Technical Supplement

Confined Space FCX-HS05 |Rev 6 | Release 03/2018

ATMOSPHERIC TESTING & MONITORING

Atmospheric testing is required for two distinct purposes:

1. Evaluation of the hazards of the permit space; and
2. Verification that acceptable entry conditions for entry into that space exist.

Air monitoring equipment will be selected by a qualified individual based on the hazards of the entry. As the monitor's sensors are gas specific, these determinations must be documented with area SOPs/Risk Registers/HIRADC/JSA. Calibration will be performed per the manufacturer's specifications and records will be kept according to the Records Retention Program.

Acceptable Monitoring Levels and Entry Conditions:

- **Oxygen levels**: O_2 levels between 19.5% - 23.5%
  - **Oxygen Deficient** (< 19.5%) is considered hazardous
  - **Oxygen Enriched** (> 23.5%) is considered hazardous
- **Flammable Gases**: Flammable gas concentration less than 10% of the Lower Explosive Limit (LEL) of the flammable gas.
- **Toxicity:** Atmospheric concentration in excess of the occupational exposure limit for any substance that is capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects and which could result in employee exposure in excess of its dose or permissible exposure limit.

Refer to the **FCX IH Field Guide** for more information on exposure limits.

REFERENCES

- 29 CFR 1910.146; Permit-required Confined Spaces
- 29 CFR 1910.146 Appendix B; Procedures for Atmospheric Testing
- 29 CFR 1910.146 Appendix F; Rescue Team or Rescue Service
- Evaluation Criteria
- 30 CFR 56.16002; Bins, hoppers, silos, tanks, and surge piles
- NSI/ASSE Z117.1-2009; Safety Requirements for Confined Spaces

ADDITIONAL REQUIREMENTS

(1) Evaluation testing. The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these results, and development of the entry procedure, should be performed by, or reviewed by, a technically qualified person based on evaluation of all serious hazards.

(2) Verification testing. The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided adjacent to the stipulated acceptable entry condition.

(3) Duration of testing. Follow manufacturer's recommendations for the duration of time the monitor should remain in place for a complete response, analysis times may vary depending on probe length and flow rate.

(4) Testing stratified atmospheres. When monitoring for entries involving a descent into atmospheres that may be stratified (layered), testing should proceed from the top to the bottom of the space and tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be reduced to accommodate the sampling speed and detector response.

(5) Order of testing. Test for oxygen first because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen deficient atmosphere. Test for combustible gases next because the threat of fire or explosion is both more immediate and more life threatening, in most cases, than exposure to toxic gases and vapors. If tests for toxic gases and vapors are necessary, they are performed last.