

**USING A PERMIT-REQUIRED CONFINED SPACE EXCEPTION  
TO ACHIEVE WASTE PACKAGE CERTIFICATION OBJECTIVES**

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**ABSTRACT**

WESKEM, LLC, Weston Solutions, Inc. and Science Applications Incorporated (SAIC) are responsible for preparing open-top Sealand™ containers to prevent seepage of liquids from waste materials during transport to a designated disposal site. A series of liners and absorbent material were set in place inside the containers. Although the containers are equipped with a walk-in door, the door is closed and the exterior joints are caulked as an added precaution to maintain the seal and prevent any leakage from occurring. In order to install the absorbent materials along the inside of the doors, ladders were proposed for entering and exiting the container to prevent jeopardizing the integrity of the exterior door seals. This situation of working inside an open-top container prompted Environmental, Safety and Health (ES&H) personnel to review the Occupational Safety and Health Administration's (OSHA's) confined space program (29 CFR 1910.146 - Permit-Required Confined Spaces [PRCSs]). Although WESKEM was required to follow an upper-tier PRCS program, the ES&H personnel believed this conservative approach was not warranted. This paper documents the justification for this exception to eliminate classifying this activity as a confined space altogether. With the doors closed, but unlocked, the four-sided container could still be conservatively interpreted as a confined space. However, the key distinction is that the container design does not have a limited or restricted means for entry or exit and would not hinder the employee's ability to escape in an emergency. Pre-entry and periodic air monitoring, including visual inspections, verified that all hazards that could impact the employee performing container preparation and certification had been effectively eliminated by the SSHO and would continue to remain eliminated for the duration of the project. In addition, the survey information verifying that the containers were safe for entry would continue to be communicated and made available to the employees. This approach to eliminate the "confined space" classification altogether while maintaining a safe work environment is consistent with OSHA regulations and letters of interpretation applied to similar scenarios.

## INTRODUCTION

WESKEM, LLC, Weston Solutions, Inc. and Science Applications Incorporated (SAIC) are responsible for preparing open-top Sealand™ containers (Figure 1 and herein referred to as containers) to prevent seepage of liquids from waste materials during transport to a designated disposal site.



**Fig. 1. A typical open-top container designed and constructed to represent a large, flat-bottom box with three walls, a door, and no ceiling. The dimensions are approximately 6.1 m (20 feet) in length, 2.4 m (8 feet) in width, and 2.6 m (8.5 feet) in height.**

The waste materials consist of hazardous, radioactive, and mixed wastes. The containers need to be sealed to prevent leakage from any liquids that may have inadvertently accumulated during interim storage. The discovery of water leaking from a container either while in transit or upon arrival at the disposal site would result in an indefinite suspension of all transportation activities. Therefore, to implement a “no-leak policy”, the following controls were established for all containers:

- Caulking all interior floor-wall joint connections.
- Adding 22.7 kg (50 pounds) of granular absorbent material at the floor-wall joints of the container.
- Rolling out absorbent blanket materials.
- Adding plastic (6 mil).
- Rolling out absorbent blanket materials.
- Adding plywood.
- Spreading 22.7 kg (50 pounds) of granular absorbent material on the plywood.
- Adding 22.7 kg (50 pounds) of granular absorbent material at the doors under the plastic.
- Covering the open-top containers with tarps and storing them under awnings to prevent the infiltration of any condensation and precipitation.
- Performing a visual inspection to verify the presence or absence of free liquids.

- Complying with all other Department of Transportation and Waste Acceptance Criteria requirements.

Although the containers are equipped with walk-in doors, the doors are closed and the exterior joints are caulked as an added precaution to maintain the seal and prevent any leakage from occurring. In order to roll back the plastic to add the granular absorbent material along the inside of the doors, the use of ladders was proposed for entering and exiting the container from an above-grade working platform. The entry from the top of the container was essential for maintaining exterior door seal integrity (Figure 2) (1).



**Fig. 2. Open-top view of the container from the above-grade working platform.**

The proposed ladders would be secured to prevent sliding by using either tie-offs or the “buddy” system. More importantly, the Site Safety and Health Officer (SSHO) would be responsible not only for determining if acceptable entry conditions are present, but also for authorizing entry and overseeing operations, maintaining a continuous line-of-sight with the employees working inside the container, and terminating entry if necessary.

Having an employee work inside an open-top container prompted Environmental, Safety and Health (ES&H) personnel to review the Occupational Safety and Health Administration’s (OSHA’s) confined space program found in Title 29 of the Code of Federal Regulations, Part 1910.146 (29 CFR 1910.146 - Permit-Required Confined Spaces) (2). Initial discussions with the oversight organization’s safety point of contact stated that “all” confined spaces are conservatively viewed as permit-required confined spaces (PRCSs). According to 29 CFR 1910.146(b) – Definitions, the **four characteristics** of a PRCS consist of:

*A permit-required confined space (permit space) means confined space that has one or more of the following characteristics:*

- (1) Contains or has a 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 which slopes downward and tapers to a smaller cross-section; or*
- (4) Contains any other recognized serious safety or health hazard.*

Because of contractual arrangements and oversight issues, WESKEM was required to follow an upper-tier PRCS program. However, WESKEM ES&H personnel (i.e., the authors) believed this conservative approach was not warranted and that field resources should be used elsewhere to address actual hazards. The ES&H personnel pursued an exception using its existing Integrated Safety Management (ISM) program (3). This paper documents the justification for the exception to eliminate classifying this activity as a PRCS. Furthermore, documenting that a PRCS condition did not exist in this case would eliminate the required use of a retrieval line/system in conjunction with container preparation. According to 29 CFR 1910.146(b) – Definitions, a retrieval system is defined as:

*The equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.*

## **WESKEM REQUEST FOR EXCEPTION FROM USING RETRIEVAL LINE AND SYSTEM**

The ES&H personnel already understood that the worst-case scenario was for an employee to be injured while performing work inside a container and then be unable to use a ladder to exit the container. This scenario prompted a review for implementing safety equipment to extract the employee during such an event. Safety equipment normally used for PRCS entry would include either a harness and retrieval line to be worn by all entrants or a mechanical hoisting device to retrieve personnel.

## **PROGRAM EXCEPTION BASED ON EXISTING SAFETY PROGRAM AND ABILITY TO EGRESS FROM THE CONTAINER**

In accordance with the **first characteristic** of a PRCS, the rationale for pursuing an exception to PRCS requirements is that conditions inside the container do not contain or have the potential to contain a hazardous atmosphere as defined in 29 CFR 1910.146(b):

*Hazardous atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:*

- (1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);*
- (2) Airborne combustible dust at a concentration that meets or exceeds its LFL;*

*NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.*

*(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;*

*(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this Part and which could result in employee exposure in excess of its dose or permissible exposure limit; [sic] NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.*

*(5) Any other atmospheric condition that is immediately dangerous to life or health.*

*NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, section 1910.1200 of this Part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.*

Since there are no heavier-than-air gases, vapors, or particulate matter, the likelihood of a hazardous atmosphere developing inside an open-top container is very unlikely. According to Rekus, “The laws of chemistry and physics prohibit the atmosphere from changing instantaneously. For example, the oxygen content in a space won't be 20.8 percent one minute and 0 percent the next. Yes, the atmosphere in a confined space can change, but it will always change at some rate. If the space is monitored continuously with an appropriately selected instrument that has been properly calibrated and set to alarm at a specified contaminant concentration, the alarm will sound when the contaminant level reaches that prescribed level, signaling the entrants that they need to evacuate. Although it's unlikely that confined space atmospheres will change instantaneously, they can change over time. This is why past history of a space's atmosphere doesn't provide any indication of its present condition. Consequently, it's prudent to not only test confined spaces prior to entry, but also to provide continuous air monitoring when technology to provide such monitoring exists.” (4)

The ES&H personnel agreed with the philosophy proposed by Rekus, but believed that it was still prudent to test the internal atmosphere of the container at various working heights for oxygen content, flammable gases and vapors, and potential toxic air contaminants using a calibrated direct-reading instrument before an employee were to enter the container. Figures 3, 4, and 5 show the instrument used to monitor atmospheric conditions inside the container (5). The pre-entry testing enables employers to develop and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during entry. Also, spot testing would also be performed to verify that atmospheric hazards had not manifested themselves during the work activity.



**Fig. 3. Monitoring at the container entry point.**



**Fig. 4. Monitoring at the working level surface.**



**Fig. 5. Monitoring “chips” for measuring specific contaminants.**

In accordance with the **second characteristic** of a PRCS, the rationale for pursuing an exception to PRCS requirements is that conditions inside the container are not expected to “engulf” the employee as defined in 29 CFR 1910.146(b):

*Engulfment means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.*

The employee would not be handling any “loose” materials, but the liner only. Solid or liquid waste material would not be added to the container while the employee was securing the liner. Any absorbents that would be defined as a finely divided (flowable) solid substance would already be added prior to the employee entering the container. Therefore, the material could neither be aspirated to cause death by filling or plugging the respiratory system nor exert enough force on the body to cause death by strangulation, constriction, or crushing.

In accordance with the **third characteristic** of a PRCS, the rationale for pursuing an exception to PRCS requirements is that conditions inside the container do not have an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section. As stated previously, the containers are designed and constructed to represent a large, flat-bottom box with three walls, a door, and no ceiling.

The rationale for keeping the door closed when the employee is inside the container is to maintain the integrity of the door seals, thus preventing leakage of water from the container. If

an employee were injured to the extent of being unable to exit the container using a ladder, the employee would not be trapped inside but instead would either exit through the unlocked walk-in door in an expedient manner or be assisted by the site emergency response team. Container certification activities would require reestablishing the door seals prior to filling the container. Other administrative controls such as employee briefings, use of the “buddy system” and maintaining a continuous line-of-sight with the employees are already in place and practiced in the field. The process of opening the walk-in door to assist the employee would be much faster and more effective than the use of a retrieval line and system. Also, the process of assembling/disassembling the retrieval system to relocate it to the appropriate container and performing this activity multiple times throughout the day could result in a malfunction or breakdown of the equipment.

In accordance with the **fourth characteristic** of a PRCS, the rationale for pursuing an exception to PRCS requirements is that conditions inside the container would not contain any other recognized serious safety or health hazard that would incapacitate or impair the ability of an entrant to exit the space. As previously evaluated, the containers are above grade, open to the environment, and preclude the possibility of having an oxygen-deficient hazardous environment. In addition to air monitoring, a visual survey of the container before entry would verify the presence of any mechanical, electrical or other hazardous items (e.g., materials) or vectors (e.g., snakes, spiders) inside the container that could cause injury to the employee. Awareness and/or removal of these items are sufficient to mitigate these hazards.

### **Another “Serious Hazard” Myth Resolved - Slip, Trip and Fall Hazards That May Exist In a Confined Space Do Not Make That Space a Permit-Required Space**

The types of work activities involved with container preparation could result in slip, trip and fall injuries. However, these hazards neither define nor constitute a PRCS. According to Rekus, “This myth stems from 29 CFR 1910.146(b) that says that a confined space that ‘[c]ontains any other recognized serious safety or health hazard’ is a permit-required space. The question, then, is what exactly constitutes a ‘serious hazard’?”

“An answer to this question may be found directly in the Occupational Safety and Health (OSH) Act. Section 17(k) of the OSH Act says that a violation is serious if there is ‘... substantial probability that death or serious physical harm could result from a condition that exists, or from one or more practices, means, methods, operations or processes that have been adopted or are in use ... .’

“It's important to understand this definition to properly classify confined spaces. For example, just because someone can fall off a ladder in a confined space doesn't necessarily make that space a permit space. Yes, falls from elevations can lead to death or serious physical harm, but an OSHA policy considers this to be a walking-working surface issue that is better addressed by other standards.

“In his Feb. 23, 1999, memorandum, Herbert Washington, director of OSHA's Office of General Industry Compliance Assistance, sheds further light on this issue. In answering the hypothetical question ‘Would a pit that meets the definition as a confined space also meet the definition of a



permit-required confined space [PRCS] if the only hazard is a potential fall from 21 feet (6.4 meters) while descending on a ladder within the pit?', Washington wrote: 'Specific fall protection requirements were not included in the PRCS standard. Fall protection and ladder safety requirements are addressed in Walking-Working Surfaces, 29 CFR 1910, Subpart D and the general-duty clause of the Occupational Safety and Health Act. Therefore, if the described potential fall hazard is the exclusive hazard within this pit, a permit program would not be required.'" (4)

Moreover, OSHA Instruction CPL 2.100 clarifies this issue even further.

*The definition of permit-required confined space contains the phrase "any other recognized serious safety and health hazard" as one of its hazard characteristics which would result in a confined space being classified as a permit space. Does the mere presence of a non-specified hazards such as physical hazards (e.g. grinding, agitators, steam, mulching, falling/tripping, other moving parts); corrosive chemical hazards; biological hazards; and other hazards (i.e. electrical, rodents, snakes, spiders, poor visibility, wind, weather, or insecure footing), which do not pose an immediate danger to life or health or impairment of an employee's ability to escape from the space constitute a hazard which would invoke this characteristic?*

*When a hazard in a confined space is immediately dangerous to life or health, the "permit space" classification is triggered. The list referenced above is only illustrative of the general range of confined space hazards which could, but not necessarily always, constitute a hazard which would present an immediate danger to life or health, such that "permit space" protection would be required. The determination of whether the resulting exposure to a hazard in a confined space will impair the employee's ability to perform self-rescue is the aspect that must be addressed by the employer. In order for "serious safety and health hazard" to be recognized as being an impairment to escape, its severity potential for resulting physical harm to an employee must be considered. (6)*

This evaluation constitutes the employer demonstrating that "any other recognized serious safety and health hazard" in the container will not impair the employee's ability to perform self-rescue.

### **Recommendation to Eliminate the Confined Space Classification**

Additional ES&H evaluations were performed to entirely eliminate the confined space classification altogether. Returning to basic principles and according to 29 CFR 1910.146(b), a confined space is defined as:

*A space that:*

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

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

*(3) Is not designed for continuous employee occupancy. (2)*

In order for the confined space classification to exist, all three criteria would have to exist simultaneously. Granted, the container “space” clearly meets the following two of the three criteria without question;

*Criterion #1 – the container is large enough and configured that an employee can bodily enter to secure the leak-proof barriers; and*

*Criterion #3 – the container is not designed for continuous occupancy.*

Therefore, the final evaluation remains focused on whether having the container doors closed but unlocked during the work activity would still constitute a confined space based upon the following:

*Criterion #2 - has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.*

WESKEM ES&H believes and interprets the intent of the confined space rule to primarily address limited or restricted means for entry or exit from tanks, vessels, silos, storage bins, hoppers, vaults, and pits as stated in the regulation. Similarly, the pit, shaft, or tank itself may be confining because of the presence of pipes, ducts, baffles, equipment or other factors which would hinder an entrant's ability to escape.

Further justification to confirm that this type of configuration does not constitute a confined space is found in OSHA Instruction CPL 2.100:

*Does the fact that a space has a door mean that the space does not have limited or restricted means of entry or exit and, therefore, is not a "confined space"?*

*A space has limited or restricted means of entry or exit if an entrant's ability to escape in an emergency would be hindered. The dimensions of a door and its location are factors in determining whether an entrant can easily escape; however, the presence of a door does not in and of itself mean that the space is not a confined space. For example, a space such as a bag house or crawl space that has a door leading into it, but also has pipes, conduits, ducts, or equipment or materials that an employee would be required to crawl over or under or squeeze around in order to escape, has limited or restricted means of exit. A piece of equipment with an access door, such as a conveyor feed, a drying oven, or a paint spray enclosure, will also be considered to have restricted means of entry or exit if an employee has to crawl to gain access to his or her intended*

*work location. Similarly, an access door or portal which is too small to allow an employee to walk upright and unimpeded through it will be considered to restrict an employee's ability to escape.*

*Are the hazards posed by a confined space to be considered in determining whether a space meets the definition of a confined space?*

*The determination whether a space has "limited or restricted means for entry or exit" within the meaning of the standard's definition of "confined space" should include consideration of whether, in light of the hazards posed by the particular space at issue, the configuration or other characteristics of the space would interfere with an entrant's ability to escape or be rescued in an emergency situation. (6)*

Also, an employee exiting the container through the unlocked doors is equivalent to the same employee exiting a walk-in freezer that OSHA has already interpreted as not falling under the requirements of a confined space (6).

*Question 1: Would a testing chamber, that can go from an extremely cold to an extremely hot temperature, similar in design to a walk-in freezer be considered a confined space if the chamber does not have a limited or restricted means for entry or exit?*

*Response: No, a testing chamber which does not have a limited or restricted means for entry or exit would not be considered a confined space as defined in 29 CFR 1910.146.*

With the doors closed, but unlocked, the four-sided container could still be conservatively interpreted as a confined space. However, the key distinction is that the container design does not have a limited or restricted means for entry or exit, and would not hinder the employee's ability to escape in an emergency. The employee would simply exit through the unlocked doors and literally be outside the "space."

## **SITE-SPECIFIC CONTAINER RECEIPT INSPECTION AND CERTIFICATION REQUIREMENTS**

Eliminating the confined space classification altogether allowed employees to prepare the container safely, without hindrance, and in accordance with the mandated "no-leak policy". Table I (next page) provides an example of site-specific container receipt inspection and certification requirements performed prior to off-site shipment.

**Table I. Example of Site-Specific Container Receipt Inspection and Certification Requirements.**

WESKEM WASTE CONTAINER INSPECTION TRACKING FORM										
ITEM #	Container Type (Circle One):				Receipt/QA (TS/QA)	Pre-Fill (TS)	Pre-Fill in CA (FC)	Post-Fill in CA Exit (FC)	Pre-Conveyance Loading (TS)	Final on Conveyance (TS/QA)
	Intermodal		SeaLand		1	2	3	4	5	6
	Drum		Metal Box							
	Package ID Number:									
1	HP incoming surveys received and complete									
2	No extraneous markings or excessive rust									
3	Support beams acceptable: no cracks or breaks in welds									
4	Fork Channels and/or ISO Corners unobstructed, free of damage									
5	Door closures move freely									
6	Door opens without binding									
7	Door gaskets free of rips, tears, gouges, cuts									
8	Absorbent Added to Container per Work Package									
9	Visual inspection found no free liquids in container									
10	Locking Assembly (closure) working properly									
11	Non-hazardous Caulking applied to Door Seals									
12	Package is strong-tight and unimpaired: No unacceptable holes or cracks									
13	Completed Pre-Use Container Inspection Checklist									
14	Ensure photos taken inside container									
15	Container Logsheet completed, 3M dose reading performed									
16	Completed Pre-Transportation Package Inspection Checklist									
17	Completed Package Weight Record									
18	Locks and/or chains and TIDs applied									
19	Verify Markings and/or Labels and/or Placards OK									
20	Required HP surveys for DOT completed, container released for use									
21	Peer Review Complete (TS) and Reviewed (DOT Manager)									
22	Attach all ITRs and CATRs generated: No outstanding NCRs exist on container									
<b>Additional Checks (23-31) to be Completed for Intermodals Only</b>										
23	Track clear, track and rollers free of damage, lid stops properly assembled, intact									
24	Lid opens without binding, travels freely entire length of track, both directions									
25	Lid stops visually verified, aligned sufficiently to engage, verified to engage in both directions									
26	Lid Closures (ratchets, hinges, rails) move freely and well greased									
27	Handles on lids are acceptable									
28	Cotter pins are present (4 total)									
29	Liner properly installed, free of holes									
30	Ratchet handles braced									
31	ISO corner locking handles turned properly									
32	Passed inspection: A = Accept, C=Conditional (repair required)									
	Date:									
	Move to next step (if C above, repairs made, all Cs struck and initialed):									
33	Date:									
Comments (QA)			Comments (Transportation Specialist)			Comments (FLM/OPs)				
If applicable, List ITR and or NCR Numbers and Closure Dates										
Upon completion Master to Project File, copy attached to shipping papers, copy to Transportation Specialist, copy to QA.										
Independent QA signature to ensure completion of form:						Date:				

## CONCLUSION

Prior to loading waste materials and ultimate disposal, open-top containers were being prepared and sealed to prevent seepage of free liquids originating from either the waste materials themselves or from the infiltration of ambient precipitation. Visual inspections were also used to verify the presence or absence of free liquids. However, employees were sometimes required to climb down into the container “space” to assist with placement of the liner and absorbent materials. Initially, the “space” inside the open-top container was conservatively classified as a PRCS based on a conservative, site-specific administrative requirement. Air monitoring and supplemental work activity reviews were used to reclassify the container as a non-PRCS. A non-PRCS means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. Specific fall protection requirements were not included in the PRCS standard, and any other recognized serious safety and health hazard that would constitute a PRCS were eliminated by the authorship systematically. Therefore, documenting a non-PRCS condition eliminated the required use of a retrieval line and system in conjunction with container preparation.

The ES&H authorship then rigorously evaluated the work activities and conditions to eliminate the confined space application altogether. The key distinction was that the container design does not have a limited or restricted means for entry or exit and would not hinder the employee’s ability to escape in an emergency. Pre-entry and periodic air monitoring, including visual inspections, verified that all hazards that could impact the employee performing container preparation and certification had been effectively eliminated by the SSHO and would continue to remain eliminated for the duration of the project. In addition, the survey information verifying that the containers were safe for entry would continue to be communicated and made available to the employees. This approach to eliminate the “confined space” classification altogether while maintaining a safe work environment is consistent with OSHA regulations and letters of interpretation applied to similar scenarios. A change to the defined scope of work or the appearance of a new or previously mitigated hazard would result in a STOP work order (3), thus preventing employee entry or requiring each employee working inside the container to exit in an expedient manner. The SSHO would then have to reevaluate the space and determine whether it must be reclassified as a PRCS in accordance with the regulation.

## REFERENCES

1. Title 29 of the Code of Federal Regulations, Subpart D – Walking-Working Surfaces. Department of Labor, Washington, DC, March 7, 1996.
2. Title 29 of the Code of Federal Regulations, Part 1910.146 – Permit-Required Confined Spaces. Department of Labor, Washington, DC, December 1, 1998.
3. B. Bell, J. Ellington, L. Smith, and J. M. Hylko, “A Practical Approach for Integrating ISMS Into Everyday Waste Management Field Activities.” Waste Management '04 - HLW, TRU, LLW, Mixed, Hazardous Wastes and Environmental Restoration Waste Management, Energy Security, and a Clean Environment. Tucson, AZ. February 29-March 4, 2004.

WM'05 Conference, February 27 – March 3, 2005, Tucson, AZ

4. J.F. Rekus, “Confined Spaces: Myths, Magic, Urban Legends and the Facts.” Occupational Hazards, 42-44, 46-48, February 5, 2001. <<http://www.occupationalhazards.com/articles/2825>>.
5. Title 29 of the Code of Federal Regulations, Part 1910.146 – Permit-Required Confined Spaces, Appendix B – Procedures for Atmospheric Testing. Department of Labor, Washington, DC, June 29, 1993.
6. Occupational Safety and Health Administration (OSHA) Instruction CPL 2.100, Directorate of Compliance Programs CPL 02-00-100 - CPL 2.100 - Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146. Department of Labor, Washington, DC, May 5, 1995.
7. OSHA Letter of Interpretation, “Confined space requirements for a testing chamber with/without limited access.” Department of Labor, Washington, DC. November 15, 1999. <[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=INTERPRETATIONS&p\\_id=22822](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=22822)>.