**SAFE WORK PRACTICE** **SWP-36**

**April 18, 2018** **MONITORING FOR THE ESCAPE OF HYDROCARBONS**

## PURPOSE/APPLICATION

To protect workers from an unplanned discharge of hydrocarbons (fluid or gas) at the worksite. If construction or maintenance activities require that workers be near or in an area where a potential unplanned discharge of hydrocarbons (fluid or gas) is possible, Canadian Plains Energy Services (CPE) will continuously monitor the surrounding atmosphere for escaping hydrocarbons.

**PPE**

- Canadian Plains Energy Services (CPE) minimum requirements
- Respiratory Protective Equipment (If applicable)

**TRAINING**

- Gas Detection and Atmosphere monitoring

**HAZARDS & CONCERNS**

- Fire/explosion
- Property damage
- Personal injury
- O2 deficiency

## PRECAUTIONS

- A Safe Work Permit must be issued by the client before accessing a work site to conduct a hazard assessment and/or to do an initial check for the presence of escaping hydrocarbons.
- Prior to workers accessing a worksite, a site-specific hazard assessment will be conducted to identify:
  - → sources of potential hydrocarbon release
  - → work area perimeter
  - → entry/exit restrictions
- Implement control measures to eliminate or minimize the hazard(s).
- Set the work area perimeter and identify as a "restricted work area".
- Ensure the "restricted work area" is clearly signed, flagged, barricaded, etc., as defined in the hazard assessment control measures.
- Maintain clear exits for the safe movement of people and equipment.
- In discussion with the owner of the facility, determine if permanent monitors are in place and whether or not they can be utilized for the task at hand and will be adequate to cover the area for the "restricted work area".
- If permanent (fixed) monitors are in place but cannot be used for the task at hand, but are in place and will not be adequate to cover the work area, or are not in place at all; then in discussion with the owner; decide what type of monitoring devices will be required:
  - → Portable intermittent
  - → Portable continuous
  - → Personal portables
  - → Aspirator type "sniffers"
  - → Tube type volume pumps
- Ensure all monitors (in place or supplied), are in good working condition.

- Always check the calibration decal on each monitor for last calibration date and next due date to ensure calibration is current.
- A bump test must be performed on monitor(s) prior to daily use to ensure functionality.
- A calibration and gas response Log must be kept current for each monitor.
- Always check the general condition of the monitor(s) for visible damage and dirty/plugged heads.
- Always check the power supply, the back-up systems and batteries; where applicable.
- Assign a competent person(s) to do an initial check of the work area for the presence of escaping hydrocarbons and or verify if this is a client responsibility.
- To strategically place the monitor(s) for general area monitoring, consider all atmospheric conditions (wind, rain, sleet, snow, temperature, etc), possible sources of gas escape and other activities that could affect the "restricted work area".
- When general area monitoring is required, a competent person trained in hydrocarbon gas hazards and detection must be provided. This person's primary responsibility is to watch, test, access and report.
- When permanent monitoring systems are in place, the owner of the facility will have a pre-determined type of alarm system with prescribed responses from owner personnel. In this case, safe evacuation routes and safe muster points will already be defined.
- In the absence of established procedures and/or when the monitor devices are the portable type, CPE supervisor personnel will establish an Emergency Evacuation Plan (EEP) as part of their Emergency Response Plan (ERP).
- Practice drills in response to various alarm conditions should be part of the ERP – consult owner for assistance.
- Once the area monitor(s) have been initially placed, a high level of awareness to changing conditions must exist and the monitors may have to be relocated to maintain proper monitoring.

## REFERENCES / ADDITIONAL INFORMATION

- Respiratory Protective Equipment "must be worn" when conducting an initial test where toxic or oxygen deficient atmospheres exit or are suspected to exist.
- Proceed to the "restricted work area",
  - → Look for wind socks, direction of steam/smoke travel, etc to determine wind direction.
  - → Approach from the up-wind direction (wind at your back).
  - → Look for flashing warning lights which may be indications of escaping hydrocarbons, H2S, etc. If there is a flashing light(s), consult with the owner for clarification.
  - → Holding the monitor in front of you proceed slowly into the "restricted work area" checking for escaping hydrocarbons, H2S, O2 and Lower Explosive Limits (LEL's).
  - → Be sure to check all low-lying areas as some gases (e.g. H2S) are heavier than air and will settle in low lying areas and/or pockets.
- Check all possible leak points for escaping product:
  - → Flanges and threaded fittings

- → Valve stems and packing
- → Instrument and solenoid vents
- → Sample and vent points
- → Vent pipes and relief devices
- → Floor drains and low points such as pits and trenches
- → Under skid bases
- → Waste containers

- COP-03 Confined Space Entry
- COP-02 Respiratory Protective Equipment

## REGULATIONS

**Alberta OHS Code -** Part 4 Chemical Hazards, Biological Hazards and Harmful Substances

***Worker exposure to harmful substances 16***

***3.1*** *A worker may not be exposed to a substance listed in Schedule 1, Table 2 at a concentration exceeding its ceiling limit at any time.*

***Airborne concentration measurements 20***

***1.*** *If a person measures the airborne concentration of a harmful substance for the purposes of complying with the occupational exposure limits as required by this Code, the person must make the measurement*

*a. in accordance with the NIOSH Manual of Analytical Methods, 4th Edition (August 1994), published by the United States Department of Health and Human Services, as amended up to and including the 2nd supplement (January 15, 1998), or*

*b. using methods or procedures that are approved by a Director of Occupational Hygiene.*

***2.*** *Despite subsection (1), an employer may use a continuous reading direct reading instrument to measure hydrogen sulfide concentration in air if the instrument is used, calibrated and maintained according to the manufacturer's specifications.*

***Potential worker exposure 21***

**1.** *If a worker may be exposed to a harmful substance at a work site, an employer must identify the health hazards associated with the exposure and assess the worker's exposure.*

**2.** *A worker who is provided with training under subsection (2) must use the procedures appropriately and apply the training.*

**Alberta OHS Code -** Part 5 Confined Spaces

***Testing the atmosphere 52***

***1.*** *If the hazard assessment identifies a potential atmospheric hazard and a worker is required or authorized by an employer to enter the confined space, the employer must ensure that a competent worker performs a pre-entry atmospheric test of the confined space to*

*a. verify that the oxygen content is between 19.5 percent and 23.0 percent by volume, and*

*b. identify the amount of toxic, flammable or explosive substance that may be present.*

***2.*** *The employer must ensure that the testing required by subsection (1) is performed using calibrated test instruments appropriate for the atmosphere being tested and the instruments are used in accordance with the manufacturer's specifications.*

***3.*** *The employer must ensure that as often as necessary after the first time a worker enters the confined space, a competent worker*

*a. performs the tests specified in subsection (1), and*

*b. identifies and records any additional hazards.*

***3.1*** *The employer must ensure that if there is a potential for the atmosphere to change unpredictably after a worker enters the confined space, the atmosphere is continuously monitored in accordance with subsection (2).*

***4.*** *If tests identify additional hazards, the employer must deal with the identified hazards in accordance with this Code.*

***5.*** *The employer must ensure that the procedures and practices put in place under subsection (4) are included in the code of practice.*

***6.*** *The employer must ensure that the results of tests required by this section are recorded.*

**Saskatchewan OHS Regulation -** PART XXI Chemical and Biological Substances

***Substances listed in Table 21 307***

**1.** *A written procedure required by subsection (2) must identify:*

*a. the substances to which a worker may be exposed;*

*b. the conditions under which a worker will be required or permitted to work, including the frequency, quantity and duration of exposure to the substances; and*

*c. the steps that the employer will take to ensure, to the extent that is practicable, that no worker's personal exposure exceeds the equivalent of the contamination limit set out in Table 21 of the Appendix.*

**Saskatchewan OHS Regulation -** PART XVIII Confined Space Entry

***Requirements before hazardous confined space is entered 270***

***1.*** *Before a worker is required or permitted to enter a confined space, an employer shall appoint a competent person:*

*a. to assess the hazards;*

*b. where a hazardous atmosphere has been identified, to test the atmosphere of the confined space for:*

*I. oxygen enrichment or deficiency;*

*II. the presence of flammable or explosive substances; and*

*III. the presence and hazardous concentration of airborne chemical substances; and*

*c. to determine whether:*

*I. work activities or processes will result in the release of toxic, flammable or explosive concentrations of any substances during the worker's occupation of the confined space;*

*II. measures have been taken to ensure that a worker will not drown or become entrapped in any liquid or free-flowing solid present in the confined space;*

*III. the entry of any liquid, free-flowing solid or hazardous substance into the confined space in a quantity that could endanger the health or safety of the worker has been prevented;*

*IV. all energy sources that present a hazard to a worker entering into, exiting from or occupying the confined space have been locked out, with the energy sources being put in a zero-energy state;*

*V. any hazards from biological substances are present in the confined space; and*

*VI. the opening for entry into and exit from the confined space is sufficient to allow safe passage of a worker who is using personal protective equipment required by these regulations.*

***2.*** *When testing the atmosphere of a confined space pursuant to clause (1)(b), a competent person shall use appropriate and properly calibrated instruments that have been tested to ensure that the instruments are capable of operating safely and effectively.*

***3.*** *A competent person who carries out the activities described in clauses (1)(a) to (c) shall prepare a report in writing that sets out:*

*a. the results of the assessment, tests and determinations;*

*b. recommended special precautions and procedures to reduce the risk to a worker that are to be followed by a worker entering into, exiting from or occupying the confined space; and*

*c. recommended personal protective equipment to be used by a worker entering the confined space.*

**British Columbia OHS Regulation -** Part 5 Chemical Agents and Biological Agents

***5.53 Workplace monitoring***

***1.*** *If a worker is or may be exposed to a hazardous substance, the employer must ensure that*

*a. a walkthrough survey is conducted to assess the potential for overexposure taking into account all routes of exposure, including inhalation, ingestion, and skin contact, and*

*b. reassessment is conducted when there is a change in work conditions which may increase the exposure, such as a change in production rate, process or equipment.*

***2.*** *If the walkthrough survey required by subsection (1) reveals that a worker may be at risk of overexposure to an airborne contaminant, the employer must ensure that air sampling is conducted to assess the potential for overexposure.*

***3.*** *Additional workplace monitoring to reliably determine worker exposure is required if*

*a. the assessment under subsection (2) reveals that a worker may be exposed to an air contaminant in excess of 50% of its exposure limit, or*

*b. measurement is not possible at 50% of the applicable exposure limit.*

***4.*** *Workplace exposure monitoring and assessment must be conducted using occupational hygiene methods acceptable to the Board.*

***5.*** *The results of workplace exposure monitoring and assessment, or a summary of the results, must be provided to workers at their request without undue delay.*

### *5.54 Exposure control plan*

***1.*** *An exposure control plan must be implemented when*

*a. exposure monitoring under section 5.53(3) indicates that a worker is or may be exposed to an air contaminant in excess of 50% of its exposure limit,*

*b. measurement is not possible at 50% of the applicable exposure limit, or*

*c. otherwise required by this Regulation.*

***2.*** *The exposure control plan must incorporate the following elements:*

*a. a statement of purpose and responsibilities;*

*b. risk identification, assessment and control;*

*c. education and training;*

*d. written work procedures, when required;*

*e. hygiene facilities and decontamination procedures, when required;*

*f. health monitoring, when required;*

*g. documentation, when required.*

***3.*** *The plan must be reviewed at least annually and updated as necessary by the employer, in consultation with the joint committee or the worker health and safety representative, as applicable.*

**British Columbia OHS Regulation -** Part 9 Confined Spaces

### *9.24 Verifying all precautions*

*Before a worker enters a confined space, pre-entry testing and inspection must be conducted to verify that the required precautions have been effective at controlling the identified hazards and that it is safe for a worker to enter.*

### *9.25 Testing the atmosphere*

***1.*** *Except as stated in subsection (7), before a worker enters a confined space, the employer must ensure that the atmosphere in the confined space is tested.*

***2.*** *The pre-entry testing must be*

*a. conducted as specified in the written work procedures, and*

*b. completed not more than 20 minutes before a worker enters a confined space.*

***3.*** *When all workers have vacated the confined space for more than 20 minutes, pre-entry testing, as required by subsection (1), must be repeated.*

***4.*** *While a worker is inside a confined space with a moderate or high hazard atmosphere, additional testing must be conducted as necessary to ensure the worker's continuing safety.*

***5.*** *Whenever practicable, continuous monitoring of the atmosphere must be done.*

***6.*** *If a worker enters a confined space with a moderate or high hazard atmosphere, the employer must continuously monitor the atmosphere if a flammable or explosive atmosphere in excess of 20% of the lower explosive limit could develop.*

***7.*** *Pre-entry atmospheric testing is not required in a confined space with a low hazard atmosphere if*

*a. the location and control of the space ensures that a more hazardous atmosphere could not inadvertently develop,*

*b. such testing is not required to verify the effectiveness of an isolation or other pre-entry control,*

*c. prior representative sampling has demonstrated that the atmosphere within the space or group of similar spaces meets the low hazard atmosphere definition, and*

*d. the written entry procedures do not require such testing.*

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