Hazard Evaluation and Determining the Appropriate Confined Space Entry

EHS Procedure EHS-SAF-21.2, Rev. 0
Effective Date: 09/01/2015

1.0 PURPOSE

This document describes the processes for evaluating the hazards in confined spaces and determining the proper procedure to implement for confined space entry at the National Cancer Institute (NCI) at Frederick and the Frederick National Laboratory for Cancer Research (FNLCR).

2.0 SCOPE

In accordance with 29 Code of Federal Regulations (CFR) 1910.146 and the American National Standards Institute/American Society of Safety Engineers (ANSI/ASSE) Z117.1, confined spaces must be identified, evaluated, and designated at the workplace.

No entry shall be made into confined spaces at NCI at Frederick and FNLCR without first conducting a hazard evaluation of the confined space and then following the procedure that is appropriate for the confined space as it is inventoried.

3.0 PROCEDURE

Procedures for entry to a confined space must be followed whenever work that must be performed within requires personnel to enter the confined space.

In 2015, the Environment, Health, and Safety (EHS) Directorate conducted a confined space hazard evaluation of confined spaces at NCI at Frederick and FNLCR. EHS maintains a repository of information gathered during the confined space hazard evaluation; this repository is referred to as the Confined Space Inventory Listing.

Reference to the Confined Space Inventory Listing is required for identifying the appropriate entry procedure, and whether or not a hazard evaluation must also be conducted before planning for entry.

- If a confined space is newly identified (i.e., it is not on the current Confined Space Inventory Listing) and/or all of the hazards have yet to be evaluated, then a hazard evaluation per Section 3.1 must be followed.
- If a confined space is already in the Confined Space Inventory Listing and the hazards have not changed, then follow the procedure for selection of the appropriate confined space entry procedure per Section 3.2.

A decision tree diagram is presented in Appendix A.

3.1 Hazard Evaluation

If a space is already designated as a confined space in the Confined Space Inventory Listing and the hazards of that space have not changed, then re-evaluation is not necessary and immediate selection of a confined space entry procedure per Section 3.2 is appropriate.

Step	Job Role	Action
1	Department Supervisors	1.1 Identify spaces that meet the definition of a confined space (see EHS-SAF-21.1, *Confined Space Entry Program Overview*), in conjunction with EHS, as necessary. 1.2 Inform the Confined Space Coordinator when a new confined space is identified.

Step	Job Role	Action
2	Confined Space Coordinator	2.1 Evaluate each confined space for hazards, using the Confined Space Evaluation Form (see Appendix B). Perform the evaluation in advance of <u>any entry</u> into the space, whether it is routine or an unanticipated emergency. **Notes**: Entry for unanticipated emergencies includes excavation to expose and repair underground utilities. If a confined space entry is necessary but was not anticipated, then perform the hazard evaluation simultaneously with the entry preparation. 2.2 Determine if the space is a permit-required confined space (PRCS) or non-PRCS; in accordance with IH-SOP-4041, *Confined Space Determination Guidance*. 2.3 Take one of the following actions (see IH-SOP-4041). • If the confined space is a PRCS, then evaluate it further to designate it as either PRCS-atmosphere or a PRCS-lockout/tagout (LOTO). • If the confined space is a non-PRCS, then evaluate it further to designate it as either non-PRCS two-person rule or non-PRCS authorized personnel only. 2.4 Update the Confined Space Inventory Listing. 2.5 Consult with the Fire Department(s) for fire protection and rescue considerations.
3	EHS	3.1 Label the confined space per IH-SOP-4041, *Confined Space Determination Guidance.* 3.2 Draft confined space-specific entry procedures in advance of PRCS entry. 3.3 Have the confined space-specific entry procedure reviewed and approved.
4	Confined Space Coordinator; EHS, and Impacted Departments	Review and approve confined space-specific entry procedures.

3.2 Selection of Confined Space Entry Procedure

The process of selecting the appropriate confined space entry procedure is determined by the confined space classification in the Confined Space Inventory Listing.

Confined spaces at NCI at Frederick and FNLCR are classified in the Confined Space Inventory Listing as follows:

1. Permit-Required Confined Spaces
2. Permit Required Confined Spaces with Lockout Tagout

3. Non Permit Required Confined Space - Two Person Rule
4. Non Permit Required Confined Spaces - Authorized Personnel Only

If a change in conditions occur within a non-permit required confined space (non-PRCS) (i.e., flooding, contamination, etc.) it automatically becomes a PRCS and all proper precautions must be taken, including re-evaluation of that space per Section 3.1, above.

The following steps, in conjunction with the Confined Space Entry Decision Tree provided in Appendix A, apply to selecting the appropriate confined space entry procedure.

Step	Job Role	Action
1	Workers	In consultation with the Department Supervisor and adhering to posted signage, determine if confined space permitting and confined space monitoring is required in the area where work is to be performed. .
2	Department Supervisors	2.1 Reference the Confined Space Inventory Listing to determine the designation of the confined space. 2.2 Determine which confined space entry procedure(s) to use for a task by selecting the appropriate category from the guidance in Appendix A.
3	Confined Space Coordinator and EHS	Provide assistance with selection of the appropriate confined space entry procedure, and provide personnel with periodic training and audits as required in EHS-SAF-21.6, *Periodic Reviews and Training*.

4.0 RECORDS

The following records are relevant to this procedure:

Record	Custodian	Storage Medium
Confined Space Inventory Listing	EHS	Electronic
Confined Space Entry Evaluation Form	EHS	Electronic

5.0 RELATED DOCUMENTS

The following documents provide requirements and background information relevant to all confined space entry procedures of this Program:

- 29 CFR 1910.146, *Permit-Required Confined Spaces*
- ANSI/ASSE Z117.1, *Safety Requirements for Confined Spaces*

The following documents provide background information relevant to the subjects of this procedure:

- EHS-SAF-21.1, *Confined Space Entry Program Overview*
- IH-SOP-4041, *Confined Space Determination Guidance*

6.0 DEFINITIONS

Definitions applicable to all confined space entry procedures are provided in EHS-SAF-21.1, *Confined Space Entry Program Overview*.

7.0 ABOUT THIS PROCEDURE

Issuing organization:	EHS
Final approver:	Terri Bray
Subject matter expert:	Michael Gearheart
Review cycle (months):	12
Date last revised:	initial issue
Date last reviewed:	initial issue

8.0 SUMMARY OF CHANGES IN THIS VERSION

None. Initial issue. Replaces portions of EHS Compliance Manual Chapter C-15.

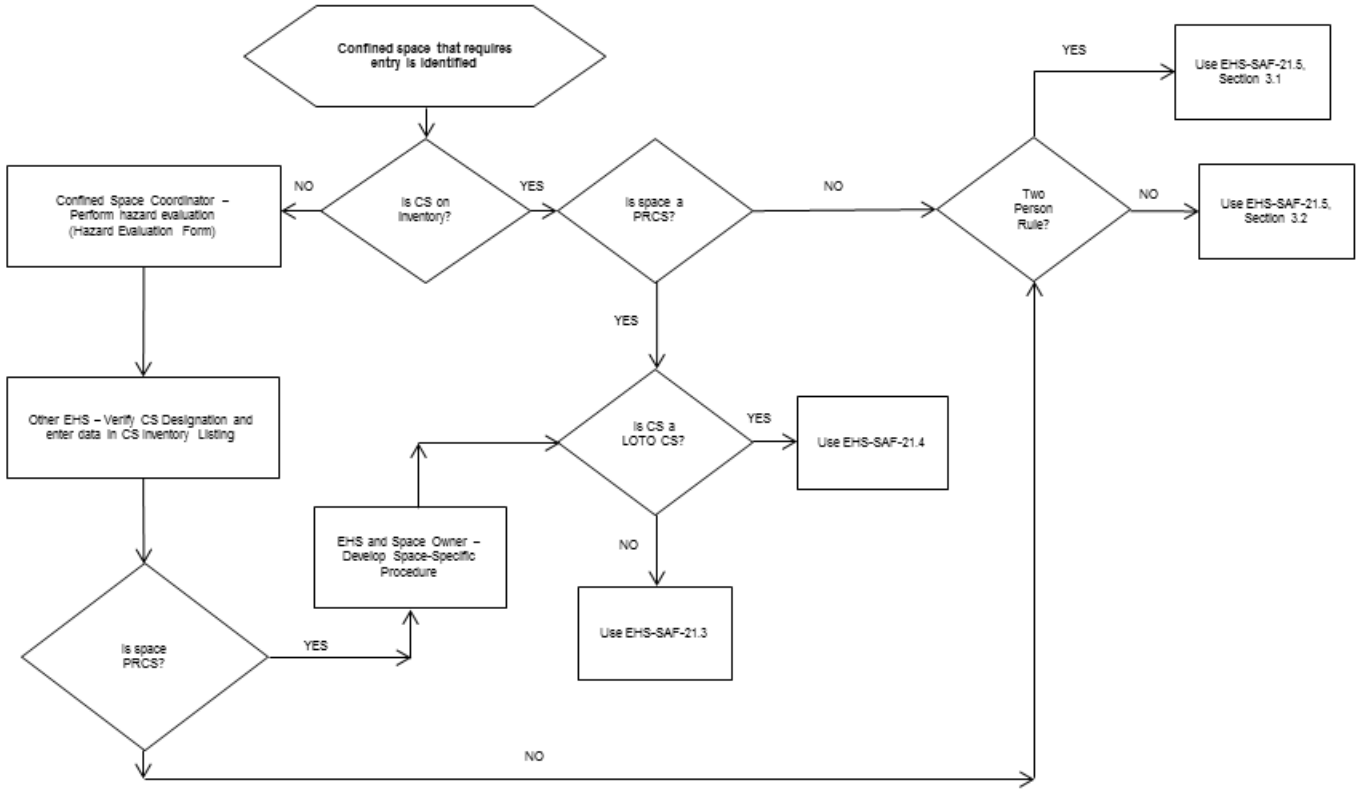
9.0 APPENDICES

Appendix A: Confined Space Entry Procedure Decision Tree

Appendix B: Confined Space Evaluation Form

Appendix C: List of Confined Space Entry Procedures

APPENDIX A: CONFINED SPACE ENTRY PROCEDURE DESCISION TREE



CONFINED SPACE EVALUATION FORM

INSTRUCTIONS

To facilitate posting and review of entry procedures, EHS maintains an inventory of NCI@F/FNLCR confined spaces that can be entered. This form is used to document the location, hazards, classification, and division owner. The division owner has knowledge of the space and its hazards.

After completing this inventory (Part 1) and hazard evaluation checklist (Part 2), the Department Supervisor must send the documents to EHS, who will review and verify the designation, assign the space an inventory number, and add the space to the Confined Space Inventory Listing. If hazard conditions for this confined space change, the division that owns the space must revise the hazard evaluation, revise the entry procedure, and may need to reclassify the space (permitted vs. non-permitted.)

PART 1 - INVENTORY

Location	For Outdoor Spaces	Identification
Building: Floor: Room: Placement:	Nearest road, Intersection, or Building: Directions from Nearest Road, Intersection, Building to Confined Space: (attach map):	Name/Type of Space (Manhole, Crawlspace, Autoclave, Utility Chase, Sewer, Stormdrain, etc.) (attach photos): Use of Space (Sewer, Storage, etc.): Identification Number (Manhole #10, Tank A, Division No., etc.):
Other Location Notes		

PART 2 – CONFINED SPACE ASSESSMENT

- Is the space large enough and configured that an employee can bodily enter and perform assigned work? Yes ☐ No ☐
- Does the space have limited or restricted means for entry and/or exit? Yes ☐ No ☐
- Is the space not designed for continuous employee occupancy? Yes ☐ No ☐

If the answers to these three questions are "Yes", then the space is a confined space. Continue to evaluate hazards.

PART 3 - CHECKLIST FOR HAZARD EVALUATION OF CONFINED SPACES

Conditions to Be Considered During Confined Space Evaluations

1. Does the space contain or have a potential to contain a hazardous atmospheres (i.e. oxygen deficiency, gasoline or solvent vapors, sewer gases, or caustic materials)? Yes ☐ No ☐ N/A ☐

If Yes, classify as a PRCS. Continue to identify specific hazards.

1.1 Is oxygen deficiency or enrichment possible? Yes ☐ No ☐ N/A ☐

1.2 Is oxygen enrichment possible? Yes ☐ No ☐ N/A ☐

Note: *Oxygen deficiency can be caused by oxidation, displacement, bacterial activity, combustion, use of inert gases such as nitrogen. Oxygen enrichment may be caused by leaking oxygen pipes, hoses, or cylinders, boiling liquid oxygen, or chemical activity.*

1.3 Is an explosive or flammable atmosphere possible? Yes ☐ No ☐ N/A ☐

Note: *Consider residues, bacterial activity (methane), leaking pipes and cylinders, reactions of acids with metals, painting or cleaning of the space, and residual dusts (coal or metals)*

1.4 Is a toxic atmosphere possible? Yes ☐ No ☐ N/A ☐

Note: *Consider chemicals such as hydrogen sulfide (H_2S), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), chlorine (Cl_2), carbon dioxide (CO_2), hydrogen cyanide (HCN), carbon monoxide (CO) and materials brought into the space.*

2. Does the space contain a material that has the potential for engulfing an entrant? Yes ☐ No ☐ N/A ☐

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

If Yes, classify as a PRCS. Continue to identify specific hazards.

3. Is there a risk of entrapment (i.e. 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)?	Yes ☐ No ☐
If Yes, classify as a PRCS. Continue to identify specific hazards.	
4. Are there electrical hazards (i.e. exposed energized conductors, switch gear, etc.)?	Yes ☐ No ☐
4.1 If Yes, can the electrical hazards be eliminated by approved LOTO procedures without entry?	Yes ☐ No ☐ N/A ☐
5. Are there mechanical hazards?	Yes ☐ No ☐
Note: *Consider unguarded moving equipment such as impellers, pumps, valves, conveyors; stored energy devices such as springs, cables under tension, counterweights; fluids/gases under pressure that are not blocked off.*	
5.1 If Yes, can the mechanical hazards be eliminated by approved LOTO procedures without entry?	Yes ☐ No ☐ N/A ☐
If 1-3 are No, and 4.1 and/or 5.1 are Yes, classify as a PRCS-LOTO. Continue to identify hazards.	
6. Can the entrant be seen from the entry point?	Yes ☐ No ☐
If the answers to 1-5 are No and the answer to 6 is Yes, classify as a Non-PRCS Authorized Personnel Only.	
If the answers to 1-6 are No, classify as a Non-PRCS Two Person Rule.	
Answer the following questions to identify additional hazards to be addressed in an entry procedure	
7. Are there any physical agents such as radiation or temperature extremes?	Yes ☐ No ☐
8. Is the space located such that weather conditions can create a hazardous situation (i.e. wind, rain (flooding), high humidity, lightning strikes)?	Yes ☐ No ☐
9. Are other operations or processes on-going in the area of the CS that could endanger personnel entering or exiting the space?	Yes ☐ No ☐
10. Will the planned work potentially result in or create a hazardous atmosphere in the space (i.e. burning, welding, and use of organic solvents)?	Yes ☐ No ☐
11. Are there pipes entering, leaving, or passing through the space that carry hazardous substances or high temperature materials? NO	Yes ☐ No ☐
12. Are there any physical hazards that could move or fall?	Yes ☐ No ☐
Other Hazard Notes	

EVALUATED BY	
Printed Names	Signature and Date
.....	.....
.....	.....

CONFINED SPACE CLASSIFICATION	
Class	**Master Inventory Listing (to be completed by EHS verification)**
☐ Permit-Required ☐ Permit-Required-LOTO ☐ Non-Permit Authorized Only ☐ Non-Permit Two Person Rule	Classification verified by EHS? Yes ☐ EHS Comments: Space added to Master Inventory Listing? Yes ☐ Date **Confined Space ID #**

AUTHORIZATION	
Printed Names	Signature and Date
Confined Space Coordinator:	.....
EHS:	.....
Other SME:	.....

APPENDIX C: LIST OF CONFINED SPACE ENTRY PROCEDURES

EHS-SAF-21.1, *Confined Space Entry Program Overview*
EHS-SAF-21.2, *Hazard Evaluation and Determining the Appropriate Confined Space Entry Procedure*
EHS-SAF-21.3, *Permit-Required Confined Space Entry*
EHS-SAF-21.4, *Permit Required Confined Space Entry with Lockout Tagout Procedure*
EHS-SAF-21.5, *Non-Permit Required Confined Space Entry*
EHS-SAF-21.6, *Periodic Reviews and Training for Confined Space Program*