Confined Space

ACTIVITY: REFRACTORY WORK IN BOILER

Objective REFRACTORY WORK IN BOILER

Responsibility Engineer In charge

PPEs to be used Helmet, Safety shoes, safety hand gloves, cutting goggle, welding shields, safety belt and Dust mask

Aspect-Impact

Fumes	Health impact
Working inside hopper	Work Environment
Steel Scrap	Resource Depletion

Hazards Identified

Energy Sources	Potential hazards	Consequences
Electrical	- Electrical & Instrumentation cables - Motors	- Electrocution - Burn injuries - Entanglement with rotating motor shafts
Kinetic	- Rotating Motor coupling - Rotating hammers	- Trip over pipeline - Entanglement with rotating machine.
Mechanical	- Rotating hammers - Rotting Impeller - Linkages	- Entanglement with rotating machine - Entanglement with linkages
Potential	- Water on the floor - All steady structures - Electrical & Instrumentation cables - Lubrication lines	- Slip & trip while walking - Trip & fall over cables Or water line laid on floor - Electrocution
Thermal	- Overheated motors ,bearings - Heat from electrical cables - Heat from the main duct - Heated electrodes	- Burn Injuries
Chemical	- Lubricants - Water - Co gas	- Slip & fall - Water borne disease - Suffocation

Radiation	- COFG heat	
Biological	- Mosquitoes - Birds	- Birds attack - Mosquito bites
Bio mechanical	- Body posture of operator entering the Chambers.	- Body Pains - Fractures - Disabilities

SAFETY PRECAUTION

24 volt DC supply should be used for providing illumination
Cotton/Leather hand gloves, nose mask, white/black goggles should be used
Proper checking of Welding machine, gas cutting set, grinding, cut off, flexible grinding machine, etc.,
While one person is working inside, one person should always be there outside continuously to communicate and monitor to inside person.
The person working inside should wear Full Body harness (FBH) and one rope should be tied to FBH and the other end of rope should be tied outside of boiler.
Breathing apparatus should be kept with the person outside.
Special care should be taken care regarding CO poisoning. CO gas should be pre checked using CO monitor before the person entering and starting his work and check the oxygen level at working zone excess or deficient to be checked.
Also presence of any flammable gases to be checked.
Proper illumination to be ensured.
Before starting of gas cutting or welding work bottom areas must be free from fire catching media or covered or clean area.
Fumes rising from confined space where there was no manholes, keep or arrange the opening from availed spaces or else provide exhaust fan for removal of fumes

PRECHECKS

Take the work permit and check the co and oxygen level at work place.
Ensure that individual 'U' seal should be filled, check in every four hours by doing overflow, entire system should be in purge and CO monitors to be used.
Ensure evaporator temperature is bellow 50 degree.
Before starting of cutting set and welding machine check the testing certificate.
Before starting of welding / gas cutting work check the any leakages, clean the working areas, make a proper arrangement or put some sheet for sitting.

DO'S

1. *Use PPE's.*
2. *Follow SOP.*
3. *Activity to be carried out during day duty hours.*
4. *New work permit to be taken after every 8 hrs.*
5. *For working in night prior approval should be taken from Head Operations*

6 *Unauthorized operation or repair of any equipment is a punishable offence.*

7 *Before putting Entrant (helper/operator) on job attendant must ensure that Entrant (helper/operator) should familiar with the operation.*

8 *Before entering into HESP ensure that shutdown of Main Fan is taken.*

9 *Before entering into HESP ensure about non availability of CO presence.*

10 *Check the grizzly platform condition (made of rods) for its looseness, to avoid falling of person.*

11 *Cutting or welding jobs inside the confined space should be carried out after checking for any explosive environment (LEL should be <10%) and by providing localized suction or heavy duty exhaust systems to prevent accumulation of gases inside the space.*

DONT'S

1 *Do not by pass SOP.*

2 *Don't enter in HESP in presence of CO.*

3 *Don't enter in HESP if temp is high.*

Confined Space Checks before job start up:

1) *Before Entering in HESP ensure –*

a. *Main exhaust fan must be in operation shutdown with LOTO.*
b. *HESP fields, rapper motors must be in operation shutdown with LOTO*
c. *HESP inside temperature should be less than 40 degree Celsius.*
d. *CO Level should be 0 ppm*
e. *Attendant must ensure proper illumination, if illumination not found ok, he must inform concern electrical person to provide hand lamp or halogen.*
f. *Take the work permit from HOD, Safety for entering inside the HESP as it is confined space.*

2) *The workmen (Entrant) who is trained and certified by SUB head and having valid confined space gate pass should perform the activity and he can be replaced(in emergency) only by certified entrant .*
3) *A standby (attendant) who is trained and certified by SUB head and having valid confined space gate pass should perform the activity and he can be replaced(in emergency) only by certified attendant .*
4) *Standby person who shall be positioned outside the confined space , must have no other duties other than monitoring people and conditions inside the confined space and coordinating with rescue personnel (he must have contact number of rescue team members) if required.*
5) *Standby (Attendant) person has to log down the In/Out entry of all entrants and ensure that entrant should be come out after 30 minutes from confined space for normal jobs.*

6) *In some cases In/Out time may be relaxed /extended based on the risk involved in the particular confined space.*
7) *Check Internal atmosphere of the space for sufficient oxygen content (19.5% to 23.5 %) flammable gases and vapours, and the potential for toxic air contaminants by the use of multi gas detector, if required use pump with extension before entering into HESP. If there is any deviation, do not enter into HESP.*
8) *Check for the presence of Chemical asphyxiates such as Carbon monoxide (CO gas detector).It should be 0 PPM*
9) *Check inside temperature and it should be is in the tolerable range (25 deg C to 45 Deg C). If the temperature is not within limits then appropriate ventilation to be used to normalize the temp.*
10) *Check for suitability of equipment that is used at the confined space.*
11) *Check any dust due to which visibility is reduced or respiratory tract is irritated.*
12) *The sign-in and sign-out of all persons entering into HESP should be recorded.*
13) *Use 24V DC supply illumination to avoid electrocution/electric shock.*
14) *Ensure that main fan damper is in open condition for natural draft during inspection and cleaning job in HESP.*
15) *If all 1 to 13 check points found acceptable then enter into HESP and start Inspection of HESP for cathode, anode, rapper hammers and dust in hoppers.*
16) *Check the grizzly platform (made of rods) for its looseness, if found any deviation correct it if not, stop the work and don't allow any person to go inside HESP.*
17) *If inspection Ok and everything is normal then carry out cleaning jobs of cathode plate, anode (emitting rods) from inside, if required use small hammer and ensure that nose mask is being used and special coat is being used by entrant.*
18) *Check the hammers for its looseness, and strike, if found any deviation ask mechanical to correct it.*
19) *Check the appearance of the cathode plates and emitting rods , if found any deviations like bent, broken, touching each other then ask mechanical team for correction.*
20) *After job completion ensure that all involved crew members are come out from HESP and close the man hole of it.*
21) *All material collected into dust hoppers to be evacuated.*
22) *Normalize the system and release all equipment shutdowns and close the work permit.*
23) *Give the clearance to HOD, SS from your side that your assigned job is completed.*

Please note that this area is considered as Confined Space so needs to maintain the checklist of the activity. All In time and out time details of entrants, levels of gases to be logged in checklist (yellow copy) or in any alternate document and to be documented.

Role of Rescue Team

As the work is being carried out inside HESP, in an emergency victim can be taken out by use of rescue apparatus such as stretcher. However attendant should call ambulance which is fully equipped. However rescue team members should take a charge of the situation.

Procedure

The Engineer in-charge shall ensure the following before commencement of work

- Clear traces of coke from all the sides of the concrete hopper and cool the hopper by spraying water.
- Align hot coke car under the quench tower after taking pusher blade to extreme reverse position.
- Take shutdown of hot coke cars, pusher blade, coke feeder, quench valve, grit arrester valve.
- Place the temporary hand-railing or work in progress board at concrete hopper towards truck unloading side.
- Lower the manila rope inside after securing the other end to a rigid structure.

Place the temporary platform at required location by inserting from coke feeder and tack weld it.

- Open the nuts and remove worn-out liner by means of rope and new liner to be lowered inside. Place liner in position and tighten the bolts. Replace the damaged 'Z' blocks.
- Remove temporary platform, scrap, and other material from the hopper.
- Ensure that nobody is still inside the hopper.
- Normalize the shutdown of all equipment and then remove the temporary hand railing/the work in progress board.

- Inform production dept for further action.
- Do carry out proper housekeeping.

Prepared & Reviewed:	Approved:	Issued:
HOD – Mech – PP	Head – Power	MR
05.04.2021	05.04.2021	05.04.2021