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|  | **VEDANTA LIMITED –**  **VALUE ADDED BUSINESS** | **Format No.:** | **FRMT/MR/10** |
| **INTEGRATED MANAGEMENT SYSTEM** | **Revision Date:** | **15.04.2023** |
| **HAZARD IDENTIFICATION** | **Revision No.:** | **03** |
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| **Departmental Use Only** | |
| **Revision No: 02** | **Unit: PID1** |
| **Revision Date: 15.04.2023** | **Dept.: Production** |

A. Work activity information

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| **Sr.No.** | **Details** | **Remark** |
| 1) | Task being carried out, their duration and Frequency: | Oxygen lancing  Occasionally |
| 2) | Location (s) where the work is carried out. | Cast house area |
| 3) | Who normally/occasionally carried out the task? | Contractor`s laborers’, company employees & 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, only trained operators are  Performing the job  No |
| 6) | Is the written systems of work mandatory? If yes state, the procedure no. | VL/IMS/PID1/PROD/WI/08 D |
| 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 | NIL |
| 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: | Oxygen cylinders, oxygen trolley, lancing pipes &holder with rubber hose |
| 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): | Oxygen gas, lancing holder, hose & Oxygen cylinders, trolley |
| 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  Gas cylinder rule  YES, Oxygen cylinders are stored and stacked as per cylinder rule |
| 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. 16.09.2002, Mr. M B Yadav Taphole operator met with burn injury.
2. 01.03.2003, hose pipe caught fire by itself
3. Tiwari met with burn injury due backfire
4. 21.05.2003, While cutting the O2 caught fire
5. 18.06.2003, while lancing the taphole hose got disconnected from the holder
6. 20.08.2003, O2 cylinders in the bank were not chained
7. 12.12.2003, O2 hose got ruptured with noise & missed hitting the workmen around the area-S. M Swadi
8. 04.06.2004, contractor labour met with burn injury as the lancing operation was carried out without the knowledge of the people working around the area
9. 30.06.2005, While lancing the taphole during casting oxygen was stopped and the hose got burnt
10. On 12.01.2010, at 17:30 hrs, while lancing the taphole, before inserting lancing pipe in the tap hole, due to backfire the person’s right hand 2 fingers got minor burns injury.
11. On 05/08/2010, at around 22:15 hrs, cast was opened by lancing. After closing oxygen valve, it was observed that smoke was coming from the holder. So immediately oxygen cylinder and main valve of oxygen manifold was closed, and continuous water sprayed on the hose.
12. On 02/03/2012 at 19:20 hrs in BF1 after drilling upto 900 mm, drill bit arrow detached from drill and struck in taphole. while lancing the taphole was open wet. After doing this activity operator started to wound lancing holder to rim. All of sudden after 3 to 4 min off the lancing the hose got fire just half meter from holder connection. All this happened after cast was opened and both valves (O2 cylinder bank & holder) were closed. There was no injury to anyone in this incident.
13. on 24-03-14 in 1st shift during lancing in BF1, Mr. Jangam (Foreman) was operating oxygen valve and Mr. Atmaram Gawas was lancing. Oxygen pressure was more suddenly at 11:55, foreman released his left hand from holder as he felt some heat shock. His hand glove got burnt and he got some superficial skin injury on his left hand. Immediately his hand was kept under chilled water for 10min. and then he was taken to Dispensary for further treatment. Person returned duty after treatment.
14. On 18.11.2014 night shift, during opening of 3rd cast Mr. Atmaram Gauns was doing lancing for taphole during which cast got opened and metal droplet entered his left leg, slight burn injury observed. He was wearing all his PPE during lancing operation. He was referred to dispensary for first aid. He reported for work after first aid
15. On 20/10/2015 at 10:30hrs BF#1 was on colder side, company tap hole operator while lancing cast opened and spark of metal entered through leg guard. He was taken to the dispensary and has given first aid. He has reported back to duty after first aid. He ws wearing all the PPE
16. Company workman Mr. Vithoba Gauns had got FAI today during working in BF1 cast house, his right-hand middle finger got minor burn during lancing operation of taphole. He was sent to dispensary for First aid, and he resumed duty.
17. On 11.10.2016 during second cast of B shift while coming from PCM 4 area to cast house2 Rajesh Paste got entangled with lancing pipe. Mr Umesh Gauns company workmen lifted one lancing pipe for taphole poking at the same time Paste got entered in cast house area. CAPA: lancing pipes should not be stored on walkway. Other location to be identified. Person has to be attentive.
18. On 19.08.2019 at 17:00 hrs. (B shift-19.08.2019), while opening oxygen trolley (new connected) for lancing operation at Bf2, the flexible hose burst at a distance of 1.0-1.5 feet away from oxygen trolley. No injury to anyone.
19. On 10.02.21, while walking in cast house of BF2 in daytime, fell down due to entanglement due to lancing pipe. No injury.

CAPA: 1. Proper housekeeping around the area to be maintained (Right thing on the right place).

2.Refresher training given to all concern workmen 3. The floor area from tuyere-6 to 3 to be elevated

by concreting to reduce the trip hazard since the width of step is less to rest the foot.

1. On 07.08.2022 at around 19:15 hrs, while inserting oxy lance into taphole, BF3 cast house Vaaman operator Mr Rushikesh Mandal got burn injury on his both legs(thigh portion) and one hand due to sudden blow from taphole. He was engaged in the activity of lance insertion and was standing at the back side to support the lance.He was immediately shifted to BF3 Dispensary and then to Sanquelim government hospital and further to GMC for treatment
2. On 13.10.2022 at PID 1, BF1 Cast house at around 12:10 hrs, Mr. Surendra Pal; (Tap hole operator), while carrying out lancing activity to make the cast through, suddenly got back fire and lancing holder got burnt. Operator suffered a burn injury to left hand and superficial injury to right hand. He was immediately sent to dispensary and resumed duty after first aid treatment.

Root Cause: Backfire due to the reduction in pressure of oxygen due to blockage of pipe during lancing

operation. 2. Backfire might be due improper lance holder and lack of safety device

Contributory causes:

1. Leakage of MS lance pipe and holder
2. Poor Condition Hand gloves

CAPA: Standard lance holder with all safety features and safety shut off valve to be procured (with

sufficient spares)

Mandatory use of flashback arrestor near the valve stands in cast house at all the times.

There must be proper storage for lance pipes at site, checking of its condition for ingress of water and

Dirt inside lance pipe.

Flush of the lance pipe before inserting the lance pipe into the tap hole each and every time as per SOP.

On job training of the tap hole operators and cast house engineers specifically on the lancing operation

SOP briefing to be provided.

PPE condition need to be inspected periodically by the area in-charge

1. On 02.01.2023 at around 21:40Hrs while releasing oxygen for salamander tapping lancing shift supervisor suffered a burn injury to left hand. He was immediately sent to Dispensary, later referred to CHC Sanquelim for Doctor evaluation after treatment at CHC Sanquelim he resumed the duty.

Root cause: Hot material got trapped in the hose during previous lancing & same came in contact when oxygen valve was opened resulted in backfire and hose failure.

Contributory cause:

* After lancing flushing was not done
* No flash back arrestor
* Lancing hose was SAE 100 R1 make
* Valve used was 3-piece cast steel

CAPA:

1. Flushing needs to be done after every lancing
2. Flash back arrestor to be installed at Lance end.
3. All flexible lancing hoses material should be 100 R2 with SS braided & asbestos wrapping
4. Valves in oxygen line should be Stainless steel single piece material (Not casting) with pressure rating of 69 Bar after regulator.
5. Proper cleaning of ID of pipes after fabrication with dry compressed air after any new installation. N2 pressure testing followed by N2 flushing is must before usage. Argon welding is preferred for joining of lines.
6. At all stations pressure gauges of suitable ratings to be present.
7. Mandatory pressure regulators after oxygen bank preferably Vanaz Make.

**Hazards identified**

1. High Pressure in the oxygen line
2. Fire & Explosion in the Oxygen line
3. contact with hot metal /slag during lancing
4. Nonuse of PPE & WI
5. Improper house keeping
6. Inadequate local lighting
7. Not shifting people from the PCM platform or PCM tail end before starting the lacing operation
8. Dust
9. Backfire while lancing
10. Bending while lancing//Muscular strain
11. Rolling down of oxygen trolley
12. Fall of trolley during transportation/positioning
13. Entanglement with loose lancing pipes
14. Bursting of Lancing hose pipe
15. No coordination between the person lancing and the one who opens the oxygen valve

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| **Prepared By:** | **Reviewed By:** |
| **Signature:** | **Signature:** |
| **Review Date: 15.04.2023** | **Review Date: 15.04.2023** |