

SUBJECT AREA CONTENT

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Management System: Worker Safety and Health			
Subject Area: Confined Spaces			
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Effective Date: Jun 15, 2016 (Rev 9.0) Periodic Review Due: Jun 15, 2021	Subject Matter Expert: Mark Marco	Management System Executive: Ed Nowak	Management System Steward: Gail Mattson

Introduction

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 and 29 CFR 1926 Subpart AA, Confined Spaces in Construction.

This subject area does not apply to (1) Construction work regulated by 29 CFR 1926 Subpart P, Excavations; (2) Construction work regulated by 29 CFR 1926 Subpart S, Underground Construction, Caissons, Cofferdams, and Compressed Air; (3) Construction work regulated by 29 CFR 1926 Subpart Y, Commercial Diving Operations.

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

Training Requirements and Reporting Obligations

This subject area contains the following training requirements (see the [BNL Training and Qualifications](#) website):

- Confined Space Entry (HP-OSH-016)
- Confined Space Challenge Exam (HP-OSH-016C)
- Confined Space Atmosphere Testing (TQ-CONSPACETESTER).

This subject area does not contain reporting obligations.

External/Internal Requirements

Requirement Number	Requirement Title
10 CFR 851	Worker Safety and Health Program
29 CFR 1910	Labor/Occupational Safety and Health Standards
29 CFR 1910.146	Permit Required Confined Spaces
29 CFR 1926	Labor/Safety and Health Regulations for Construction
ACGIH TLVs	Threshold Limit Values for Chemical Substances and Physical Agents
BSA Contract No. DE-SC0012704 - Clause C.4	Statement Of Work
BSA Contract No. DE-SC0012704 - Clause H.27 (ACT)	Non-Federal Agreements for Commercializing Technology (Pilot) (ACT)
BSA Contract No. DE-SC0012704 - Clause H.3	Contractor Assurance System

References

29 CFR 269, Electric Power Generation, Transmission, and Distribution

29 CFR 1910.268, Telecommunications

[BNL Training and Qualifications](#) website

[Electrical Safety](#) Subject Area

[Fire Safety](#) Subject Area

[Confined Space Classification Form](#), [Hazard Validation Tool - Confined Spaces](#)

[Lockout/Tagout \(LOTO\) for Installation, Demolition, or Service and Maintenance](#) Subject Area

[Safety Data Sheets](#) (*Limited Access), [Chemical Management System](#) website

[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.

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PROCEDURE: IDENTIFYING CONFINED SPACES

Management System: Worker Safety and Health		
Subject Area: Confined Spaces		
1. Identifying Confined Spaces		
Effective Date: Jun 15, 2016	Subject Matter Expert: Mark Marco	Management System Executive: Ed Nowak

Applicability

This information applies to personnel who identify, evaluate, and classify confined spaces.

Required Procedure

The Department/Division [Environment, Safety and Health Representative \(ESHR\)](#) or designee coordinates the following:

Step 1	<p>Identify spaces (e.g., equipment, tanks, vessels, silos, storage bins, hoppers, vaults, pits, manholes) which have the following physical characteristics:</p> <ul style="list-style-type: none"> Large enough and so configured that personnel can bodily enter and perform assigned work; Limited or restricted means for entry or exit (e.g., man-way door, hatch, cover); and Not designed for continuous personnel occupancy (e.g., a hazardous situation is typically present in the space). <p>If all three conditions above are present, the space is a confined space. Proceed to step 2 to classify the space. If all three conditions are not present, the space is not covered by this subject area.</p> <p>Certain typically unoccupied portions of buildings (i.e., basements, crawl spaces, and attics) may have the configuration of a confined space but are excluded from this subject area. If hazards exist in such areas (e.g., animal droppings or asbestos) or are brought into the area (e.g., solvents), those hazards are controlled by the other safety programs that address those hazards.</p>
Step 2	<p>Classify the confined space based on the potential hazard(s) in the space using the the Confined Space Classification Form (located in the Hazard Validation Tool - Confined Spaces) or equivalent. See the Definitions section for classification of confined spaces.</p>

Step 3	Ensure 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 Confined Space Sign exhibit when posting areas) or by other effective means. For use of equivalent signs, contact the Confined Space SME for approval.
Step 4	Add Class 2A, 2B, and 2C confined spaces into the Hazard Validation Tool - Confined Spaces . Update when: <ul style="list-style-type: none"> • Changes occur that eliminate or increase permanent hazards; • Spaces are added or eliminated.

Guidelines

Personnel should notify the Department/Division if they identify a Class 2A, 2B, or 2C confined space that has not been posted or they create a confined space during work.

Some types of spaces are pre-classified in the exhibit [Predetermined Confined Space Classifications](#).

The classification described in this section of the subject area does not replace a pre-entry certification at the time of entry, as described in the section [Planning and Entering a Confined Space](#).

Class 1 spaces do not need to be inventoried into the [Hazard Validation Tool - Confined Spaces](#).

References

[Confined Space Classification Form](#), [Hazard Validation Tool - Confined Spaces](#)

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PROCEDURE: PLANNING AND ENTERING A CONFINED SPACE

Management System: Worker Safety and Health		
Subject Area: Confined Spaces		
2. Planning and Entering a Confined Space		
Effective Date: Jun 15, 2016	Subject Matter Expert: Mark Marco	Management System Executive: Ed Nowak

Applicability

This information applies to BNL staff and supervisors who evaluate and plan methods to control potential hazards of confined spaces (2A, 2B, and 2C).

Required Procedure

Step 1	<p>Complete work planning documentation (such as work control documents or Radiological Work Permit). See the Work Planning and Control for Experiments and Operations Subject Area.</p> <ul style="list-style-type: none"> The Confined Space Classification Form (located in the Hazard Validation Tool - Confined Spaces) identifies the inherent hazards present in the space (such as chemical residues, ODH, mechanical and electrical energy sources). Identify the work to be done in the space. If the work performed will introduce an additional hazard(s) to the space, then evaluate the hazard to determine if the classification needs to be upgraded or a permit is required.
Step 2	<p>Document the planning for entry into the confined spaces using the Class 2A & 2B Confined Space Pre-entry Certification Form or Class 2C (Permit-required) Confined Space Entry Permit Form. Obtain approval signatures as listed on the Certification or Permit form.</p> <p>Upgrade a space to Class 2C (Permit-required) if</p> <ul style="list-style-type: none"> An operation (such as welding or solvent use) is conducted that generates a hazardous atmosphere that cannot be controlled with exhaust ventilation; or Work is performed on energized electrical equipment (see the exhibit in the Electrical Safety Subject Area); or Work is performed on mechanical energy systems that are not appropriately de-energized and locked out.

<p>Step 3</p>	<p>Prior to entry, secure the area and prepare controls:</p> <ul style="list-style-type: none"> • Remove any conditions that make it unsafe to remove an entrance cover. • Before removing the cover, make measurements of hazardous atmosphere contaminants at the entrance. • Guard the opening (with railing, temporary cover, or other physical barrier) to prevent an accidental fall into the space, protect the Entrants from external hazards, and prevent unauthorized entry. • Assign and qualify personnel for their role(s) as Attendant, Atmosphere Tester, Entrant, and/or Entry Supervisor, as required. • Prevent unauthorized personnel from attempting entry for rescues. • Ensure procedures are in place to quickly summon BNL Fire-Rescue to ensure an effective rescue in an emergency in Class 2C entries. Verify that BNL Fire-Rescue services are available before entry and will be available throughout the entry by calling ext. 2350 or 2351. • Establish concurrence with Fire-Rescue on the process to facilitate non-entry rescue. Retrieval equipment is required for Class 2C spaces, unless it is not feasible or poses an additional hazard. Establish with Fire-Rescue the process and retrieval equipment to be used, such as: <ul style="list-style-type: none"> ◦ Retrieval line and full body harness or wristlets; ◦ A mechanical lifting device when the vertical height from the floor to the opening is more than 5 feet (1.5 meters). It is acceptable to rely on the retrieval equipment under the control of Emergency Services as the deployment measure. <p>Brookhaven National Laboratory provides the following equipment at no cost to the employees, maintains that equipment properly, and ensures that employees use that equipment properly:</p> <ul style="list-style-type: none"> • Testing and monitoring equipment; • Ventilating equipment needed to obtain acceptable entry conditions; • Communications equipment; • Personal protective equipment insofar as feasible engineering and work practices controls do not adequately protect employees; • Lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency; • Barriers and shields; • Equipment such as ladders, needed for safe ingress and egress by authorized entrants; • Rescue and emergency equipment; • Any other equipment necessary for safe entry into and rescue from confined spaces.
<p>Step 4</p>	<p>Ensure all personnel (Entrant, Attendant, Confined Space Supervisor, and Atmosphere Testers) receive confined space entry training for their role(s).</p> <p>See the exhibit Roles of Personnel Involved in Confined Spaces Entry and the BNL Training and Qualifications website for information on the training for each role.</p>

Step 5	<p>Conduct hazardous atmosphere monitoring in spaces prior to and during entry, as required, using the exhibit Hazardous Atmosphere Testing Criteria.</p> <p>If overexposure to a hazard occurs</p> <ul style="list-style-type: none"> • Stop work and evacuate the space immediately; • Document the conditions on the Certification or Permit Form; • Report the incident to the ES&H Coordinator or Environment, Safety and Health Representative (ESHR) and Entry Supervisor, and • Contact an ORPS categorizer.
Step 6	<p>Ensure potentially exposed persons are informed of the existence, location of, and the dangers in Class 2A, 2B, and 2C spaces. This can be met by posting with a sign or other equally effective mean.</p> <p>Inform personnel involved in entering confined spaces of the hazards and controls in place by providing:</p> <ul style="list-style-type: none"> • Atmosphere testing results • Class 2A and 2B Pre-Entry certification. (Post or provide a copy of the Certification Form, if required). • Class 2C (Permit-required) Confined Space Entry Permit. (Have the Permit available at the entry site). • Information on danger and additional requirements for hazards introduced into the space (including signs, symptoms, and consequences of exposure to the hazards. Address hazard information from the Safety Data Sheets (*Limited Access) for materials in the space.) • Job-specific briefing each day for the personnel involved in the entry that includes: <ul style="list-style-type: none"> ◦ Work to be performed; ◦ Pre-existing or introduced hazards; ◦ Hazard control measures; and ◦ Emergency rescue procedures. <p>When entry into the confined space involves workers from more than one Department/Division or contractor, the organization owning the space coordinates a review of the entry activities with personnel from all organizations.</p>
Step 7	<ul style="list-style-type: none"> • Take appropriate precautions for existing or introduced hazards (such as electrical equipment and tools; solvents, paints, and residues; grounding; cutting and welding; and lighting). Follow the controls in the exhibit Precautions for Existing or Introduced Hazards in Confined Spaces. • Install engineering controls to adequately eliminate chemical, mechanical or physical hazards (including purging, isolation, lockout/tagout, and/or ventilation).
Step 8	<p>When exhaust ventilation is used to control hazards within a confined space (for respiratory protection or to prevent a flammable or explosive atmosphere), ensure:</p>

	<ul style="list-style-type: none"> • Personnel do not to enter the space until the forced air ventilation has eliminated or controlled any hazardous atmosphere (Class 2A or 2B); • Forced ventilation air comes from a clean source that does not increase the hazards of the space (Class 2B); • Forced ventilation air is operated continuously (Class 2B); and • The atmosphere within the space is continuously tested if the continuous forced air ventilation is used to prevent the accumulation of an atmospheric hazard (Class 2B) • If the ventilation does not control the worker exposure below the permissible exposure limit (PEL)/threshold limit value (TLV), respirator protection will be required. <p>For welding and torch cutting, use local ventilation that complies with 29 CFR 1910.252 to control the hazard. Ensure that ventilation is adequate based on an evaluation of the anticipated concentration of hazardous chemicals, size of the space, configuration of the space, volume of the breathing zone of the worker, and ventilation rate of the equipment to be used. Ensure compliance with 29 CFR 1910.252.</p>
<p>Step 9</p>	<p>Control the work area during entry into all confined spaces.</p> <ul style="list-style-type: none"> • The Attendant is not to perform other duties that might interfere with the ability to observe and protect the Entrants. • The Attendant is not to enter the confined space, unless he/she is relieved by another Attendant. • If the space is left unattended (for lunch, breaks, or other reasons), reevaluate the space according to certification/permit entry procedures before entry reoccurs. • For 2C permit-required spaces, the Attendant monitors the safety of Authorized Entrants and others by remaining at the work site to: <ul style="list-style-type: none"> ◦ Control entry into the space; ◦ Maintain communication with the Authorized Entrant(s); ◦ Ensure the ventilation systems is properly operating. • Notify all personnel to leave the space immediately if: <ul style="list-style-type: none"> ◦ A prohibited condition occurs; ◦ Behavioral signs of exposure occur in Entrants; ◦ A situation occurs outside the space that could endanger the Entrants; ◦ The forced air ventilation system entry fails; ◦ The attendant cannot effectively and safely perform all the required duties; or ◦ Fire-Rescue services are no longer available. <p>See the exhibit Roles of Personnel Involved in Confined Spaces Entry.</p>
<p>Step 10</p>	<p>Address issues, concerns, and changing conditions:</p> <ul style="list-style-type: none"> • If any person determines there is a need for rescue assistance, immediately call for rescue services at 911 or 631-344-2222. • If any person does not think they have been appropriately briefed on the hazards or control methods, or does not believe that the hazards are appropriately controlled, they can refuse to enter the space until the hazards are mitigated.

- If there are changes in conditions from those documented on the Certification or Permit Form
 - Evacuate the space immediately
 - Report the incident to the Entry Supervisor
 - Re-evaluate the space and entry controls
 - Document the conditions on the Certification or Permit Form.
- If changes in conditions result in an overexposure or emergency occurs
 - Document the conditions on the Certification or Permit Form
 - Report the incident to the [ES&H Coordinator](#) or [ESHR](#) and Entry Supervisor, and
 - Contact an ORPS categorizer.
- If the incident reveals that deficiencies to the Site or Department/Division program exist
 - Correct deficiencies in the program before authorizing subsequent entries
 - Modify training material and retrain workers, if necessary, and
 - Retrain workers when the reason for a deficiency is inadequacies in the employee's knowledge or use of procedures.

Step 11

When the entry is completed, expired, or canceled, the Entry Supervisor ensures:

- The space is not occupied;
- The entry ports/doors are secured;
- Fire-Rescue is notified that the entry is completed and rescue services are no longer needed;
- The 2A Confined Space Pre-entry Certification Form is removed and completed (documenting problems encountered during the entry on the form). This form is filed with the work package.
- The Class 2C (Permit-required) Confined Space Entry Permit Form and 2B Confined Space Pre-entry Certification Form are removed and completed (noting completion time and documenting problems encountered during the entry on the permit or form), and returned to the Department [Environmental, Safety & Health Coordinator](#) or [ESHR](#), who will review them and forward them to the SME or designee.
- All completed Class 2C (Permit-required) Confined Space Entry Permits and completed Class 2B Confined Space Pre-entry Certification Forms must be retained by the SME or designee for a minimum of (1) one year. The SME or designee must then forward those entry permits and Class 2B Certification Forms that document atmospheric monitoring to the Industrial Hygiene Department. The Industrial Hygiene Department must retain this documentation per the Department of Energy Administrative Records Schedule 1: Personnel Records. This schedule requires exposure records to be retained for 75 (seventy-five) years after the employee has left employment at Brookhaven National Laboratory. The records must then be destroyed.
- Workers are provided an opportunity to provide feedback and suggestions on the form; and
- If any person has suggestions for improvement of the entry or the BNL program, they inform their supervisors of their ideas.

Guidelines

Use the exhibit [Confined Space Hazards](#) as an aid in preparing the [Class 2A & 2B Confined Space Pre-entry Certification Form](#) or the [Class 2C \(Permit-required\) Confined Space Entry Permit Form](#). Hazards inherent to the space may include:

- Hazards from material previously in the space (e.g., solvent, gases, fuels);
- Atmospheric hazards (e.g., lack of oxygen from plant material decomposition or oxidization, chemical vapors, welding fumes);
- Space configuration hazards, such as potential for engulfment or entrapment;
- Serious safety hazards (e.g., electrical, steam); or
- Non-ionizing radiation hazards.

[Hazardous atmosphere](#) means an atmospheric concentration of any substance that:

- Exceeds a dose or a permissible exposure limit (PEL) published in 29 CFR 1910 Standards, Subpart Z, Toxic and Hazardous Substances, or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values for Chemical Substances and Physical Agents, whichever is lower; and
- Could result in employee exposure in excess of its dose or PEL. An atmospheric concentration not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered.

See the exhibit [Predetermined Confined Space Classifications](#) for guidance on atmosphere testing and the certification/permit form needed.

See the [Confined Space Entry Procedures Flowchart](#) for an overview of the process for entering all spaces.

A Department/Division that frequently conducts entries into similar type Class 2A, 2B, or 2C spaces may 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](#).

If atmospheric testing or inspection of physical hazards demonstrate that hazards in a pre-classified 2C space are not present or were eliminated, then the space can be certified as for non-permit-required entry (Class 2A or 2B) for as long as the hazards remain eliminated.

The preferred method of protecting electrical equipment is by using ground fault interrupters (GFCI), or double-insulated tools. For alternative methods, refer to the [Electrical Safety](#) Subject Area and discuss with the [Electrical Safety Subject Matter Expert](#).

Data-logging meters may be used to record confined space atmosphere monitoring results. Record the air concentration results at key entry events on the [Class 2C \(Permit-required\) Confined Space Entry Permit Form](#). Maintain a copy of the data log with the Class 2C permit.

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.

Do not create the permit to exceed the time required to complete the assigned task or job.

References

[BNL Training and Qualifications](#) website

[Confined Space Classification Form](#), [Hazard Validation Tool - Confined Spaces](#)

[Electrical Safety](#) Subject Area

[Safety Data Sheets](#) (*Limited Access), [Chemical Management System](#) website

[Work Planning and Control for Experiments and Operations](#) Subject Area

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PROCEDURE: MANAGING CONFINED SPACE ENTRY BY CONTRACTORS

Management System: Worker Safety and Health		
Subject Area: Confined Spaces		
3. Managing Confined Space Entry by Contractors		
Effective Date: Jun 15, 2016	Subject Matter Expert: Mark Marco	Management System Executive: Ed Nowak

Applicability

This information applies to BNL staff who contract work by contractors involving entry into OSHA non-permitted and permitted confined spaces. This includes service providers, repairmen, or other similar work done in 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 and the OSHA Standards 29 CFR 1910.146 for general industry and 29 CFR 1926 Subpart AA for construction activities.

Step 1	When requesting work, the Department/Division owning the space provides the contracting BNL Department/Division with available information involving experience with the spaces in question, including applicable confined space inventories, hazard identifications, hazard evaluations, confined space classifications, and entry permits.
Step 2	<p>Before awarding the contract, the contracting Department/Division</p> <ul style="list-style-type: none"> • 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 for general industry and 29 CFR 1926 Subpart AA for construction activities. • Provides the contractor with the information involving experience and history with the spaces and the BNL Emergency Plan.
Step 3	

	<p>At the time of bid, the contractor submits a written plan describing their confined space entry program. The plan must cover all elements of the applicable OSHA regulations for the contractor's operations:</p> <ul style="list-style-type: none"> • 29 CFR 1910.146 for operation and maintenance type activities (general industry); • 29 CFR 1926 Subpart AA for construction activities; • 29 CFR 1910.268 for telecommunication activities; and • 29 CFR 269 for power transmission activities.
<p>Step 4</p>	<p>The contracting Department/Division has the contractor's plan reviewed by the appropriate BNL ES&H professional(s) to ensure that the plan is compatible with BNL operations and programs and with applicable OSHA regulations.</p> <p>Note: The contractor is required to ensure that personnel, including lower tier subcontractors, possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities, and retain records respecting such competency and qualifications, making them available upon request.</p>
<p>Step 5</p>	<p>The contractor coordinates precautions, procedures, and entry operations, when both BNL and contractor staff will be working in or near confined spaces.</p> <p>When BNL workers enter confined spaces under a contractor's program, the ES&H Coordinator or Environment, Safety and Health Representative (ESHR) of the BNL organization that owns the space and the supervisor of BNL workers entering the space must review and approve the entry activities.</p>
<p>Step 6</p>	<p>Before entry into Class 2C (OSHA-permitted) confined spaces, the contractor</p> <ul style="list-style-type: none"> • Provides retrieval systems and trained staff to facilitate nonentry rescue; • Coordinates with the BNL Emergency Services Division Fire-Rescue group by calling ext. 2222 or 631-344-2222; • Stops entry into permit-required spaces if the BNL Fire-Rescue Group is not available due to other response activities.
<p>Step 7</p>	<p>The contractor monitors the confined space for atmospheric hazards and records the results on a permit or certification form. When working the space with a residual or introduced chemical with an OSHA Permissible Exposure Limit or ACGIH Threshold Limit Value®, exposure monitoring is required to determine if the exposure levels exceed these limits. The contractor provides BNL with a copy of all monitoring records.</p>
<p>Step 8</p>	<p>All personnel stop work and evacuate the space immediately, if</p> <ul style="list-style-type: none"> • there are any changes in conditions from those documented on the Confined Space Entry Permit; • any other problems arise; or • BNL orders the entry to stop. <p>The Attendant immediately calls ext. 2222 or 631-344-2222 for rescue service, if there is an emergency, or if an Entrant(s) needs rescue assistance.</p>

Step 9	If the incident reveals that deficiencies to the BNL or Contractor's program exist, revise the program(s) to correct deficiencies before authorizing subsequent entries. This includes additional training when there is reason to believe that there are deviations from the permit space entry procedure or inadequacies in the employee's knowledge or use of procedures.
Step 10	The contracting Department/Division debriefs the contractor at the conclusion of entry operations on any hazards confronted or created during the confined space entry. When the entry is completed, the contractor obtains worker feedback and documents it on the form.

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PROCEDURE: CONSTRUCTION ACTIVITIES

Management System: Worker Safety and Health		
Subject Area: Confined Spaces		
4. Construction Activities		
Effective Date: Jun 15, 2016	Subject Matter Expert: Mark Marco	Management System Executive: Ed Nowak

Applicability

This information applies only to construction activities.

Required Procedure

When BNL is conducting construction activities on-site, the work must be performed in accordance with the requirements of this subject area and OSHA Standard 29 CFR 1926 Subpart AA for construction activities. If there is no controlling contractor present at the worksite, the requirements for, and the role of, controlling contractor in this section must be fulfilled by the host employer or other employer who arranges to have employees of another employer perform work that involves permit space entry. All confined space communication between employers on the construction site are depicted in the exhibit [Communication Between Host Employers, Controlling Contractors, and Entry Employers](#).

Construction Activities contains two subsections:

- [4.1 Permit Space Pre-entry Communications and Coordination](#)
- [4.2 Permit Space Post-entry Communications and Coordination](#)

4.1 Permit Space Pre-entry Communications and Coordination

Step 1	Before work is conducted at a worksite, each employer must ensure that a competent person identifies all confined spaces in which one or more of the employees it directs may work, and identifies each space that is a permit space, through consideration and evaluation of the elements of the space, including testing as necessary. The Confined Space Classification Form (located in the Hazard Validation Tool - Confined Spaces) or equivalent must be used to document these confined spaces and signed by a competent person.
Step 2	If the workplace contains one or more permit spaces, the employee who identifies or receives notice of a permit space must:

	<ul style="list-style-type: none"> • Inform exposed employees by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by, each permit space; • Inform, in a timely manner and in a manner other than posting, its employees' authorized representatives and the controlling contractor of the existence and location of, and the danger posed by, each permit space. This information must be documented and included in the work package.
Step 3	Each employer who identifies, or receives notice of, a permit space and has not authorized employees it directs to work in that space must take effective measures to prevent those employees from entering that permit space, in addition to complying with all other applicable requirements of the Confined Space Subject Area. These measures must be documented and filed with the work package.
Step 4	<p>Before entry operations begin, the host employer must provide the following information in writing, if available, to the controlling contractor and include it in the work package.</p> <ul style="list-style-type: none"> • The location of each known permit space; • The hazards or potential hazards in each space or the reason it is a permit space; • Any precautions that the host employer or any previously controlling contractor or entry employer implemented for the protection of employees in the permit space. <p>The Confined Space Classification Form (located in the Hazard Validation Tool - Confined Spaces) or equivalent must be used to provide this information and signed by a competent person.</p>
Step 5	<p>Before entry operations begin, the controlling contractor must:</p> <ul style="list-style-type: none"> • Obtain the host employer's information about the permit space hazards and previous entry operation; • Provide the following information to each entity entering a permit space and any other entity at the worksite whose activities could foreseeably result in a hazard in the permit space: <ul style="list-style-type: none"> ◦ The information received from the host employer ◦ Any additional documentation the controlling contractor has about the confined spaces listed in step 4 ◦ The precautions that the host employer, controlling contractor, or other entry employers implemented for the protection of employees in the permit spaces. • Document this information and include it in the work package.
Step 6	<p>Before entry operations begin, each entry employer must:</p> <ul style="list-style-type: none"> • Obtain all of the controlling contractor's information regarding permit space hazards and entry operations;

	<ul style="list-style-type: none"> • Inform the controlling contractor of the permit space program that the entry employer will follow, including any hazards likely to be confronted or created in each space.
Step 7	<p>The controlling contractor and entry employer(s) must coordinate entry operations when:</p> <ul style="list-style-type: none"> • More than one entity performs permit space at the same time; or • Permit space entry is performed at the same time that activities that could foreseeably result in a hazard in the permit space performed.
Step 8	<p>The entry employer ensures their program is in accordance with the following requirements prior to entering a permit-required confined space:</p> <ul style="list-style-type: none"> • If any employer decides that employees it directs will enter a permit space, that employer must have a written permit space program that complies with the Confined Space Subject Area implemented at the construction site. The written program must be made available prior to and during entry operations for inspection by employees and their authorized representatives. • As part of an employer's permit-required confined space program, atmospheric hazards are to be continuously monitored unless the employer can demonstrate that the equipment for continuously monitoring a hazard is not commercially available or that periodic monitoring is of sufficient frequency to ensure that the atmospheric hazard is being controlled at safe levels. If continuous monitoring is not used, periodic monitoring is required with sufficient frequency to ensure that acceptable conditions are being maintained during the course of the entry operations. • When an engulfment hazard is identified in a permit-required confined space, the employer's confined space permit program must require continuous monitoring. Some examples of this monitoring may be remote sensors, a posted observer, or other means deemed effective to provide advanced notification to the entrants in the space to allow them to exit safely. • In the event of changes from the entry conditions listed on the confined space permit or an unexpected event requiring evacuation of the space, the permit may be suspended, instead of cancelled. The space must be returned to the entry conditions listed on the permit before entry. • Employers who are relying on local emergency services must arrange for responders to give advance notice if they will be unable to respond for a period of time (because they are responding to another emergency, attending department training, etc.). Employers must also evaluate the rescuer's ability to respond in a timely manner, considering the hazards identified. For example, employers should provide standby rescue capable of immediate action to rescue employee(s) wearing respiratory equipment in atmospheres that are immediately dangerous to life and health (IDLH).

4.2 Permit Space Post-entry Communications and Coordination

Step 1	The controlling contractor must debrief each entity that entered permit space regarding the permit space program followed and any hazards confronted or created in the permit space (s) during the entry operation.
Step 2	The entry employer must inform the controlling contractor in a timely manner of the permit space program followed and any hazards confronted or created in the permit space(s) during entry operations.
Step 3	The controlling contractor must inform the host employer of the information exchanged with the entry entities. The information must be documented in writing and included in the work package.

References

[Confined Space Classification Form](#), [Hazard Validation Tool - Confined Spaces](#)

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EXHIBIT: COMMUNICATION BETWEEN HOST EMPLOYERS, CONTROLLING CONTRACTORS, AND ENTRY EMPLOYER

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Communication Between Host Employers, Controlling Contractors, and Entry Employer

Effective Date: Jun 15, 2016

[Communication Between Host Employers, Controlling Contractors, and Entry Employers](#) is provided as a Word file.

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Communication Between Host Employers, Controlling Contractors, and Entry Employers

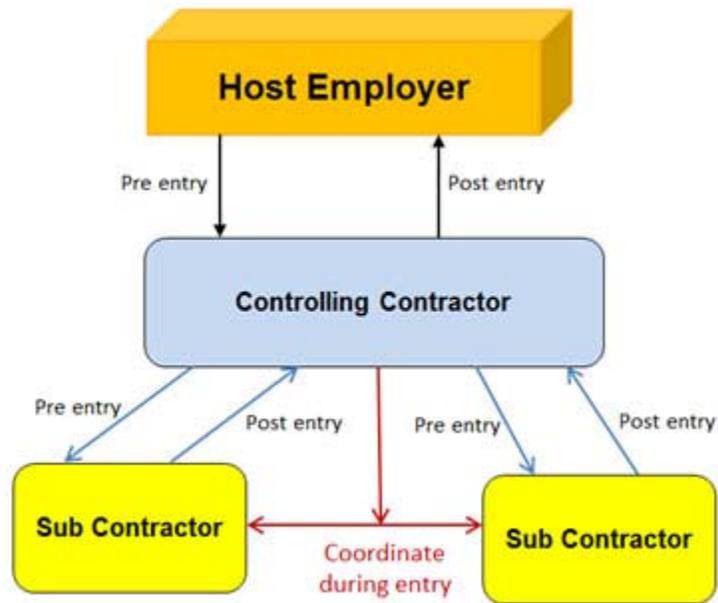


EXHIBIT: CONFINED SPACE ENTRY PROCEDURES FLOWCHART

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Confined Space Entry Procedures Flowchart

Effective Date: Jun 15, 2016

The [Confined Space Entry Procedures Flowchart](#) is provided as a PDF.

The only official copy of this file is the one on-line in SBMS.

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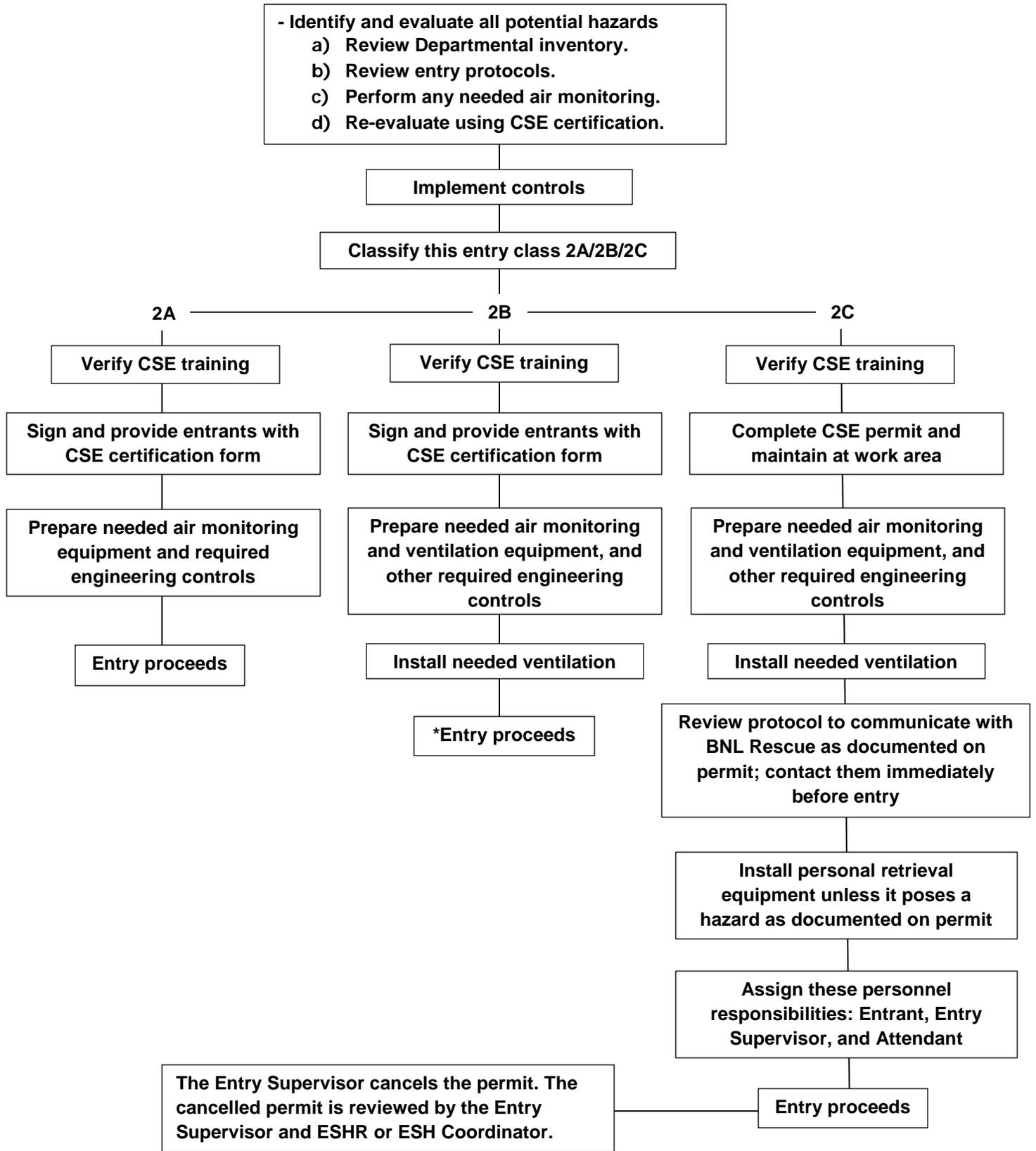
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CONFINED SPACE ENTRY PROCEDURES FLOWCHART

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 the space immediately. CSE – Confined Space Entry

EXHIBIT: CONFINED SPACE HAZARDS

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Confined Space Hazards

Effective Date: Jun 15, 2016

[Confined Space Hazards](#) is provided as a Word file.

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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 non-breathable 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 that allows 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) Non-sparking tools are required to prevent fire or explosion

EXHIBIT: CONFINED SPACE SIGN

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Confined Space Sign

Effective Date: Jun 15, 2016

The [Confined Space Sign](#) is provided as a PDF.

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).

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Exhibit: Confined Space Sign

Signs: Use the following mandatory and optional criteria when posting areas.

Signal Word & Symbol	Required Word: DANGER (Symbol is optional)	 Format for new signs
	Required format: White text on red background	 Acceptable format on existing signs
Required Hazard Warning	Alternative wording is acceptable Required Format: Black text color on white background	Confined Space Certification or Permit Needed before Entry
Optional Hazard Wording	Equivalent or no additional wording is acceptable Required Format: Black text color on contrasting background color	Contact ESH Coordinator for Assistance or for a Permit
<p>Sample of permanent sign mounted at closed entrances to Class 2A, 2B, or 2C spaces</p> <p>[Sign is not required if alternative means of notifying worker is used.]</p>		

EXHIBIT: EXAMPLE OF A WRITTEN PROTOCOL FOR A CONFINED SPACE

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Example of a Written Protocol for a Confined Space

Effective Date: Jun 15, 2016

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 - Such as 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 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, then 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.

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EXHIBIT: HAZARDOUS ATMOSPHERE TESTING CRITERIA

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Hazardous Atmosphere Testing Criteria

Effective Date: Jun 15, 2016

[Hazardous Atmosphere Testing Criteria](#) is provided as a Word file

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Hazardous Atmosphere Testing Criteria

Testing Protocol

1.	Testing to be done by an Atmosphere Tester. If monitoring assistance is required outside of normal working hours, then obtain ESH&Q assistance by contacting the on-duty desk sergeant at Police Headquarters at extension 2238.
2.	<p>Initial monitoring:</p> <ul style="list-style-type: none"> • Class 1 (where work done has introduced a hazard). • Class 2A, Class 2B, Class 2C <p>Periodic monitoring:</p> <ul style="list-style-type: none"> • Class 2B <p>Continuous monitoring:</p> <ul style="list-style-type: none"> • Class 2C <p>Re-entry Monitoring</p> <ul style="list-style-type: none"> • Class 2A, 2B or 2C, before Entrants re-enter a confined space after a substantial break (such as rest break or lunch) • Class 2B or 2C where there is a potential for a hazardous atmosphere to re-occur.
3.	Conduct the test from outside the space whenever possible. If the Atmosphere Tester has to enter the space to conduct the testing, train the tester as an authorized Entrant for a Class 2C space.
4.	<p>Use a calibrated and “bump checked” direct-reading instrument(s) capable of detecting the hazard(s) in the space.</p> <ul style="list-style-type: none"> • 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. • Maintain instruments calibrated according to the manufacturers' recommendation and at the frequency recommended by the manufacturer.
5.	<p>When a hazardous atmosphere is potentially present, before entering any Class 2 A, 2B or 2C confined space, test for (in this order):</p> <ul style="list-style-type: none"> • Oxygen deficiency; • Flammable gases; • Toxins (such as carbon monoxide (CO) and hydrogen sulfide (H₂S)); • Other anticipated hazardous atmosphere (e.g., sulfur dioxide and ammonia); <p>Additional tests such as noise or radiation.</p>
6.	<p>Document the testing results on the:</p> <ul style="list-style-type: none"> • Class 2A & 2B Confined Space Pre-entry Certification Form or • Class 2C Permit-required Confined Space Entry Permit Form. <p>Perform employee exposure monitoring when a hazard with the potential to exceed the</p>
7.	OSHA Permissible Exposure Limit or ACGIH Threshold Limit Value® is a residue of the contents of the space or is introduced into a confined space (unless appropriate respiratory protection is used). Provide for observation of the monitoring by representatives of the workers.

Hazard Criteria

Atmospheric conditions that must be met for <ul style="list-style-type: none"> ○ Class 1 (at all times), ○ Class 2A and 2B (to reclassify to non-permit required), and ○ Class 2C (for entry without PPE) 	
Oxygen	The percentage of oxygen <ul style="list-style-type: none"> • Greater than or equal to 19.5% and • Not greater than 23.5%.
Flammable and combustible	Flammable and combustible gases and vapors: <ul style="list-style-type: none"> • Not greater than 10% of the Lower Exposure Limit (LEL). Spaces that have a combustible gas indicator reading above 10% LEL must not be entered, regardless of respiratory equipment, until they have been reduced below this level with purging or ventilation. <p>(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).</p>
Toxic Atmospheres	Each potential toxic substance below the OSHA PEL and ACGIH TLV® (whichever is lower).

EXHIBIT: PRECAUTIONS FOR EXISTING OR INTRODUCED HAZARDS IN CONFINED SPACES

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Precautions for Existing or Introduced Hazards in Confined Spaces

Effective Date: Jun 15, 2016

[Precautions for Existing or Introduced Hazards in Confined Spaces](#) is provided as a Word file

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Precautions for Existing or Introduced Hazards in Confined Spaces

Chemicals	Use of chemicals/cleaners/solvents within the work space and residues of contents of the space. Maintain ventilation sufficient to keep the vapor concentration below the OSHA PEL /ACGIH TLV). Conduct air sampling to verify compliance with OSHA PEL/ACGIH TLV).
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 the Fire Safety Subject Area).
	All surfaces with coatings that may decompose under hot work, and produce toxic, corrosive, irritant or flammable emissions are stripped from the area of heat application for a distance of at least six inches. During stripping, exhaust ventilation is provided. Flames are not to 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 are made to ensure that no flammable or toxic contaminants are being produced by the preservative or coatings. If contaminants are produced, then the hot work is stopped immediately and re-evaluated.
Electrical Equipment	All equipment and lighting follow the grounding requirements in the Electrical Safety Subject Area. The preferred method of protecting electrical equipment is by using ground fault interrupters (GFCI), or double-insulated tools. For alternative methods see the Electrical Safety Subject Area and discuss with the Electrical Safety SME.
	Lighting and electrical equipment complies with the requirements of equipment. See the Electrical Safety Subject Area and the Fire Safety Subject Area.
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 are prohibited in this area.
	Scrapings and rags soaked with solvent are placed in a covered metal container outside the confined space.
	Equipment and lighting used in a flammable atmosphere is explosion-proof, and/or intrinsically safe for the atmosphere.
	Non-sparking 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 is 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 the Lockout/Tagout (LOTO) Subject Area. When the power source cannot be controlled, movable components are disconnected or blocked and switches, clutches, and other controls must be tagged. When the power source cannot be de-energized, obtain an Energized Electrical Work Permit.

EXHIBIT: PREDETERMINED CONFINED SPACE CLASSIFICATIONS

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Predetermined Confined Space Classifications

Effective Date: Jun 15, 2016

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Predetermined Confined Spaces Classifications

Predetermined Confined Spaces Classifications

Area	Hazards	Class	Certification/Permit	Testing
Attics	Potential hazards are from sources not covered in Program (i.e., biohazards from rodent infestation, asbestos and fiberglass from insulation)	(Exempted from Confined Space Program)	No certification needed, but evaluation and PPE of Asbestos, Fiberglass, and biohazards required.	No atmosphere testing required
Crawl spaces	Potential hazards are from sources not covered in Program (i.e., biohazards from rodent infestation, asbestos and fiberglass from insulation)	(Exempted from Confined Space Program)	No certification needed, but evaluation and PPE of Asbestos, Fiberglass, and biohazards required.	No atmosphere testing required
Duct: Heating & Air Conditioning	By design, respirable air occupies the space under normal conditions.	Class 1 (Non-permit)	No certification needed, unless hazard is introduced. Freon, or work is going on with air handler with Freon, coolants etc.	No atmosphere testing required
Duct: Toxic exhaust ventilation	By design, non-respirable air occupies the space under normal conditions.	Class 2A (Non-permit)	Classification and certification form required.	Atmosphere testing for hazards in system required
Air-handling fan units: HVAC or Exhaust	By design, respirable air occupies the space under normal conditions.	Class 2A (Non-permit)	If de-energized and LOTO of moving parts and stored energy: Classification form required. No certification needed, unless hazard is introduced.	No atmosphere testing required
		Class 2C (Permit required)	If NOT de-energized or LOTO or there is a potential for occupant contact with hazardous moving parts, then permit is required.	No atmosphere testing required
Utility manholes containing telecommunication	Low hazard is in the space from the utility. Potential hazard arises from rusting or microbial decomposition.	Class 2A (Non-permit)	Classification and certification form required.	Oxygen, CO and H ₂ S testing is required to prove it is not a permitted space.

Predetermined Confined Spaces Classifications

Area	Hazards	Class	Certification/Permit	Testing
Utility manholes electrical	Low hazard is in the space from the utility. Potential hazard arises from rusting or microbial decomposition. Potential hazard arises from energized sources.	Class 2A (Non-permit)	If oxygen or hazardous gases reduced below hazardous levels after control measures, then certification form is required.	Oxygen, CO and H ₂ S testing is required to prove it is not a permitted space.
		Class 2C (Permit required)	If NOT de-energized or LOTO or there is a potential for occupant contact with hazardous moving parts, then permit is required.	Oxygen, CO and H ₂ S testing is required to prove it is not a permitted space.
Utility manholes containing water	Low hazard is in the space from the utility. Potential hazard arises from rusting or microbial decomposition.	Class 2A or 2B (Non-permit)	Classification and certification form required.	Oxygen, CO and H ₂ S testing is required to prove it is not a permitted space.
		Class 2C (Permit required)	If oxygen remains at hazardous levels after control measures, then permit is required.	Oxygen, CO and H ₂ S testing is required during entry.
Utility manholes containing sewage	Moderate hazard is in the space from the utility posed by rusting or microbial decomposition.	Class 2A (Non-permit)	Classification and certification form required.	Oxygen, CO and H ₂ S testing is required to prove it is not a permitted space. If hazardous atmosphere exists, can usually be purge/vented to Class 2B.
		Class 2C (Permit-required)	If oxygen or hazardous gases remain at hazardous levels after control measures, then permit is required.	Oxygen, CO and H ₂ S testing is required during entry.
Elevator Pits	Low atmospheric hazard, respirable air occupies the space under normal conditions. High physical hazards, e.g. entrapment, contact with moving parts resulting from mechanical and electrical equipment. Verify not contiguous to source of contaminants around area such as cryogenics, vehicles, or	Class 2A (Non-permit)	If de-energized and LOTO of moving parts and stored energy: Classification form required. No oil or water in the pit. No certification needed, unless hazard is introduced.	No atmosphere testing required

Predetermined Confined Spaces Classifications

Area	Hazards	Class	Certification/Permit	Testing
	propane heaters. Oil or water in the pit.			
		Class 2C (Permit required)	If NOT de-energized or LOTO or there is a potential for entrapment (potential for occupant contact with hazardous moving parts), then permit is required.	No atmosphere testing required
	Low atmospheric hazard, respirable air occupies the space under normal conditions. High physical hazards, e.g., entrapment, contact with moving parts resulting from mechanical and electrical equipment. Contiguous to source of contaminants around area such as cryogenes, vehicles, or propane heaters. Or oil or water in the pit.	Class 2C (Permit required)	If NOT de-energized or LOTO, entrapment (potential for occupant contact with hazardous moving parts) or introduction of hazard (hot work/solvents), then permit is required, or contiguous to sources of contaminants, around areas such as cryogenes, vehicle use or propane heaters; oil or water in the pit.	Oxygen, CO, and H ₂ S testing is required to prove it is not a permitted space due to atmosphere conditions.
Cooling Towers (Open to the atmosphere/fresh air)	By design, respirable air occupies the space under normal conditions. Physical hazards exist, e.g., moving parts, electrical, and stored energy. Water engulfment hazard may exist.	Class 2A (Non-permit)	If de-energized, LOTO of electric, stored energy/moving parts. No hazard(s) introduced into the space and no engulfment hazard exists.	No atmosphere testing required
		Class 2C (Permit required)	If not de-energized or LOTO of electric, stored energy/moving parts. Engulfment hazard exists or introduction of hazard(s) into the space.	No atmosphere testing required

EXHIBIT: ROLES OF PERSONNEL INVOLVED IN CONFINED SPACES ENTRY

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Roles of Personnel Involved in Confined Spaces Entry

Effective Date: Jun 15, 2016

[Roles of Personnel Involved in Confined Spaces Entry](#) is provided as a Word file.

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Roles of Personnel Involved in Confined Spaces Entry

Atmosphere Tester	
Role	1. Properly use all testing and monitoring equipment associated with confined space entry.
Qualification	Completed and is current on: <ul style="list-style-type: none"> • Confined Space Entry (HP-OSH-016) or an equivalent; • TQ-CONSPACETESTER or an equivalent; and • Operation of a meter that measures the concentration of airborne hazards of the space.

Attendant (Class 2A, 2B)	
Note: While an Attendant is not required in Class 2A or 2B spaces, it is a good work practice and the functions described must be assigned to an individual.	
Role	<ol style="list-style-type: none"> 1. Know the hazards faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure; 2. Be aware of possible behavioral effects of hazard exposure in authorized Entrants; 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; 4. Remain outside the permit space during entry operations until relieved by another Attendant; 5. Communicate with authorized Entrants as necessary to monitor Entrant status and to alert Entrants of the need to evacuate the space; 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: <ol style="list-style-type: none"> a. If the Attendant detects a prohibited condition; b. If the Attendant detects the behavioral effects of hazard exposure in an authorized Entrant; c. If the Attendant detects a situation outside the space that could endanger the authorized Entrants; or d. If the Attendant cannot effectively and safely perform all the duties required by this subject area. 7. Summon the BNL Fire-Rescue Group at 344-2222 or 911 as soon as the Attendant determines that authorized Entrants may

	<p>need assistance to escape from confined space hazards;</p> <p>8. Take the following actions when unauthorized persons approach or enter a space while entry is underway:</p> <ol style="list-style-type: none"> a. Warn the unauthorized persons that they must stay away from the space; b. Advise the unauthorized persons that they must exit immediately if they have entered the space; and c. Inform the authorized Entrants and the Entry Supervisor if unauthorized persons have entered the space; <p>9. Perform non-entry rescues as specified by the Department/Division's rescue procedure; and</p> <p>10. Perform no duties that might interfere with the Attendant's primary duty to monitor and protect the authorized Entrants.</p>
Qualification	<p>Completed and is current on:</p> <ul style="list-style-type: none"> • Confined Space Entry (HP-OSH-016) or an equivalent

Attendant (Class 2C)	
Role	<ol style="list-style-type: none"> 1. Know the hazards faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure; 2. Be aware of possible behavioral effects of hazard exposure in authorized Entrants; 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; 4. Remain outside the permit space during entry operations until relieved by another Attendant; 5. Communicate with authorized Entrants as necessary to monitor Entrant status and to alert Entrants of the need to evacuate the space; 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: <ol style="list-style-type: none"> a. If the Attendant detects a prohibited condition; b. If the Attendant detects the behavioral effects of hazard exposure in an authorized Entrant; c. If the Attendant detects a situation outside the space that could endanger the authorized Entrants; or d. If the Attendant cannot effectively and safely perform all the duties required by this subject area. 7. Summon the BNL Fire-Rescue Group at 344-2222 or 911 as

	<p>soon as the Attendant determines that authorized Entrants may need assistance to escape from confined space hazards;</p> <p>8. Take the following actions when unauthorized persons approach or enter a space while entry is underway:</p> <ul style="list-style-type: none"> a. Warn the unauthorized persons that they must stay away from the space; b. Advise the unauthorized persons that they must exit immediately if they have entered the space; and c. Inform the authorized Entrants and the Entry Supervisor if unauthorized persons have entered the space; <p>9. Perform non-entry rescues as specified by the Department/Division's rescue procedure; and</p> <p>10. Perform no duties that might interfere with the Attendant's primary duty to monitor and protect the authorized Entrants.</p>
Qualification	<p>Completed and is current on:</p> <ul style="list-style-type: none"> • Confined Space Entry (HP-OSH-016) or an equivalent

Entrant (Class 2A, 2B)	
Role	<ol style="list-style-type: none"> 1. Know the hazards faced during entry, including information on the mode, signs or symptoms, and consequences of exposure; 2. Properly use all equipment associated with confined space entry, including <ul style="list-style-type: none"> a. Ventilating equipment; b. Communications equipment; c. Personal protective equipment; d. Lighting equipment needed to see well enough to work safely and to exit the space quickly in an emergency; e. Barriers and shields; f. Equipment such as ladders needed for safety entry and egress; g. Any rescue and emergency equipment used in conjunction with BNL's Fire-Rescue Group in an emergency. 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; 4. Alert the Attendant whenever <ul style="list-style-type: none"> a. The Entrant recognizes any warning sign or symptom of exposure to a dangerous situation; or

	<p>b. The Entrant detects a prohibited condition; and</p> <p>5. Exit from the permit space as quickly as possible whenever</p> <p>a. An order to evacuate is given by the Attendant or the Entry Supervisor;</p> <p>b. The Entrant recognizes any warning sign or symptom of exposure to a dangerous situation;</p> <p>c. The Entrant detects a prohibited condition; or</p> <p>6. An evacuation alarm is activated.</p>
Qualification	<p>Completed and is current on:</p> <ul style="list-style-type: none"> • Confined Space Entry (HP-OSH-016) or an equivalent

Entrants, Authorized (Class 2C Permit Entry)

Role	<ol style="list-style-type: none"> 1. Know the hazards faced during entry, including information on the mode, signs or symptoms, and consequences of exposure; 2. Properly use all equipment associated with confined space entry, including <ol style="list-style-type: none"> a. Ventilating equipment; b. Communications equipment; c. Personal protective equipment; d. Lighting equipment needed to see well enough to work safely and to exit the space quickly in an emergency; e. Barriers and shields; f. Equipment such as ladders needed for safety entry and egress; g. Any rescue and emergency equipment used in conjunction with BNL's Fire-Rescue Group in an emergency. 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; 4. Alert the Attendant whenever <ol style="list-style-type: none"> a. The Entrant recognizes any warning sign or symptom of exposure to a dangerous situation; or b. The Entrant detects a prohibited condition; and 5. Exit from the permit space as quickly as possible whenever <ol style="list-style-type: none"> a. An order to evacuate is given by the Attendant or the entry supervisor; b. The Entrant recognizes any warning sign or symptom of exposure to a dangerous situation; c. The Entrant detects a prohibited condition; or d. An evacuation alarm is activated.
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Qualification	Completed and is current on: <ul style="list-style-type: none"> • Confined Space Entry (HP-OSH-016) or an equivalent
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Entry Supervisors	
Role	<ol style="list-style-type: none"> 1. Know the hazards faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure; 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; 3. Terminate the entry and cancel the permit; 4. Verify that rescue services are available before entry and will be available throughout the entry. 5. Verify that the means for summoning BNL Fire-Rescue are available and operable; 6. Verify the availability of Fire-Rescue services before and throughout the entire entry by calling 344-2350; 7. Remove unauthorized individuals who enter or who attempt to enter the space during entry operations; and 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; 9. Notify Fire-Rescue when entry is completed and rescue coverage is no longer needed.
Qualification	Completed and is current on: <ul style="list-style-type: none"> • Confined Space Entry (HP-OSH-016) or an equivalent

Rescue and Emergency Services	
Role	<ol style="list-style-type: none"> 1. Know how to properly use the personal protective equipment and rescue equipment necessary for making rescues from Class 2C spaces; 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; 3. Practice making confined space rescues at least once every 12 months by simulated rescue operations in which they remove dummies, mannequins, or actual persons from actual confined spaces or from representative confined spaces. Representative

	<p>confined spaces must, for opening size, configuration, and accessibility, simulate the types of confined spaces from which rescue is to be performed;</p> <ol style="list-style-type: none"> 4. Know basic first-aid and CPR. At least one member holding current certification in first-aid and CPR must be available; 5. Notify Entry Supervisors or designees if they become unavailable to provide rescue and emergency services; 6. Provide BNL with confined-space rescue services unless other provisions are made.
<p>Qualification</p>	<p>Completed and is current on:</p> <ul style="list-style-type: none"> • Confined Space Entry (HP-OSH-016) or an equivalent • Training on Retrieval and rescue, as per Fire-rescue procedures • Confined Space Atmosphere Testing (TQ-CONSPACETESTER) or equivalent • Confined space testing equipment. • Know basic first-aid and CPR. At least one member holding current certification in first-aid and CPR must be available.

FORM: CLASS 2A & 2B CONFINED SPACE PRE-ENTRY CERTIFICATION FORM

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

Class 2A & 2B Confined Space Pre-entry Certification Form

Effective Date: Jun 15, 2016

The [Class 2A & 2B Confined Space Pre-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 and act as a reminder to users that the introduction of hazards into Class 1 exempt spaces automatically changes the classification to a Class 2 and needs further evaluation.

The only official copy of this file is the one on-line in SBMS.

Before using a printed copy, verify that it is the most current version by checking the *effective date*.

[Questions/Comments](#)

[Disclaimer](#)

https://sbms.bnl.gov/SBMSearch/subjarea/122/122_Exh11.cfm



CLASS 2A & 2B CONFINED SPACE PRE-ENTRY CERTIFICATION FORM

Department/Division	Building	Area/Location/Room:	Date:
Work to be Performed:			
Pre-classification: <input type="checkbox"/> 1 <input type="checkbox"/> 2A <input type="checkbox"/> 2B <input type="checkbox"/> 2C Revised Classification: <input type="checkbox"/> Same <input type="checkbox"/> 1 <input type="checkbox"/> 2A <input type="checkbox"/> 2B <input type="checkbox"/> 2C			
Entry Supervisor/ Designee (optional)	Name	Signature	Life #
Person Determining Hazards	Name	Signature (required)	Life #
Electrical Systems <small>De-energized; Energized but Guarded; or Energized but not Working On or Near</small>		Other identified hazard:	
<input type="checkbox"/> Controlled <input type="checkbox"/> Not present		<input type="checkbox"/> Eliminated <input type="checkbox"/> Not present	
Engulfment Hazard	<input type="checkbox"/> Eliminated <input type="checkbox"/> Not present	Mechanical Systems	<input type="checkbox"/> Controlled <input type="checkbox"/> Not present
Entrapment Hazard	<input type="checkbox"/> Eliminated <input type="checkbox"/> Not present	Pressure Hazard	<input type="checkbox"/> Eliminated <input type="checkbox"/> Not present
Other Energized Systems	<input type="checkbox"/> Controlled <input type="checkbox"/> Not present	High Temperature	<input type="checkbox"/> Eliminated <input type="checkbox"/> Not present
Manhole <input type="checkbox"/> Not present	<input type="checkbox"/> tested before cover removal	Ventilation required	<input type="checkbox"/> In place <input type="checkbox"/> Not required
Manhole <input type="checkbox"/> Not present	<input type="checkbox"/> guard with rail	Radiological Hazard	<input type="checkbox"/> Following FS Guidance <input type="checkbox"/> Not present

ATMOSPHERE MONITORING TEST EQUIPMENT (Class 2A and 2B)

Meter:	Serial #:	Calibration Date:
Day of Use Sensor Check (Bump): <input type="checkbox"/> Yes <input type="checkbox"/> No	Tested By (Name):	BNL#:

Describe Method of Ventilation (Continuous ventilation required for 2B) None required

Results of Monitoring recorded via meter data log Results of monitoring recorded below (30 minute interval or less)

MONITORING RESULTS

Date/ Time	O2 (%)	Flammable (% LEL)	CO (ppm)	H2S (ppm)	Other		Date/ Time	O2 (%)	Flammable (% LEL)	CO (ppm)	H2S (ppm)	Other
	19.5 – 23.5 %	< 10 % of LEL	25 ppm	10 ppm				19.5 – 23.5 %	< 10 % of LEL	25 ppm	10 ppm	
Pre-Entry Certification test												

FORM: CLASS 2C (PERMIT-REQUIRED) CONFINED SPACE ENTRY PERMIT FORM

Management System: [Worker Safety and Health](#)

Subject Area: [Confined Spaces](#)

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

Effective Date: Jun 15, 2016

The [Class 2C \(Permit-required\) 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.

The only official copy of this file is the one on-line in SBMS.

Before using a printed copy, verify that it is the most current version by checking the *effective date*.

[Questions/Comments](#)

[Disclaimer](#)

https://sbms.bnl.gov/SBMSearch/subjarea/122/122_Exh3.cfm

ATMOSPHERIC TESTING RECORD			
TESTING EQUIPMENT USED			
Make/Model:	Serial #	Calibration Date:	
Make/Model:	Serial #	Calibration Date:	
Day of Use Sensor Check <input type="checkbox"/> Yes <input type="checkbox"/> No		Field Check (Bump Test) <input type="checkbox"/> Yes <input type="checkbox"/> No	
Tested By:	BNL No:		

Results of Monitoring recorded via meter data log Results of monitoring recorded below (30 minute interval or less)

Date/Time	O2 (%)	Flammable (% LEL)	CO (ppm)	H2S (ppm)	Other		Date/Time	O2 (%)	Flammable (% LEL)	CO (ppm)	H2S (ppm)	Other
	19.5 – 23.5 %	< 10 % of LEL	25 ppm	10 ppm				19.5 – 23.5 %	< 10 % of LEL	25 ppm	10 ppm	
Pre-Entry												

Atmosphere Tester (Tested By): _____ BNL Life Number: _____

ENTRY AUTHORIZATION	
ENTRY AUTHORIZED BY: (Entry Supervisor)	
NAME: _____	TIME: _____
SIGNATURE: _____	DATE: _____

HAVE ENTRY PERMIT AVAILABLE AT ENTRANCE TO CONFINED SPACE

ENTRY CANCELLATION/SUSPENSION

ENTRY CANCELLED/SUSPENDED BY (Entry Supervisor):	
NAME: _____	TIME: _____
SIGNATURE: _____	DATE: _____
PERMIT _____	TIME _____
SUSPENDED _____	DATE _____
(CONSTRUCTION ONLY)	
PERMIT _____	TIME _____
REINSTATED _____	DATE _____
(CONSTRUCTION ONLY)	
NOTIFICATION OF CANCELLATION MADE TO FIRE RESCUE _____	DATE: _____ TIME: _____
REASON FOR CANCELLATION:	
<input type="checkbox"/> Entry Operation Completed <input type="checkbox"/> Prohibited Condition Arose (Specify) _____	
Personnel's Comments: _____	
<input type="checkbox"/> Offered opportunity, no feedback provided	

Cancelled Permit Review by : <input type="checkbox"/> Supervisor _____	Date: _____	<input type="checkbox"/> Other _____	Date: _____
<input type="checkbox"/> ESH Rep _____	Date _____	Select all appropriate as required by procedure	

Return Permit to Subject Matter Expert

DEFINITIONS

Definition: Confined Spaces

Term	Definition
atmosphere tester	<p>An individual who</p> <ul style="list-style-type: none"> • Has demonstrated competency in use of monitoring equipment and selection of equipment for the job; • Is knowledgeable in the permissible exposure limits as published by OSHA and ACGIH; • Is trained in proper sampling/monitoring procedures in confined spaces; • If the atmospheric tester must enter the space to perform the monitoring, he/she must also have received confined space entry training.
Class 2A and 2B Pre-Entry Certification Form	BNL document used to evaluate the atmosphere in Class 2A and 2B spaces. Also used when a hazard is introduced into a Class 1 space.
Class 2C (Permit-required) Confined Space Entry Permit Form	BNL document that allows and controls entry into a permit-required, Class 2C confined space.
competent person	One who is capable of identifying existing and predictable hazards in the surrounding or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.
confined space	<p>A space that meets all of these criteria:</p> <ul style="list-style-type: none"> • Is large enough and configured so that an individual can bodily enter and perform assigned work; • 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); • Is not designed for continuous human occupancy.
Confined Space Classification Form	BNL document used to classify confined spaces into Class 2A, 2B, or 2C categories.
confined space, class 1	

	<p>A space that meets the definition of a confined space, but by design and use does not contain a hazard.</p> <p>Class 1 Confined spaces do not require a Confined Space Entry Certification Form unless hazards are going to be introduced during entry.</p> <p>Examples: Attics, Crawl Spaces, Air Plenums.</p> <p>OSHA equivalent is a nonpermitted confined space.</p>
<p>confined space, class 2</p>	<p>A confined space that has one or more of the following characteristics:</p> <ul style="list-style-type: none"> • Contains or has a potential to contain a hazardous atmosphere; • Contains a material that has the potential for engulfing an entrant; • 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; • Contains any other recognized serious physical or health hazard. <p>There are three categories of Class 2 confined spaces: Class 2A, 2B, and 2C.</p>
<p>confined space, class 2A</p>	<p>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.</p> <p>Examples: electric manholes (when de-energized), telecommunication manholes.</p> <p>OSHA equivalent is Permit-required Confined Space that has been downgraded to Nonpermitted Confined Space based on pre-entry certification (i.e., an OSHA Alternate Procedure Entry Space).</p>
<p>confined space, class 2B</p>	<p>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.</p> <ul style="list-style-type: none"> • All physical hazards are removed or controlled. • Continuous forced air ventilation alone is sufficient to maintain the space safe for entry (when an atmospheric hazard is present). • 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). <p>OSHA equivalent is Permit-required Confined Space that has been downgraded to Nonpermitted Confined Space based on pre-entry</p>

	evaluation and controls (i.e., an OSHA Alternate Procedure Entry Space).
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. OSHA equivalent is a Permit-required Confined Space.
controlling contractor	The employer that has overall responsibility for the construction at the worksite. Note: If the controlling contractor owns or manages the property, then it is both a controlling employer and a host employer.
early-warning system	A method used to alert authorized entrants and attendants that an engulfment hazard may be developing. Examples of early-warning systems include, but not limited to: alarms systems activated by remote sensors; and lookouts with equipment for immediately communicating with the authorized entrants and attendants.
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.
entrant	Personnel trained to enter a Class 2A and 2B confined space.
entrant, authorized	Personnel trained to enter a Class 2C confined space to work.
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 employer	An employer who decides that an employee it directs will enter a permit space. Note: An employer cannot avoid the duties of the standard merely by refusing to decide whether its employees will enter a permit space, and BNL will consider the failure to do decide to be an implicit decision to allow employees to enter those spaces if they are working in the proximity of the space.
entry supervisor	A trained employee responsible for <ul style="list-style-type: none"> • Determining if acceptable entry conditions are present at a confined space where entry is planned; • Authorizing entry; • Overseeing entry operations;

	<ul style="list-style-type: none"> • Terminating entry as required.
hazardous atmosphere	<p>An atmosphere that meets one or more of the following causes:</p> <ul style="list-style-type: none"> • Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL) or lower explosive limit (LEL); • 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); • Atmospheric oxygen concentration below 19.5 percent oxygen deficient or above 23.5 percent oxygen enriched; • Atmospheric concentration in excess of the more stringent of the OSHA permissible exposure limit or ACGIH TLV. <ul style="list-style-type: none"> ◦ 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. ◦ A substance capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is covered. • Any atmospheric condition that is immediately dangerous to life or health.
host employer	<p>The employer that owns or manages the property where the construction work is taking place</p> <p>Note: If the owner of the property on which the construction activity occurs has contracted with an entity for the general management of that property, and has transferred to that entity the information of the location, hazards and precautions of each permit confined space before any operations begin, the contracted management entity will be treated as the host employer. In no case will there be more than one host employer.</p>
isolation	<p>The process by which a hazard is removed from the space or completely protected against release into the space by such means as</p> <ul style="list-style-type: none"> • Blanking or blinding; • Misaligning or removing sections of lines, pipes, or ducts, a double-block and bleed system; • Lockout or tagout of all sources of energy; • Blocking or disconnecting all mechanical linkages.
nonpermit confined space	<p>A confined space that does not contain or have the potential to contain a hazard capable of causing death or serious physical harm.</p>
physical hazard	<p>Physical hazard includes configuration as well as equipment, machinery, or utilities. If they are not de-energized or isolated, and locked or tagged</p>

	out, then they 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. When working on or near electrical energized parts that cannot be de-energized, obtain an Energized Electrical Work Permit (see the exhibit Electrical Work Permits with Instructions in the Electrical Safety Subject Area).
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.

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