Confined Space

Objective : Cleaning of condenser tubes
Scope : TG condenser
Responsibility : Plant manager, Shift I/C, Operator
PPEs to be used **:** Helmet, Safety shoes, safety hand gloves, ear plugs, nose mask, Goggles

Aspect-Impact

Waste water generation	Resource Depletion, Land contamination

Hazards Identified

Mechanical Hazard	Entangles between moving parts of pump Fall of man/ material from height
Physical Hazard	Water Pressure Suffocation
Electrical Hazard	Electric Shock
Human behavior	improper housekeeping Non use of PPEs Alcoholism Improper body positioning

Controlling Hazards:

The system should establish the means, procedures and practices to eliminate or control hazards necessary for safe permit space entry operations. These may include:

A. Specifying acceptable entry conditions;
B. Isolating the permit space;
C. Providing barriers;
D. Gas monitoring system must be there in place
E. Control of residues, dust ,fumes

Verifying acceptable entry conditions; and Purging, making inert, flushing or ventilating the permit space& ensure free from any residual gasses

Detection of hazardous conditions

If hazardous conditions are detected during entry, employees must immediately leave the space. The engineer must evaluate the space to determine the cause of the hazardous atmosphere and modify the program as necessary in consultation with safety. When entry to permit spaces is prohibited, the engineer must take effective measures to prevent unauthorized entry.

Safety precautions :

1. Before entering in the confined space, one must test the internal atmosphere of the space for oxygen content, flammable gases and vapours, and the potential for toxic air contaminants.
2. The engineer must also provide continuous ventilation and verify that the required measurements are performed before entry.
3. Check for the presence of Oxygen Level to avoid simple asphyxia (Oxygen Level Meter is required)
4. Should be decontaminated/purged before entry.
5. Check for suitability of equipment that is used at the confined space
6. Check for the presence of Chemical asphyxiates such as Carbon monoxide (CO gas detector)
7. Check for the presence of flammable gases & other gasses such as Methane (Multi gas detector)
8. Check for hot air/hot surfaces with IR Thermometer Gun
9. Check the humidity level and accordingly plan for ventilation
10. Check any dust due to which visibility is reduced or Respiratory tract is irritated
11. The sign-in and sign-out of all persons entering the confined space
12. The supervisor should ensure that all necessary mechanical and electrical isolations (including lock-off of isolation switches) have been made
13. Use 24V DC supply illumination to avoid electrocution/electric shock.
14. If exposed to any chemicals then that MSDS or other written information must be made available to the medical facility.
15. If required Self Contained Breathing Apparatus (SCBA) along with other necessary PPEs
16. Supplementary protection such as self-contained breathing apparatus should be thoroughly washed , drained and ventilated
17. Monitor & record the parameters such as temperature, gas etc in every half an hour.
18. Ensure constant communication with the person in confined space and the emergency rescue/supervisor, outside the confined space.
19. Ensure emergency preparedness in place such as immediate retraction of the person who has entered the confined space, fire fighting arrangements, medical aid (CPR & other first aid), etc.
20. Avoid using mobile phone while working.
21. Use appropriate tools required for the job.
22. Electrical equipments used should be thoroughly certified by Electrical Engineer.
23. After job always do proper housekeeping.
24. Always prevent body from line of action of force.
25. Perform proper communication verbal and non-verbal as required.

Pre-checks:

1. Check and ensure that i/l and o/l valves of cooling water is closed and locked out.
2. Check and ensure that oxygen level inside water box is not less than 19.5% and not more than 22.5%.
3. Ensure proper illumination inside water box.

Equipment for safe entry

In addition to personal protective equipment, other equipment that employees may require for safe entry into a permit space includes:

A. Testing, monitoring, ventilating, communications and lighting equipment;
B. Barriers and shields;
C. Ladders; and
D. Body harness
E. Life lines
F. Retrieval devices

Informing Contract Employees

Engineer must inform contractors whom they hire to enterpermit spaces about:

a. The permit spaces and permit space entry requirements;
b. Any identified hazards;
c. The engineer's experience with the space, such as knowledge ofhazardous conditions; and
d. Precautions or procedures to be followed when in or near permitspaces
e. Safe system of work in confined space
f. Emergency Evacuation procedure

Procedure:

1. The work area has to be cleaned.
2. Place the bullet cleaning machine in work front area. Provide electrical supply and clean water supply required. Connect water hoses.
3. Ensure cooling water i/l and o/l valves are closed and locked out.
4. Open drain valves of water box and ensure that full water is drained out.
5. Open manhole door on front and rear side of condenser and note tube condition before cleaning activity.
6. Insert phosphor bronze bullets on condenser tubes.
7. Shoot the bullets one by one with water jet from front side.
8. Collect the bullets on rear side.
9. Fix bullets on remaining tubes and perform water jet shooting on remaining tubes till job completes.
10. Carry out water flushing of tube sheet area and water box after tube cleaning.
11. After complete cleaning perform visual inspection and record findings.
12. Close manhole doors on front and rear side.
13. Clear i/l and o/l valve shutdown.


DANGER
Confined space.
Enter by permit only.
Follow confined space entry procedures.