



Gas Detection for Hazardous Atmospheres

Document Number: RGS0008A	Standard – Administrative	Applies To: Regional Wood Buffalo
Revision Date: 2018/03/28 Revision: 4 Review Cycle: 3	Document Owner (Title): General Manager, EH&S Upstream	

Rev No.	Section Changed	Revision Made
1		New Document
2		Cyclical Review, formatted template
3		Addition of personal gas detection requirements for Fort Hills
4		Added Section 5 on Response to Personal Gas Monitor Alarms Added East Tank Farm to Appendix 2

Purpose

To drive continuous improvement of workplace and process safety.

To assist in the creation of a safe working environment in locations where oxygen deficient atmospheres or hazardous substances such as flammable or toxic gases (such as hydrogen sulphide or sulphur dioxide) or ignitable vapours exist or could exist.

To establish the minimum requirements for the acquisition, use, care, calibration and repair of personal gas detection equipment.

Compliance

This document applies to work performed at Suncor Energy operating sites in the Wood Buffalo Region that includes Oil Sands, In Situ, Fort Hills, East Tank Farm, Major Projects, and Pipelines.

Roles and Responsibilities

The following individuals and groups have the following roles and responsibilities:

- | | |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Document Owner | <ul style="list-style-type: none"> • Ensures this document is reviewed according to the required revision cycle. • Ensures the document is updated to accommodate changes to Suncor, provincial, and federal regulation. • Ensures the document is updated to mitigate risks found as the result of an incident. |
| Document Approver | <ul style="list-style-type: none"> • Ensures this standard is necessary and that it aligns with management and company direction. |

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Approved By: Sheila Chernys, Director OS Enviro & Reg; Jim Chuey, GM EH&S OSIS

Roles and Responsibilities *Continued***Business Area Management**

- Ensures all aspects of this standard are implemented and followed.
- Ensures all managers, supervisors, and employees (both Suncor and contractor) affected by this standard fully understand the requirements of this standard and are competent and qualified to perform the tasks they are assigned.
- Ensures gas detection facilities and services are maintained as required by this standard.
- Provides input during determination of where bumping stations are to be located.
- Assess the need for personal gas detection before a turnaround or outage activity (turnaround/outage management).
- Decisions made to forego or provide alternate means of personal gas detection before an event (e.g. during turnaround/outage, commissioning of a new asset) must be documented as a deviation as per [RGP11007](#) - OEMS Element 11- Deviations to Governing Documents Procedure.

Workers

- Uses Risk Assessments to assist in pre-work identification of hazards associated with chemical, flammable, toxic, combustible hazards and oxygen content.
- Notifies Supervisor of identified chemical, flammable, toxic, combustible hazards and oxygen content.
- Maintains personal knowledge of and follows all standards, work practices, and procedures applicable to personal gas detection in the Wood Buffalo Region (WBR).
- Exchanges faulty personal gas detection equipment for proper working equipment.
- Each person who has received a personal gas detector is responsible to:
- Review and understand the overview on gas detector use and care.
- Perform the required gas detector bump test and calibration when in use according to Suncor schedule (See Appendix 2).
- Take proper care of the detectors.
- Return detectors to their Supervisor if vacating their current role.

Supervisors

- Maintains personal knowledge of, and follows all standards, work practices, and procedures applicable to personal gas detection in the Wood Buffalo Region (WBR).
- If responsible for work activities, ensures a pre-work hazard assessment is conducted for all work activities where there is the potential for hazardous atmospheres to exist.
- Ensures employees are competent in the use and care of personal gas detectors.
- Ensures personal detectors from vacating employees are collected and returned.

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Roles and Responsibilities *Continued***Contractors and Subcontractors**

All contractors and subcontractors working in the Wood Buffalo Region (WBR) locations are responsible for ensuring the workers in their employment or supervision follow safe work practices and procedures that meet or exceed all requirements of this standard, including:

- Responsible for all duties in Workers responsibilities section.
- Contractor personnel are aware of and comply with their company rules and Suncor's practices and procedures applicable to this standard.
- Contractor personnel apply Risk Assessment methods to assist in pre-work identification of hazards associated with chemical, flammable, toxic, combustible hazards and oxygen content.
- Any personal gas detection equipment used or owned by the contractor is operated in a safe and reliable manner according to manufacturer's recommended practices, this standard and legislation.

Gas Detection System Administrator

- Assigned as additional responsibilities to an existing role as outlined in Appendix 2.
- Competent on the personal gas detection system used in the Area.
- Maintains a system to verify all equipment is bump tested and calibrated as required per Suncor schedule.
- Periodically reports status of instruments (bumps, calibrations, failed bumps and failed calibrations) and any alarms which have occurred to the various business areas.
- Maintains a system to ensure availability and access to calibration gas.
- Ensures replacement equipment received is installed as soon as possible after arrival.
- Maintains bump stations.
- Performs emergency bump testing for users if required.
- Contacts the vendor to ensure trouble shooting of equipment can occur as required.

Tool Crib Worker

- At Suncor sites where personal gas detectors are tracked to individuals:
 - a. Issues and assigns detectors to Suncor personnel and contractors, as required.
 - b. Confirms proof of training before issuing a personal gas detector to workers (also applicable to contractors as required).
- At Suncor sites where personal gas detectors are not tracked to individuals, dispenses detectors to Suncor personnel and contractors, as required.
- Maintains a system to ensure the faulty personal gas detection equipment can be exchanged for working equipment.
- Ensures all personal gas detectors with deficiencies are reported to area management.
- Maintains a reporting system on detector issuing, returns and out for repair frequencies to Business Area.
- Receives and returns broken personal gas detectors to the vendor.

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Roles and Responsibilities *Continued***Supply Chain**

- Determines which contractors are to be provided with personal gas detection equipment.
- Ensures personal gas detectors supplied by a contractor meet or exceed this standard.
- Ensures warranty replacement exists for personal gas detectors in use at the various sites.

IT Department

- Makes gas detection software available to potential users (intranet access, system requirements, and additional software or hardware requirements) as required.

Note: This may vary from site to site depending on the personal gas detector used.

- Maintains and updates personal gas detection software system when such a system is in use.

Safety Specialists

- Provide a level of expertise for questions and concerns regarding personal gas detection.

Industrial Hygienists

- Provide a level of expertise for questions and concerns regarding occupational exposure limits and alarm limits (Appendix 1) of the personal gas detectors.

References

- Risk Assessment Tool
- [RGM02002](#) FLHA
- [RGP0004A](#) Safe Work Permit
- [LMS0037A](#) Confined Space Entry
- [LMS0095A](#) Hydrogen Sulphide (H₂S) Standard
- [No 0503](#) Suncor Standard for Area Classification
- [RGM10001](#) OSIS Contractor Safety Regional General Manual
- [RGP0010A](#) MSA Altair 4X Personal Gas Monitor Operational Procedure
- [RGP0011A](#) BW Personal Gas Monitors Operational Procedure
- [RGP05001](#) Management of Technical Change Procedure
- [RGS0009A](#) Personal Protective Equipment Standard
- [RGP11007](#) OEMS Element 11 – Deviations to Governing Documents

Definitions

The following terms and acronyms are used in this standard:

15-Minute Occupational Exposure Limit or Short Term Exposure Limit (STEL)

A 15-minute time weighted average of airborne concentration of a contaminant that shall not be exceeded at any time during the workday, even if 8-hour exposure level is below the OEL. STEL is the concentration to which it is believed that workers can be continuously exposed for a short period of time without suffering from:

- irritation
- chronic or irreversible tissue damage
- dose-rate dependent toxic effects
- narcosis of sufficient degree to increase the likelihood of accidental injury, impaired self-rescue or materially reduced work efficiency.

Bump Test

A field test conducted according to Suncor schedule outlined in Appendix 2. The test ensures the detector is working properly.

During a bump test, the detector is exposed to a known concentration of calibration gas. If the detector responds within predetermined limits, the instrument is ready for use.

Calibration

An instrument's measuring accuracy relative to a known concentration of gas. The instrument's response to the calibration gas serves as the measurement scale or reference point.

Ceiling Occupational Exposure Limit (Ceiling)

The concentration of a substance that must not be exceeded at any time. The limit is indicated by a "C" in in Schedule 1, Table 2 of the Alberta Occupational Health & Safety Code. Ceiling limits can be measured using a direct reading instrument such as a colorimetric detector tube or an instrument with a diffusion controlled sensor which effectively averages measurements over approximately 1 minute.

Combustible

Any vapour, liquid or solid that is capable of catching fire and burning.

Competent

A person who is adequately qualified and suitably trained with sufficient experience to safely perform work without supervision or with a minimal degree of supervision.

Immediately Dangerous to Life or Health (IDLH)

Circumstances in which the atmosphere is deficient in oxygen or the concentration of a harmful substance in the atmosphere:

- Is an immediate threat to life
- May affect health irreversibly
- May have future adverse effects on health
- May interfere with a worker's ability to escape from a dangerous atmosphere.

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Definitions *Continued*

Lower Explosive Limit (LEL)	The lower value of the range of concentrations of a substance at which, in a mixture with air, may ignite.
Occupational Exposure Limit (OEL)	An upper limit of airborne concentrations of various contaminants in the workplace. Typically, Occupational Exposure Limits are airborne concentrations averaged over an 8 hour work day and are reported as time weighted average concentrations. For some substances, a ceiling limit is also applicable. If any of these limits are exceeded, a potential hazard from that substance is presumed to exist.
Time Weighted Average Exposure (TWA)	The average exposure to a contaminant or condition to which workers may be exposed without adverse effect over a period of time.
Maximum Use Concentration (MUC)	the maximum concentration of an airborne contaminant from which an employee is expected to be protected when wearing a respirator, determined by the assigned protection factor of the respirator or class of respirators and the occupational exposure limit for that contaminant. The MUC is usually determined mathematically by multiplying the assigned protection factor specified for a respirator by the occupational exposure limit, which can include a short-term exposure limit and a ceiling limit or any other exposure limit used for that chemical agent, as defined by the authority having jurisdiction.

Standard**1. Competency & Qualifications**

The minimum personal gas detection qualifications and competency requirements for workers at the Wood Buffalo Region (WBR)

Item	Description
Qualifications to use Personal Gas Detectors	1.1 Before using a personal gas detector a worker must be trained on the specific equipment including but not limited to the equipment's use, bump test and calibration requirements and required response to alarm or pre-alarm conditions.
Recertification	1.2 Depending on type of personal gas detector used, recertification may be required at a specified frequency or when new equipment is introduced. Refer to site specific personal gas detector procedure.

2. Hazard Identification and Mitigation

Hazards can be due to equipment design, process failure or upset, the work environment, the work itself, hazard migration from a nearby source or work location.

Item	Description
Pre-Work Hazard Assessments (Formal Risk Assessment FLHA)	2.1 Fixed/permanent area monitoring systems are not to be relied upon to meet personal gas detection requirements for work. These systems are not capable of warning workers when conditions are changing such as when the Short Term Exposure Limit (STEL) is exceeded.

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Hazard Identification and Mitigation *Continued*

Item	Description
2.2	The Supervisor responsible for the work activities will ensure a pre-work hazard assessment is conducted for all work activities where there is the potential for hazardous atmospheres to exist: <ul style="list-style-type: none"> • For high-risk activities in these areas a risk assessment process is to be followed. • Personnel performing any activity, task, or work where there could be an exposure to one or more hazardous substances.

Responsibility	Step	Action	Initial/Date
	2.3	Hazardous Area Classification maps and the area classification descriptions are to be used to determine adequate hazard controls.	

3. Care And Maintenance Of Equipment

Item	Description
3.1	Each worker is responsible for the care and maintenance of the assigned personal gas detector equipment as per the manufacturer's recommendations and training. Bump testing and calibration is to occur according to Suncor schedule.

4. Approved Gas Detection Equipment

Item	Description
4.1	To ensure equipment integrity, the acquisition of all new types or brands of personal gas detection equipment and accessories is to be approved by EH&S, Industrial Hygiene and the site gas detection systems administrator.

5. Post Exposure Response to Personal Gas Monitor Alarms

When wearing a personal gas detector, the detector alarms, it is an indication that a gas in the air around the detector has been detected at a level equal to or above the prescribed alarm level for that gas. The recommended alarm response is outlined below:

Item	Description
5.1	If an alarm sounds, leave the area and proceed to identified safe area note in the Risk Assessment, Permit, or Field Level Hazard Assessment (FLHA).
5.2	Notify your Supervisor and Operations.
5.3	Work shall not continue in the area until the source of the alarm has been identified and controlled by Operations.
5.4	A High/STEL alarm requires medical assessment for exposure. Worker must be taken to the closest first aid facility for assessment. The exposed worker is not allowed to continue work until the assessment has been completed.

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Item	Description
5.5	A Low/TWA alarm indicates that a first aid visit is at the discretion of the supervisor or if worker reports of any symptoms.
5.6	Data from the personal gas monitor shall be recorded and added to the Incident Management tool.
5.7	Obtain approval/all clear from Operations to re-enter the area.
5.8	In the event, respiratory protection is being used to mitigate exposure to a contaminant and a personal gas monitor alarms for that contaminant, then first aid visits are mandatory after the respirator's Maximum Use Concentration (MUC) is exceeded or if worker is reporting related adverse health effects. Note: Maximum use concentrations (MUC) are calculated through LMS0052A, as Assigned Protection Factor x OEL. The calculated MUC must be below IDLH of contaminant of concern when using an APR.
5.9	Return to work to regular or modified duties will be determined by treatment room indicated on the Duty Disposition Report. Worker must be fit for duty to return to operating area.

End of Standard

Appendix 1 – Low and High Alarm Settings For Personal Gas Detectors

Sensor	Low Alarm	High Alarm	Alarm TWA	Alarm STEL
Oxygen (% Vol)	19.5	23	NA	NA
Combustible LEL Sensor (%LEL)	10	20	NA	NA
Carbon Monoxide (ppm)	25	125*	25	100
Hydrogen Sulphide (ppm)	10	15	10	15
Sulphur Dioxide (ppm)**	2	4	2	4

Note:

- * Currently the high alarm limit for CO at Suncor sites vary, and may not be set at 125 ppm.. The alarm limit will be changed to 125 ppm when new detectors are purchased or other configuration changes are made to existing detectors.
- ** Contractor-owned personal SO₂ gas detectors may have a high alarm setting of either 4 or 5 ppm and a low alarm of 2 ppm.

Appendix 2 – Suncor Bump Test and Calibration Schedule

Suncor BU	Bump Test	Calibration	Detector	Gas Detection System Administrator	Equipment Contact
In Situ	Daily	Monthly	MSA Altair 4 Four Head	MR: Electrical & Instrumentation FB: Shop Foreman	EH&S
Oil Sands	At least once per shift cycle Daily	Factory Calibrated As per manufacturer recommendations	BW Single Head Industrial Scientific MX4	Central Shop Services	Central Shop Services
Pipelines	Daily	As per manufacturer recommendations	Industrial Scientific MX4	Electrical & Instrumentation Technician	Electrical & Instrumentation Technician
Fort Hills- Primary Extraction Only	Daily	Monthly	MSA Altair 2 Two Head*	Operations coordinators	Tool Crib
Fort Hills	Daily	Monthly	MSA Altair 4 Four Head**	Operations Coordinators	Tool Crib
Major Projects	N/A unless otherwise specified by site specific requirements	N/A unless otherwise specified by site specific requirements	N/A unless otherwise specified by site specific requirements	N/A unless otherwise specified by site specific requirements	N/A unless otherwise specified by site specific requirements
East Tank Farm	Daily	Monthly	MSA Altair 4 Four Head	Operations	EH&S

* The Altair two head gas monitor will have H2S and CO sensors and can only be used in primary extraction at Fort Hills.

** The Altair four head gas monitor will have H2S, CO, LEL and O2 sensors and can be used in all areas at Fort Hills that require a personal gas detector.



The following individuals have approved and signed this document.

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Title: Dir OS Enviro & Reg

Date: Monday, 02 April 2018, 08:13 AM Mountain Time

Meaning: Approver 1 Signed

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UserName: Jim Chuey (jchuey)

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Meaning: Approver 2 Signed

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