# Contents: Confined Spaces

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

| Section | Overview of Content (see section for full process) |
|---|---|
| Introduction | |
| 1. Identifying Confined Spaces | • Identify, evaluate, and classify confined spaces.<br>• Add spaces to the Fire-Rescue run card system. |
| 2. Conducting Pre-entry Evaluation Before Entering a Confined Space | • Evaluate status of confined space.<br>• Complete and approve documentation.<br>• Conduct atmospheric testing.<br>• Complete and sign appropriate entry forms. |
| 3. Entering Nonpermitted Confined Spaces (Class 2A & 2B) | • Ensure unsafe conditions are eliminated before removing entrance cover.<br>• Ensure atmosphere is tested and results recorded.<br>• Ensure hazard and engineering controls are accomplished.<br>• Verify training.<br>• Conduct work within parameters set by entry forms.<br>• When entry is completed, remove certification from the space; and after verifying the space is not occupied, secure entry ports/doors. |
| 4. Entering Permit-required Confined Spaces (Class 2C) | • Ensure unsafe conditions are eliminated before removing entrance cover.<br>• Ensure atmosphere is tested and results recorded.<br>• Ensure hazard precautions are taken |

- Ensure hazard precautions are taken.
- Conduct job-specific briefing and verify training.
- Monitor safety of authorized entrants.
- When entry is completed, expired, or canceled, complete documentation; remove permit;
  return it to the Departmental ES&H Coordinator; and after verifying the space is not occupied, secure entry ports/doors.

| | |
|---|---|
| 5. Confined Space Entry by Contractors | • Ensure contractor complies with subject area.<br>• Contractor submits written plan describing confined space entry program and provides retrieval systems and trained staff.<br>• Coordinate precautions, procedures, and entry operations with the contractor to ensure staff safety.<br>• Contractor and BNL debrief one another on hazards after entry. |

Definitions

**Exhibits**
Confined Space Entry Procedures Flowchart
Confined Space Hazards
Confined Space Sign
Example of a Written Protocol for a Confined Space
Hazardous Atmosphere Testing Criteria
Precautions for Existing or Introduced Hazards in Confined Spaces
Predetermined Confined Space Classifications
Roles of Personnel involved in Class 2C Confined Spaces Entry

**Forms**
Confined Space Entry Certification Form
Class 2C Permit-required Confined Space Entry Permit Form

# Training Requirements and Reporting Obligations

This subject area contains training requirements. See the Training and Qualifications Web

Site.

This subject area does not contain reporting obligations.

# References

29 CFR 1910.146, Permit-required Confined Spaces

29 CFR 1926, Safety and Health Regulations for Construction

ES&H Standard 1.5.0, Electrical Safety

ES&H Standard 1.5.1, Lockout/Tagout Requirements

ES&H Standard 1.5.2, Design Criteria for Electrical Equipment

ES&H Standard 4.3.0, Cutting and Welding

ES&H Standard 4.12.0, Special Precautions for Locations Containing Flammable Atmospheres

Firehouse Response Card System Web site

Material Safety Data Sheets (MSDS) Database Query Web site (*Limited Access)

Training and Qualifications Web Site

Work Planning and Control for Experiments and Operations Subject Area

*Access Limited to BNL Staff and Authorized non-BNL Staff

# Standards of Performance

All staff and guests shall comply with applicable Laboratory policies, standards, and procedures, unless a formal variance is obtained.

Managers shall analyze work for hazards, authorize work to proceed, and ensure that work is performed within established controls.

All staff and users shall identify, evaluate, and control hazards in order to ensure that work is conducted safely and in a manner that protects the worker, the environment and the public.

All staff and users shall ensure that they are trained and qualified to carry out their assigned responsibilities, and shall inform their supervisor if they are assigned to perform work for which they are not properly trained or qualified.

# Management System

This subject area belongs to the **Worker Safety and Health** management system.

This subject area belongs to the **Worker Safety and Health** management system.

Back to Top



1.0-062003/standard/3s/3s00t011.htm

Send a question or comment to the SBMS Help Desk
Disclaimer

# Introduction: Confined Spaces

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

This subject area provides procedures for ensuring safe work at BNL for all personnel who enter confined spaces. It describes the requirements for safe entry, work, and exit of personnel assigned to work in confined spaces. These requirements apply to all BNL staff and non-BNL staff, including outside contractors.

This subject area describes restrictions and requirements for entry certification and confined space entry permits for compliance with 29 CFR 1910.146, Permit-required Confined Spaces.

Most construction activities (covered by 29 CFR 1926, Safety and Health Regulations for Construction) are excluded from the procedures described in this subject area. Contact the Construction Safety SME for confined space entries in construction activities.

Back to Top



1.0-062003-/standard/3s/3s00i011.htm

*Subject Area:* ***Confined Spaces***

# 1. Identifying Confined Spaces

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

## Applicability

This information applies to BNL staff and non-BNL staff who identify confined spaces, and ES&H Coordinators or designees who evaluate and classify confined spaces.

## Required Procedure

A confined space is a space that

1. Is large enough and so configured that personnel can bodily enter and perform assigned work;
2. Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits);
3. Is not designed for continuous personnel occupancy.

A Department/Division inventory of Class 2A, 2B, and 2C Confined Spaces is maintained so that staff are aware of the hazards and appropriate entry procedures.

The Department/Division ES&H Coordinator or designee coordinates the following:

| | |
|---|---|
| **Step 1** | Identify confined spaces in the following ways:<br>• The Department/Division conducts a survey of their premises and operations to identify identify Class 2 confined spaces. The survey is updated at a frequency appropriate to maintain an accurate Class 2 inventory.<br>• A staff member identifies a potential confined space during routine work or creates a potential confined space during routine work, e.g., cutting a hole in a duct. If personnel identify a confined space that has not been posted, they notify the ES&H Coordinator or designee.<br>**Note:** Unique spaces must be individually identified, but broad classes may be |

| | |
|---|---|
| | **Note:** Unique spaces must be individually identified, but broad classes may be identified by class where this does not interfere with meeting the requirements for hazard identification and evaluation, and confined space classification. |
| **Step 2** | The ES&H Coordinator or a qualified designee<br><br>• Evaluates the identified spaces;<br>• Classifies the confined spaces;<br>• Ensures exposed persons are informed of the existence, location of, and the dangers posed by the Class 2 Confined Spaces by posting Danger Signs (Use the exhibit Confined Space Sign), or by any other effective means. For use of equivalent signs, contact the Confined Space SME for approval.<br>**Note:** The evaluation and classification is not intended to replace a pre-entry certification conducted by the Entry Supervisor, as described in the section Conducting Pre-entry Evaluation before Entering a Confined Space.<br>• Institutes additional measures as required to protect personnel. |
| **Step 3** | The ES&H Coordinator adds the identified confined spaces to the Emergency Management Fire-Rescue run card system. See the Firehouse Response Card System Web site. |

# References

Firehouse Response Card System Web site

| Continue to Next Page |

Back to Top

*Subject Area:* ***Confined Spaces***

# 2. Conducting Pre-entry Evaluation Before Entering a Confined Space

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

## Applicability

This information applies to BNL staff, visitors, guests, and contractors (within BNL operations), evaluate, and plan methods to control potential hazards of confined spaces before work is conducted in the space.

## Required Procedure

See the Confined Space Entry Procedures Flowchart for an overview of the process for entering all spaces.

Before work is performed in a confined space, the Entry Supervisor or designee must ensure the safety of entrants by doing the following:

| | |
|---|---|
| **Step 1** | The Entry Supervisor, ES&H Coordinator, Facility Support Representative, or cognizant staff member evaluates the current status of the confined space. The evaluation includes identifying<br>• **Hazards inherent to the space**, including legacy hazards, potential for engulfment, entrapment, atmospheric hazards, serious safety hazards, or radiological hazards;<br>• **Hazards associated with the work** to be performed in the confined space.<br>**Note:** Worker input into developing the confined space entry certification and entry permits should be obtained. |
| **Step 2** | The Entry Supervisor or Designee initiates the evaluation of the space by a |

| | |
|---|---|
| | qualified person. The Entry Supervisor verifies that the evaluation has occurred and signs the completed Confined Space Entry Certification Form or the Class 2C Permit-required Confined Space Entry Permit Form. The evaluator can use the exhibit Confined Space Hazards as an aid in this process. |
| **Step 3** | The Entry Supervisor or Designee ensures that additional documentation that may be required is completed (such as work control documents or Radiological Work Permit. See the Work Planning and Control for Experiments and Operations Subject Area). |
| **Step 4** | The Entry Supervisor or Designee must approve and sign the Confined Space Entry Certification Form before staff may enter a confined space, **or**<br><br>The Entry Supervisor and ES&H Coordinator must approve the Class 2C Permit-required Confined Space Entry Permit Form before staff may enter a Class 2C Confined Space (Permit-required Confined Space). |
| **Step 5** | When a hazardous atmosphere is potentially present, an Atmosphere Tester conducts atmospheric monitoring with a calibrated direct-reading instrument(s) capable of detecting the hazards in the space, using testing and monitoring procedures discussed as follows. Document results on the Confined Space Entry Certification Form, or if the space is pre-determined to be a Class 2C, on the Confined Space Entry Permit Form. See the exhibit Hazardous Atmosphere Testing Criteria for testing protocol.<br><br>If it is necessary to enter the confined space to conduct atmospheric testing, then perform such entry as a Class 2C (Permit-required) Confined Space Entry, and wear appropriate personal protective equipment.<br><br>If testing and inspection show that the hazards within the 2C space (Permit-required) have been eliminated, the space may be temporarily reclassified as a non-permit required confined space (Class 2A or 2B entry) for as long as the hazards remain eliminated. |

# Guidelines

Any Department/Division that will routinely authorize entry into Class 2A or Class 2B spaces should develop written protocols (such as a SOP, APM, or OPM, or equivalent ) for ensuring safe entry. See the exhibit Example of a Written Protocol for a Confined Space.

# References

Work Planning and Control for Experiments and Operations Subject Area

| Go to Previous Page | Continue to Next Page |

Back to Top



1.0-062003/standard/3s/3s02d011.htm

Send a question or comment to the SBMS Help Desk
Disclaimer

*Subject Area:* ***Confined Spaces***

# 3. Entering Nonpermitted Confined Spaces (Class 2A & 2B)

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

## Applicability

This information applies to all staff, visitors, and guests entering non-permitted Class 2A and 2B confined spaces.

## Required Procedure

Personnel involved in entering Class 1 confined spaces must be made aware of what constitutes a confined space and the danger and additional requirements of introducing hazards into these otherwise non-permitted spaces (by site-level or organizational level awareness training).

Personnel involved in entering Class 2A and 2B confined spaces must take the following steps:

| | |
|---|---|
| **Step 1** | When entry into the confined space involves workers from more than one Department/Division or BNL-supervised contractors, the ES&H Coordinator (or Designee, e.g., Work Coordinator) of the organization owning the space coordinates a review of the entry activities with applicable personnel from all organizations. |
| **Step 2** | The Entry Supervisor ensures that any conditions making it unsafe to remove an entrance cover must be eliminated before the cover is removed.<br><br>When entrance covers are removed, the opening must be promptly guarded, as necessary, to prevent an accidental fall through the opening, and to protect the Authorized Entrants from external hazards. |
| **Step 3** | Just before each entry, the Entry Supervisor verifies the hazard condition on the Confined Space Entry Certificate or Confined Space Permit remains valid. Before personnel enter a Class 2A or 2B space, when a hazardous |

| | |
|---|---|
| | valid. Before personnel enter a Class 2A or 2B space, when a hazardous atmosphere is potentially present, the Entry Supervisor ensures the atmosphere is tested by an atmosphere tester with calibrated instrument(s) capable of detecting the hazard(s) in the space. See the exhibit Hazardous Atmosphere Testing Criteria for testing protocol.<br><br>The atmosphere tester records the results of the monitoring on the Confined Space Entry Certification Form. Other means of recording the results (such as data-logging meters) may be used, but the results must be included with the Confined Space Entry Certification Form.<br><br>The Entry Supervisor informs each authorized entrant of the results of testing and the content of the certification by posting the permit or providing a copy of the permit. |
| **Step 4** | If the space contains a hazard, the Entry Supervisor ensures<br><br>• Appropriate controls are accomplished (including purging, isolation, lockout/tagging, and/or ventilation;<br>• Appropriate precautions are taken for existing or introduced hazards (such as electrical equipment and tools; solvents, paints, and residues; grounding; cutting and welding; and lighting.)<br><br>The exhibit Precautions for Existing or Introduced Hazards in Confined Spaces lists precautions.<br><br>Confined Space operations requiring a Cutting and Welding Permit are automatically classified as a Class 2C (permit-required) entry (unless evaluated and permitted by an IH Service Representative.) |
| **Step 5** | The Entry Supervisor conducts the job-specific briefing each day for the Authorized Entrants. Topics that must be included are<br><br>• Review of the Confined Space Entry Certificate;<br>• Work to be performed;<br>• Preexisting or introduced hazards, including signs, symptoms, and consequences of exposure to the hazards;<br>• Hazard control measures;<br>• Emergency rescue procedures.<br><br>If any staff involved in the entry do not think they have been appropriately briefed on the hazards or the control methods, or do not believe that the hazards of the entry are appropriately controlled, they may refuse to enter the space until the hazards are mitigated. |
| **Step 6** | If forced air ventilation is necessary for entry, the Entry Supervisor ensures ventilation equipment is installed and functioning adequately: |

| | |
|---|---|
| | • Personnel may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;<br>• The air supply for the forced air ventilation must be from a clean source and may not increase the hazards in the space;<br>• Within a Class 2A space, the atmosphere must be periodically tested as necessary;<br>• Within a Class 2B the space, the atmosphere must be continuously tested to ensure that the continuous forced air ventilation is preventing the accumulation of an atmospheric hazard;<br>• The ventilation systems must be monitored regularly for operation by attendants;<br>• If the forced air ventilation system fails during the entry, each all personnel must leave the space immediately.<br><br>**Note:** Whenever possible, forced air-systems should draw hazards away from the worker and introduce breathable air into the confined space through the worker's breathing zone before the air passes through the hazard. |
| **Step 7** | For Class 2B spaces, the Entry Supervisor verifies that engineering controls are installed and functioning adequately to eliminate mechanical or physical hazards. |
| **Step 8** | The Entry Supervisor verifies that all authorized entrants have received confined space entry training. See the Training and Qualifications Web Site for information. |
| **Step 9** | The Entry Supervisor verifies that proper personal protective equipment, respirators, and retrieval equipment are available as required. |
| **Step 10** | Authorized Entrants enter the space and conduct work within the parameters set by the Confined Space Entry Certification Form. |
| **Step 11** | If there are any changes in conditions from those documented on the Confined Space Entry Certification Form, or if any other problems arise, personnel stop work and evacuate the space immediately. |
| **Step 12** | If the Authorized Entrant(s) needs rescue assistance, he/she immediately calls for rescue services by calling 911 or 631-344-2222.<br><br>Before reentry, the Entry Supervisor has the space reevaluated according to the section Conducting Pre-entry Evaluation Before Entering a Confined Space. |
| **Step 13** | Workers report problems encountered during an entry operation that may |

| | |
|---|---|
| | result in not protecting the employee to the ES&H Coordinator. If deficiencies to the Department/Division program exist, the ES&H Coordinator revises the program to correct deficiencies before authorizing subsequent entries. |
| **Step 14** | If Authorized Entrants reenter a confined space after substantial break (such as rest break or lunch), they must retest for potential atmosphere hazards before entry to verify the space is within the hazard class determined in the entry certificate. |
| **Step 15** | When the entry is completed, the Authorized Entrants<br>• Remove the certification from the space;<br>• After verifying the space is not occupied, secure the entry ports/doors. |

# Guidelines

The preferred method of protecting electrical equipment is by using ground fault interrupters (GFCI), or double-insulated tools. For alternative methods see ES&H 1.5.0, Electrical Safety and discuss with the Electrical Safety Subject Matter Expert.

# References

Training and Qualifications Web Site

| Go to Previous Page | Continue to Next Page |

Back to Top



1.1-092003/standard/3s/3s03d011.htm

Send a question or comment to the SBMS Help Desk
Disclaimer

*Subject Area:* ***Confined Spaces***

# 4. Entering Permit-required Confined Spaces (Class 2C)

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

## Applicability

This information applies to all BNL staff, visitors, and guests entering Class 2C confined spaces.

## Required Procedure

Staff, visitors, and guests involved in entering Class 2C confined spaces must take the following steps:

| | |
|---|---|
| **Step 1** | When entry into the confined space involves workers from more than one Department/Division or BNL-supervised contractors, the ES&H Coordinator (or Designee, e.g., Work Coordinator) of the organization owning the space coordinates a review of the entry activities with applicable personnel from all organizations. |
| **Step 2** | The Entry Supervisor ensures that any conditions making it unsafe to remove an entrance cover must be eliminated before the cover is removed.<br><br>When entrance covers are removed, the opening must be promptly guarded, as necessary, to prevent an accidental fall through the opening, and to protect the Authorized Entrants from external hazards. |
| **Step 3** | Just before each entry, the Entry Supervisor verifies the hazards on the Confined Space Permit remain valid. Before personnel enter a Class 2 space, when a hazardous atmosphere is potentially present, the Entry Supervisor ensures the atmosphere is tested by an atmosphere tester with calibrated instrument(s) capable of detecting the hazard(s) in the space. See the exhibit Hazardous Atmosphere Testing Criteria for testing protocol |

| | |
|---|---|
| | the exhibit Hazardous Atmosphere Testing Criteria for testing protocol.<br><br>The Atmosphere Tester records the results of the monitoring on the Class 2C Permit-required Confined Space Entry Permit Form. Other means of recording the results (such as data-logging meters) may be used, but the results must be included with the Class 2C Permit-required Confined Space Entry Permit Form.<br><br>The Entry Supervisor informs each Authorized Entrant of the results of testing. |
| **Step 4** | The Entry Supervisor verifies that engineering controls are installed and functioning to minimize mechanical or physical hazards, including<br><br>• Purging;<br>• Isolation;<br>• Lockout/Tagging;<br>• Ventilation.<br><br>The exhibit Precautions for Existing or Introduced Hazards in Confined Spaces lists precautions.<br><br>Confined Space operations requiring a Cutting and Welding Permit are automatically classified as a Class 2C (permit-required) entry (unless evaluated and permitted by an IH Service Representative.) |
| **Step 5** | The Entry Supervisor ensures appropriate precautions are taken for existing or introduced hazards into the space for sources such as<br><br>• Electrical equipment and tools;<br>• Solvents, paints, and residues;<br>• Grounding;<br>• Cutting and welding;<br>• Lighting.<br><br>See the exhibit Precautions for Existing or Introduced Hazards in Confined Spaces for precautions. |
| **Step 6** | The Entry Supervisor conducts the job-specific briefing each day for the Authorized Entrants and the Attendants. Topics that must be included are<br><br>• Review of the Confined Space Entry Permit;<br>• Work to be performed;<br>• Preexisting or introduced hazards, including signs, symptoms, and consequences of exposure to the hazards;<br>• Hazard information from the Material Safety Data Sheet (MSDS) (*Limited Access) for materials in the space;<br>• Hazard control measures;<br>• Emergency rescue procedures.<br><br>If any staff involved in the entry do not think they have been appropriately briefed on the hazards or the control methods. or do not believe that the |

| | |
|---|---|
| | hazards of the entry are appropriately controlled, they may refuse to sign the permit and refuse to enter the space until the hazards are mitigated. |
| **Step 7** | The Entry Supervisor of Class 2C spaces verifies that the hazard conditions of the Confined Space Entry Permit remain valid and signs it each day for the duration of the operation.<br><br>• All parties involved in the entry of Class 2C spaces read and initial the form;<br>• The Entry Supervisor signs and posts the form at the entry site. The duration of the permit may not exceed the time required to complete the assigned task or job, which is the purpose of the entry. |
| **Step 8** | If forced air ventilation is a permit requirement, the Entry Supervisor and Attendant ensure ventilation equipment is installed and functioning adequately, and verify<br><br>• The air supply for the forced air ventilation comes from a clean source and does not increase the hazards in the space;<br>• The atmosphere within the space is continuously tested if the continuous forced air ventilation is preventing the accumulation of an atmospheric hazard;<br>• The ventilation system is monitored regularly for operation by attendants;<br>• If the forced air ventilation system fails during the entry, all personnel must leave the space immediately.<br><br>**Note:** Whenever possible, forced air-systems should draw hazards away from the worker and introduce breathable air into the confined space in a manner so that the air passes through the worker's breathing zone before passing through the area of hazard. |
| **Step 9** | The Entry Supervisor verifies that all Authorized Entrants and Attendants have received confined space entry training. See the exhibit Roles of Personnel involved in Class 2C Confined Spaces Entry and the Training and Qualifications Web Site for information. |
| **Step 10** | The Entry Supervisor verifies that proper personal protective equipment, respirators, and retrieval equipment are available as required. |
| **Step 11** | The Entry Supervisor posts the Class 2C (Permit-required) Confined Space Entry Permit Form at the entrance to the space. The Entry Supervisor ensures the area is secured to prevent unauthorized entry, e.g., barriers, caution tape. |
| **Step 12** | The Entry Supervisor ensures procedures and mechanisms are in place to quickly summon BNL Fire/Rescue in an emergency, and for preventing unauthorized personnel from attempting a rescue.<br><br>Verify that rescue services are available before entry and will be available throughout the entry by calling extension 2350 or 2351 |

| | |
|---|---|
| | throughout the entry by calling extension 2222 or 631-344-2222.<br><br>To facilitate nonentry rescue, use a personnel retrieval system for all entries (unless it is not feasible or poses an additional hazard). |
| **Step 13** | The Attendant monitors the safety of Authorized Entrants by<br><br>• Controlling the entry into the space;<br>• Remaining at the work site;<br>• Maintaining communication with the Authorized Entrant(s);<br>• Not performing other duties that might interfere with his/her ability to observe and protect the Authorized Entrant;<br>• Not entering the confined space, unless he/she is relieved of his/her responsibilities by another Attendant.<br><br>See the exhibit Roles of Personnel involved in Class 2C Confined Spaces Entry. |
| **Step 14** | The Attendant orders the Authorized Entrant to evacuate the space if the Attendant<br><br>• Detects a prohibited condition;<br>• Detects behavioral signs of exposure in authorized entrants;<br>• Detects a situation outside the space that could endanger the authorized entrants;<br>• Cannot effectively and safely perform all the required duties;<br>• Is notified by Fire Rescue that rescue services are no longer available. |
| **Step 15** | If there are any changes in conditions from those documented on the Confined Space Entry Permit, or if any other problems arise, personnel stop work and evacuate the space immediately. |
| **Step 16** | If the Authorized Entrant(s) needs rescue assistance, the Attendant immediately calls for rescue services by calling extension 2222 or 631-344-2222. The Attendant can not enter the space to attempt rescue.<br><br>Before reentry, the Entry Supervisor has the space reevaluated according to the section Conducting Pre-entry Evaluation Before Entering a Confined Space. |
| **Step 17** | Workers report health and safety problems encountered during an entry to the ES&H Coordinator. If deficiencies to the Department/Division program exist, the ES&H Coordinator revises the program to correct deficiencies before authorizing subsequent entries. |
| **Step 18** | If Authorized Entrants reenter a confined space after a substantial break (such as rest break or lunch), they must retest for potential atmosphere hazards before entry to verify the space is within the hazard class determined |

| | |
|---|---|
| | hazards before entry to verify the space is within the hazard class determined in the entry certificate or permit. |
| **Step 19** | When the entry is completed, expired, or canceled, the Entry Supervisor<br><br>• Completes the Class 2C (Permit-required) Confined Space Entry Permit (noting completion time and documenting problems encountered during the entry on the permit);<br>• Removes the permit from the space;<br>• Returns it to the Departmental ES&H Coordinator;<br>• After verifying the space is not occupied, secures the entry ports/doors;<br>• Notifies Fire Rescue that the entry is completed and rescue services are no longer needed.<br><br>**Note:** The Department/Division retains canceled permits a minimum of 1 year or until incorporated into the SME review of canceled permits. |

# Guidelines

The preferred method of protecting electrical equipment is by using ground fault interrupters (GFCI), or double-insulated tools. For alternative methods see ES&H 1.5.0, Electrical Safety and discuss with the Electrical Safety Subject Matter Expert.

# References

Material Safety Data Sheets (MSDS) Database Query Web site (*Limited Access)

Training and Qualifications Web Site

*Access Limited to BNL Staff and Authorized non-BNL Staff

| **Go to Previous Page** | **Continue to Next Page** |

**Back to Top**



1.0-062003/standard/3s/3s04d011.htm

*Subject Area:* ***Confined Spaces***

# 5. Confined Space Entry by Contractors

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

## Applicability

This information applies to BNL staff involved with the work of contractors and to non-BNL contractors entering Class 2A, 2B, and 2C confined spaces.

## Required Procedure

When BNL arranges to have an independent contractor perform work on-site that involves confined space entry, the contracting Department/Division ensures that the contractor complies with the requirements of this subject area.

| | |
|---|---|
| **Step 1** | Before awarding the contract, the Department/Division<br>• Informs the contractor that the workplace contains confined spaces and that entry is allowed only through compliance with a program meeting the requirements of 29 CFR 1910.146, "Permit-Required Confined Spaces;"<br>• Provides the contractor with information involving experience and history with the spaces in question, (such as applicable confined space inventories, hazard identifications, hazard evaluations, confined space classifications, and/or entry permits) that describe precautions and procedures applicable for the contractor's entry. |
| **Step 2** | At the time of bid, the contractor submits a written plan describing their confined space entry program. The contracting Department/Division has the plan reviewed by appropriate BNL ES&H professional to ensure the plan is compliant with OSHA regulations and compatible with BNL operations and programs. |
| **Step 3** | The contractor provides retrieval systems and trained staff to facilitate nonentry |

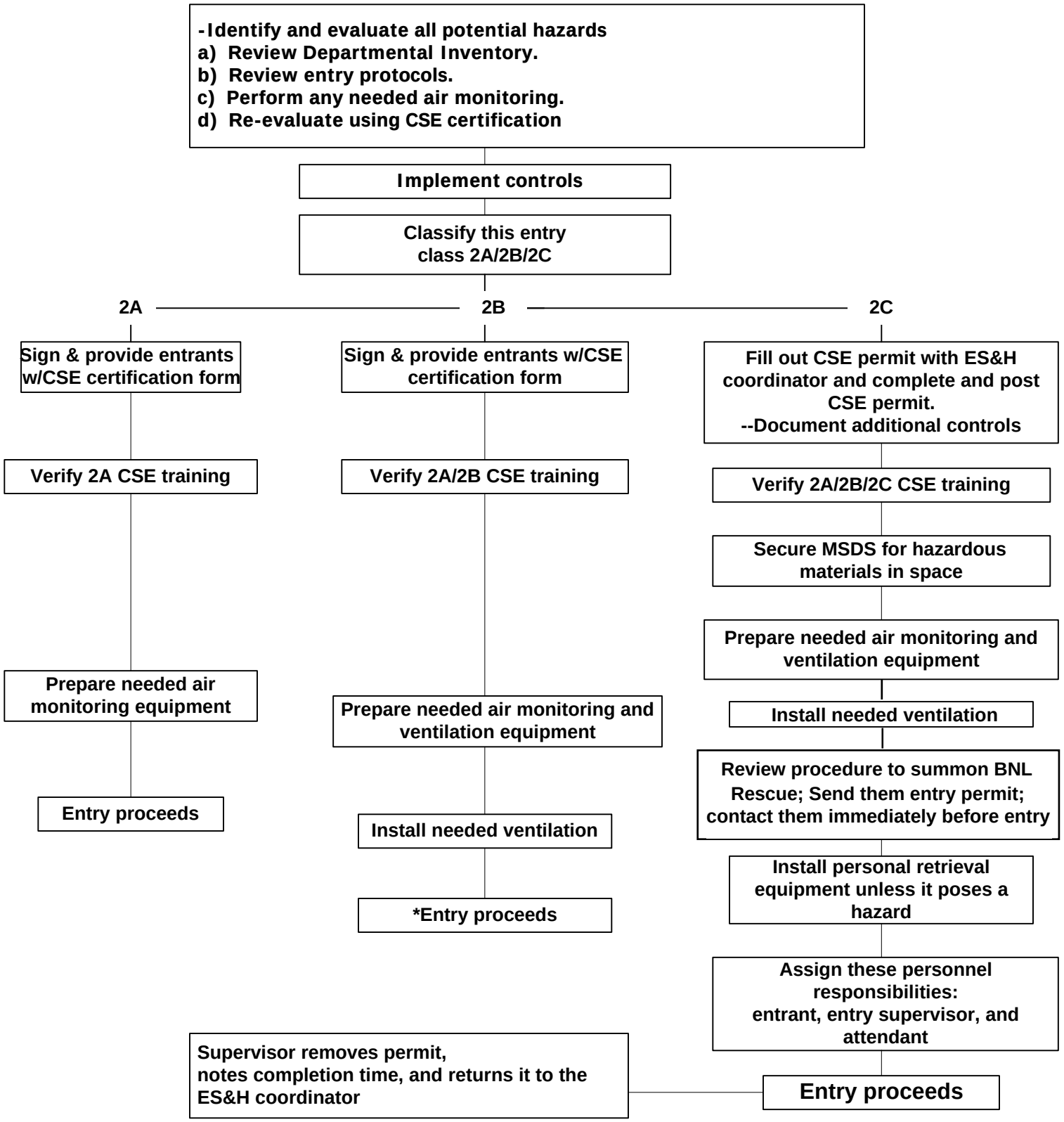
| | |
|---|---|
| | rescue. The contractor coordinates with the BNL Fire-Rescue group before entry into Class 2C (OSHA-permitted) confined spaces. |
| **Step 4** | The contracting Department/Division coordinates precautions and entry operations when both BNL staff and the contractor staff will work in or near confined spaces. |
| **Step 5** | The contracting Department/Division debriefs the contractor at the conclusion of entry operations regarding any hazards confronted or created during the confined space entry. |
| **Step 6** | All personnel stop work and evacuate the space immediately, if there are any changes in conditions from those documented on the Confined Space Entry Certification Form or Confined Space Entry Permit, or if any other problems arise. |
| **Step 7** | The Attendant immediately calls extension 2222 or 631-344-2222 for rescue service, if there is an emergency or the Authorized Entrant(s) needs rescue assistance. |
| **Step 8** | The contractor<br><br>1. Requests from the Department/Division any available information involving experience with the spaces in question, including applicable confined space inventories, hazard identifications, hazard evaluations, confined space classifications, entry permits, and the BNL Emergency Plan;<br>2. Coordinates precautions, procedures, and entry operations, when both BNL and contractor staff will be working in or near confined spaces;<br>3. Debriefs BNL at the conclusion of entry operations regarding any hazards confronted or created during the confined space entry. |

| **Go to Previous Page** |

**Back to Top**

## CONFINED SPACE ENTRY PROCEDURES FLOWCHART

Entry precautions: Entrance Covers. Any conditions making it unsafe to remove an entrance cover must be eliminated before the cover is removed. When the entrance covers are removed, the opening must be promptly guarded as necessary to prevent an accidental fall through the opening and to protect the entrants from external hazards.




***if there are any changes in conditions or if any other problems arise, stop work and evacuate space immediately. CSE - Confined Space Entry**

# Confined Space Hazards

| HAZARD IDENTIFICATION (the space contains or potentially contains) |
|---|
| **Chemical Hazards** |
| 1) Hazardous atmosphere from: |
| a) Chemicals currently contained or stored in space |
| b) Chemicals brought into space during entry |
| c) Chemical residues from chemicals previously contained, used, or stored in the space |
| d) Substances used in the space, which have acute hazards |
| e) Cleaning solvents or paints used in the space |
| f) Corrosives that could irritate the eyes or cause chemical burns |
| g) Flammable/combustible substances |
| 2) Oxygen in the breathing area can be reduced by: |
| a) Rusted interior surfaces (rusting consumes oxygen) |
| b) Decomposing organic matter (consumes oxygen) |
| c) Introduction of nonbreathable gas or vapor that reduces the oxygen level |
| 3) Other concerns: |
| a) Welding, cutting, brazing, riveting, scraping, or sanding performed in the space (consume oxygen and potentially generates ozone and toxic metal fumes) |
| b) Poor natural ventilation may allow an atmospheric hazard to develop |
| c) Pipes, which bring chemicals into or run through space, must be considered for the hazard in the event of rupture or leakage during entry |
| **Physical Hazards** |
| 4) Materials that can potentially trap, engulf, or drown an entrant |
| 5) Vision obscured by dust at 5 feet or less |
| 6) Mechanical equipment that if running could injure or trap the entrants |
| 7) Thermal hazards (e.g., extremely hot or cold) |
| 8) Excessive noise levels (that could interfere with communication with an attendant) |
| 9) Slip, trip, or fall hazards |
| 10) Operations conducted near the space opening, which could present a hazard to entrants |
| 11) Hazards from falling objects |
| 12) Lines under pressure servicing the space |
| 13) Energized electrical cables or equipment that cannot be locked or tagged out |
| **Physical Characteristic of the Space** |
| 13) Conditions that could prevent any entrants' self-rescue from the space |
| 14) Converging walls, sloped or tapered floors to smaller cross-sections, which could trap or asphyxiate an entrant (Entrapment Hazard) |
| 15) Diked areas where the dike is 5 feet or more in height |
| 16) Space configuration that restricts mobility or could trap an entrant |
| **Required Actions that Require a Space be Treated as Hazardous** |
| 17) Air monitoring is necessary to ensure the space is safe for entry due to potential hazardous atmosphere |

| |
|---|
| 18) Mechanical ventilation is needed to maintain a safe environment |
| 19) Respiratory protection is required because of a hazardous atmosphere |
| 20) Nonsparking tools are required to prevent fire or explosion |

*Subject Area:* ***Confined Spaces***

# Confined Space Sign

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

The Confined Space Sign is provided as a Word file.

**Posting Sign:** The wording on this sign (or an equivalent approved by the SME) is used to post Class 2A, 2B and 2C confined spaces when entry is not in progress. (During entry, a permit or certification is posted.)

Back to Top



1.0-062003/standard/3s/3s01e011.htm

**Confined Space Sign**

DANGER

# Confined Space

Certification or Permit Needed
before Entry
Contact ESH Coordinator
for Assistance or for a Permit

*Subject Area:* ***Confined Spaces***

# Example of a Written Protocol for a Confined Space

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

**Sewage, Manholes, Lift Stations, and Ejector Pits**

I. Potential Hazards

A. Engulfment - Means the surrounding and effective capture of a person by a liquid or finely divided 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.

B. Toxic Gases - Hydrogen sulfide, equal to or greater than 10 ppm measured as an 8-hour time-weighted average, or 15 ppm measured over any 15-minute period. If there is reason to suspect any toxic contaminant other than hydrogen sulfide, a specific-monitoring program will be developed.

C. Oxygen Deficiency - A concentration equal to or less than 19.5%.

D. Explosive/Flammable Gases - Equal to or greater than 10% of the lower explosive limit (LEL).

II. Control of Hazards (Pre-Entry Procedures)

The following actions must all be able to be accomplished without entering the confined space. If they cannot, the PE ESH Coordinator (or designee) must be contacted and procedures for entry employing a confined space entry permit must be initiated.

A. Pumps and Lines - If pumps and/or lines may reasonably be expected to allow contaminants to flow into the space, they must be effectively isolated (e.g. disconnected, locked out). Not all laterals require blocking, but where experience or system knowledge indicates there is a reasonable potential for engulfment or air contamination, then all affected laterals must be isolated.

B. Surveillance - The surrounding area must be surveyed to avoid hazards such as drifting vapors from tanks, piping, or sewers.

C. Air Monitoring - The atmosphere within the space must be tested to determine whether dangerous air contamination and/or oxygen deficiency exists. Combination oxygen/toxic gas/combustible gas meters will be used. Testing will be performed under the direction of the Entry Supervisor and will be performed by personnel trained in the use of the monitoring equipment. Oxygen, hydrogen sulfide, and the LEL will be monitored at a minimum.

III. Entry Procedures

A. No Hazards - If pre-entry air monitoring detects no hazards (i.e., the results of all air monitoring are less than 50% of the allowed applicable set points) within the space, and there is no reason to expect that any will develop, entry into and work within may proceed.

A written record of the pre-entry test results will be made and kept at the work site for the duration of the entry. The Supervisor will certify in writing, based on the results of the pre-entry testing, that all hazards have been eliminated. This certification will be posted at the work site for all affected personnel to see.

Continuous testing of the atmosphere in the space will be accomplished during entry by having one worker in each entry wear a multi-gas personal monitor set to alarm at each of the three limits specified above. If any of the gas monitors' set points cause an alarm, all workers will exit the space immediately.

Rescue - Attendants and arrangement for rescue services are not required under these entry conditions.

B. Ventilation Required - If pre-entry air monitoring detects any of the monitored for gases at levels of 50% or more of their set points, mechanical forced air ventilation must be used to ventilate the space for at least 30 minutes or until pre-entry testing verifies that the hazardous atmosphere has been eliminated. Once testing has verified that there are no atmospheric hazards in the space and there is no reason to expect that any will develop, entry into and work within may proceed.

Mechanical ventilation will be left on for the duration of the entry.

A written record of the pre-entry test results will be made and kept at the work site for the duration of the entry. The Supervisor will certify in writing, based on the results of the pre-entry testing, that all hazards have been eliminated. This certification will be posted at the work site for all affected personnel to see.

Continuous testing of the atmosphere in the space will be accomplished during entry by having one worker in each entry wear a multi-gas personal monitor set to alarm at each of the three limits specified above. If any of the gas monitor's set points cause an alarm, all workers will exit the space immediately

Rescue - Attendants and arrangement for rescue services are not required under

Rescue - Attendants and arrangement for rescue services are not required under these entry conditions.

C. Permit Required - If mechanical ventilation alone is not sufficient to achieve safe atmospheric conditions or if the atmosphere tests as safe but unsafe conditions can reasonably be expected to develop, the entry procedures in this procedure may not be used. The PE ES&H Coordinator (or Designee) must be contacted and procedures for entry employing a Confined Space Entry Permit must be initiated.

Back to Top



1.0-062003/standard/3s/3s05e011.htm

# Hazardous Atmosphere Testing Criteria

**Testing Protocol**

| | |
|---|---|
| 1. | When a hazardous atmosphere is potentially present, before entering any Class 2 A, 2B or 2C confined space, test for (in this order):<br><br>• Oxygen deficiency;<br>• Flammable gases;<br>• Toxins (such as carbon monoxide (CO) and hydrogen sulfide (H2S);<br>• Other anticipated hazardous atmosphere;<br>• Additional tests such as noise or radiation. |
| 2. | Continuously monitor Class 2B and Class 2C confined space if atmospheric hazards may exist. |
| 3. | **Testing to be done by an atmosphere tester**. If monitoring assistance is required outside of normal working hours, obtain ESH&Q assistance by contacting the on-duty desk sergeant at Police Headquarters at extension 2238. |
| 4. | Perform instrument pre-operational checks once per day before the instrument is released for field use (i.e., bump test). The sensors for hazards present in the space must be challenged with the appropriate gas to determine its functionality. Instruments must be field-checked before each entry. |
| 5. | Maintain instruments calibrated according to the manufacturers' recommendation and at the frequency recommended by the manufacturer. |

**Hazard Criteria**

| **Atmospheric conditions that must be met for**<br><br>○ **Class 1 (at all times),**<br>○ **Class 2A, and 2B (to reclassify to non-permit required), and**<br>○ **Class 2C (for entry without PPE)** | |
|---|---|
| **Oxygen** | The percentage of oxygen<br><br>• Greater than or equal to 19.5% and<br>• Not greater than 23.5%. |
| **Flammable and combustible** | Flammable and combustible gases and vapors:<br><br>• Not greater than 10% of the Lower Exposure Limit (LEL). Spaces that have a combustible gas indicator reading above10% LEL must not be entered, regardless of respiratory equipment, until they have been reduced below this level with purging or ventilation.<br><br>(Measurements may be erroneous if the oxygen level is less than or greater than normal atmospheric concentrations. Test for oxygen before testing for flammable and combustible atmospheres). |

| | |
|---|---|
| **Toxic Atmospheres** | Each potential toxic substance below the OSHA PEL and ACGIH TLV® (whichever is lower). |

# Precautions for Existing or Introduced Hazards in Confined Spaces

| | |
|---|---|
| Torch Cutting and welding (Hot work Permit) | Cutting and welding work must not be started in or on the exterior surfaces of a confined space until a hot work permit has been issued (see ES&H Standard 4.3.0, Cutting and Welding). |
| | All surfaces with coatings that may decompose under hot work, and produce toxic, corrosive, irritant or flammable emissions, must be stripped from the area of heat application for a distance of at least six inches. During stripping, exhaust ventilation must be provided. Flames must not be used to remove soft or greasy preservative coatings. |
| | During surface removal and during hot work on metal covered with preservatives or protective coatings, continuous atmospheric tests must be made to ensure that no flammable or toxic contaminants are being produced by the preservative or coatings. If contaminants are produced the hot work must be stopped immediately and re-evaluated. |
| Electrical Equipment | All equipment and lighting must follow the grounding requirements in ES&H Standard 1.5.0, Electrical Safety. The preferred method of protecting electrical equipment is by using ground fault interrupters (GFCI), or double-insulated tools. For alternative methods see ESH Standard 1.5.0 and discuss with the Electrical SME. |
| | Lighting and electrical equipment must comply with the requirements of equipment. See ES&H Standard 1.5.2, Design Criteria for Electrical Equipment and ES&H Standard 4.12.0, Special Precautions for Locations Containing Flammable Atmospheres. |
| Flammable and Explosive Atmospheres | Ventilation is sufficient to keep the vapor concentration below 10% of the Lower Explosive Limit (LEL). |
| | Smoking, open flames, matches, arcs, and spark-producing equipment or other ignition sources must be prohibited in this area. |
| | Scrapings and rags soaked with solvent must be placed in a covered metal container outside the confined space. |
| | Equipment and lighting used in a flammable atmosphere should be explosion-proof, and/or intrinsically safe for the atmosphere. |
| | Nonsparking tools must be used. |

| | |
|---|---|
| Isolation | The hazard source is eliminated by physical disconnection, double-block and bleed, or blanking off of all lines. |
| Lighting | Lighting equipment must be provided so workers can see well enough to work safely and to exit the space quickly in an emergency. |
| Lockout and Tagout | Eliminate all hazardous energy sources by following ES&H Standard 1.5. 1, Lockout/Tagout Requirements. When the power source cannot be controlled, movable components should be disconnected or blocked and switches, clutches, and other controls must be tagged. When the power source cannot be de-energized, obtain a Hot Work Permit. |

# Predetermined Confined Spaces Classifications

| Area | Hazards | Class |
|---|---|---|
| **Attics** | Potential hazards are from sources outside the scope of the Confined Space Standard atmosphere testing (i.e., biohazards from rodent infestation, asbestos and fiberglass from insulation) | Nonpermit Class 1 (no certification needed), but evaluation and PPE of Asbestos, Fiberglass, and biohazards required. |
| **Crawl Spaces** | Potential hazards are from sources outside the scope of the Confined Space Standard atmosphere testing (i.e., biohazards from rodent infestation, asbestos and fiberglass from insulation) | Nonpermit Class 1(no certification needed), but evaluation and PPE of Asbestos, Fiberglass, and biohazards required. |
| **HVAC ducts** | By design, respirable air occupies the space under normal conditions. | Non-permit Class 1(no certification needed), unless hazard is introduced, such as welding or cleaning solvents, then certification is required. |
| **Utility Manholes containing telecommunication only** | Low hazard is in the space from the utility. Potential hazard arises from rusting or microbial decomposition. Oxygen and Hydrogen sulfide (H2S) must be tested. | Oxygen testing is required to prove Nonpermitted Class 2A |
| **Utility Manholes containing telecommunication & electrical** | Low hazard is in the space from the utility. Potential hazard arises from rusting or microbial decomposition. Oxygen and Hydrogen sulfide (H2S) must be tested. | Oxygen testing is required to prove Nonpermitted Class 2A |
| **Utility manholes containing potable water** | Low hazard is in the space from the utility. Potential hazard arises from rusting or microbial decomposition. Oxygen and Hydrogen sulfide (H2S) must be tested. | Oxygen testing is required to prove Non-permitted Class 2A |
| **Utility Manholes containing sewage** | Moderate hazard is in the space from the utility posed by rusting or microbial decomposition. Oxygen and Hydrogen sulfide (H2S) must be tested. | Certification Testing required, typically Class 2A. If hazardous atmosphere exists, can usually be purge/vented to Class 2B. |

# Roles of Personnel Involved in Class 2C Confined Spaces Entry

| | |
|---|---|
| Authorized Entrants | 1. Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure;<br>2. Properly use all equipment that may be associated with confined space entry, including<br>a. Ventilating equipment;<br>b. Communications equipment;<br>c. Personal protective equipment;<br>d. Lighting equipment needed to see well enough to work safely and to exit the space quickly in an emergency;<br>e. Barriers and shields;<br>f. Equipment such as ladders needed for safety entry and egress;<br>g. Any rescue and emergency equipment they may use in conjunction with BNL's Fire/Rescue Group in an emergency.<br>3. Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to alert entrants of the need to evacuate the space;<br>4. Alert the attendant whenever<br>a. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation; or<br>b. The entrant detects a prohibited condition; and<br>5. Exit from the permit space as quickly as possible whenever<br>a. An order to evacuate is given by the attendant or the entry supervisor;<br>b. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation;<br>c. The entrant detects a prohibited condition; or<br>d. An evacuation alarm is activated. |
| Atmosphere tester | Properly use all testing and monitoring equipment associated with confined space entry. |
| Attendants | 1. Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;<br>2. Be aware of possible behavioral effects of hazard exposure in authorized entrants;<br>3. Continuously maintain an accurate count of authorized entrants in the space and ensure the means used to identify authorized entrants accurately identifies who is in the space;<br>4. Remain outside the permit space during entry operations until relieved by another attendant;<br>5. Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space;<br>6. Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and order the authorized entrants to evacuate the space immediately under any of the following conditions:<br>a. If the attendant detects a prohibited condition; |

| | |
|---|---|
| | b. If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;<br>c. If the attendant detects a situation outside the space that could endanger the authorized entrants; or<br>d. If the attendant cannot effectively and safely perform all the duties required by this subject area.<br>7. Summon the BNL Fire/Rescue Group at extension 911 or 2222 as soon as the attendant determines that authorized entrants may need assistance to escape from confined space hazards;<br>8. Take the following actions when unauthorized persons approach or enter a space while entry is underway:<br>a. Warn the unauthorized persons that they must stay away from the space;<br>b. Advise the unauthorized persons that they must exit immediately if they have entered the space; and<br>c. Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the space;<br>9. Perform nonentry rescues as specified by the Department/Division's rescue procedure; and<br>10. Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants. |
| Entry Supervisors | 1. Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;<br>2. Verify, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;<br>3. Terminate the entry and cancel the permit;<br>4. Verify that rescue services are available before entry and will be available throughout the entry.<br>5. Verify that the means for summoning BNL Fire/Rescue are available and operable;<br>6. Verify the availability of Fire/Rescue services before and throughout the entire entry by calling extension 2350. Send the Permit to Fire/Rescue prior to entry;<br>7. Remove unauthorized individuals who enter or who attempt to enter the space during entry operations; and<br>8. Whenever responsibility for a Class 2C space entry operation is transferred, communicate to the new entry supervisor, which entry operations and conditions remain in effect. The new entry supervisor verifies that acceptable entry conditions are maintained;<br>9. Notify Fire/Rescue when entry is completed and rescue coverage is no longer needed. |
| Rescue and Emergency Services | 1. Know how to properly use the personal protective equipment and rescue equipment necessary for making rescues from Class 2C spaces;<br>2. Know how to perform assigned rescue duties. Each member of Fire/Rescue must also receive the training required of authorized entrants under this subject area;<br>3. Practice making confined space rescues at least once every 12 months by simulated rescue operations in which they remove dummies, manikins, or actual persons from actual confined spaces or from representative confined spaces. Representative confined spaces must, for opening size, configuration, and accessibility, simulate the |

| | |
|---|---|
| | types of confined spaces from which rescue is to be performed;<br>4. Know basic first-aid and CPR. At least one member holding current certification in first-aid and CPR must be available;<br>5. Notify entry supervisors or designees if they become unavailable to provide rescue and emergency services;<br>6. Provide BNL with confined-space rescue services unless other provisions are made. |

*Subject Area:* ***Confined Spaces***

# Confined Space Entry Certification Form

Effective Date: **June 2003**

Point of Contact: Confined Space Subject Matter Expert

The Confined Space Entry Certification Form is provided as a Word file.

This form (or an equivalent approved by the SME) is used to document hazard evaluation on Class 2A and 2B confined spaces.

1.0-062003/standard/3s/3s02e011.htm

BROOKHAVEN NATIONAL LABORATORY

# CONFINED SPACE ENTRY CERTIFICATION

| | |
|---|---|
| Location | Date |
| Department | Division |
| Building | Area/Location/Room: |
| Supervisor/Designee | Life # |

| PRE-ENTRY QUESTIONS<br>*For each item, check "yes" or "no": If no, consult Supervisor* | YES | NO |
|---|---|---|
| Is entry essential to perform work? | □ | □ |
| Have all personnel been trained in confined space entry? | □ | □ |
| Are conditions safe to remove utility-hole cover? | □ | □ |
| Has opening been guarded? | □ | □ |
| Is monitoring equipment calibrated? | □ | □ |
| Has monitoring been performed and recorded below? | □ | □ |
| Is GFCI used, if outside or in wet conditions? | □ | □ |
| Is ventilation blown into bottom of space? (If required) | □ | □ |
| Are personnel instructed to evacuate upon hazard detection? | □ | □ |
| Have all workers reviewed these entry requirements? | □ | □ |
| Radiation: If present, RWP may be required – review work with ESH Coordinator and RCD personnel. Evaluate hazards and controls. | □ **Reviewed** | □ |

| SPACE CLASSIFICATION QUESTIONS<br>For each item, check box only if "yes" | Class 2A | Class 2B | Class 2C |
|---|---|---|---|
| Engulfment Hazard Present | | | □ |
| Entrapment Hazard Present | | | □ |
| Electrical Systems: | | | |
| • Deenergized | □ | | |
| • Energized and Working Hot | | | □ |
| • Energized, but Guarded or not Working Hot | □ | | |
| Mechanical Systems: | | | |
| • Deenergized | □ | | |
| • Energized and Working Hot | | | □ |
| • Energized but Guarded or not Working Hot | □ | | |
| Other Energized Systems: (e.g., steam, sewage) | | | |
| • Deenergized | □ | | |
| • Energized and Working Hot | | | □ |
| • Energized but Guarded or not Working Hot | □ | | |
| Chemical Hazards inherent in space, based upon monitoring, but controllable by ventilating | | □ | |
| Chemical Hazards inherent in space, based upon monitoring, but not controllable by ventilating | | | □ |
| Chemical Sources, introduced into space? (e.g., welding fumes, solvents) | | | □ |
| High Temperature/Pressure Hazard? (other than steam utility-holes) | | | □ |

- If ANY box in column 2C is checked, a Confined Space Permit **IS** required.
- If any box in column 2B is checked, and none in column 2C, a Confined Space Permit **IS NOT** required **BUT** continuous monitoring and ventilating ARE required.
- If only boxes in column 2A are checked, no additional requirements apply.

**Classification evaluation**

| **CLASSIFICATION**<br>CLASS: | I have completed the front and back of this Confined Space Entry Certification form and classified this space. If the confined space is classified as a 2C, I will obtain a Confined Space entry permit. If the space is Class 2B, continuous monitoring and ventilation is required and will be documented on this form. | |
|---|---|---|
| | Supervisor/Designee: Life # | Date: |

# BNL CONFINED SPACE ENTRY CERTIFICATION

| Meter: | Serial # | Calibration Date: |
|---|---|---|
| Day of Use Sensor Check □ Yes □ No | | |
| Tested By: | | BNL#: |

| MONITORING RESULTS | | | | | |
|---|---|---|---|---|---|
| Tested By: | | BNL Number: | | | |
| Date/ Time | Oxygen % (% O2) | Flammable Gas (% LEL) | Carbon Monoxide (CO ppm) | Hydrogen Sulfide (H2S ppm) | Other: |
| **Pre-Entry Certification test** | | | | | |
| Acceptable Reading | 19.5 – 23.5 % | < 10 % of LEL | <25 ppm | <10 ppm | |

**Supplemental sampling record**

# CLASS 2B CONFINED SPACE ENTRY CERTIFICATION

For Class2B spaces, continuous monitoring is required.

| MONITORING RESULTS | | | | | |
|---|---|---|---|---|---|
| Tested By: | | BNL Number: | | | |
| Date/ Time | Oxygen % (% O2) | Flammable Gas (% LEL) | Carbon Monoxide (CO ppm) | Hydrogen Sulfide (H2S ppm) | Other: |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Acceptable Reading | 19.5 – 23.5 % | < 10 % of LEL | 25 ppm | 10 ppm | |

Class 2B: Describe Method of Ventilation:

*Subject Area:* ***Confined Spaces***

# Class 2C (Permit-required) Confined Space Entry Permit Form

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

The Confined Space Entry Permit Form is provided as a Word file.

This form (or an equivalent approved by the SME) is used to document hazard evaluation and entry on Class 2C confined spaces.

1.2-042004/standard/3s/3s03e011.htm

Send a question or comment to the SBMS Help Desk
Disclaimer

BROOKHAVEN NATIONAL LABORATORY

# CLASS 2C (PERMIT-REQUIRED) CONFINED SPACE ENTRY PERMIT

## GENERAL INFORMATION

Permit Space Location:

_____

Purpose of Entry:

_____

Entry Permit Valid for Date:_____ to Date:_____

Time:_____ to Time:_____

## CONFINED SPACE HAZARDS

| ATMOSPHERIC | YES | NO |
|---|---|---|
| Oxygen Deficiency | ☐ | ☐ |
| Oxygen Enrichment | ☐ | ☐ |
| Explosive (Gas/Vapor) | ☐ | ☐ |
| Carbon Monoxide | ☐ | ☐ |
| Hydrogen Sulfide | ☐ | ☐ |
| Other Toxic Gases/Vapors (e.g. solvents; welding fumes) | ☐ | ☐ |
| ENGULFMENT | | ☐ |
| CONFIGURATION (ENTRAPMENT) | ☐ | ☐ |
| MECHANICAL | ☐ | ☐ |
| ELECTRICAL | ☐ | ☐ |
| SUBSTANCE HAZARDOUS TO SKIN OR EYES | ☐ | ☐ |
| HEAT STRESS | ☐ | ☐ |
| OTHER POTENTIAL HAZARDS | ☐ | ☐ |
| RADIATION | ☐ | ☐ |
| NOISE | ☐ | ☐ |
| | ☐ | ☐ |

## PERSONNEL

| Entrant(s) | Time in | Time out |
|---|---|---|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

Attendant(s) _____

_____

Entry Supervisors(s) _____

_____

**COMMUNICATION PROCEDURES USED BY ENTRANT(S) & ATTENDANT(S)** check all that apply

- ☐ Visual
- ☐ Rope
- ☐ Voice
- ☐ Radio
- ☐ Other (specify) _____

## RESCUE AND EMERGENCY SERVICES

Names: Phone #:

_____ _____

_____ _____

Summoning Procedure: _____

_____

## CONTROLS/EQUIPMENT (check all that apply)

- ☐ ISOLATION
  - ☐ LOCKOUT/TAGOUT
  - ☐ BLANKING/BLINDING
  - ☐ DOUBLE BLOCK AND BLEED
  - ☐ LINEBREAKING/MISALIGNMENT
  - ☐ OTHER
- ☐ INERTING
- ☐ PURGE/CLEAN
- ☐ METHODS FOR SAFE COVER REMOVAL AND SECURING AREA
- ☐ ATMOSPHERIC TESTING
  - ☐ Periodic (give interval)
  - ☐☐ Continuous
- ☐ VENTILATION
  - ☐ Natural
  - ☐ Continuous forced air
  - ☐ Local exhaust
- ☐ ENTRY EQUIPMENT
  - ☐ Ladders
  - ☐ Other_____
- ☐ PERSONAL PROTECTIVE EQUIPMENT
  - ☐ Respiratory
    - ☐ SCBA
    - ☐ SAR
    - ☐ Air Purifying
  - ☐ Protective Clothing (specify)_____ _____
  - ☐ Eye and face protection
  - ☐ Hearing protection
- ☐ RESCUE AND RETRIEVAL EQUIPMENT
  - ☐ Full Body Harness
  - ☐ Lifeline
  - ☐ Tripod w/mechanical winch
  - ☐ Explosion proof lighting
- ☐ NON-SPARKING TOOLS
- ☐ INTRINSICALLY SAFE ELECTRICAL EQUIP & GFCI
- ☐ COMMUNICATION EQUIPMENT
  - ☐ Radio
  - ☐ Phone
  - ☐ Other
- ☐ HOT WORKING PERMIT
- ☐ FIRE EXTINGUISHERS

## RESCUE PROCEDURES

_____

_____

_____

_____

_____

Verify Fire Rescue availability before entry is made

☐ Yes Date _____

## ATMOSPHERIC TESTING RECORD

| TESTING EQUIPMENT USED | | |
|---|---|---|
| Make/Model: | Serial # | Calibration Date: |
| Make/Model: | Serial # | Calibration Date: |

| | |
|---|---|
| Day of Use Sensor Check □ Yes □ No | Field Check (Bump Test) □ Yes □ No |
| Tested By: | BNL No: |

| Date & Time | Oxygen % (%O2) | Flammable Gas (% LEL) | Carbon Monoxide (CO ppm) | Hydrogen Sulfide (H2S ppm) | Other: |
|---|---|---|---|---|---|
| Pre-Entry | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Acceptable Reading | 19.5 – 23.5 | < 10 % | 25 ppm | 10 ppm | |

| | |
|---|---|
| Atmosphere Tester (Tested By): | BNL Life Number: |

### ENTRY AUTHORIZATION

**ENTRY AUTHORIZED BY:** (Entry Supervisor and ESH Coordinator)

NAME: _____ TIME: _____
SIGNATURE: _____ DATE: _____
NAME: _____ TIME: _____
SIGNATURE: _____ DATE: _____

## POST ENTRY PERMIT AT ENTRANCE TO CONFINED SPACE

## ENTRY CANCELLATION

**ENTRY CANCELLED BY (Entry Supervisor):**

NAME: _____ TIME: _____
SIGNATURE: _____ DATE: _____
NOTIFICATION OF CANCELLATION MADE TO FIRE RESCUE DATE: _____ TIME: _____

REASON FOR CANCELLATION:

- □ Entry Operation Completed
- □ Prohibited Condition Arose (Specify) _____

Personnel's Comments:

| | |
|---|---|
| Cancelled Permit Review by: | Date: |
| Return Permit to ESH Coordinator on Completion | |

# Definitions: Confined Spaces

Effective Date: **June 2003**
Point of Contact: Confined Space Subject Matter Expert

| Term | Definition |
|---|---|
| atmosphere tester | An individual who<br>• Has demonstrated competency in use of monitoring equipment and selection of equipment for the job;<br>• Is knowledgeable in the permissible exposure limits as published by OSHA and ACGIH;<br>• Is trained in proper sampling/monitoring procedures in confined spaces;<br>• If the atmospheric tester must enter the space to perform the monitoring, he/she must also have received confined space entry training. |
| attendant | A trained individual stationed outside one or more Class 2C confined spaces, who monitors the authorized entrants during an entry and who performs all attendants' duties as required by this subject area. An attendant cannot enter the confined space unless relieved by another attendant. |
| authorized entrant | Personnel trained to enter a Class 2C confined space to work. |
| confined space | A space that meets all of these criteria:<br>• Is large enough and configured so that an individual can bodily enter and perform assigned work;<br>• Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits and spaces that may have limited means of entry);<br>• Is not designed for continuous human occupancy. |
| | A space that meets the definition of a confined space, **but** by design and use does not contain a hazard. |

| | |
|---|---|
| confined space, class 1 | Class 1 Confined spaces do not require a Confined Space Entry Certification Form unless hazards are going to be introduced during entry.<br><br>Examples: Attics, Crawl Spaces, Air Plenums.<br><br>**OSHA equivalent is a nonpermitted confined space.** |
| confined space, class 2 | A confined space that has one or more of the following characteristics:<br><br>1. Contains or has a potential to contain a hazardous atmosphere;<br><br>2. Contains a material that has the potential for engulfing an entrant;<br><br>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;<br><br>4. Contains any other recognized serious physical or health hazard.<br><br>There are three categories of Class 2 confined spaces: Class 2A, 2B, and 2C. |
| confined space, class 2A | Space that meets the configuration of a confined space, **and** the space has the potential to contain a hazard. **However**, it is certified before entry not to contain a hazard, and no hazard will be introduced during the entry.<br><br>Examples: electric manholes (when de-energized), telecommunication manholes.<br><br>**OSHA equivalent is Permit-required Confined Space that has been downgraded to Nonpermitted Confined Space based on pre-entry certification.** |
| confined space, class 2B | Space that meets the configuration of a confined space, **and** the space was found to have a hazard. The hazard will be eliminated by an engineering control before entry. No hazard will be introduced during the entry.<br><br>• All physical hazards are removed or controlled.<br>• Continuous forced air ventilation alone is sufficient to maintain the space safe for entry (when an atmospheric hazard is present).<br>• Monitoring documents Class 2B status. |

| | |
|---|---|
| | • Continuous monitoring is done to verify that the ventilation continues to be effective (when forced air ventilation is used to control the hazards).<br><br>**OSHA equivalent is Permit-required Confined Space that has been downgraded to Nonpermitted Confined Space based on pre-entry evaluation and controls.** |
| confined space, class 2C | Space that meets the configuration of a confined space, **and** contains a serious safety or health hazard that is not completely eliminated or a hazard will be introduced during the entry.<br><br>**OSHA equivalent is a Permit-required Confined Space.** |
| Confined Space Entry Certification Form | BNL document used to evaluate and classify confined spaces into Class 1, Class 2A, 2B, or 2C categories. |
| Confined Space Entry Permit Form | BNL document that allows and controls entry into a permit-required, Class 2C confined space. |
| emergency | Any occurrence (including failure of hazard control or monitoring equipment) or event that could endanger confined space entrants. |
| engulfment | A situation where liquid or finely divided solid material could trap an entrant. |
| entrapment | A situation where a mechanical or physical hazard is present and may inhibit egress. |
| entry | The action by which a person passes through an opening into a permit-required confined space. Entry occurs as soon as any part of the entrant's body breaks the plane of an opening into the space. |
| entry supervisor | A trained employee responsible for<br><br>• Determining if acceptable entry conditions are present at a confined space where entry is planned;<br>• Authorizing entry;<br>• Overseeing entry operations;<br>• Terminating entry as required. |
| hazardous atmosphere | An atmosphere that meets one or more of the following causes:<br><br>• Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL) or Lower explosive limit (LEL);<br>• 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 or less);<br>• Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;<br>• Atmospheric concentration in excess of the more stringent of the OSHA permissible exposure limit or ACGIH TLV.<br>  ○ A substance with an exposure limit intended solely to prevent long-term health effects is not considered to be a hazard initiating the requirements of this subject area.<br>  ○ A substance capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is covered.<br>• Any atmospheric condition that is immediately dangerous to life or health.<br><br>**Note:** An atmosphere that contains a substance at a concentration exceeding its TLV or PEL, which is intended solely to prevent long-term health effects, is not considered to be a hazard initiating the requirements of this subject area. |
| isolation | The process by which a hazard is removed from the space or completely protected against release into the space by such means as<br><br>• Blanking or blinding;<br>• Misaligning or removing sections of lines, pipes, or ducts, a double-block and bleed system;<br>• Lockout or tagout of all sources of energy;<br>• Blocking or disconnecting all mechanical linkages. |
| nonpermit confined space | A confined space that does not contain or have the potential to contain a hazard capable of causing death or serious physical harm. |
| oxygen deficient | An atmosphere containing less than 19.5 percent oxygen by volume. |
| oxygen enriched | An atmosphere containing more than 23.5 percent oxygen by volume. |
| physical hazards | Equipment, machinery, or utilities that are not de-energized or isolated, and locked or tagged out must be guarded as required by applicable standards for mechanical and/or electrical equipment. As long as the equipment inside the confined space remains adequately guarded, personnel within the space are not considered to be exposed to any physical hazards. |
| retrieval system | The equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate and a lifting device or anchor) |

| | |
|---|---|
| | used for nonentry rescue of persons from Class 2C (permit-required) spaces. |

Back to Top



1.0-062003/standard/3s/3s00l011.htm

Send a question or comment to the SBMS Help Desk
Disclaimer

# Revision History: Confined Spaces

Point of Contact: Confined Space Subject Matter Expert

## Revision History of this Subject Area

| Date | Description | Management System |
|---|---|---|
| June 2003 | This subject area provides procedures for ensuring the safe work of BNL staff and non-BNL staff who enter confined spaces. It describes the requirements for safe entry, work, and exit of employees assigned to work in confined spaces.<br><br>It also describes restrictions and requirements for entry certification and confined space entry permits for compliance with 29 CFR 1910.146, Permit-Required Confined Spaces.<br><br>This subject area takes the place of ES&H Standard 2.2.4, Confined Spaces. | Worker Safety and Health |

Back to Top



1.0-062003/standard/3s/3s00a011.htm

Send a question or comment to the SBMS Help Desk
Disclaimer