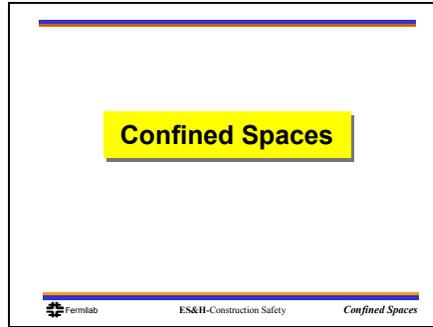
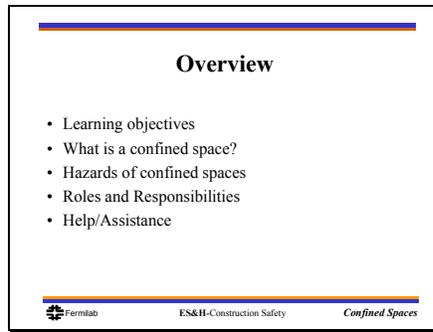


Slide 1



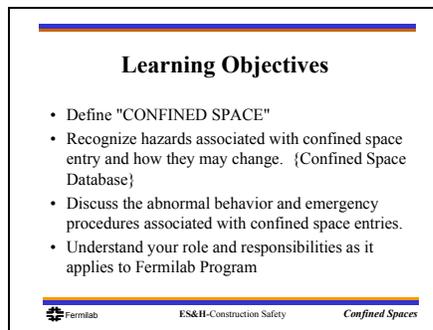
Introduce yourself and the section you represent - give a work history and mention your responsibilities at Fermilab.

Slide 2



Explain overview of class.

Slide 3



Explain learning objectives.

Slide 4

Learning Objectives - Continued

- Know ES&H procedures and requirements found in contract documents and FESHM
- Given a sample entry permit, identify inconsistencies, incomplete and invalid data
- Given access to portable atmospheric monitors, demonstrate proper methods of operation and use in accordance with procedures provided in class
- Know where to go for help

 FermilabES&H-Construction SafetyConfined Spaces

Slide 5

What is a “confined space”?

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

 FermilabES&H-Construction SafetyConfined Spaces

Pose question to audience, “What is a confined space?”

"Restricted entry or exit," means physical impediment of the body, e.g., use of the hand or a contortion of the body to enter into, or exit from, the space. Underground beamline enclosures are not usually considered confined spaces. Enclosures that can be accessed by a ladder with no other access/egress points **are** considered confined spaces. The Landlord ES&H Department shall evaluate large-scale excavations on a case-by-case basis.

Slide 6

Examples of confined spaces

- Tanks
- Vessels
- Silos
- Storage Bins
- Manholes
- Vaults
- Pits
- Sewers
- Septic
- Pipelines

Fermilab ES&H-Construction Safety Confined Spaces

Examples of confined spaces seen at Fermilab

Slide 7

Permit Required Confined Spaces

- 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 which slopes downward and tapers to a smaller cross-section; or
- Contains any other recognized serious safety or health hazard.

Fermilab ES&H-Construction Safety Confined Spaces

Pose question to audience. Are all confined spaces Permit-required confined spaces? No, it's the hazard that makes a confined space a permit-required confined space. A space therefore, must meet all three criterion plus one of the following to be considered a permit required confined space.

Slide 8

What The Statistics Tell Us

- Over 200 confined space fatalities annually
- 60% are would-be rescuers
- Nearly 90% die of suffocation
- More than 95% had no formal training
- **They all could have been prevented!!!!!!**

Fermilab ES&H-Construction Safety Confined Spaces

Explain that many of the rescuers that die in confined spaces are supervisors and that its not the 95% who had **no** formal training that we are necessarily concerned about at Fermilab, but more the 5% who did have formal training. Also point out that most of the fatalities do deal with atmospheric hazards.

Slide 9

Dangers of Confined Spaces

- Personnel did not recognize a permit required confined space
- Personnel trusted their senses
- Personnel underestimated the danger
- Personnel did not stay on guard
- Personnel tried to rescue others

Fermilab ES&H-Construction Safety Confined Spaces

Thus the previous overhead leads use to conclude the following.

Slide 10

Hazards in Confined Spaces

- Hazardous Atmospheres
 - Oxygen Deficient and Enrichment
 - Flammable and Combustibles
 - Toxic Gases and Vapors

Fermilab ES&H-Construction Safety Confined Spaces

Oxygen - 20.8% in fresh air
Less than 19.5%
Leading cause of confined space deaths
Not always recognizable by entrant
Causes confusion and disorientation
Below 10% fatal in minutes
Greater than 23.0%
Promotes combustion
Minor physical symptoms

Greater than 10% of the **Lower Explosive Limit** LEL

The two toxic gases as measured by the MSA Five-Star Multigas monitor are Carbon Monoxide (alarm point is 25 ppm) and Hydrogen Sulfide (alarm point 5 ppm). Some of the other toxic gases at Fermilab include Acetylene, Carbon Dioxide, Methane, Natural Gas, Nitrogen, and Helium.

Slide 11

Other Hazards in Confined Spaces

- Electrical Shock
- Slippery and/or sloped surfaces
- Moving Equipment
- Poor illumination
- Flooding
- Restricted Access/Egress
- Falls
- Temperature Extremes

Fermlab ES&H-Construction Safety Confined Spaces

Are we bringing hazards into the confined space?

Slide 12

Signs and Symptoms of an Exposure to a Hazard

- Dizzy, Faint, Lightheaded
- Suddenly Feel Tired
- Nauseous
- Burning Eyes or Skin
- Itching, Sneezing
- Difficult Breathing
- Cool, Clammy Skin
- Face Suddenly Feels Flush
- Having Difficulty Focusing

Claims to understand Fermlab sculptures

Fermlab ES&H-Construction Safety Confined Spaces

Keep in mind that as an entrant, many of the signs and symptoms are similar to that of the common cold. This is critical, because, as we will learn later, being able to recognize the signs and symptoms of overexposure is essential in performing self-rescue. We have added one more for this year “Claims to understand Fermlab sculptures.”

Slide 13



Fermlab ES&H-Construction Safety Confined Spaces

If you're an attendant on a confined space entry and the entrant without any prompting starts to explain the meaning of this sculpture it may be time to remove them from the space. Does anyone want to venture a guess?

Slide 14

Hazard Control

- Isolation procedures
 - Blanking/blinding
 - Double block and bleed
 - Line breaking
- Energy control
 - LOTO (ZMS)
- Ventilation

Fermilab ES&H-Construction Safety Confined Spaces

Explain these hazard control methods. ZMS-Zero Mechanical State. Remember guarding and barriers.

Slide 15

Roles and Responsibilities

- The main players:
 - Entry Supervisor
 - Authorized Attendant
 - Authorized Entrant
 - Fermilab Fire Dept.
- The secondary players:
 - Subcontractors
 - Task Manager
 - Construction Coordinator
 - ES&H Section
 - Divisions/Sections and ES&H Groups

Fermilab ES&H-Construction Safety Confined Spaces

We break up the roles and responsibility into two separate groups the main players and the secondary players.

Slide 16

Entry Supervisor

- Definition
 - The person (such as the employer, foreman or Task Manager) responsible for determining if acceptable entry conditions are present where entry into a confined space is planned, for authorizing and overseeing entry operations, and for terminating entry.

Fermilab ES&H-Construction Safety Confined Spaces

May serve as an Attendant or as an Authorized Entrant as long as they have been trained and equipped as required-----Duties may be passed.

Slide 17

Entry Supervisor - Continued

- Responsibilities
 - Determines whether a confined space is involved for each task under his/her supervision and complete any required permits.
 - Assures the entry permit contains the required information before authorizing or allowing entry.
 - Insures that the procedures, practices and equipment necessary for safe entry are in effect before allowing entry.

Fermilab ES&H-Construction Safety Confined Spaces

Other permits that may be necessary are an electrical permit, burn permit, etc.

Slide 18

Entry Supervisor - Continued

- Responsibilities
 - Insures that employees who work as authorized Entrants and Attendants are trained.
 - Informs authorized Entrants of the required personal protective equipment (PPE) and informs on the proper use of the PPE.
 - Insures at specified intervals throughout the access, that entry operations and conditions remain consistent with the terms of the entry permit.

Fermilab ES&H-Construction Safety Confined Spaces

If you are unsure about the training credentials of anyone on the confined space entry team check the TRAIN database.

Slide 19

Entry Supervisor - Continued

- Responsibilities
 - Cancels the entry authorization and terminates entry when acceptable conditions are not present. Notifies Landlord and Functional Landlord.
 - Takes the necessary measures for concluding an entry operation and canceling the permit once the work authorized by the permit has been completed.
 - Notifies other affected personnel such as the local building/area manager, Fire Department, Landlord and Functional Landlord prior to entry.
 - May serve as attendant or entrant.

Fermilab ES&H-Construction Safety Confined Spaces

Can the Entry Supervisor be the attendant? If so, can he also sign the permit?

The entry supervisor may also serve as the attendant or entrant, provided that they have received the necessary training and can adequately fulfill the duties and responsibilities of each position.

Slide 20

Authorized Attendant

- Definition
 - Any *trained* employee, subcontractor, or user who is stationed and remains outside of the confined space for the purpose of monitoring the Entrants and who performs all Attendant's duties.

Fermitab ES&H-Construction Safety Confined Spaces

The key words are that the attendant be **trained** and **remains outside**.

Slide 21

Authorized Attendant - Continued

- Responsibilities
 - Maintains an accurate count of all Entrants
 - Can recognize potential confined space hazards
 - Can recognize signs and symptoms of a hazardous exposure
 - Performs continuous air monitoring of space
 - Performs non-entry retrievals if trained on equipment

Fermitab ES&H-Construction Safety Confined Spaces

Testing Procedures

Attempt to monitor without entry
If entry is necessary to monitor use SCBA

Test slowly

Use the shortest sampling hose possible

Beware of energized equipment

Test the entire space

We will talk more about testing the air in confined spaces later in the program.

Performs non-entry retrievals if trained on equipment.

--**From FESHM and OSHA
Confined Space Standard
1910.146**

To facilitate entry and non-entry rescues, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space. This equipment typically includes a full body harness attached by a retrieval line to a mechanical retrieval device. All entrants are required to wear a full body harness, even if it is not attached to a retrieval

line. Exceptions exist to this requirement if the use of retrieval equipment presents a greater hazard or would not contribute to the rescue of the entrant. Retrieval systems must be specified for each entry on the permit.

Slide 22

Authorized Attendant - Continued

- Responsibilities - Continued
 - Maintains effective and continuous contact with authorized Entrants
 - Insures Entrant is protected from external hazards
 - Notifies the Fermilab Fire department in case of emergency
 - Performs no duties that might interfere with the Attendant's primary responsibility of monitoring the Entrants

 ES&H-Construction Safety *Confined Spaces*

Contact with entrants may be with a phone, cell phone, radio, voice, hand signals, etc.

Examples of external hazards may include, equipment exhaust, etc.

Slide 23

Authorized Attendant - Continued

- Responsibilities - Continued
 - Orders Entrant(s) to evacuate the confined space immediately upon observing any of the following:
 - conditions which are not authorized by permit
 - detects signs/symptoms of hazard exposure
 - detects hazardous situation outside
 - the Attendant cannot effectively and safely perform all duties required
 - Serves as Bouncer in case of entry by unauthorized persons and notifies entrants and entry supervisor

 ES&H-Construction Safety *Confined Spaces*

Takes corrective actions when unauthorized persons approach or enter a permit space while entry is underway.

Warn unauthorized persons to stay away

Communicate that they are to leave immediately if they have entered
Inform entrants and entry supervisor of unauthorized persons

Slide 24

Authorized Entrant

- Definition
 - Any **trained** employee, subcontractor, or experimenter who **enters** a confined space.

Fermilab ES&H-Construction Safety Confined Spaces

An employee is considered **entered** when any part of the entrants body breaks the plane of the opening of the confined space. Again the key word is **trained**.

Slide 25

Authorized Entrant - Continued

- Responsibilities
 - Knows the hazards that may be encountered
 - Use safety equipment properly, this may include monitoring equipment
 - Maintain communication with Attendant
 - Alert Attendant whenever:
 - recognizes any warning sign and/or symptom of exposure to a dangerous situation
 - detection of a prohibited condition

Fermilab ES&H-Construction Safety Confined Spaces

Slide 26

Authorized Entrant - Continued

- Responsibilities - Continued
 - Exit from a confined space as quickly as possible whenever:
 - an order to evacuate is given by the Attendant
 - recognizes any warning sign and/or symptom of exposure to a dangerous situation
 - detection of a prohibited condition
 - an evacuation alarm is activated

Fermilab ES&H-Construction Safety Confined Spaces

If the attendant tells the entrant to evacuate, do so immediately and without delay.

Slide 27

Fermilab Fire Department

- Performs entry required rescues from confined spaces
- Annually practices making confined space rescues

 **Fermilab** **ES&H-Construction Safety** *Confined Spaces*

Slide 28

Subcontractors

- The subcontractor shall provide the Fermilab Construction Coordinator/Task Manager (FCC/TM) with the following:
 - Written copy of their confined space program.
 - Training records for potential Entrants, Attendants, and Entry Supervisors.
 - Evidence that all air monitoring equipment is properly calibrated.
- Subcontractor shall follow all Fermilab safety policies.

 **Fermilab** **ES&H-Construction Safety** *Confined Spaces*

See contract documents for further information.

Slide 29

Subcontractors - Continued

- Subcontractor shall provide their own PPE, such as lifelines, harnesses, respirators, tripods, ventilators.
- If the subcontractor can demonstrate that continuous forced air ventilation alone is sufficient to maintain safe entry conditions, then the job specific confined space entry procedures can be modified by the Landlord ES&H Department.

 **Fermilab** **ES&H-Construction Safety** *Confined Spaces*

Unless specified in contract documents the subcontractor shall provide their own PPE, such as lifelines, harnesses, respirators, tripods and ventilators.

Slide 30

Subcontractors - Continued

- Each subcontractor who is retained to perform permit space entry operations shall:
 - Obtain available information regarding permit space hazards and entry operations from the FCC/TM.
 - Coordinate entry operations with FCC/TM when working along side Fermilab employees.
 - Prior to entry, inform FCC/TM of the specific permit space procedures the subcontractor will follow.

Fermilab ES&H-Construction Safety Confined Spaces

Communication is the key!

Slide 31

Subcontractors - Continued

Subcontractor must also:

- Inform FCC/TM prior to entering the space
- Inform FCC/TM of any unanticipated hazards confronted during the confined space entry.
- Provide copy of permit, reclassification form or written certification once the work has been completed.

Fermilab ES&H-Construction Safety Confined Spaces

May provide additional information to the landlord division/section for future confined space entries.

Slide 32

**Task Manager/
Construction Coordinator**

- Informs subcontractors of the confined space and that a permit system is required
- Appraise subcontractors of hazards
- Appraise subcontractors of any precautions or procedures
- Ensures that activities are completed in accordance with subcontractor's confined space entry program.

Fermilab ES&H-Construction Safety Confined Spaces

The Task Manager/ Fermilab Construction Coordinator is to ask the subcontractor to provide:
Written Program
Training Records
Calibration Record of Air monitoring equipment

Slide 33

**Task Manager/
Construction Coordinator -
Continued**

- Coordinate entry operations
- Notifies Fire Department, Landlord and Functional Landlord ES&H Departments prior to entry.
- Debrief the subcontractor at the conclusion

Fermilab ES&H-Construction Safety Confined Spaces

Debriefing the subcontractor at the conclusion of the confined space entry also helps to gain additional insight into the confined space hazards and potential changes within the space. Aids in maintaining an accurate confined space database.

Slide 34

ES&H Section

- Provides a uniform confined space training program
- Provide expertise to Divisions/Sections
- Provides a supply of signs to denote confined spaces
- Maintains lab-wide confined space database on the [ES&H Web-page](#)

Fermilab ES&H-Construction Safety Confined Spaces

As mentioned earlier, the MSA 5-Star monitors for LEL, CO, H₂S, and O₂. The instruments are calibrated prior to each use by the user or an ES&H representative.

Show confined space database on ES&H web-page link (if possible).

Slide 35

**Divisions/Sections
and ES&H Group**

- Implements Confined Space Entry program.
- Develops confined space entry notification methods and documents Landlord ES&H Department's signature approval requirements.
- Maintain inventory of confined spaces for which they are landlord on the [ES&H Web-page](#).
- Provide Fermilab specific training (i.e., radiation)

Fermilab ES&H-Construction Safety Confined Spaces

Other training may also include controlled access, ODH, etc.

Slide 36

**Divisions/Sections and
ES&H Group - Continued**

- Provide all available information on confined space to be entered to the Confined Space Entry Team, Task Manager and Construction Coordinator
- Ensure that the confined spaces are labeled
- Annual review of confined space program and permits
- Maintains and calibrates monitoring equipment

Fermilab ES&H-Construction Safety Confined Spaces

Slide 37

Entry Permits

- Entry Supervisor/Task Manager shall insure the completion of the entry permit. Complete as team.
- The duration of permit is for the length of the job, so long as the conditions remain the same
- In the event that unacceptable conditions arise, the Attendant will order an evacuation and inform the Entry Supervisor. The permit will be void and a re-evaluation will be required by the division/section senior safety officer or designee

Fermilab ES&H-Construction Safety Confined Spaces

Click on the Entry Permit link and show and review permit.

The key is to think of the permit as a tool. I strongly encourage the permit be completed by the confined space entry team.

If the job is anticipated to last longer than one day be sure to indicate that on the permit.

Other Permit Thoughts:

How to summon rescue and emergency services -
Communication Equipment
Test Radio
Expiration date of permit
Permit cancellation signature
ID numbers, Entry Supervisor and Details

Slide 38

Entry Permits - Continued

- All significant identifiable hazards shall be listed
- If there is a shift change or multiple day jobs or change in Entrants/Attendants, a roster of [Entrants/Attendants](#) should be attached to the permit
- [Air monitoring records](#) must be recorded on the permit
- All canceled confined space permits shall be retained for one year by the D/S making the entry

Fermitab ES&H-Construction Safety Confined Spaces

Show and review proper procedures for filling out permit.

Show the attached forms for additional Entrants and Attendants and monitoring records.

Slide 39

Reclassification Form

- A Permit-Required Confined Space may be reclassified as a Non-Permit Confined Space by an individual trained in confined space entry after the following provisions have been met:
 - No actual or potential atmospheric hazard exists (determined following initial atmospheric testing).
 - All other recognized serious safety or health hazards must be eliminated without entry into the space.

Fermitab ES&H-Construction Safety Confined Spaces

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Reclassification Form - Continued

- The basis for determining that all hazards have been eliminated must be documented using the Confined Space [Reclassification Form](#) from the ES&H Website.
- All completed confined space reclassification forms shall be retained by the division/section making the entry for a minimum of one (1) year.
- The Landlord and Functional Landlord ES&H Departments and Fire Department shall be notified prior to entry.

Fermitab ES&H-Construction Safety Confined Spaces

Show and review proper procedures for filling out Reclassification form.

Slide 41

Key Program Requirements

- Use the permit and reclassification forms as planning tools
- Identify and evaluate potential hazards
- Manage the hazards
- Use only trained personnel
- Always utilize an attendant under permit entries
- Establish communications with entrants

Fermilab ES&H-Construction Safety Confined Spaces

Slide 42

Key Program Requirements

- Continuously monitor the atmosphere
- Record monitor readings
- Observe for changing conditions
- Develop an emergency plan
- Post the permit
- Review program on an annual basis

Fermilab ES&H-Construction Safety Confined Spaces

Remember to record the readings at least once an hour.

Slide 43

Help/Assistance

- Contract
- Hazard Analysis Form
- Division/Section ES&H Groups
- ES&H Section Web-Page: www-esh.fnal.gov
 - [FESHM Chapter 5063](#)
 - [Confined Space Flowchart](#)
- ES&H Section {Dave Baird, Bob Arnold}

Fermilab ES&H-Construction Safety Confined Spaces

If the confined space entry encompasses the entire job than a Hazard Analysis would not be necessary. If however, the confined space job is part of a much larger project, the projects hazard analysis should merely reference the permit.

Show chapter and flowchart by pointing and clicking on links.

Slide 44

Summary

- We defined confined spaces
- Hazards make the confined spaces a permit required
- Discussed Roles and Responsibilities
- The importance of a fully completed Entry Permit or Reclassification Form
- Where to turn for help and assistance

 Fermilab ES&H-Construction Safety *Confined Spaces*

Are there any additional questions?

Have a safe day!