vehicles, to residents/businesses to initiate evacuation procedures.
- Ensure the following information is delivered:
 - The type of emergency and related dangers.
 - Directions for proceeding out of the area safely.
 - Provide assistance to individuals requesting help.
- If residence is unoccupied, record in Resident Contact Log (Section 6).
- Report evacuation status to Public Safety Coordinator.
- Record all evacuation data on Resident Contact Log (Section 6).
- After evacuation procedures are completed, assist roadblock crews with securing the EPZ and manning roadblocks.

LEVEL 1 EMERGENCY:

- No immediate hazard to the public or environment exists but the situation has the potential to escalate to a Level 2 emergency.
- Situation can be controlled by AltaGas.

Examples:

- Situations in which an odour or leak has been detected.
- Small contained fire or explosion has occurred.
- Indication of product release.
- Security breach.
- External threat (bomb).
- Spill confined to lease / Limited quantity.

Actions:

- Internal response to eliminate or control the emergency.
- Activation of ERP
- Standby notification to CEOC Team.
- External reporting requirements.
- Standby notification to sensitive public.

TELEPHONE CREWS

Assist Public Safety Coordinator with prioritizing and conducting Resident call down

- Assist the Public Safety Coordinator with prioritizing resident call down.
- Confirm with Public Safety Coordinator which message is to be delivered to area residences/businesses ("Shelter" or "Evacuation").
- Fill in appropriate information in message form.
- Proceed to contact residences/businesses and deliver selected message.
- Maintain an accurate log of all telephone conversations, times, etc. on Resident Contact Log (Section 6).
- Establish communications with Evacuation Centre Coordinator, relaying resident and/or business status as it changes.
- Notify the Public Safety Coordinator of any problems, issues or requirements arising from the contact process (i.e. no contact made, need for assistance, only children at home, etc.).
- Assist with post-emergency notifications when the emergency is called down by the Incident Commander.

LEVEL 2 EMERGENCY:

- A Level 1 Emergency which has escalated to become a potential or limited hazard to the public or environment.
- Local/Regional media interest.
- Situation may be controlled by AltaGas, but could require external assistance.

Examples:

- Confirmed release of gas/liquids with imminent control probable.
- Fire/explosion which remains out of control.
- External security breach or confirmed bomb threat.
- Substantial spill (probably off lease).

Actions - Level 1, Plus:

- Public safety action as appropriate – Shelter/Evacuation/Ignition/Roadblocks (Evacuation Criteria >10 PPM of H₂S for 3 minutes).
- Activation of initial CEOC Team and assembly at CEOC.
- Activation of external resources as appropriate.

EVACUATION CENTRE COORDINATOR

Assist Public Safety Coordinator with notifications, record keeping and securing equipment/services for evacuation

- Pick up evacuation centre kit (if applicable) and ERP Manual.
- Proceed to designated Reception Centre to receive evacuees.
- Contact additional personnel to assist as required.
- Set up Reception Centre (tables/chairs) as needed.
- Record the arrival of all members of the public on the Evacuation Centre Check-in Sheet (Section 6).
- Liaise with Public Safety Coordinator to ensure resident concerns are addressed and answered promptly.
- Report status of evacuees to Public Safety Coordinator and record status on the Evacuation Centre Check-in Sheet (Section 6).
- Assist residents with compensation issues.
- Assist with post-emergency actions.

DOWNGRADING AN EMERGENCY

The Level of Emergency may be downgraded through joint decision of the IC and the appropriate Government Agencies

- Activities can be downgraded once when there is no longer a threat to people, property or the environment.
- Incident Commander (in consultation with the OSC) will notify all affected parties that the emergency is over, including:
 - Company and external resources used to handle the emergency
 - Affected/evacuated area residents
 - Government agencies
 - Media & Communications Coordinator (who must then issue a media statement)
- OSC to ensure affected residences are clear of gas before allowing residents to return
- OSC to provide transportation to evacuated residents
- OSC to ensure evacuated personnel return and roadblocks are discontinued
- OSC to complete initial AltaGas Incident Investigation Report Form
- OSC/IC are to make arrangements for repair, clean-up, refurbishing of equipment, etc.
- IC to initiate critical stress management action as appropriate
- IC to conduct a post-incident debriefing within 30 days and submit report to the appropriate government agency
- IC to ensure reimbursement of all costs incurred by residents due to the emergency

ROADBLOCK CREWS

Establish and maintain hazardous area roadblocks**Prior To Dispatch:**

- Assemble at designated site for briefing by On-Scene Commander (if possible).
- Obtain roadblock kits and applicable safety equipment.
- Establish schedule of report-in times to On-Scene Commander.

To Isolate the Emergency Planning Zone (EPZ):

- Establish a safe route to get to your location and an escape route should conditions warrant.
- Record vehicle information for vehicles stopping at roadblock on Roadblock Log (Section 6).
- Monitor H₂S/LEL levels and relay information to On-Scene Commander. Be prepared to move position of roadblock(s) as conditions change.
- Maintain roadblock until relieved or informed by On-Scene Commander to stand down.
- Finalize report.

LEVEL 3 EMERGENCY:

- A Level 2 Emergency which has escalated in scope and is an immediate or major hazard to the public or environment.
- Significant media interest.
- Situation is uncontrolled and will require external assistance to bring under control.

Examples:

- Uncontrolled release from any source resulting in prolonged concentrations of H₂S/SO₂/LEL which exceed evacuation criteria.
- Ignition procedures implemented.
- Uncontrolled release from any source which may result in an environmental disaster (spill enters a water course).
- Ongoing breach or security or bomb threat.

Actions - Level 2, Plus:

- Escalated response actions utilizing appropriate external resources.
- Enhanced CEOC Team membership.

LEVELS OF EMERGENCY
SHELTER / EVACUATION &
DOWNGRADING
PROCEDURESEMERGENCY RESPONSE
SIDE 2