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PERMIT-TO-WORK SYSTEM/ CONFINE SPACE MANAGEMENT

TECHNICAL PAPER PRESENTED
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1.0 Introduction and Piper Alpha

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Piper Alpha Disaster.mp4

1.1 **Definition and Explanation of PTW System**

A Permit-To-Work (PTW) is a formal, documented safety procedure forming part of the safe system of work, which ensure that all necessary actions are taken before, during and after particular high risk work. It typically;

1. Specifies the job to be done.
2. Identifies potential visible and hidden hazards in the job to be done.
3. Recommends necessary precautionary measures required to be put in place.
4. Communicates all relevant persons associated with the work
5. Identifies who authorized the job – The Permit Holder.
6. Expects competent and trained workers with PTW to always take responsibility.

What PTW is NOT.

A PTW is <u>NOT</u> the following;

1. Simply a permission to carry-out a dangerous job.
2. A statement that all hazards and risks have been eliminated from the work area.
3. Issuing a PTW does not by itself make a job safe – safety can only be achieved by those preparing for the work and those carrying it out.

1.2 Types of Permit-To-Work

- Hot work permit: Hot work involved naked flame or ignition sources
- Cold work/Work over water permit.
- Confined Spaces Work Permit: Confined Space Entry
- Chemical Work Permit: Work involving dangerous chemicals.
- Electrical work Permit: Work on high-voltage electrical system
- Height Work Permit: Working at height.
- Excavation Permit: Excavation near buried services.
- Maintenance Permit: Maintenance work on large and complex machinery.

1.3 Functions of A Permit-To-Work (1)

1. Ensure the proper authorization of a specific work.

2. Confirm the identity, nature, timing, extent and limitations of the work.

3. Establish criteria to be considered when identifying hazards and what they are.

4. Confirm that hazards have been removed/controlled, where possible.

1.3 Functions of A Permit-To-Work (2)

5. Ensure persons in charge are aware of the job to be done.
6. Confirm when work started, suspended, conducted and finished safely and if required, provide procedure for job suspension.
7. Control and confirm who has control of the location and equipment relating to the work when it passes between parties (proper coordination of work).
8. Provide a record of the steps in the process.

1.4. Operations and Applications of Permit To Work

There are four (4) areas of operations anf applications of Permit-to–work:

1. Main sections of PTW
2. Permit To Work initiation and Documentation
3. Requirements of Permit To Work System
4. Permit To Work Forms

1.4.1 Main Sections To PTW (1)

There are four (4) main sections to a Permit-to–work:

1. Issue
2. Receipt
3. Clearance/return to service
4. Cancellation

There may be also section for extension-work overrun

1.4.1 Main Sections To PTW (2)

Issue (1).

- This section give description of the work to be carried out.
    1. Nature of the work/
    2. Where the work to take place-location.
    3. Names of the authorised workers for the work.
    4. Commencing date and time.
    5. Validity of permit.
    6. Any restriction.
- Assessment of hazards associated with the job.

1.4.1 Main Sections To PTW (3)

Issue (2)

- Controls required including;

  1. Isolation of services.
  2. Appropriate PPEs.
  3. Atmospheric monitoring.
  4. Additional permits.
  5. Emergency procedure.

  The authorising manager signs, dates and time the permit formally confirming all is checked and work can commence.

1.4.1 Main Sections To PTW (4)

Receipt

- In this section, the competent person accepts the signed permit from the approving person formally. Acknowledges that they understand all hazards, risk and all necessary precautions and that they will implement all the control measures.
- Names in capital letters, signatures, dates and times.

- "Signing onto permit" or "receipt" for work to start.

1.4.1 Main Sections To PTW (5)

Clearance/Return To Service

- The signature of the competent person stating that the work is completed confirming that they have left work area safe. Isolation can be removed and that routine work can resume normally.
- “Sign off” or “clearance”

1.4.1 Main Sections To PTW (6)

Cancellation

- The authorising manager signs this section to accept the hand-back of the workplace from the workers. This also has the effect of cancelling the permit so that no further work can take place under this authority.
  - "Cancellation of permit"

1.4.2 Permit-To-Work Documentation

Permit-to–work document is a documented procedure that authorises certain people to carry out specific work within a specified time frame. It sets out the precautions required to complete the work safely, based on a risk assessment.

The PTW system documentation should therefore:

- Be controlled. (by designated or authorized personnel)
- Have a specific owner.(the permit approver is the owner)
- Be periodically reviewed and amended if required.
- Be a standard to be audited against.

1.4.3 Requirement of the Permit-To-Work System

The requirement of an effective permit-to-work system:

1. Must be formal and documented
2. Simple to operate, understand and implement
3. Have a commitment of all parties involved- those who operate and are affected by it.
4. Provide concise and accurate information
5. Liaison with controllers of other plant or work areas whose activities may be affected by the permit-to-work.
6. Boundary and limits must be clearly marked and identified.
7. Contractors undertaking specific task must be included in the permit-to-work system, including any briefing prior to commencement

1.4.4 Permit-To-Work-Form (1)

The important features of a permit-to-work form are:

- Permit title
- Permit number Reference to other relevant permits or isolation certificates
- Job location
- Plant identification
- Description of work to be done and its limitations
- Hazard identification - including residual hazards and hazards introduced by the work
- Protective equipment

1.4.4 Permit-To-Work-Form (2)

- Authorisation: Signature confirming that isolations have been made and precautions taken, except where these can only be taken during the work. Date and time duration of permit.
- Acceptance: Signature confirming understanding of work to be done, hazards involved and precautions required. Also confirming permit information has been explained to all workers involved.

1.4.4 Permit-To-Work-Form (3)

- Hand back: Signed by acceptor certifying work completed. Signed by issuer certifying work completed and plant ready for testing and re-commissioning.
- When the need arises only the originator may amend, cancel or extend the timescale of the permit.
- Extension/shift handover procedures: Signatures confirming checks made that plant remains safe to be worked upon, and new acceptor/workers made fully aware of hazards/precautions. New expiry time given.

Permits are often written in triplicate:

- One copy is displayed in the area where the work is taking place
- One copy stays with the authorizing manager
- One copy is displayed in a central location (often on a permit board) where other permits are also displayed for clear communication.
- PTW is NOT just a piece of paper and should NOT be treated as a necessary paperwork to be filled in because someone at the head office says so.

1.5 Limitation of PTW System

Permit to-work is just only a piece of paper, it does not ensure safety.

Thorough checks is required before its issuance. A good permit system is only as good as the person using it. To work effectively:

1. Only authorized persons should issue permits
2. Permit issuer must be familiar with the hazards of the workplace and the job to be carried out
3. Precautions should be checked before permits are authorized.
4. The permit should be treated with respect.
5. All permit conditions must be adhered to.
6. Permit must NEVER be amended
7. Staffs must be trained and competent
8. The system must be monitored to ensure it is effective

2.0 CONFINE SPACE MANAGEMENT

2.1 Definition of Confine Space

Confined Space is a space that has all of the following characteristics:

- It is large enough and so configured that a person can bodily enter; and
- It has limited or restricted, impeded means for entry or exit; and
- It is not designed for continuous occupancy.

Examples are Storage Tanks, Tank Trucks, Mud Pits, Bulk Tanks, Process Vessels, Furnace Boxes, Sewer Systems, Ducts, Tunnels, Flues

2.2 Hazards of Confined Spaces

- Atmospheric hazards
- Mechanical hazards
- Fire and explosion
- Engulfment
- Uncontrolled introduction of Substances
- Biological Hazards
- Electrical hazards
- Noise
- Skin contact with hazardous substances
- Manual tasks
- Radiation

Other hazards that are likely to occur outside the confined work area are;

- Physiological & psychological demands
- Traffic hazards

2.3 Categories and functions of Workers

- Attendants
- Authorized entrants
- Contractor entries
- Supervisors
- Rescue and emergency service
- Authorized Gas Tester

Entrants & Duties

To ensure that the space is 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 be familiar with the work to be performed and the procedures that apply to the job and wear the appropriate PPE.

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

To monitor the entrants during the job and during entry and exit.

To guard the space against unnecessary obstructions.

Attendants & Duties

To call emergency when necessary

To monitor the atmospheric conditions in the space before and during entry.

Authorized Gas Tester (AGT)

- Shall minimally test for the presence of flammable vapors, toxic gases, and oxygen prior to and during work covered by Confined Space Entry Permit.

- When it is determined that Volatile Organic Compounds (VOCs) or other toxic agents may be present, the Project Manager, AGT shall notify the supervisor and consultation with the HSSE Advisor shall be initiated.

- AGTs shall be trained on the specific monitor in use and must understand the limitations of the devices that they are using.

Fire Watch

The Fire Watch is responsible for confirming that:

1. Flammable materials have been cleared away from the work area.
2. Sparks and welding spatter are contained by the use of fire blankets.
3. Firefighting equipment is available and ready for immediate use.
4. The alarm is sounded immediately and work suspended when a fire or gas release occurs in the area.
5. The work site is monitored for 30 minutes after Hot Work stops.

2.4 Components of A Confined Space Permit

1. The confined space to be entered and its corresponding number
2. The purpose of the entry
3. The date and time of entry
4. The authorized entrants, attendants, rescue service and supervisors
5. The hazards (known or potential) within the space
6. The hazard control measures used
7. Acceptable entry conditions
8. Testing and monitoring results
9. Communication procedures
10. Equipment and PPE used on the site of entry
11. Any other information considered to be pertinent to the operations

2.5 Mitigations of Hazards in Confined Space (1)

- **Eliminating the risk :** Eliminate confined space associated risks so far as is reasonably practicable. Always a big question is: can the work be carried out without entering the confined space?
- **Substitution:** minimize the risk by substituting or replacing a hazard or hazardous work practice with something that gives rise to a lesser risk.
- **Engineering controls**: engineering controls are physical control measures to minimize risks. For example, forced extraction ventilation for large spaces, tanks, vessels

2.5 Mitigations of Hazards in Confined Space (2)

Administrative controls: If risk remains, it must be minimized by implementing administrative controls, so far as is reasonably practicable.

- **Isolation**: minimize the risk by isolating or separating the hazard or hazardous work practice from any person exposed to it.

- Personal protective equipment (PPE): Minimizing residual risk with suitable PPE.

2.6 Risks of Working in Confined Spaces

Health and safety risks working in confined spaces. For example:

- Loss of consciousness, injury or death from contaminants in the air
- A fire or explosion that kills or seriously injures
- Suffocation from oxygen deficiency.
- Crushing or suffocation from something like grain, sand, flour or fertiliser if you fall into it.
- trip/slip and fall

2.7 Confine Space Fatality Statistics

Table 1: Fatal occupational injuries involving confined spaces, 2011-2018								
Year	2011	2012	2013	2014	2015	2016	2017	2018
Fatal work juries	120	88	112	116	136	144	166	148

Resourced: U. S. Bureau of Labor Statistics, Census of Fatal Occupational Injuries (CFOI), 2020

2.8 Cofine Space Legal/organisational requirements

- **Nigerian Factories Act. 1987**

  Section 29 . Precautions in places where dangerous fumes are likely to be present.

- **Department of Petroleum Resources Guide 0037 – 2020**

  Guidelines and Requirements for Work at height and In Confined Spaces in the Nigerian Oil and Gas Industry

- **Statutory Instruments of health and Safety, United kingdom 1997 No. 1713**

  The Confined Spaces Regulations

- **29 CFR 1910.146 subpart J Standard of Occupational Safety and Health Administration (OSHA), USA** Permit required confine space

- **Organisational policies**

  Permit required confine space requirements

2.9 Components of Confine Space Management

1. General Requirements
2. Training Requirements
3. Identifying and evaluation of confine space
4. Labeling of confine space
5. Personal Protective Equipment (PPE) for Confined Space.
6. Testing and Evaluation of Confined Space.
7. Gas purging
8. Mechanical Ventilation.
9. Rescue procedures and Emergency Services

General Requirements (1)

All confined space activity shall be carried out under a permit-to-work system. The identification of hazards, assessment of risks, and emplacement of control measures to prevent/mitigate identified risks must be carried out prior to working in confined spaces. Additionally, the following shall apply:

i. All energy sources connected to the confined space are properly identified and isolated.

General Requirements (2)

ii. The confined spaces that contain or have the potential to contain serious atmospheric hazards shall be tested prior to entry and continuously monitored by a competent person.

iii. An attendant and gas tester must be stationed outside a confined space. At a minimum, the attendant is required to monitor the entrants to the confined space, test the air quality and alert the rescue team during an emergency.

Furthermore, the attendant shall remain outside the permit space during entry and rescue operations until relieved by another attendant.

General Requirements (3)

iv. Adequate supervision shall be carried out at the confined space to ensure that:

a. The confined space meets acceptable entry conditions
b. Only authorized personnel enter a confined space
c. Entry into a confined space is monitored and tracked and
d. Work is terminated immediately in the event of adverse changes to the confined space atmosphere.

v. Any person entering a confined space must be physically and mentally fit to cope with physical and psychological stresses associated with working in the confined space.

Training Requirements (1)

The employer shall provide training so that all employees whose work is regulated by confine spaces acquire the understanding, knowledge, and skills necessary for the safe performance of the duties.

1. Training shall be provided to each affected employee:
   (i) Before the employee is first assigned duties under confine space;
   (ii) Before there is a change in assigned duties;
   (iii) Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;

Training Requirements (2)

(iv) Whenever there is deviations from the permit space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.

(2)The training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary, for compliance with this section.

(3) The employer shall certify that the training required by confine space operation has been accomplished.

Training Requirements (3)

At a minimum, personnel shall understand the following:

- Permit To Work (PTW) System
- Physical hazards and control measures
- Atmospheric hazards and control measures
- Personal Protective Equipment (PPE)
- Actions to be taken during confined space emergencies

Training Requirements (4)

- Gas detection systems
- Fire Fighting equipment
- Mechanical retrieval/rescue systems such as tripod, davit etc
- Mechanical ventilation equipment and
- Communication equipment.

Identifying and evaluation of confine space

To meet the definition of a confined space, it must meet all three of the following criteria:

1. The space is large enough and so configured that an employee can bodily enter and perform assigned work;
2. Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults); and
3. Is not designed for continuous employee occupancy.

IF YES TO ABOVE, THEN IS A CONFINE SPACE

Identifying and evaluation of confine space

A permit-required confined space means a space that has one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfing an entrant;
3. 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
4. Contains any other recognized serious safety or health hazard.

NB: If the space meets ANY of the four criteria, then the space has a "high hazard potential" and is a permitrequired confined space. A permit system must be implemented as a regulatory requirement

Identifying and evaluation of confine space

NB: The responsible uint and HSE should perform and document an initial evaluation/risk assessment. Current copies of the permit required confined spaces list are to be included in the written Confined Space Management Program. Spaces should be re-evaluated periodically.

NB: A Npermit required confined space that does NOT contain…hazards [or] have the potential to contain any hazard capable of causing death or any serious physical harm (OSHA). Examples; Utility Tunnels, Crawl Spaces, Elevator Pits

Labeling of confine space

DANGER

PERMIT-REQUIRED CONFINED SPACE

DO NOT ENTER

Labeling of confine space

CAUTION

NON-PERMIT REQUIRED CONFINED SPACE

DO NOT BRING HAZARDS INTO SPACE

PRE-ENTRY CHECKLIST FOR ENTRY INTO NON-PERMIT REQUIRED CONFINED SPACES

This form must be completed by any person intending to enter the non-permit required confined space. This applies to authorized UC Irvine employee entrants as well as contractors.

Date:

Name of Person Filling Out This Checklist:

Space Name and Location:

Reason For Entry into This Space:

- Obtain a copy of the Confined Space Hazard Analysis of this space from the department performing the work or EH&S and review it before continuing with this checklist.
- Verify that there have not been any changes to this space since the last hazard evaluation.
- Answer the following questions :

1. Will there be any activities conducted inside the confined space (e.g., welding) or any chemicals (e.g., solvents) brought into the confined space that could create a hazardous atmosphere inside the space?

No	Yes	If yes, DO NOT ENTER. Contact HSE for assistance.

2. Are there conditions in and around this confined space that could adversely affect anyone entering the confined space?

No	Yes	If yes, DO NOT ENTER. Contact HSE for assistance.

If the answers to both questions are “No”, then take the following precautions before entering the space:

1. Secure the work site.
2. Install barriers and post warning signs.
3. Take measures to prevent any hazards on the outside of the space.
4. Control vehicular and pedestrian traffic.

Note: Any indication of an abnormal atmosphere inside the space is cause to evacuate the space immediately.

After entry into the space, return this completed form to both the department performing the work and EH&S. Debrief EH&S of the entry procedures and obtain signature.

Entrant Signature: ---------- Date ----------

---------- Date ----------

Permit-Required Confined Space Entry Permit

Date & Time Issued: _____ Date & Time Permit Expires: _____

Job Site/Space ID: _____ Job Supervisor: _____

Equipment to be worked on: _____

Description of Work to be Performed: _____

Entry Personnel: _____

Standby Personnel: _____

1. Atmospheric Checks BEFORE isolation and ventilation

Time	Oxygen (>19.5%)	LEL (<10%)	H2S (<1 ppm)

1. Source isolation (No Entry)? Yes/No
2. Pumps and/or lines blinded, disconnected, and blocked? Yes/No
3. Ventilation Modification? Mechanical or Natural Ventilation
4. Atmospheric Checks AFTER isolation and ventilation

Time	Oxygen (>19.5%)	LEL (<10%)	H2S (<1 ppm)

6. Method of Communication? Verbal/Line of Sight/2-way Radio
7. Rescue Procedures in place? Yes/No
8. Entry, Standby, & Backup persons successfully completed required training? Yes/No AND Current/Not Current
9. Equipment:
    a. Direct reading gas monitor used? Yes/No
    b. Safety harness and lifelines for entry and standby persons? Yes/No
    c. Hoisting equipment? Yes/No
    d. Powered Communications? Yes/No
    e. SCBA's for entry and standby personnel? Yes/No
    f. Protective Clothing? Yes/No
    g. All electric equipment listed Class I, Division I, Group D and non-sparking tools? Yes/No
10. Periodic Atmospheric Tests (taken every 10 minutes of work)

Time	Oxygen (>19.5%)	LEL (<10%)	H2S (<1 ppm)

We have reviewed the work authorized by this permit and the information contained herein. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any items are marked as "No" responses. This permit is not valid unless all appropriate items are completed.

Permit Prepared By (Supervisor's signature): _____

Approved By (Trade's Supervisor signature): _____

Reviewed By (HSE Manager signature): _____

This permit is to be kept at the job site. Return job site copy to EH&S following completion of the job.

Personal Protective Equipment (PPE) for Confined Space (1)

The minimum PPE required for WAH are:

- Safety helmet
- Safety footwear
- Eye protection
- High visibility vest and coverall
- Gloves
- Fall arrest harnesses

Personal Protective Equipment (PPE) for Confined Space (2)

Other specific confine space PPE required are;

- Air purifying respirators if there is a risk of air contaminants (gases, fumes and vapours)
- Air-supplying respirators shall be used if the risk of low-level oxygen is present.

Testing and Evaluation of Confined Space (1)

No person shall enter a confined space unless it is certified safe for entry by a competent person. In testing confined spaces, the following, at the minimum, shall apply:

- Testing shall be carried out by a competent person, if the atmosphere which has been contaminated or to any extent unsafe to breathe or where any doubt exists as to the condition of the atmosphere.
- The results shall be recorded on the permit-to- work.

Testing and Evaluation of Confined Space (2)

- Gas detectors shall be used to conduct regular monitoring to ensure that there is no change in the atmosphere while the work is being carried out.

- Any time a hazardous atmosphere is detected, every entrant shall leave the space immediately. Before re-entry, the space must be recertified by a competent person.

Gas Purging

Purging the gas or vapour from the confined space shall be carried out where there is presence or possible presence of flammable or toxic gases or vapours. For confined spaces with flammable contaminants, inert gases shall be used. After purging, the requirements of gas testing and evaluating the confined space atmosphere shall apply.

Mechanical Ventilation (1)

Mechanical ventilators such as a blower/LEV shall be used to continuously ventilate a confined space, if there is a limitation to natural ventilation. When mechanical ventilation is used, the following shall, at the minimum, apply:

i. An entrant shall not enter the space until the hazardous atmosphere is eliminated.

ii. The air supply for mechanical ventilation shall be from a clean source, free from any contaminants and shall not increase the hazards in the space.

iii. The requirements of gas testing and evaluating the confined space atmosphere shall apply.

Mechanical Ventilation (2)

iv. The mechanical ventilator shall:

a. Be monitored to ensure its continuous operation during the period the confined space is occupied.

b. Have controls clearly identified and tagged.

c. Be guarded against unauthorised interference.

NB: Oxygen shall not be used to ventilate a confined space. Oxygen enrichment (excess) of an atmosphere can result in increased flammability level and the likelihood of explosion or fire is heightened.

Rescue procedures and Emergency Services

Emergency plans and procedures for confined space must be in place prior to commencement of work. At a minimum, the emergency plans shall address the following:

1. the nature of the confined space;
2. location of rescue/emergency team
3. means of communication
4. all the risks identified in the confined space; and
5. the likely nature of an emergency rescue;
6. certified and maintained rescue equipment.
7. non-entry rescue arrangement

NB: Trained personnel and Rescue drills.

3.0 Documentation and Reporting Requirements

Required documentation for the Confined Space Management Program shall be maintained by the unit performing the work and HSE and includes;

1. Written Confined Space Management Program;
2. A permit-required confined spaces and non-permit-required confined spaces register;
3. Confined Space Hazard Analysis Form for each confined space;
4. Permit-Required Confined Space Entry Permits for all permit-required confined spaces;
5. Copies of training certificates for all employees trained in permit-required confined space entry operations; and,
6. Pre-entry checklists for each entry into a non-permit-required confined space

4.0 Conclusion

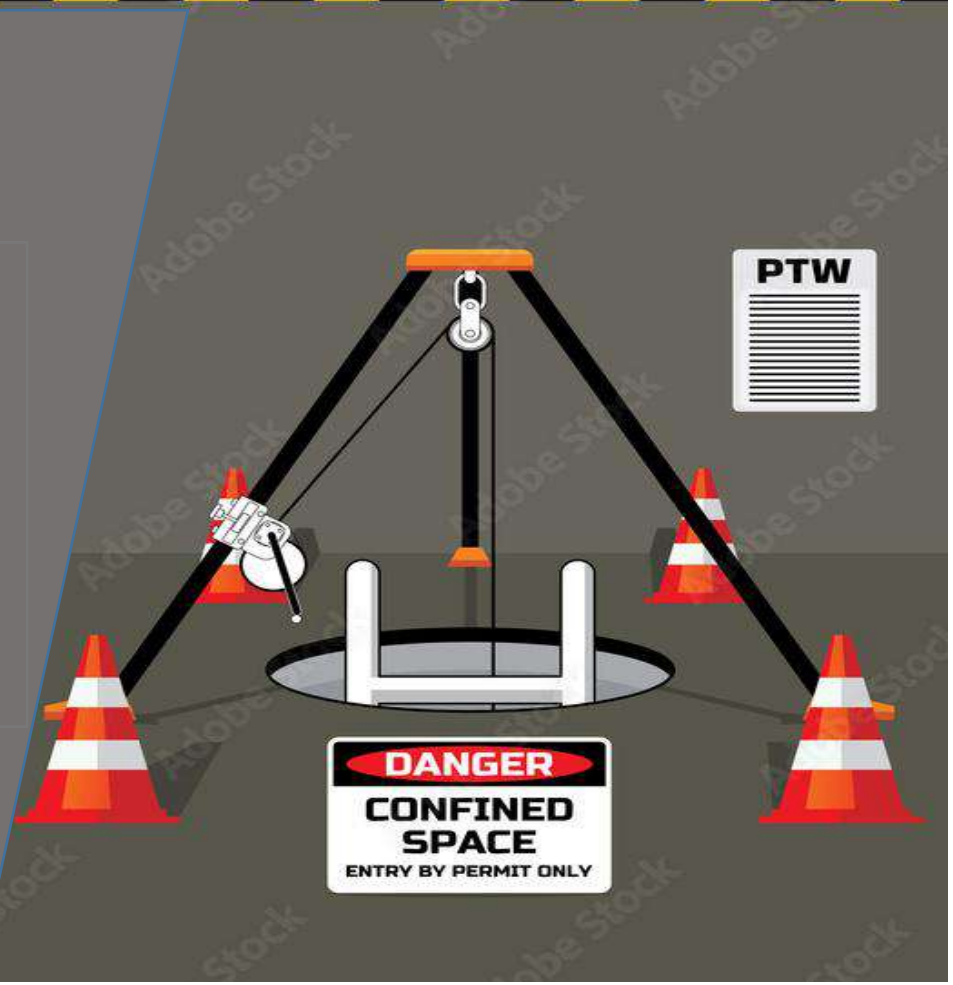
- It is essential to implement PTW system, as part of safe system of work in all high risks work activities like confine space to ensure that all hazard are identified,risks are assessed and appropriated controls are put in place.
- Confine space management plan needs to establish, implement, maintain and document in order to prevent accident from confine space operations and guarrantee health and safety of workers.

Reference

- Meyer, S. (2003). Fatal occupational injuries involving confined spaces, 1997-2001. Occupational health & safety (Waco, Tex.), 72(11), 58-64.
- Nigerian DPR (2020). Guidelines for Work at Height and Confined Space Entry 2020. https://www.ogel.org/legal-and-regulatory-detail.asp?key=30887
- Occupational Safety and Health Administration. (1910). Occupational safety and health standards. Permits required Confine space. Washington, DC: OSHA. Standards, 29 CFR 1910.146. Mhttps://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.146
- Minors, C. (2022). UC Irvine Environmental Health & Safety.
- Nebosh (2014). International General Certificate; course booklet; smts group, RRC module No:1, 2, and 3.

CONFINED SPACE SAFETY TIPS

THANK YOU FOR LISTENING.



CONFINED SPACE SAFETY TIPS

Q & A.