Safe Working in Confined Spaces
Medium Risk
Instructor - Sheridan Easter
Before we start

Emergency Procedures

• Tea Breaks & Lunch
• Mobile Phones
• End Assessment
• Evaluation - Administration
Aim

- To identify safe working practices when working in medium risk confined spaces and ensure the confined space work is adequately supervised.
Objectives

• By the end of this session you will be able to recognise a confined space and the dangers associated with it.
• Also identify the key elements for ensuring safe systems of work and adequate supervision when working in confined spaces.

• What are the dangers of confined spaces?
Note

• On average work in confined spaces kills 15 people every year in the UK across a wide range of industries.

• In addition a number of people are seriously injured. Those killed not only include people working in the confined space but those who try to rescue them without proper training or equipment.
The Health & Safety at Work Act 1974 (HASAWO 78)

Aim of the Act :-

• To promote & stimulate H&S in the workplace
• To involve everyone
• To protect the employer
• To Protect YOU!!
• Your responsibility
Duty of Employers

• Ensure safe systems of work and the health safety & welfare of their employees
• Provide safe access & egress
• Provide safe plant and equipment
• Provide information, training, instruction & supervision
Duty of Employees

• To ensure the health safety and welfare of themselves and others who may be affected by their actions or omissions

• Cooperate with the employer

• Report any defects

• Not to misuse or abuse any thing provided by the employer
Definition of a Confined Space

“Any place, including any chamber, tank, vat, silo, pit, trench, sewer, flue, well or similar space in which by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk.”
Specified risk

This is a defined term within the CS Regulations and means a risk of:

1. serious injury from fire or explosion;
2. loss of consciousness arising from an increase in body temperature (i.e. from working in hot conditions);
3. loss of consciousness arising from exposure to gas, fume, vapour or the lack of oxygen;
4. drowning as a result of engulfment by liquids;
5. asphyxiation or entrapment as a result of engulfment by solids.
Potential Hazards in Confined Spaces

- **Oxygen Deficiency**
  - $<19.5\%$ or $>23.5\%$ oxygen concentration

- **Combustibles**
  - Methane
  - Hydrogen
  - Acetylene
  - Propane
  - Gasoline fumes

- **Toxic Materials**
  - Carbon Monoxide
  - Hydrogen Sulfide
  - Welding fumes
  - Corrosives

- **Electricity**
- **Mechanical Hazards**
  - Mixers
  - Crushers
Level Of Risk

High Risk –
• a confined space where a hazardous environment is present, hazards are expected, e.g. First entry. Permit to work required.

Medium Risk –
• a confined space where hazardous environment is not present,
• but there is potential for such to arise e.g. sludge/sediment disturbance causing gas release or physical change to environment.

Low Risk –
• a confined space where the probability of an abnormality existing regarding atmosphere or physical change to space is negligible, where adequate precautions to negate effect of potential hazards are in place.
National Classifications of Confined Spaces (NC)

• **NC 1-** e.g. shallow chamber not exceeding 1.5 meters in depth

• **NC 2-** e.g. chamber greater than 1.5 meters deep where operative remains connected to lifeline/winches.

• **NC 3-** e.g. chamber greater than 1.5 meters deep where operative/s is/are disconnected from winch.

• **NC 4-** e.g. chamber where known hazards are existing or likelihood is sufficient for their presence e.g. first entry.
A Confined Space Risk Assessment must focus on:

Hazards identified and those affected; level of risk posed; significant findings recorded and communicated; the control measures in place and their effectiveness; regular review of assessment.

5 Steps

1. Identify the hazards and those affected by them?
2. Evaluate the risks. – Low, Medium or High?
3. Record the findings – and communicate them to those affected?
4. Introduce control measures; eliminate, substitute, reduce, control isolate, information, training, instruction and last resort PPE?
5. Review the findings – monitor the effectiveness of the assessment?
Safe Systems of Work
(Detailed method statement)

• SSW needs to describe the particular methods of risk reduction and how the work is to be done.

• A good description of what work is to be done. By who and with what equipment and procedures in place to carry out the work.

• When work is to be done underground it should be the normal intention to reduce the space to a low risk.

• Generic SSW may be acceptable in similar locations, refer- Risk Assessment.
Permit-Required Confined Space

- A Permit-Required Confined Space is confined space that has one or more of the following characteristics:
  - Contains or has the 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 become trapped or asphyxiated; or
  - Contains any other serious safety or health hazard.
Permit-Required Confined Space Entry Procedure

- Isolate the space
- Ventilate the space
- Complete permit
- Test the atmosphere
- Enter the space
Isolate the Space from all hazards.

• **Close Valves:**
  – Double block & bleed, or
  – Blank flange.

• **Empty the Space:**
  – Depressurize, vent & drain.

• **Lockout/Tagout Equipment:**
  – Electrical sources
  – Rotating/reciprocating parts
  – Hazardous materials.

• **Clean residue from the space.**
Complete Entry Permit Form

- Permit must be correctly and completely filled out prior to entry.
- Permit must be activated by Entry Supervisor’s signature to be valid.
- No entry is allowed without a valid permit.
- Permits are valid for time specified only.
- When work is completed, permit and tailboard form should be returned to safety.
- Cancelled permits must be kept on file for at least one year.
It Will Never Happen To Me!!
Ventilation Equipment

Potential Hazards
• May cause trip hazards for work in confined spaces, restrict access / egress during emergency exit, can increase risk of fire / explosion or electrocution.

Benefits
• Introduces fresh air, reduces temperature, removes or extracts contaminants.
Ventilation Equipment

Natural

- Rarely dependable
- Depends on configuration.
- Consider nature of atmospheric Hazard.

Mechanical

- Dependable and efficient
- Preferred due to reduction of hazards
**Confined Space Entry Thermal Hazards**

*Note* When lifting work has to be done in warm confined spaces reference to documents in relation to: ‘How to carry out a risk assessment’ - ‘Working in hot humid conditions’ and ‘Safe manual handling’ may be necessary.

<table>
<thead>
<tr>
<th>Heat Stress</th>
<th>Heat Stress Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Heat Rash</td>
<td>• Heart Rate</td>
</tr>
<tr>
<td>• Heat Cramps</td>
<td>• Body Core Temperature</td>
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<tr>
<td>• Heat Exhaustion</td>
<td>• Body Loss</td>
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<tr>
<td>• Heat stroke</td>
<td>• Incoherence</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Cold Exposure</th>
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</tr>
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<tr>
<td>• Loss of dexterity</td>
<td>• Area Numb</td>
</tr>
<tr>
<td>• Dehydration</td>
<td>• White Coloured Skin</td>
</tr>
<tr>
<td>• Wind Burns</td>
<td>• Chills</td>
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Test the Atmosphere

In this order:

• Check for Oxygen Content:
  • At least 19.5% and less than 23.5%

• Check for Combustibles:
  • Less than 10% of the LEL

• Check for Toxic Gasses:
  • Most commonly carbon monoxide
  • or any other hazardous materials as determined by the use of the space.
Test the atmosphere

Always test the air at various levels to be sure that the entire space is safe.

Good air near the opening does NOT mean there is good air at the bottom!
Three Main Gas Groups

1) Oxygen
2) Toxic
3) Flammable

Atmospheric Hazards

- Lack of oxygen
- Oxygen enrichment
Supervisor Responsibilities

• To ensure adequate protection is provided to the entrants by verifying adequate lockout/tagout and that all hazards are securely isolated.

• To support the attendant’s authority in controlling access to a confined space.

• To verify that all personnel have exited prior to closing the space.

• To assure that all personnel involved are aware of the hazards associated with the space.

• To assure that rescue services are available prior to entry.
Top Man / Attendant Responsibilities

- To monitor entrants during the job and during entry & exit to help insure their safety.
  - The attendant may not abandon his post for any reason while personnel are in the space unless relieved by another qualified attendant.

- To monitor atmospheric conditions in the space prior to and during entry.

- To control access to the confined space.

- To summon emergency assistance as needed.

- To assess hazards in and around the space, and take action on the same.

- To keep records of confined space work, such as air test results, personnel entry/exit, etc.
Entrant Responsibilities

- To ensure that the space has been adequately ventilated, isolated, emptied, or otherwise made safe for entry.

- To immediately exit a space, without question, upon word of the attendant, no matter what the reason.

- To follow all safety rules and procedures that apply to the job.

- To be familiar with the work to be performed and the procedures that apply to the job.

- To use the appropriate PPE whenever necessary.
Is there safe access and egress provided?

• Consider the size of the opening
Composition Of Air

Inspired (Inhaled)

- Oxygen 21%
- Nitrogen 78%
- Carbon Dioxide 0.03%
- Others 0.97%
Composition Of Air

Expired (Exhaled)

- Oxygen 17%
- Nitrogen 78%
- Carbon Dioxide 4%
- Others 1%
COSHH Regulations 2002 – *(as amended 2005)*

Routes Of Entry Into A Human Body

- Absorption
- Inhalation
- Ingestion
- Injection
Beware of storing Flammable liquids or solids in confined spaces
Bacterial Infection

Hepatitis A

• Hepatitis means inflammation of the liver.
• Two to six week incubation period
• 57.5% of sewage workers have signs of having Hepatitis A
Bacterial Infection

Hepatitis B

- Estimated 100 x more infectious than the H.I.V. virus
- Weils Disease (Leptospirosis)
Selection of suitable breathing apparatus?
Selection of R.P.E.

- What is the hazard is it a fume, vapour, dust, gas etc
- Used for escape or working?
- Fitness of User?
- Does the user require glasses?
- Duration of use?
- Access and egress with breathing apparatus
- Clean shaven in area of seal?
- Face fit testing?
Is there a risk of flooding?
Confined Space Entry Hazards

Means of Raising the Alarm?
Emergency assistance

Note - must be suitable and sufficient for work activities.

Two Types

1. Planned (In house) Rescue teams in place.

2. Un-planned Emergency Rescue from Fire and Rescue Services
• Are suitable rescue provisions in place?
• Tripod-Winch?
• Rescue Harness/Stretcher?
• Full Breathing Apparatus?
• First Aid Provisions & Resuscitation-
• Persons who enter confined spaces or act as a Top Man must be suitably trained in emergency procedures including emergency first aid and artificial resuscitation.
First Aid Provision?
Plant and Equipment

• PPE- to be suitable, it is the responsibility of operatives to ensure their PPE is in a clean and serviceable condition and any defects are reported.

• Gas Monitoring Equipment- should be at least capable of detecting gases that have been identified in RA as likely to be present. Modern portable detectors detecting up to 4 gases including oxygen. Minimum requirement is 3 way gas detector to be re-calibrated at six monthly intervals.

• Ropes, Harnesses and Lifelines- shall be visually inspected before and after use and all defects however slight to be reported and relevant defective item will not be used.

• Fall Arrest & Tripod/Winch- visual inspection before use and re-certified inspection at 6 month intervals.
Plant & Equipment contd.

• **Escape Breathing Apparatus** –
  all operatives carrying out underground operations must be trained in EBA (for self rescue only) Steel cylinders require re-certification on a 5 yearly basis.

• **Full Breathing Apparatus** –
  is used continuously by those operating underground for the duration of operations where the safety of entry without it cannot be assured and maintained, e.g. for rescue of people from underground in an emergency. Carbon composite cylinders require re-certification on a 3 yearly basis.