|  |  |  |  |
| --- | --- | --- | --- |
|  | **VEDANTA LIMITED –**  **VALUE ADDED BUSINESS** | **Format No.:** | **FRMT/MR/10** |
| **INTEGRATED MANAGEMENT SYSTEM** | **Revision Date:** | **10.07.2023** |
| **HAZARD IDENTIFICATION** | **Revision No.:** | **03** |
| **Page No.:** | **1 of 1** |

|  |  |
| --- | --- |
| **Departmental Use Only** | |
| **Revision No: 06** | **Unit: PID1** |
| **Revision Date: 10.07.2023** | **Dept.: Production** |

A. Work activity information

|  |  |  |
| --- | --- | --- |
| **Sr.No.** | **Details** | **Remark** |
| 1) | Task being carried out, their duration and Frequency: | Tapping Operation  45 min. to 01. hour  12 casts per day |
| 2) | Location (s) where the work is carried out. | BF-Casthouse |
| 3) | Who normally/occasionally carried out the task? | Company as well as Contractors labourers & supervisors |
| 4) | Who else may be affected by the work (For example visitors, subcontractors? the public) | Maint. Staff & Visitors |
| 5) | a) Has the personnel trained for performing the task  b) Any special training required | Yes  No |
| 6) | Is the written systems of work mandatory? If yes state, the procedure no. | VL/IMS/PID1/PROD/WI/08C |
| 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, | Drill machine & mudgun |
| 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: | Liquid metal & slag poking bar of 6 mtr length &25-30mm dia., anhydrous mudgun mass |
| 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 | pneumatic system for drill machine & hydraulic system for mudgun |
| 15) | Physical form of substances encountered during the work (For example fume, gas, vapour, liquid, dust/powder, solid): | Liquid metal , slag & solid poking bar etc. |
| 16) | Content and recommendations of safety data sheets relating to substances used or encountered:  (this is applicable in case of chemical material) | NA |
| 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? | Dry and wet bulb temperature of the  Working environment |
| 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 22.08.2003 While poking the taphole hot metal spark entered through helmet & screen causing burn injury -R M Hankare
2. On 21.05.2003 while poking the blowpipe for coke removal a tiny piece hit the operator through the gap between the helmet & screen& causing burn injury-Gopal Todkar.
3. On 24.05.2003 When the operator was on the way to drinking water behind the control room and his leg went into the hole formed on the grating-Ganesh Prasad
4. On 04.09.03 there was a metal overflow from the main runner (towards drilling machine)
5. On 12.09.2003 Superficial burn injury on elbow & forearm of a supervisor due splashing of hot mudgun clay -BF2 (RAMBABU)
6. On 14.09.2003 Burn injury while taking a metal sample-Umesh fadte
7. On 29.09.2003 Cast was opened by itself -Jyothin Raithatha
8. On 09.11.2003, while poking the taphole poking rod gave way at welded joint
9. On 24.11.2003, Cast house barricade was damaged by the crane
10. On 14.11.2003 corrugated sheet of roof fallen on the person who was working on the slag spout-Shivaji Rane Sardesai.
11. On 16.12.2003 Stacking of drill bits in BF2 is in unsafe condition.
12. Used poking rods and drill bits are stacked behind the scrap belt.
13. On 31.01.2004 Drilling machine was not chained when it was not in use.
14. On 15.02.2004, while poking the taphole poking rod broken in to two pieces at its welded joint-Anand Pawar.
15. On 24.05.2004, while poking the taphole poking rod gave way at its welded joint-Ashok Todkar.
16. On 30.04.2004, Mudgun brushed while the operator was on his way to pick up the lancing pipe in the mudgun swing area-Anand Pawar.
17. On 08.05.2004, in BF1 cast house drilling machine came back as its manual lock failed Mr Sudhakar fell on the railing & injured.
18. On 02.07.2004 Poking rod gave way at the welded joint while poking the taphole.
19. On 19.06.2004, While cleaning the taphole a hot metal went into shoes between the gap of leg guard-T. Tiwari.
20. On 08.10.2004 burn injury while cleaning the taphole -Anand Pawar.
21. On 28.12.2004 Drill machine hose got disconnected and started flying all over-Sandip Gawde.
22. On 19.01.2005 Operator received a burn injury while breaking the dam-Ganesh Patil.
23. On 22.02.2005, (BF1 17.00 HRS.) when the Ist cast of II nd shift was opened, the taphole operator went to push the sand from drilling machine then spark went into his shoes between the gap of leg guard and the laces joint.
24. On 25.02.2005 at 00.45 in BF1 cast house while poking the taphole a metal spark went into a shoe through leg guard and causing burn injury to the operator Mr. Amoldas Sinari.
25. On 10.03.2005, at 03.30 hrs in BF2 cast house, while poking the taphole metal spark went into shoes causing burn injury to the operator Mr. Sundar Pawar.
26. On 22.06.2005 at 15.30 hrs Burn injury while diverting the runner in BF2-Jangam.
27. On 21.08.2005 at 01.30 hrs burn injury while cleaning the taphole-Maruti patil.
28. On 17.09.2006 the poking rod gave way at welded joint while poking the taphole, operators were left with rod which they were holding –R M Hankare & Tarkeshwar.
29. On 25.01.07 While pulling the jam from the main runner with the help of hook, the hook got straightened and the operator fell down-Ashok Todkar.
30. On 26.08.07 in BF#2 cast house, ladle L23 developed hole just below the trunion. Hot metal jet hit the other ladle L21 which was placed on second spout. About 3T H.M spilled out.
31. On 25.03.2009 at around 5.10hrs, injured was cleaning the tail end of PCM 4. The fourth cast of BF2 was opened wet due to this wet tap hole spark from tap hole fell on the back of the injured resulting in superficial burn injury.
32. On 19.11.09, 1st shift BF1 cast House, the main runner developed a hole towards the drill machine side, metal & slag came down at the ladle placement area through the false runner.
33. 18.01.10 while cleaning the metal & slag jam in front of tap hole area with the help of long pipe of 1-inch dia which slipped from the jam and due to sudden jerk, his right palm hit the turn buckle arm support of the drill machine resulting in minor cut injury to index finger.
34. On 18.09.10, second cast (Cast No.8709) was closed with Rastogi clay at 11:45Hrs. After two minutes tap hole got opened itself when mudgun was on the tap hole. This happened in front of the supplier. The clay was used for trial. So mudgun from tap hole was removed and the tap hole was closed by VVEL 165+78 clay.
35. On 31/01/2011, at 12.30hrs, in BF2, tuyere no.1 inlet hose pipe got punctured (3–4-inch slit) & water flooded the main runner. Immediately wind was reduced to minimum (11000 Nm3/hr) & mechanical dept was informed. Mechanical backflushed the tuyere & changed the inlet. After this the main runner was heated up & the cast was opened.
36. On 29.04.2011, At 21.05 hrs senior tap hole operator Mr. Ashok Todkar was trying to make cast through using welded pocking rod. At that time one end of pipe open up from welding & felt into runner while other end was in hands of Mr. Todkar.
37. On 01/08/2013 2nd cast of night shift was closed at 4:40hrs and 3rd cast opening was delayed by almost one hour due to Mud gun swiveling problem, cast opened in 1st shift at 7:20hrs by lancing. Because of wide taphole, cast opened very wildly, and metal flow was uncontrollable slag started flowing out of runner which was controlled by reducing wind to minimum. Metal from 1st ladle was diverted at safe level but due to big flow metal was not getting diverted properly and 1st ladle started overflowing during this ladle was removed but ladle L27 pin and bottom shell got damaged. Cast closed by hydrous clay by taking shutdown. No injury to any person.
38. On 17/08/2013 in BF2 Cast House, while opening C. No. 20972 at around 23:20hours Mr. Ashok Todkar tap hole operator was standing in front of mudgun side man cooler. A metal spark flew from the taphole and hits his eyelid. He was administered first aid and was advised rest for the day.
39. On 20.09.2013 during 2nd cast of 2nd shift, to remove coke from tap hole he was pocking with lancing pipe. During this activity hot slag drop got stuck to his leg guard. The leg guard got burn at two layers and his right leg below knee got superficial burn injuries resumed work after first aid.
40. On 06.12.2013 For the cast 21786 (BF2) some metal spilled below 2nd spout as there was no 2nd ladle when metal was diverted after taking sufficient level in 1st ladle. Immediately cast was closed not dry and reopened after 25mins.
41. On 01.07.2014, at around 14:40 hrs 4th cast was opened in BF2 by cast house engineer. After opening the cast, it was observed that metal/slag spillage in hearth area from main runner. So immediately cast was closed and inspection was done. After inspection it was observed that runner wall was punctured near taphole towards drilling machine side. The runner was repaired immediately by reducing the wind and after that cast was opened.

Root Cause:

Failure of regular inspection of refractories. Contributory Cause: -Launder sand washed out due to drill machine swiveling movement Erosion of refractory towards the drill machine side of runner. Corrective & Preventive action: Ensuring proper refractory/runner mass condition throughout by fixing the inspection schedule. Launder sidewall height to be maintained.

1. On 21/08/2015, A-shift during casting no 2017 ladle L-32 which was placed at second spout got full and started overflowing of hot metal. Cast was immediately closed. There was a spillage of metal resulting in damage to the top ring of ladle and jamming of bottom pin.
2. On 17.03.2016 at 18:35 hrs in Bf1 cast house contractor workmen Mr. Cornolis got minor injury to his left-hand small finger while removing bypass runner jam crowbar

Causes: Sharp edge on the angle.

Loss of balance while cleaning the jam.

CAPA: Sharp edge on the angle Covered.

Ensure proper position & posture for performing the task.

Retraining to workers on safe handling of crowbar while cleaning bypass runner.

1. on 2nd May, today at around 12.15 p.m. at PID 1 cast house area, wherein one of the contract worker Mr. Umesh Gawas while trying to cross BF-2 Hot Metal main runner, slipped and fell, sustaining burn injuries to both the legs and upper arm

Root Cause:

1. Lack of awareness resulting in low-risk perception.

2. Inadequate controls for entry in cast house and hot metal handling area.

Contributory factors:

1. Inadequate supervision for activity in critical area.

2. Unmanned cast house during shutdown

3. No safety supervisor from contractor side.

CAPA:

1. Pre-screening of contract worker by user department during recruitment by interaction and interview.
2. Strengthening on job training and refresher training systems.
3. Physical access control to prevent unauthorized entry in all critical hazardous area to ensure only trained and authorized people have access to these areas, in addition runner to be guarded during shutdown.
4. Signage in cast house to be improved.
5. Supervision to be strengthened either from contractor side as well as company side to ensure adequate supervision for critical areas like cast house & PCM.
6. Emergency preparedness and response to be strengthen by ensuring sufficient first aiders and mock drills on this aspect.
7. Today at around 20:25 pm at BF 1 after opening the cast while rotating drill for removing, drill bit twisted and failed at welding joint and drill hit on the waist of baiganath tudu of Mahadev Gawas which resulting into minor abrasion.

Root Cause: Welding joint was within 1m from the tip of drill bit pipe. In the process of releasing the pipe, while the rotation and hammering operation was done from the machine the welding joint gave way.

CAPA:

1. Weld joint to be avoided within 1.5m from the tip of drill bit pipe.
2. Opening of tap hole on drill bit should be avoided as far as possible.
3. Explore the possibility of providing provision of lowering and raising of drill machine boom.
4. If at all there is a bend/twist in the pipe in front of the face plate hole, then the pipe to be removed from the shank manually by spanner.
5. Solid rod to be used for poking in case manual poking is not effective.
6. Ensure, other workmen in cast house at far end/ back side while doing reverse operation of drill bit.
7. On 17.03.2016 at 18:35 hrs in Bf1 cast house contractor workmen Mr. Cornolis got minor injury to his lefthand small finger while removing bypass runner jam crowbar slipped. He resume on duty after first aid

Causes: Sharp edge on the angle.

Loss of balance while cleaning the jam.

CAPA:

Sharp edge on the angle Covered.

Ensure proper position & posture for performing the task.

Retraining to workers on safe handling of crowbar while cleaning bypass runner

1. On 05.12.2016 at around 10:30 hrs after immediate closing of 1st cast of BF 1, ladle at 2nd spout while draining metal runner got over flown and damaging ladle pin. No injury to anyone.

Causes:1. Misjudgment of metal level in ladle 2. Clear accountability is missing (As same cast house is individually manned by various level of people like Proper designated furnace in charge, Forman , Undesignated Forman , Shift Superintendent) , hence accountability , responsibility and competency for the same job is handled by different competency people.3. Multiple problem faced at a time in furnace & peripheral area (Jammed ladle given for cast opening when cast was already delayed, problem in hot metal handling area)

CAPA:1. Retraining of cast house operators & Engineers .2. Redefinition of roles & responsibility of Foreman & Cast House In charge.3. Proactive approach in the daily shop floor activity.

1. Today at 11:40hrs after closing the second cast in bf1 graphite partical enter into the eye of Mr. Anand Gawas so he went to the dispensary to remove it. while removing graphite the eye became red so company doctor send him to Vision eye hospital Mapuca He reported back at 15:00hrs

Root Cause:

Inadequate dust extraction system

Contributory cause:

Inadequate safety goggle

CAPA:

Dedusting system to be installed on priority.

Total sealing goggle to be explored.

1. On 21.01.2017 at around 00:35 hrs at Bf1 after opening the Cast no-607 metal diverted to 2nd ladle around 00:35 hrs. After diverting the metal, abnormal smoke observed from 1st spout ladle area below C/H platform. No injury to anyone. Ladle taken out immediately.

Causes: 1. The spout area castable was damage, due to impact of Hitachi/ Hooking during cleaning

metal oozed out from the damage area.2. Work instruction not followed

CAPA:

1. Work instruction to be followed (the ladle should be checked in every shift for damage, and damage ladle should not be used until repaired).

2.Refrectory design to be checked

3. Ring elimination to be checked

4.Inspection check list to be strengthened with additional parameters as required.

5. Thermograph to increase the frequency of the inspection schedule

6. Ladle inspection after every cleaning.

1. 0n 03.05.3017, Today at 11:40hrs after closing the second cast in bf1 graphite particle enter into the eye of Mr. Anand Gawas so he went to the dispensary to remove it. while removing graphite the eye became red so company doctor send him to Vision eye hospital Mapuca He reported back at 15:00hrs

Root Cause:

Inadequate dust extraction system

Contributory cause:

Inadequate safety goggle

CAPA:

Dedusting system to be installed on priority.

Total sealing goggle to be explored.

1. On 12.05.2018 in BF1 while poking taphole with lancing pipe to make the taphole through, sparks from the taphole came onto taphole operator Mr. Vithoba Gawas causing burn injury on his leg. He was wearing all PPEs. He resumed work after getting treated at dispensary.

Root cause: Insufficient heat protection above leg guard

CAPA: 1) Coats with better protection or Alu safe to be used

2) Pants with greater tolerance to heat puncture to be used by tap hole operators

1. On 01.10.2018 at around 16:00 hrs one Graphite particle was entered into Company workmen right eye while casting operation, which was removed in dispensary. He was wearing all protective gears including goggle. He resumed back to work immediately after removing the particle.

Root cause: Draft near man cooler causing entry through the safety glass gap

CAPA: Mono goggles to be used in cast house

1. On 29.12.2018, Mr. Jaiprakash Ray (Quess Contractor) was engaged for metal dam preparation in BF2 Cast House. While applying rice husk for the same, sudden metal eruption took place at 18:40Hrs which caused superficial burn injury to his lips and right leg below ankle. He was wearing all required PPE viz. spectacle, face towel, leg guard, woolen patti. Immediately he was taken to dispensary and First Aid was given.
2. On 11.01.2019 At 17:30 hrs Mr. Narendra Gawas (Company workmen) was clearing jam with bamboo from runner of BF2 cast-house during running tapping as main-trough was completely jammed. He was wearing all PPE including leg-guard and safety over-coat. In spite of this some liquid metal sparks flew in between the safety coat and penetrating into his pants causing superficial burn injuries on skin of his left leg knee. First aid was given, and he resumed to work.
3. On 10.03.2019 At 11:45 hrs Mr. Ramesh from hofincons was clearing jam from runner of PCM4. During running tapping eruption at slag pit (EL) took place and some hot material entered in his shoes. He was wearing all PPE including woolen Patti and safety shoes. In spite of this some hot material sparks flew in shoes causing superficial injuries to his left leg. First aid was given, and he then resume to work for pouring.
4. On 8/11/2019, at around 1.45 am approx., when cast was taken in EL at BF 1 of PID 1, there was a mild explosion which ignited the tarpaulin and other combustible materials kept nearby. The fire was extinguished with fire hydrant and fire extinguisher. No injury to anybody.
5. On 06.06.2020 at around 15:03hrs production Dept. reported that ladle hood trolley wheel stopper found bend. On inspecting the same by trail run on site it was found that ladle hood trolley right front wheel facing from drive end was found dragging with jam wheel with bend bracket & stopper with damaging rail track about 2.5mtrs. There was no injury to anyone.
6. On 08.08.2020 In B shift Mr. Ramtikari (Vaman Contractor workman) was diverting the metal to 2nd spout ladle. At the same time running Casting started to blow and he came in contact with some metal/slag sparks at the back of his neck (gap between helmet and overcoat) and minor burn observed. He was wearing all the requisite Cast house PPEs. First aid (Burn heal ointment) was provided in BF-2 control room and he continued duty afterward.

Gap between Helmet and overcoat at the back of the neck

Contributory cause: Blowing of the cast at the same time

CAPA:

Long fire-resistant cloth to be provided along with skull cap/Helmet which covers the body below shoulder level so that there is no gap.

1. On 10.12.2020 at Bf2 cast house at around 16:05 hrs after closing the cast Mr Shailesh Navelkar (company workman) was working on Dam area. While spreading the burnt rice husk on dam area small eruption occurred and he got superficial injury to his back side of the left leg near knee area. He was wearing all the required PPE’s. IP had given first aid injury at dispensary and resumed work thereafter.

Cause:

Based on earlier CAPA, rice husk needs to be applied through shovels only (not to spread directly). This practice is not followed.

Contributory causes /circumstances:

Moisture in Rice Husk

CAPA: 1. Feasibility of providing more thicker dress material like DENIM to Dam operators to be checked

2.Installation on camera for monitoring cast housework practices and maintaining discipline

3.Rice husk to be stored in moisture free area at Cast house

1. On 10.05.2021 At 08:00 hrs it was observed that the pedestrian fan additional safety mesh provided 2 days back was found removed. Mesh replaced by electrical immediately. The fan is being used by employees of Vaman in BF 2 behind BF 2 control room area. All concerned were made aware about the hazard.

Cause: From site condition it was observed that as area is congested (Block from 2 side) and there is no Natural fresh air flow and also installed fan was of lower capacity, hence in frustration of this cast house worker may have removed fan safety mesh

CAPA: 1. Pedestal fan to be changed by higher capacity.

2. Production department to give list of location where high capacity of Pedestal/wall mounted fan is required to Electrical department for indenting the fan.

3. Proper rest room to be made available for Cast house workmen.

4. Behavioural and Guarding safety standard training of Do’s and Don’ts to be imparted to Cast house area worker.

1. On 17.06.2021 in BF1 cast was opened at 05:30 hrs. At around 05:40 hrs While diverting the slag small piece of slag hit the left leg above calf muscle to one of our company workmen and he got superficial burn injury. First aid treatment given in the dispensary. IP resume duty after treatment. He was wearing all the safety PPE (Safety over coat, leg guard, shoes, helmet etc.)

CAUSES: Lack of protection for lower body from heat.

Contributory causes /circumstances

Improvised tool for slag diversion.

CAPA: 1. Safety overcoat slit present at rear side to be minimized and studied to avoid hot material contact further.

2)Improvised tools for slag diversion to be used so that diversion activity when cast is spitty can be done from safer and further distance from runner.

3) Jeans material for pant to be considered to further protect lower body from hot material.

1. On 16.01.2022 at around 08:30 hrs, after closing the cast, Mr Anil kumar Rai (Vaman Engg) was inspecting the condition of slag pit screens through inspection window. While turning back his right ear bruised against the inspection window sheet leading to small cut on his right ear. He was sent to the dispensary from where he was referred to Sankhali PHC for the treatment. He resumed to his normal duty after taking treatment from PHC.

CAUSES: The inspection window is for viewing the pit condition from outside itself and not peeping into it by putting your head out.

Contributory causes /circumstances

No barrication to avoid person’s head from entering the inspection window

CAPA: 1. Rod barrication to avoid persons head entry through the inspection window.

2. Same barrication to be horizontally deployed in BF 2 slag pit window as well.

3.HIRA and SOP of the activity to be revisited

4.Retraining of workmen through PEP talk on Do's and Don’ts while carrying out such type of activity.

**Hazards identified**

1. Contact with hot metal and slag
2. Contact with hot metal while poking the taphole
3. Contact with hot metal while pushing the sand/rice husk
4. Fall of Person
5. Fall of person while pulling the jam
6. Electric shock
7. Mechanical –Impact
8. Slipping in the runner
9. Slipping in the runner due to failure of poking rod at welded joint
10. Mech. Impact by drill machine
11. Mech. Impact by mudgun
12. Mech. Pressure
13. Contact with hot metal sparks
14. Contact with hot water
15. Entry of hot metal & slag on cast house platform
16. Bricks worn out of ladle
17. Nonuse of PPE &WI
18. Improper house keeping
19. heat
20. Noise induced hearing loss
21. Vision impairment due to glare of hot metal
22. Dust obstructing lungs disease
23. Runner leakage
24. Improper job posture
25. Not evacuating persons working in the area in front of taphole in Hot metal crane bay
26. Use of welded poking rod
27. Opening of taphole on its own
28. Puncture of hose pipe leading to flooding of main runner.
29. Bending while tapping/Muscular strain
30. Uncontrollable metal flow from taphole leading to injury/damage
31. Opening casting/diverting metal without placing ladle
32. Graphite particle entering into operators’ eyes.
33. Smoke coming out below metal spout area
34. Ladle puncture
35. Wet runner due to water leakage from tap hole resulting into metal eruption after opening cast
36. Un alertness in surrounding area of people around
37. ladle hood trolley operation failure

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