**WORK INSTRUCTIONS FOR APH & GPH** **CLEANING**

**Responsibility: Shift Superintendent**

**Criteria: Safe working in** APH & GPH

**Identified Hazards:**

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| 1. Fall of person from Height 2. High pressure water discharge 3. Electrical shock 4. Fire & Explosion 5. Dust Emission 6. Burns due to contact with hot object 7. Steaming while cleaning 8. Inadequate local lighting 9. Non-adherence to PPE, & non following of WI 10. Improper House keeping 11. Water splashing 12. Impact or hit by lance/hose due to high pressure 13. Slip /trip/fall   **Significant Aspect**:   1. Usage of water 2. Generation of dust 3. Generation of hot fumes 4. Consumption of air   **Procedure for** APH & GPH **cleaning:**  **This is a confined space; refer SP 44Y for requirement and detailed guidelines for working.**  **Please follow the following procedure**  **FOR MORE DETAILS REFER CENTRALISED CONFINED SPACE ENTRY SOP-VL/IMS/VAB/SP44** |
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Confined Space Checks before job start up:

1. Before Entering in Confined Space ensure –
2. Inside temperature should be less than 40°C.
3. CO Level should be 0 ppm
4. Attendant must ensure proper illumination, if illumination not found ok, he must inform concern electrical person to provide hand lamp or halogen.
5. Take the work permit from production-in-charge, Safety, electrical, mechanical for entering Confined Space.
6. The workmen (Entrant) who is trained and certified by SBU Head and having valid confined space gate pass should perform the activity and he can be replaced (in emergency) only by certified entrant.
7. A standby (attendant) who is trained and certified by SBU Head and having valid confined space gate pass should perform the activity and he can be replaced (in emergency) only by certified attendant.
8. 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.
9. 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.
10. In some cases, In/Out time may be relaxed /extended based on the risk involved in the particular confined space.
11. 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. If there is any deviation, do not enter into confined space.
12. Check for the presence of Chemical asphyxiates such as Carbon monoxide (CO gas detector). It should be 0 PPM
13. Check inside temperature and it should be is in the tolerable range (25°C to 40°C). If the temperature is not within limits, then appropriate ventilation to be used to normalize the temp.
14. Check for suitability of equipment that is used at the confined space.
15. Check any dust due to which visibility is reduced or respiratory tract is irritated.
16. The sign-in and sign-out of all persons entering into confined Space should be recorded.
17. Use 24V DC supply illumination to avoid electrocution/electric shock.
18. 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.

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 confined Space, 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.***

Do not enter the APH & GPH unless it is very much necessary

1. Unauthorized operation or repair of any equipment is a punishable offence
2. Ensure APH & GPH are isolated from Gas line by water sealing the gas line.
3. Ensure steam purging is done in the line (from water seal and is seen coming out from relief valve over APH & GPH). Keep open all relief valves.
4. Blank the Gas line above GPH water seal
5. In BF1 Close the inlet/outlet valves in the BFG line.
6. Close the steam valve to the gas line after steam purging.
7. Open all the inspection door flanges on the APH & GPH viz., the top & bottom ones for cleaning the inside of tubes & the side ones for cleaning the outside of the tubes.
8. Air purging to be done for 30 min after opening all the flanges.
9. Ensure gas line is kept water sealed and sufficient overflow of water from the seal is maintained.
10. Ensure lockout pad is put around water sealing valve wheel and locked and ensure slight continuous overflow of water from the seal.
11. Ensure that there is no surge in gas line at the water seal and keep one man to have constant watch on the overflow.
12. Ensure BFG of the other running furnace is uniformly regulated by GEL or through flare stack to avoid surge.
13. Ensure all flanges are fully open and don’t allow closing of these flanges when cleaning is in progress.
14. Check the presence of CO with the help of detector
15. Minor coating of dust in tubes can be cleaned by compressed air
    1. With a pipe long enough & bent conveniently so that the person need not enter inside, connected with hose for compressed air, the pipe should be inserted into each of the tubes, one by one, and cleaned.
    2. This can be done from outside the chamber & not needed to enter inside.
    3. Care should be taken that the pipe for cleaning is held firmly and then compressed air valve is opened to avoid any untoward incident due to uncontrolled movement of pipe due to high pressure.
    4. The dust collected at the bottom towards the other end of these tubes has to be completely cleared from the chamber below (so that it does not again get into the tubes in normal operation). The outside of the tubes also to be cleaned using compressed air from side openings.
16. In case the coating is severe then the same cleaning is to be done by high pressure water jet using pump.
    1. Start the pump.
    2. Operator has to be careful in ensuring that the gun is held firmly before switching ON the gun for water spraying. Since the pressure is high there is possibility of impact to operator, by gun, if not held firmly.
    3. After the gun is firmly held and directed into the tube open the gun switch and start cleaning.
    4. This can be done from outside the chamber & not needed to enter inside.
    5. The tank has to be ensured to be topped up with water continuously to avoid dry running.
    6. The dust slurry collected at the bottom towards the other end of these tubes has to be completely cleared from the chamber below by opening the drain valves at the bottom (so that it does not again get into the tubes in normal operation). The outside of the tubes also to be cleaned using water jet spray from side openings.
17. If, in case, it is very much necessary to enter the APH & GPH ensure a blank is put just at the inlet of APH & GPH, wear safety helmet, Goggles, dust mask & Air respiratory mask. Check the O2 level also with the help of oxygen monitor which is available with instrumentation department (Oxygen level should not be less than 19%)
18. Ensure sufficient illumination inside the APH & GPH.
19. Ensure no work permits are issued for cutting & welding jobs on the gas line other than the one issued for cleaning the dust catcher.
20. After the cleaning is completed ensure all dust, slurry, water is cleared from the bottom drain valves & manholes
21. Close all the manholes
22. Clear the work permit & normalize the unit

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| **Prepared By:**  Head – Production PID I | **Reviewed & Issued By:**  Management Representative | **Approved By:**  Head – Pig Iron Division |
| **Signature:** | **Signature:** | **Signature:** |
| **Date: 15.07.2022** | **Date: 15.07.2022** | **Date: 15.07.2022** |

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| **Amendment Record** | | | |
| **Revision date** | **Manual Section ref. and para** | **Brief details of revision** | **New Revision No.** |
| 12.07.2021 | Procedure for APH & GPH Cleaning | Point no 13 hazards | 04 |
| **15.07.2022** | Procedure for APH & GPH Cleaning | **Point 4,5** | **05** |