



Lawrence Berkeley National Laboratory

Confined Space Program

Revision 9.0

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Date

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3/15/07

Date

CONFINED SPACE PROGRAM

Lawrence Berkeley National Laboratory

I. POLICY

Permit-Required Confined Spaces (PRCS) at Berkeley Laboratory may be entered only after a written and authorized Confined Space Entry Work Permit (Permit) has authorized that entry, and all requirements of this program for safe entry are accomplished.

Italicized text indicates elements of this program that are not required by regulation, but are included to enhance LBNL's program effectiveness.

II. SCOPE

This program applies to all LBNL employees, any persons working under the technical supervision of an LBNL employee, and all sub-contractors who enter or participate in the entry of a permit-required confined space. Permit-required confined spaces are defined in OSHA regulation 29CFR 1910.146.

III. INVENTORY

The Confined Space Inventory identifies and classifies all spaces evaluated at LBNL for confined space hazards. A discussion of the classification rationale is provided in the Inventory. Please contact the Confined Space Program Manager at x2603 for Inventory information.

The Inventory outlines the specific requirements for entry into each space. The Inventory defines Permit requirements, signature authority for the Permit, and every requirement for entry.

The Inventory is maintained by the Confined Space Program Manager. Physical labeling of PRCS alerts persons at the point of entry for PRCS, except that the heavy covers found on telecommunications and utility vaults, storm drains and sanitary sewers are not labeled. Managers of persons who would need access to these spaces are

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informed via ongoing training that these spaces are PRCS and are responsible for assuring all entries proceed with Permit.

IV. CONFINED-SPACE ENTRY WORK PERMIT

The Confined Space Entry Permit (Appendix A) must be completed for all permit required confined-spaces before entry. The Permit provides a method of certifying that all hazards have been evaluated by the responsible qualified person(s), and that all necessary protective measures have been implemented.

JOB INFORMATION

Fill out all the information required on the permit. Only an Industrial Hygienist Permit Writer may extend a Permit beyond a shift.

CONFINED-SPACE TEAM

List all the Entrants and Attendants. If Attendants rotate jobs with Entrants, then specify this on the Permit.

PERMIT REQUIREMENTS COMPLETED PRIOR TO ENTRY

The permit contains a checklist of items to be considered prior to entry. The checklist is designed to ensure that all hazards identified in the Inventory and any additional hazards are evaluated and mitigated. It also will indicate when an additional subject matter expert and Industrial Hygienist Permit Writer is required.

If any of the asterisked (*) requirements apply, site-specific details must be written in the “Additional Information” section.

The key points in this section are described below.

- If **12-kv electrical** lines are present in the confined space, the Electrical Shop Supervisor must also approve the entry permit.
- **Lockout and tagout/blockout must be done in accordance with LBNL’s [Lock Out Tag Out procedures](http://www.lbl.gov/ehs/pub3000/ch18.html)** <http://www.lbl.gov/ehs/pub3000/ch18.html>.
- Lines, pipes or other vessels must be **blanked or capped** to the extent feasible before the confined space is entered.
- If mechanical **ventilation** is required, the direction of airflow and the placement of the air intake, must be documented in the “Additional Information” section
- The confined space must be emptied and purged of all **hazardous materials** to the extent possible prior to entry. If **hazardous materials** have been identified or will be used in the confined space, an Industrial Hygienist must write the Permit.
- Periodic or continuous **air monitoring** requires documentation of levels every half hour on the Permit.
- When entrance covers are removed, openings must be guarded by **temporary**

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barriers that will protect the entrants from external hazards, such as vehicles, and protect pedestrians from falling into the opening.

- If **ionizing radiation** may be present, radiation levels must be monitored by personnel trained in radiation hazard assessment before entry.
- At least one Attendant must be present at all times while the PRCS is occupied.
- If **PPE or respiratory protection** is required, the respirator and cartridges, must be specified in “Additional Information”.
- If **hot work** will be performed, a Hot Work Permit must be completed and posted at the entrance. The Fire Department writes the Hot Work permit in consultation with an LBNL Industrial Hygiene Permit Writer.

MONITORING RESULTS

Atmospheric monitoring is required for all entries into PRCS. The initial monitoring prior to the authorizing of the Permit must be performed by the Permit Writer. The Permit form provides space for the initial monitoring results. The results for all gases read by the meter and other contaminants measured must all be documented on the form as well as calibration and bump test information for the meter.

If the Permit requires continuous monitoring, then an additional page for readings must be attached to the Permit so that meter readings can be documented every half hour. (Note: Monitoring is continuous, results are recorded each half hour.) This documentation of readings may be conducted by Entrants or Attendants. The person recording the readings must sign their name and record the times and readings accurately.

ADDITIONAL INFORMATION

On the “Additional Information” section of the form, include all information that will be necessary to ensure the safety of the entry.

APPROVAL SIGNATURES

The Inventory identifies the subject matter experts and Permit Writers who are required to sign each Permit. Additional signatures may be required because of the work process within the space. The Permit Writer must assure that all conditions of the Permit are met for entry, including assuring the competent reading of the meter if it is used continuously during the entry and the Permit Writer is not performing the monitoring. The Permit Writer is also responsible for assuring that any sub-contractor’s employees are approved for entry.

PERMIT EXPIRATION

Permits expire when the entrance is closed or at the end of the 8-hour work shift, whichever is sooner. If the confined space will remain isolated and the type of work will not change, the permit may be extended by the authorizing Industrial Hygienist.

After the Permit expires, any comments must be attached to the Permit and sent to the Confined Space Program Manager.

V. SUB-CONTRACTORS

When a sub-contractor must enter a PRCS, the requester must assure that complete Inventory information and other helpful information about safe entry into the confined space has been provided before Bid. This information must include any previous experience LBNL has had with this PRCS, and precautions and procedures to protect LBNL personnel in the PRCS or the area.

Sub-contractors may use their own confined space written program if it is approved by LBNL. The Sub-contractor's plan must contain procedures which meet Federal OSHA requirements for entering PRCS and include a permit form, an acceptable hazard evaluation process, and documented training from a qualified safety trainer.

Coordination between LBNL and Sub-contractors must assure that the work of one does not create a hazard for the other.

If a LBNL employee enters a confined space on the Permit of the Sub-contractor, the entrant must have completed the required LBNL training.

After the entry is completed, the Sub-contractor must debrief LBNL about the entry to provide information about any concerns or changes that should be made to the Inventory or Program

VI. PROGRAM MANAGEMENT

The Confined Space Program Manager performs an annual review of the program and makes whatever revisions are necessary. The review evaluates program effectiveness and ensures that employee protection is assured.

In addition to the annual review, the Program Manager shall evaluate other changes that may impact program effectiveness at the time they arise.

VII. TRAINING

Supervisors who authorize entry into confined spaces and Entrants or Attendants must have completed initial training, Confined Space Training class, EHS 275. The Refresher class, EHS 274 must be taken a year later, and after that every three years. Retraining is waived if the individual does not enter Permit Required Confined Spaces or serve as a Supervisor or Attendant for PRCS entry.

Permit Writers must successfully complete the Permit Writer Training class, EHS 277. The class must be repeated every three years unless the individual does not write Permits.

Additional training may be required due to the presence of additional hazards identified in the Inventory or by the Permit Writer.

An EHS Industrial Hygienist Permit Writer may provide entry-specific training with approval from the Confined Space Program Manager.

VIII. RESPONSIBILITIES

ENTRANTS

- Read the Confined Space Entry Work Permit before starting work, and abide by its conditions.
- Stop work and exit the confined space if conditions under which the permit was written change or if any danger is perceived. Report this to the attendant and supervisor.
- Ensure that the Confined Space Entry Work Permit is posted at the worksite, and that other safety precautions, such as isolation of the space, lockout/tagout, barricades, etc., are performed, if required.
- Consult with the space/equipment owners and the person completing the permit to ensure that all hazards have been considered.
- Be knowledgeable of the hazards that may be encountered during the entry, including the signs, symptoms, and consequences of exposure to these hazards.
- Remove permits/barriers after the work has been completed.
- Maintain contact with the attendant. Follow instructions from the Attendant.
- Provide post-entry feedback to the Attendant, Permit Writer, or Confined Space Program Manager.

ATTENDANTS

- Read the Confined Space Entry Work Permit before starting work, and abide by its conditions.
- Stop work and request that workers exit the confined space if conditions under which the permit was written change, if any danger is perceived, if an Entrant reports a problem, or if any Entrant appears to be suffering a toxic effect
- Remain outside the confined space until relieved by another attendant.
- Summon the Fire Department if it is determined that employees in the confined space may need assistance in escaping.

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- Be knowledgeable of the hazards that may be encountered during the entry, including the signs, symptoms, and consequences of exposure to these hazards.
- Perform non-entry rescues if training or drills have adequately prepared you for this task.
- Maintain contact with the workers in the confined space.
- Attendants must be dedicated to one PRCS. Approval for monitoring two entry jobs must come from the CS Program Manager.

PERMIT WRITERS

- Assume responsibility for assuring that all entry conditions from the Inventory and the Permit have been evaluated and all conditions made safe.
- Perform the initial monitoring. Assure that all possible contaminants have been identified and exposure levels evaluated.
- *Test that the Entrants and Attendants know how to use the meter properly if continuous monitoring is required. Do not allow anyone to assume this task if they are not capable.*
- Develop an emergency rescue plan. Prescribe the use of rescue and emergency equipment. Assure that employees have drilled on the equipment prior to the entry.
- Define all safety needs of the entry, including ladders, communications, ventilation equipment, PPE, pedestrian and vehicle barriers and shields, testing and monitoring equipment, and anything else that may effect the safety of an entry.
- Assure that all Entrants and Attendants have observed monitoring, evaluation and permitting process and that they have had an opportunity to ask questions.
- If there is any question that the entry may not be safe, do not proceed.
- Terminate the entry by collecting the Permit and forwarding it to the CS Program Manager.

EHS INDUSTRIAL HYGIENE

- Authorize entry as Permit Writers.
- Evaluate spaces to identify PRCS *using the form in Appendix B.*
- Maintain the Inventory of PRCS.
- Perform the initial and periodic evaluation of the hazards of each PRCS.
- Provide technical guidance including air monitoring and hazard evaluation.
- Conduct the Confined Space Entry Hazards class (EHS 275) and Refresher (EHS274).
- Conduct the Permit Writer training class (EHS 277).

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- Administer the Confined Space Entry Program.
- Maintain copies of all Permits for at least a year.
- *Review Confined Space Programs submitted by subcontractors.*
- *Assure that a list of trained personnel is maintained and updated on a monthly basis.*

EMERGENCY SERVICES

- Assist in rescue drills with non-entry equipment.

ALAMEDA COUNTY FIRE DEPARTMENT (LBNL STATION)

- Provide emergency rescue service as may be required.

FACILITIES

- Identify future confined space jobs so that bid information contains specific information about any confined spaces to be entered and sub-contractors get approved on schedule.

PROCUREMENT

Provide assurance that subcontractors are informed before bidding on projects of the hazards of any PRCS and that they perform all work in accordance with [LBNL policy](#) .

SUPERVISORS

- Ensure that employees who may work or authorize entry into confined spaces have completed all required training.
- Ensure equipment used for confined-space entries is kept in good operational condition and is calibrated according to manufacturers' recommendations by a qualified person.
- *Assist the Confined Space Program Manager with writing entry conditions as necessary for research equipment.*
- Ensure that operations comply with the terms and conditions on the permit.

IX. RESCUE AND EMERGENCY PLANNING

Only non-entry rescues are allowed by LBNL employees or subcontractors. The importance of pre-planning for all conditions and possible emergencies is paramount. Difficult PRCS will be identified in the Inventory and suggested emergency measures will be provided.

The local fire department is to be notified of the PRCS entry location ahead of entry if required by the Inventory by calling x6370.

For emergencies, the premier way to get emergency assistance is to call x7911 from a LBNL telephone, because the dispatcher will know your exact location and can assure the fastest response. (NOTE: For special circumstances on LBNL property when a land line is not

available call 1-925-447-6880. You must tell them your exact LBNL location. This number is not good outside LBNL, and may cause delays in response.)

X. INFORMATION, REFERENCES AND STANDARDS

Please contact the Confined Space Program Manager at x2603 if you have any questions about the Program or desire more information.

29 CFR 1910.146, Permit Required Confined Spaces

ANSI Z117.1-2003, Safety Requirements for Confined Spaces

APPENDIX A. CONFINED SPACE ENTRY WORK PERMIT

 <p align="center" style="font-size: 1.2em;">Confined Space Entry Permit</p>	<p>LBL Emergency Phone Numbers x7911 or 9-911 Give exact location at LBNL</p>
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Start Date: _____ Time: _____	Expiration Date: _____ Time: _____
Location: _____	
Task: _____	

Confined Space Team	
Entrants: _____	
Attendants: _____	
Supervisor/PermitWriter: _____	Telephone: _____

Requirements Completed for Entry	No	Yes		No	Yes
Training verified for all of team	<input type="checkbox"/>	<input type="checkbox"/>	12 kv lines in space* ¹	<input type="checkbox"/>	<input type="checkbox"/>
Rescue/Emergency Plan**	<input type="checkbox"/>	<input type="checkbox"/>	LOTO	<input type="checkbox"/>	<input type="checkbox"/>
Lifeline or retrieval gear*	<input type="checkbox"/>	<input type="checkbox"/>	Hot work permit*	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous materials evaluated**	<input type="checkbox"/>	<input type="checkbox"/>	Lines blanked/broken/capped**	<input type="checkbox"/>	<input type="checkbox"/>
Ventilation needed for space*	<input type="checkbox"/>	<input type="checkbox"/>	Signs and barriers	<input type="checkbox"/>	<input type="checkbox"/>
Continuous air monitoring*	<input type="checkbox"/>	<input type="checkbox"/>	Special communications*	<input type="checkbox"/>	<input type="checkbox"/>
PPE and respiratory protection**	<input type="checkbox"/>	<input type="checkbox"/>	Other*	<input type="checkbox"/>	<input type="checkbox"/>

* Specifics documented in *Additional Information* below.
 ** Specifics documented in *Additional Information* and *Industrial Hygienist Permit Writer* required.
 *¹ Sign-off by Jean Myers and Keith Gershon required.

<p>Initial Monitoring Results</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td style="text-align: center;">Oxygen</td><td style="text-align: center;">%</td></tr> <tr><td style="text-align: center;">Combustible</td><td style="text-align: center;">%</td></tr> <tr><td style="text-align: center;">Carbon Monoxide (CO)</td><td style="text-align: center;">ppm</td></tr> <tr><td style="text-align: center;">Hydrogen Sulfide (H₂S)</td><td style="text-align: center;">ppm</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>	Oxygen	%	Combustible	%	Carbon Monoxide (CO)	ppm	Hydrogen Sulfide (H ₂ S)	ppm							<p>Initial here that the bump test was done: _____</p> <p>Record continuous monitoring results on the second page of this Permit.</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td style="text-align: center;">Instrument</td><td> </td></tr> <tr><td style="text-align: center;">Serial Number</td><td> </td></tr> <tr><td style="text-align: center;">Calibration Date</td><td> </td></tr> </table>	Instrument		Serial Number		Calibration Date	
Oxygen	%																				
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Carbon Monoxide (CO)	ppm																				
Hydrogen Sulfide (H ₂ S)	ppm																				
Instrument																					
Serial Number																					
Calibration Date																					

<p>Additional Information</p>

Signatures						
<table style="width:100%;"> <tr> <td style="width:50%;">Approved Permit Writer: _____</td> <td style="width:50%;">Date: _____</td> </tr> <tr> <td>Industrial Hygienist: _____</td> <td>Date: _____</td> </tr> <tr> <td>Other Signatures: _____</td> <td>Date: _____</td> </tr> </table>	Approved Permit Writer: _____	Date: _____	Industrial Hygienist: _____	Date: _____	Other Signatures: _____	Date: _____
Approved Permit Writer: _____	Date: _____					
Industrial Hygienist: _____	Date: _____					
Other Signatures: _____	Date: _____					

APPENDIX B. CONFINED SPACE EVALUATION FORM

CONFINED SPACE EVALUATION FORM

Location:

Description of Space:

Defining Questions - Confined Space

- Is large enough and so configured that an employee can enter; and
- Has limited or restricted means for entry or exit; and
- Is not designed for continuous employee occupancy.

Defining Questions - Permit Required Confined Space

- Contains or has a potential to contain a hazardous atmosphere; or
- Contains a material that has the potential for engulfing an entrant; or
- Has an internal configuration that could trap or asphyxiate by converging walls or downward slope to a small cross-section; or
- Contains any other recognized serious safety and health hazard.

Analysis - Description of yes answers and discussion

Conclusion

- This space IS IS NOT a Permit-Required Confined Space.
- This space IS IS NOT a Non-Permit-Required Confined Space.
- This space IS IS NOT a Confined Space.
- This space DOES DOES NOT require a mandatory Safe Work Procedure.

Evaluated by: _____ **Date:** _____