

CONFINED SPACES

1.0 SCOPE

This Performance Assessment Guide for Confined Spaces will be used to carry out the oversight responsibility of the U.S. Department of Energy (DOE) Brookhaven Group. This guide was prepared to assist in conducting performance-based assessments of the effectiveness of line management of both DOE prime contractors and subcontractors to ensure that their confined spaces safety programs identify, disposition, and take corrective action on issues that affect satisfactory facility performance. The goals are to ensure that laboratory employees and the public do not experience injuries and illness as a result of confined space activities and that there is little or no economic loss to the Government.

Confined spaces assessments will be directed at all prime contractors and subcontractors working at DOE sites. DOE line management must ensure that these contractors comply with DOE Orders and Federal and State regulations. Information developed from this assessment will determine the degree to which this is being done as well as the effectiveness of the laboratory's program.

2.0 ATTRIBUTES AND LINES OF INQUIRY

This section provides lines of inquiry to help assess whether the laboratory management organization has implemented a program that ensures that the confined spaces program requirements are incorporated into line activities. This section will be used to evaluate the laboratory's organization.

2.1 The laboratory has identified the locations within the site where confined spaces program concerns exist.

- Has a survey been conducted to develop an inventory of those locations or equipment, or both, that meet the definition of a confined space/permit-required confined space so that personnel may be made aware of them and appropriate procedures developed prior to entry?
- Does the scope of the laboratory's guidance include the following types of spaces: storage tanks, silos, trenches, bins, ditches, vaults, culverts, pits, vessels, sewers, communication manholes, and restricted entry and exit areas that may contain potential or known safety and health hazards?

- Are the hazards for each space identified by reviewing past and present uses, the physical characteristics, the configuration and location, and existing or potential hazards of the confined space?
- Based on evaluation of the hazards, has a qualified person classified the confined spaces as either a permit-required confined space (PRCS) or a non-permit confined space (NPCS)?
- How are these hazards identified (special warning signs, procedure cautions or warnings, etc.) in the field?
- Does documentation supporting markings/labels indicate they are based on applicable standards/specifications?

2.2 The laboratory has a comprehensive and effective program for the entry into an NPCS to ensure worker safety.

- Has a written procedure been developed that addresses specific measures and precautions that must be taken to safely enter an NPCS?
- Does the procedure specify what conditions and precautions must be in place to allow for safe entry and what would constitute a change in conditions that would require a reevaluation of the confined space?
- Are all employees who will enter a confined space trained in entry procedures, and what conditions would prohibit entry?
- Are NPCSs reevaluated periodically to ensure proper classification?
- Does a qualified person conduct atmospheric testing of the confined space, and, if atmospheric levels are not within acceptable limits after implementation of engineering controls, is entry prohibited?

2.3 The laboratory has a comprehensive and effective program for entry into PRCSs to ensure worker safety.

- What procedural documents provide the guidance that is used to implement a process of entering a PRCS that meets all the requirements of 29 CFR 1910.146, "Permit-Required Confined Spaces"?
- Is a permit established for all PRCS entries and does it include as a minimum—

- The date of entry, the location of entry, and the type of work that will be conducted in the confined space?
- The hazards to be controlled or eliminated before entry?
- Safety equipment required to perform the job and related duties in the confined space?
- Safety precautions required while performing the job?
- The type of atmospheric tests required and the results of those tests?
- The type of equipment that will be necessary for a rescue and how aid will be summoned in the event of an emergency?
- A duration for the permit?
- A space for approval authority?
- Before each entry into a confined space, is an entry permit as defined above completed by a qualified person and the contents communicated to the occupants, or posted, or both?
- For a permit to remain in effect, is the following done before each entry into the confined space:
 - Atmospheric test results within the acceptable limits (Oxygen - 19.5% to 23.5%, Flammability - less than 10% of the Lower Explosive Limit (LEL) or Lower Flammable Limit (LFL), Toxicity - less than recognized Permissible Exposure Limits (PELs) or Threshold Limits Values (TLVs.)
- Does a qualified person verify and document that all precautions and other measures called for on the permit are still in effect? Is the documentation complete and accurate according to the contractor's standard operating procedures?
- Are only operations or work originally approved on the confined space entry permit conducted in the confined space? How does the laboratory monitor, ensure, and document this?
- When conditions or work activity are different than those specified on the permit and when they could introduce a new hazard to the confined space, is the permit immediately revoked and a new permit issued or is the original permit reissued?

2.4 Before entry into a confined space, testing is conducted for hazardous atmospheres by a qualified person.

- Is testing equipment used in hazardous classified areas listed or approved for use in such areas? (Listing or approval is from nationally recognized testing laboratories such as Underwriters Laboratories or Factory Mutual Systems.)
- Are the instruments used for monitoring calibrated at least annually following the manufacturer's recommendations and guides? Are they field-calibrated before and after each use? Is a pre- and post- survey calibration log maintained?
- Is initial testing of atmospheric conditions and subsequent tests after a job has been stopped for a significant time done with the ventilation systems shut down?
- Is further testing conducted with ventilation systems turned on to ensure that the contaminants are removed and that the ventilation system itself is not causing a hazardous condition?
- If the confined space is vacated for any significant time, is the atmosphere of the confined space retested before reentry is permitted?
- Is testing of the confined space conducted throughout the entire portion of the space to be occupied?
- Whenever testing of the atmosphere indicates that oxygen level, flammability, or toxicity are not within acceptable limits, is entry prohibited until appropriate controls are implemented or appropriate personal protective equipment is provided?
- Do procedures require the gathering and analysis of multiple atmospheric samples before classifying confined space atmosphere?
- Are monitoring and measuring instruments in a calibration program and are they used by qualified individuals trained on their uses and limitations?
- If there is the possibility that the confined space atmosphere can become unacceptable while the work is in progress, are procedures and equipment provided to allow the employee to safely exit the confined space?
- Do the laboratory's procedures ensure that subcontractors are aware of their responsibilities with respect to the confined spaces program?

2.5 Attendants are stationed outside any PRCS.

- Is the number of attendants needed determined by a qualified person who considered the personnel needed to carry out the duties?
- Do attendants and occupants remain in constant two-way communication?
- Do attendants provide standby assistance to occupants entering the confined space?
- Does the attendant have the responsibility to direct occupants to exit the confined space when any irregularities are observed?
- Does the attendant initiate evacuation and emergency procedures?
- Does the attendant monitor for any conditions or changes that could adversely effect the entry?
- Does the attendant remain at the entry point unless relieved by another attendant?

2.6 All energy sources that are potentially hazardous to confined-space entrants are secured, relieved, disconnected, and/or restrained (lockout/tagout), before personnel are permitted to enter the confined space.

- Are all hazardous-material, high-pressure, high-temperature, and other piping that could introduce a hazard isolated by using blinding, disconnection, removal, or double block and bleed as needed to prevent entry of material(s) and hazardous contaminant(s)?
- Are there special procedural requirements (i.e., two-man rule, additional reviews or approvals, etc.) for work on pressurized systems in confined spaces?
- Do procedures specifically require workers to isolate and bleed off the system pressure prior to working on a system?
- Are pipelines or similar conveyances between the confined space and point(s) of entry drained, cleaned, or flushed of hazardous material and known hazardous contaminants as necessary?
- Are there operational controls for maintaining the boundaries of pressure systems and components, such as opening of valves that would depressurize into confined spaces?
- Are there operational controls for welding, cutting, and brazing while in confined spaces?

- Are precautions taken to ensure that, whenever drains, vents, or piping are left open, reversal of flows, or air contamination from adjacent processing, or chemical handling, cannot enter the confined space?
- Are equipment or processes locked or tagged out or both per ANSI Z244.1-1982, "Lockout/Tagout of Energy Sources" and 29 CFR 1910.147, "The Control of Hazardous Energy"? Does documentation support use of these references?
- Is lockout or tagout, or both, of equipment, systems, and processes confirmed before entry into the confined space is permitted?
- If tagout is used, can the contractor demonstrate that this method is as protective as lockout?

2.7 When ventilation is used to remove atmospheric contaminants from the confined space, the space is ventilated until the atmosphere is within acceptable ranges.

- Is adequate ventilation maintained during the occupancy of a confined space if there is a potential for the atmospheric conditions of the confined space to change?
- When ventilation is not possible or feasible, are alternate protective measures or methods to remove air contaminants and protect occupants determined by the qualified person before authorizing entry?

2.8 Before entry, confined spaces are cleaned/decontaminated of hazardous materials to the extent feasible.

- Is cleaning/decontamination the preferred method of reducing exposure to hazardous materials?
- Where cleaning/decontamination is not practical, is personal protective equipment worn by the entry personnel to provide appropriate protection against potential hazards?
- Do employees wear personal protective equipment selected in accordance with the requirements of the job to be performed and meeting the specifications of applicable standards?

2.9 Safeguards for work in confined spaces are in place, when required.

- Has each entry and exit point been evaluated to determine the most effective methods and equipment to be used to enable employees to safely enter and exit the confined space?

- Is appropriate retrieval equipment used whenever a person enters a PRCs?
(Exception: If the retrieval equipment increases the overall risks of entry or does not contribute to the rescue, its use may be waived with adequate documentation and implementation of equivalent safeguards for emergency occupant rescue procedures.)
- Is a mechanical device available to retrieve personnel from vertical-type PRCs greater than 5 feet deep?
- Where a potential exists for persons or objects to fall into a confined space, are warning systems or barricades employed at the entrance?
- Are fall-arresting systems worn by personnel entering confined spaces?
- Where there is a potential for electrical shock, is appropriate electrical equipment or systems used (lockout/tagout)?
- Are all confined spaces that could be inadvertently entered posted with a sign identifying them as confined spaces?
- Are such signs maintained in a legible condition?
- For PRCs, does the sign contain a warning that a permit is required before entry?

2.10 A plan of action is written that includes provisions to conduct a timely rescue of individuals in a confined space should an emergency arise.

- Is there a provision to determine what methods of rescue must be implemented to retrieve individuals?
- Are the designated rescue personnel immediately available where PRCs entries are conducted?
- Are there provisions for identifying the type and availability of equipment needed to rescue individuals?
- Are there provisions for an effective means to summon rescuers in a timely manner?
- Are there provisions directing the training and drill of the attendant and rescue personnel in preplanning, rescue, and emergency procedures?
- Do all rescue personnel use self-contained breathing apparatus (SCBA) or Combination Type C Air-line/SCBA breathing equipment, when entering the confined space to rescue victims?

- Is all rescue equipment inspected periodically by a qualified person and before start of work to ensure that it is operable?

2.11 Personnel responsible for supervising, planning, entering or participating in confined-space entry and rescue are adequately trained in their functional duties prior to any confined space entry.

- Does training include an explanation of the general hazards associated with confined spaces?
- Is a discussion of specific confined space hazards associated with the site, location, or operation included?
- Is there training on the proper use, the reason for, and the limitations of personnel protective equipment and other safety equipment required for entry into confined spaces?
- Is there an explanation of the permit system and other procedural requirements for conducting a confined space entry?
- Does the training cover how to respond to emergencies?
- Are the personnel trained in their duties and responsibilities as a member of the confined space entry team?
- Does the training include a description of how to recognize probable air contaminant overexposure symptoms in themselves and co-workers, and method(s) for alerting attendants?
- Does the training for atmospheric monitoring personnel cover the proper use of atmospheric monitoring instruments, including field calibration, basic knowledge of the work being performed, the anticipated hazardous contaminants, and any process that could significantly alter original conditions inside or outside the confined space?
- Does the training for attendants include summoning rescue or other emergency services and the proper use of equipment used for communicating with entry and emergency/rescue personnel?
- Does the training for emergency response personnel cover the rescue plan and procedures developed for each type of confined space they are anticipated to encounter, use of emergency rescue equipment, first aid and CPR, the work location, and confined space configuration to minimize response time?
- Are rescue personnel, who may be required as a condition of their job to render first aid, trained in the requirements of 29 CFR 1910.1030, "Bloodborne Pathogens"?

- Are the governing regulations and proposed standards addressed or described in the training program?
- Does the training program clearly address safety concerns, requirements, and practices to be followed at the site?
- Does the training clearly identify who has responsibility for implementing the confined spaces program?
- Are personnel who are in a position to authorize and control performance of work in PRCSS appropriately trained and instructed so that the required level of safety is maintained?
- Is the training of the confined spaces program entrants provided on a periodic basis?
- Does a review of the training documentation show that the course content is comprehensive and teaching materials and conditions appropriate?
- What process does the laboratory have to ensure that only properly trained workers gain access to the confined spaces program?
- Is a list of qualified entrants available at the worksite?
- If no list is available, how is certainty provided that only qualified entrants gain access to the worksite?
- When the level of responsibility changes (i.e., from entrant to attendant or for authorizing the confined spaces program permits), is additional training provided as required?
- Do interviews with workers show that they understand the importance and application of the confined spaces program at the site?
- Are there special training or certification requirements for individuals who perform rescue activities for personnel entering confined spaces?
- Do procedures establish working agreements with offsite rescue teams to ensure they are aware of the hazards they may confront at the site?
- Is a periodic assessment of the effectiveness of employee training conducted by a qualified person?
- Are training sessions repeated as often as necessary to maintain an acceptable level of personnel competence?

- 2.12** The physical and psychological suitability of persons to work in confined spaces is considered before they enter confined spaces.
- Are the physical and psychological capabilities of potential candidates for confined space work evaluated during training exercises for the confined space work?
- 2.13** There are procedures to allow contractors to work in confined spaces.
- When the laboratory uses contractors to enter confined spaces are the contractors informed of the potential hazards associated with the confined space to be entered?
 - Is preplanning conducted between the contractor and the laboratory to establish who will be responsible to perform rescue and provide medical services in the event of an emergency situation?
 - If the contractor expects to use the laboratory's rescue capabilities, is this agreed on before the entry and is the method of contacting the rescue responder established?
- 2.14** The laboratory's program ensures that site modifications incorporate the required safety design criteria for changes that have the potential to alter the status of a confined space from a low-hazard space to a high-hazard space.
- Are there design processes that ensure that new systems are designed to meet safety criteria with respect to the confined spaces program?
 - Are applicable confined space entry design codes and standards referenced in the modification program for the facilities and are these documents readily accessible?
 - Does the laboratory have an accessible process for documenting the current system design information such that organizations needing to know are informed of applicable design changes?
 - Does the modification allow workers to safely operate and maintain the equipment (e.g., readily available pressure indications, adequate isolation capability, vents to allow depressurization, shields to protect contact from energized components)?

2.15 A walkthrough of the site indicates that the laboratory's program is effective in ensuring that the confined spaces program is implemented.

- Does the walkthrough of the site indicate that the confined space labeling criteria are being met?
- Do site walkthroughs indicate that good practices are being followed by contractor employees while working in PRCs?
- Does a walkthrough of the site indicate that confined spaces are properly classified?
- Do the findings of the walkthrough confirm that the method of atmosphere control or monitoring meets the requirements for classification as a low-hazard confined space?
- Does a review of active confined space permits indicate that all the confined spaces program requirements are being met?
- Does a document review of active burn permits indicate that confined space considerations were included in the initiation of actions?
- Do technicians performing surveys of spaces take multiple samples at multiple levels to account for stratification of gases and vapors?
- Has every reasonable attempt been made to allow for "self-rescue" of entrants (i.e., temporary ramps, or in the case of a long-term tank job, cutting a temporary entry/exit hole instead of using a top-located hatch)?
- Are entrants and attendants aware of the specific hazards of the confined space entry being observed?

3.0 STANDARDS AND REQUIREMENTS

3.1 Specific DOE Orders and Standards.

- DOE O 232.1A, "Occurrence Reporting and Processing of Operations Information."
- DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees."
- DOE 2300.1B, "Audit Resolution and Followup."
- DOE 2321.1B, "Auditing of Programs and Operations."

- DOE 5480.4, "Environmental Protection, Safety, and Health Protection Standards."

3.2 Title 29 CFR Requirements.

- 29 CFR 1910.94(d), "Open Surface Tanks."
- 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response."
- 29 CFR 1910.134, "Respiratory Protection."
- 29 CFR 1910.146, "Permit-Required Confined Spaces."
- 29 CFR 1910.147, "The Control of Hazardous Energy."
- 29 CFR 1910.252, "Welding, Cutting, and Brazing General Requirements."
- 29 CFR 1910.268(o), "Underground Lines."
- 29 CFR 1926.21(b), "Safety Training and Education."
- 29 CFR 1926.352(g), "Fire Prevention."
- 29 CFR 1926.353, "Ventilation and Protection in Welding, Cutting and Heating."

3.3 Other Codes and Standards.

- ANSI Z117.1-1989, "Safety Requirements for Confined Spaces."
- ANSI Z244.1-1982, "Lockout/Tagout of Energy Sources."

4.0 GUIDANCE TO ASSESSOR

This assessment guide is intended to assist in conducting a performance assessment of the confined spaces program. It is not to be considered as all-inclusive, inflexible, or limiting reasonable assessment concentration when lines of inquiry responses dictate that an area must be more thoroughly probed.

Between 1974 and 1977, 276 confined space accidents resulted in 234 deaths and 193 injuries, as found by an OSHA-sponsored study of 20,000 reported industrial accidents. Where multiple deaths occurred, the majority of the victims in each event died while trying to rescue the original entrant from a confined space. This evidence indicates that in addition to untrained workers, untrained or poorly trained rescuers constitute an especially important risk group.

The industry and OSHA both agreed that confined spaces posed a significant hazard for workers. The agency has further determined that the ongoing need for monitoring, testing, and communication at the workplaces that contain entry permit confined spaces can be satisfied only through the implementation of a comprehensive confined space entry program.

The attributes of a comprehensive program are provided above as lines of inquiry regarding procedures, managers, training, etc., and should give the assessor some insight to determine if there is a working program in place. Talking to the confined space workers themselves will let the assessor know if they feel safe working in confined spaces and if they feel the controls are adequate.