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|  | **VEDANTA LIMITED –**  **VALUE ADDED BUSINESS** | **Format No.:** | **FRMT/MR/10** |
| **INTEGRATED MANAGEMENT SYSTEM** | **Revision Date:** | **10.07.2023** |
| **HAZARD IDENTIFICATION** | **Revision No.:** | **02** |
| **Page No.:** | **1 of 1** |

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| **Departmental Use Only** | |
| **Revision No: 01** | **Unit: PID1** |
| **Revision Date: 10.07.2023** | **Dept.: Production** |

A. Work activity information

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| **Sr.No.** | **Details** | **Remark** |
| 1) | Task being carried out, their duration and Frequency: | Flare stack operation & maintenance  (Water sealing, connecting, steam purging  As and when required |
| 2) | Location (s) where the work is carried out. | Flare stack area bf1 & 2 |
| 3) | Who normally/occasionally carried out the task? | Company`s & contract employees |
| 4) | Who else may be affected by the work (For example visitors, subcontractors, the public) | Visitors & subcontractors |
| 5) | a) Has the personnel trained for performing the task  b) Any special training required | Yes |
| 6) | Is the written systems of work mandatory? If yes state, the procedure no. | Yes  VL/IMS/PID1/PROD/WI/61A |
| 7) | Is the work permit required for the task? | No |
| 8) | Plant and machinery that may be used:  Eg : crusher, conveyor, crane, heavy earthing equipment, Truck etc, | NIL |
| 9) | Any electrically operated hand tools are used | Yes |
| 10) | Manufacturers or supplier’s instructions for operation and maintenance plant machinery and powered hand tools are available or not: | Nil |
| 11) | Chain block, tools and shackles such as wire rope, hydraulic jack etc are used. | No |
| 12) | What materials are handled? Size, shape, surface character and weight of materials that may be handled: | Gas |
| 13) | Is the material is required to be moved by hand. If yes Distance and heights of the place where materials have to move by hand. | No |
| 14) | Services used Eg: compressed air, oxygen, acetylene,  LPG gas, hydraulic oil, welding electrode for welding | Yes |
| 15) | Physical form of substances encountered during the work (For example fume, gas, vapour, liquid, dust/powder, solid): | Gas |
| 16) | Content and recommendations of safety data sheets relating to substances used or encountered:  (This is applicable in case of chemical material) | NIL |
| 17) | a) Relevant acts, regulations and standards relating to the work being done, the plant and machinery used, and the materials used or encountered:  b) Is the activity is reviewed for compliance to statutory requirement | Factory act  Yes |
| 18) | What is the data (s) required to be monitored during the activity and the frequency of monitoring? | NIL |
| 19) | Any information available from within and outside the organization on incident, accident and ill health experience associated with the work being done, equipment and substances used: | Yes |

2. From the above activity information hazards are to be identified and recorded below using Appendix 'A' of SP/41

1. On 29.03.08 after completion of burner installation and on reaching the 3rd platform, CO monitor indicated the CO level was 600-700 ppm. It was observed that the gas was coming from BF#1 flare stack since water seal was broken on BF#1 flare stack without clearance-Shripad Desai. (Instrumentation)Roshan Naik (Production).
2. ON 8/09/2009 GEPL FLARE STACK & BF1FLARE STACK was taken Shutdown for Checking GEPL Burner no: I & Burner no: 2 after getting Both Flare stack clearance from Production Mr. Arun Sawant we (Mr. Paresh Gawas, Mr. Praneet Sadekar. Mr. Ashish Naik & 2 Mechanical contractor helpers) went on GEPL flare stack for checking the burner at around 15:00pm suddenly there was flaring from BF1 Flare Stack.
3. On 12/12/09 In Electrical office at Cat DG top room CO monitor started giving alarm. Found CO level was 37 ppm. Checked at cat DG room motor area, found level was 78ppm. Informed to production about it After words CO level came down to zero. Reason was this incidence was suspected as flare stack flame failure.
4. At 15:30 hrs. CO gas presence was observed near drill bit shed and around admin office. The CO level was found to be between 150-200 ppm. Immediately flaring of GEPL flare stack was checked and the burner flame temperature was found to be 200 deg cent. Later the CO level gradually dropped.
5. On 11/05/2016 at around 2:30hrs in C shift, gas leakage was observed from Bf1 flare stack drip pot (drip pot was empty). It was found that leakage was due to hole developed at U seal line. This was observed by Mr Vatu Kotkar, Leakage was arrested by sealing the line, Inspection of drip pot & BFG was last done on Nov 2015.

Causes: Pin hole on the U seal of drip pot due to corrosion.

CAPA: Inspection to be done for all drip pots with BFG line since it is almost six months since last inspection.

      NDT to be carried out for all drip pots.

Design of all drip pot structures to be standardized.

1. On 23.12.2016 Isolation valve of GEL GAS line MOV 317 got closed at 12:17 hrs. on interlock with gas holder level low and –ve GEPL line pressure due to line pressure increase HBS one drip pot gave away and gas spread in Blower house area. Immediately drip pot filled with water. All drip pot in the line checked found ok. There was no gas poisoning to anybody.

Causes: cause: 1. Absence of Quick Response Valve in flare stack.

Contributory Factors: Missing feedback from second transmitter

No alarm/Notification for open fault/no signal for one of inputs for critical alarm

No periodic testing of critical interlock

CAPA: 1. Quick response valve similar to PIEP should be explored for GEL flare stack in PIP

Periodic testing and simulation of critical interlocks to be done

Possibility of changing operating logic of motorized flare stack valve such that it opens in auto on high pressure but closes manually or providing different lower set point for closing once it opens on high pressure to be explored.

Frequent CO alarm in control room of gas presence may dilute the importance of critical alarm. GCS area CO presence to be analyzed.

1. On 24.05.2018 at around 8.30 am, the online CO monitor at dispensary was giving alarm and showing around 39 ppm on screen for a few minutes. Control room was informed.

Root cause: Slight Delay in ignition of BFG at GEPL flare stack

Possible High moisture content in BFG

CAPA: System/interlock to prevent burning above capacity

New Burners on auto mode to be procured and installed

BFG moisture content to be monitored

Air velocity of BFG to be standardized and followed for proper combustion

**Hazards identified**

1. BF Gas poisoning
2. Fall of person causing injury
3. Contact with hot surface causing burns
4. Human Behavior -Nonuse of PPE
5. Human Behavior -Improper house keeping
6. Inadequate local illumination
7. Breaking of flare stack water seal without the knowledge that people were working on top.
8. Human Behavior -Not following work permit procedure.
9. Declaring shutdown without water sealing all the valve of the line
10. Flare stacks flame failure leading to gas presence in plant area.
11. LPG leakage
12. Slipping from monkey ladder while climbing

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| **Prepared By:** | **Reviewed By:** |
| **Signature:** | **Signature:** |
| **Review Date: 10.07.2023** | **Review Date: 10.07.2023** |