Gas Safety and Management Plan

1. Purpose

This plan establishes the minimum safety, environmental, and operational requirements for managing hazardous gases, including Dioxide (CO_2), Methane (CH_4), Helium (He), Argon (Ar), and Nitrogen (N_2), 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 Dioxide (CO_2)	Colorless, odorless, heavier than air	Severe asphyxiation risk, IDLH = 40,000 ppm, pipeline corrosion	OSHA PEL = 5,000 ppm, NIOSH IDLH = 40,000 ppm

Methane (CH_4)	Colorless, odorless, lighter than air, flammable	Explosion hazard (LEL = 5%, UEL = 15%), asphyxiation in confined spaces	OSHA PEL = 1,000 ppm
Helium (He)	Colorless, odorless, non-toxic, lighter than air	Asphyxiation risk in enclosed areas, oxygen displacement	No PEL; O_2 levels must remain >19.5%
Argon (Ar)	Colorless, odorless, inert, heavier than air	Oxygen displacement accumulates in confined spaces	No PEL; O_2 levels must remain >19.5%
Nitrogen (N_2)	Colorless, odorless, non-toxic, lighter than air	Asphyxiation risk in enclosed areas, oxygen displacement	No PEL; O_2 levels must remain >19.5%

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 CO_2, CH_4, He, Ar and N_2 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 CO_2 or Ar accumulation.

5.2. Monitoring Procedures

- Continuous monitoring in confined spaces or enclosed work areas.
- Pre-entry atmospheric testing for CO_2, CH_4, He, Ar and N_2 in confined spaces.

Alarm thresholds:

- CO_2: 5,000 ppm (Action Level), 40,000 ppm (IDLH)
- CH_4: 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.

- Conduct pre-spud gas hazard assessments.
- Use ventilation and exhaust systems in areas with potential CO_2 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. CO_2 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. CH_4 Exposure

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

8.3. He, Ar and N_2 Exposure

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

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.