

Gas Safety and Management Plan

1. Purpose

This plan establishes the minimum safety, environmental, and operational requirements for managing hazardous gases, including Dioxide (CO₂), Methane (CH₄), Helium (He), Argon (Ar), and Nitrogen (N₂), throughout Pulsar Helium's operations.

This plan aims to:

- Protect personnel from asphyxiation, fire/explosion, and respiratory hazards.
- Prevent environmental hazards associated with gas leaks and emissions.

Ensure compliance with applicable federal, state, and local regulations, including:

- OSHA 29 CFR 1910.1000 Air Contaminants
- OSHA 29 CFR 1910.134 Respiratory Protection
- OSHA 29 CFR 1910.146 Permit-Required Confined Spaces
- NIOSH Pocket Guide to Chemical Hazards Exposure Limits
- API RP 55 Recommended Practices for Managing Hazardous Gases
- Minnesota OSHA (MNOSHA) 5205.0010 General Industry Safety Standards

2. Scope

This Gas Safety and Management Plan applies to:

• All employees, contractors, and consultants working on Pulsar Helium drilling and production sites.

All operational phases, including:

- Drilling
- Well completion & workovers
- Wireline and well intervention
- Sampling from the wellhead
- Processing and transport operations

Note: Contractors must follow this plan unless they have an equivalent or more stringent policy.

3. Gas Characteristics and Hazards

This section outlines the characteristics, hazards, and regulatory exposure limits of gases handled in operations.

Gas	Properties	Hazards	Regulatory Limits
Carbon	Colorless, odorless,	Severe asphyxiation risk,	OSHA PEL = 5,000
Dioxide	heavier than air	IDLH = 40,000 ppm,	ppm, NIOSH IDLH =
(CO ₂)		pipeline corrosion	40,000 ppm



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Methane	Colorless, odorless,	Explosion hazard (LEL = 5%,	OSHA PEL = 1,000
(CH₄)	lighter than air,	UEL = 15%), asphyxiation in	ppm
	flammable	confined spaces	
Helium	Colorless, odorless,	Asphyxiation risk in	No PEL; O ₂ levels
(He)	non-toxic, lighter than	enclosed areas, oxygen	must remain >19.5%
	air	displacement	
Argon	Colorless, odorless,	Oxygen displacement	No PEL; O ₂ levels
(Ar)	inert, heavier than air	accumulates in confined	must remain >19.5%
		spaces	
Nitrogen	Colorless, odorless,	Asphyxiation risk in	No PEL; O ₂ levels
(N ₂)	non-toxic, lighter than	enclosed areas, oxygen	must remain >19.5%
	air	displacement	

4. Safety Responsibilities

4.1. Managers and Supervisors

- Conduct pre-job hazard assessments for gas exposure risks.
- Ensure all personnel are trained in gas monitoring and emergency response.
- Verify that CO₂, CH₄, He, Ar and N₂ detection systems are operational.

4.2. Employees and Contractors

- Wear personal gas monitors in designated areas.
- Follow PPE requirements, including SCBA in IDLH conditions.
- Report gas alarms, leaks, or symptoms of exposure immediately.

5. Gas Monitoring and Detection

5.1. Required Monitoring Equipment

- Fixed, portable, and/or personal gas detection systems in permanent confined spaces, well pads, and production areas as appropriate.
- Ventilation fans and exhaust systems in enclosed workspaces with potential CO₂ or Ar accumulation.

5.2. Monitoring Procedures

- Continuous monitoring in confined spaces or enclosed work areas.
- Pre-entry atmospheric testing for CO₂, CH₄, He, Ar and N₂ in confined spaces.

Alarm thresholds:

- CO₂: 5,000 ppm (Action Level), 40,000 ppm (IDLH)
- CH₄: 10% of LEL (Action Level), 50% of LEL (Evacuate)
- He, Ar and N_2 : If O_2 <19.5%, evacuate area

6. Safe Work Procedures

6.1. Drilling and Well Operations

• Install fixed gas monitors in drilling cabins, mud logging units, and enclosed spaces with exposure potential.

Pulsar Helium Safety Management System



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- Conduct pre-spud gas hazard assessments.
- Use ventilation and exhaust systems in areas with potential CO₂ buildup.

6.2. Well Intervention & Sampling

- Vent wellhead gas before opening sampling ports.
- Ensure upwind positioning during any gas release activities.

6.3. Confined Space Entry

- Follow OSHA 29 CFR 1910.146 for confined space procedures.
- Monitor oxygen levels before and during entry.
- Require standby rescue teams with SCBA cascade systems for confined space work.

7. Emergency Response Plan

7.1. Alarm Response Actions

Gas Level	Action Required
CO ₂ < 1,000 ppm	Normal conditions
1,000 - 5,000 ppm	Increase ventilation, monitor personnel
5,000 - 40,000 ppm	Evacuate non-essential personnel, wear SCBA
> 40,000 ppm (IDLH)	Immediate evacuation, emergency response activation
CH ₄ > 10% LEL	Stop work, verify gas readings
CH ₄ > 50% LEL	Shut down ignition sources, evacuate

7.2. Rescue Operations

- Only trained personnel with SCBA may perform rescues in hazardous gas environments.
- No single rescuer entry a minimum of two personnel is required.
- Use retrieval harnesses and air monitoring for confined space rescues.

8. First Aid Procedures

8.1. CO₂ Exposure

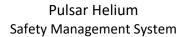
- Move victim to fresh air immediately.
- If unconscious but breathing, place in recovery position.
- If not breathing, administer CPR and provide 100% oxygen.

8.2. CH₄ Exposure

- Remove victim from the area.
- If an explosion has occurred, treat burns and seek medical help.

8.3. He, Ar and N₂ Exposure

- Move victim to fresh air immediately.
- Administer oxygen therapy.
- If unconscious, provide CPR and seek medical assistance.





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9. Training & Compliance Requirements

- Annual gas hazard training covering gas properties, monitoring, and emergency response.
- Respirator fit testing (OSHA 29 CFR 1910.134).
- Emergency response drills for gas leaks and confined space rescues.
- Recordkeeping: Maintain logs for gas monitoring, training, and incident reports.

Disclaimer

This Gas Safety and Management Plan has been developed by Pulsar Helium for use in its operations. Contractors who do not have their own gas safety plan may choose to adopt this plan as a reference; however, Pulsar Helium does not guarantee the accuracy, completeness, or applicability of this plan to any specific contractor operations.

It is the sole responsibility of the contractor to ensure that they comply with all applicable federal, state, and local regulatory requirements, including but not limited to OSHA, EPA, and Minnesota state workplace safety regulations. Contractors must conduct their own hazard assessments, regulatory reviews, and training programs to confirm compliance with all relevant safety standards.