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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: 03** | **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: | Ladle cleaning activity  24-30 times in a day |
| 2) | Location (s) where the work is carried out. | baghouse area |
| 3) | Who normally/occasionally carried out the task? | Company employees, contractor labours & supervisors. |
| 4) | Who else may be affected by the work (For example visitors, subcontractors? the public) | Visitors |
| 5) | a) Has the personnel trained for performing the task  b) Any special training required | Yes  No |
| 6) | Are the written systems of work mandatory? If yes state, the procedure no. | Yes  VL/IMS/PID1/PROD/WI/24 |
| 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, | Ladle, 25t, 12t crane, backhoe with breaker & anchor |
| 9) | Any electrically operated hand tools are used | No |
| 10) | Manufacturers or supplier’s instructions for operation and maintenance plant machinery and powered hand tools are available or not: | Yes |
| 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: | Solid debris & liquid metal |
| 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. | NIL |
| 14) | Services used Eg: compressed air, oxygen, acetylene,  LPG gas, hydraulic oil, welding electrode for welding | NIL |
| 15) | Physical form of substances encountered during the work (For example fume, gas, vapour, liquid, dust/powder, solid): | Liquid metal , debris & graphite flakes, Lancing hooks & solid rod etc |
| 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? | Ambient Air Quality |
| 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. 17.01.2003, Ladle carried over the other ladle
2. 25.07.2003, Burn injury to the contractor labour
3. 05.06.2005 At 16.30 Hrs. It was observed that pendant of PB station of BF1 Hot metal crane damaged from the front side by wheel loader.
4. On 23.01.2007 While cleaning the ladle in the ladle pit wire rope of the 12t crane pulley came out of the pulley on its own and anchor and hook fell inside the ladle
5. Safety alert 39:

Recently at KCM – KIBU-1 Shaft, a contract employee met with an accident and succumbed, on 24th March-2014 at 23.00 hrs, victim (Drill Rig Operator) along with his colleague are engaged in drilling of slipping holes in the 3700mN connection crosscut to ventilation drive using boomer number 282-01. In the process of drilling, the machine has developed an oil leak on the percussion. In order to verify the oil leak, victim went in front of the machine to show the artisan where the leak was, during the process inadvertently the Lock out Cylinder broke, causing the boom to swing which struck victim’s chest and injured him fatally.

1. On 16-04-2014 in third shift ladle L32 was removed from the circulation and kept for repairs as it was found punctured just below spout.

Causes: Brick or plastic clay in the ladle has given a way & metal splash made a hole to shell during the Desulphurization process,

CAPA • Proper supervision while breaking (ladle cleaning) & fitness of the ladle is ensured by PCM in charge before applying clay to the spout

• SOP to be reviewed stating that ladle will not be used if safety layer is exposed.

• Ladle spout will be checked after 350 heats

1. On 12.04.2019 night shift, Hitachi was removing debris from the newly commissioned dumping chamber. While in operation the back portion of Hitachi got rubbed against the barricade of pit where ladle is cleaned. Due to this, the fog gun which was welded with the barricade for its support got toppled and fell on the ground. Later on, it was lifted up and shift mech. engg. was called and was taken in operation
2. On 02.02.2020 at around 16:00 hrs. While climbing down after cleaning the ladle one step of bottom staircase got dislodged and Mr. Pisso Bhagat, Bag house Operator slipped and rested on next step. No injury to Operator during this incident.
3. On 16.04.2022 at PID1 in Hot Metal Handling area (PCM) at around 08:45 hrs. after closing 1st cast of BF2,2nd spout ladle L33 was lifted for pouring after some time ladle developed a small hole below top ring due to which little spillage of hot metal occurred on floor, immediately pouring stop, ladle made empty and taken out, no damage to property, no injury to anyone.
4. On 10.09.2022 at PID1 in Hot Metal Handling area (PCM) around 13:45 hrs, after 5 min of diverting metal of BF1, 1st spout ladle L06 developed a small pin hole below top ring towards furnace side. Due to which minor spillage of hot metal occurred on the floor. Immediately ladle removed from the spout & pouring started. Ladle made empty and taken out from the circulation. No injury to anyone.

Root Cause: No assessment/ inspection of ladle refractory after ladle cleaning.

Contributory Cause: Gradual Deterioration/weakening of ladle refractory at the top portion may be due to cleaning with Hitachi breaker over the period of usage. Ladle had reached 488 heats.

CAPA: 1. Ladle taken out of circulation after pouring metal.

Preventive Action: 1. Checklist to be incorporated with Responsibility after every Cleaning of ladle. 2. Exploring the possibility of online ladle repair in event of small damage at the top rings. 3. Explore feasibility of AI based ladle refractory health monitoring on real time basis.

**Hazards identified**

1. Fall of a person from platform into pit or on ground
2. Contact of hot fumes, graphite flakes, solid debris & liquid metal
3. Emission of graphite dust
4. Impact of wheel loader/truck/crane/backhoe/breaker attachment on structures & persons around.
5. Impact due to swing of backhoe
6. Impact due to flying metal pieces.
7. Contact with graphite dust
8. Fall of anchor in the ladle
9. Human Behavior-Nonuse of PPE
10. Human Behavior-Improper house keeping
11. Inadequate local lighting
12. Human Behavior-Crossing ladle pit barricade
13. Vision impairment due to glare at hot debris
14. Contact with hot metal & slag
15. Contact with dust
16. Contact with hot ladle
17. Damage to ladle refractory while cleaning with backhoe
18. Fall of ladle
19. Suspected fouling of vehicle on stairs
20. Metal Splash

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