

ORDER

U. S. Department of Transportation
Federal Aviation Administration

SO AF 3900 27

7/31/00

SOUTHERN REGION

SUBJ: SOUTHERN REGION CONFINED SPACE PROGRAM

1. **PURPOSE.** The Federal Aviation Administration (FAA), Southern Region, seeks to prevent accidents in the work place by developing employee awareness and employee training on work place safety. The Permit-Required Confined Space (PRCS) Entry Program, as required by 29 CFR 1910.146, is designed to enable employees to operate in and maintain a safe confined space work environment. Based upon surveys performed by both qualified contractors and FAA personnel, the majority of the PRCS within the FAA can be entered utilizing alternate entry procedures or may be reclassified in accordance with 29 CFR 1910.146, with a minimal burden to the entrants. This order prescribes procedures and assigns responsibilities within Airway Facilities (AF) for the implementation of a Confined Space Program. All program requirements are based upon regulatory standards developed by the Occupational Safety and Health Administration (OSHA), 29 CFR 1910.146, Permit-Required Confined Spaces, as well as incorporating elements from the Telecommunications Standard, 29 CFR 1910.268(o)(1)(i) through 29 CFR 1910.268 (o)(5)(ii). The Telecommunications Standard includes procedures for safe entry into confined space that closely resembles manhole entries that may be encountered by AF employees.

2. **DISTRIBUTION.** This order is distributed to section level in the Airway Facilities Division and to all Southern Region Airway Facilities field offices.

3. **DEFINITIONS.**

a. Alternate entry procedures are procedures utilized for entry when the only hazard or potential hazard presented by the confined space is atmospheric and may be eliminated by the use of forced air (see paragraph c5 of 29 CFR 1910.146).

b. Attendant is a person who performs observation and monitoring duties during full entry procedures.

c. Authorized entrant is a person who is authorized and trained to perform entry.

d. Confined space or nonpermit confined space is defined as an area which:

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(1) Is large enough and so configured that an employee can bodily enter and perform assigned work;

(2) Has limited or restricted means of entry or exit (for example: manholes, tanks, vessels, silos, hoppers, vaults, and pits are spaces that may have limited means of entry);

(3) Is not designed for continuous employee occupancy;

e. Full entry procedures are procedures utilizing attendants, entrants, and supervisors which requires communication, retrieval, and rescue equipment.

f. Hazardous atmosphere is an atmosphere that may expose employees to the risk of death, incapacitation, or impairment of the ability to self-rescue.

g. Hot work permit is a permit required for work performed that may produce an ignition point such as welding, cutting, braising, etc.

h. Lower explosive limit/lower flammable limit is the lower limit at which a gas or vapor may explode/ignite.

i. Permit-required confined space is defined as a confined space that has one or more of the following characteristics:

(1) Contains or has the potential to contain a hazardous atmosphere.

(2) Contains a material that has the potential for engulfing an entrant.

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section.

(4) Contains any other recognized serious safety or health hazard.

j. Retrieval system is a system including a winch, tripod, etc., capable of providing nonentry rescues.

4. **POLICY**. It is the policy of the FAA that Southern Region employees will not enter permit required confined spaces, without prior authorization from the regional safety manager, unless alternate entry procedures are utilized or the spaces are reclassified in accordance with 29 CFR 1910.146.

5. **REGULATORY STANDARDS**. Federal regulations governing Permit Required Confined Spaces were promulgated by OSHA and published in 29 CFR 1910.146 dated

April 15, 1993. State and local regulations may exist which place additional requirements in this program area. The regulation, 29 CFR 1910.146, is incorporated herein by reference.

6. RESPONSIBILITIES.

a. The Regional AF Division Manager (ASO-400) is responsible for:

(1) Informing the Associate Administrator for Airway Facilities (AAF-1) and the Regional Administrator in a timely manner of all significant Confined Space Program (CSP) issues in the region.

(2) Ensuring adequate resources are provided to implement a region-wide CSP and that surveys are completed at all confined spaces.

(3) Integrating the CSP into the planning and execution of the overall mission of the AF Division in the region and ensuring the CSP requirements are considered as early as possible in all construction, operation, and other projects and programs.

(4) Ensuring that other division managers are kept informed of CSP activities and issues.

(5) Curtailing or suspending any operation within the AF Division that poses a substantial danger to FAA employees, members of the public, or the environment and recommend such actions, as appropriate, to other division managers in the region.

b. Regional AF Division Resource Management Branch manager (ASO-420) is responsible for:

(1) Implementing training programs for employees who have responsibilities in the CSP, including but not limited to AF maintenance personnel, design engineers, resident engineers, associate program managers and SMO safety officers, and collateral duty safety personnel.

(2) With input from other AF branches, preparing the regional AF Division budget necessary to comply with all CSP requirements.

(3) With input from the regional program manager for environment and safety (RPMES), ensuring that adequate personnel resources are requested for implementing the CSP in a safe manner.

(4) Accounting for all funds expended and requested for CSP related projects in support of the RPMES.

(6) Ensuring that all projects include adequate funding for confined space issues.

c. NAS Implementation Center manager (ANI-300) is responsible for:

(1) Considering CSP requirements as early as possible in all construction, installation, commissioning, modification, and other projects managed by the branch. Prior to any construction project, coordinating with the RPMES to verify that a confined space survey for the affected area has been conducted.

(2) Ensuring review and coordination of project documents that may involve the entrance into confined spaces.

(3) Ensuring that the costs for compliance with project-specific environmental and safety requirements are included in all cost estimates prepared for projects managed by the branch.

(4) Ensuring all personnel are provided with appropriate safety equipment and training as required by this order.

d. Regional AF Division Operations Branch manager (ASO-470) is responsible for:

(1) Considering CSP requirements as early as possible in all construction, installation, commissioning, modification, and other projects managed by the branch.

(2) Ensuring that the costs for compliance with project-specific CSP requirements are included in all cost estimates prepared for projects managed by the branch.

e. Regional safety manager (RSM) is responsible for:

(1) Implementing and managing the CSP for the AF Division in the region.

(2) Approving all reclassified spaces.

(3) Ensuring that documentation associated with the CSP meets applicable regulatory requirements and review of such documentation prepared by the branches and SMO's.

(4) Ensuring routine inspections and audits of CSP activities are conducted.

f. The regional program manager for environment and safety (RPMES) is responsible for ensuring that program and budget requests identify resource requirements to implement the CSP in accordance with this order and applicable laws and regulations.

g. System management office (SMO) manager is responsible for:

(1) Coordinating with the RPMES and RSM to implement the CSP in the SMO/sector.

(2) Considering CSP requirements as early as possible in all construction, installation, commissioning, modification, and other projects managed by the SMO.

(3) Prior to any construction project, coordinating with the SMO safety officer to verify a confined space survey has been conducted of the affected area.

(4) Implementing a CSP at all facilities occupied and/or maintained by AF where confined spaces have been identified or assumed.

(5) Ensuring SMO/sector employees receive training as outlined in this order.

(6) Designating a confined space program coordinator (CSPC) for facility/facilities that contain confined spaces. The CSPC will act as the designated contact for the facility/facilities and shall receive training determined by the level of CSP management required. The CSPC will verify that a confined space survey has been conducted for all suspect facility/facilities, employees are trained in proper standard operating procedures (SOP) before entering confined spaces, these SOP's are utilized before entering confined spaces, and proper records are maintained. One person may serve as the CSPC for more than one local facility.

7. PROGRAM REQUIREMENTS. This section contains two parts: (a) A list of the program elements; and (b) A detailed description of each program element.

a. The following are elements of the Confined Space Program:

(1) Identification of Confined Spaces. Recognizing and identifying all confined spaces in the work area.

(2) Hazard Identification. Identifying and evaluating each hazard of the permit spaces, including determination of severity.

(3) Hazard Control. Establishing and implementing the means, procedures, and practices by which the permit spaces can be entered safely.

(4) Permit System. Establishing a written permit system for the proper preparation, issuance, and implementation of entry permits.

(5) Employee Information. Ensuring that employees are informed about the hazards of confined spaces.

(6) Prevention of Unauthorized Entry. Preventing unauthorized employee entry through such measures as training or by posting signs and barriers as necessary.

(7) Employee Training. Training employees as provided by this standard.

(8) Equipment. Providing, maintaining, and ensuring the proper use of the equipment necessary for safe entry, including testing, monitoring, and personal protective equipment.

(9) Protection from external hazards. Ensuring that all necessary barriers are provided to protect entrants from external hazards.

(10) Multi-Employer Workplaces. Ensuring that when a contractor plans to send employees into a permit space which is under the control of the FAA, the contractor will be provided with all available information on permit space hazards, and on any other work place hazards, safety rules and emergency procedures of which the contractor needs to be aware of in order to comply with this standard.

b. The following is a detailed description of the listed program elements.

(1) Identification of Confined Spaces. The SMO safety officer or designee shall identify and record all confined spaces within the work area using the criteria identified in this order. A master map shall be created on which all confined spaces are identified and marked as confined spaces or permit required confined spaces. A guideline has been supplied in appendix 1 to assist in the determination of confined spaces. The following are examples of PRCS's:

(a) Storage tanks, including spill prevention pits.

(b) Lift stations, including wet and dry wells.

(c) Sewers.

(d) Septic tanks.

(e) Storm water structures.

(f) Boilers.

(g) Man ways.

(h) Tunnels.

(i) Utility vaults.

(j) Dust-collection systems.

(2) Hazard Identification. Conditions in and around a confined space can directly affect the safety of personnel in the confined space. The area around the entrance and throughout the confined space must be surveyed by the entry personnel to detect any hazards. Some hazards of PRCS's have been characterized and are attached in appendix 1 as an example. A blank Permit-Required Confined Spaces Status Form is provided in appendix 1 for your use. The survey, at a minimum, will include:

(a) Potential for discharge of fumes or exhaust from engine powered equipment in and around the space.

(b) Fire potential.

(c) Potential for a sudden flow of water or liquid into or through the confined space.

(d) Existing or potentially hazardous atmospheres in the confined space, such as:

1. Oxygen deficient or enriched atmosphere.

2. Flammable/explosive atmosphere.

3. Toxic or hazardous atmosphere.

(e) Traffic and pedestrian right-of-way interference.

(f) Any other physical hazard that could adversely affect the safety of personnel entering the confined space.

(3) Hazard Control. Once the PRCS's have been surveyed as required in section b.(1) above and the hazards have been identified, the hazards should be evaluated for control using various control procedures; i.e., lock-out/tag-out, atmospheric monitoring, ventilation, etc., and recorded on figured 2 in appendix 1.

(a) Lock-Out/Tag-Out. The PRCS will be isolated (locked out) from hazardous energy sources prior to entry. Certain lockout operations that have to be conducted after entry will be specified on the PRCS entry permit. If blocking and/or isolation requires entry into the PRCS, all provisions for isolation specified on the permit must first be met.

1. Electrical equipment or wiring that may create a hazard will be de-energized, locked, tagged, and tested by trained personnel.

2. Mechanical equipment or apparatuses that may create a hazard in the PRCS will be disconnected or disabled and blocked and locked to prevent movement.

3. All pumps and lines that may cause contaminants or fluids to flow into the PRCS will be disconnected, blinded, locked out, or effectively isolated by other means to prevent engulfment or the development of a hazardous atmosphere.

4. Padlocks with keys will be provided and used for isolation and lockout. Where more than one lock is required, a hasp will be used to hold multiple locks. The only key to each lock will be in the possession of the individual authorized entry at all times.

5. Prior to starting work, designated personnel will ensure that deenergizing or isolation has been accomplished.

6. At the completion of the PRCS work, designated personnel will ensure that isolated systems are returned to service.

(b) Atmospheric Monitoring. Atmospheric testing is required to evaluate the hazards of the PRCS and to verify that acceptable entry conditions exist prior to entry and are maintained while the PRCS is occupied. The atmosphere of a confined space will be analyzed with calibrated, direct-reading, intrinsically safe air monitors. The air monitors will be equipped to monitor for oxygen (O₂), combustible gas (LEL), carbon monoxide (CO), and hydrogen sulfide (H₂S). These air monitors are equipped with both audible and visible alarms to signal the existence of a hazardous condition. (See appendix 2 for standard operating procedures on atmospheric monitoring.) An existing or potentially hazardous atmosphere in the confined space may be:

1. Oxygen deficient or enriched atmosphere.
2. A flammable/explosive atmosphere.
3. A toxic or hazardous atmosphere.

(c) OSHA classifies the following as hazardous atmospheres:

1. An oxygen content less than 19.5 percent or greater than 23.5 percent.
2. Greater than 10 percent of the Lower Flammable Limit (LFL) of a flammable gas, vapor, or mist.

3. An airborne combustible dust at a concentration that obscures vision at a distance of five feet or less.

4. A contaminant that could result in an exposure in excess of the OSHA permissible exposure limit (PEL); when there is no PEL for the substance in question, other sources of information must be used.

5. An atmosphere recognized as immediately dangerous to life or health (IDLH).

(d) Ventilation. Continuous ventilation of the confined space will be conducted to ensure employee safety. An evaluation of the atmospheric hazards associated with the PRCS should be performed so that at no time will employee exposure to airborne contaminants exceed the OSHA permissible exposure limits. Where there are no PEL's, airborne limits shall not exceed NIOSH recommended exposure limits, the American Conference of Governmental Industrial Hygienist Threshold Limit Values, or other published sources such as material safety data sheets. As per 29 CFR 1910.146, the atmosphere of the PRCS must meet the following conditions prior to entry:

1. Atmospheric oxygen must be between 19.5 and 23.5 percent.

2. Flammable gas, vapor, or mist must be less than 10 percent of its lower flammable limit.

3. Airborne combustible dust must be less than its LFL. This concentration may be approximated as a condition in which the dust obscures vision at a distance of five feet or less.

4. Carbon monoxide must be less than 35 PPM.

5. Hydrogen sulfide must be less than 10 PPM.

6. There may be no other atmospheric condition that is immediately dangerous to life or health.

(e) PRCS Entry Procedures. The Permit Required Confined Spaces Status Form, found in figure 2, appendix 1, shall be reviewed before a permit to enter a confined space can be issued. The permit system is described in the section titled Entry Permit System. The evaluation of the PRCS verifies that the information on the hazardous conditions and control measures is still valid. The following procedure will be utilized to define the entry conditions stated on the entry permit:

1. The PRCS will first be evaluated to determine if the hazards within the space (the hazards identified in the Permit Required Confined Spaces

Status Form can be eliminated or controlled prior to entry into the PRCS. The procedure for reclassification of PRCS is detailed in the section below.

2. If the only hazard that cannot be eliminated in the first step (reclassification process) above is a hazardous atmosphere, then alternate entry procedures (detailed in following sections) will be utilized to enter the PRCS.

3. If the PRCS cannot be reclassified or alternate entry procedures cannot be utilized, then full PRCS entry procedures (detailed in appendix 5) will be required to enter the PRCS. It is the Southern Region policy that FAA employees will not enter PRCS's utilizing full PRCS entry procedures without prior authorization of the regional safety manager.

(f) Reclassification of PRCS's. A space classified as a permit-required confined space may be reclassified as a nonpermit confined space under the following procedures:

1. If the PRCS poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the PRCS may be reclassified for as long as all hazards remain eliminated. Entry SOP for reclassified confined spaces can be found in appendix 3.

2. If all hazards cannot be eliminated prior to entering the PRCS, alternate entry procedures may be utilized. Entry SOP for Alternate Entry Procedures can be found in appendix 4.

3. The safety officer or designee shall document the basis for determining that all hazards in a PRCS have been eliminated through a certification that contains the date, the location of the space, and the signature of the person making the determination. A copy of the certification will be made available to each employee entering the space.

4. If hazards arise within the PRCS that has been reclassified, the space will be evacuated, and the safety officer or designee will reevaluate the space. A checklist for reclassified spaces, to assist in the evaluation, can be found in appendix 8.

(g) Alternate Entry Procedures. Alternate entry procedures (See Alternate Entry SOP in appendix 4) that omit the need for attendants and rescue provisions may be utilized provided that, prior to the entry, the entry supervisor verifies:

1. That the only hazard posed by the permit space is an actual or potential hazardous atmosphere.

2. That continuous forced air ventilation alone is sufficient to maintain a safe permit space.

3. That monitoring and inspection data will be performed in accordance with 29 CFR1910.146.

4. That determinations and supporting data are documented and made available to the entrants.

5. That the entry is in accordance with requirements as listed in 29 CFR1910.146 and this program.

(h) Entry into a permit space by alternate entry procedures may be accomplished under the following requirements:

1. Any conditions making it unsafe to remove an entrance cover shall be evaluated before removing the cover, i.e., testing on or around cover.

2. When entrance covers are removed, the opening shall be promptly and effectively guarded.

3. Before entry, internal atmospheres shall be tested with a calibrated direct-reading instrument for the following conditions in the order given:

(aa) Oxygen content.

(bb) Flammable gases and vapors.

(cc) Potential toxic air contaminants.

4. There shall be no hazardous atmospheres within the space whenever any employee is inside the space.

5. Continuous forced air ventilation shall be used as follows:

(aa) Entry will not be permitted until hazardous atmosphere is eliminated.

(bb) Ventilation shall be directed to the immediate areas where employees are or will be present and shall continue until all employees have left the space.

(cc) The air supply shall be from a clean source and may not increase the hazards in the space.

6. The atmosphere within the space shall be periodically tested as necessary to ensure that the ventilation is adequate.

7. If a hazardous atmosphere is detected during or after entry:

(aa) Each employee shall leave the space immediately.

(bb) The space shall be evaluated to determine how the hazardous atmosphere developed.

(cc) Measures shall be taken to protect the employees from a hazardous atmosphere before subsequent entry.

(dd) The entry supervisor shall certify in writing that the space is safe for reentry and that all of the above requirements have been met. An alternate checklist to assist in the evaluation can be found in appendix 9.

(ee) The certification shall be made available to each employee before reentry.

(i) PRCS Entry Permit. All PRCS entry operations will be conducted in accordance with a PRCS entry permit system. The PRCS entry permit is an authorization and approval in writing that:

1. Specifies the location and type of work to be performed.
2. Certifies that all existing hazards have been evaluated by a qualified person.

3. Certifies that the necessary protective measures have been followed and to ensure the safety of each worker prior to and during both entry and exit from the PRCS. Ventilation shall be directed to the immediate areas where employees are or will be present and shall continue. The permit in appendix 6 contains an evaluation checklist to assist supervisors, attendants, entrants, and persons authorizing entries in making safe entries. Nonpermit required confined spaces pose no actual or potential hazards. A nonpermit required space must be evaluated for actual or potential hazards before each entry, in order to maintain its nonpermit-required status. The confined space checklist to be used is found in appendix 7 and is based on the form provided by OSHA in 29 CFR 1910.146. The confined space permit will identify and contain the following.

(aa) The permit space to be entered.

- (bb) The purpose of the entry.
- (cc) The date and authorized duration of the entry permit.
- (dd) The authorized entrants within the permit space.
- (ee) The personnel serving as attendants.
- (ff) The individual serving as entry supervisor.
- (gg) The hazards of the permit space to be entered.
- (hh) The measures used to isolate the permit space and to eliminate or control hazards before entry.
- (ii) The acceptable entry conditions.
- (jj) The results of initial and periodic tests performed and the identification of the testing and monitoring equipment used, accompanied by the initials of the person performing the test and the time tests were performed.
- (kk) The rescue and emergency services that are on call and the method of contact if required.
- (ll) The communication procedures to be used by the authorized entrants and the attendants to maintain contact.
- (mm) Equipment to be provided for entry operations (i.e., ventilation equipment, monitoring equipment, PPE, ladders, water pumps, etc.).
- (nn) Other information necessary to ensure employee safety.
- (oo) Any additional permits issued (hot work permit, etc.).
- (pp) A space for the authorization and approval by the entry supervisor.
- (qq) A space for the approval by the regional safety manager if full entry procedures are to be utilized.

(4) Entry Permit System. Prior to employee entry into a PRCS, the entry permit will be completed and approved by the entry supervisor. During the PRCS entry operation, the entry permit will be conspicuously displayed immediately adjacent to the PRCS. A copy of the completed and signed entry permit will also be retained by the safety officer or designee. The duration of the permit may not exceed the time required to complete the work. Upon completion of the work in the PRCS, the permit is canceled by the entry supervisor. After an entry permit has expired, a new entry permit must be issued. A permit will not be valid for a period of more than eight hours or one session of entry into a confined space. The old permit must be canceled and a new permit issued upon a change in entry supervisor or other shift changes. Any problems regarding the PRCS entry will be noted by the entry supervisor on the permit and immediately conveyed to the safety officer or designee. A PRCS entry permit may be canceled at any time by the entry supervisor, and entry into the PRCS will be terminated if a prohibited condition occurs in or near the PRCS. Emergency evacuation of a PRCS will be grounds for cancellation of the permit. Canceled PRCS permits will be kept by the safety officer or designee for a minimum of one year in order to review the entry permits and the permit system. If atmospheric sampling establishes employee exposure in excess of PEL's, records of the sample results will be maintained in accordance with 29 CFR 1910.1020, Access to Employee Exposure and Medical Records. Review of the entry permit will also be conducted whenever there is:

- (a) Any unauthorized entry into a PRCS;
- (b) Detection of a hazardous condition not covered by the entry permit;
- (c) An injury or near-miss during entry;
- (d) A change in the use or configuration of a PRCS; or
- (e) An employee complaint about the effectiveness of the program.

(5) Employee Information. If the workplace contains permit spaces, the employer shall inform exposed employees, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces.

(6) Prevention of Unauthorized Entry. All employees who work in and around PRCS's will be included in the PRCS program and will have, as a minimum, completed the training required by this program. Access and entry points into PRCS's shall be controlled by keys, bolts, and the weight of covers as appropriate. Where maintenance is being performed, unauthorized personnel are to be prevented from entering confined spaces through such measures as posting signs and barriers as deemed necessary.

(7) Employee Training. All employees who work in PRCS's will be properly trained before being assigned to work.

(a) Refresher training will be conducted whenever:

1. Job duties change.
2. The hazards in the PRCS change.
3. Whenever evaluation determines inadequacies in the employees' knowledge.

(b) Employees will receive training appropriate to their job duties and responsibilities in the PRCS. Training will incorporate:

1. Hands-on use and inspection of equipment.
2. Actual entries into confined spaces.
3. PRCS Alternate Entry Procedures.

(c) The immediate supervisor will ensure that workers are trained in the use of personal protective equipment (PPE) as per OSHA's PPE standard 29 CFR 1910.132-137. This training will include:

1. When PPE is necessary
2. What PPE is necessary and the limitations of PPE.
3. How to wear PPE.
4. The proper care and maintenance of the PPE.

(d) The safety officer or designee will certify that training has been conducted. The training certification will include:

1. The employee's name.
2. The signature of the trainer(s).
3. The date of the training.

4. An outline of the training topics.

(e) Authorized entrant training will include (required for full PRCS and alternate entry):

1. Hazards that may be faced during entry, including information on the mode, signs, or symptoms, and the consequences of exposure.

2. How to properly use communications equipment in order to maintain communication with the attendant (for full procedures only).

3. When to alert the attendant (for full procedures only):

(aa) When there is an alarm.

(bb) When a warning symptom occurs.

(cc) Other hazardous or prohibited conditions exist.

(dd) How and when to use the following equipment

and its limitations:

(1) Personal protective equipment

entry procedures only).

(2) Mechanical retrieval systems (for full

(3) Ventilating equipment.

(4) Direct-reading multi-gas monitors.

(5) Lighting equipment.

(6) Barriers and shields.

(7) Other equipment as necessary.

procedures.

(ee) Entry permit system and routine entry

(ff) Isolation and lockout/tagout procedures.

procedures only).

(gg) Emergency and rescue procedures (for full

(hh) When to evacuate the PRCS.

- (for full procedures only).
sign or symptom of exposure.
condition.
- (1) When the attendant orders evacuation
 - (2) When the entrants recognize a warning
 - (3) When the entrants detect a prohibited
 - (4) When an evacuation alarm is activated.

(f) Attendant training will include (required for full entry procedures):

1. Hazards that may be faced during entry, including information on the mode, signs, or symptoms, and the consequences of exposure.
2. Possible behavioral effects of hazard exposure in entrants.
3. How to monitor conditions both inside and outside the PRCS in order to determine if the entrants are safe.
4. How to properly use communications equipment in order to maintain communication with the entrants.
5. For what and when to use the following equipment:
 - (aa) Personal protective equipment.
 - (bb) Mechanical retrieval systems.
 - (cc) Ventilating equipment.
 - (dd) Direct-reading air monitors.
 - (ee) Lighting equipment.
 - (ff) Barriers and shields.
 - (gg) Other equipment as necessary.
6. Entry permit system and routine entry procedures.

7. Isolation and lockout/tagout procedures.
8. Emergency and rescue procedures including performing nonentry rescues if required.
9. Monitoring and protecting the safety of the entrants.
10. Maintaining an accurate and continuous count of all authorized entrants.
11. Communicating with entrants as necessary to monitor entrant status.
12. Remaining on duty outside the PRCS at all times during entry operations until relieved by another attendant.
13. Evacuating the PRCS.
14. Preventing unauthorized entry into the PRCS.
15. Summoning and coordinating rescue.
16. Basic first aid and cardiopulmonary resuscitation.

(g) Entry supervisor training will include (required for reclassification and full entry procedures):

1. Hazards that may be faced during entry, including information on the mode, signs, or symptoms, and the consequences of exposure.
2. Possible behavioral effects of hazard exposure in entrants.
3. The procedures used to verify that all tests have been conducted and that all procedures and equipment are in place before signing (endorsing) the entry permit.
4. The procedures used to terminate entry and cancel permits.
5. The procedures used to verify that rescue services are available and the means to summon them are effective.
6. The procedures used to remove unauthorized individuals who enter PRCS's.

7. The procedures used to ensure that entry operations remain consistent and that acceptable entry conditions are maintained.

8. Basic first aid and cardiopulmonary resuscitation (required under full entry procedures only).

(h) Training will not be considered complete until the safety officer or designated supervisor or other training official determines that the employee has attained an acceptable level of proficiency for working in confined spaces. The trainee's judgment of the adequacy of his/her training will be properly considered.

(8) Equipment. Each organizational unit authorizing confined space entries will have access to the following equipment at no cost to the employees and will be required to maintain the equipment properly and ensure that employees use the equipment properly. The equipment provided will include:

(a) Direct-reading, multi-gas air monitors (See section titled Air Monitoring Equipment).

(b) Explosion-proof ventilating equipment that provides positive pressure ventilation.

(c) Intrinsically safe flashlights and other lighting equipment so employees can see well enough to work safely and exit the space quickly in an emergency.

(d) Barriers and shields.

(e) Appropriate personal protective equipment for all personnel will include:

1. Full coverage work clothing.

2. Appropriate foot, eye, and head protection.

(f) Equipment such as ladders needed for safe ingress and egress.

(g) Lockout/tagout equipment to isolate hazardous energy sources.

(h) Air monitoring equipment. Air monitors will be capable of simultaneously measuring percent LEL, carbon monoxide, hydrogen sulfide, and oxygen in the range of concentrations specified by this program and 29 CFR 1910.146. All monitors will have the necessary attachments to provide remote confined space testing and will be maintained and calibrated according to manufacturer's recommendations.

(i) Rescue equipment. FAA personnel are not allowed to enter PRCS's using full entry procedures without contacting the regional office. Therefore, no emergency rescue and retrieval equipment is furnished or provided. If a rescue is needed, the appropriate local emergency rescue team will be contacted. FAA contractors shall be required by contract to provide their own PRCS procedures and equipment.

(9) Protection from External Hazards. Precautions to protect entrants from external hazards may include posting signs to warn of maintenance and installing/establishing barriers to prevent or reroute vehicular or pedestrian traffic. Pumps may be required in the event water accumulates in the confined space. Should the potential exist where dirt or other debris has the ability to enter the confined space causing entrapment to the entrant, barriers shall be installed to prevent such occurrences.

(10) Multi-Employer Work places. To ensure that contractors work safely at FAA facilities, the facility manager and project manager and/or resident engineer or COR shall verify that the following actions are completed:

(a) The contract includes the requirement that the contractor utilize the proper shoring if required and utilize proper SOP's for entry into PRCS's.

(b) When construction activities have progressed to the point that a confined space has been created, the confined space must be evaluated to determine if it is a permit required confined space and to ensure that it is included in the PRCS program.

(c) Add a check on the joint acceptance inspection (JAI) to verify that the construction has been evaluated to determine if there are new PRCS's as a result of the construction.


for William L. Lindsey
Manager, Airway Facilities Division

SO APPENDIX 1. GUIDELINE FOR DETERMINING CONFINED SPACES
STANDARD OPERATING PROCEDURES

Facility Name: _____

Type (electric manhole, sewer manhole): _____

Location: _____

The following criteria is to be used to determine if the space listed above is considered a confined space.

- _____ The space is enclosed.
- _____ The space is large enough and so configured that an employee can bodily enter and perform assigned work
- _____ The space has limited or restricted means for entry or exit, e.g., tanks, vessels, vaults, pits and diked areas.
- _____ The space is not designed for continuous employee occupancy.

If all four blanks listed above have been checked, the space in question is a **confined space**.

The following criteria is to be used to determine if the confined space is a permit required confined space.

- _____ The space contains a hazardous atmosphere or a reasonable potential to contain a hazardous atmosphere.
- _____ A material with the potential for engulfment of an entrant is present in or around the space, e.g., sand, liquid, etc.
- _____ The space has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to smaller cross section around the space, e.g., sand, liquid, etc.
- _____ The space has some other recognized serious safety or health hazard.

If any of these last four blanks has been checked, the space is a **Permit Required Confined Space**. If none of the blanks have been checked, the space is a **Non-Permit Required Confined Space**. Record all confined spaces on the master map.

SO APPENDIX 1. GUIDE
FIGURE 1. EXAMPLES OF PERMIT-REQUIRED CONFINED SPACES

<u>DESCRIPTION</u>	<u>HAZARD</u>	<u>ALTERNATE ENTRY ACCEPTABLE</u>	<u>RECLASSIFIABLE</u>	<u>STEPS NECESSARY TO RECLASSIFY</u>
<u>Tanks</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>No</u>	<u>No</u>	<u>N/A</u>
<u>Lift Stations</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>
<u>Sewers</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>
<u>Septic Tanks</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>No</u>	<u>Ensure O2 content is 19.5 - 21.5 percent, Ensure LFL is < 10 percent, Ensure H2S is < 10 ppm</u>
<u>Stormwater Structures</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>Yes</u>	<u>Ensure O2 content is 19.5 - 21.5 percent, Ensure LFL is < 10 percent, Ensure H2S is < 10 ppm</u>
<u>Boilers</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>Yes</u>	<u>Ensure O2 content is 19.5 - 21.5 percent, Ensure LFL is < 10 percent, Ensure H2S is < 10 < 10 ppm</u>
<u>Man ways</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>Yes</u>	<u>Ensure O2 content is 19.5 - 21.5 percent, Ensure LFL is < 10 percent, Ensure H2S is < 10 ppm</u>
<u>Tunnels</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>Yes</u>	<u>Ensure O2 content is 19.5 - 21.5 percent, Ensure LFL is < 10 percent, Ensure H2S is < 10 ppm</u>
<u>Utility Vaults</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>Yes</u>	<u>Ensure O2 content is 19.5 - 21.5 percent, Ensure LFL is < 10 percent, Ensure H2S is < 10 ppm</u>
<u>HVAC Units</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>Yes</u>	<u>Ensure O2 content is 19.5 - 21.5 percent, Ensure LFL is < 10 percent, Ensure H2S is < 10 ppm</u>
<u>Dust Collection Systems</u>	<u>Flammability, Toxic Atmosphere, Oxygen Deficiency</u>	<u>Yes</u>	<u>Yes</u>	<u>Ensure O2 content is 19.5 - 21.5 percent, Ensure LFL is < 10 percent, Ensure H2S is < 10 ppm</u>

SO APPENDIX 2.
STANDARD OPERATING PROCEDURES
CONFINED SPACE ATMOSPHERIC MONITORING

Areas to be tested: All permit-required confined spaces to include tanks, lift stations, sewers, septic tanks, storm water structures, boilers, man ways, tunnels, utility vaults dust collection systems, certain HVAC units

This standard operating procedure provides guidance for the atmospheric testing of confined spaces. This standard operating procedure has the following limitations:

- Testing limited to personnel who have been trained in the testing equipment and procedures.
- Testing limited to those tests that can be performed from outside of the confined space.
- Oxygen content limited to the range of 19.5 percent - 21.5 percent.
- Contaminant limited to concentrations below the appropriate PEL/TLV
- Lower flammable limit, limited to less than 10 percent.
- Carbon monoxide limited to less than 35 ppm.
- Hydrogen sulfide limited to less than 10 ppm.

EQUIPMENT:

Tools and Supplies:

1. Bronze or other nonsparking tools required to lift manhole covers, etc.
2. Multigas monitoring instrument with extension probe.
3. Calibration kit.
4. Isolating devices for energized systems.

Personal Protective Equipment (PPE):

1. Eye protection.
2. Hand protection.
3. Foot protection.
4. Hearing protection (if working in high noise area).
5. Hard hat (if working in areas with overhead activity).

SO APPENDIX 2.
METHODOLOGY

The following procedures must be followed, as listed, prior to and during atmospheric testing of confined spaces:

1. Assemble necessary equipment to calibrate multi-gas monitor.
2. Calibrate multigas monitor per the manufacturer's operating manual.
3. Check-off and sign calibration log provided in appendix 2.
4. Attach probe to monitor, if not attached during calibration.
5. If dangerous gases are present, stop all work and contact authorizing official listed on permit. If dangerous gases are not present at outside of entrance, access the confined space utilizing nonsparking tools if necessary.
6. Without entering the confined space, test atmosphere inside the space utilizing the extension probe at 1-foot intervals until bottom is reached. Sample at each interval the length of time required by the manufacturer's instructions. Record worst case readings on permit.
7. If hazardous atmospheric conditions (O₂ not in range of 19.5 percent - 21.5 percent, LFL less than 10 percent, and contaminant at or below the appropriate PEL/TLV) are encountered which can be eliminated by use of continuous ventilation, ventilate space for a minimum of 15 minutes. Retest space using previously listed methods (step 7) and verify the hazardous atmospheric conditions are eliminated. Continue ventilation of the confined space throughout the confined space entry. If hazardous atmospheres cannot be eliminated, do not enter confined space and contact safety officer or designee.
8. Detach probe and install monitor on person for individual monitoring before entering the confined space. The monitor will provide continuous readings while in the confined space.

SO APPENDIX 3.
STANDARD OPERATING PROCEDURES
ENTRY PROCEDURES FOR RECLASSIFIED CONFINED SPACES

This standard operating procedure provides guidance for the entry into reclassified confined spaces. This standard operating procedure has the following limitations:

- All hazards within the space must be eliminated prior to entry.
- All potential hazards within the space must be eliminated prior to entry.

EQUIPMENT:

Tools and Supplies, PPE:

1. Bronze or other nonsparking tools required to lift manhole covers, etc.
2. Calibrated multigas monitoring instrument with extension probe.
3. Confined space entry permit.
4. Glasses/goggles.
5. Hard hat.
6. Gloves.
7. Protective clothing.
8. Hearing protectors (if necessary).
9. Face shield (if necessary).
10. Communications system (radios, telephone, hand signals).
11. Lighting (if necessary).
12. Barriers/barricades.
13. Foot and hand protection (if necessary).

SO APPENDIX 3.
METHODOLOGY

The following procedures must be followed, as listed, prior to, during and after entry into a reclassified permit-required confined space:

1. Obtain confined space entry permit.
2. Assemble necessary equipment to gain access to the permit-required confined space.
3. Calibrate monitoring equipment or ensure calibration
4. Test atmosphere around outside of entrance to confined space to ensure that no dangerous gases are present or leaking around cover (See Confined Space Atmospheric Monitoring SOP in appendix 2).
5. If dangerous gases are not present around outside of entrance, install barriers/guards as necessary and gain access to confined space utilizing nonsparking tools.
6. Without entering the confined space, test atmosphere inside the space for oxygen content, flammable gases and vapors, and toxic air contaminants utilizing the extension probe at one foot intervals until bottom is reached. Ensure that there is no potential for atmospheric hazards and that other hazards can be eliminated without entering the confined space.
7. Once mechanical and electrical hazards have been eliminated (if present), and no actual or potential atmospheric hazards exist, the entry supervisor will verify that the PRCS has been reclassified and successfully controlled. The entrant will detach the probe on the monitor and wear the monitor for continuous monitoring throughout the PRCS entry.
8. If hazardous atmospheric conditions are encountered, stop all work, exit the confined space, contact authorizing official listed on permit, and proceed to the Alternate Entry SOP in appendix 2.
9. Upon completion of work within confined space, debrief personnel on any problems, terminate confined space entry permit and present permit to appropriate person for filing.

SO APPENDIX 4.
STANDARD OPERATING PROCEDURES
ALTERNATE ENTRY PROCEDURES

1. This standard operating procedure provides guidance for the entry into confined spaces utilizing Alternate Entry Procedures. This standard operating procedure has the following limitations:
2. Entry by alternate procedures is limited to spaces where the only hazard posed is an actual or potentially hazardous atmosphere.
3. Entry by alternate procedures is limited to spaces where continuous forced air ventilation alone is sufficient to maintain a safe permit space.

EQUIPMENT:

Tools and Supplies, PPE:

1. Bronze or other nonsparking tools required to lift manhole covers, etc.
2. Calibrated multigas monitoring instrument with extension probe.
3. Confined space entry permit.
4. Glasses/goggles.
5. Hard hat.
6. Gloves.
7. Protective clothing.
8. Hearing protectors (if necessary).
9. Face shield (if necessary).
10. Communications system (radios, telephone, hand signals).
11. Lighting (if necessary).
12. Ventilation equipment.
13. Barriers/barricades.
14. Foot and hand protection (if necessary)

SO APPENDIX 4. METHODOLOGY

The following procedures must be followed, as listed, prior to, during and after entry into a permit-required confined space by alternate entry procedures:

1. Obtain confined space entry permit.
2. Assemble necessary equipment to gain access to the permit-required confined space.
3. Calibrate monitoring equipment/ensure calibration
4. Test atmosphere around outside of entrance to confined space to ensure that no dangerous gases are present or leaking around cover (See Confined Space Atmospheric Monitoring SOP). If cover is open, proceed to step 5.
5. If dangerous gases are not present around outside of entrance, install barriers/guards as necessary and gain access to confined space utilizing non sparking tools.
6. Set up ventilation equipment for the continuous ventilation of confined space. Follow all manufacturers' instructions.
7. Ventilate space for a minimum of 15 minutes before testing. **Ventilation shall continue for the duration of the work.**
8. Without entering the confined space, test atmosphere inside the space for oxygen content, flammable gases and vapors, and potential toxic air contaminants (contaminant at or above the appropriate PEL/TLV) utilizing the extension probe at 1-foot intervals until bottom is reached.
9. If hazardous atmospheres are not eliminated, stop all work and contact authorizing official listed on permit.
10. If hazards are eliminated, detach probe and install monitor on entrant for continuous individual monitoring before entering confined space.
11. Upon completion of work within confined space, debrief personnel on any problems, terminate confined space entry permit and present permit to appropriate person for filing.

SO APPENDIX 5.
STANDARD OPERATING PROCEDURES
FULL ENTRY PROCEDURES

WARNING !: This document is provided only for guidance to evaluate a contractor's "full entry" work plan. As a minimum, the contractor's submittal shall include the following steps, and shall be limited to:

- Outside contractors.
- Personnel trained in accordance with 29 CFR 1910.146.

EQUIPMENT: (All tools and supplies listed for entry will be provided by the contractor.)

Tools and Supplies, PPE:

1. Bronze or other nonsparking tools required to lift manhole covers, etc.
2. Calibrated multigas monitoring instrument with extension probe.
3. Confined space entry permit.
4. Respirator (SCBA, full-face cartridge as necessary).
5. Glasses/goggles.
6. Hard hat.
7. Gloves.
8. Protective clothing.
9. Hearing protectors (if necessary).
10. Face shield (if necessary).
11. Life line, lanyard.
12. Retrieval line, harness, or wristlets.
13. Tripod, winch.
14. Communications system (radios, telephone, hand signals).
15. Lighting.
16. Ventilation equipment.
17. Barriers/barricades.
18. Foot and hand protection (if necessary).

SO APPENDIX 5. METHODOLOGY

The following procedures must be followed, as listed, prior to, during and after entry into a permit-required confined space:

1. Obtain confined space entry permit.
2. Assemble necessary equipment to gain access to the permit-required confined space.
3. Calibrate monitoring equipment or ensure calibration.
4. Brief all personnel required for entry on expected hazards, communication, escape and emergency procedures and contact numbers.
5. Check all personnel for training documentation.
6. Ensure that all personnel on entry team are familiar and current on training.
7. Designate personnel as attendant(s) or authorized entrants.
8. Contact designated rescue personnel and brief on confined space project.
9. Test atmosphere around outside of entrance to confined space to ensure that no dangerous gases are present or leaking around cover (See Confined Space Atmospheric Monitoring SOP).
10. If dangerous gases are not present at outside of entrance, gain access to confined space utilizing non sparking tools if necessary.
11. Without entering the confined space, test atmosphere inside the space utilizing the extension probe at 1-foot intervals until bottom is reached.
12. Entry supervisor will verify that PRCS is safe to enter.
13. Don appropriate PPE.
14. Detach probe and install monitor on personnel for continuous individual monitoring before entering confined space. Ventilate confined space continually throughout the confined space entry operation.
15. Upon completion of work within confined space, debrief personnel on any problems, terminate confined space entry permit and present permit to appropriate person for filing.

SO APPENDIX 6. CONFINED SPACE ENTRY PERMIT

Location of Work: _____

Description of Work: _____

Be specific and detailed in your narrative (i.e., spray painting, cutting/grinding/sanding, cleaning, (cleaning products) gluing, welding, other chemical use)

Entry Date: ___/___/___ **Entry Time:** ___:___ a.m./p.m. **Exit Time:** ___:___ a.m./p.m.

Outside contractor (if applicable): _____

Entry Status:

Permit space may be temporarily reclassified to non permit status: Yes/No

Alternate entry procedures may be utilized: Yes/No

Entry limited to full permit entry procedures: Yes/No

Authorized supervisor (if necessary): _____

Attendant (if necessary): _____

Authorized entrants: _____

Hazards and work discussed: _____

SO APPENDIX 6. SPECIAL REQUIREMENTS (YES OR NO):

	YES	NO		YES	NO
Lock-Out/tag out	()	()	Disconnect lines	()	()
Non sparking tools	()	()	External barriers	()	()
Retrieval line	()	()	Hot work permit	()	()
Ventilation	()	()	Inerting	()	()
Blocking, blanking	()	()	Lighting	()	()
Purging	()	()	Respirator	()	()
Protective clothing	()	()	Tripod/hoisting	()	()

Calibration Record: Calibrate the air-monitoring equipment per manufacturer's instructions. Record the necessary information in this section.

Instrument brand: _____ **Instrument model:** _____

Instrument serial number: _____

Tester's name: _____

Tester's signature: _____

Atmospheric testing: (record worst case readings):

Oxygen content: _____ Lower flammable limit: _____
(19.5 percent - 23.5 percent) (less than 10 percent)

Carbon monoxide: _____ Hydrogen sulfide: _____
(less than 35 ppm) (less than 10 ppm)

CAUTION: If conditions outside the limits are encountered, cease all work immediately and contact the authorizing official below.

Date of testing: ____/____/____ **Time of testing:** ____:____ a.m./p.m.

7/31/00

SO AF 3900.27
SO Appendix 6

SO APPENDIX 6. EMERGENCY/RESCUE NAMES AND TELEPHONE NUMBERS:

Name: _____ Number: _____

Name: _____ Number: _____

Name: _____ Number: _____

Entry authorized by:

SO APPENDIX 7. CONFINED SPACE ENTRY
CHECK LIST

	YES	NO
Is entry necessary?	()	()
TESTING		
Are the instruments used in atmospheric testing properly calibrated?	()	()
Was the atmosphere in the confined space tested?	()	()
Was Oxygen at least 19.5 percent and not more than 21.5 percent?	()	()
Is the atmosphere at or below 10 percent of the LEL?	()	()
Were toxic or oxygen-displacing gases/vapors present?	()	()
MONITORING		
Will the atmosphere in the space be monitored continuously while work is going on?	()	()
VENTILATION		
Has the space been ventilated before entry?	()	()
Will ventilation be continued during entry?	()	()
Is the air intake for the ventilation system located in an area that is free of combustible dusts and vapors and toxic substances?	()	()
If atmosphere was found to be unacceptable and then ventilated, was it retested before entry?	()	()
ISOLATION		
Has the space been isolated from other systems?	()	()
Has electrical equipment been locked out?	()	()
Have disconnects been used where possible?	()	()
Has mechanical equipment been blocked, checked, and disengaged where necessary?	()	()
Have lines under pressure been blanked and bled?	()	()

SO APPENDIX 7. CLOTHING/EQUIPMENT

YES NO

Is the proper PPE present? () ()

Are special tools required for this project? () ()

Communication device available to notify outside emergency assistance. () ()

TRAINING

Have personnel been trained in confined space entry? () ()

Are personnel able to recognize potential hazards? () ()

Is the attendant trained in CPR/first aid? () ()

PERMIT

Has a confined space entry permit been issued? () ()

Does the permit include a list of emergency telephone numbers? () ()

SO APPENDIX 8. CONFINED SPACE REENTRY
CHECK LIST FOR RECLASSIFIED CONFINED SPACES

- | | YES | NO |
|---|-----|-----|
| 1. Does your survey of the surrounding area show it to be free of hazards such as drifting vapors from tanks, piping, etc.? | () | () |
| 2. Does your knowledge indicate this area is likely to remain free of dangerous air contaminants while occupied? | () | () |
| 3. Is the person operating the multigas monitor trained to use that particular piece of equipment? | () | () |
| 4. Has a gas monitor functional test been performed this shift on the gas monitor to be used? | () | () |
| 5. Was the atmosphere of the confined space tested prior to entry? | () | () |
| 6. Did the atmosphere check as acceptable (no alarms given)? | () | () |
| 7. Go to Alternate Entry Procedures SOP in appendix 2. | | |

**SO APPENDIX 9. CONFINED SPACE RE-ENTRY
CHECK LIST FOR ALTERNATE ENTRY PROCEDURES**

- | | YES | NO |
|---|-----|-----|
| 1. Does your survey show the confined space to be free of nonatmospheric hazards? | () | () |
| 2. Does your knowledge indicate this space is likely to remain free of nonatmospheric hazards? | () | () |
| 3. Has the confined space been ventilated for a minimum of 15 minutes? | () | () |
| 4. Will the confined space be continuously ventilated for the duration of the entry? | () | () |
| 5. Is the person operating the multigas monitor trained to use that particular piece of equipment? | () | () |
| 6. Has a gas monitor functional test been performed this shift on the gas monitor to be used? | () | () |
| 7. Will the atmosphere of the confined space be tested prior to entry? | () | () |
| 8. Does the atmosphere of the confined space check as acceptable (no alarms given)? | () | () |
| 9. Will the atmosphere of the confined space be continuously monitored while the space is occupied? | () | () |

IF THE ANSWER TO ANY QUESTION IS NO, STOP ALL WORK AND CONTACT THE AUTHORIZING OFFICIAL LISTED ON THE PERMIT.