**ACTIVITY: JETTY UNLOADER MAINTENANCE**

1. **Purpose:** - To describe Safe and quality maintenance procedure of Jetty Unloaders.
2. **Scope:** - MCD Jetty Unloader 1,2,3 & 4.
3. **References.**: -
4. **Responsibility**: - Engineer- in- charge & Maintenance fitter on the job.
5. **SAFETY PRECAUTIONS:**

* Ensure all Process, Electrical & Mechanical isolation prior to starting work on equipment. Follow documented isolation procedure as per Vedanta approved isolation standards.
* Seek Proper work permit whenever applicable.
* Job to be carried out by Competent Person.
* Safety briefing / Toolbox talk to be carried out and to be documented
* Follow one man one lock system and use of LOTO box.
* Wear approved PPE (Personal Protective Equipment)
* Ensure that workplace is clean and safe.
* Operate pull cord switch / LCS to Off position prior to work as an additional safety measure.
* Ensure all the planned jobs have been completed and release mechanical isolations if applied.
* All unwanted material from the area to be removed before releasing the equipment electrical isolation.
* Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
* Ensure all the job is completed as planned and all safety guards have been placed and secured properly as per guidelines before releasing the equipment for operation

6.0 PPE to be used :

* Helmet,
* Safety shoes.
* Dust mask.
* Hand gloves.
* Safety goggles.
* Reflector jacket.
* Job specific PPEs face Shield, Full body Harness, lifeline, fall back arrestor, CO detector etc.

**7.0 Activities**

* Activity No 1 : Hoist-Lower wire rope changing.
* Activity No.2 : Open close wire rope changing.
* Activity No.3 : Grab Bucket overhauling.
* Activity No.4 : Replacement of Motor O-C & H-L
* Activity No.5 : Replacement of Motor O-C & H-L
* Activity No.6 : Replacement of wire rope drum O-C & H-L
* Activity No.7 : Replacement of CT gear box.
* Activity No.8 : Replacement of CT Motor.
* Activity No.9 : Replacement of floating shaft.
* Activity No.10 : Replacement of drive wheels.
* Activity No.11 : Preventive maintenance.

8.0 Aspect- Impact.

Scrap generation Resource Depletion.

Oil Spillage. Land Contamination.

Oil soaked cotton waste and hand gloves Land Contamination

Fumes Health

9.0 Hazards identified

1. Physical Hazard

* Fall of oil in ears, eyes, mouth
* Fire

1. Mechanical Hazard

* Trapping between two objects,
* Fall of material like hammer, tools, slung items, bolts, wedges, etc,
* Fall of person from platform,
* Impact of moving / slung items
* Cut from tool.
* Flying off of gas cutting and welding sparks.

1. Human behaviour aspect of operators:

* Workmen Nature.
* Improper house keeping
* Alcoholism.
* Casual approach.
* Horse play.
* Back pain
* Non usage of PPEs
* Height phobia.

1. Electrical hazard.

* Shock.

# Activity No 1 : Hoist - Lower wire rope changing.

1. Take the grab down fully on ground so that the hoist-lower wire rope is loose and position it as per our convenience.
2. Isolate CT drive shutdown with with proper isolation procedure as per the Vedanta isolation standard.
3. Isolate Open- Close motor as per proper isolation procedure as per the Vedanta isolation standard.

(Isolation of Open Close motor to be removed as per requirement during the process and the same is strictly co-ordinated within mechanical and electrical team – Keep one dedicated electrician during the complete process of wire rope changing. Follow proper procedure for restoring the open close drive for trial run of the equipment)

1. Operate the hoist-lower motor to unwound the wire rope on the drum keeping only one round on the drum.
2. Isolate hoist-lower motor as per proper isolation procedure as per the Vedanta isolation standard.
3. Loosen the wire rope clamps that needs to be replaced.
4. Lower the removed wire rope from the drum on ground using suitable nylon rope.
5. Ensure person working on the ground have been vacated till the rope is lowered.
6. Remove the pin and disengage wire rope holder from the grab.
7. Loosen wedge and remove wire rope clamps to remove the wire rope.
8. Take the new wire rope of required length and shift one end of the wire rope at drum level with suitable nylon rope.
9. Wrap one round of wire rope on drum and tighten the wire rope clamp.
10. Minimum 4-5 round of wire rope must be on drum when bucket is fully lowered.
11. Temporarily release the hoist-lower motor isolation as per Vedanta isolation procedure to operate hoist-lower drum
12. Operate hoist-lower motor and wrap wire rope fully on the drum. Compare the lengths of two wire ropes.
13. Operate hoist-lower motor and lower the wire rope.
14. Reposition wire rope in the wedge and engage holder with grab bucket.
15. Take no-load trial and check for balancing of grab.
16. Shift the removed wire rope to the allocated scrap area.

(Note: In case wire rope has sheared more than 3mtrs from the either ends, scrap the wire rope.)

1. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
2. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
3. Release the grab assembly for operations.

# Activity No 2 : Open-close wire rope changing.

1. Take the grab down fully on ground so that the hoist-lower wire rope is loose and position it as per our convenience.
2. Isolate CT drive shutdown with proper isolation procedure as per the Vedanta isolation standard.
3. Isolate hoist-lower motor as per proper isolation procedure as per the Vedanta isolation standard.

(Isolation of Open Close motor to be removed as per requirement during the process and the same is strictly co-ordinated within mechanical and electrical team – Keep one dedicated electrician during the complete process of wire rope changing. Follow proper procedure for restoring the open close drive for trial run of the equipment)

1. Cut the wire rope from holder.
2. Unwrap the wire rope by operating open-close motor till one round of wire rope remains on the drum.
3. Loosen wire rope clamp of the wire rope that needs to be changed.
4. Lower the removed wire rope from the drum on ground using suitable nylon rope.
5. Ensure person working on the ground have been vacated till the rope is lowered.
6. Remove the wire rope around the floating pulley manually.
7. Wrap wire rope around the floating pulley with the help of 5mm nylon rope as per drawing. Consult the concerned engineer. Make use of the supporting angles to wrap around top floating pulley.
8. Take the new wire rope of required length and shift one end of the wire rope at drum level with suitable nylon rope.
9. Wrap one round of wire rope on drum and tighten the wire rope clamp.
10. Minimum 4-5 rounds of wire rope are required on drum when bucket is at lowest position.
11. Reposition wire rope in the wedge and engage holder with grab bucket.
12. Take no-load trial and check for equal opening and closing of grab.
13. Shift the removed wire rope to the allocated scrap area.

(Note: In case wire rope has sheared more than 3mtrs from the either ends, scrap the wire rope.)

1. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
2. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
3. Release the grab assembly for operations.

# Activity No 3 : Grab Bucket Overhauling.

1. Lower the grab to be overhauled in the designated area for each unloader.

(If floating box must be removed for overhauling, lower grab in closed condition. If floating box doesn’t have to be removed, lower grab in open condition.)

1. Isolate CT drive shutdown with proper isolation procedure as per the Vedanta isolation standard.
2. Isolate open-close motor as per proper isolation procedure as per the Vedanta isolation standard.

(Isolation of Open Close motor to be removed as per requirement during the process and the same is strictly co-ordinated within mechanical and electrical team – Keep one dedicated electrician during the complete process of wire rope changing. Follow proper procedure for restoring the open close drive for trial run of the equipment)

1. Remove grab bucket pin and disengage top floating box pulley with arm from grab bucket.
2. Lift the removed assembly with the help of hoist-lower wire rope and reposition it as per our convenience.
3. Remove pin and disengage holder from the grab.
4. Remove support angles used to access top floating pulley.
5. Disassemble top floating box with bucket arm by removing pins.
6. For removing bottom floating box, lock the grab bucket halves and bucket arms near floating box for easy removing and assembly of floating box.
7. Remove the floating box shaft by using jack and puller. Remove the pulleys.
8. Remove all the bushes using jack and puller.
9. If pins and bushes are worn out, replace them with the new ones.
10. Assemble the bucket and lubricate fully.
11. Shift the removed pins to metal scrap yard.
12. Shift the phosphor bronze bushes to the stores.
13. Shift the used hand gloves, cotton waste to oil-soaked waste barrel.
14. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
15. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
16. Release the grab assembly for operations

# Activity No 4 : Replacement of Motor (O-C. H-L)

1. Place the grab bucket on hopper grizzly and unwound the wire rope.
2. Shift the trolley closer to the unloading side of the unloader.
3. Isolate the power of open-close, hoist-lower & CT drive with proper isolation procedure as per the Vedanta isolation standard.
4. Seek work permit for replacement of motor.
5. Shift the new / overhauled motor fitted with coupling to the unloader area using proper material shifting arrangement and certified lifting tools.
6. Remove the roofing sheets of the trolley house above the motor which needs to be removed.
7. Release the drum brake.
8. Remove the electrical connections.
9. Decouple the motor from the gear box.
10. Remove foundation bolts.
11. Use certified lifting tools for lifting the motor from the location.
12. Use crane for removing the motor from the place or else the activity must be carried out using certified chain block of enough capacity.
13. Replace the new / overhauled motor using crane/chain block to the place of replacement.
14. Provide the foundation bolts.
15. Align motor with the gear box.
16. Check the direction of rotation of motor as required.
17. Provide coupling bolts to connect the drive to gear box.
18. Drum brake setting to be done.
19. Close the roof sheeting.
20. Shift the trolley above grab.
21. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
22. Take trials in co-ordination with operator to properly guide the rope on the drums.
23. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
24. Ensure all the job is completed as planned and all safety guards have been placed and secured properly as per guidelines before releasing the crusher for operation
25. Release the crusher for operation.
26. Shift the removed motor to workshop by using proper material handling arrangement.

# Activity No 5 : Replacement of Gear Box (O-C. H-L)

1. Place the grab bucket on hopper grizzly and unwound the wire rope.
2. Shift the trolley closer to the unloading side of the unloader.
3. Isolate the power of open-close, hoist-lower & CT drive with proper isolation procedure as per the Vedanta isolation standard.
4. Seek work permit for replacement of gear box.
5. Shift the new / overhauled gear fitted with couplings to the unloader area using proper material shifting arrangement and certified lifting tools.
6. Remove the roofing sheets of the trolley house above the ger box which needs to be removed.
7. Release the drum brake.
8. Decouple input and output coupling of the damaged gear box.
9. Remove the foundation bolts
10. Use certified lifting tools for lifting the gear box from the location.
11. Use crane for removing the gear box from the place or else the activity must be carried out using certified chain block of enough capacity.
12. Replace the new / overhauled gear box using crane/chain block to the place of replacement.
13. Provide the foundation bolts.
14. Align gear box with motor and drum
15. Provide coupling bolts to input and output drum coupling.
16. Drum brake setting to be done.
17. Close the roof sheeting.
18. Shift the trolley above grab.
19. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
20. Take trials in co-ordination with operator to properly guide the rope on the drums.
21. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
22. Ensure all the job is completed as planned and all safety guards have been placed and secured properly as per guidelines before releasing the crusher for operation
23. Release the crusher for operation.
24. Shift the removed gear box to workshop for repairs by using proper material handling arrangement.

# Activity No 6 : Replacement of wire rope drum (O-C. H-L)

1. Place the grab bucket on hopper grizzly and unwound the wire rope.
2. Shift the trolley closer to the unloading side of the unloader.
3. Isolate the power of open-close, hoist-lower & CT drive with proper isolation procedure as per the Vedanta isolation standard.
4. Seek work permit for replacement of drum.
5. Shift the new / overhauled drum fitted with coupling and bearings with bearing blocks to the unloader area using proper material shifting arrangement and certified lifting tools.
6. Remove the roofing sheets of the trolley house above the drum which needs to be removed.
7. Release the drum brake.
8. Decouple drum from the gear box.
9. Remove the foundation bolts of drum mountings.
10. Remove the wire rope from the drum. (refer activity 1 in this work instruction)
11. Use certified lifting tools for lifting the drum from the location.
12. Use crane for removing the drum from the place or else the activity must be carried out using certified chain block of enough capacity.
13. Replace the new / overhauled drum using crane/chain block to the place of replacement.
14. Provide the foundation bolts.
15. Align drum with gear box.
16. Provide wire rope on the drum (refer activity No.1 in this work instruction)
17. Provide coupling to drum and gear box.
18. Drum brake setting to be done.
19. Close the roof sheeting.
20. Shift the trolley above grab.
21. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
22. Take trials in co-ordination with operator to properly guide the rope on the drums.
23. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
24. Ensure all the job is completed as planned and all safety guards have been placed and secured properly as per guidelines before releasing the crusher for operation
25. Release the crusher for operation.
26. Shift the removed drum to workshop for repairs by using proper material handling arrangement.

# Activity No 7 : Replacement of CT Gear Box

1. Isolate the power of CT drive with proper isolation procedure as per the Vedanta isolation standard.
2. Seek work permit for replacement of CT gear box.
3. Shift the new / overhauled CT gear box with coupling at the trolley using proper material shifting arrangement and certified lifting tools.
4. Use certified lifting tools for lifting the gear box from the location.
5. Use enough capacity chain block to hold the gear box.
6. Decouple gear box (input and output drives).
7. Remove the mounting bolts of gear box.
8. Lift the gear box at the platform level and shift out of trolley with proper material handling arrangement.
9. Replace the new gear box to the location with same material lifting arrangement and position with the help of chain block.
10. Provide foundation bolts and align with gear box and output drives.
11. Connect input and output drives by providing coupling bolts.
12. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
13. Take trials in co-ordination with operator.
14. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
15. Ensure all the job is completed as planned and all safety guards have been placed and secured properly as per guidelines before releasing the crusher for operation
16. Release the crusher for operation.
17. Shift the removed gear box to workshop for repairs by using proper material handling arrangement.

# Activity No 8 : Replacement of CT motor.

1. Isolate the power of CT drive with proper isolation procedure as per the Vedanta isolation standard.
2. Seek work permit for replacement of CT motor.
3. Shift the new / overhauled CT motor with coupling at the trolley using proper material shifting arrangement and certified lifting tools.
4. Use certified lifting tools for lifting the motor from the location.
5. Use enough capacity chain block to hold the motor
6. Decouple motor from the gear box.
7. Remove electrical connections.
8. Remove the mounting bolts of motor.
9. Lift the motor at the platform level and shift out of trolley with proper material handling arrangement.
10. Replace the new motor to the location with same material lifting arrangement and position with the help of chain block.
11. Provide foundation bolts and align with gear box.
12. Connect motor drive by providing coupling bolts.
13. Provide electrical connections.
14. Check the direction of motor as required.
15. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
16. Take trials in co-ordination with operator.
17. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
18. Ensure all the job is completed as planned and all safety guards have been placed and secured properly as per guidelines before releasing the crusher for operation
19. Release the crusher for operation.
20. Shift the removed motor to workshop for repairs by using proper material handling arrangement.

# Activity No 9 : Replacement of floating shaft.

1. Isolate the power of CT drive with proper isolation procedure as per the Vedanta isolation standard.
2. Shift the new / overhauled floating shaft fitted with coupling at the place of replacement
3. Decouple the floating shaft from drive wheels and gear box.
4. Remove the floating shaft from the location.
5. Replace new floating shaft and couple with CT gear box and drive wheels.
6. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
7. Take trials in co-ordination with operator.
8. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
9. Ensure all the job is completed as planned and all safety guards have been placed and secured properly as per guidelines before releasing the unloader for operation
10. Shift the removed shaft to workshop / scrap yard for repairs / disposal based on the condition.

# Activity No 10 : Replacement of drive wheels.

1. Isolate the power of CT drive with proper isolation procedure as per the Vedanta isolation standard.
2. Shift the new / overhauled wheels shaft assembly fitted with bearing block assy. at the place of replacement with proper material handling arrangement
3. Decouple the floating shaft from drive wheels and gear box.
4. Lift the trolley assy. with hydraulic jack and provide wooden logs/structural supports to hold the trolley in lifted position.
5. Remove the drive wheel assy. mounting bolts and shift the wheel assy. out from the trolley.
6. Replace the new / overhauled drive assembly using proper material handling arrangement.
7. Provide foundation bolts and tighten.
8. Align the wheel input shaft with CT drive gear box.
9. Install floating shaft and provide coupling bolts.
10. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
11. Take trials in co-ordination with operator.
12. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
13. Ensure all the job is completed as planned and all safety guards have been placed and secured properly as per guidelines before releasing the unloader for operation
14. Shift the removed shaft to workshop / scrap yard for repairs / disposal based on the condition.

# Activity No11 : Preventive Maintenance.

Preventive Maintenance of Jetty unloaders are cover under

1. CLTI. (Cleaning, Lubrication, Tightening, Inspection)
2. Monthly Preventive maintenance.
3. Quarterly Preventive Maintenance.
4. Half Yearly Preventive Maintenance.
5. Yearly Maintenance.

CLTI is basically is routine run check inspection and any identified abnormality is documented and updated in SAP in MR Notification. On opportunity the same is resolved and the abnormality is closed.

**Procedure for Preventive maintenance**

1. Check the preventive maintenance schedule in SAP.
2. Take system generated print of generated PM and hand it over to maintenance crew for execution.
3. Isolate the Jetty unloader with proper isolation procedure as per the Vedanta isolation standard.
4. Carry out all tasks mentioned in the checklist as per guidelines and update the job completed and actual conditions with the time taken for completion of the job.
5. Ensure all the jobs are completed and in case of any abnormality or pending jobs in the list, a separate notification must be raised in SAP for ensuring the compliance.
6. All unwanted material from the area to be removed before releasing the equipment electrical isolation.
7. Follow proper documented procedure for releasing the electrical isolations as per Vedanta approved isolation standards.
8. Ensure all the job is completed as planned and all safety guards have been placed and secured properly as per guidelines before releasing the equipment for operation.
9. After completion of PM activity, the generated order needs to be closed within 24 hrs of the execution.
   1. **RECORDS:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Record No.** | **Record Title** | **Maintained by** | **Soft/Hard form** | **Retention Time** |
| 1. |  | CLTI | Area in Charge | Hard | 1 Yr. |
| 2. |  | PM Checklist | Area in Charge | Hard | 1 Yr. |
| 3. |  | Notification Data | Area in charge | Soft |  |
| 4. |  | Hazard Identification | IMS | Soft | 1 Yr. |
| 5. |  | Risk Assessment | IMS | Soft | 1 Yr. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Manual Section Ref. & Para** | **Brief details of Revision** | **New Rev.** |
| 13-08-2022 | Header | Company logo & Document no. | 07 |
|  |  |  |  |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Prepared By:**  Head Mechanical Maintenance, Battery 1- MCD | **Reviewed & Issued By:**  Management Representative | **Approved By:**  Head Mechanical Maintenance MCD |
| **Signature:** | **Signature:** | **Signature:** |
| **Review Date: 13.08.2022** | **Review Date: 13.08.2022** | **Review Date: 13.08.2022** |