

Permit-Required Confined Space Entry from an Expert Witness's Perspective

**Verne R. Brown, Ph.D.
President
ENMET Corporation
Ann Arbor, MI**

Introduction

Whether the arena is athletic competition, military confrontation, industrial espionage, investing into the stock market, or regulatory compliance, one tenet remains undeniably paramount—“Forewarned is Forearmed!” Thus, the purpose of this paper is to alert employers conducting confined space entry operations of the more frequently cited aspects of such activities by state and federal OSHA that have led to contested cases requiring expert witness participation.

Many articles have been written on the topic of confined space entry since federal OSHA issued the final rule in early 1993. However, very few have ever focused on the ugly “back story” of this topic—what alleged violations are cited when major disaster strikes, serious injuries and/or fatalities occur, citations are issued, fines are levied, and the matter heads for the courtroom. Welcome to the world of OSHA solicitors, plaintiff’s and defendant’s lawyers, administrative law judges, expert witnesses, and (sometimes) criminal charges from grand jury indictments!

The purpose of this paper will be to assist employers in identifying those critical aspects of their maintenance operations which may need special emphasis in order that their OSHA compliant permit-required confined space entry program will be free from incident and possible citations. The comments and advice from the author represent precepts gleaned from his participation in over 30 expert witness cases since 1976 in the confined space area.

Since the permit-required confined space topic is so varied in its dimensions and compliance requirements, it is first necessary to restrict the scope of this discussion to only a few of the key issues that could possibly lead to contested cases such as:

- Application of General Industry vs. Construction Safety Standards
- Classification of Spaces (Permit/Non-Permit, etc.)
- Air Quality Testing
- Ventilation
- Permit System/Permit Content
- Rescue Requirements
- Training and Duties of Key Personnel

Since the promulgation of the final rule in 1993, have been the three most frequently cited, fined, and contested areas of the author’s expert witness activity in this field have been

1. General industry versus Construction,
2. Classification of Spaces, and
3. Rescue Requirements.

Let's briefly review some aspects of the key contested issues inherent to these topics.

General Industry Versus Construction

Paragraph (a) of 1910.146 specifically exempts "agriculture construction and shipyard employment" from compliance with the Permit-Required Confined Space rule. For years, the moment a backhoe, "bobcat," or crane was at the job site (or even if the word "construction" was painted on the door of a pick-up truck) employers have often claimed exemption from 1910.146 and at best, followed bare minimal compliance with CFR1926(b)(6), the confined space rule for construction from the 1970s. Some salient points should be noted here: OSHA has clearly distinguished and classified maintenance, rehabilitation, re-lining, and so on, as general industry tasks, while only true building of the space (or major reconstruction) should fall under construction regulation. The CFR1926 construction regulation is weak, limited, and fails to cover rescue, air monitoring, multi-employer worksites, and classification of spaces among other deficiencies.

In the absence of a current rigorous confined space rule for true construction work, many large host employers and mega-project managers have required all sub-contractors to follow 1910.146 even though the site was really a bona fide construction site. (The Boston, Mass "Big Dig" project was a good example of this practice.) As a result of some combination of the above circumstances, certain employers failed to follow 1910.146 practices at sewer relining projects, tank entry, and wet well-pump maintenance operations, with disastrous consequences. None of the author's expert witness assignments in the area of general industry versus construction was ever adjudicated in favor of the employers' contention that 1926.21(b)(6) was the appropriate standard for compliance when basic maintenance of an existing confined space was the task being performed.^{1,2}

Classification of Spaces

In its general requirements section, CFR1910.146 (c)(a) states that an employer must evaluate work spaces at their facilities for the possible presence of "permit-required confined spaces," as given in the definition in Section (b) of the regulations. The evaluation of the workspace and the

¹ *Author's Note:* Contested cases in this area have expanded considerably in the last few years, so it should not be a surprise that federal OSHA put forth for comment in early 2006 its 29 CFR1926.1200, subpart AA, a true new "Confined Spaces in Construction" Regulation.

² *Author's Note:* Cases involving application of general industry versus construction confined space regulations usually involve an employer selecting the very weak content of CFR1926.21 (b)(6) from construction regulations in order to avoid the more stringent 1910.146 from general industry regulations. OSHA interpretation letters have exempted true (new) construction sites from the general industry permit standard (as well as major reconstruction and altering the use of the space), but repairing, relining, rehabilitation, sealing, coating, painting, and so on, have been determined to be "maintenance tasks" thus not true construction and the general industry rule should apply.

resultant proper classification of the space are best described by logic path diagram given in Exhibit 1.

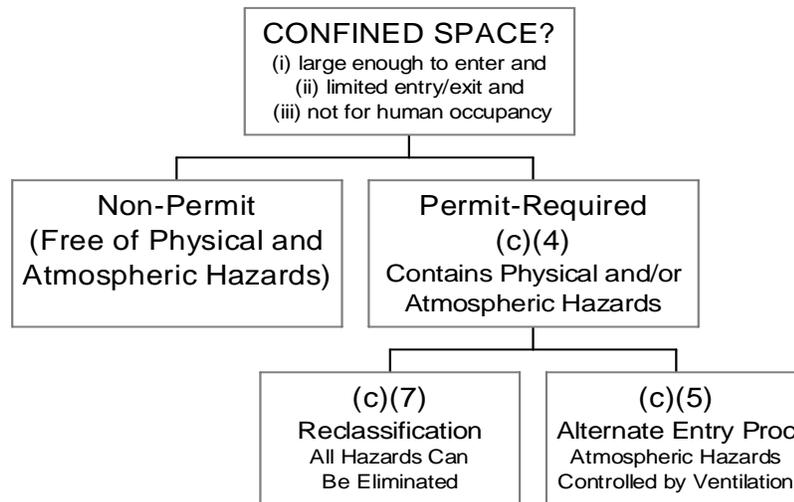


Exhibit 1. Classifications of Spaces Logic Path Diagram

It should be noted from Exhibit 1 that, upon determining that a workspace meets the three concurrent confinement requirements given in OSHA’s definition of “confined space,” the competent person making the evaluation has only two options in their classification logic—“Non-Permit Confined Space” or “Permit-Required Confined Space.” A truly “Non-Permit Space” must be free of all hazards, requires no signage, eliminates rescue requirements, and suspends the bulk of any costly and time-consuming requirements for entry. (A hazard review form should be kept on file to support the employers’ contention of “hazard-free” status of such a space.) When the confined space under review fails the test of “hazard-free” status, it must be designated as “permit-required.” But an in-depth review of the history of the space, accident/incident reports, and the nature of tasks performed may allow the competent person to elect one of the three options listed below:

1. Permit in perpetuity (always entered under full permit conditions);
2. “Reclassification to non-permit” status through elimination of *all* hazards; or
3. “Alternate procedure,” using adequate ventilation when only atmospheric hazards are present.³

Although the language of 1910.146 may not be eminently clear to all, it is a simple fact that the discussion above and the content of the rule allows four options for entry whenever an employer requires that a task be done in a permit-required confined space under their ownership or control. This is best summarized by the diagram in Exhibit 2.

³ Full discussions of these options are found in sections (c)(4), (c)(7), and (c)(5), respectively of CFR 1910.146.

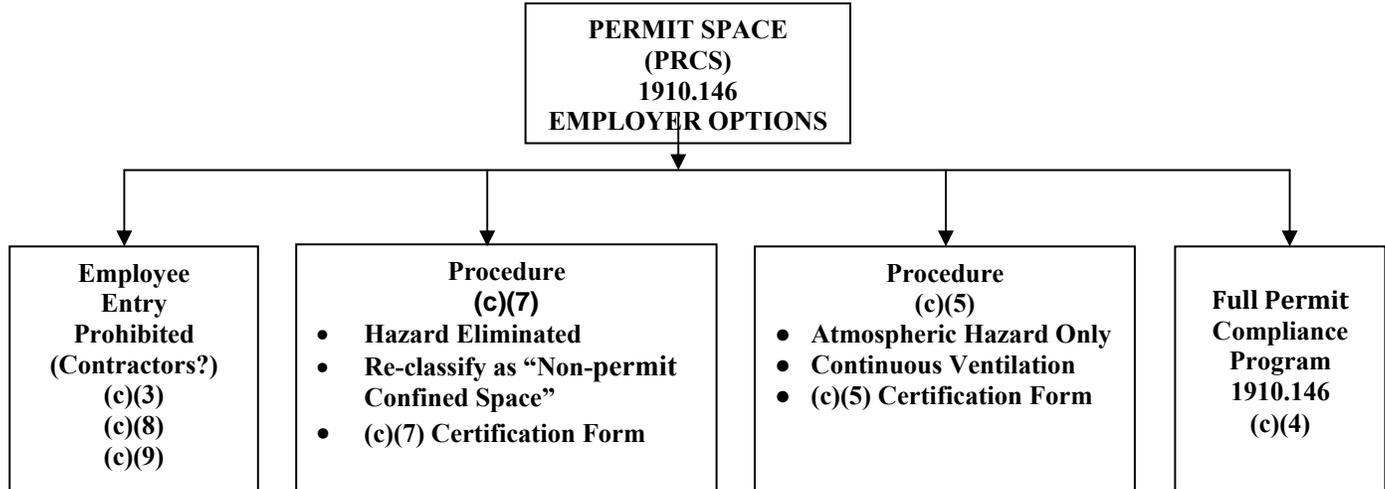


Exhibit 2. Employer Options for Confined Space Entry

Cases involving improper classification of space have frequently centered on:

- Reclassified space to non-permit status, as found in paragraph (c)(7)
- “Alternate procedure” entry by continuous ventilation of atmospheric hazards to safe levels, as found in section (c)(5)(ii)

Some common classification errors are listed below:

1. The employer often makes a determination of non-permit status even when *all hazards* have not been eliminated. Example: A space has been emptied of contents, isolated (including lockout), washed and cleaned but shows several %LEL of residual flammable substances and an oxygen level of 19.9% by volume; it clearly is not free of all atmospheric hazards!
2. The employer introduces a blower of 1200 cfm effective blower capacity to a 1500 ft³ pit with 6” of standing liquid of unknown origin at the bottom of the pit. In this instance, the blower is of adequate capacity to effectively ventilate the space, but standing liquids of unknown origin cannot be present during “(c)(5)/Alternate Procedure” entries.
3. The employer decides to combine (c)(5) and (c)(7) procedures to reclassify a space, unaware that a federal OSHA opinion letter of the mid 1990s does not allow combining the two procedures (since ventilation never eliminates air contaminants, it possibly could only control them to safe levels.)
4. An employer puts workers in protective suits to clean out sludge-like residue at the bottom of a chemical tank after bringing a gasoline-powered blower into the tank, producing carbon monoxide. The contention of a (c)(5) alternate procedure, due to continuous ventilation, was firmly overruled by an administrative law judge due to CO exposure and chemical hazards still in the confined space.
5. An employer incorrectly designated furnace shut down, cool down, isolation (with lock out) as an alternate procedure, simply because a blower was required after all other hazard removal steps were complete. Only atmospheric hazards (actual or potential) can

be present in alternate procedure entries; thus, the above furnace preparation was essentially a (c)(7) “hazard eliminated” entry, not an alternate entry.

Rescue Requirements

It should be emphasized here that federal OSHA’s only substantive change of 1910.146 since its introduction was in 1998 when it expanded rescue section (k), added employee participation paragraph (l), and introduced Appendix (F) for Evaluation Criteria for Rescue Services. Many employers failed to have the resources in budget and personnel to develop their own rescue trained and equipped service, and sought help from outside the workplace through the use of fire departments or private contract rescue services. Several salient points have developed in recent years regarding compliance with the enhanced rescue section (k) and Appendix (F):

1. Employers often (incorrectly) classified the space as a non-permit space at the outset in order to avoid the costly requirements of rescue section (k)
2. The employer sometimes argued reclassification of this permit space to non-permit (to avoid the costly rescue section requirements) when in truth they had not truly eliminated *all* hazards through isolation of the space.
3. Some employers have argued that an attendant activating a non-entry rescue retrieval device (attached by lifeline and harness to the entrant), while summoning an EMS unit via cell phone, is full compliance with rescue section (k) and guidelines of Appendix (F). To my knowledge, none of these strategies have even been accepted by OSHA during informal conferences, before an administrative law judge, or before the OSHA Review Commission.
4. The employer named a local fire department as the off-premises rescue service, but had no written contract or on-site practice drills to support their contention.

Rescue section (k) has been a frequent and costly violated paragraph of the standard and, in some instances, authorities have levied higher monetary fines for violations of this section, as compared to violations of other paragraphs of 1910.146.

Contested cases involving violation of rescue section (k) have frequently been based on the following:

1. Failure of the employer to develop an effective rescue plan, which designates the rescue service and means to contact that service.
2. Failure of the employer to have the designated rescue service perform (at a minimum) an annual practice rescue drill from a typical permit space using a dummy, mannequin, or human volunteer.
3. Employer contention that an attendant activating a non-entry rescue device (winch, tripod, hoist, davit arm, etc., from outside the space) constitutes full compliance with the regulation.
4. Failure of the employer to evaluate the training, response time, and equipment available, etc., for the designated rescue service in order to be assured that rescue can be achieved based on location, width, depth, height, and so on, of the permit space.

In recent years, my expert witness service has strongly focused on three key areas of the regulation:

1. General Industry versus construction;
2. Absence of, or improper classification of, spaces; and
3. Deficiencies of compliance with rescue Section (k).

Conclusions

All sections of OSHA permit-required confined space regulation are important and can lead to a citation and monetary fine when violations occur. This paper highlights the three areas of the rule, which in recent years have most frequently, in the author's experience, brought lawyers, solicitors, administrative law judges, employers, and their expert witnesses into conflict in the courtroom.

Appendix: Confined Space Compliance I.Q. Test: A C S C I Q Test for Health and Safety Professionals

Welcome to the late 2nd Quarter of 2010. On the anniversary date of April 15, 2010, the American workplace will be into its 17th year of mandatory compliance with the U.S. Department of Labor's permit-required confined space safety regulation.⁴ It seems logical that, after 16 years of enforcement by state and federal OSHA, the safety and health community (CSPs, CIHs, maintenance supervisors, safety officers, risk managers, etc.) should know the requirements of the regulation in great detail. WRONG!! My 900+ seminars on the general topic since 1974; my contract lecturer status with the OSHA Training Institute; my 15+ PDCs with AIHA; and my 30+ expert witness assignments on the topic of confined spaces, convince me to the contrary. Work history, personal opinion, and company policy seem to often "cloud the mind" and lead to practice, procedures, or opinions regarding permit-required confined spaces that are in conflict with the actual content of the OSHA regulation.

Perhaps the most graphic way to explore this "compliance" gap is by means of the a simple 20-question quiz that, in the author's opinion, will point out some common errors of interpretation sometimes found in both those who enforce the regulation and those who must develop programs to comply with the regulation. For sharpening the focus, the questions have been segmented into such topic areas as "General Requirements," "Instrumentation," "Ventilation," "Classification of Spaces," and "Rescue."

In the following section there are 20 questions; the proper answer should be selected (either True or False). Immediately following the questions are the answers, along with a brief explanation.

Scoring

Note from the author, as a former teaching fellow and college professor:

- 18 or more correct: Congratulations, you are a pro!
- 14 to 17 correct: Time for a review session!
- Less than 14 correct: Sign up for a PRCS seminar or PDC ASAP!

⁴ 29 CFR 1910.146 (14 January 1993, publication date; 15 April, 1993, date of enforcement).

1-20 Questions

1. (True or False) An employer must evaluate all places of work and if permit-required confined spaces (PRCSs) are found, the employer must develop a confined space entry team and address the rescue requirements of the regulation. [Paragraph (k)]
2. (True or False) An employer must maintain a list, directory or database for all PRCS at their facility.
3. (True or False) Continuous ventilation is required for all PRCS entries.
4. (True or False) A poured concrete dry vault 11 feet deep contains only water shutoff valves for fire fighting purposes. A ladder is required for entry. This is a PRCS.
5. (True or False) A state university campus has over 5 miles of below-ground utility service tunnels carrying steam lines, 220 Vac power, data, etc. The tunnel system is a PRCS.
6. (True or False) Contractors are required by 1910.146 to follow the host employer's PRCS entry program.
7. (True or False) Application of LO/TO (1910.147) allows an employer to reclassify a permit space to non-permit status prior to a (c)(7) entry.
8. (True or False) A below-ground utility vault contains a water main and meter. This space is a strong candidate for possible entry by alternate procedure (c)(5).
9. (True or False) A below-ground vault near an airport jet A fuel storage area is tested with an industry standard "four-gas" meter and registers 20.9% O₂, 0 LEL methane, 0 CO, 0 H₂S. However, an odor of jet fuel is present. This is a non-permit space, and entry is OK without PRCS considerations.
10. (True or False) Local exhaust ventilation constitutes adequate ventilation for OSHA's alternate procedure (c)(5).
11. (True or False) Continuous ventilation of a PRCS with a blower of 1500 cfm or greater suspends the need for air testing a confined space.
12. (True or False) A blower and/or hose can be removed temporarily during personnel or equipment entry when an alternate procedure entry is underway.
13. (True or False) Cancelled permits must be kept on file for 12 months after completion of the entry and reviewed annually.
14. (True or False) When atmospheric hazards of PRCS exceed limits of "hazardous atmosphere," all entrants must evacuate the space and cease operations.
15. (True or False) Detector tubes are an acceptable methodology for testing atmospheric hazards prior to confined space entry.
16. (True or False) Continuous atmospheric monitoring of PRCSs is required during entry operations.
17. (True or False) The atmospheric testing instrument must be calibrated immediately prior to use at a confined space entry operation.

18. (True or False) The oxygen sensor mode of a “four-gas” (CO, H₂S, O₂, LEL) instrument can be used to estimate interferent gas levels such as argon, CO₂, halon, freon, etc.
19. (True or False) A portable “combination” electronic gas detector must be certified intrinsically safe by one or more North American testing laboratories.
20. (True or False) A “four-gas” combination instrument has been factory (and field) calibrated at 50% LEL using methane gas. This unit is accurate to +/- 10% for other gas and vapor LELs.

1-20 Answers

1. (False) Having found PRCS on premises, an employer must identify such spaces, prohibit entry by their employees, and instead may choose to use outside contract personnel for tasks done in such spaces. (The contract should stipulate that the contractor follow a PRCS program and provide rescue capability.)
2. (False) It is required that the cognizant individual (safety director, maintenance supervisor, etc.) know where all PRCS are and their hazards, but no actual list or database is required by OSHA.
3. (False) Ventilation is mandatory under 1910.146 only for “alternate procedure” entries (See (c)(5) of regulations). OSHA recognizes ventilation for helping to keep atmospheric hazards “controlled” to safe levels while cautioning that ventilation cannot “eliminate” any hazard.
4. (True and False) This is a trick question. This space has no physical hazards, such as machinery and no engulfment hazards. OSHA does not make depth (i.e., fall hazard) a condition of confined space. If air monitoring over a reasonable time period shows clean air (20.9/0/0/0 on a 4-gas meter), the employee could classify this as a non-permit confined space (i.e., confined but hazard-free). Alternate procedure (c)(5) would also be acceptable.
5. (False) Issue 1: Public employee facilities are not covered by federal OSHA rules unless the state is one of the 23 state plan states. Issue 2: In a state plan state, these utility service tunnels are not treated as PRCS. A tunnel entrance procedure is written (an SOP), PPE is specified for entrants, and an emergency response plan is developed, but 1910.146 need not be followed.
6. (False) General requirement Section (c), paragraphs (8) and (9), requires a contractor to follow a PRCS entry program. However, by contract or negotiation, the PRCS program may be either that of the host employer or that of the contractor, if both have OSHA compliant written programs.
7. (False) Hazard elimination of a PRCS requires isolation of the space (such as double block and bleed, blanking, blinding, disconnecting), emptying the space of its contents *and* lockout/tagout. 1910.147 is only a part of isolation of a space.
8. (True) Underground vaults with standing water may potentially have atmospheric hazards and could pose an engulfment hazard. If the vault is dry and historical air test data is favorable, then it is a strong candidate for (c)(5) “alternate procedure” entry.

9. (False) The combustible sensor on a four-gas portable instrument is the catalytic element (hot wire) type and is usually calibrated by using methane gas (CH₄). However, fuel vapor such as diesel, Jet A, and heating oil may require a correction factor multiplier of 5 to 7 times the LEL reading. It would be best to check for fuel vapor with an MOS sensor, hydrocarbon detector tube, or PID before entry operations proceed.
10. (False) CFR 1910.146 (c)(5) requires forced air (positive pressure) ventilation from a clean source outside the space.
11. (False) A pre-entry air test is still required of alternate procedure (ventilated vault entries) under CFR 1910.146 (c)(5).
12. (False) When a blower stops for any reason, occupants must exit a space being entered under the (c)(5) alternate procedure.
13. (True) See OSHA CFR 1910.146 (a). Permits must be saved for 12 months, but review of permits can be monthly, quarterly, or annually. Certificates for (c)(5) and (c)(7) entries do *not* have to be kept on file.
14. (True and False) This is a trick question. When atmospheric hazards exceed OSHA limits for hazardous atmosphere, entrants must indeed exit a PRCS. However, the entry supervisor may require additional cleaning or isolation of the space or the use of IDLH-rated PPE by trained entrants supported by a rescue team. Work can continue in IDLH-rated spaces when trained personnel use proper PPE.
15. (True) OSHA Compliance Directorate Office stated, in an interpretation in 1993, that detector tubes and combustible gas indicators were acceptable methods for confined space air testing.
16. (False) Pre-entry testing is mandatory. Thereafter, “periodic” or “as necessary” is allowed. Only for sewer environments does CFR 1910.146 support “continuous atmospheric monitoring.”
17. (True and False) This is a trick question. CFR 1910.146 requires a portable gas detector to be maintained in accordance with the manufacturer's instructions. OSHA does not address sensor technology or instrument design and maintenance. You must maintain your instrument consistent with the stated requirements of the owner’s manual supplied with your monitor.
18. (False) Oxygen sensors are very specific for oxygen (O₂) gas. Interferent gases like argon, CO₂, and halon, must reach about 70,000 ppm before an oxygen deficiency alarm of 19.5% is read by the instrument.
19. (False) CFR 1910.146 does not address electrical equipment approvals for hazardous locations. A properly maintained, 20-year-old, unapproved device is absolutely acceptable practice. In reality, almost all instruments on the market for the last decade bear one or more third-party approval labels for intrinsic safety.
20. (False) Instrument manuals will show “correction factors” or correction curves for combustible gas sensors in atmospheres other than that used by the factory. Correction factors can routinely be 1.5 to 2.5 and as high as 5 to 7 for kerosene and jet fuel (high flash-point hydrocarbons).