# केंद्रिय विघुत अनुसंधान संस्थान

( भारत सरकार की सोसाइटी, विघुत मंत्रालय)

थर्मल अनुसंधान केन्द्र, खसरमारी रोड, अल्ट्राटेक सिमेंट के बाजू, धुटी, डोंगरगाव, वर्धा रोड, नागपुर-441108 (महाराष्ट्र राज्य)

# CENTRAL POWER RESEARCH INSTITUTE

(A government of India Society, Ministry of Power)

THERMAL RESEARCH CENTRE, KHASARMARI ROAD, ADJACENT TO ULTRATECH CEMENT, DHUTI, DONGARGAON,
WARDHA ROAD, NAGPUR – 441 108. (M.S.)

वेब साइट / website : http://www.cpri.in


No. TRC/EMD/TOS-295/2023-24/FR /3 Date 02.01.2024

To
The Chief Engineer,
Chandrapur Super Thermal Power Station,
Maharashtra State Power Generation Co. Ltd.,
Chandrapur. (M.S.)

Kind Attention: Superintending Engineer (CHP-A/B/C)

**Subject:** Final report of Inspection of damaged /running/failed parts at CHPA/B/C of Unit 3 to7 of Chandrapur Super Thermal Power Station, MSPGCL,Chandrapur. (M.S.)

**Reference:** CSTPS/4500128199/1725 dtd. 29.08.2023

**Dear Sir,**

With reference to the above we have completed the Inspection of damaged /running/failed parts at CHPA/B/C of Unit 3 to 7 of Chandrapur Super Thermal Power Station, MSPGCL,Chandrapur. (M.S.), as per the scope of work. We are very thankful for the co-operation extended by the concerned engineers for completing this study.

Please find enclosed herewith the Final report of Inspection of damaged /running/failed parts at CHPA/B/C of Unit 3 to 7 of Chandrapur Super Thermal Power Station, MSPGCL,Chandrapur for your reference and necessary action.

Thanking you and assuring our best services at all the times.

Encl.: As above.

CSTPS/CE
DATE 3/1/24
TIME 10:40 A.m

Yours faithfully

Rajesh Ranjan

(Rajesh Ranjan)
Joint Director/Unit Head

# FINAL REPORT

**(PROJECT CODE- TOS –295)**

**ON**

## INSPECTION OF DAMAGED /RUNNING/FAILED PARTS CHPA/B/C of Unit 3 to7

**AT**

## M/s. CHANDRAPUR SUPER THERMAL POWER STATION,MSPGCL,CHANDRAPUR

**STUDY CONDUCTED BY:**


***CENTRAL POWER RESEARCH INSTITUTE***
***THERMAL RESEARCH CENTRE,DHUTI– 441108,***
***DIST.-NAGPUR (M.S.)***

# ACKNOWLEDGEMENT

Work of inspection of damaged /running/failed parts at CHPA/B/C of Unit 3 to7 of CSTPS Chandrapur was carried out by M/s. CPRI, Thermal Research Centre, Dhuti, Nagpur during the month of September 2023 vide P.O. no.: CSTPS/4500128199/1725 dtd. 29.08.2023.
We express our grateful thanks to Superintending Engineer, Executive Engineer,Addl. Executive Engineerof and Engineers of M/s. CSTPS, MSPGCL, Chandrapur for their valuable co-operation and support extended for successful completion of the test.

We also sincerely thank to Chief Engineer, M/s. Chandrapur STPS, MSPGCL, Chandrapur for their co-operation for the successful completion of the study.

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( भारत सरकार की सोसायटी, विद्युत मंत्रालय)
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# FINAL REPORT

**PROJECT CODE: TOS-295**

| | |
|---|---|
| TEST REPORT NO. & DATE | :TRC/EMD/TOS-295/2023-24/FR Date 02.01.2024 |
| CLIENT'S ADDRES | : Chief Engineer,<br>Chandrapur Super Thermal Power Station,<br>Maharashtra State Power Generation Co. Ltd.,<br>Chandrapur. (M.S.) |
| WORK ORDER NO. | : P.O. no.: CSTPS/4500128199/1725 dtd. 29.08.2023 |
| PARTICULARS OF COMPONENT INSPECTED | : Components CHPA/B/C of Unit 3 to7 |
| PERIOD OF INSPECTION | : 14.09.2023-16.09.2023 |
| PARTICULARS OF INSPECTION of Unit 3 to7 | : Inspection of damaged /running/failed parts at CHPA/B/C |
| TEST IN ACCORDANCE WITH STANDARD/SPECIFICATION/ CLIENTS REQUIRMENT | : As per client's requirement. |
| DEVIATION IF ANY | : NIL |
| NUMBER OF PAGE | : 31 Pages.(Thirty One pages only) |

NOTE: a) This is not a certificate of compliance.
b) This test result relates to the item tested.
c) Publication or reproduction of this report in any from other than by complete set of the whole report and in the Language written are not permitted without consent of CPRI.
d) Corrections/erasing invalidate the test report.

(D.M.GOURKHEDE)
**JOINT DIRECTOR**

(Rajesh Ranjan)
**JOINT DIRECTOR/UNIT HEAD**

## 1.0 INTRODUCTION

1.1 Detailed Project Report for CHP Improvement Schemes at CHPA/B/C of Unit 3 to7, CSTPS, Chandrapur is in process. In this context M/s. Chandrapur Suprr Thermal Power Station, MSPGCL, Chandrapur, Maharashtrahave decided to carry out the work of Inspection of damaged /running/failed parts of CHPA/B/C of Unit 3 to7 vide P.O. no.: CSTPS/4500128199/1725 dtd. 29.08.2023.

The Chandrapur Super Thermal Power Station of MAHAGENCO is having installed capacity of 2920 MW. Currently, total 7 Nos. of units are in operation, out of which Units # 3 & 4 are each of generation capacity 210 MW and Units # 5 to 9 are each of generation capacity 500 MW. Unit#3&4 are commissioned in the year -1986. Unit# 5, 6 & 7 are commissioned in the year -1992, 1993 and 1997 respectively. Unit#8&9 are commissioned in the year -2016. The daily requirement of coal is @ 47000 MT for overall CSTPS. To feed the required amount of coal to Unit # 3 to 9, total four Coal Handling Plants CHP-A, CHP-B, CHP-C & CHP-D are installed at CSTPS

The CHPA is commissioning in the year 1984.The Coal Handling Plant-A has to feed the coal to 2x210 MW Units (2x210MW). Daily coal requirement of coal is @ 8000 MT and has facility to receive coal from Rail, Rope & Road mode. Two numbers of Ropeways are installed for transportation of coal from (WCL) Durgapur Open casts mine to CHPA of CSTPS. Daily @ 7000 MT coal being transported through ropeways. Further various interconnection conveyors also installed at CHPA to bunker the coal to Unit 5,6&7 to utilized complete infrastructure of CHPA to feed the coal to CHPB of Unit 5 to7.

The Coal handling Plant-B is commissioned in the year 1992 to feed the coal to 3 x 500MW sets. Daily requirement of coal is @ 24000 MT. Coal received through BOXN & BOBR type wagons are being unloaded at Wagon Tippler hopper & Track hopper with the help of wagon tippler & Paddle feeder respectively. CHP-C is installed to receive coal from Padmapur OCM through CSTPS UTS wagons. The belt conveyor system is established for transportation of unloaded coal from receiving point to coal bunkers of each Unit. Hence to ensure coal at bunkers, smooth running of Coal Handling Plant-A, B, C, D is very much essential, for that healthiness and maximum availability all unloading auxiliary and coal conveyor stream is very important to run the coal handling plant for sustainable capacity.

1.2 The work of Inspection of damaged /running/failed parts of CHPA/B/C of Unit 3 to7, CSTPS, Chandrapur was carried out by CPRI, Thermal Research Centre, Dhuti, Nagpur on 14$^{th}$ to 16$^{th}$ September - 2023 at site as per the scope given by the plant authorities.

## 2.0 PROJECT TEAM

| Sr. No. | Name of the official | Dsignation |
|---|---|---|
| 1. | Sh. D. M. Gourkhede | Joint Director |

## 3.0 OBJECTIVE

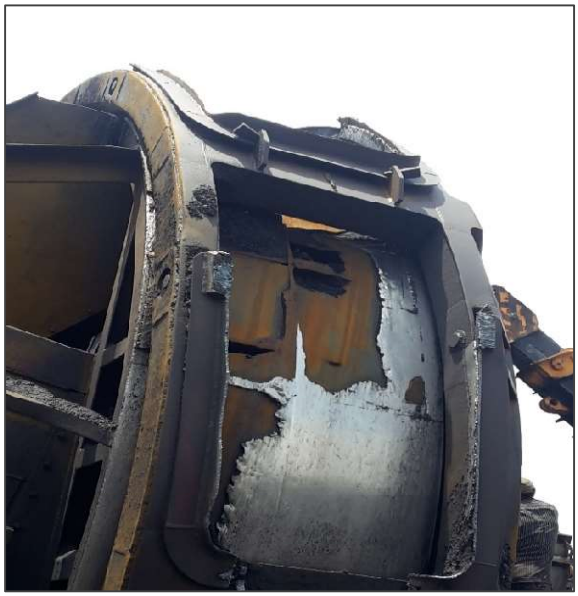
3.1 To carry out the work of Inspection of damaged /running/failed parts of CHPA/B/C of Unit 3to7

3.2 To submit a final report after completion of detailed inspection.

## 4.0 INSPECTION OF CHP EQUIPMENT AND RECOMMENDATION:

### 4.1 Reliability & availability improvement for Stacker Reclaimer by supply & technical support for commissioning of essential equipment at CHPB of Unit 5,6&7:

Two nos. of Stacker Cum Reclaimer are installed and commissioned by M/s Elecon At CHPB are in service since 1992. Stacker Reclaimer Machine is critical auxiliary and non-availability will hamper the unloading of wagons as well as hamper the reclaiming of coal. Stacker cum Reclaimer is equipped with Boom Conveyor, Intermediate Conveyor, Vibrating Feeder, Slewing mechanism & Luffing mechanism. Due to abrasive properties of coal and continuous reclaiming of coal, bucket wheel body rim assembly, bucket assembly, chute assembly are getting worn out. Maintenance of these equipment's is increasing day by day. Hence for healthy, maximum availability and for smooth running of Stacker Reclaimer, above spares need be available for replacement before failure. All the most of drive bogie and idle bogie are in service since commissioning and during physical inspection of drive bogie & idle bogie, it is observed that idle bogie and drive bogie are due for replacement. Slewing ring Bearing & boom luffing hydraulic power play very vital role in luffing mechanism as well as in Slewing mechanism. As such failure of slewing bearing/boom luffing may lead to outage of stacker Reclaimer for long period as it is not readily available. OEM M/s Elecon declared life of Slewing ring bearing is 15 to 20 years. Hence it is proposed to upgrade the hydraulic system of Boom Luffing Mechanism and supply & commissioning of slewing ring. OEM spares have high reliability long life, high quality and better performance and having interchangeability during breakdown of Stacker cum Reclaimers.



*Bucket wheel rim1*

*Boom Luffing Cylinder piston rod*

Damaged slewing bearing

Bucket wheel rim & buckets

*Idle/drive bogie*

*Idle/drive bogie*

**Recommendation:**

Considering the critical auxiliary and non-availability of stacker cum reclaimer machine and its consequential effects on unloading of coal, as well as reclaiming for maintaining bunker level, it is very much essential to improve the loadability and availability of stacker reclaimer machine by supply & technical support for commissioning of essential equipment from OEM M/s Elecon.

### 4.2 Reliability & availability improvement for Impactor Crusher by supply & technical support for commissioning of essential equipment at CHPB of Unit 5,6&7

CHP-C is installed to receive coal from Padmapur OCM through CSTPS UTS wagons and feed to coal bunkers of Unit 6&7. Single conveyor belt stream is installed for unloading of raw coal received through BOBR/UTS wagons at Track Hopper and having 02 nos. of wobbler feeder for screening and crushing at 02 nos. of impactor crusher. The complete coal handling Plant-C is installed and commissioned by M/s Elecon in the year 1997. All the auxiliaries are in service since commissioning. Failure of any stream, CHP-C will not be available for unloading & bunkering. Hence to ensure coal at bunkers, smooth running of Coal Handling Plant-B/C is very much essential, for that healthiness and maximum availability all unloading auxiliary and coal conveyor stream is very important.

Moreover, the Pipe Conveyor System is established and in service for transportation of coal from Bhatadi Open Cast Mines to Padmapur loading station of CSTPS through pipe conveyor system. Also, CHPC has facility to unload the coal receive through road mode also as this will help to maintain the bunker level of Unit 6&7 as per requirement. Due to mechanised arrangement for

unloading of trucks and addition of coal received through Pipe Conveyor System, running hours of CHPC installed auxiliaries are increased due to handling of additional coal receipt, thereby increase in wear & tear. Due to this failure of crusher impactor has been increased, results into outage of crusher frequently. This affects the loadability & availability of Crusher and which affect the bunker level of Unit 6&7

*Worn out hammer*

*Old Hammer*

**Recommendation:**

In order to increase the service life of existing crusher, replacement of all crusher elements is essential with up graded crusher elements for smooth generation of electricity. Upgradation will be done as per recommendation & concerned of OEM (Original Equipment Manufacturer) with increase in weight of Crusher Hammer as suitable.

It is recommended to upgrade the crushing elements to give sustainable service life with replacement of all other Crusher Elements to improve its availability & loadability for smooth performance.

## 4.3 Reliability & availability improvement for Conveyor Drive by supply & technical support for commissioning of essential equipment at CHPB of Unit 5,6&7 CSTPS at Chandrapur:

Coal handling plant-B is having 22 km long conveyor belts for conveying coal to the bunkers of Unit 5, 6, & 7 for bunkering & unloading of Wagons. There are 33 nos. of conveyor belt streams are installed by M/S L&T and Elecon. In conveyor drive system of these belt conveyors includes various gearboxes for which Elecon is OEM. Conveyor systems availability, reliability, and load-ability depend on these Elecon make drive gear boxes. Due to continuous operation of the system, internal parts are getting worn-out. Hence, timely replacement is inevitable to avoid break down and generation loss. At present conveyor drive system of conveyor belt is not healthy due unavailability healthy conveyor drive. It hampers the bunkering and unloading conveyor streams which results into high demurrages charges and generation loss occurred.

*Planetary gear box*

*Planetary gear box drive pinion*

*Damaged Hallow shaft*


*Damaged shaft matching with hollow shaft*

*Damaged Gear*

*Damaged gear*

**Recommendation:**

To increase loadability & availability of conveyor to avoid uninterrupted coal supply to bunkers and to achieve smooth running of coal handling plant, it is essential to supply & technical support for commissioning of essential equipment's of conveyor drive from OEM M/s Elecon.

### 4.4 Renovation & Modernization of Wagon Tippler Concrete Hopper of Coal Handling Plant-B of Unit 5,6&7 at CSTPS Chandrapur:

In CHPB, there are 02 nos. of wagon tippler supplied & commissioned by M/s L&T in the year 1992 for unloading of N type wagons. During unloading wagon is placed on Tippler Platform and tipped to below Hopper. There are two numbers of hoppers for storage of coal. The tippler hoppers are concrete hoppers with special cementing. Due to continuous falling of coal RCC concrete hopper and supporting beam surface of these wagon tippler hopper gets damaged. Also, the reinforced steel bars are worn out due to exposer to coal. In past repairing of these RCC hopper & beams were carried out 2-3 times, now it is very much essential to carry out the Renovation & Modernization of Wagon Tippler Concrete Hopper by special compound with allied works for smooth operation of Wagon Tippler and to avoid any eventuality in future. The special compound must be abrasive and high impact resistant with minimum curing time for minimum downtime. The compound shall be at least three times better compressive strength than concrete hopper.

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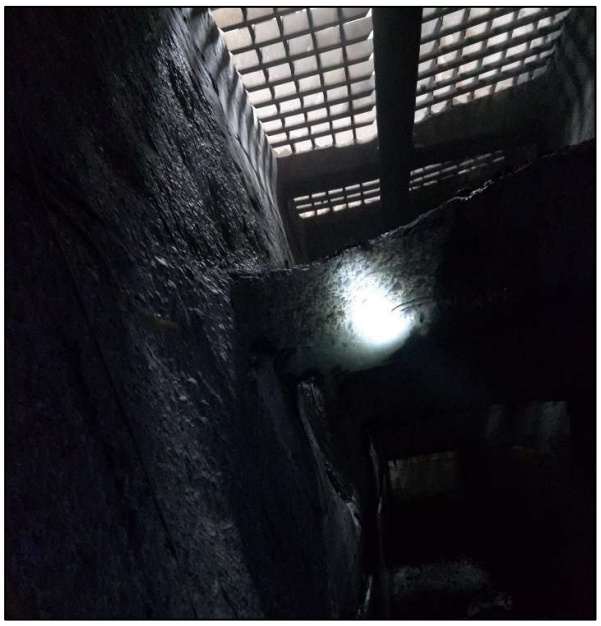
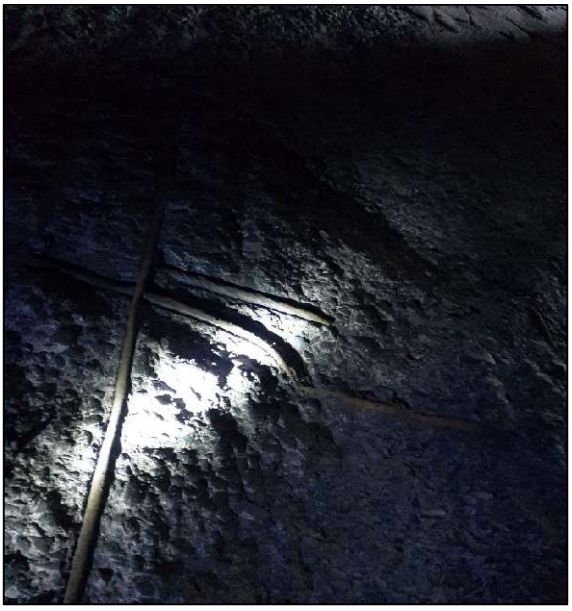
*WT RCC Hopper damaged*

*WT RCC Hopper damaged*



*WT Horizontal beam damaged*



*WT reinforcement steel bar opened*

**Recommendation:**

Since Wagon Tippler comes under unloading path as well as in generation path, it is essential to carry out the work of Renovation & Modernization of Wagon Tippler Concrete Hopper of Coal Handling Plant-B of Unit 5,6&7.

### 4.5 Renovation & Modernization of Wagon Tippler Concrete Hopper of Coal Handling Plant-D of Unit 8&9 at CSTPS Chandrapur:

In CHPD, there are 03 nos. of wagon tippler supplied & commissioned by M/s Elecon in the year 2016 for unloading of N type wagons. During unloading wagons is placed on Tippler Platform and tipped to below Hopper. There are two numbers of hopper for storage of coal. The tippler hoppers are concrete hopper with special cementing. Due to continuous falling of coal RCC concrete hopper gets damaged. Also, the reinforced steel bars are worn out due to exposer to coal. In past repairing of these RCC hopper & beams were carried out 1.-2 times, now it is very much essential to carry out the Renovation & Modernization of Wagon Tippler Concrete Hopper by special compound with allied works for smooth operation of Wagon Tippler and to avoid any eventuality in future. The special compound must be abrasive and high impact resistant with minimum curing time for minimum downtime. The compound shall be at least three times better compressive strength than concrete hopper.

*Reinforcement steel bar opened*

*Reinforcement steel bar opened*

**Recommendation:**

Since Wagon Tippler comes under unloading path as well as in generation path, it is essential to carry out the work of Renovation & Modernization of Wagon Tippler Concrete Hopper of Coal Handling Plant-B of Unit 8&9.

## 4.6 Work of Modification, Upgradation & renovation of Bunker Hopper of Unit 5&6 along with coal flow system at CSTPS Chandrapur.

The 1st & 2nd 500 MW units of stage-III (Unit # 5 & 6) at CSTPS were commissioned in March 1991 and March 1992 respectively. The bunkers of unit # 5 & 6 consist of 08 nos. of hoppers each for coal storage. Each hopper has a coal storage capacity of 1600 MT. The total height of each hopper is 30.650 Mtrs. Each hopper has a rectangular cuboid shape at top (Height 17.80 Mtr.) and trapezoidal prism shape (Height 12.85 Mtr) at coal discharge area. The inner surface of rectangular cuboid portion was covered with polymers anchored in the concrete of the walls. The trapezoidal prism's inner surface was having 05 mm thick stainless-steel lining. Both the 500 MW units i.e.

unit #5 & #6 have completed more than 30 yrs. of service. During last 30 years of bunkering of variety of coal, the deterioration of exposed surface area of the hoppers occurred gradually due to abrasion and corrosion. The stainless-steel lining on the trapezoidal prism portion deteriorated over period of time. Due to deterioration of the SS lining, the mother plates of the lower trapezoidal prism inner portion got exposed to the abrasion and corrosion caused due to bunkered coal. This led to the wear and tear of the mother plates of this portion. The problem of leakages of coal from this portion of the hoppers became more prominent during last 5 yrs. This portion of the hoppers is deteriorating very fast and may lead to heavy leakages due to rupture of the hopper wall mother plates in near future or may lead to complete collapse of lower trapezoidal prism portion. The deterioration is found in all hoppers of unit #5 & #6. Hence, it advisable to take concrete long-term measure so that Bunker Hopper will run in sustainable capacity for 15-20 years.

The phenomenon of bunker mouth chock up/rat holes became prominent in the hoppers during wet coal bunkering especially in rainy season. Rat hole refers to huge built up of coal on inner surface of the walls of hoppers on all sides forming a narrow passage for coal flow to the coal feeder pipe. Due to formation of rat holes, continuous poking is required to hoppers during rainy seasons. The generation loss during rainy season is mostly attributed to poor coal bunkering due to formation of holes.

*Bunker Hopper damaged*

*Bunker Hopper damaged*

*Bunker Hopper damaged*

*Bunker Hopper coal leakages*

*Bunker Hopper coal leakages*

**Recommendation:**

The phenomenon of bunker mouth chock up /rat hole formation can be avoided by installing coal flow system to this portion of the hoppers. The coal flow system is an air pressuring hammer system, and it can set as per requirement and installed around the neck portion of the Bunker Hopper. The required air pressure is @ 6-7 kg bar.

In view of above and smooth running of coal handling plant for smooth generation of electricity and to increase the service life of bunker hopper, the work of Modification, Upgradation & renovation of Bunker Hopper with coal flow system, is very much essential. Hence it is recommended to initiate a proposal for replacement with modification of the coal bunker hopper's trapezoidal prism discharge portion of Unit No.5 & Unit No.6 with newly fabricated hopper equipped with coal flow system.

## 4.7 Supply & Installation of Energy Chain System of Various Auxiliaries of CHPA/B/C of CSTPS Chandrapur.

The existing festoon trolley cable carriers installed for simultaneous cable movement along with moving auxiliaries such as shuttle conveyors of CHP-B. Festoon tracks have rusted and deformed damaging cable insulation due to continuous rubbing, cable snapping due to festoon misalignment etc. This condition causes short circuits, flashovers etc resulting in frequent tripping of connected auxiliaries. Paddle feeders 1 & 2 of CHP-C have reeling drum for power & control cables for movement of cables along with them. These reeling drum consists of cable drum, slip ring assembly, motor, gearbox etc. Therefore, to keep the reeling drum in service, all above sub-assemblies are required to be well maintained. Failure of any of above sub-assemblies' results into failure of cable reeling drum. Also, the power and control cables runs on the cable trays during movement of the paddle feeders and shuttle conveyors. Therefore, the cables are more prone to damage due to rubbing with the damaged cable trays and falling of coal lumps on the cable trays. Breakdown of these auxiliaries i.e.. Shuttle conveyors and paddle feeders may cause generation loss.

*1 Existing old Festoon trolley*

*Existing Festoon Trolley guide roller/channel /chain arrangement*

**Recommendation:**

In view of above, it is recommended to install energy chain system which consists of very simple strong, weather and wind resistant, dust proof chain which can accommodate control and power cables together and can be mounted on side wall and does not require motor, gearbox, slip ring assembly like cable reeling drums thereby increasing ease for maintenance and feed the coal to all bunkers smoothly.

### 4.8 Renovation & Upgradation of Bunker Lift of Unit 6&7.

The existing goods cum passenger lifts at bunker # 6 and 7 have relay-based control circuits having slow and delayed response. The technology of these lift has now become outdated and also production of these kinds of elevators is discontinued and no spares are available with the parent manufacturing company. Due to faulty lift doors and other spares, lifts are rarely used and most of the time they are out of service. Due to inconsistency in operation, only goods like conveyor parts, small motors, gear boxes etc. are transported through these lifts in view of safety of working personnel. Due to ageing effect, the operation of the system has deteriorated considerably and is now very much inefficient and unreliable as regards the system requirements. Due to round the clock operation and maintenance, concerned employees and other working personnel are forced to use the stairs causing loss of man-hours and increasing the time for maintenance works thereby imposing additional constraints of time, work and manpower which are further aggravated due to the already prevailing emergency situation at such times.

Recommendation**:**

Considering the working height of bunker (84 meter) in 500 MW plant, availability of these lifts is very essential for round the clock operation. Also, as per remarks in the letter from office of Maharashtra State Secretary Licensing Board & Lift Inspector "The CHP-B bunker lifts of unit-6 & unit-7 found out dated. The same shall be totally renovated".

Hence, it is recommended to replace the DCVV drive module with variable frequency (V/F) drive with microprocessor controller module along with complete lift system renovation to improve the availability of the Bunker goods cum passenger lift of Unit-6 and of Unit-7.

### 4.9 Design, Engineering, Supply, Fabrication, Erection, installation & commissioning of Modified take up arrangement for BC 108A/B of CHPB.

BC-108 A/B are main bunkering belts for 3x500 MW units with their drive located at TP-105 in front of Delcon gate. The vertical take-up pulley assembly and its guides are located close to TP-105. The conveyor gantry of BC-108 A/B is simply supported at TP-105 on sliding bearing arrangement. This sliding bearing arrangement is located on a beam which is supported from the TP-105 structure. The take up lifting fixture for lifting of take up pulleys of BC 108 A/B comprises of winch machine located at ground level, wire rope which runs from take up pulley frame through various sheave pulleys up to the winch machine. One of these sheave pulleys is mounted on the beam supporting the sliding bearing arrangement. Due to take up lifting activities over period of years, the beam supporting the sliding bearing arrangement found twisted in 2016. This created danger of collapse of the conveyor gantry. The problem was later rectified by replacing the twisted beam in November-2017. But as take up lifting is a routine maintenance activity; such kind of problem is likely to repeat in future. This problem can be eliminated by shifting the take up lifting arrangement to a suitable location between available

conveyor gantry trestles. An independent take up pulley and guide structure can be fabricated and erected.

*Existing TP 105 and take lifting arrangement*

*old TP 105 damaged supporting channel*

*Old TP 105 damaged channel*

**Recommendation:**

In view of the above it is essential to shift the existing take up arrangement to a suitable location between available conveyor gantry trestles without any load on the existing conveyor gantry structure.

Considering a very critical auxiliary & comes under generation path, it is recommended to Design, Engineering, Supply, Fabrication, Erection, installation & commissioning of Modified take up arrangement for BC 108A/B of CHPB.

## 4.10 Design, Engineering, Supply, installation & commissioning of Coal Pile Thermal monitoring system of Stack Pile of CHPB.

Spontaneously combustion triggers auto-ignition in coal piles as ambient temperature increases and turn into fire if not attended well on time. Coal piles being fairly big in size makes it almost impossible to locate auto-ignition spot instantly. Hence, fully automized solution is required.

Further Coal auditor also suggested that thermography of coal pile may be carried out to identify hot spot in coal stock pile to prevent coal fire at yard at all plants and eliminate energy loss.

To address above, Coal Pile Thermal Monitoring System is the solution to detect and locate hot spot instantly before it becomes red-hot or induces smoke. The Coal Pile Thermal Monitoring System will help in to a large extent saving of coal from burning in coal piles.

**Recommendation:**

In order to address the burning of coal in coal piles it is recommended for Design, Engineering, Supply, installation & commissioning of Coal Pile Thermal monitoring system of Stack Pile of CHPB.

## 4.11 Design, Engineering, Supply, installation & commissioning of Energy Efficient LED lighting System at various tunnel system of CHPA&B&C

Coal Handling Plants A, B & C of CSTPS, Chandrapur being spread across wide area of 10km in radius, handles daily around 32000 MT of coal for 2x210MW & 3x500MW units. Belt conveyor system is established for transfer of coal received at unloading point to the bunkers of respective units. To carry out round the clock operation and maintenance work in areas under vast jurisdiction of CHP A, B & C, proper illumination is necessary for clear visibility of objects in dark places, various isolated areas and during night hours for working personnel. At present, as per the provision of Rule 35 of the Maharashtra Factories Rules 1963 minimum intensity of illumination in Lux is not maintained. Electric lighting constitutes a major role in auxiliary energy consumption in CHP A, B & C. Conventional lighting systems have been installed at various locations which consist of HPMV/ HPSV High Bay/well glass/Flame proof fixtures since commissioning of these plants. In conventional lamps like incandescent and gas discharge lamps, most of the electricity is wasted in terms of heat and also since ballast requires high voltage at the time of starting, these consume more power. Great amount of energy savings is possible using energy efficient equipment, effective controls and careful design. The lighting design also strongly affects visual performance and visual comfort by aiming to maintain adequate and appropriate illumination while controlling reflection and glare. By installing advanced lighting technologies, reduction in the amount of electricity consumed and energy costs associated with lighting can be achieved. Energy efficient lighting reduces the electricity demand and is a cost-effective method of lighting system compared to conventional lighting methods. Energy efficient lighting includes the use of more illumination from less power lights by replacing high power consumption lights like incandescent, high discharge lamps, etc. It will also replace high power lighting accessories by low power devices such as electronic ballasts, fixtures, etc.

**Recommendation:**

In view of the above it is recommended to Design, Engineering, Supply, installation & commissioning of Energy Efficient LED lighting System at various tunnel system of CHPA&B&C to fulfill the statuary norms of Maharashtra Factories Rules 1963.

### 4.12 Renovation & Modernization of Old Ropeway & New Ropeway of CHPA

Coal Handling Plant-A was established in the year 1983 & handled 8000 MT coal daily for its 2x210MW sets. At, CHPA Coal received from various sources viz. ropeway, railway, road transport etc., is unloaded at various unloading points viz. discharge terminal, wagon tippler, road hopper etc., Among all the sources ropeway is one of the main sources of coal supply to CHPA. Raw coal from Durgapur mines is unloaded in ropeway I&II hoppers at loading terminal with the help of belt conveyor L1, L2 &L3 and then transfer to coal buckets to discharge terminal by 1.2 Km ropeway. Due to aging effect, it is observed that the mechanical breakdown of ariel ropeway is increased. Breakdown of haulage rope, damage of buckets, buckling of tower, falling of buckets, overload of ropeway, etc., has been increased. Steel structures of ropeway are subjected to high rate of rusting. During visual inspection, it is observed that steel structures are badly rusted at several locations. Tower trusses supporting structure are apparently highly corroded and top member of N trusses are showing extensive deterioration. After rendering more than 35 years of service, sign of deterioration was observed. In past strengthening or repairing of this ropeway has been done, but now it is beyond repairable need permanent concrete measure for smooth running of ropeway. Further CEA has advised to all power utilities not to retire any thermal units till 2030 and urged to carrying out the Renovation and Modernization of aged units to ensure the availability & reliability of units.

*Old Ropeway rusted structure*


JT 12 structure


new ropeway bunker

*Ropeway rusted steel structure*

*Rusted Ropeway OHE crossing platform*

**Recommendation:**

In past strengthening or repairing of this ropeway has been done, but now it is beyond repairable and for permanent concrete measure for smooth running of ropeway it is recommended to take up the work of Renovation & Modernization of Old Ropeway & New Ropeway of CHPA, so that ropeway will run with optimum capacity for several years.

### 4.13 Automation of Complete Main Control Room and Wagon Tippler control room of CHPA of Unit 3&4.

In CHP-A, two nos. of belt conveyor streams are provided for transportation of coal from unloading point to the bunkers of unit #03 and 04. The control room is established to coordinate the various activities regarding unloading of coal, bunkering of coal and day to day operational & maintenance activities. In the present system wired relay logic is provided for control system of belt conveyors and other auxiliaries. All activities like starting and stopping of conveyor system are controlled through control desk provided in control room. Status of the auxiliaries is recognized with the help of indications on the control desk but no-fault message is auto generated in case of failure of any auxiliary. Therefore, in the present system problem diagnostic is difficult and consumes more time for restoration of auxiliaries. The present system is not capable of providing real time data about the various operational parameters, history of failure of auxiliaries etc. which is required for making quick fact-based decisions.

**Recommendation:**

In view of the long service more than 35 years and ageing effect, it is recommended to carry out the automation of main control room and wagon tippler control room of CHPA of Unit3&4 by providing PLC system for better process control.

### 4.14 Supply, installation & commissioning of OBMS at CHPA of Unit 3&4.

As huge quantity of coal is received from various coal mines at CSTPS, it contains foreign material of ferrous nature like vehicle parts, wagon parts, conveyor parts etc which are required to be separated from the coal in order to avoid further damages to the crushers, conveyor belts, coal feeders and coal mills. Damage to coal mill due to foreign material directly leads to generation loss.

The reclaimed coal from stacker reclaimer and slit hopper also contains foreign materials which have damaged successive belt conveyors in coal stream. Also, more incidences were reported of foreign ferrous material viz. angles, frames, channels etc. reaching coal mills of unit #3, #4 & #7, which have caused major damages to coal mills.

**Recommendation:**

To avoid mixing of foreign material of ferrous nature with coal, it is necessary and hence recommended to install more quantity of highly efficient magnets in stacker reclaimer side belt conveyors and on bunker side belt conveyors to avoid damages of belt conveyors, crushers and especially coal mills

### 4.15 Supply, installation, and commissioning of MV VFD panel along with integrated online cell redundance technology with VFD bypass conveyor 103A&103B & Crushers of CHPB

At present DOL starters are provided for the HT/LT induction motor of the conveyor belts at CHP-B. These motors are subjected to more nos. of ON/OFF operations due to system requirements which is not desirable for healthiness of induction motor. Due to this it results into premature failure of HT/LT motors and the life of induction motor is also reduced. Also, rated efficiency and power factor is not achievable with DOL starters. A mechanical breakdown such as snapping of conveyor belts due to jamming of rollers is prominent due to jerks on the conveyor belts during starting and stopping. Restoration of conveyor system after failure of motors and snapping of conveyor belts & crushers requires more time which hampers coal feeding to unit #05, 06 and 07 which results into considerable generation loss. BC 103A/B are main unloading HT conveyor streams, any failure to these conveyors, unloading as well as bunkering will hamper. Crusher I, II, III&IV also play very crucial role in crushing of coal as well as in unloading & bunkering also.

**Recommendation:**

In view of the above, it is recommended for installation, and commissioning of MV VFD panel along with integrated online cell redundance technology with VFD bypass conveyor 103A&103B & Crushers of CHPB

### 4.16 Renovation & Modernization of R&D yard (Receipt & Dispatch) of CSTPS Chandrapur.

In CSTPS railway siding receipt & dispatch yard is provided in the year 1983 for receiving incoming traffic & dispatching outgoing traffic and is attached with new A cabin. The traffic coming from Vivekananda Railway Station & Chandrapur station to exchange yard is dealt here. All the receive traffic coming from R&D yard for placement at different locations in the plant area of CSTPS. Hence the healthiness of R&D yard is very much essential for smooth movement of rolling stock (Smooth receipt of coal) as it directly connected with mail line of south-central line. Further at R&D yard various wagon handling activities are carried out like receipt of coal rake, distribution of coal rakes, receipt of empty rake after unloading, inspection of all wagons of empty rake for safe run-in main line through Railway staff of C&W. Railway commercial staff taking the rake unloading time; Railway operating staff taking control of coal rake movement and other wagon

movement activities are carried out at R&D yard. So, at R&D yard all railway staff & CSTPS staff working simultaneously. As per Railway recommendation for ensure the safety of rolling stock & for continuous supply of coal to thermal power station, provision of standard infrastructure facilities at CSTPS yard is suggested. Infrastructure facilities consist of 1) provision of pathway in between rail line at R&D yard 2) Provision of tower light 3) construction of shed 4) construction of office building.

**Recommendation:**

Considering railway suggestion and necessity of work for smooth & continuous receipt of coal rake, it is recommended to carry out the work of Renovation & Modernization of R&D yard (Receipt & Dispatch) of CSTPS Chandrapur

## 5.0 Conclusion:

The inspected equipment are badly damage & are beyond repair. Replacement/ Renovation & Modernization seems to be the only solution to further improve the coal handling plant availability & performance. Moreover, CEA has circulated the necessary guidelines & advised that all power utilities not to retire any thermal units till 2030 and ensure the availability of units after carrying out the necessary renovation and modernization of aged coal fired thermal power plant for life extension and improve the reliability of thermal units considering the expected demand scenario in future.

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