

NTPC Limited

Mouda Super Thermal Power Station

Reportable Incident

A. Particulars of incidents:

Date & Time of Accident : 01.12.2021 at about 1640 Hours
Location of Accident : Near TP#12 (rear side of coal pile#3, CHP)
Type of Accident : Reportable
Nature of Injury : Minor cut injury at epigastric region

B. Brief History of Incident:

Two persons were engaged through sub-contractor for coal yard H/K work. On the day of accident both were deployed for grass cutting work near TP-12 on the pile side at back end of coal yard in CHP area. At about 1640 Hrs. Grass Cutting Operator was cutting the grass with grass cutting machine (FS 230, M/s XXXX make, cutting attachment - 2 teeth blade). Suddenly, the cutting blade failed and hit another person, who was standing about 6m away him. That person sustained superficial laceration at the point of contact (near brush) on the epigastric region (below left ribs) of his stomach and was immediately taken to nearest Hospital. After administering first aid treatment (stitching and medication) he was referred for further medical evaluation. After examination and rest he was discharged from hospital.

Immediate Action Taken:

1. Grass cutting Machine confiscated.
2. Instruction issued for stoppage of grass cutting work through machines deployed in Plant & Township area till further instruction.

C. Incident Enquiry Committee (IEC) Members:

Matter was referred to standing committee constituted to investigate the reason and identify the root cause and suggest corrective action to prevent reoccurrence of such events in future.

D. Investigation:

a. Observation and Findings

The 'IEC' visited the incident spot and interacted with concerned persons associated persons on 01.12.2021, 04.12.2021, 06.12.2021, 07.12.2021 and took the status of the 'Approach' & 'Safety Aspects' of that area and discussed in detail about the accident with grass cutting operators, supervisors of agency, employees & injured person.

Many grass cutting machines are used at multiple locations in plant and township. These machines are of different make and used for small grass, large bushes and at some places shrub's with use of nylon rope and metal blades. However, largely nylon ropes are being used to cut grasses and bushes. Grass cutting machines are very handy , simple to use and gives maximum output within minimal time in comparison to manual work. As it is very easy to use, many safety practices and machine instructions are overlooked.

Following observations were recorded during investigation of this incident and interaction with other usage area:

At Incident Site: Bushes/ shrubs at incident place i.e. backside of TP 11- TP 12 were of large size with thick stems at some places. The nearby area was also waterlogged. Operator was supposed to clean this area with the machine along with assistant. Operators informed that shrubs with thick stem were being cut by sickle (हंसिया). Assistant was standing 20-25 fts away behind and on right side of operator. Metal blade broke into two pieces and injured the assistant. The piece that injured the assistant was recovered, but other piece couldn't be recovered. However, exact location of injured person cannot be verified at site, except information received from operator.

At other Sites and Offices :

- 1) After the incident all the grass cutting machines were inspected by concerned department along with safety. It was observed that different agencies were using different cutting blades/ wires.
- 2) Burrs were observed on the damage blade due to continuous usage.
- 3) As per manufacturer manual, interaction with M/s XXXX service engineer and Operators, possibility of blade breaking is minimal if checked thoroughly.
- 4) Many Operators were not aware of the proper sequence of fitment of cutting blade.
- 5) Record of training for safe operation of machine was not found for this case and other places of operation.
- 6) SOP was not found prepared. Record of HIRA and JSA not found available for grass cutting operation.
- 7) Machine issuing details and daily safety check report not maintained by the contractor in general.
- 8) The injured person was not standing at a safe distance during the grass cutting operation while as per OEM recommendation is 15 meter.
- 9) Manufacturer's instruction not followed in general for this case and others.
- 10) No permit system for grass cutting operation.

b. **Root-cause Analysis of Incident**

Based on site visit and interaction with concerned officials, root-cause analysis by committee members is as under: -

Immediate Cause: -

Failure of blade of grass cutting machine during operation.

Probable Route Causes : Operator was not aware of the Stones & Pebbles or metal parts beneath the shrub's. As Brush Cutter Strikes at a very high-speed, it leads to failure of blades resulting into injury.

- Operator who was operating the machine was not aware about the correct & intended operations of FS 230 cutting machine due to that unintentionally rotating blade collided with ground.
- Machine Failure may be due to wrong use or sudden breakdown.
- Use of Defective/Cracked blade knowingly/unknowingly may lead to breaking down of blades into pieces resulting in projectile motion striking the associate, who was standing at about 6 meters distance.

E. Conclusion :

No concrete reason could be ascertained for failure of the blade. However, sudden Failure of blade may be because of -

- a. Usage of defective/cracked blade which may have failed as it struck with stones/pebbles/metal during grass cutting operation
- b. Wrong fitment of cutting attachment resulting in failure of cutting blade also cannot be ruled out.
- c. Operational error & machine breakdown while using grass cutting machine.

F. Recommendations:

1. Grass/bush cutting to be done primarily with nylon rope attachment only. If use of metal cutting attachment found necessary, then bush cutting to be done under expert supervision with intimation to EIC (Engineer-In-Charge).
2. Training to all Operator's, Safety Supervisor's, Site In-charge's & concerned Owner's by OEM/Expert on safe operation of the machine. Record of the same to be maintained.
3. SOP to be prepared and HIRA & JSA to be done. Workers to be educated. Permit system to be used for grass cutting as well. This will be useful for information to operation, identification of site condition, SOP and JSA .
4. Signage's to be provided and area to be barricaded with Safety cone/appropriate tools in a 20-meter radius of working area to warn the other people. While cutting grass on roadside or other area in vicinity of people movement appropriate barricade like green cloth material is to be suggested.

5. Blades not to be changed at site in any condition by operator. It is to be changed by responsible trained person with correct procedure of OEM at designated place.

- Mandatory PPE's for operator and Safety Equipment's- Cut-resistant Gloves with anti-vibration property, FFP1 Dust mask, Ear Muffs, Safety Goggles, Gum Boots with Steel toe, Face Shields & Fire Extinguishers. Coveralls (Leather/Cut-resistant) is also suggested.

G. Other Precautionary Measures :

1. Area should be inspected before work commencement for pebbles/Stones.
2. Min. 20 m distance should be maintained from the Brush Cutting Operations.
3. Specially in Township areas, all work should be done under expert supervision.
4. All logs of machine issuance to operators in the form of machine issue register, repair & maintenance register to be maintained. Also, all machine to be checked before issuance and at regular intervals by responsible person. Record of the same to be maintained.
5. Operation of the grass cutting machine to be done as per manufacturer instructions (period of operation with rest intervals). The same to be mentioned in SOP.
6. Guard/deflector necessarily to be placed on machine at correct distance from cutting portion. Also, Healthiness Certificate to be made available for every single machine by authorized Service Provider.
7. The machine to be operated with all recommended fittings as per manufacturer's instructions.

H. Photographs:

Initial Inspection of Grass Cutting Machines conducted by user dept. along with Safety.



Technical Safety Precautionary Measures

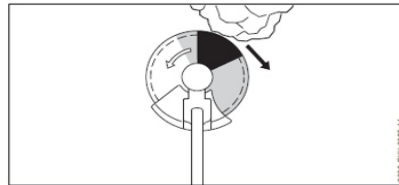


- If the cutting attachment makes contact with a foreign object during operation, the object or parts of it may be thrown at high speed. Persons may be injured or property damaged.
 - ▶ Remove foreign objects from the working area.
- If the rotating metal cutting attachment makes contact with a hard object, sparks may occur and the cutting attachment may be damaged. Sparks can cause fires in a flammable environment. Persons may be seriously or fatally injured and property may be damaged.
 - ▶ Do not use the chain saw in a flammable environment.
 - ▶ Make sure the metal cutting attachment is in a safe condition.
- Note that the cutting attachment continues to rotate for a short period after you release the trigger. They may cause serious injury to persons.
 - ▶ Wait until the cutting attachment comes to a complete stop.

5 Safety Precautions

- In an emergency, the user may start to panic and forget to take off the carrying system. This may result in serious injury to the user.
 - ▶ Practice taking off the carrying system.

5.9 Reactive Forces

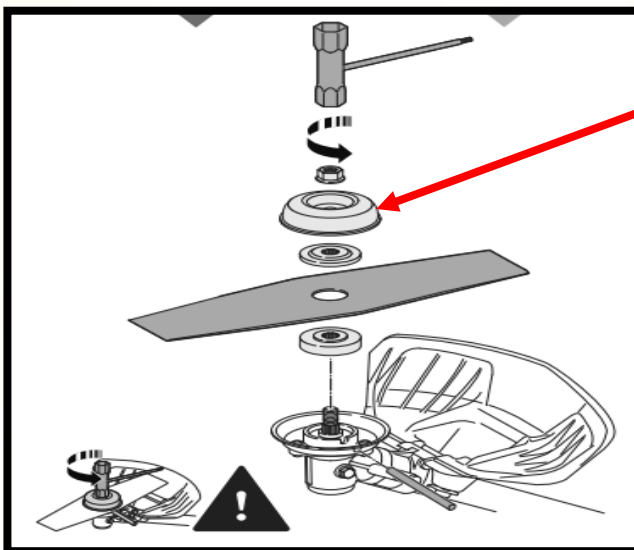


- Kickout can be caused for the following reasons:
- The shaded area or the black area of the rotating metal cutting attachment comes into contact with a solid object and is suddenly braked.
 - The rotating metal cutting attachment gets pinched in the cut.

The risk of kickout is greatest in the black area.

⚠ WARNING

- These situations can abruptly decelerate or stop rotation of the cutting attachment and cause the cutting attachment to be thrown to the right or in the direction of the user (black arrow). The user can lose control of the trimmer. This can result in serious or fatal injuries.
 - ▶ Hold the trimmer firmly with both hands.
 - ▶ Use the working techniques described in this instruction manual.
 - ▶ Do not use the black area for cutting.
 - ▶ Use a combination of cutting attachment, deflector and carrying system recommended in this instruction manual.
 - ▶ Sharpen the metal cutting attachment correctly.
 - ▶ Cut with the motor running at full speed.



Some Vital Parts Missing during operation & Fitments also not in correct sequence as per manufacturer recommendations





Operation Review at Site by Investigation Committee



Training to All Grass Cutting Operator's



SOP IMPLEMENTED SUCCESSFULLY

<p style="text-align: center;">एनटीपीसी NTPC</p> <p style="text-align: center;">मौदा MOUDA</p> <p style="text-align: center;">STANDARD OPERATING PROCEDURE FOR GRASS CUTTING & BUSH REMOVAL IN CHP AREA</p> <p>To ensure safe operation of Machine (with Metal tool/blade) for grass cutting, removal of bushes/vegetation grown around TPs and below conveyors, in & around Coal Slack piles/pile boundaries and along the length of rails of Stacker Reclaimer, following steps are to be followed:</p> <ol style="list-style-type: none"> 1. Identify and ensure that the person identified for Grass cutting/Bush removal work is having sufficient experience of doing so and have basic knowledge of machine operations (like mounting the deflector/metal cutting attachment, fueling, preparing Start/Stop of engine, basic maintenance viz. lubrication, filter cleaning etc.) and controls and undergone relevant training in this field. Do not allow operator having cardiac problem fitted with Pacemaker to operate Machine. Person should be healthy enough to carry & operate the machine properly. 2. Before taking machine into operation, loose/missing nuts/bolts, screws, condition of metal/nylon rope cutting attachment, deflector/guard, leakage of fuel etc. to be checked thoroughly and tightened and/or replaced as needed. The cutting tool/blade of machine must be installed correctly using tools/spares provided for attachment & as per manual. Do not start the engine if there is any leakage of Fuel or damage in fuel cap/hose connections and/or spark plug boot as there is a risk of fire. 3. Inspection of cutting tool can be done for damage by tapping the tool with a metal object. If the tool rings clearly (like a bell), it is undamaged. If the sound is dull, the tool is damaged and must be replaced. 4. Unevenly sharpened metal cutting attachments cause out-of-balance not to be used. Do not continue using or attempt to repair damaged or cracked cutting attachments by welding, straightening or modifying the shape (out of balance). Balancing of Metal cutting attachment to be done by OEM's authorized service dealers while servicing/repair. Use genuine accessories prescribed by OEM only. 5. Servicing & repair of machine to be done from OEM's authorized service dealers only and machine fitness to be ensured before taking machine into operation. Usefulness of metal cutting attachment also to be verified during servicing & to be checked time to time as per manual and blades to be replaced accordingly. 6. Inspect & identify the area of CHP where Grass/bush cutting to be done, segregate the same wrt type of terrain (viz. Plain, muddy, having stones, metal scraps, cables, uneven surfaces etc.) & type of vegetation (viz. grass, long & strong brushes, small trees etc.) and identify the correct cutting tool (metal cutting toll or nylon rope attachment) accordingly. 7. Grass/bush cutting to be done primarily with nylon rope attachment only or manually (with hasiya/khurpa). For wood or shrubs with a stem diameter up to 2 cm, if use of metal cutting attachment found mandatory, bush cutting to be done in supervision of agency's supervisor/expert only with intimation to EIC. 	<ol style="list-style-type: none"> 8. Appropriate signage to be placed around 15-meter radius of working area to prevent trespassing. While using metal cutting attachment, 15-meter radius area to be barricaded with Safety cones/appropriate tools along with signage. 9. Within identified working area, if there are objects to avoid like metal, stones, debris etc. & any potential trip hazards such as tree stumps and roots, try placing sticks/identification markers where they are so that same can be easily identified while working. Grass cutting from machine not to be done nearby Railway Track of Stacker Reclaimer, in & around Sone Picker tramp discharge chute/area identified to dump scrap, vegetation/bushes grown inside drains/confined space. Do not work on slippery, uneven, or unstable surfaces. 10. Ensure wearing of necessary PPE's like close fitting safety glasses (EN 166 standard or equivalent), Face Helmet, Ear protection, dust respirator mask, shoulder harness/carrying system, Safety Helmet, steel toed safety boots and work gloves, safety jackets & long trousers made from resistance material from sharp edges of cutting attachment. Wear close fitting clothing and remove scarves & jewelry. 11. When using the grass/bush cutter, make sure that there are no Man and/or animals, within a 15-metre radius, as there is a risk of serious injury from flying stones, damaged metal cutting attachment and other small objects. Safety distance should also be maintained from objects such as vehicles and windows while using machine. 12. After all checks & safety precautions as mentioned above, grass/bush cutting may be started as per following sequence: <ol style="list-style-type: none"> i) Start the engine at least 3 meters from the fueling spot, outdoors only. ii) Place the unit on firm ground in an open area. Make sure you have good balance and secure footing. Hold the unit securely. The cutting attachment must be clear of the ground and all other obstructions because it may begin to run when the engine starts. iii) Always hold the power tool firmly with both hands on the handles. iv) Sweep the grass cutter in an arc like a scythe (sweep it to the right and left). v) To cut wild growth and scrub, lower the cutting attachment down onto the growth to achieve a shredding effect – always keep the cutting attachment below hip level during this process. 13. After finish of grass/bush cutting, shut off the engine & wait for the cutting attachment to come to a standstill, allow machine to cool down then clean the machine, air filter, deflector, cutting attachment & stack machine at its designated place withing reach of identified persons only. 14. Do not modify grass/bush trimmer's operating or safety equipment (mounting of cutting attachment, deflector etc.) in any way without consultation/approval of OEM. 15. Never cut wood or shrubs with a stem diameter of more than 2 cm. 16. Always keep an escape route clear for emergencies while using a grass/bush cutter. Slippery or uneven surfaces are dangerous, so try to avoid these if possible. 17. In case of any emergency, following persons may be contacted.
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Case Study of Near-Miss

01. Near-Miss -

Reported on 12.10.2022, Unit-02 Boiler & Aux, During box up of RCF 2G Front door, hinge head got detached due to ageing and fallen on Workers Leg. #Luckily escaped with no injury.

HOP Visit At Near-Miss Location On 12.10.2022



HOP (Mouda) visited the incident spot. Suggested recommendation has been implemented in one feeder. The same will be provided in all remaining 37 feeders to avoid any such occurrence in future. Photos given below.


20:19 ✓

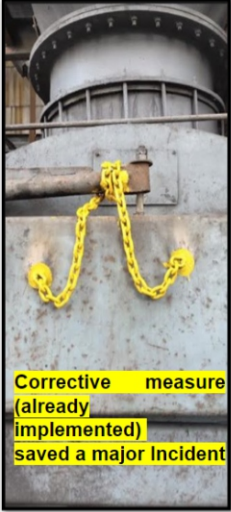


Corrective measures saved a major Incident



CAPA (Corrective Action Preventive Action) saved a Major Incident **एनटीपीसी NTPC**





Corrective measure (already implemented) saved a major Incident

Recommendation suggested by HOP (Mouda) implemented for all 37 feeders to avoid any such occurrence in future.

It was shared by Worker named Mr. Namdeo working in M/s Simar (BMD), during interaction in safety induction on 24.07.2023. While asking with the group, "How many of you have ever faced the near-miss at your site".

He suddenly replied "सर मैं एक दिन बाल बाल बच गया" Gone into depth & then came to know about the similar incident which genuinely saved him from a major incident.

CAPA (Corrective Action Preventive Action) saved a Major Incident **एनटीपीसी NTPC**



Corrective measure (already implemented) saved a major Incident
Location:- U#2 Boiler Feeder-F
Date-29.05.2023







Reference object

Functional loc. MOUDA: U-2 BOILER & AUX

Equipment

Subject

Coding Near Miss

Description

Subject Long Text

Incident Type NEAR MISS

RCF 2G Front door during box up, hinge head got detached due to ageing and fallen on Workers Leg. #Luckily escaped with no injury.

13.10.2022 11:50:55 INDIA (060627)

Responsibilities

Planner group / Boiler maint.

Main WorkCtr / RM-1

Reported by Notif.date

We have Suraksha APP for Reporting Unsafe Observations/Incidents in much easier way which is further directly linked with SAP systems to effectively monitor the same.

As per the Location Management Instructions (LMI) for Safety Awareness Communication & Promotion, Ref:- LMI/MOUDA/SAFETY-10/OD/OPS/SAFT/007/Rev0

Above Person has been rewarded for reporting the near-miss.

02. Near-Miss

As reported in SAP:- 10.06.2022 18:21:20 INDIA (PM_BATCH)

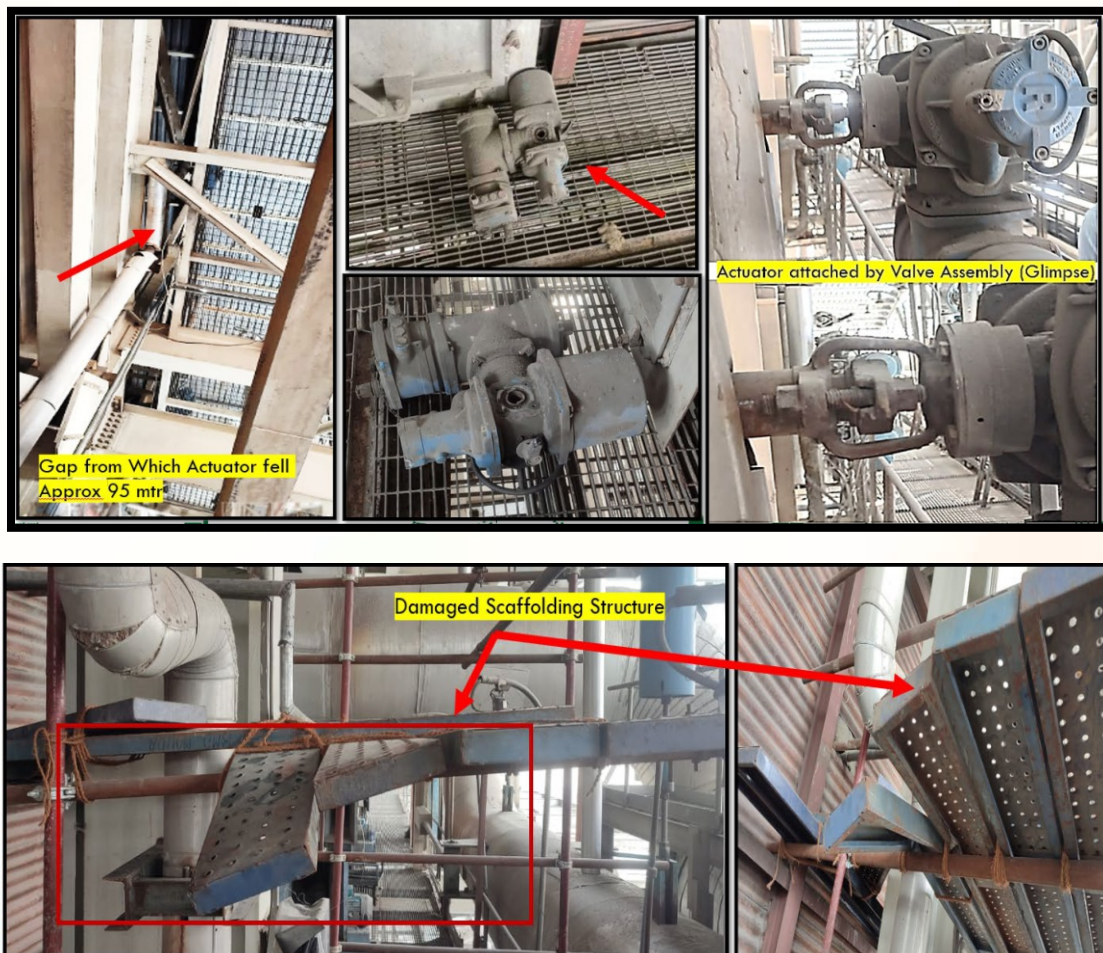
Unit-4 SB tape off vent valve electrical actuator fallen from 90 mtr to 80 mtr. Scaffolding and piping support got damaged.

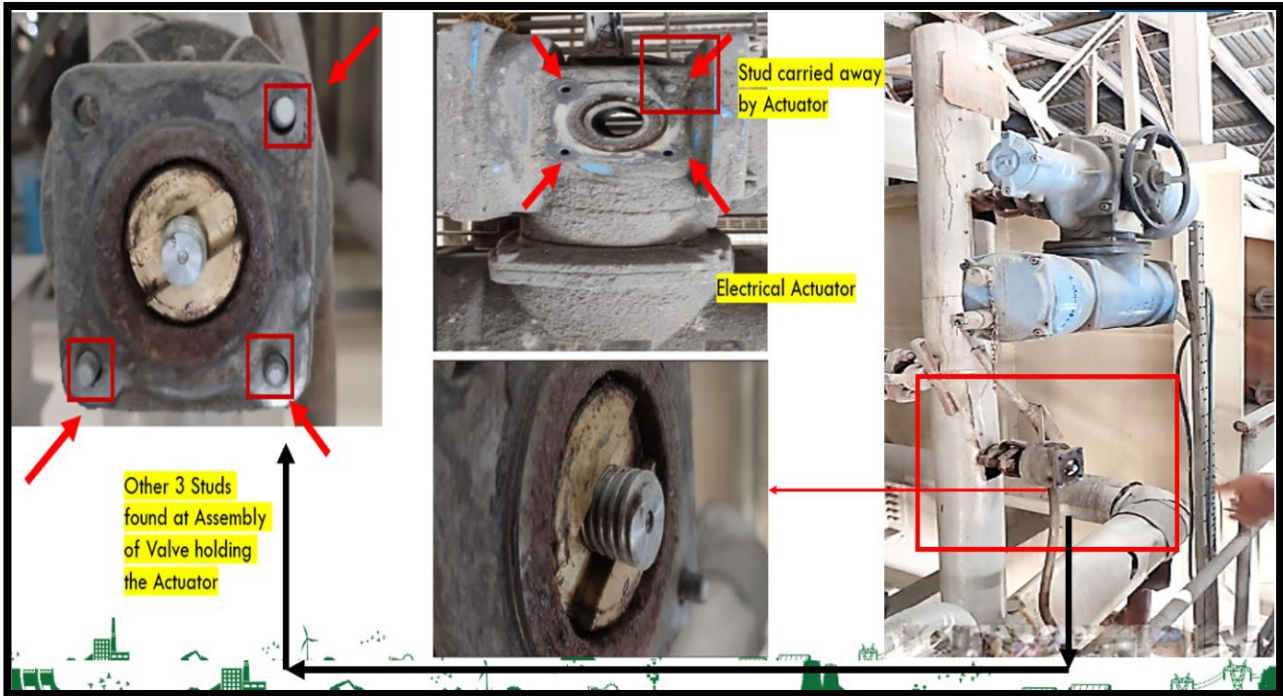
After Reviewing the Site Location & On interaction with BMD (Boiler Maint. Dept.) & TMD (Turbine Maint. Dept.) Managers:-

On 10/06/2022, afternoon 12:10 hrs When agency workers (SIMAR) reached for resumption of work (Reheater preservation line modification) on Scaffolding, they found the Structure damaged & Electrical Actuator laid near by. Hence, reported to BMD.

After reviewing the Site location, It seems that weight of SB TAP OFF VENT RHS Electrical Actuator, approx. 40-45 kg have been completely dependent on 4 Studs which hold the actuator, & Owing to the possibility of loosening of such studs due to certain reasons like (might have left to tighten it properly in previous Overhauling, or it may get loosened due to hammering/vibration) could resulted into such menace, self weight is catalysing factor here. Scaffolding Structure damaged very badly, We are fortunate that no one was working during that time.

Time of Falling the Actuator have been ascertain, as nobody saw it during fall.





Route-Cause identified:-

Owing to the possibility of loosening of studs responsible for holding the Electrical actuators due to certain reasons like (might have left to tighten it properly in previous Overhauling, or it may get loosened due to hammering/vibration) could resulted into such menace, self-weight is catalysing factor here.

Committee Recommendations: -

- 1) All such Electrical Actuators & other Equipment's held by such means should be checked thoroughly & re-tighten again on or before 20/06/2022 for all 4 units. (Recommended by HOP).
- 2) Preventive Maintenance Schedule should be made such that all such equipment's at a certain frequency can be inspected to prevent similar kind of incidences in mere future.
- 3) Also, one aspect of "Effectiveness of holding such equipment's" shall be explored & design of other such assemblies can be reviewed again pertaining to safety.

TURBINE SIDE			
UNIT	TOTAL ACTUATORS	ACTUATORS CHECKED	ONE BOLT MISSING TO BE ATTENDED
1	145	145	11
2	145	145	15
PLATFORM ISSUE / UNSAFE PLATFORM			
	UNIT 1	UNIT 2	
Turbine side	32	41	

UNIT-1 TURBINE SIDE ACTUATOR PROBLEMS						SUPPORTING PICTURES		
UNIT	ACTUATOR NAME	LOCATION	Qty	TIGHTNESS STATUS	OTHER PROBLEMS			
1	FDV-9,8,7,6,5,4,10,12,16 ALL IBV	8.50 MTR TURBINE	9	-	PLATFORM N/A			
2	AS-21 A	33 MTR TURBINE	1	TIGHTNESS DONE	A-UNSAFE PLATFORM			
3	SG ECW SUCTION VALVE-A+B	9 MTR TURBINE	2	TIGHTNESS DONE	PLATFORM N/A			
4	CDV-8,7 IBV	9 MTR TURBINE	2	TIGHTNESS DONE	A-UNSAFE PLATFORM			

Standing Committee Order

MTPC Maharashtra Company

CIRCULAR

Mouda/safety/2021-22 Date: 31.12.2021

Following standing investigation committees have been constituted for investigation of fire incident, Near Miss incident and accident involving loss time injury.

No.	Nature of Investigation Committee	Member - 1 (Shri)	Member - 2 (Shri)	Alternative member * (Shri)	Member - 3 (Shri)
1	Fire Incident Investigation	Mansu Gupta	Narayan Reddy	Poojit Borikade	T. Turkar
2	Near Miss Incident Investigation	Abhinav Bhaku	Rahul Dhant	Ankush Yatisbandhe	Kishorek Tharde
3	Loss time Injury Investigation (Reportable & Non-reportable)	Sanjay Verma	Nitin Rakhonde	Satyajit Banerjee	D V Babekar

*Alternative member shall replace the member-1 only in case the incident occurs in the area of responsibility of the late.

The terms of reference for the Investigation committee are:

- Circumstances and reasons of the incident /incident.
- Estimate of extent of loss or damage of property etc. (not applicable for near miss incidents).
- Fixation of responsibilities (not applicable for near miss incidents).
- Suggestions for prevention of recurrence of similar or related nature of incident.
- Any other relevant aspect.

The committee shall investigate all incidents (except an office order released by the Competent Authority for investigation of certain incidents) and suggest remedial measures to avoid recurrence of similar incidents and submit the report within the timelines recommended in LMF MOUDA/SAFETY-01/ODG/EN/MS/REV03.

The committee shall submit the report to HOP through HOD (Safety) & GM (O&M) for their observations or comments. The tenure of the committee shall be up to 31.12.2022. This comes with immediate effect.

This has approval of the Competent Authority.

K.K. Pal
AGM (Safety)

Copy: - ES to CGM through e-mail for kind inf to CGM
 - All concerned through e-mail
 - All HODs through e-mail