



भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
पूर्वी क्षेत्रीय विद्युत समिति

Eastern Regional Power Committee

14, गोल्फ क्लब रोड, टॉलीगंज, कोलकाता-700033
14 Golf Club Road, Tollygunj, Kolkata-700033



वैश्व कटुम्बकम्
ONE EARTH - ONE FAMILY - ONE FUTURE

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सं./NO. पू.क्षे.वि.स./PROTECTION/2023/531

दिनांक /DATE:10.07.2023

सेवा में / To,

संलग्न सूची के अनुसार / As per list enclosed.

विषय : दिनांक – 22.06.2023 को आयोजित 127 वीं पीसीसी बैठक का कार्यवृत्त ।

Sub: Minutes of the 127th PCC meeting held on 22.06.2023

महोदय/ Sir,

22.06.2023 को आयोजित 127वीं पीसीसी बैठक का कार्यवृत्त पू.क्षे.वि.स. की वेबसाइट (<http://www.erpc.gov.in/>) पर उपलब्ध है। कृपया देखें।

Please find the minutes of the 127th PCC meeting of ERPC held on 22.06.2023 available at ERPC website (<http://www.erpc.gov.in/>).

यदि कोई अवलोकन हो, तो कृपया इस कार्यालय को यथाशीघ्र भेजा जाए।

Observations, if any, may please be forwarded to this office at the earliest.

यह सदस्य सचिव, पू. क्षे. वि. स. के अनुमोदन से जारी किया जाता है।

This issues with approval of Member Secretary, ERPC.

भवदीय / Yours faithfully,

P.P. Jena

(पी. पी. जेना / P.P.Jena)
Executive Engineer (PS)
कार्यपालक अभियंता(पी.एस)

LIST OF ADDRESSES:

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Chief Engineer (System Operation), SLDC, BSPTCL, Patna-800021	
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General Manager (OS), ERHQ-I, NTPC Ltd., LoknayaJaiprakashBhawan, (2 nd Floor), DakBunglowChawk, Patna-800001	Manager (Electrical), Adhunik Power & Natural Resources Ltd. “Lansdowne Towers, Kolkata-700020 (Fax No. 033-2289 0285)
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Chief Engineer (Trans.) Power Deptt., Govt. of Sikkim, Gangtok-731010	Sr. Manager (CTMC) Durgapur Projects Limited, Durgapur-713201
Executive Director, ERLDC, POSOCO, Tollygunge, Kolkata-700033	The Head Maithon Power Limited, Maithon Office, MA 5 Gogna, Dist. Dhanbad, Jhankand State, PIN-828207
General Manager (AM), ER-II Power Grid Corporation of India Ltd., J-I-15, Block-EP, Sector-V, Salt Lake, Kolkata-91	Head –Regulatory and contracts, IndiGrid Limited , 247 Embassy, Office No 107, ‘B’ Wing, Hindustan Co. Bus Stop, Gandhi Nagar, L.B.S. Road, Vikhroli West, Mumbai – 400 079. Ph : +91 845509 96408
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Managing Director, Bhutan Power Corporation Post Box no. 580, Thimpu, Bhutan.	Managing Director, Druk Green Power Corprn. P.O. Box-1351, Thimpu, Bhutan.

Associate Director (Commercial and Regulatory) Darbhanga-Motihari Transmission Company Limited (DMTCL),503, Windsor, Off CST Road, Kalina, Santacruz(E), Mumbai-400098	The Plant Head, JITPL, Angul, Odisha (FAX:011- 26139256-65)
Shri D. P. Bhagava, Chief Consultant (O&M), TeestaUrja Limited, New Delhi (FAX:011- 46529744)	Director (GM Division), Central Electricity Authority Sewa Bhawan, R. K. Puram, New Delhi-110066
Director (NPC), CEA, NRPC Building, Katwaria Sarai, New Delhi- 110016	President, Dans Energy Pvt. Ltd, 5th Floor, DLF Building No. 8, Tower-C, Gurgaon - 722002
Director, Shiga Energy Pw. Ltd., 5th Floor, DLF Building No. 8, Tower-C, Gurgaon - 722002	DGM (E&I), HALDIA ENERGY LIMITED, BARIK BHAWAN, KOKATA-700072, FAX: 033-22360955
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Minutes of 127th PCC Meeting

Date: 10/07/2023
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 127th PROTECTION COORDINATION SUB-COMMITTEE MEETING HELD ON 22.06.2023 AT 10:30 HRS AT ERPC CONFERNECE HALL

Member Secretary ERPC chaired the meeting. List of participants is attached at **Annexure A**.

PART – A

ITEM NO. A.1: Confirmation of Minutes of 126th Protection Coordination sub-Committee Meeting held on 17th May 2023 through MS Teams online platform.

The minutes of 126th Protection Coordination sub-Committee meeting held on 17.05.2023 was circulated vide letter dated 02.06.2023.

Members may confirm.

Deliberation in the meeting

MPL representative requested to add following discussion under the deliberation of item No. B2 in 126th PCC Minutes.

“

Regarding unit tripping on over frequency, MPL representative opined that in MPL units there is no over frequency tripping given from relays. He added that as during fault condition the frequency derived from voltage gives erratic value therefore instead of over frequency protection, instantaneous mechanical or electronic over speeding protection is enabled in the turbine. He suggested that same may be explored with OEM at Tenughat.

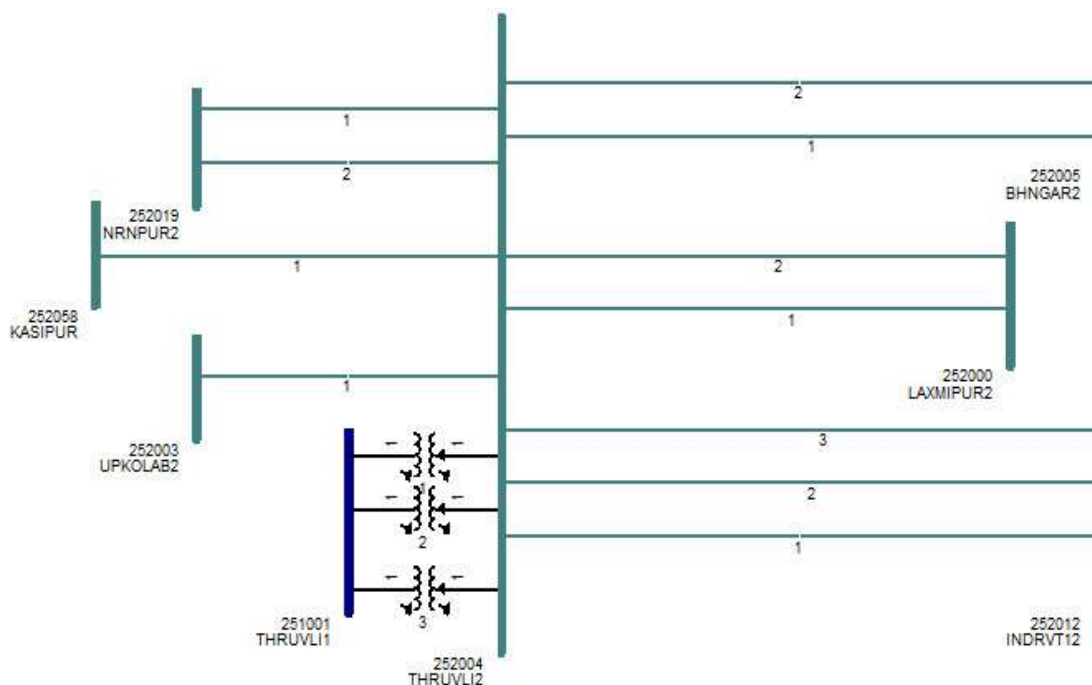
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With above addition under item B.2, PCC confirmed the minutes of 126th PCC Meeting.

PART – B

ITEM NO. B.1: Total Power failure at 220 kV Therubali (OPTCL) S/s on 15.05.2023 at 11:13 Hrs.

As reported, the fault was created due to snapping of OPGW wire of 220 V Therubali-Lakshmipur-2 line between location no. 1209 & 1210. The fault was not cleared from Therubali end which led to tripping of all associated feeders at Therubali. Subsequently total power failure occurred at 220kV Therubali, 220kV Kasipur & 220kV Jaypatna sub-stations in south Odisha.



Detailed report from ERLDC is attached at **Annexure B.1.1.**

Gen. Loss: 20 MW, Load Loss: 25 MW
Outage Duration: 00:38 Hrs

OPTCL may explain.

Deliberation in the meeting

*OPTCL representative explained the incident with help of presentation which is attached at **Annexure B.1.2.***

He informed that, OPGW wire of 220 kV Therubali-Laxmipur-2 snapped between location no. 1209 & 1210 which resulted in fault and subsequent disturbance at Therubali S/s. The fault was not cleared from Therubali end subsequently all associated feeders at Therubali end tripped and total power failure occurred at 220kV Therubali, 220kV Kasipur & 220kV Jaypatna sub-stations in south Odisha.

Relay Indications for feeders and ICTs at 220 kV Therubali S/s during the incident is as follows-

S.No.	Name of Element	End 1	End 2
1	Theruballi- Indravati-1	Distance protection operated	Broken Conductor
2	Theruballi-Indravati-2	BCG trip	No Trip
3	Therubali-Indravati-3	No Trip	Broken conductor
4	Theruballi-Kashipur (Indrawati-4)	No Trip	Broken conductor
5	Theruballi-Laxmipur-1	Zone 4	$I > 1$ trip

6	Theruballi-Laxmipur-2	No Trip	Zone 1
7	Theruballi-Bhanjanagar-1	No Trip	Zone 3
8	Theruballi-Bhanjanagar-2	No Trip	Zone 3
9	Theruballi-Gunupur	BCG trip	No trip
10	Theruballi-Narendrapur-2	BCG trip	No trip
11	Theruballi-Upper kolab	No trip	Distance protection operated
12	ICT1, ICT 2, ICT3	No trip	No trip

Analysis of the incident:

Main and tie CB of 220 kV Therubali-Laxmipur-2 at Therubali end did not operate during the fault in the line. On detailed investigation it was found that spring charge indication bulb terminal got shorted in the main CB which caused fuse blown of control circuit in CR panel and resulted in failure of DC supply to the panel. This ultimately led to non-operation of breaker. OPTCL representative explained that as the fault current feed by individual 220kV feeders i.e Upper Kolab/Indravati 1,2 3& 4/Bhanjanagar 1&2/ Narendrapur 1 &2 is very less, so fault continued upto 70 sec due to delay in fault clearance from ends.

Regarding tripping of Therubali-Indravati & Therubali-Kashipur line in broken conductor protection, PCC opined that broken conductor function is generally kept in alarm mode and the tripping of the lines on this protection is not desirable. OPTCL representative submitted that they are in process to rectify the above setting by disabling the tripping initiation from broken conductor function.

Remedial measures taken:

OPTCL representative informed that non-directional overcurrent protection had been disabled at and direction feature have been enabled wherever the feature is available. He further added that new relay will be procured and installed where directional feature is not available.

He informed that DC distribution scheme had been rectified in the CR panel for some of the feeders and further SAS upgradation is being planned for Therubali S/s. An internal protection audit was carried out after the incident and based on the observations; necessary corrective measures are being taken up. The observation of protection audit is enclosed at **Annexure B.1.3**.

Regarding review of earth fault overcurrent protection settings and zone 3 distance protection settings with proper coordination among feeders, they informed that review of settings had been completed for Therubali and Bhaj Nagar S/s.

PCC observed that as the substation is quite old(more than 40 years), renovation and upgradation of the control and protection system should be taken up on priority basis for reliable and secure operation of the system.

Further PCC advised following:

- SLDC Odisha representative to coordinate with Balimela HEP and share detailed report of unit tripping to ERPC/ERLDC. Further DR/EL at Indravati end for the above disturbance also to be shared.
- To review zone-3 settings well as back up O/C and E/F setting of the feeders for other concerned substations of OPTCL as well as Indravati and Balimela end.
- To test auto-reclose scheme for 220 kV Therubali-Laxmipur-2 at Therubali end.

ITEM NO. B.2: Tripping of 2* 600 MW units at JITPL on 18.05.2023 at 14:07 Hrs

Due to failure of LA of GT#2, Unit #2 of JITPL got tripped on operation of unit differential protection. After 11 seconds, Unit 1 at JITPL also got tripped on loss of auxiliary supply due to tripping of its station transformer.

Detailed report from ERLDC is attached at **Annexure B.2.**

Gen. Loss: 1096 MW

Outage Duration: 06:30 Hrs

JITPL may explain.

Deliberation in the meeting

From the report submitted by JITPL the disturbance was explained as follows:

The disturbance occurred due to failure R and Y phase LA and BPI of GT#2. This failure occurred due to heavy storm during inclement weather condition. Unit # 2 tripped on operation of unit differential protection.

Subsequently all auxiliary load of plant shifted to ST 1. After 11 seconds, the station transformer-1 also got tripped on overcurrent protection leading to tripping of Unit 1 on loss of auxiliary supply. It was reported that the setting of overcurrent relay was not configured properly which led to tripping of ST#1. The settings have been revised after the event.

ITEM NO. B.3: Disturbance at Jorethang HEP on 14.05.2023 at 16:36 Hrs

220 kV Jorethang-New Melli d/c got tripped from Jorethang end only. Consequently, one running unit at Jorethang tripped and power supply interrupted at Jorethang station.

Detailed report from ERLDC is attached at **Annexure B.3.**

Gen. Loss: 43 MW

Outage Duration: 00:03 Hrs

Jorethang HEP may explain.

Deliberation in the meeting

ERLDC representative informed that on 14.05.2023 at 16:36 Hrs, 220 kV Jorethang-New Melli D/C got tripped from Jorethang end. Subsequently one running unit at Jorethang tripped and power supply interrupted at Jorethang station. He further added that both circuits were restored after 3 minutes and no fault was present in line.

Jorethang HEP representative was not present in the meeting.

It was decided that a communication would be sent to Jorethang HEP for sharing details regarding above tripping incident.

ITEM NO. B.4: Total Power failure at 220 kV Chatra (JUSNL) S/s on 15.05.2023 at 14:22 Hrs

220 kV Daltonganj-Chatra-1 got tripped due to Y phase fault leading to total power failure at 220 kV Chatra as well as Latehar S/s as 220 kV Daltonganj-Latehar-1 was under shutdown and Latehar & Chatra S/s were radially fed through 220 kV Daltonganj-Chatra-1 only.

Detailed report from ERLDC is attached at **Annexure B.4.**

Load Loss: 28 MW

Outage Duration: 01:42 Hrs

JUSNL may explain.

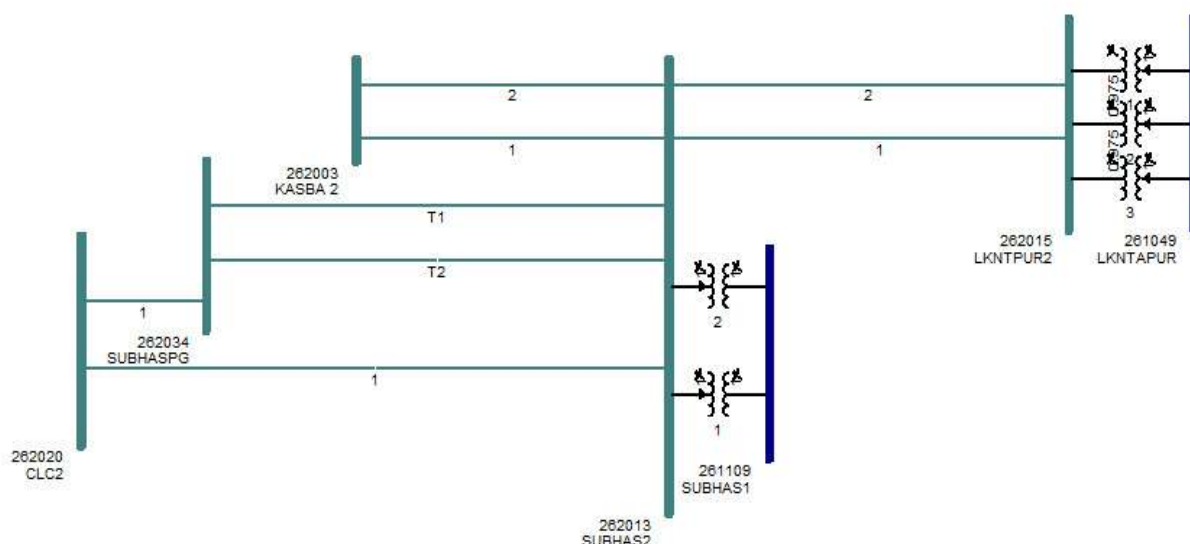
Deliberation in the meeting

Both 220 kV Chatra and Latehar S/s are being radially fed through 220 kV Daltonganj-Chatra-1 prior to the disturbance. At 14:22 hrs, 220 kV Daltonganj-Chatra-1 got tripped due to Y phase fault leading to total power failure at 220 kV Chatra as well as Latehar S/s as 220 kV Daltonganj-Latehar-1 was under shutdown. JuSNL informed that the fault was due to snapping of jumper at loc 21.

On enquiry from ERLDC regarding A/R issue at Chatra end, JUSNL representative informed that the matter is being taken up with the relay OEM. The timeline for rectification is Aug-23.

ITEM NO. B.5: Total Power failure at 220 kV Lakshmikantpur (WBSETCL) S/s on 23.05.2023 at 02:36 Hrs

On 23rd May 2023 at 02:36 Hrs, 220 kV Subhashgram (WB)-Lakshmikantpur-2 got tripped due to Y phase fault. At the same time, 220 kV main bus-2 at Subhshgram (WB) and 220 kV Subhashgram-Lakshmikantpur-1 also got tripped leading to total power failure at Lakshmikantpur which is radially fed through 220 kV Subhshgram (WB).



Detailed report from ERLDC is attached at **Annexure B.5.**

Load Loss: 289 MW

Outage Duration: 00:54 Hrs

WBSETCL may explain.

Deliberation in the meeting

WBSETCL representative intimated that the disturbance was caused due to snapping of R phase conductor of 220 kV Subhashgram-Lakshmikantpur-2 at loc. 208(at 1 km from Subhasgram end) and subsequently touched Y phase and ground. The line got tripped on Y-N fault from both end in zone 1 distance protection within 100 msec.

He added that at the same time snapped conductor of circuit 2 touched circuit 1 due to which 220 kV Subhashgram-Lakshmikantpur-1 also got tripped within 100 msec from both ends with relay indication of R_N fault. This led to total supply failure at Lakshmikantpur S/s and downstream areas.

He informed that during the incident 220 kV Bus-2 at Subhashgram (WB) also tripped on operation of Bus bar differential protection. Thorough testing was done for this unwanted busbar operation and it was found that the differential relay was operating for much lower current than the set value suggesting mal operation during close in faults.

He submitted that necessary setting modification was carried out in the busbar relay and it was put into service after satisfactory testing and intimated that they are planning to implement numerical bus bar protection at Subhasgram S/s under PSDF.

ITEM NO. B.6: Major grid events other than GD/GI

A) Bus tripping occurred in Eastern Region during May 2023

Element Name	Tripping Date	Reason	Utility
220 kV Main Bus-1 at Motipur	14.05.2023 at 20:42 Hrs	Bus bar protection operated during tripping of 220 kV Motipur-Mushari-1	BSPTCL
400 kV Main Bus-1 at Angul	16.05.2023 at 13:08 Hrs	-	PG Odisha
220 kV Main Bus-2 at Mejia	18.05.2023 at 14:55 Hrs	Bus bar protection operated	DVC
400 kV Main Bus-2 at Jeerat	19.05.2023 at 18:51 Hrs	LBB operated while charging 400 kV Jeerat-Bakreshwar	WBSETCL
220 kV Main Bus-2 at Meramundali B	25.05.2023 at 08:36 Hrs	Gas leakage	OPTCL

Concerned utilities may explain.

Deliberation in the meeting

• Tripping of 220 kV Main Bus-1 at Motipur on 14.05.2023 at 20:42 Hrs

It was informed by BSPTCL that during tripping of 220 kV Motipur-Mushari-1 due to inclement weather condition, the bus bar protection mal-operated for 220 kV Main Bus-1 at Motipur.

On enquiry from PCC regarding fault current observed during tripping of line, BSPTCL representative informed that fault current observed for 3 successive tripping of line on same day are 13 kA, 9 kA, 8.8 kA respectively.

ERLDC representative informed that since bus bar protection had not operated for earlier two tripping of line where fault current was more, so it is not possible that tripping was caused due to CT saturation issue.

On enquiry from PCC regarding analysis and remedial measure taken by BSPTCL, they replied that check zone slope settings of bus bar differential relay had been modified to 90% from 30%.

PCC observed that the setting of 90 % is on higher side and the setting shall be implemented as per the relay manual. Further PCC opined that root cause of the busbar bar operation shall be investigated and accordingly setting shall be modified.

BSPTCL was advised following:

- The current waveform during the incident may be studied for CT saturation effect.
 - The pick-up value may also be checked and it should be 1.2 times of highest of all the CT ratio.
 - CT knee point may be tested, and further busbar relay may be tested to ensure its stable operation.
-
- **Tripping of 400 kV Main Bus-1 at Angul on 16.05.2023 at 13:08 Hrs**

He informed that on day of incident, one of 765/400 kV ICT was under shutdown for some testing work during which an interturn fault got developed in ICT. Subsequently the mechanical relay gave tripping command to breaker however breaker did not open.

He added that low current BF protection is enabled for bus bar relay and as per scheme of low current BF protection, it will trigger busbar operation for any value of current if breaker condition is closed even after tripping command had been issued by relay. In this incident, this protection had operated as breaker did not open and there was small current due to inter turn fault in ICT and resulted in tripping of 400 kV Main Bus-1 at Angul. He further added that to avoid similar incidents in future, low current BF protection had been disabled.

- **Tripping of 220 kV Main Bus-2 at Mejia on 18.05.2023 at 14:55 Hrs**

The disturbance analysis report submitted by DVC is enclosed at **Annexure B.6.A.3.**

DVC representative informed that single line to ground fault occurred in 220 kV MTPS – Kalyaneshwari line due to falling of the Wave-Trap of the line to the ground. Subsequently zone 1 distance protection operated from MTPS end and carrier aided zone 2 protection operated from other end and line got tripped.

It was observed that wave trap had fallen on the ground encircling the CT of line at MTPS end. After delay of 1 second, auto-recloser attempt was made from Kalyaneshwari end during which CT of line at MTPS end also measured current of around 1.2 kA even if the breaker is open. Since this current was getting fed to the Bus-Bar Main Zone 2 and Check-Zone relay as an extra current apart from the stable bus differential current, the Bus bar main Zone 2 and CheckZone busbar differential relays operated causing tripping of all the feeders connected to Main Bus 2. Subsequently unit 2 and unit 3 at MTPS got tripped as emergency drives of both units got failed due to interruption in power supply from Station transformer.

MPL representative suggested that in low impedance busbar differential protection, breaker status may be incorporated along with isolator status in busbar logic to avoid this type of tripping where busbar operated even with breaker of the feeder in open condition.

PCC observed that the busbar relay at MTPS operated correctly as per the configuration and further advised DVC to consider the proposal of MPL and the busbar scheme may be reviewed if necessary.

- **Tripping of 400 kV Main Bus-2 at Jeerat on 19.05.2023 at 18:51 Hrs**

*WBSETCL representative explained the incident with help of presentation which is attached at **Annexure B.6.A.4.***

He informed that busbar scheme at Jeerat was configured taking the breaker status into consideration. While charging 400 kV Jeerat-Bakreshwar, BI for close command from control switch got missed as no feedback was received from TNC for which current of said BKTPP bay (4.6 k A) was not taken into consideration for Bus zone -B. Due to mismatch of current in the bus-zone, busbar protection operated with Zone-B indication and all the bays connected to Bus-Zone - B got tripped. Regarding remedial measure, he informed that defective switch would be replaced by availing the shutdown.

- **Tripping of 220 kV Main Bus-2 at Meramundali B on 25.05.2023 at 08:36 Hrs**

OPTCL representative informed that both the bus of Meramundali-B busbar got tripped due to leakage of SF6 gas in bus side isolator chamber of ICT 2. He added that OEM Engineer had visited site after the incident and issue was rectified. PCC opined that both the bus should not be tripped during the above incident and advised OPTCL to check the busbar scheme and in case of any anomaly the same shall be rectified.

B) Total power failure at 400 kV OPGC, 400 kV Lapanga S/s at 17:27 Hrs on 10.06.2023

On 10.06.2023 at 17:27 hrs, while taking charging attempt of 400 kV Meramundali-Lapanga-1 on 10.06.2023, 400 kV OPGC S/s became dead and around 580 MW generation loss occurred. At the same time, all emanating 400 kV feeders also tripped at Lapanga S/s.

As observed from PMU, charging attempt of 400 kV Meramundali-Lapanga-1 was taken from Meramundali at 17:26 Hrs and failed. Details of event is attached at **Annexure B.6.B.**

Reply for following issues are required from concerned utility-

- Reason for taking charging attempt of line from Lapanga end even after failed attempt from Meeramundali end
- Delayed clearance of fault leading to disturbance at OPGC and Lapanga S/s along with remedial measured taken.

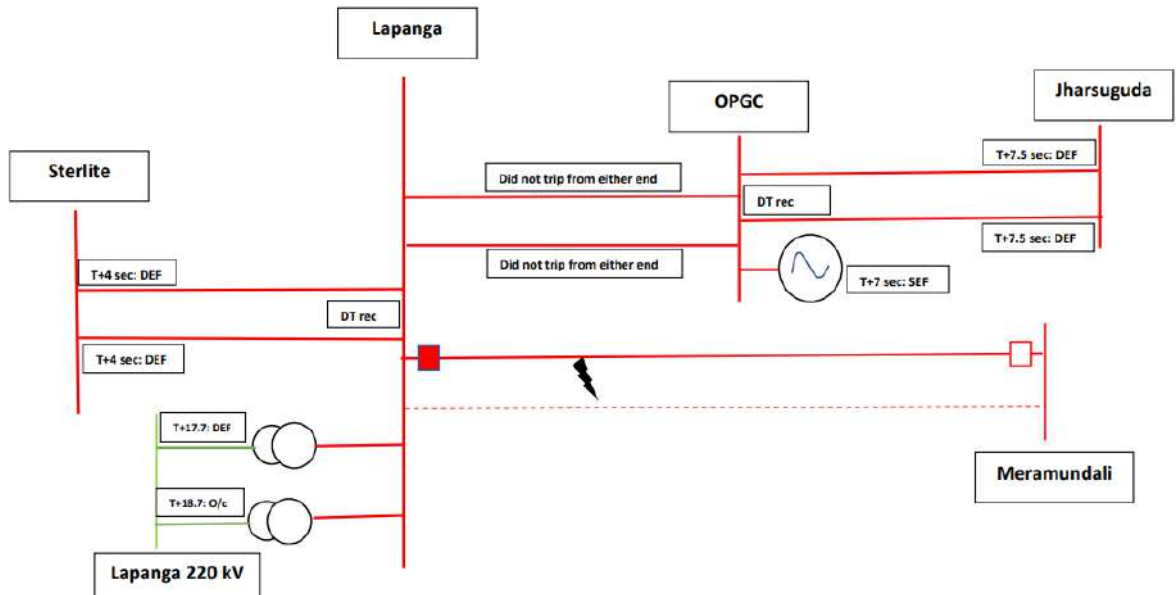
OPTCL & OPGC may explain.

Deliberation in the meeting

*ERLDC representative explained the incident with help of report which is attached at **Annexure B.6.B.1.** The event is explained as below:*

- *Due to due to bad weather conditions and localized storm, tower collapse occurred for 400 kV Meramundali-Lapanga D/C line at 16:21 hrs.*
- *At 17:26 Hrs, while charging attempt was made for 400 kV Meramundali-Lapanga-1 from Meramundali end, line got tripped in distance protection instead of SOTF protection. Subsequently after 1 minute charging attempt was again done from Lapanga end however line tripped after persistence of fault for 17-18 second.*
- *As fault was persisted for 17-18 seconds, other feeders also at 400 kV Lapanga S/s got tripped which led to total power failure at 400 kV Lapanga and OPGC S/s.*

Disturbance at Lapanga, OPGC at 17:27 hrs on 10.06.2023



ERLDC representative enquired OPTCL about reason for taking charging attempt of line from Lapanga end even after failed attempt from Meramundali end to which OPTCL representative informed that due to communication gap between the two S/s, charging attempt was repeated for line.

PCC advised SLDC Odisha to ensure proper coordination between substations during charging of the line and advised OPTCL to sensitize the substation personnel for adhering the standard procedure during the charging of the line. This would avoid unwanted tripping and disturbance in the system which may affect reliability and security of the grid.

It was observed that instead of sufficient fault current, neither distance protection nor DEF operated for 400 kV Meramundali-Lapanga-1 at Lapanga end due to which fault got persisted for 17-18 seconds and led to tripping of other feeders from remote end.

GT of unit 4 at OPGC tripped in SEF protection in T+7 second. Further due to non- tripping of 400 kV OPGC -Lapanga-d/c from both ends, 400 kV OPGC – Jharsuguda d/c tripped in DEF from Jharsuguda end in T+7.5 second with DT sent to OPGC end. This led to total power failure at 400 kV OPGC S/s.

PCC advised OPTCL for root cause analysis of the event and a report along with DR/EL shall be submitted to ERPC/ERLDC. The issue would be discussed in next PCC Meeting.

C) Repeated tripping of 400 kV Meramundali-Mendhasal D/c on 12.06.2023

400 kV Meramundali-Mendhasal D/c got tripped thrice on 13.06.2023. As reported, 400 kV Meramundali-Mendhasal-2 got tripped due to R phase fault and other circuit got tripped on back Up O/c. It is observed that line loading was around 600 MW in each circuit.

In 123rd PCC, the issue of sag was already highlighted, and these lines were included for proactively taking up preventive maintenance, however the issue is persisting.

Reply for following issues are required from concerned utility:

- Nature of the fault and remedial measures taken for such tripping.
- Tripping of other parallel circuit in Back Up O/c.

- Enabling of Back Up O/c protection for any other lines in OPTCL system owing to transmission constraint.

OPTCL may explain.

Deliberation in the meeting

*ERLDC representative explained the incident with help of report which is attached at **Annexure B.6.C**. It was informed that 400 kV Meramundali-Mendhasal-2 got tripped due to R phase fault and subsequently other circuit got tripped on back up O/C protection. It was reported that circuit 2 had tripped due to clearance and sag issues in the line. It was highlighted that though O/C protection is not recommended for 400 kV lines, Meramundali-Mendhasal circuit-1 tripped on the O/C protection.*

The reason keeping O/C protection in 400 kV line could not be explained by OPTCL in the meeting. It was decided that the issue would be discussed in next PCC meeting. OPTCL was advised to share the list of lines in their network where overcurrent protection has been implemented owing to transmission constraints and further the reason for enabling overcurrent protection in 400 kV Meramundali-Mendhasal line.

D) Repeated tripping of transmission lines during the month of May'23

S.No.	Name of the Element	No. of times Tripped	Remarks	Utility
1	132 kV Sonnagar-Nagaruntari	7	Line kept idle charged from Soennagar. B_N or R_B_N fault in all instances.	BSPTCL/JUSNL
2	220 kV Begusarai-Saharsa-1	4	Fault in R_ph in all instances. Fault distance around 60 km for 3 instances	BSPTCL
3	400 kV PPSP-Bidhannagar-1	4	Fault distance between 140-160 km from PPSP.	WBSETCL

Concerned utilities may explain.

Deliberation in the meeting

For repeated tripping of 132 kV Sonnagar-Nagaruntari, BSPTCL representative informed that around 32 km of line is under jurisdiction of Bihar for which tower top patrolling was done on 16th June 2023 and some damaged insulators were found and replacement of these insulators is in progress.

For repeated tripping of 220 kV Begusarai-Saharsa-1, BSPTCL representative informed that the trippings were occurred due to clearance issues on account of OPGW commissioning work in the line.

However, OPGW work had been completed and no further clearance issues is present in line. He further added that some damaged polymer insulators were also found in line which had been replaced.

For repeated tripping of 400 kV PPSP-Bidhannagar-1, WBSETCL representative informed that inclement weather was reported during all the event and due to clearance issue of line with OPGW earth wire of 132 kV Kalipahari- DTPS line of DVC near Andal airport the repeated trippings were occurred. The matter is being taken up with DVC to resolve the issue at the earliest.

ITEM NO. B.7: Non-Harmonization of UFLS relay settings and other associated issues

On 15th May 2023, frequency of ER got dropped to 49.399 Hz due to sudden generation loss of around 7000 MW, triggering the criteria for operation of UFLS stage 1. However, it was observed that the load relief in Eastern region was not adequate. UFLS being a defense mechanism of last resort, its operation should be accurate and adequate load relief should happen in such case.

Following points may be discussed in this regard:

- Non-harmonization of UFR relay settings (delay, operating criteria)
- At many places, static relays for UFR are installed. Many of these Sub-stations were upgraded under PSDF, then why static UFR relays are commissioned.
- Plan for upgradation of static UFR relays to numerical UFR
- As the network is evolving and load pattern of different feeders are changing, periodic review of load shedding quantum of feeders under UFR to be taken up.

Members may discuss.

Deliberation in the meeting

ERPC representative informed that on 15th May 2023, frequency of ER got dropped to 49.399 Hz due to sudden generation loss of around 7000 MW, triggering the criteria for operation of UFLS stage 1. However, it was observed that the load relief in Eastern region was not adequate which is undesirable and adequate load relief should happen in such case. Details submitted by the state utilities are enclosed at Annexure.

Regarding time delay of UFR, PCC advised that no time delay should be present in any UFR relay time settings. Further, PCC advised that wherever static relays are present, the same shall be replaced with numerical relay for better performance.

All SLDCs were advised to review the operation of UFR on the above event and also to review the load shedding quantum of feeders under UFR considering the change in network configuration and present load pattern of the feeders.

ITEM NO. B.8: Review of existing islanding schemes in Eastern Region

A list of islanding scheme details available with ERLDC is attached below. These islanding schemes have not been reviewed since long. A detailed review may be undertaken of each individual islanding schemes. Further, any new islanding scheme in control area of respective SLDC may be intimated for inclusion in the list.

Station/System
CHPC (Bhutan)
CESC
NALCO(CPP in Orissa system)
ICCL(CPP within Orissa system)
RSP (CPP in Orissa system)
Bhushan Power & Steel (CPP in Orissa system)
Arya ISPAT and power Ltd. (CPP in Orissa system)
Maithon Ispat Limited (CPP in Orissa system)

IFFCO (CPP in Orissa system)
Hindalco(CPP in Orissa system)
IMFA (CPP in Orissa system)
VAL (CPP in Orissa system)
Bakreswar Islanding Scheme
Tata Power Haldia Islanding Scheme
Bandel Islanding Scheme

Members may discuss.

Deliberation in the meeting

SLDC Odisha representative informed that most of islanding schemes as listed are from Odisha system therefore a separate meeting may be convened in this regard with all the CPPs to review status of these islanding schemes.

Regarding islanding schemes in West Bengal, PCC advised WB SLDC to review status of these islanding schemes in consultation with the concerned utilities.

ITEM NO. B.9: Tripping Incidence in month of May -2023

Single line tripping incidents in the month of May-2023 which needs explanation from constituents of either end is attached.

Members may discuss.

Deliberation in the meeting

*Explanation from constituents of either end for single line tripping incidents in the month of May-2023 is attached at **Annexure B.9**.*

PART- C :: OTHER ITEMS

ITEM NO. C.1: Implementation of Single-Phase Auto recloser feature in DEF Relays for the 400 kV transmission lines of TPTL-(Agenda by TPTL)

In 108th PCC meeting, the proposal of implementing auto reclosure with DEF protection was discussed and after discussion it was opined that the proposal needs elaborate technical discussion and confirmation from the relay manufacturers regarding provision of the single-phase auto reclosing functionality in DEF relay for which PCC had further advised TPTL to furnish relevant document / information for further discussion in this regard.

Subsequently TPTL had contacted with the relay suppliers of 400 kV D/C Teesta III HEP – Kishanganj transmission line at Teesta III end and Kishanganj end. The supplier of P442 relay at Teesta III HEP end, i.e., M/s GE Renewable Energy has confirmed that single phase tripping and auto reclose is possible in aided DEF protection function in the P442 relay. Further, as per the relay manual of MiCOM P127 relay, supplied by M/s Areva (formerly M/s Schneider) at Teesta III end, auto reclosure feature is available in DEF protection function of the relay. At Kishanganj end

it was also confirmed by the relay supplier, i.e., M/s Hitachi Energy (formerly M/s ABB Power Systems India) that single phase auto reclose is available in DEF protection function of REL670 relay.

In view of above, it is proposed to implement Single Phase Auto recloser feature in DEF Relays for the 400 kV transmission lines of TPTL.

Discussion was held in 121st PCC Meeting regarding this agenda and after detailed deliberation, the following way forward was decided:

- ERLDC to coordinate with NERLDC to get feedback regarding reliability and success rate of auto recloser scheme in DEF relay.
- TPTL to make a detailed presentation on proposed scheme & its logic and on implementation of the scheme at relay level along with wiring & communication channel detailing in next PCC meeting.
- All transmission utilities were advised to share comments to ERPC/ERLDC regarding implementation of single-phase auto reclosing feature in DEF relay.

In 122nd PCC Meeting, ERLDC representative informed that as per communication received from NERLDC, single phase auto-recloser scheme in DEF relay had been implemented in 400 kV Silchar- Imphal d/c and 400 kV Silchar- Misa d/c line and it is operating satisfactorily. He further informed that current reversal guard need to be implemented along with auto recloser scheme in DEF relay for its successful operation.

In 124th PCC, Powergrid representative shared case study paper of IIT Mumbai describing about mal operation of DEF protection resulting in spurious tripping of healthy line. He suggested that comments may be shared by utilities before implementing single phase auto recloser feature in DEF Relays for the 400 kV transmission lines of TPTL.

ERLDC informed that spurious tripping of healthy line is even possible if single phase auto recloser feature is disabled in DEF relays however they requested all utilities to share the observation on the proposed scheme.

TPTL representative informed that as per communication made with M/s GE, the detail scheme & its implementation will be presented at the earliest.

In 125th PCC Meeting, TPTL representative informed that they had received scheme details from M/s GE and they are planning to have a discussion with the OEM before making the presentation in PCC meeting.

PCC advised TPTL to share the scheme/details as received from M/s GE to ERPC/ERLDC. The presentation on detailed logic/scheme may be made in next PCC meeting.

In 126th PCC Meeting, PCC advised TPTL to present the scheme in coordination with M/s GE in next PCC meeting.

TPTL may update.

Deliberation in the meeting

*ERPC representative informed that scheme details received from TPTL had been shared to Powergrid. The same is enclosed at **Annexure C.1**.*

PCC advised Powergrid representative to share observations on the scheme submitted by TPTL.

ITEM NO. C.2: Submission of protection settings for newly charged elements/change in network configuration

In 123rd PCC Meeting, PCC advised all the utilities to intimate any changes in network configuration in their intra state network regularly and review the settings accordingly & upload the relay settings in PDMS by using DMNS portal or by sending the settings file in desired format to erpc-protection@gov.in.

On enquiry from ERLDC regarding facility in PDMS to review the settings implemented in the relay, PRDC representative replied that settings can be extracted from PDMS and analysis/review of same can be done by simulation tool of PSCT.

It was decided that the substation-wise review of protection settings may be carried out using PDMS & PSCT for that PRDC was advised to make a presentation in this regard in PCC.

In 125th PCC Meeting, it was decided that PRDC would made a presentation in next PCC meeting on protection setting coordination using PSCT & PDMS.

In 126th PCC Meeting, PCC advised all concerned utilities (mostly from OPTCL, North Karanpura and NTPC Barh) to share pending relay settings in desired format to erpc-protection@gov.in or upload the relay settings in PDMS by using DMNS portal. The updated status of protection settings for new elements charged in ER Grid from Nov 22 to May 2023 is given at **Annexure C.2**.

Members may update.

Deliberation in the meeting

PRDC representative requested all the utilities to intimate any changes in network configuration in their intra state network regularly and review the settings accordingly & upload the relay settings in PDMS by using DMNS portal or by sending the settings file in desired format to erpc-protection@gov.in.

She further demonstrated the procedure to extract relay settings from PDMS portal and how to use the relay settings to in PSCT application for relay coordination study. She requested all concerned utilities to use the protection database and the PSCT application for relay coordination purpose and in case of any help/query they may take help of PRDC personnel.

Member Secretary advised utilities take necessary steps for timely Updation of settings data in protection database and also advised to use the database with the help of PSCT tool for relay coordination, setting review of their network.

ITEM NO. C.3: Follow-up of Decisions of the Previous Protection Sub-Committee Meeting(s)

The decisions of previous PCC meetings are attached at **Annexure C.3**.

Members may update the latest status.

Deliberation in the meeting

*Updated status of decision of previous PCC meetings is attached at **Annexure C.3**.*

ITEM NO. C.4: New Element Integration

A) FTC of 220 kV Muzaffarpur-Amnour D/c

As per information received at ERLDC, 220 kV Muzaffarpur-Amnour D/c is going to be first time charged from both ends.

Line parameters are as below:

Name	Conductor Type	Length
220 kV Muzaffarpur-Amnour D/c	ACSR Zebra	65.4 km

Protection Co-ordination may be reviewed as per following table (Based on information available at ERLDC):

Reason	Settings to be reviewed	At S/s	Utility	Remarks
FTC of 220 kV Muzaffarpur-Amnour D/c	220 kV Muzaffarpur-Amnour D/c	Muzaffarpur, Amnour	PG ER-1, BSPTCL	Protection coordination to be done for newly connected elements as per ERPC guidelines.
	220 kV Muzaffarpur-Hazipur D/c	Hazipur	BSPTCL	Adjacent longest line will now be 220 kV Muzaffarpur-Amnour D/c (65.4 km). Hence Zone-3 settings may be reviewed keeping in view it should not encroach next voltage level.
	220 kV Hazipur-Amnour D/c			
	220 kV Muzaffarpur-KBUNL (MTPS) D/c	MTPS (KBUNL)	KBUNL	
	220 kV Muzaffarpur-Goraul D/c	Goraul	BSPTCL	

- Carrier Scheme healthiness confirmation is required to facilitate FTC of the lines.
- Utilities may confirm if any changes in protection setting required or not. If any changes done, may share the revised protection settings with ERLDC and ERPC at the earliest.

Concerned utilities may update.

Deliberation in the meeting


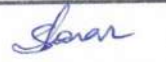
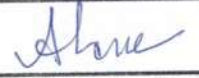



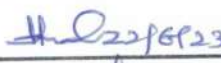
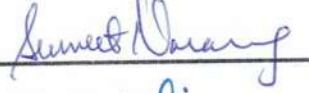

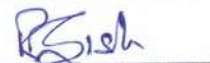

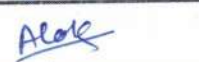

PCC advised concerned utilities to review relay settings and share revised settings to ERPC/ERLDC.

Participants in 127th Protection Coordination Sub- Committee Meeting

Venue: ERPC Conference Hall, Kolkata

Time: 10:30 hrs

Date: 22.06.2023(Thursday)

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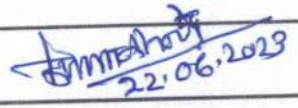
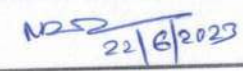
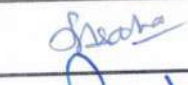

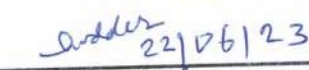

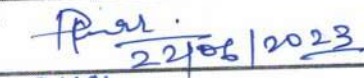
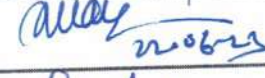
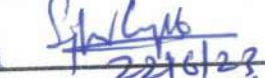
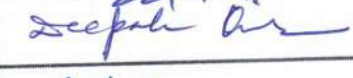
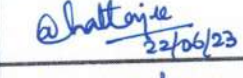
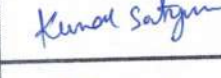


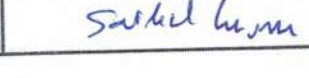
"Coming together is a beginning, staying together is progress, and working together is success." –Henry Ford

Participants in 127th Protection Coordination Sub- Committee Meeting

Venue: ERPC Conference Hall, Kolkata

Time: 10:30 hrs

Date: 22.06.2023(Thursday)

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30	Saibal Ghosh	ERLDC, Manager	8584072077	Saibal@grid-india.in	 22/06/23





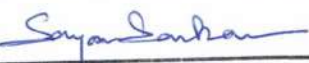
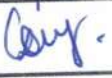

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Date: 22.06.2023(Thursday)

Sl No	Name	Designation/ Organization	Contact Number	Email	Signature
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ग्रिड-इंडिया
GRID-INDIA

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]




पूर्वी क्षेत्रीय भार प्रेषण केन्द्र / Eastern Regional Load Despatch Centre

कार्यालय : 14, गोल्फ क्लब रोड, टॉलीगंज, कोलकाता - 700033
Office : 14, Golf Club Road, Tollygunge, Kolkata - 700033
CIN : U40105DL2009GOI188682, Website : www.erldc.in, E-mail : erldcinfo@grid-india.in, Tel.: 033 23890060/0061

घटना संख्या: 15-05-2023/1

दिनांक: 01-06-2023

Report on the grid event in Eastern Region (पूर्वी क्षेत्र में ग्रिड घटना पर रिपोर्ट)**Summary of the event (घटना का सारांश):**

At 11:13 Hrs, OPGW wire of 220 V Therubali-Laxmipur-2 snapped between location no. 1209 & 1210 and fault was not cleared from Therubali end. This led to tripping of all associated feeders at Therubali and total power failure at 220kV Therubali, 220kV Kasipur & 220kV Jaypatna sub-stations in south Odisha. There was load loss of around 25MW in Therubali area and generation loss of 20 MW at Balimela HEP following the fault. Power restored at 220kV Therubali S/S at 11:51 hrs. by charging of 220kV Therubali- Bhanjanagar Ckt#2.

- **Date / Time of disturbance:** 15-05-2023 at 11:13 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 220/132 kV Therubali, Kashipur, Jaypatna S/s
- **Load and Generation loss.**
 - 20 MW generation loss reported at Balimela
 - 25 MW load loss reported during the event at Therubali.

Important Transmission Line/element if out (महत्वपूर्ण संचरण लाइने जो बंद है):

- 220 kV Jaynagar-Balimela-1&2
- 220 kV Jeypore-Jaynagar-2,3
- 220KV Jayanagar-Therubali-3

Major elements tripped (प्रमुख ट्रिपिंग):

Transmission/Generation element name संचरण लाइन / विद्युत उत्पादन इकाई का नाम	Trip Date बंद होने की तिथि	Trip Time बंद होने का समय	Restoration Date वापस आने की तिथि	Restoration time वापस आने का समय
220 kV Therubali-Bhanjanagar Ckt-1	15/05/2023	11:13	15/05/2023	13:33
220 kV Therubali-Bhanjanagar Ckt-2	15/05/2023	11:13	15/05/2023	11:51
220 KV Therubali -Narendrapur Ckt-2	15/05/2023	11:13	15/05/2023	12:39
220kV Therubali-Gunupur 1	15/05/2023	11:13	15/05/2023	12:48
220 KV Therubali -Indravati Ckt 1	15/05/2023	11:13	15/05/2023	13:33
220 KV Therubali -Indravati Ckt 2	15/05/2023	11:13	15/05/2023	13:25
220 KV Therubali -Indravati Ckt 3	15/05/2023	11:13	15/05/2023	13:22
220 KV Therubali -Upper Kolab Ckt	15/05/2023	11:13	15/05/2023	12:15
220 KV Therubali - Kasipur Ckt	15/05/2023	11:13	15/05/2023	13:14
220kV Therubali-Laxmipur D/C	15/05/2023	11:13	Under Breakdown	

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

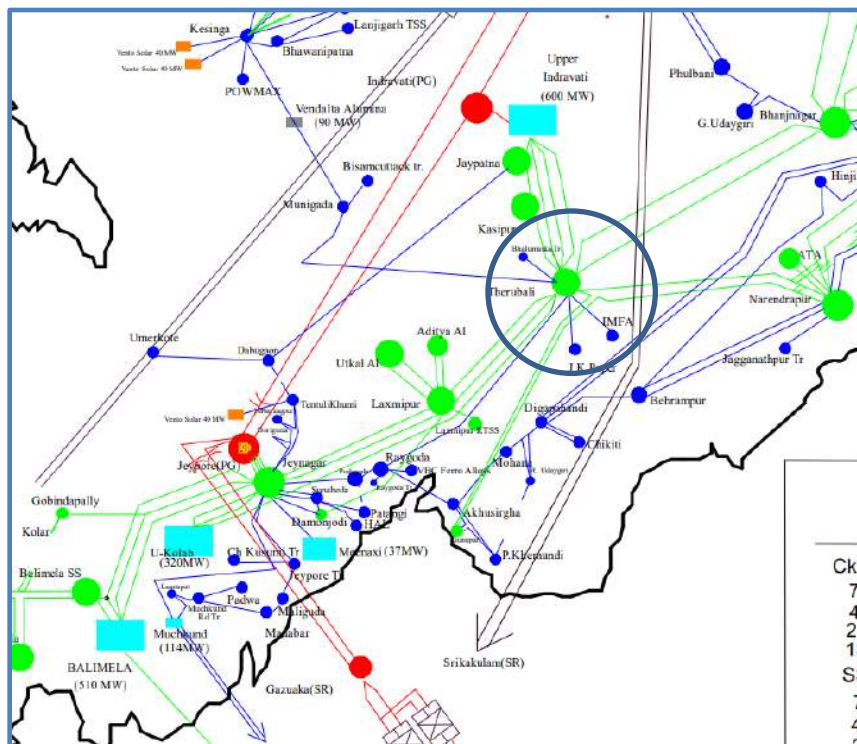


Figure 1: Network across affected area

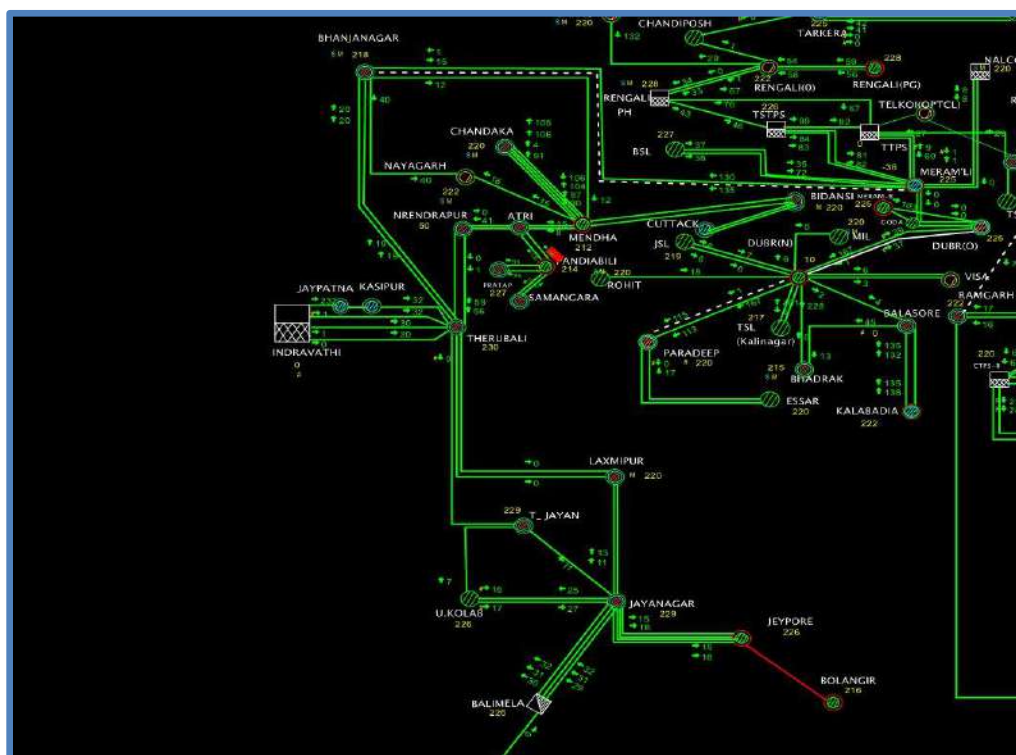


Figure 2: SCADA snapshot of the system

Relay indication* and PMU observation (रिले संकेत और पीएमयू पर्यवेक्षण):

Sl.No	Feeder Name	Local End	Remote End
1	Theruballi- Indravati-1	Distance protection operated	Broken Conductor, IR=288A, IY=522A, IB=443A
2	Theruballi-Indravati-2	BCG trip. IR=252.9A, IY=1187.8A, IB=1050.4A, IG=450.78 A	NO TRIP
3	Therubali-Indravati-3	NO TRIP	Broken Conductor, IR=114.3A, IY=449.6A, IB=415.8A
4	Theruballi-Kashipur	NO TRIP	Tripped at Indravati end: Broken conductor indication, IR = 76.61A, IY = 417.3A, IB = 368.5A. In=194.6A
5	Theruballi-Laxmipur-1	Zone-4 with fault current IB=2.26 Kamp, Distance=41.85Km	I>1 trip. With fault current of IY=1.7Kamp and IB=1.5Kamp
6	Theruballi-Laxmipur-2	NO TRIP	Zone-1 trip, distance=13.38Km. IB=3.715Kamp.
7	Theruballi-Bhanjanagar-1	NO TRIP	Zone-3, IR=46.5A, IY=523.5A, IB=530A, Distance=256.1Km
8	Theruballi-Bhanjanagar-2	NO TRIP	Zone-3, Distance=250.7Km, IR=40A, IY=520A, IB=525.9A
9	Theruballi-Gunupur	BCG trip. IR=65.7A, IY=283.2A, IB=309.2, IG=216.30A	NO TRIP
10	Theruballi-Narendrapur-2	BCG trip. IR=32.5A, IY=583.4A, IB=77.9A, IG=247.99A	NO TRIP
11	Theruballi-Upper kolab	NO TRIP	Distance relay. IR=393.1A, IY=581A, IB=511.9A
12	100MVA Auto-1	NO TRIP	NO TRIP
13	100MVA Auto-2	NO TRIP	NO TRIP
14	160MVA Auto-3	NO TRIP	NO TRIP

*As submitted by OPTCL

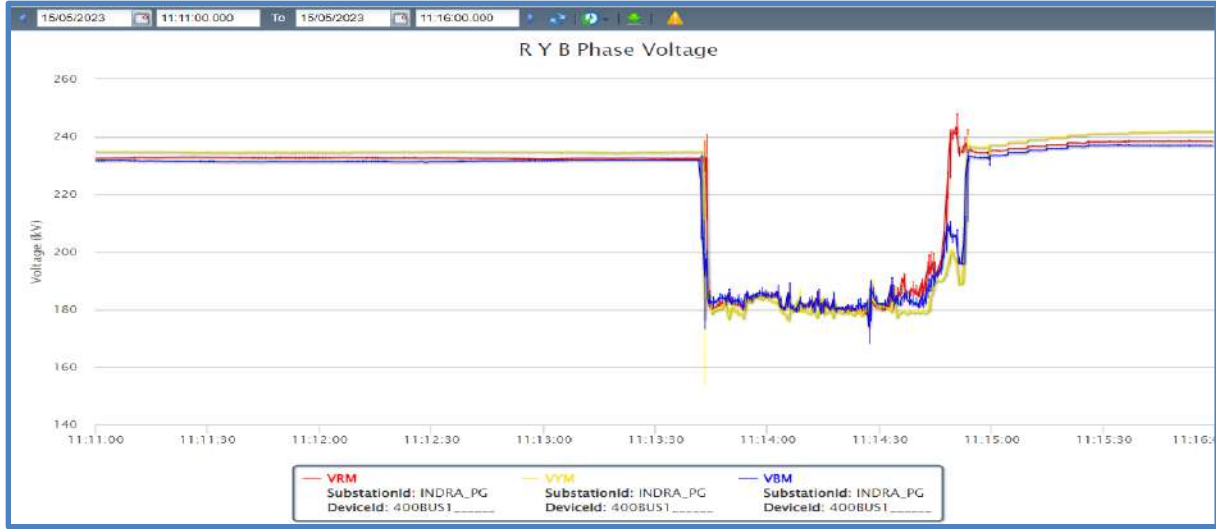


Figure 2: PMU voltage snapshot of 400/220 kV Jeypore S/s

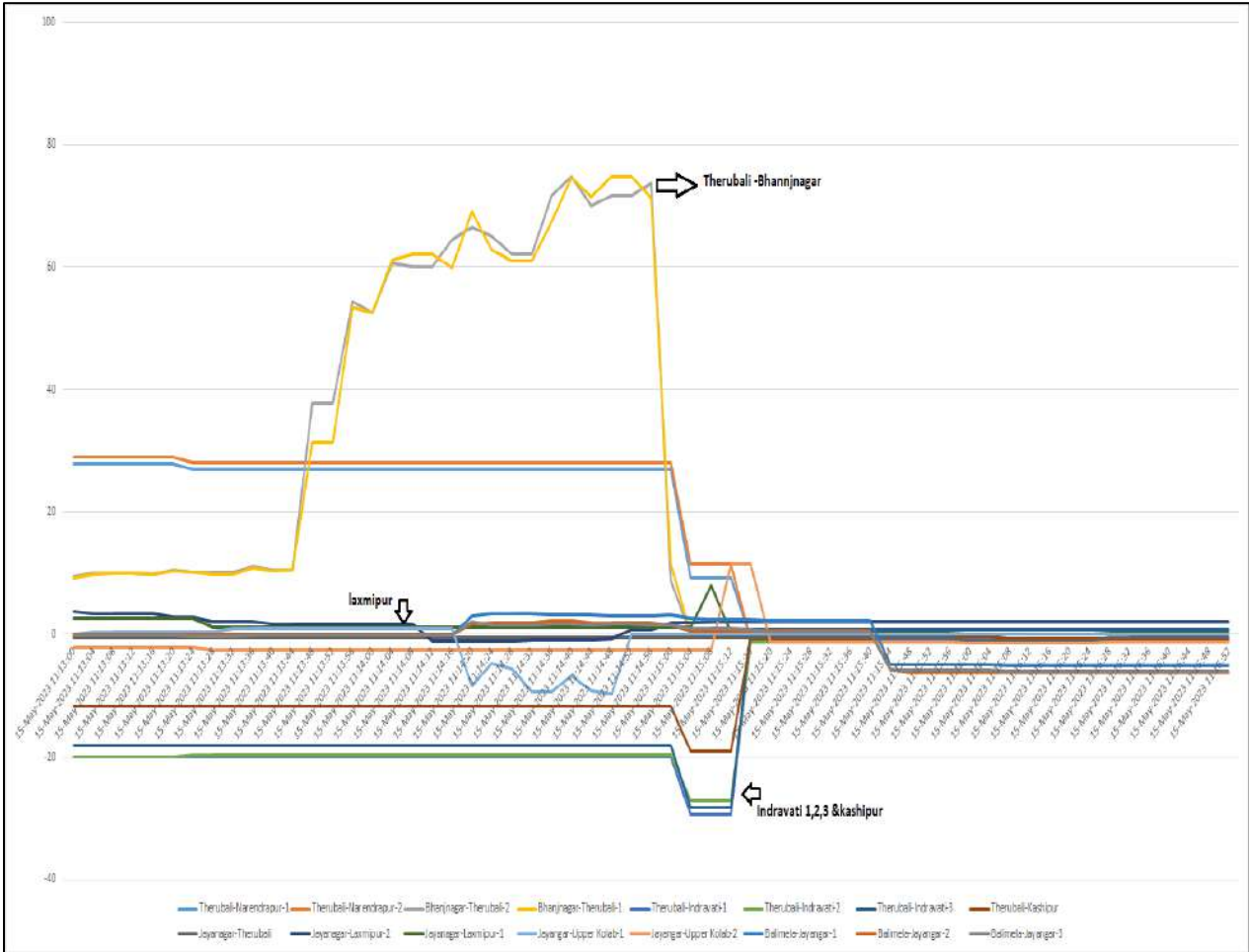
Analysis of the event (घटना का विश्लेषण) & Protection issue (सुरक्षा समस्या):

Sequence of Events:

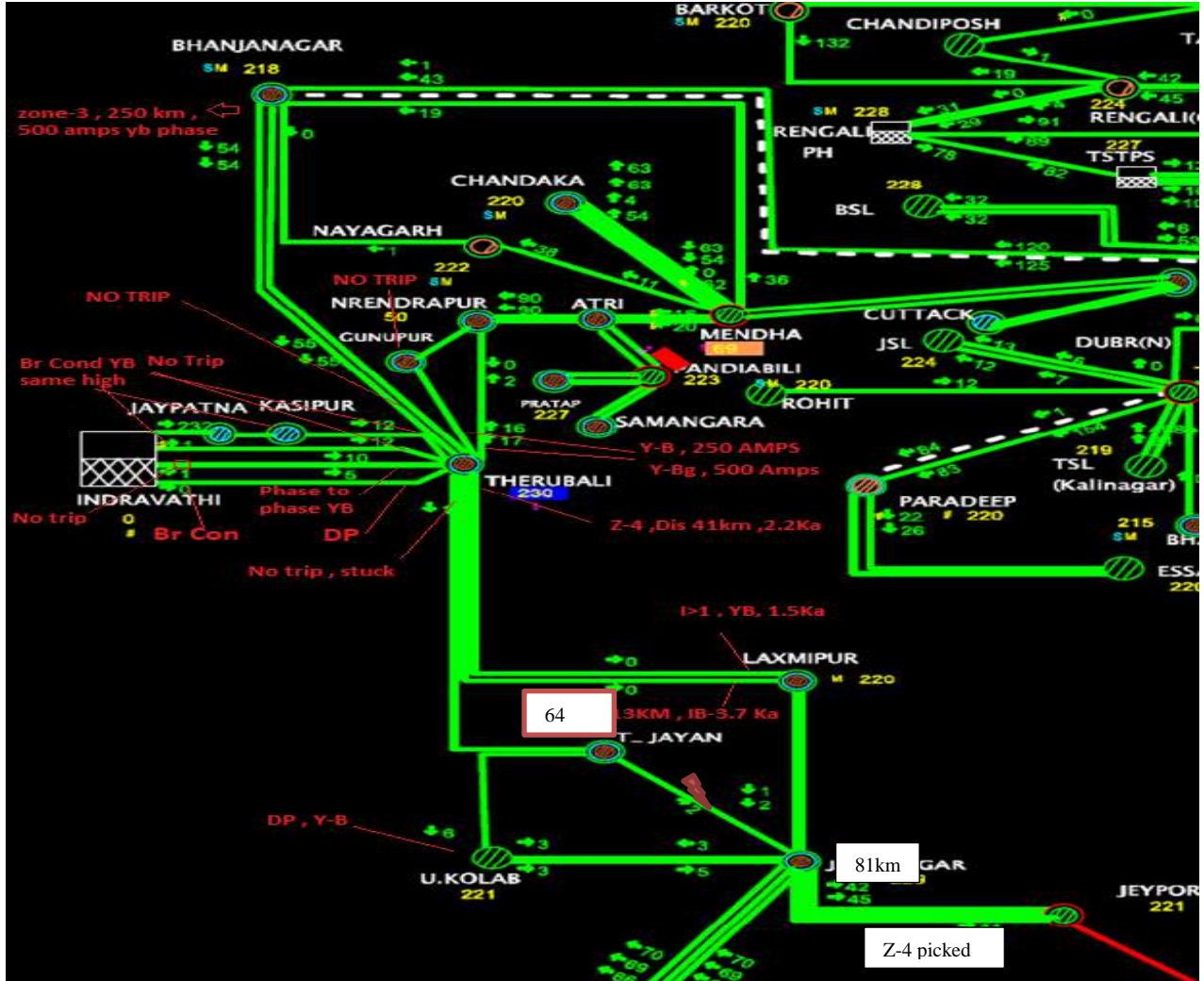
- T+0: B_ph fault struck 220 kV Therubali-Laxmipur-2 and B_ph CB opened from Laxmipur end
- T+620 msec: Another fault struck Y_ph of the line, however, at this instance only Y_ph breaker tripped at Laxmipur instead of three phase.
- T+1000 msec: Three phase A/r attempt of 220 kV Therubali-Laxmipur-2 which failed.
- No tripping of 220 kV Therubali-Laxmipur-2 occurred from Therubali end.
- T+11 seconds: 220 kV Therubali-Laxmipur-1 tripped from Laxmipur only on O/c
- T+45 seconds: 220 kV Therubali-Laxmipur-1 tripped from Therubali end on B_N fault, Zone-4.
- 220 kV Therubali-Bhanjnagar D/c tripped from Bhanjnagar only on Zone-3
- 220 kV Therubali-Gunupur, 220 kV Therubali-Narendrapur-2 tripped from Therubali only (Y_B Back Up O/c)
- Finally, 220 kV Therubali-Indravati-1,3 and 220 kV Therubali-Kashipur-Indravati tripped from Indravati end on broken conductor. 220 kV Therubali-Indravati-2 tripped on Back Up O/c at Therubali end.

Exact Timestamp of tripping is difficult to ascertain due to non-synchronization of DR and non-availability of complete SCADA data.

SCADA Plot (ERLDC data)



SLD with Relay



Detailed Observation and Issues

220 kV Therubali Laxmipur -II

The fault on 220KV Theruballi – Laxmipur D/C tower happened due to snapping of OPGW between location no 1209-1210.

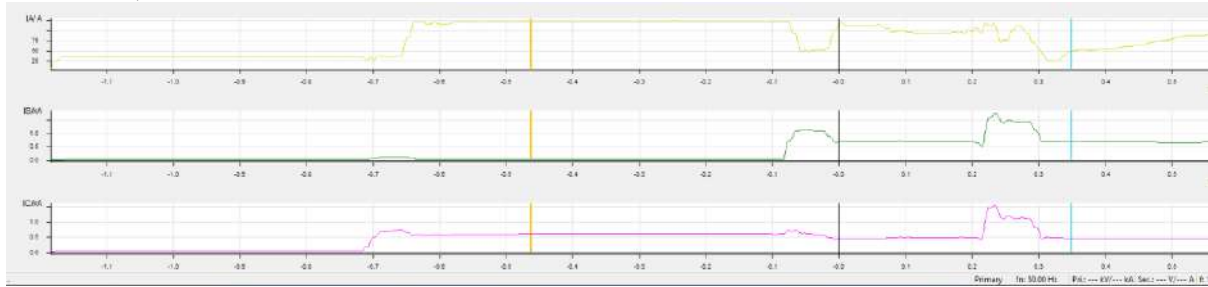
Ckt-2 tripped from laxmipur end in Zone -1. However, it seems three phase A/r in in service and there was single phase trip during successive fault within A/r dead time.

At Therubali end, fault was not cleared due to non-tripping of its main & tie CB at Theruballi GSS end. It was found that the DC supply failed in its own CR panel due to blown control circuit fuse. On further checking, it was found that the spring charge indication bulb terminal shorted in its main CB due to which control fuse got blown.

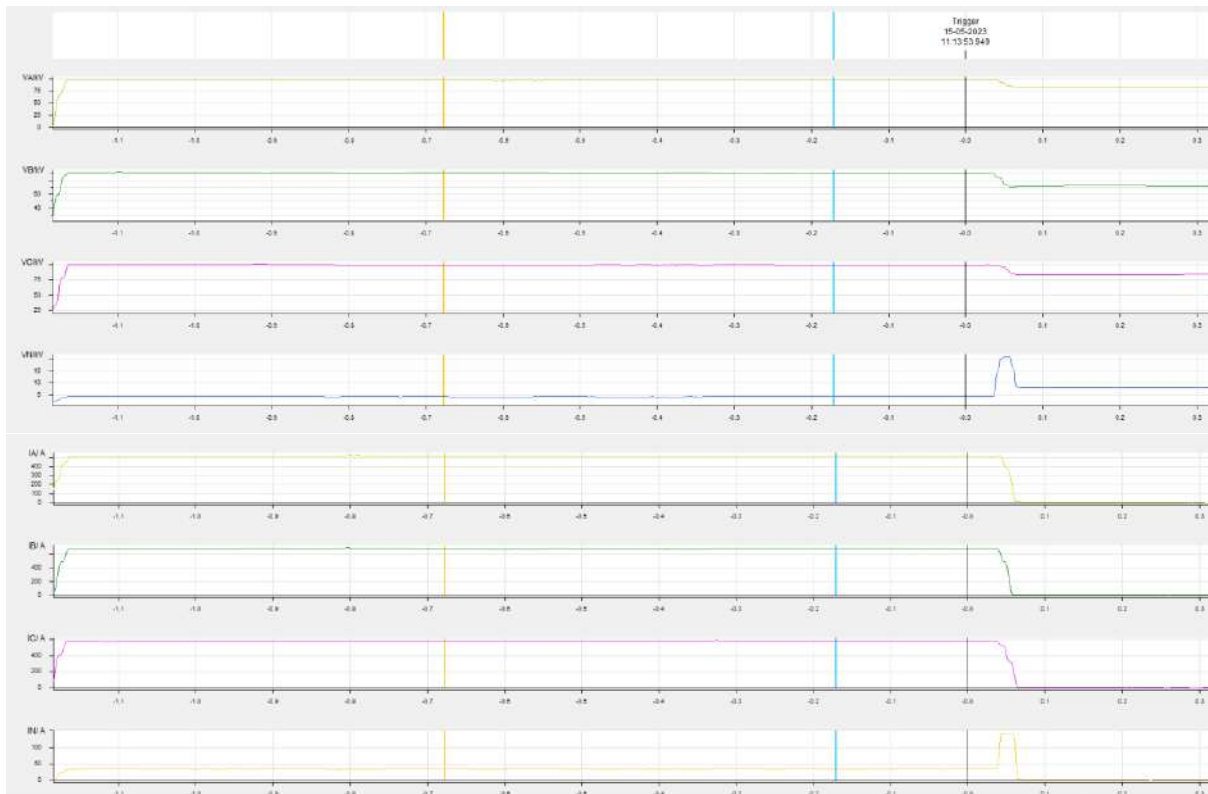
220 kV Therubali Laxmipur -I

11:13:43:043 at T=0 instance at Laxmipur end: B phase fault converted to Y-B phase fault and F/C, 600 amps and IN=600 Amps, Initially sensing Z-4 but dropped due to reduction in current

at Therubali end. Y phase converted to Y-B, sensing fault in zone-3 but dropped due to current reduction ,

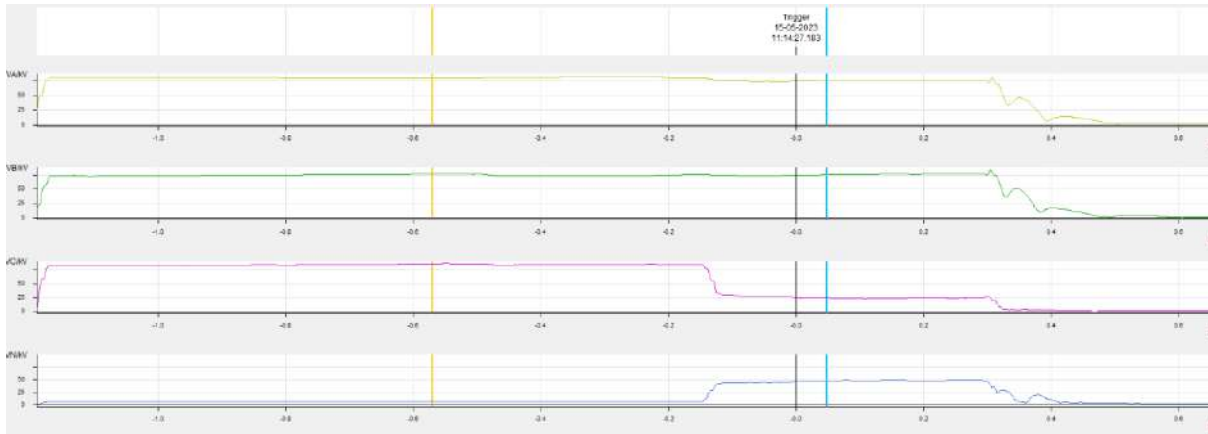


11:13:53:943 at T+11: Laxmipur end :Y-B phase fault and F/C , 600 amps and IN=600 Amps persisted for 11 seconds and line tripped from Laxmipur end after 11 seconds Line current zero but line voltage was persisting which means breaker was closed from Therubali end .Tripped on I>1, why it took 11 seconds to operate , Overcurrent protection setting to be checked , and if DEF enabled it should have also operated, both things to be checked.



11:14:27:183 at T+45:

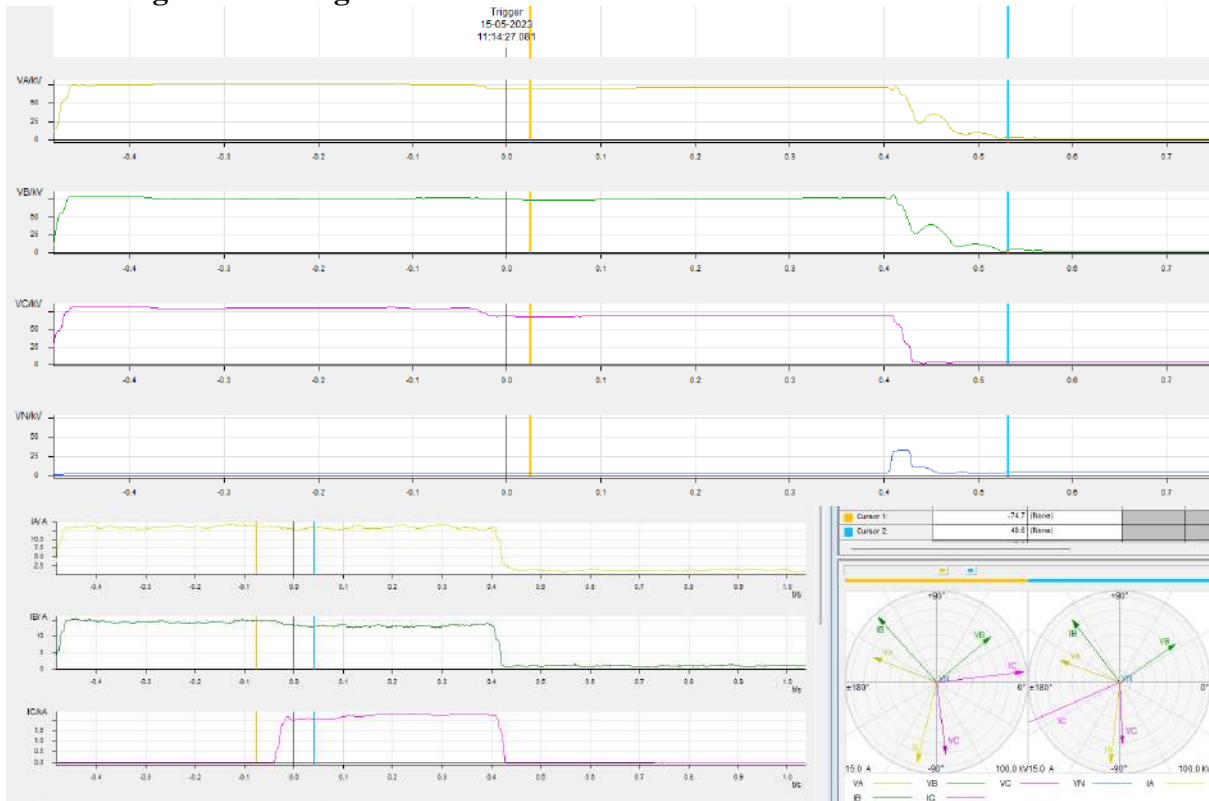
At Laxmipur end finally Line voltage became zero which means breaker also opened from Therubali end after 45 seconds.



At Therubali end : Therubali Laxmipur-1 at Therubali end tripped in Zone-4. Initially only charging current was flowing as line tripped from Laxmipur end which is evident from DR, V & I 90 degree apart, but suddenly B phase fault appeared in zone-4 and current reversal also took place and it tripped in z-4.

If breaker tripped from laxmipur how it got path to feed current in reverse even if both lines touch via opgw snapping fault current path should be forward to Therubali.

Line is 65 Km and Z-4 distance in relay is 41 km, this may be checked as z-4 reach seems to be set at higher much higher.



220 kV Therubali -Bhanjnagar tripped in zone-3 from Bhanjnagar.

220 kV Therubali -Narendrapur tripped from Therubali end in Y-B phase fault probably in non-directional Back-Up O/c operation. DR not available.

Finally, at last 220 kV **Therubali -Indravati** 1,3, 4 tripped from Indravati end by Broken conductor operation after 70 seconds approx. DR not available. Broken conductor generally kept for alarm purpose only, adopted settings may be shared.

220 kV Therubali-Indravati-1&2 also tripped from Therubali end on Y-B probably non-directional Back Up O/C as DR not available.

Any relay picked up at therubali end for 3 & 4 or not?

For 220 kV Jeynagar -Laxmipur line at Jeynagar end. Why Z-4 picked for the fault in Therubali-Laxmipur line?

Major Issues:

Old Control panel and protection scheme:

Existing CR panel scheme is very old and there is no provision of Trip coil supervision, DC supervision and Ann. facia with existing scheme. So necessary scheme modification will be done to adopt above supervision.

Protection Co-ordination and thorough need of Audit:

- Back-up Overcurrent co-ordination needs to be done for fast and accurate tripping.
- Directional earth fault to be enabled at all locations with proper co-ordination.
- All Distance protection schemes reach of each line to be checked once.

Proper configuration of DR and time synchronization:

- None of the DRs are time synchronised even Main 1/Main-2 for same line are differing.
- Digital channels are improper and essential signals are not configured such as breaker status, relay pick up etc, needs to be done as per ERPC philosophy.
- This issue has resulted into problem in analysis and identifying sequence of operation.
- DR from many places is yet to be received.

Nature of Fault:

- Root cause analysis of fault inception and nature of fault needs to be done. As the fault persisted till 70 seconds.
- Overall thorough protection audit needs to be done.

220KV SYSTEM DISTURBANCE REPORT



GRID S/S NAME: 220/132/33KV THERUBALLI

DATE: 15/05/2023

TIME: 11:13 HRS

220KV Bus system : 1 and ½ Scheme.

Bus-1: Bhanjanagar-1, Bhanjanagar-2, Gunupur, Narendrapur-2, Kashipur, Indravati-3 and Auto-1.

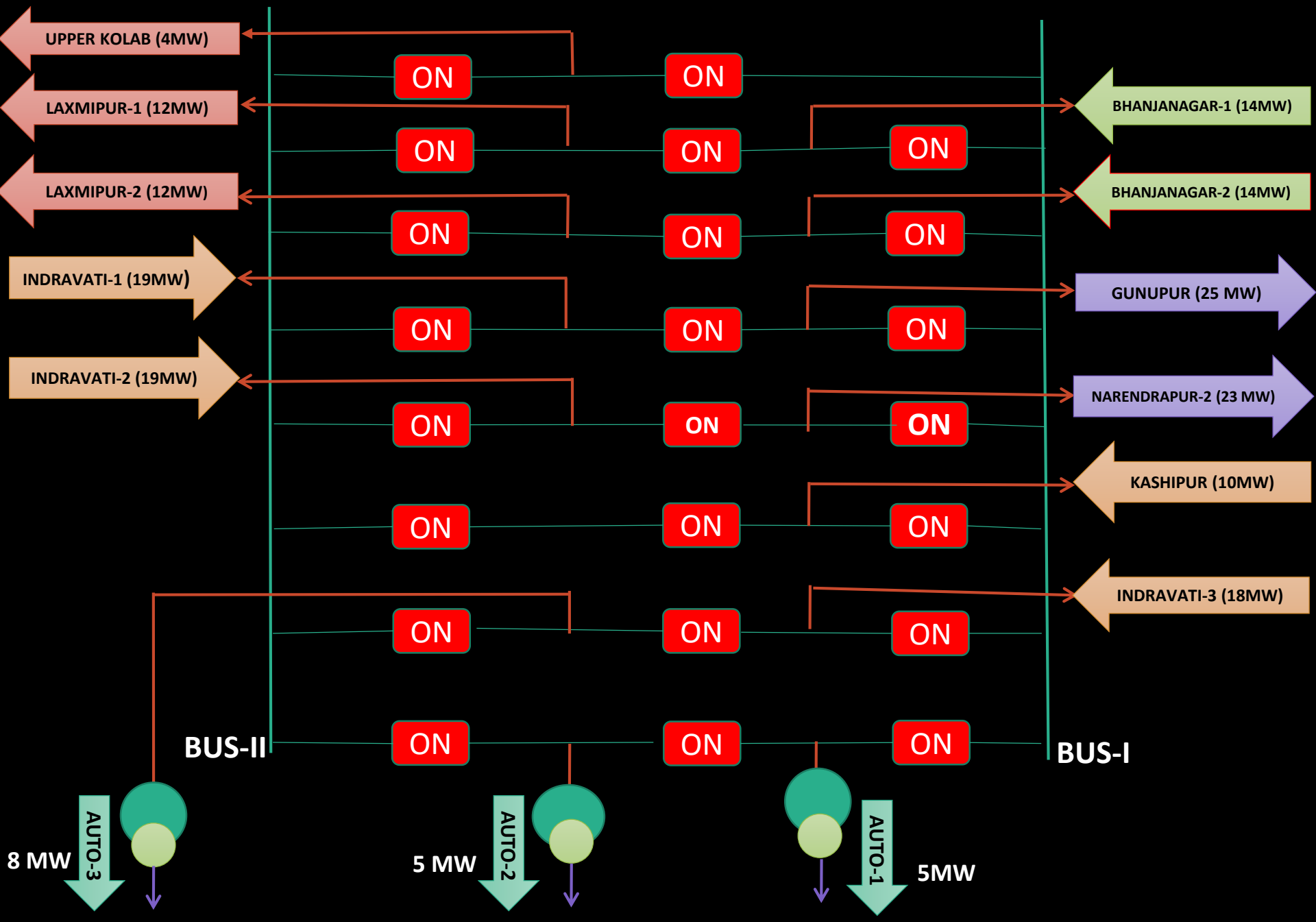
Bus-2: Upper Kolab, Laxmipur-1, Laxmipur-2, Indravati-1, Indravati-2, Auto-3 and Auto-2.

Weather Condition : Sunny

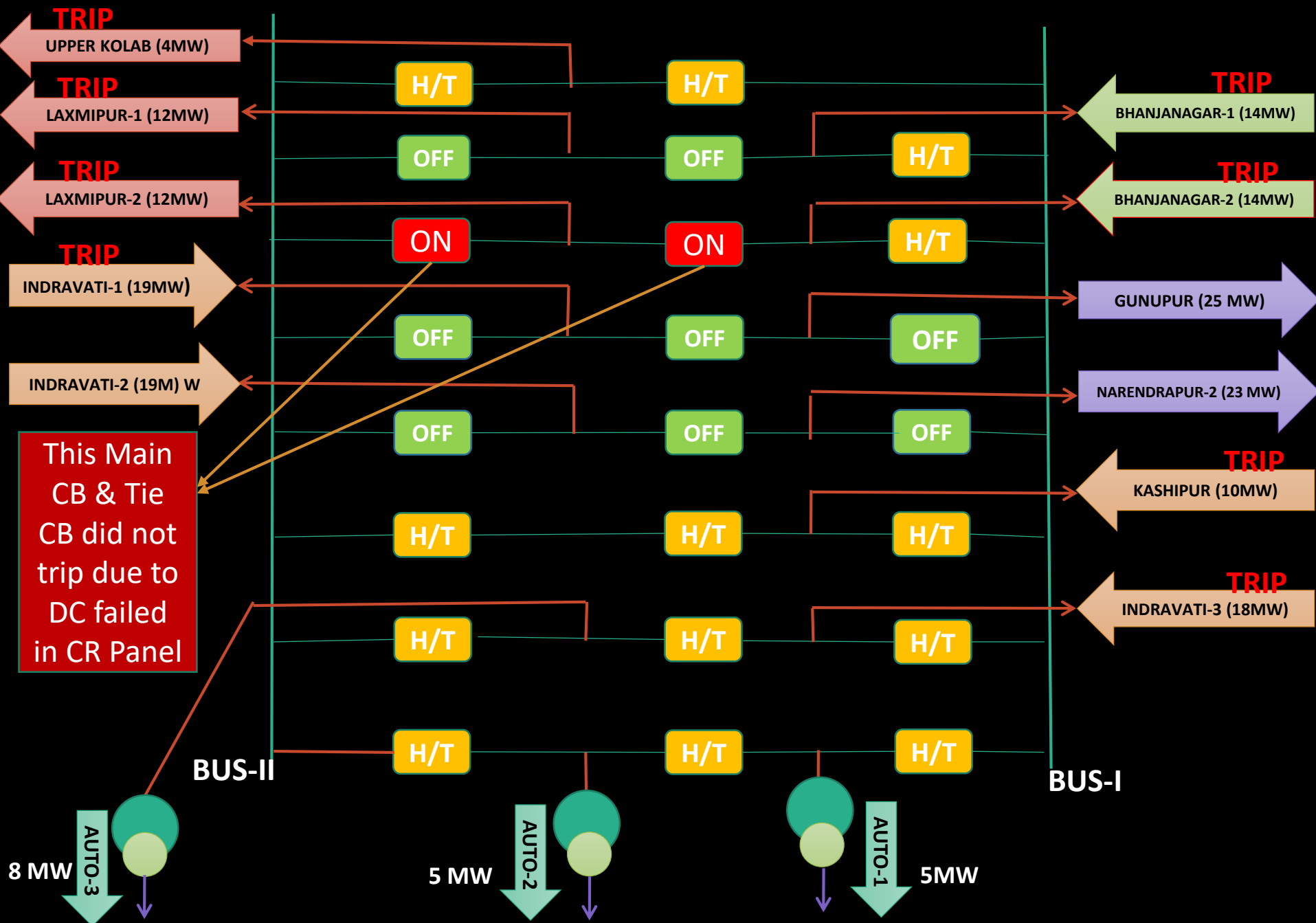
Pre-Fault Load Flow in 220KV bays :

Sl.No	Bus-1 Feeder/Bay Name	MW	Load Flow		Sl.No	Bus-II Feeder/Bay Name	MW	Load Flow
1	BHANJANAGAR-1	14MW	Import		8	UPPER KOLAB	4MW	Export
2	BHANJANAGAR-2	14MW	Import		9	LAXMIPUR-1	12MW	Export
3	GUNUPUR	25MW	Export		10	LAXMIPUR-2	12MW	Export
4	NARENDRAPUR-2	23MW	Export		11	INDRAVATI-1	19MW	Import
5	KASHIPUR	10MW	Import		12	INDRAVATI-2	19MW	Import
6	INDRAVATI-3	18MW	Import		13	100MVA AUTO-2	5MW	Export
7	100MVA AUTO-1	5MW	Export		14	160MVA AUTO-3	8MW	Export

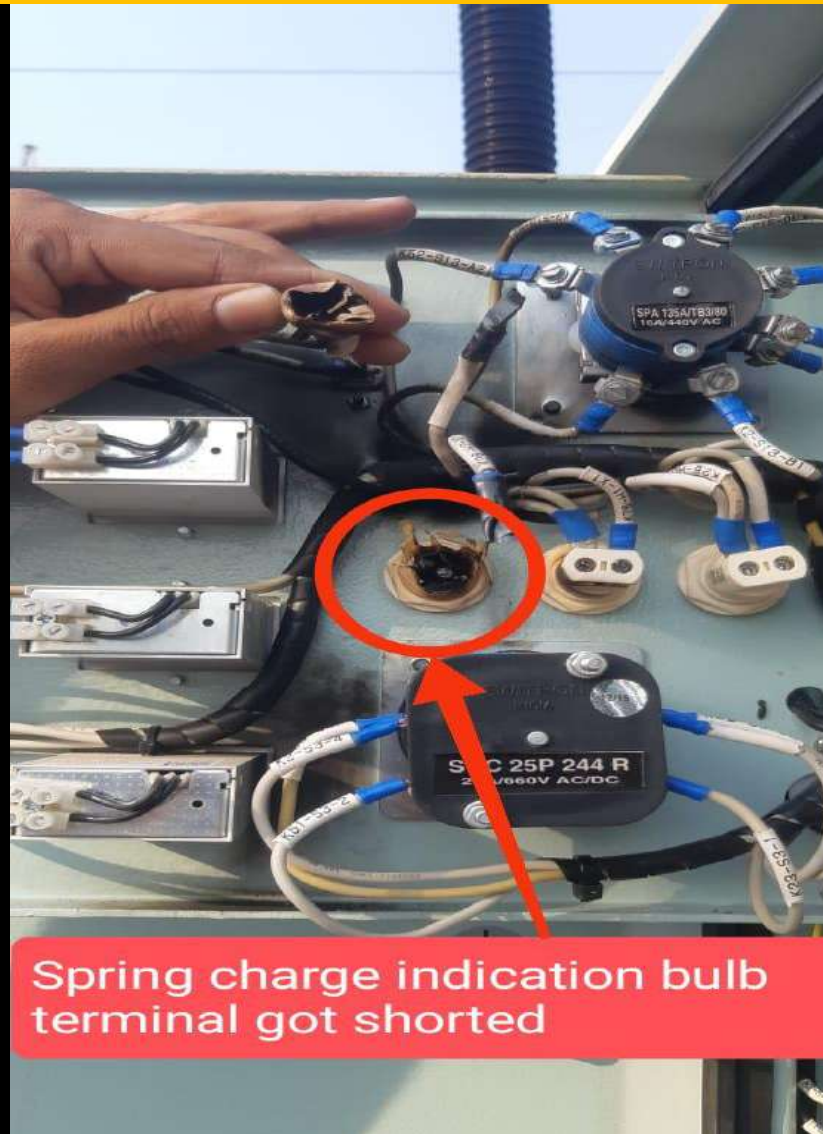
PRE FAULT LOAD PATTERN OF DIFFERENT 220KV FEEDERS



POST FAULT CONDITION



Laxmipur-2 feeder Main Breaker (Siemens) at Theruballi GSS



Spring charge indication bulb terminal got shorted

RELAY INDICATION DETAILS

Sl.No	Feeder Name	Local End	Remote End
1	Theruballi- Indravati-1	Distance protection operated	Broken Conductor, IR=288A, IY=522A, IB=443A
2	Theruballi-Indravati-2	BCG trip. IR=252.9A, IY=1187.8A, IB=1050.4A, IG=450.78 A	NO TRIP
3	Theruballi-Indravati-3	NO TRIP	Broken Conductor, IR=114.3A, IY=449.6A, IB=415.8A
4	Theruballi-Kashipur	NO TRIP	Tripped at Indravati end: Broken conductor indication, IR = 76.61A, IY = 417.3A, IB = 368.5A. In=194.6A
5	Theruballi-Laxmipur-1	Zone-4 with fault current IB=2.26 Kamp, Distance=41.85Km	I>1 trip. With fault current of IY=1.7Kamp and IB=1.5Kamp
6	Theruballi-Laxmipur-2	NO TRIP	Zone-1 trip, distance=13.38Km. IB=3.715Kamp.
7	Theruballi-Bhanjanagar-1	NO TRIP	Zone-3, IR=46.5A, IY=523.5A, IB=530A, Distance=256.1Km
8	Theruballi-Bhanjanagar-2	NO TRIP	Zone-3, Distance=250.7Km, IR=40A, IY=520A, IB=525.9A
9	Theruballi-Gunupur	BCG trip. IR=65.7A, IY=283.2A, IB=309.2, IG=216.30A	NO TRIP
10	Theruballi-Narendrapur-2	BCG trip. IR=32.5A,IY=583.4A, IB=77.9A, IG=247.99A	NO TRIP
11	Theruballi-Upper kolab	NO TRIP	Distance relay.IR=393.1A,IY=581A,IB=511.9A
12	100MVA Auto-1	NO TRIP	NO TRIP
13	100MVA Auto-2	NO TRIP	NO TRIP
14	160MVA Auto-3	NO TRIP	NO TRIP

Analysis:

1. The fault on 220KV Theruballi – Laxmipur D/C tower happened due to snapping of OPGW conductor between location no 1209-1210.
2. Line fault on 220 KV Theruballi-Laxmipur Ckt-2 not cleared due to non-tripping of its main & tie CB at Theruballi GSS end. So it is checked and found that the DC supply fail in its own CR panel and it is due to blown of its control ckt fuse.
3. So checked its control and protection ckt and found the spring charge indication bulb terminal shorted in its main CB due to which control fuse blown.
4. Due to this, fault in the line persists for long time, resulting other 220 KV feeders affected both at local and remote end.
5. As the fault current feed by individual 220KV feeders i.e Upper Kolab/Indravati 1,2 3& 4/Bhanjanagar 1&2/ Narendrapur 1 &2 is very less, so fault continued upto 70 sec due to delay in fault clearance from ends.

Note:

1. The event logger system of Theruballi GSS is not working since long.
2. Due to GPS IRIG-B error , date & time of relays are showing different.

Remedial Measures:

1. Control ckt of main CB of 220 KV Theruballi-Laxmipur Ckt-2 rectified.
2. Zone-4 time delay setting set at 500 ms in all DP relays of 220 KV system at Theruballi GSS.
3. Existing CR panel scheme is very old and there is no provision of Trip coil supervision, DC supervision and Ann. facia with existing scheme.
4. So necessary scheme modification will be done to adopt above supervision.

Restoration Element:

At 11:51 Hours, the restoration process started by taking supply from Bhanjanagar end. Then one by one other feeders charged except faulty one.

THANK YOU



ଓଡ଼ିଶା ବିଦ୍ୟୁତ ଶକ୍ତି ସଂଚାରଣ ନିଗମ ଲିଡ.

ODISHA POWER TRANSMISSION CORPORATION LIMITED

(A Government of Odisha Undertaking)

OFFICE OF THE DY. GENERAL MANAGER (ELEC).

E & M.R. DIVISION: BIDYUTPURI COLONY, BERHAMPUR-760010

Email-id: emrt.div.bam@optcl.co.in, Website: www.optcl.co.in

CIN: U4102OR2004SGC007553

No: 200(5)

Date: 25/05/2023

To,

The Director (Operation),
OPTCL, Bhubaneswar.

Sub: Regarding blackout of 220/132/33 kV Therubali GSS on dated 15.05.2023.

Ref: Your Office Letter No. Dir (O)-JeyporeCircle/14/2017-62(5) dated 18.05.2023.

Sir,

With reference to the subject cited above, the undersigned had visited 220/132/33 kV Therubali GSS on dated 24.05.2023 to investigate the blackout incident of Therubali GSS on dated 15.05.2023.

Date and Time of Incident: 15.05.2023 11:13:42 AM

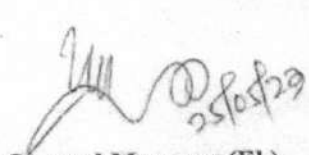
Cause of Blackout: Non-Tripping of 220 kV Therubali-Laxmipur circuit-2 Circuit Breaker at Therubali end during incident with fault persisting condition. As the DC supply has failed in same circuit C/R panel and it is due to blown off of its control & protection circuit fuse.

The observations and recommendations to overcome the issues and avoid such incidents in future are mentioned in Annexure A and the observations regarding Tripping and Blackout of GSS are mentioned in Annexure B.

This is for favour of your kind information and necessary action.

Yours sincerely,

Enclosure: As stated above



Deputy General Manager (EL.)
E&MR Division, Berhampur

CC:

1. The Executive Director, Southern Zone. OPTCL Berhampur for favour of kind information.
2. The GM (EL.), EHT (O&M) Circle, Berhampur for favour of kind information.
3. The DGM (EL.) EHT (O&M) Division, Therubali for favour of information.
4. The DGM (EL.) E&MR Division, Rayagada for favour of information.

OBSERVATIONS & RECOMMENDATIONS:

Sl. No.	Issue	Observations	Recommendations
1	Annunciation Facia Status & its availability	Annunciation Facia are not available in most of the 220 kV & 132 kV Feeders/Transformers. 03 Nos. Common annunciators are available and used only for Circuit Breaker Open status.	As per the requirement for each Feeder, Circuit Breaker SF6 status, numerical relay unhealthy status, Trip circuit healthiness status and DC fail status needs to be wired for all the 220 kV Feeders & Transformers. On the day of visit of the undersigned, spare Annunciation Facias (09 Nos.) have been bought from 220/33 kV Laxmipur GSS and were tested. The 09 Nos. of Annunciators will be commissioned in various 220 kV & 132 kV Bays for above mentioned purpose. Also the spare windows in common annunciators which are already available for Breaker status will be engaged as required to accommodate the signals of all Feeders.
		There is no provision for annunciation of numerical relays healthiness in the existing C/R Panel.	It needs to be done using the watch dog contact of numerical relays with annunciation to its Facia.
2	Protection Relays	Most of the Back Up (Over Current & Earth Fault Protection) Relays in 220 kV system are of non-directional type.	As per standard and practice, directional type of relays should be used for 132 kV and above system. Therefore, all non-directional relays need to be replaced with Directional Relays
		Some of the relays in 220 kV, 132 kV and 33 kV system are of Electromechanical type.	The Electromechanical relays should be replaced with Numerical type relays
		The Distance Protection relays of 220 kV Indravati 2 and Narendrapur 2 are of Make: ABB Model: REL 670 which are very old and doesn't communicate with Laptop.	It is recommended to replace those relays immediately.
		REF protection is not available for Auto Transformer 1 & 2 since long due to unavailability of NCT.	As discussed with DGM (El) EHT (O&M) Division, Therubali, it is ensured that NCT is already collected and as discussed with E&MR wing, REF protection will be adopted very soon after erection of NCT.
		Only 1 No. Distance Protection Relay (Main-1) is available in all 220 kV Feeder Bays in place of 02 Nos. as per standard	It is recommended to use 2 Nos. Distance Protection Relays (Main-1 and Main-2)


 Deputy General Manager (Elect.)
 E&MR DIVISION, OPTCL
 BERHAMPUR

SI No.	Issue	Observations	Recommendations
3	Status of Trip Circuit Supervision, DC supervision and CB SF6 Gas monitoring	It is observed that as the GSS is very old, in some 220 kV bays (220 kV Bhanjanagar 1 & 2, 220 kV Laxmipur 1 & 2 and 220 kV Kolab circuit) and 132 kV Bays, Trip Circuit Supervision Relays and DC supervision relays are not available. Bulb arrangement is done in some panels for monitoring the Trip Coil status but as per investigation and discussion it was observed that they have not been checked since long.	The undersigned has recommended to check the scheme and healthiness of all the available bulbs. Also wherever it is not available, the Trip circuit supervision to be adopted either through relays or bulb indication immediately for time being.
		Circuit Breaker SF6 Low Gas Alarm and Lockout status is monitored through Bulbs/Facia.	Also, DC supervision for individual bay has to be done through DC supervision relays or CMR relays and signals to be given to annunciation facia on main DC of same panel.
			Bulb arrangement/Facia Status to be checked in all the 220 kV and 132 kV Own Bays & Tie Bays for CB SF6 Low and Lockout condition. The same needs to be adopted immediately wherever it is not available.
4	Bus-Bar Protection System	It is observed that LBB scheme is not adopted in Bus Bar Protection system	LBB scheme needs to be engaged at the earliest for isolating the Grid due to failure of any Breaker during Fault. The same will avoid cascading of Fault to other connected GSS


 Deputy General Manager (Elect.)
 E&MR DIVISION, OPTCL
 BERHAMPUR


ANALYSIS OF TRIPPING

Observations:

- i. The undersigned has analyzed the Disturbance Records of all the Relays at Therubali GSS and connected remote end OPTCL GSS (Bhanjanagar, Narendrapur, Laxmipur, Gunupur) and observed that the fault has been cleared after around 70 seconds i.e. at 11:14:53 AM.
- ii. The fault was in 220 kV Therubali-Laxmipur ckt-2 which had tripped the Breaker at Laxmipur end but due to DC failure in C/R Panel at Therubali end, all relays were off and Breaker did not Trip at Therubali end.
- iii. As such, all the Fault feeding sources (220 kV Indravati 1, 2 & 3, Kashipur, Narendrapur, Gunupur, Bhanjanagar 1 & 2, Upper Kolab) had to be tripped simultaneously. But, as the fault current was low and fault current fed by individual 220KV feeders was very less, fault persisted for upto 70 seconds due to delay in fault clearance from Upper Kolab/Indravati/Bhanjanagar/Narendrapur/Gunupur end.
- iv. As per the DR of all relays it has been observed that from the time of incidence of fault i.e. 11:13:42, the remote end relays (Bhanjanagar, Narendrapur and Gunupur) have sensed Zone 3 pick-up and drop off multiple times for about 60 secs. After about 70 secs the above feeders were isolated due to operation of Back up/DP relays. As the characteristic/type of actual fault which has occurred physically not known clearly, low fault current and low dip in Voltage shown in the DR of relays has caused only pick up of relays but no Tripping at the time of fault incidence.
- v. It is observed that the numerical relays are not synchronized with GPS system at 220/132/33 kV GSS Narendrapur and 220/132/33 kV GSS Bhanjanagar which causes difficulty in analyzing the Fault tripping.
- vi. As per the representative of Indravati, the centralized DR is not functional due to which disturbance record has not been provided by Indravati P/H. Also, Therubali circuit 1, 3 & 4 have tripped in Broken Conductor Protection which was set with time delay of 05 secs at Indravati end. The actual time of tripping at Indravati end is not known as their relays are also not synchronized with GPS system.

Recommendations:

- i. The GPS system at 220/132/33 kV Bhanjanagar & Narendrapur GSS need to be rectified and all the numerical relays need to be synchronized with GPS.
- ii. The tripping of Laxmipur Circuit-1 in Zone-4 with forward distance indication of 41.85 kms was checked for its relay settings. The relay will be tested and cause of Zone 4 tripping will be analyzed by E&MR wing shortly.


Deputy General Manager (Elect.
E&MR DIVISION, OPTCL
BERHAMPUR



घटना संख्या: 18-05-2023/1

दिनांक: 09-06-2023

Report on the grid event in Eastern Region (पूर्वी क्षेत्र में ग्रीड घटना पर रिपोर्ट)

Summary of the event (घटना का सारांश):

At 14:08 Hrs on 18.05.2023, U#2 at JITPL tripped due to operation of unit differential protection. After 11 seconds, U#1 at JITPL also tripped due to tripping of its Station transformer leading to tripping of the unit due to loss of auxiliary supply. Around 1096 MW generation loss occurred at JITPL S/s.

- **Date / Time of disturbance:** 18-05-2023 at 14:08 hrs
- **Event type:** GI-2
- **Systems/ Subsystems affected:** 400 kV JITPL S/s
- **Load and Generation loss.**
 - 1096 MW generation loss occurred during the event.
 - No load loss occurred during the event.

Important Transmission Line/element if out (महत्वपूर्ण संचरण लाइने जो बंद हैं):

- NIL

Major elements tripped (प्रमुख ट्रिपिंग):

- U#1, U#2 at JITPL (600 MW each)

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

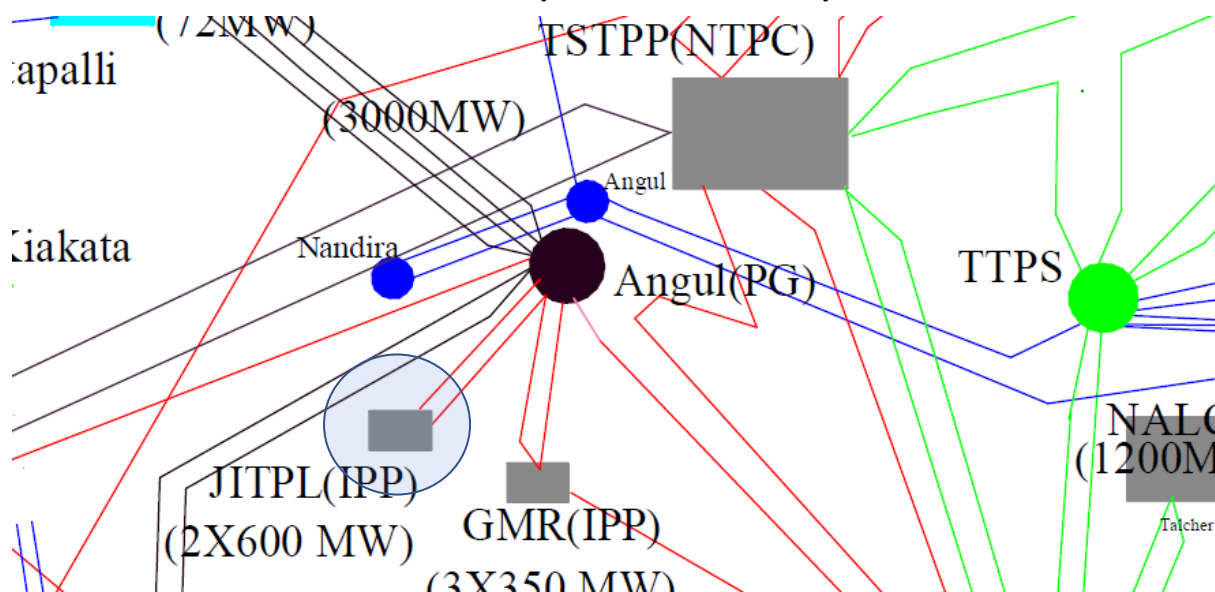
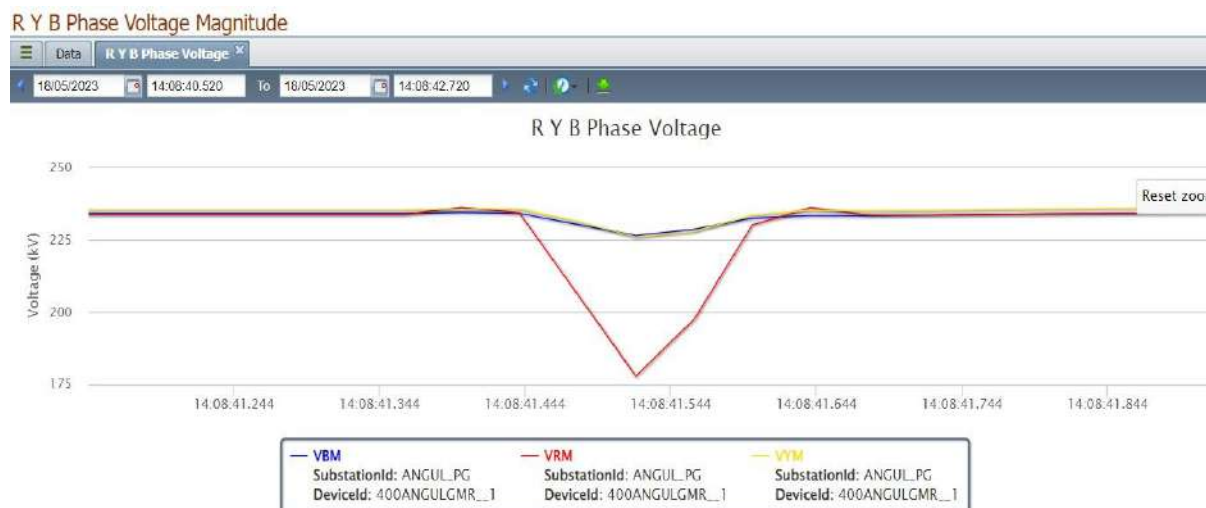


Figure 1: Network across the affected area

Relay indication and PMU observation (रिले संकेत और पीएमयू पर्यवेक्षण):

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
14:08	JITPL U#1	Station transformer tripped on O/c	-	Around 60 kV dip in R_ph voltage at Angul. Fault clearance time: 100 msec
	JITPL U#2	GT differential protection operated	-	



R Y B Phase Voltages Angles

Figure 2: PMU snapshot of 765/400 kV Angul S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
JITPL U#1	20:37
JITPL U#2	08:40 (19.05.23)

Analysis of the event (घटना का विश्लेषण) & Protection issue (सुरक्षा समस्या):

- At 14:08 Hrs, R_ph LA and BPI and Y_ph LA of GT#2 failed during inclement weather and GT#2 tripped on differential protection.
- All auxiliary load of the plant shifted to ST#1 only. After around 11 seconds, ST#1 tripped on O/c protection.
- U#1 also tripped due to loss of auxiliary supply.
- As informed, total auxiliary load on ST#1 was less than its rated capacity, however, O/c settings were on the conservative side. Settings were revised later. **JITPL may explain.**
- Report from JITPL is attached at Annexure-3.

Non-compliance observed (विनियमन का गैर-अनुपालन):

Issues	Regulation Non-Compliance	Utility
DR/EL not provided within 24 Hours	1. IEGC 5.2 (r) 2. CEA grid Standard 15.3	JITPL

Status of Reporting (रिपोर्टिंग की स्थिति):

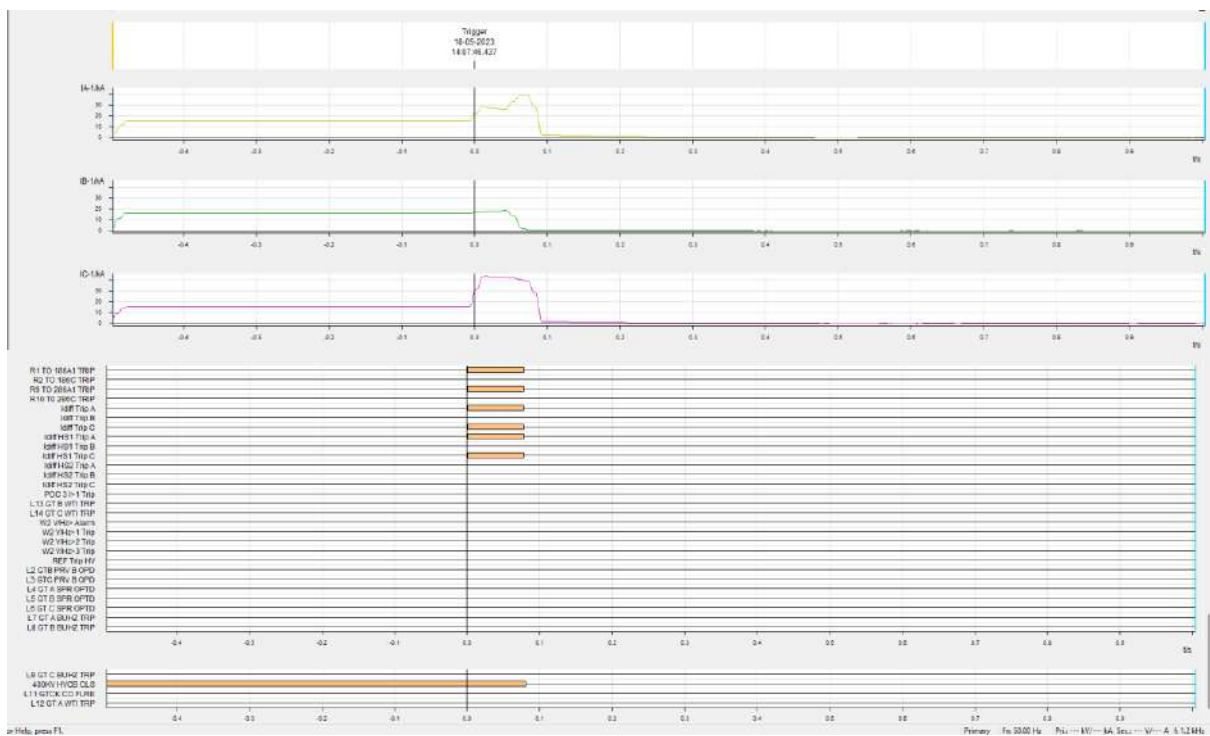
- DR/EL received from JITPL.

Annexure 1: Sequence of events recorded at ERLDC SCADA data at the time of the event.

Date	Time	STATION	DESCRIPTION	STATUS
18-05-2023	14:08:41.455	JITPL_PG	400_Unit2_Main_CB	Open
18-05-2023	14:08:41.609	JITPL_PG	400_SPARE_2_Unit2_Tie	Open
18-05-2023	14:08:52.868	JITPL_PG	400_Unit1_Main_CB	Open
18-05-2023	14:08:53.236	JITPL_PG	400_ANGUL_PG_1_Unit1_Tie	Open

Annexure 2: DR recorded

DR of GT#2 at JITPL



ROOT CAUSE ANALYSIS REPORT

DEPARTMENT :- EMD	EQUIPMENT: - GT 1 and GT 2	STATION BLACK OUT
	EQUIPMENT CODE :-	TRIP DATE: - 18/05/2023
	DATE OF RCA:-19/05/2022	TRIP TIME: - 14:08

NAME OF FAULT / BREAKDOWN (PLEASE STATE THE PARTS DAMAGED , LOCATION IF ANY)

Unit 2 tripped on electrical protection followed by Unit 1 tripped after 7 seconds resulting in station black out

OBSERVATIONS

On dated 18.05.2023 at 14:08 hours unit 2 tripped on electrical protection due to failure of GT 2 R phase LA and BPI and GT 2 Y phase LA. These LAs and BPI was broken due to heavy storm. At this time a local thunderstorm, lightning was happening, and rain was also pouring. Due to very high wind pressure LA and BPI broken from bottom portion. GT 2 differential protection (87) acted and GT 2 HVCB (403CB) and Tie (402 CB) tripped in DIA 4. Both the 400 KV lines were healthy. Due to tripping of GT 2 BTS was initiated to transfer Unit 2 auxiliaries load to Unit 1. However, ST1 over current protection acted which initiated GRP group lock out relays 186 A 1 and 286 A1, hence GT 1 HVCB (CB 412) and Tie CB (CB411) tripped. Station blackout occurred due to tripping of both the GTs (GT1 & GT2).

CAUSES OF FAILURE/ ROOT CAUSE

Why1: Why GT 2 tripped?

Ans-Due to damage of GT 2 R phase LA, BPI and Y phase LA. (LA and BPI broken)

Why2: Why LAs and BPI of GT2 got damaged?

Ans: - LAs and BPI broken due to heavy thunderstorm (very high velocity wind)

Why3: - Why LA and BPI broken due to high velocity wind, thunderstorm?

Ans: - Position of LA and BPI are offset with respect to GT-2 R phase and Y phase bushing. This offset creates extra force on LA and BPI on one side.

Why4: - Why Unit 1 tripped?

Ans: After initiation of BTS due to tripping of GT2, ST 1 overcurrent protection acted which opened GT1 HVCB (CB412) and Tie CB (CB411) through 186 A1 & 286A1 GRP group protection.

Why5: - Why ST 1 tripped?

Ans: - Load current experienced by relay was above threshold set value of ST 1 over current protection.

Why6: - Why ST 1 overcurrent protection acted?

Ans: - Though as per existing relay settings protection acted correctly, however such setting needs to be reviewed as it is not justified.

Why7: - Why station blackout occurred?

Ans: - Due to tripping of both the GT (GT1 & GT2) and despite both 400KV lines were healthy, station blackout occurred because ST is dependent on GT. Independent ST is not provided.

ACTION TAKEN

After review of GT1 GRP protection 186 A 1, 286A1 GT1 was charged, and clearance was given for Unit 1 boiler lit up. LA, BPI of GT2 R phase and LA of GT2 Y phase were replaced, IR measurement of GT2 carried out and GT2 charged.



ग्रिड-इंडिया
GRID-INDIA

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]




पूर्वी क्षेत्रीय भार प्रेषण केन्द्र / Eastern Regional Load Despatch Centre

कार्यालय : 14, गोल्फ क्लब रोड, टॉलीगंज, कोलकाता - 700033
Office : 14, Golf Club Road, Tollygunge, Kolkata - 700033
CIN : U40105DL2009GOI188682, Website : www.erldc.in, E-mail : erldcinfo@grid-india.in, Tel.: 033 23890060/0061

घटना संख्या: 14-05-2023/1

दिनांक: 08-06-2023

Report on the grid event in Eastern Region (पूर्वी क्षेत्र में ग्रिड घटना पर रिपोर्ट)

Summary of the event (घटना का सारांश):

At 16:36 Hrs on 14.05.2023, 220 kV Jorethang-New Melli D/c tripped from Jorethang end only. Consequently, one running unit at Jorethang tripped and power supply interrupted at Jorethang. Around 43 MW generation loss occurred.

- **Date / Time of disturbance:** 14-05-2023 at 16:36 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 220 kV Jorethang S/s
- **Load and Generation loss.**
 - 43 MW generation loss reported during the event.
 - No load loss occurred during the event.

Important Transmission Line/element if out (महत्वपूर्ण संचरण लाइने जो बंद है):

- Nil

Major elements tripped (प्रमुख ट्रिपिंग)

- 220 kV jorethang-New Melli D/c
- U#1 at Jorethang

Relay indication and PMU observation (रिले संकेत और पीएमयू पर्यवेक्षण):

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
16:36	220 kV Jorethang-New Melli D/c		New Melli: Didn't trip	No fault observed from PMU
	U#1 at Jorethang	Loss of evacuation path		

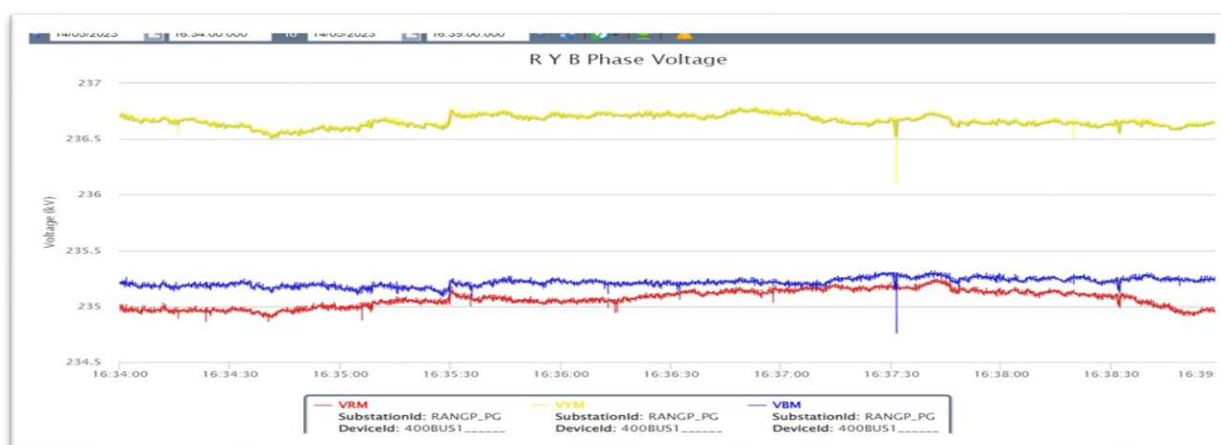


Figure 1: PMU Voltage snapshot of 400/220 kV Rangpo S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Jorethang-New Melli D/c	16:39
U#1 at Jorethang	-

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

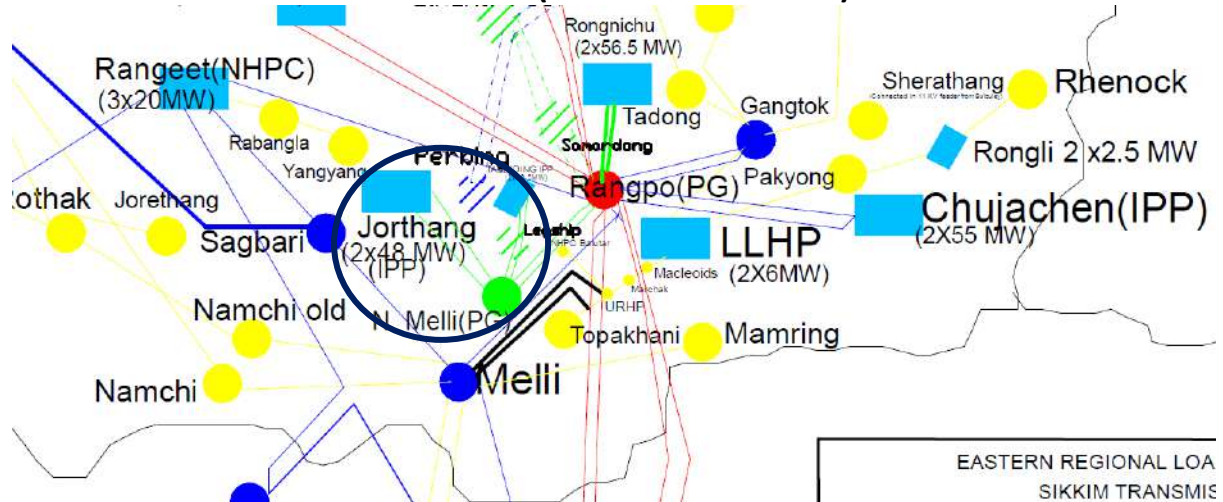


Figure 2: Network across the affected area



Figure 3: SCADA snapshot of the affected area

Analysis of the event & Protection issue (घटना का विश्लेषण और सुरक्षा समस्या):

- 220 kV Jorethang-New Melli D/c tripped from Jorethang end only.
- From DR of Jorethang end, it is not clear which protection operated and further, line was charged within 3 minutes. JLHEP may explain the event.
- U#1 at Jorethang tripped due to loss of evacuation path.

Non-compliance observed (विनियमन का गैर-अनुपालन):

Issues	Regulation Non-Compliance	Utility
DR/EL not provided within 24 Hours	1. IEGC 5.2 (r) 2. CEA grid Standard 15.3	Jorethang

Status of Reporting (रिपोर्टिंग की स्थिति):

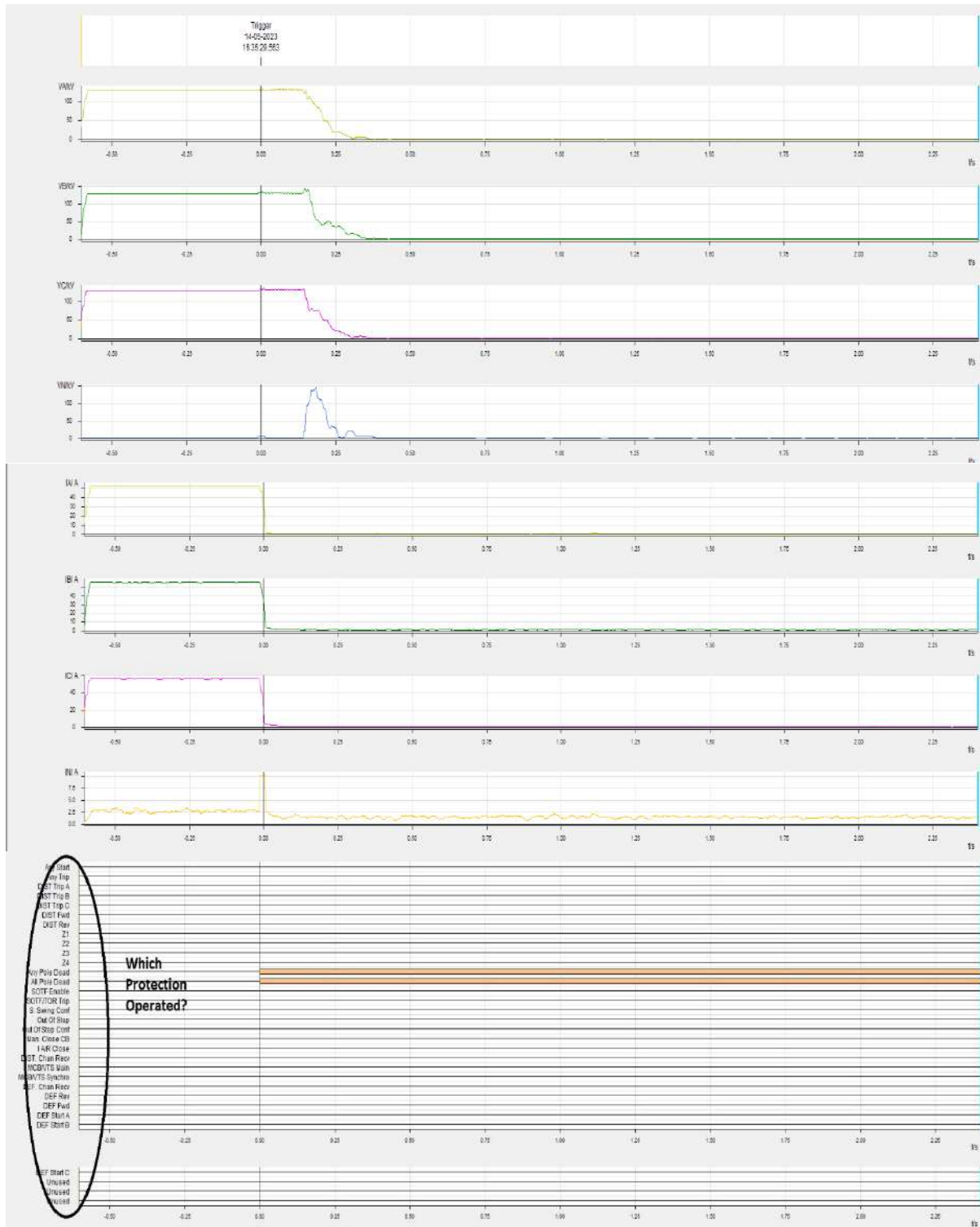
- DR/EL received from Jorethang.

Annexure 1: Sequence of events recorded at ERLDC SCADA data at the time of the event.

Sequence of Event not recorded at the time of event.

Annexure 2: DR recorded

220 kV Jorethang-New Melli-1 (Jorethang)



घटना संख्या: 15-05-2023/1

दिनांक: 09-06-2023

Report on the grid event in Eastern Region (पूर्वी क्षेत्र में ग्रिड घटना पर रिपोर्ट)

Summary of the event (घटना का सारांश):

At 14:22 Hrs on 15.05.2023, 220 kV Daltonganj-Chatra-1 tripped due to Y_N fault leading to total power failure at Chatra, Latehar as 220 kV Daltonganj-Latehar-1 was under shutdown and Latehar, Chatra were radially fed through 220 kV Daltonganj-Chatra-1 only. Around 28 MW load loss reported at Latehar and Chatra by SLDC Jharkhand.

- **Date / Time of disturbance:** 15-05-2023 at 14:22 hrs
- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Chatra, Latehar S/s
- **Load and Generation loss.**
 - No generation loss was reported during the event.
 - Around 28 MW load loss reported during the event at Chatra and Latehar by Jharkhand SLDC.

Important Transmission Line/element if out (महत्वपूर्ण संचरण लाइने जो बंद हैं):

- 220 kV Daltonganj-Latehar-1

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Daltonganj-Chatra-1

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

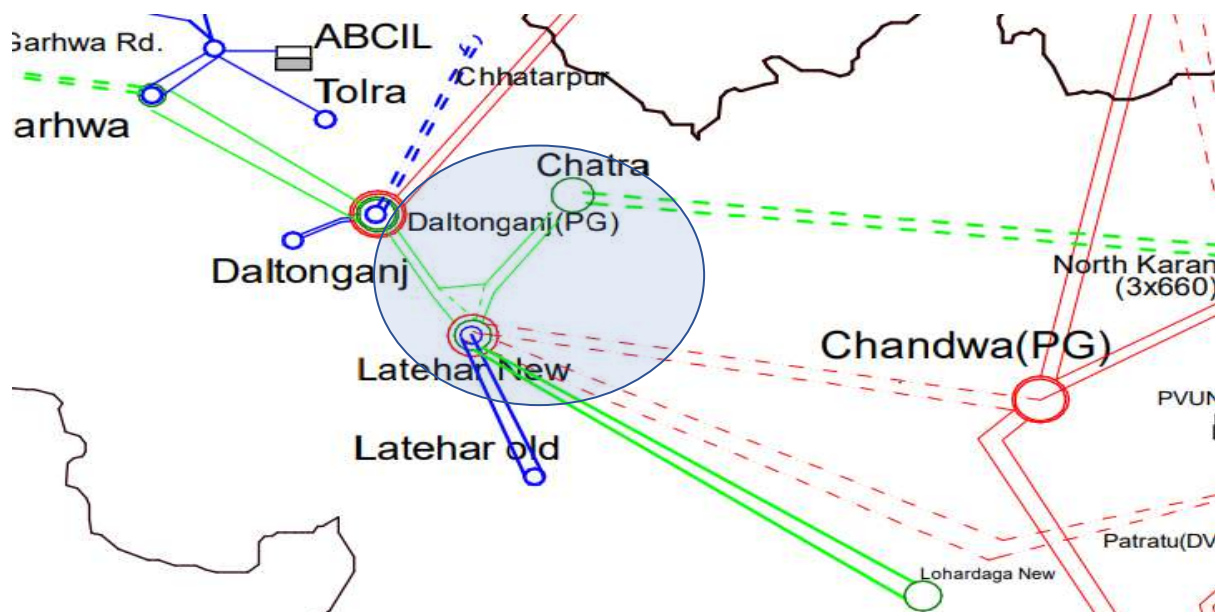


Figure 1: Network across the affected area

Relay indication and PMU observation (रिले संकेत और पीएमयू पर्यवेक्षण):

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
14:22	220 kV Daltonagnj-Chatra-1	Daltonganj: Y_N, 23.35 km, 3.27 kA, A/r successful	Chatra: Y_N, 29 km	Around 50 kV dip in Y_ph voltage at Daltonganj. Fault clearance time: 100 msec

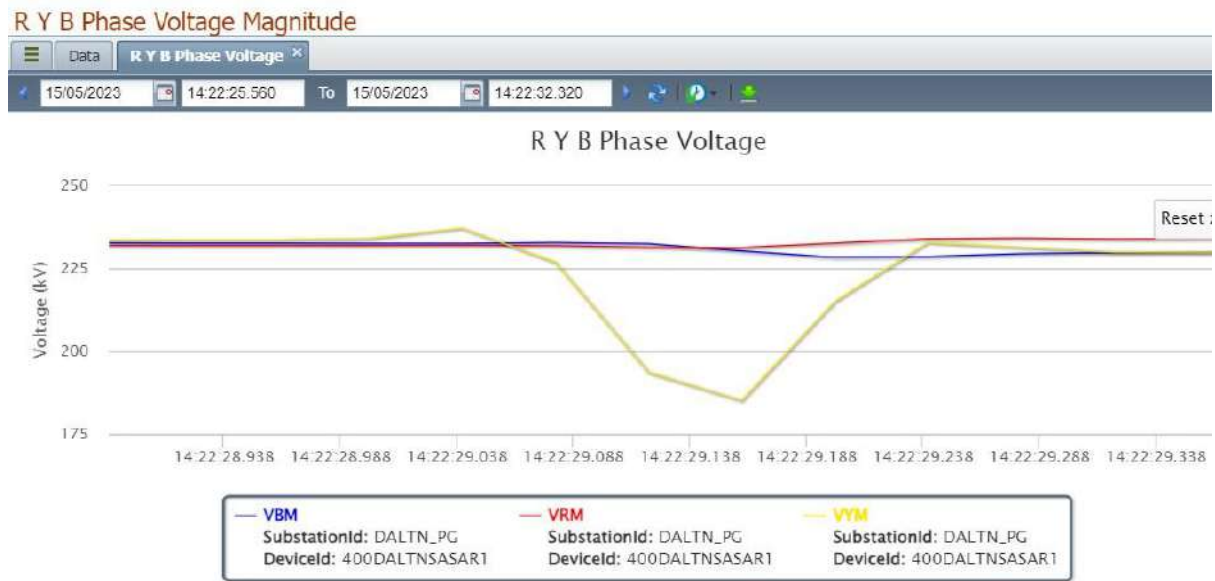


Figure 2: PMU snapshot of 400/220 kV Daltonganj S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Daltonganj-Latehar-1	16:04
220 kV Daltonganj-Chatra-1	01:07 (16.05.23)

Analysis of the event (घटना का विश्लेषण) & Protection issue (सुरक्षा समस्या):

- 220 kV Daltonganj-Chatra-1 tripped due to Y_N fault. A/r attempt was successful from Daltonganj only. As reported, Y_ph jumper snapped at loc. 21.
- Non-operation of A/r at Chatra end may be resolved at the earliest as the issue is persisting since long and is affecting reliability of supply to Chatra and Latehar.
- Power supply was restored after charging of 220 kV Daltonganj-Latehar-1 which was under shutdown.

Non-compliance observed (विनियमन का गैर-अनुपालन):

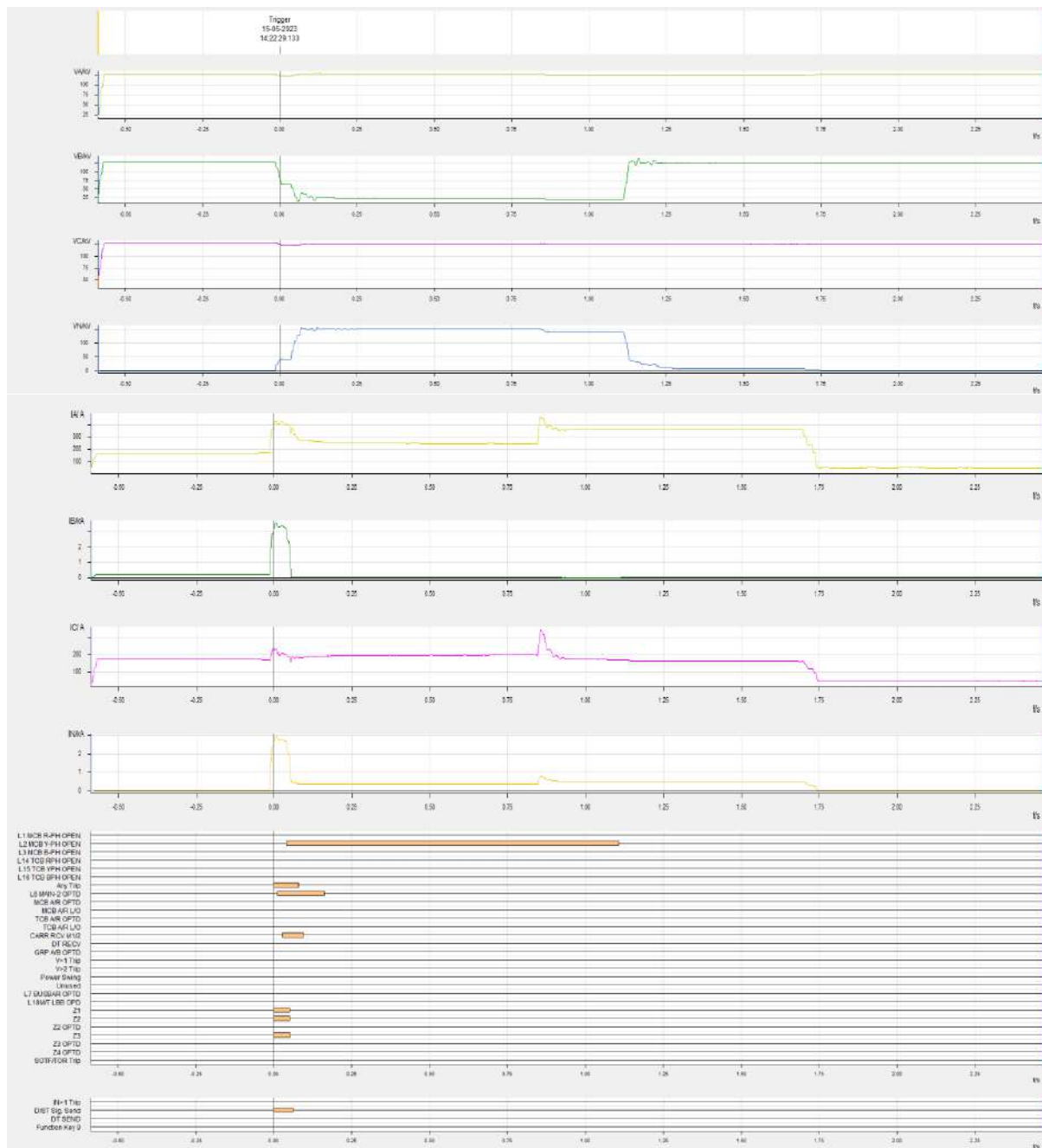
Issues	Regulation Non-Compliance	Utility
DR/EL not provided within 24 Hours	1. IEGC 5.2 (r) 2. CEA grid Standard 15.3	PG ER-1, JUSNL

Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL yet to be received from JUSNL.

Annexure 1: Sequence of events recorded at ERLDC SCADA data at the time of the event
Sequence of Events not recorded at the time of event.

DR of 220 kV Daltonganj-Chatra (Daltonganj)





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(भारत सरकार का उद्यम)
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
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CIN : U40105DL2009GOI188682, Website : www.erldc.in, E-mail : erldcinfo@grid-india.in, Tel.: 033 23890060/0061

घटना संख्या: 23-05-2023/1

दिनांक: 09-06-2023

Report on the grid event in Eastern Region (पूर्वी क्षेत्र में ग्रिड घटना पर रिपोर्ट)

Summary of the event (घटना का सारांश):

At 02:36 Hrs on 23rd May 2023, 220 kV Subhashgram (WB)-Lakshmikantpur-2 tripped due to Y-Earth fault. At the same time, 220 kV Main Bus-2 at Subhshgram (WB) and 220 kV Subhashgram-Lakshmikantpur-1 also tripped leading to total power failure at Lakshmikantpur which is radially fed through 220 kV Subhashgram (WB). Around 289 MW load loss reported during the event at Lakshmikantpur, Sirakol, Kakdwip and Falta.

- **Date / Time of disturbance:** 23-05-2023 at 02:36 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 220/132 kV Subhashgram, Lakshmikantpur S/s
- **Load and Generation loss.**
 - No generation loss occurred during the event.
 - 289 MW load loss reported during the event by SLDC West Bengal.

Important Transmission Line/element if out (महत्वपूर्ण संचरण लाइने जो बंद हैं):

- NIL

Major elements tripped (प्रमुख ट्रिपिंग)

- 220 kV Main Bus-2 at Subhshgram (WB)
- 220 kV Subhshgram-Lakshmikantpur D/c
- 220 kV Subhashgram-Subhashgram-2
- 220 kV Subhshgram-Kasba-2
- 160 MVA 220/132 kV ATR-2 at Subhashgram (WB)

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

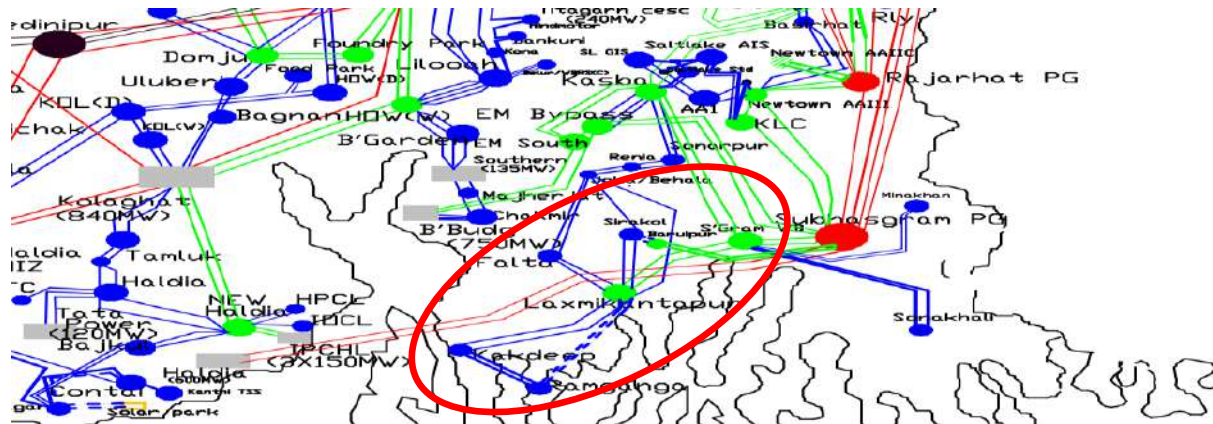


Figure 1: Network across the affected area

Relay indication and PMU observation (रिले संकेत और पीएमयू पर्यवेक्षण):

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
02:36	220 kV Subhashgram-Lakshmikantpur-2	Subhashgram: Y_N, Zone-1	Lakshmikantpur: Y_N, 26.02 km, 1.412 kA	Around 110 kV dip in Y_ph voltage at Subhashgram S/s. Fault clearance time: 100 msec.
	220 kV Subhashgram-Lakshmikantpur-1			
	220 kV Main Bus-2 at Subhashgram (WB)	Bus bar protection operated at Subhashgram (WB)		
	220 kV Subhashgram-Subhashgram-2		-	
	220 kV Subhashgram-Kasba-2		-	
	160 MVA 220/132 kV ATR-2 at Subhashgram (WB)		-	

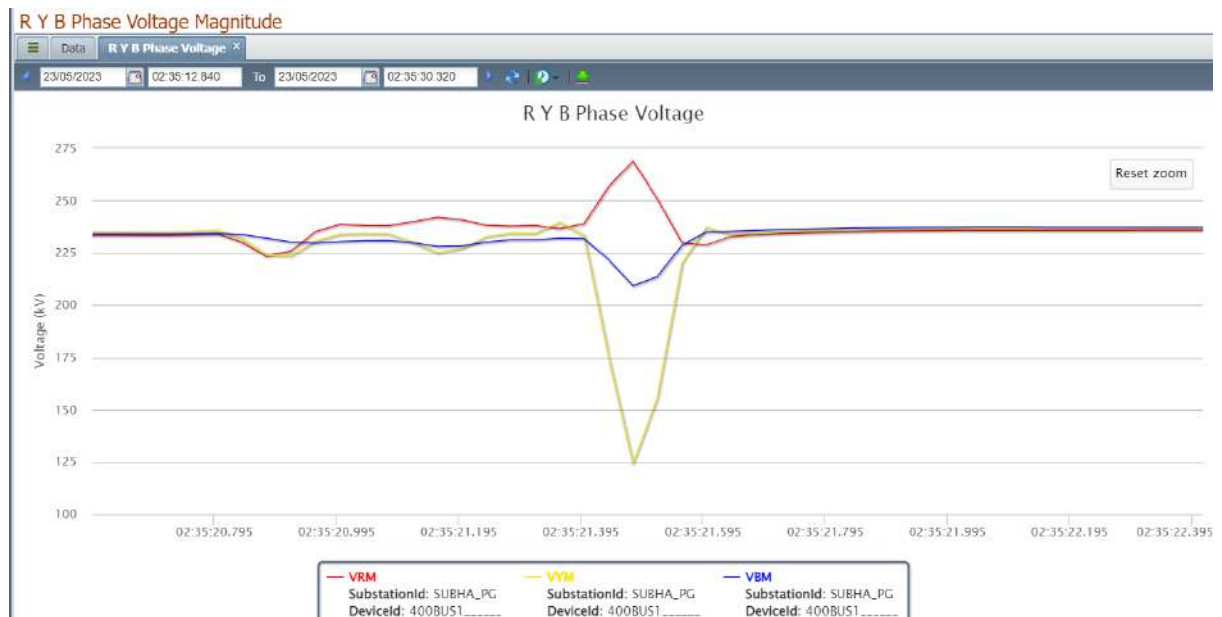


Figure 1: PMU Voltage snapshot of 400/220 kV Subhashgram S/s

• Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Subhashgram-Lakshmikantpur-2	-
220 kV Subhashgram-Lakshmikantpur-1	02:52
220 kV Main Bus-2 at Subhashgram (WB)	07:47
220 kV Subhashgram-Subhashgram-2	03:27
220 kV Subhashgram-Kasba-2	03:50
160 MVA 220/132 kV ATR-2 at Subhashgram (WB)	04:08

Analysis of the event & Protection issue (घटना का विश्लेषण और सुरक्षा समस्या):

- As reported, R_ph conductor of 220 kV Subhashgram-Lakshmikantpur-2 snapped at loc. 208 and touched Y_ph from earth at around 1km from Subhashgram S/s. Line tripped on Y-Earth fault within 100 msec.
- At the same time, 220 kV Subhashgram-Lakshmikantpur-1 also tripped due to R_N fault and fault was cleared within 100 msec. This led to total supply failure at Lakshmikantpur S/s and downstream areas.
- 220 kV Bus-2 at Subhashgram (WB) tripped on operation of Bus bar differential protection during this transient fault. During testing, it was found that the differential relay was operating for much lower current than the set value, suggestive of mal operation during close faults. Later settings have been revised. **WBSETCL may explain.**
- Replacement of electromechanical bus bar protection with numerical relay may be expedited.

Non-compliance observed (विनियमन का गैर-अनुपालन):

Issues	Regulation Non-Compliance	Utility
DR/EL not provided within 24 Hours	1. IEGC 5.2 (r) 2. CEA grid Standard 15.3	WBSETCL

Status of Reporting (रिपोर्टिंग की स्थिति):

- Complete DR/EL yet to be received from WBSETCL.

Annexure 1: Sequence of events recorded at ERLDC SCADA data at the time of the event.

Sequence of events not recorded at the time of the event.

Annexure 2: DR recorded

Report on tripping of MTPS 220KV Bus#2 on 18-5-2023

BRIEF HISTORY

It was reported that MTPS 220KV Bus # 2 tripped on 18-05-2023 at around 2:55 p.m. due to the operation of Main Zone # 2 and Check-Zone relays of Bus-Bar differential protection along with tripping of Line # 239 [MTPS – Kly] through Distance Zone 1 from both ends.

Relay Indications appeared: -

Feeder	MTPS end Relay Indication	Other end Relay Indication
L # 239	Distance Z#1, C Phase & 96	Distance Z#2, Carrier Receive, C-Phase.
L # 231	96	NA
L # 222	96	NA
L # 232	96	NA
SST # B	96	NA
SST # C	96	NA
GT # 1	96	NA
BUS-TIE	96	NA
Bus-Section 2-4	96	NA

ANALYSIS OF EVENT

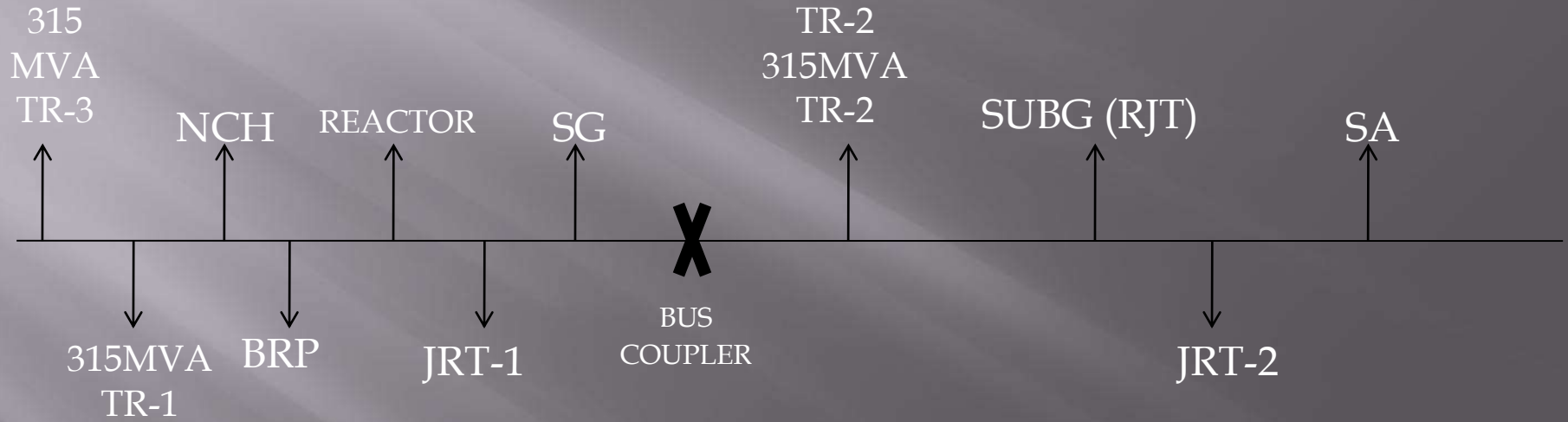
1. Single line to ground fault occurred in L#239 at MTPS end due to falling of the Wave-Trap of the line to the ground. Distance relay of L#239 tripped from MTPS End through C-Phase Zone # 1 and carrier aided Zone 2 from Kly End.
2. It was also found that the Wave-Trap of L#239 had fallen on the ground encircling the CT of L#239 at MTPS end.
3. After around 1 Second delay L#239 Auto Reclosed from Kalyaneshwari end. This was a reclosure on a permanent fault and L#239 tripped instantaneously from Kalyaneshwari end.
4. During this reclosure from Kalyaneshwari End, the CT of L#239 (at MTPS) had also measured current of around 1.2 kA because of the Wave-Trap falling on the CT and getting grounded. The same was confirmed from the disturbance report of the distance relay of L#239 (MTPS end), which had recorded current of 1.2 KA in magnitude even after tripping of the CB from MTPS End. Probably the CT primary had received some induced current from the charged wave trap near it's vicinity. This time the line tripped from Zone 1 protection from Kly End due to zero sequence mutual coupling from the parallel charged line.
5. **Reason for operation of Busbar Protection at MTPS End:** As this current was getting fed to the Bus-Bar Main Zone # 2 (since Main Bus # 2 isolator of L # 239 was in closed condition) and Check-Zone relay as an extra current apart from the stable bus differential current (theoretically 0 A), the Bus Zone # 2 and Check Zone Busbar Differential relays operated causing tripping of all the feeders connected to MB # 2 through respective 96 relays correctly.
6. Emergency drives to Unit # 2 and Unit # 3 were taking power from the SST # B board. As SST#B tripped through Bus-Bar protection, emergency drives of Unit#2 & Unit#3 failed, causing tripping of Unit#2 & Unit#3.

*Presentation regarding
Busbar Tripping iro Jeerat
400 KV substation*

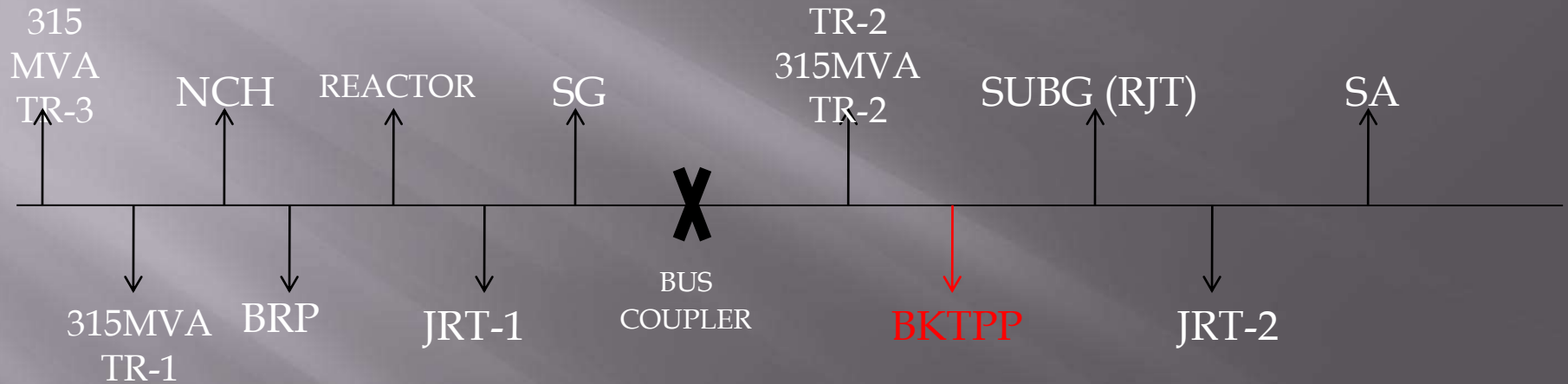
INCIDENT

- ▣ Place-Jeerat 400 KV Substation.
- ▣ Date-19/05/2023
- ▣ Time 18:51 hrs
- ▣ Incident-During charging of faulty BKTPP 400 KV line,400 KV bus 2 tripped on Busbar Differential Protection.
- ▣ Relay-ABB REB670.

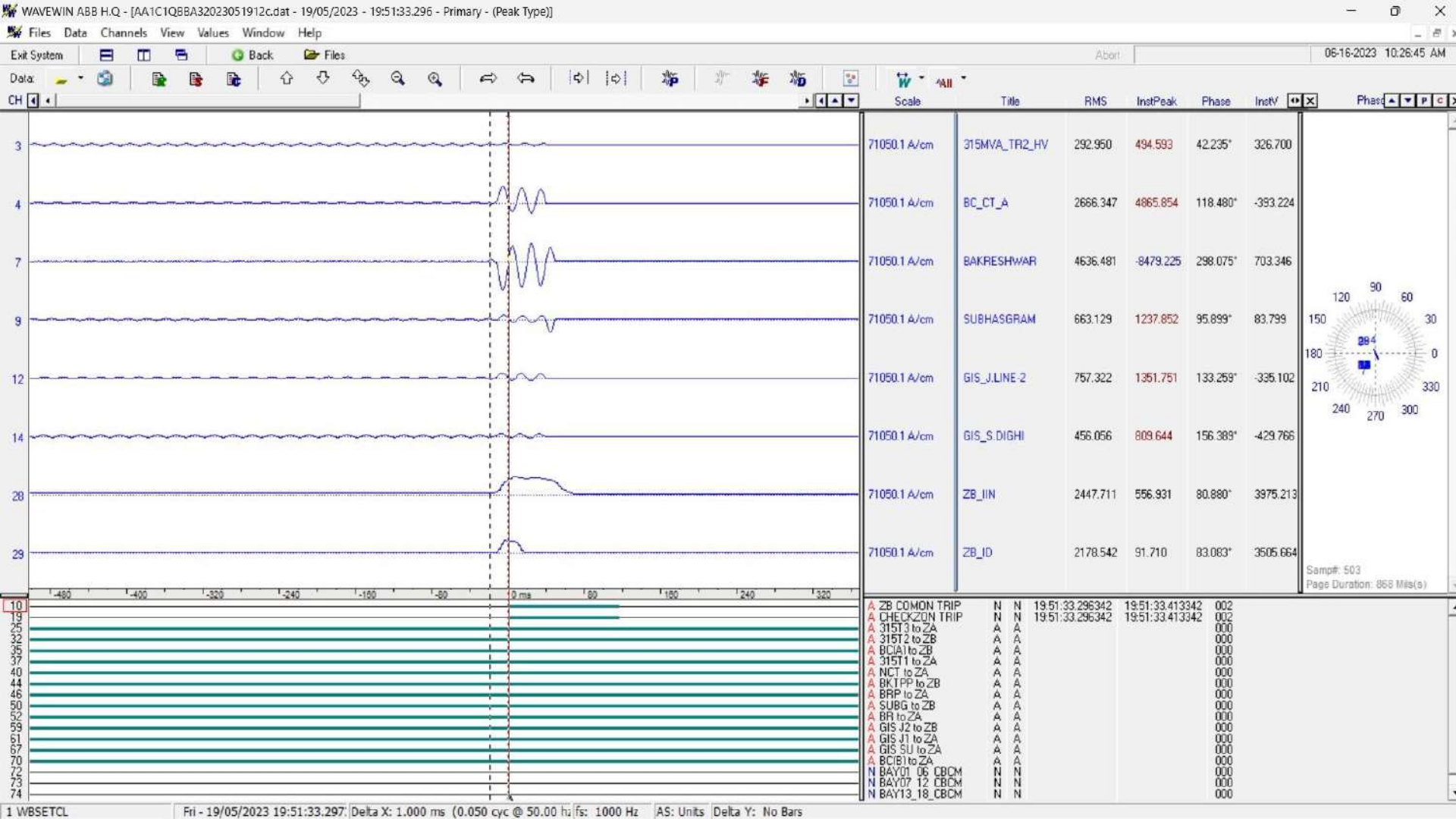
BUSCONFIGURATION PRIOR TO BUSBAR TRIP



BUS CONFIGURATION AT THE TIME OF BKTPP CHARGING

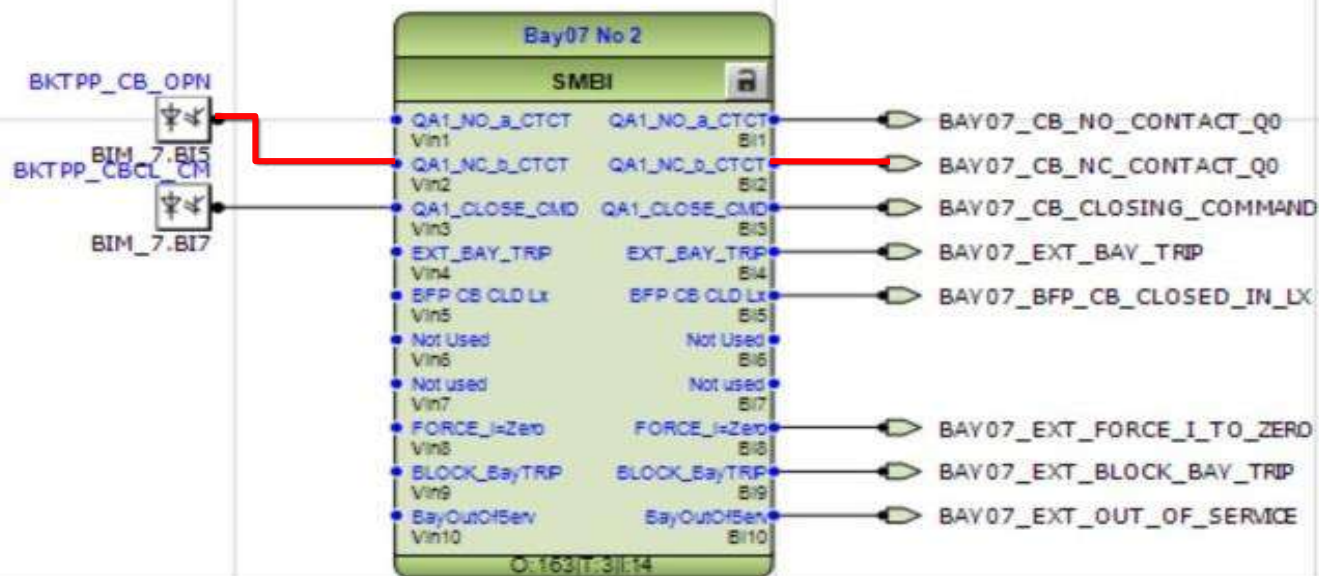


DATE OF INCIDENT 19/05/2023 TIME 18:51 HRS

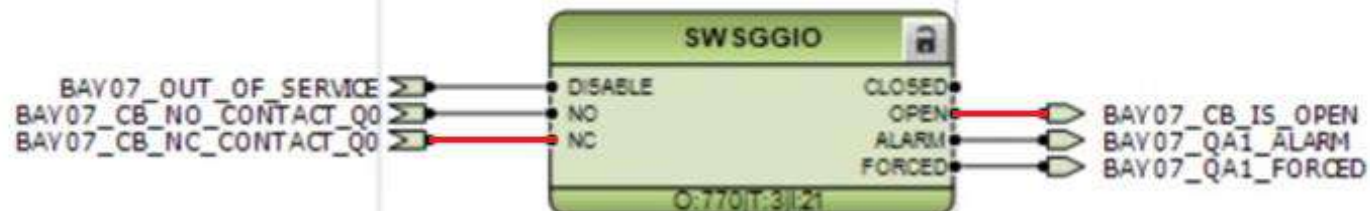


Reason for Busbar tripping

- CB open status stays during charging of BKTPP bay.
- CB close command did not come.
- As per relay configuration , current fed by BKTPP bay during charging(4.6 KA) could not be counted to BUS B.



Determines QA1 status for Bay07.



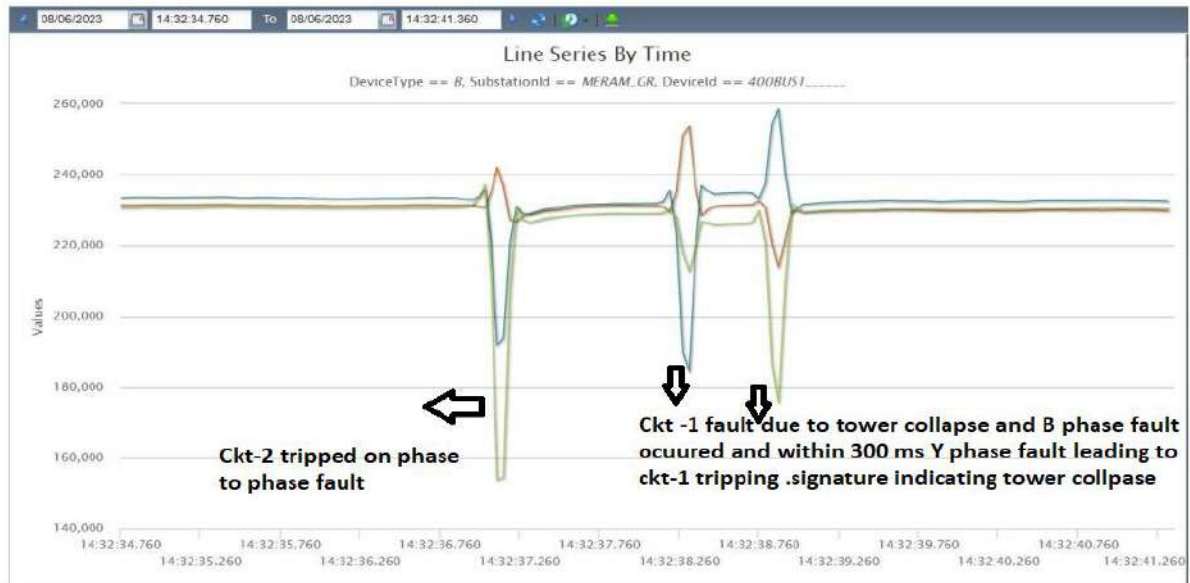
Corrective measures taken

- ▣ CB close command was checked and it was found CB discrepancy switch Close Contact for Busbar relay was found faulty.
- ▣ CB Discrepancy switch will be replaced upon getting shutdown.

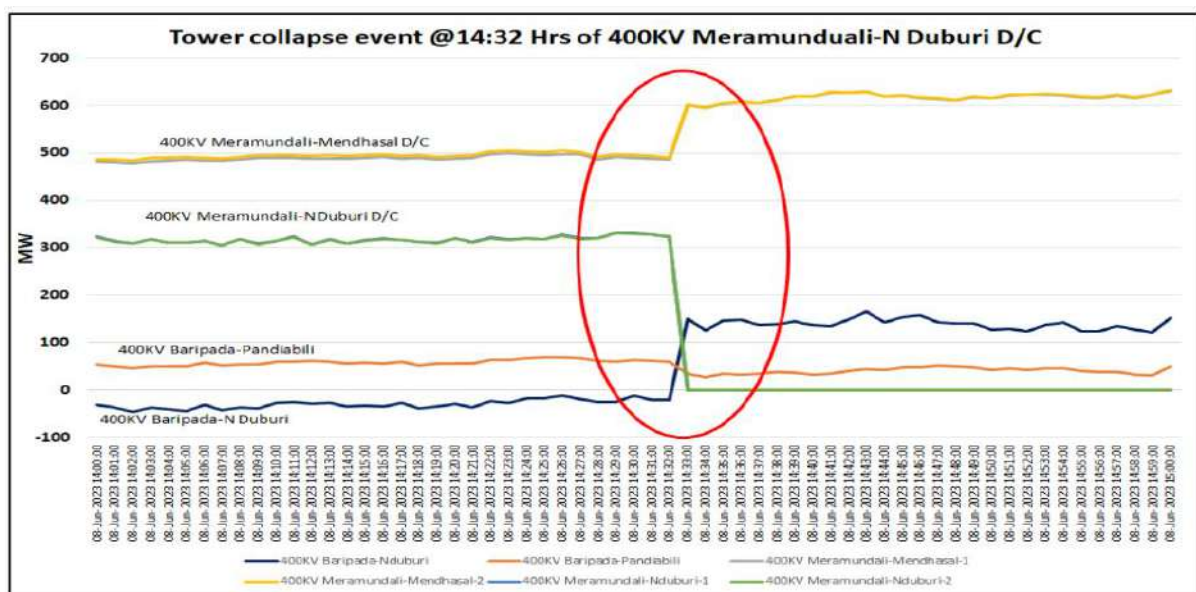
Analysis and Impact of multiple tower collapse In Odisha system

Event 1(8th June at 14:32 Hours):-

- 400 kV Meramandali-New Duburi D/C tripped at 14:32 hrs of 08.06.2023 due to inclement weather. Tower collapse reported at location number 131 approximately 31 Kms from Meramandali.
- PMU plot attached also shows the Signature of tower collapse



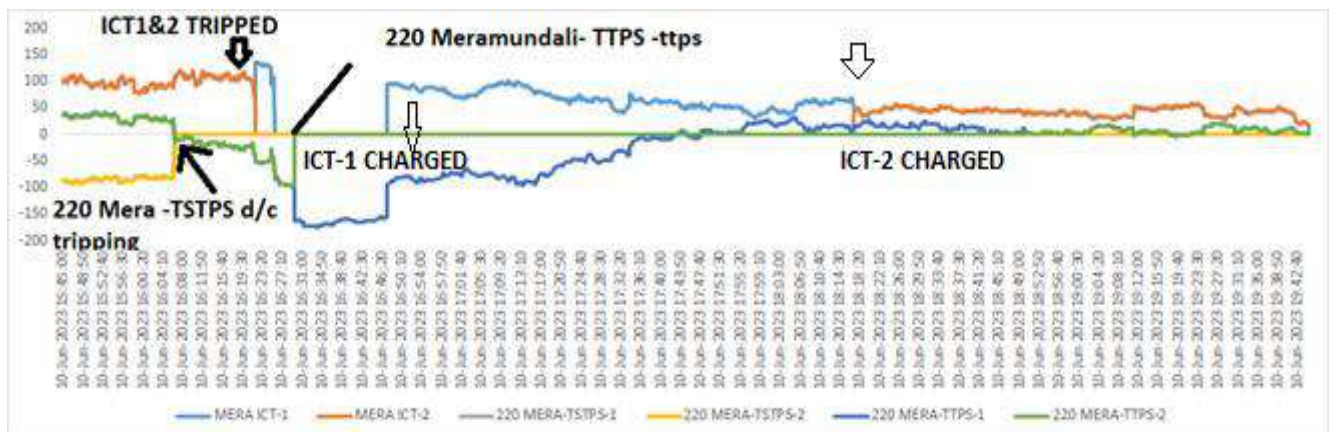
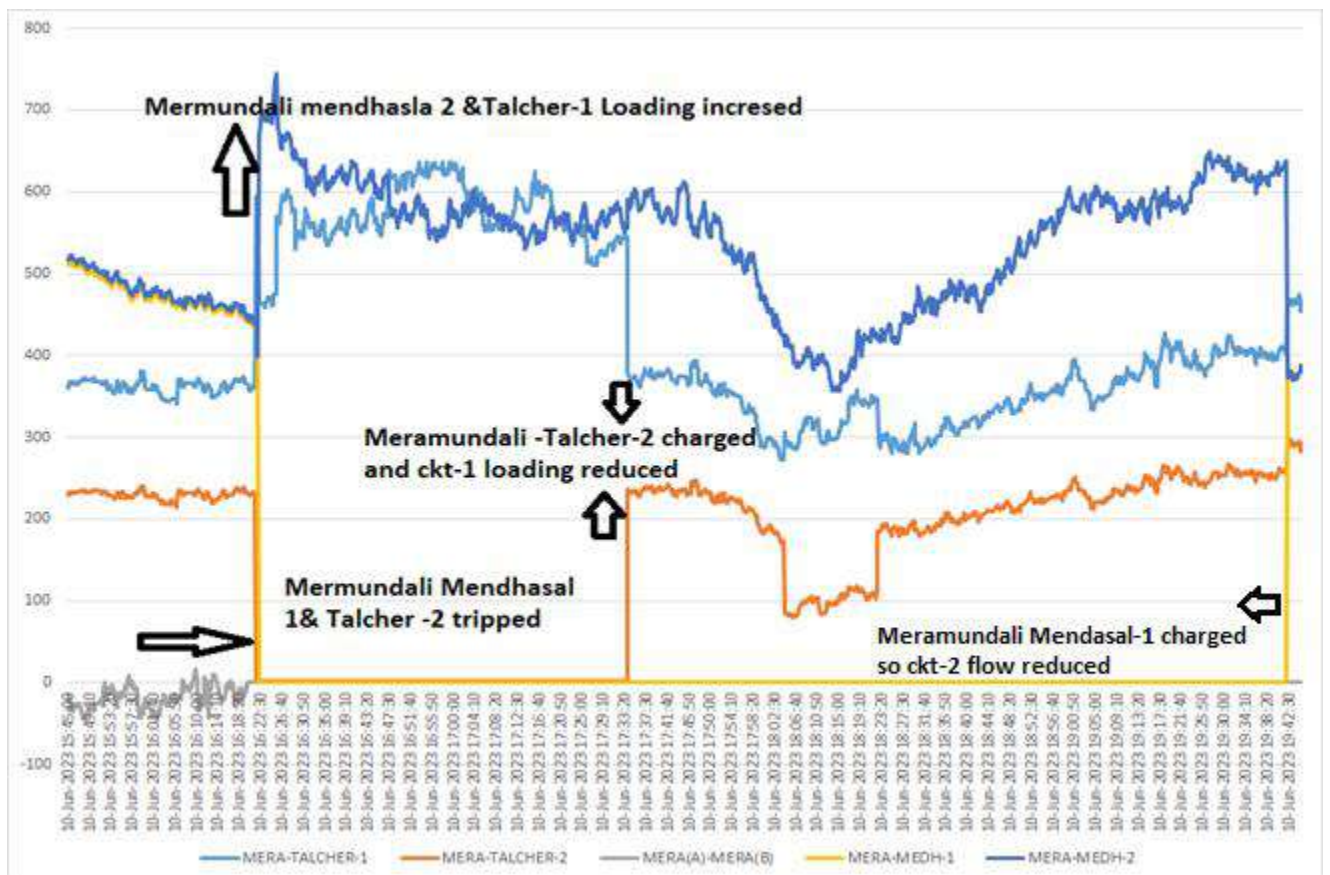
From below scada it is evident as New dubri D/C tripped , it lead to increase in loading of Meramundali -Mendhasal D/C as power was wheeling from meramundali to mendhasal and then to New dubri. Also it was violating N-1 during High demand period .

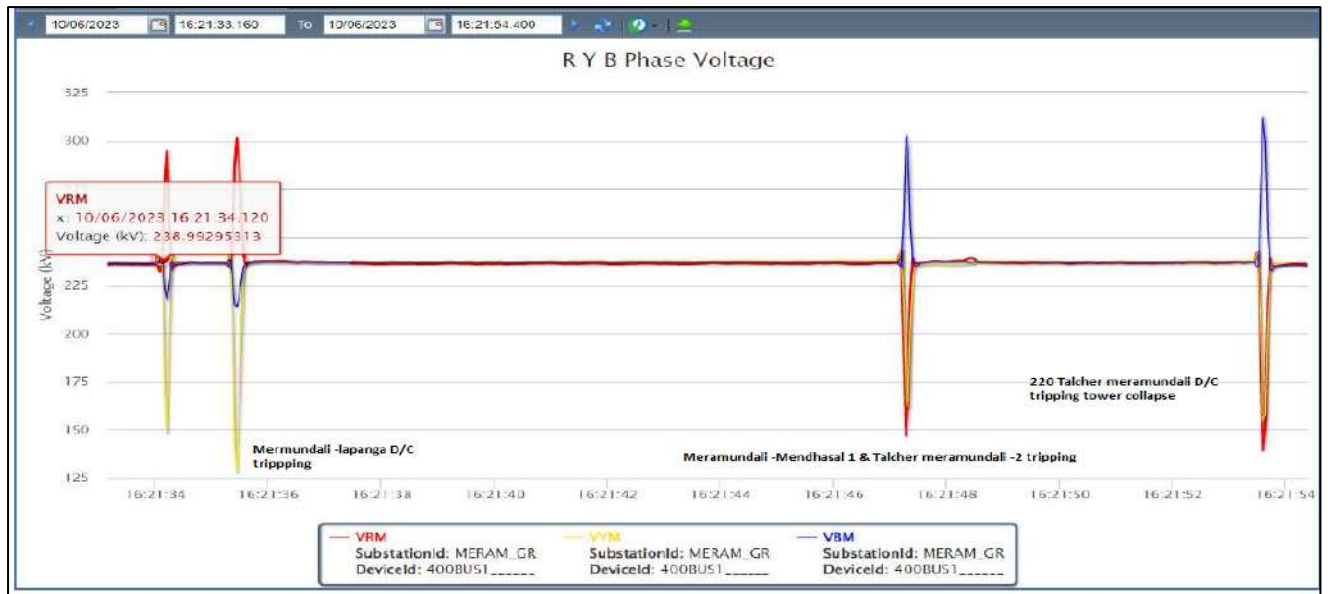


Event 2(10th June at 16:21 Hrs) :-

Following elements tripped at Meramundali at 16:21 hrs on 10.06.2023 due to inclement weather.

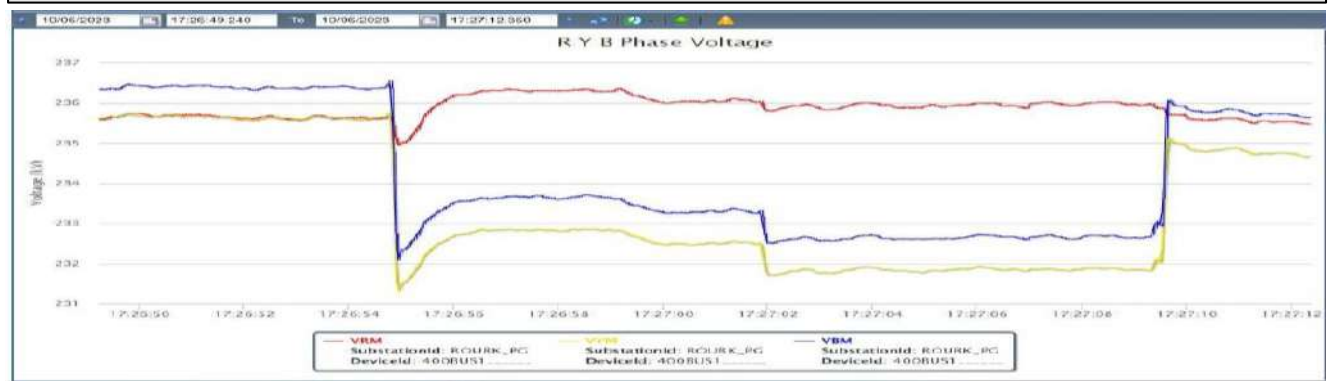
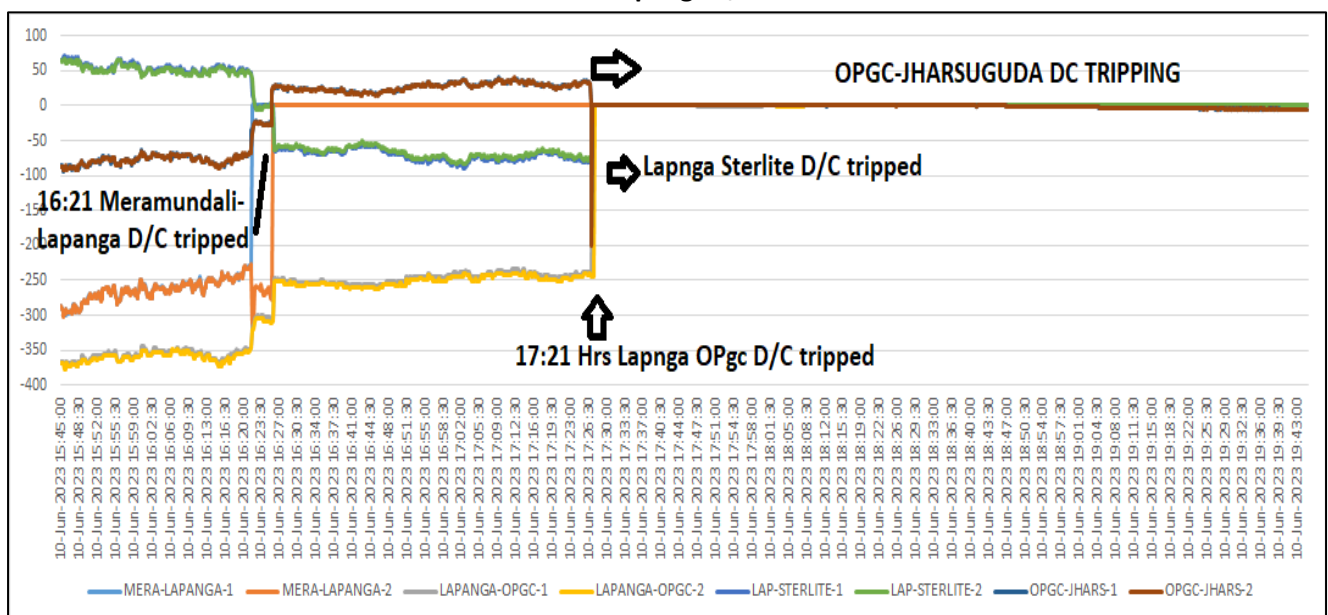
- 400 kV Meramundali Lapanga D/C (Tower collapse, under breakdown)
- 400 kV Meramundali Mendasal – 1 (restored)
- 400/220 kV ICTs at Meramundali (restored)
- 220 kV Talcher Meramundali D/C (Tower collapse, under breakdown)
- 400 kV Meramundali JSPL (restored)
- 400 kV Meramundali Talcher – 2 (Restored)





Event 3(10th June at 17:27 Hrs) :-

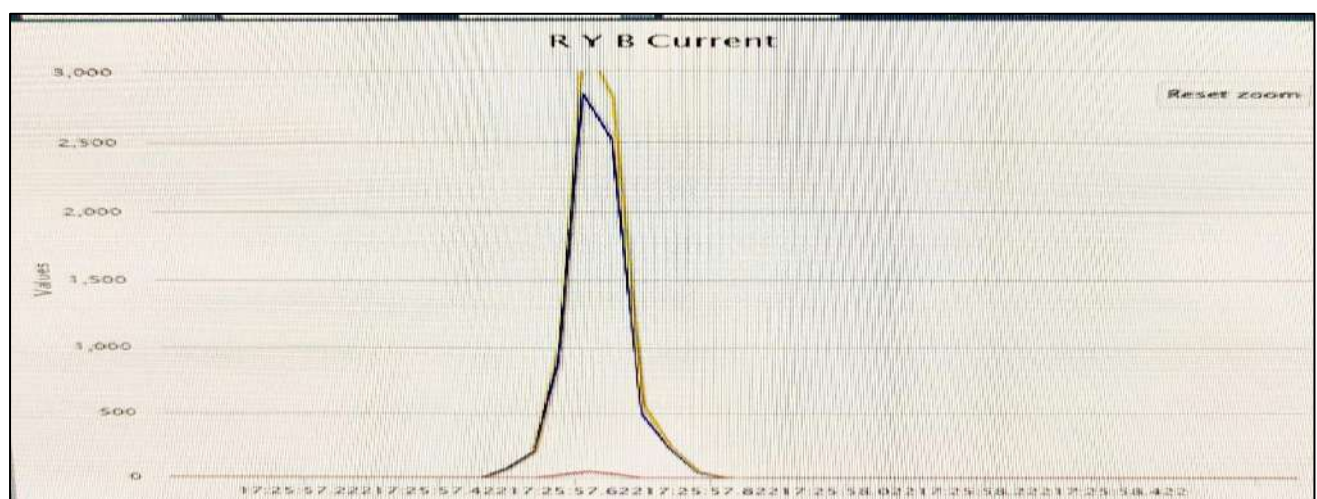
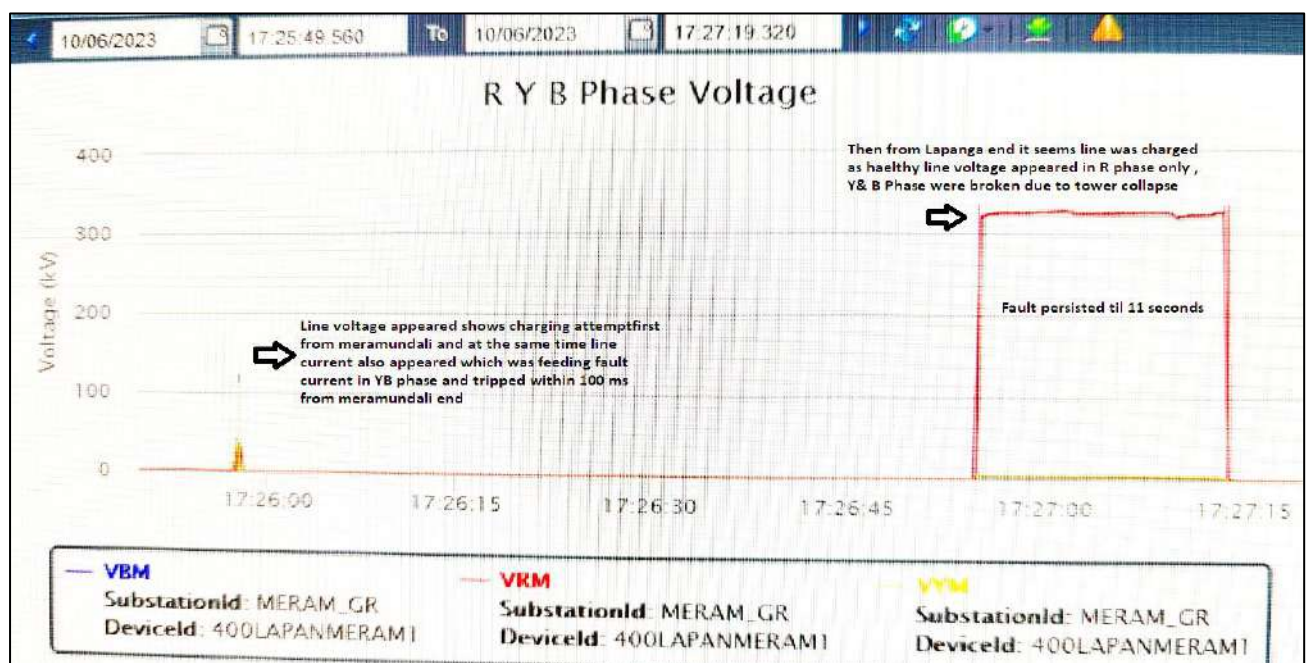
Further at 17:27 Hrs, while charging 400 kV Meramundali-Lapanga-1, fault persisted for 11 sec seems protection did not operated properly which led to tripping of all lines from Lapanga and disturbance occurred at 400 kV OPGC and 400 kV Lapanga S/s.



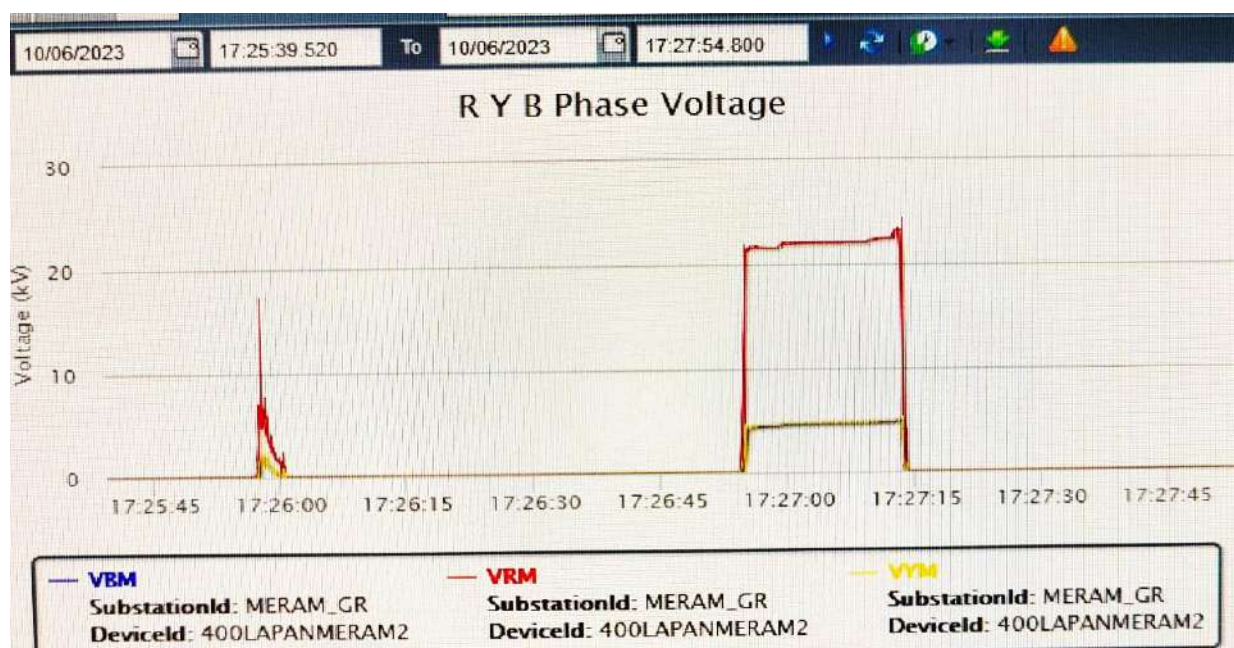
Lapanga and OPGC became dead with above tripping.

Finding:

- It appears first line was charged from Meramundali end but line did not hold protection operated perfectly and fault was isolated but later after 1 minute it was again charged from lapanga end and fault persisted till 11 seconds as protection did not operated .
- Below is the Line voltage & current plot at Meramundali end:
- Line voltage appeared shows charging attempt first from meramundali and at the same time line current also appeared which was feeding fault current in YB phase and tripped within 100 ms from meramundali end.
- Then after 1 minute at 17:27 Hrs from lapanga end line was charged as healthy R phase line voltage appeared as Y&B Phase were already broken due to tower collapse and may be only R phase was through. At this instant line current at Meramundali end was zero also indicating charging was done from lapnga .

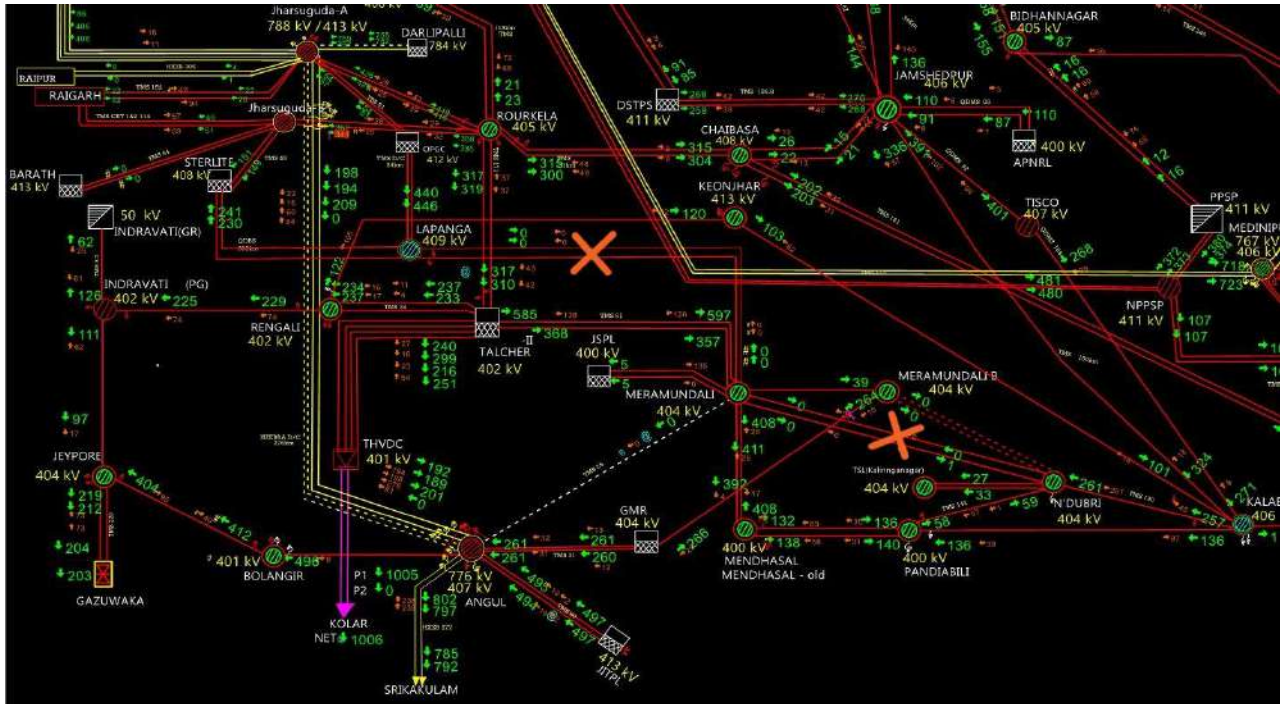


Induced voltage in circuit -2 as shown below also indicates the same .



Currently Under Outage:

Transmission/Generation element name	Trip Date	Trip Time	Restoration Date
संचरण लाइन / वधुत उत्पादन इकाई का नाम	बंद होने की तिथि	बंद होने का समय	वापस आने की तिथि
400 kV New Duburi – Meramundali ckt 1	08-06-2023	14:32	Tower bend at one location reported (expected revival in 20-25 Days)
400 kV New Duburi – Meramundali ckt 2			
400 kV Meramundali Lapanga 1	10-06-2023	16:21	Tower bend at one location reported (review going on for revival)
400 kV Meramundali Lapanga 2			Tower bend at one location reported (review going on for revival)
220 kV Talcher Meramundali D/C			Tower collapse at two locations reported (review going on for revival)

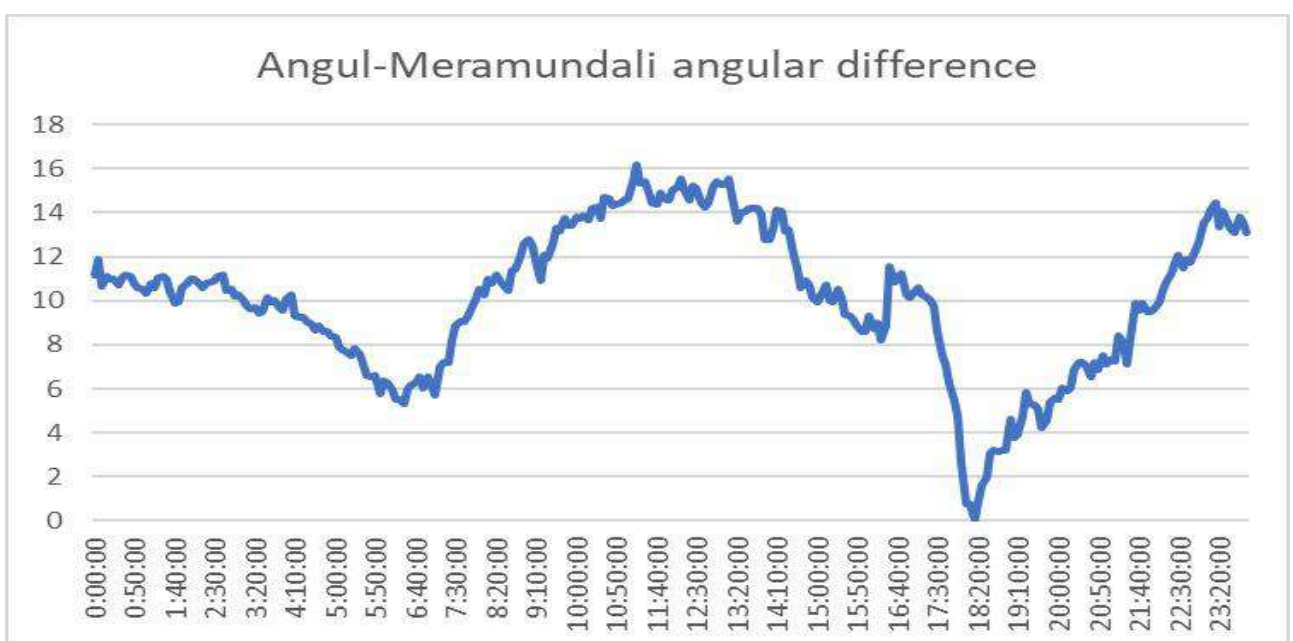


Due to Outage of Lapanga -Meramundali D/C and Meramundali -New Dubri D/C ,Meramundali was connected via only Talcher D/C hence to increase the reliability of Meramundali and nearby load centres , Docking of Talcher Meramundali at Angul .

To control the loading 400 kV Talcher-Meramundali d/c ,TSTPP-I generation was backed down to TM through SCED.

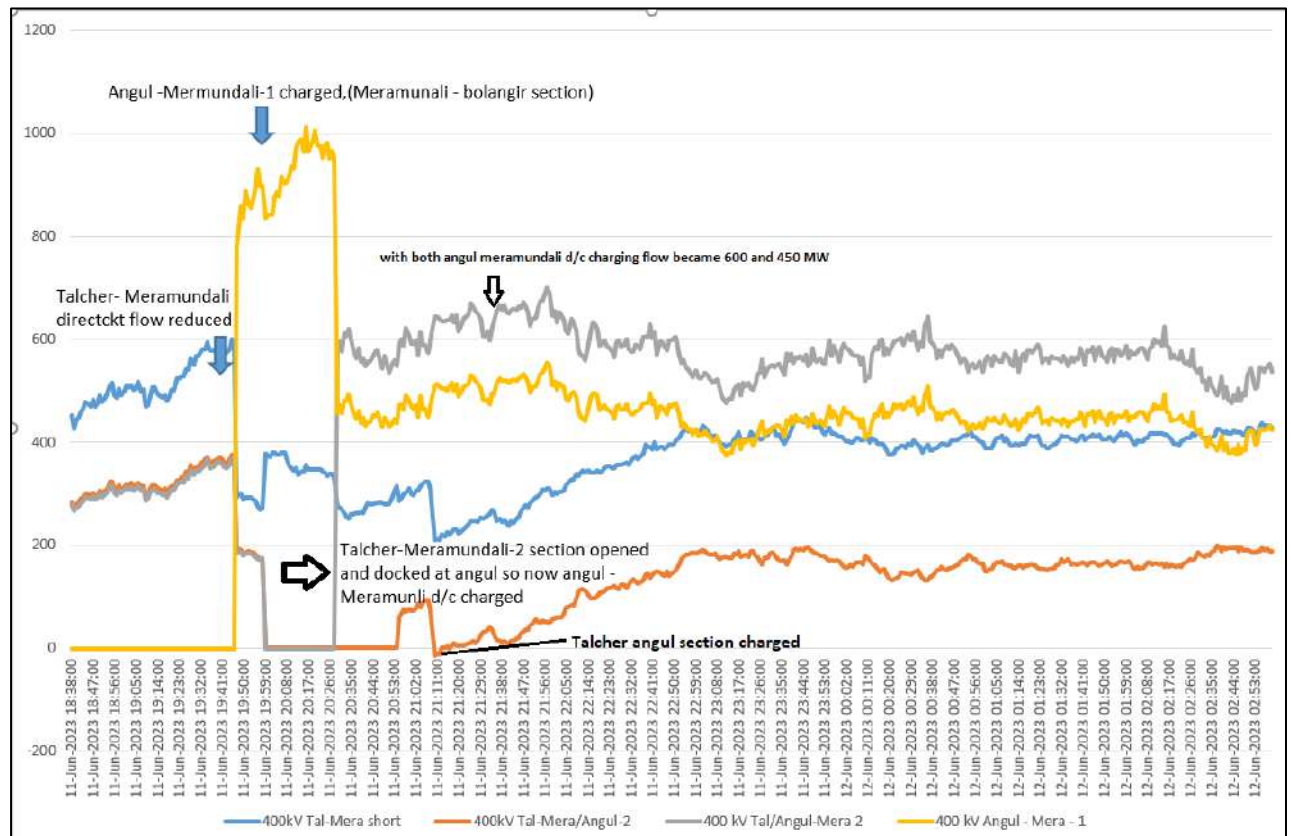
Docking process for improving reliability of Meramundali-11th June)

So based on previous day (10 June) angular separation plot it was decided to close angul-meramundali (Docking) between 17:30 to 19:00 Hrs to limit the loading while closing the line .



Due to load increase in real time, angle difference was on higher side so

- For reducing angular difference between angul and meramundali, 400 kV Talcher meramundali flow was increased by reducing HVDC Talcher kolar flow by 400 MW.
 - 400 kV Angul- Meramundali is closed at 19:46 Hrs. During closing angle diff between angul meramundali was around 11 degrees. Power flow was around 800-900 MW.
 - For docking at Angul, 400KV-MEERAMUNDALI-TSTPP-2 opened at 19:58 Hrs. for docking at Angul. 400 kV angul-meramundali-2 successfully charged at 20:28 Hrs.
 - 400 kV Angul – Talcher S/C successfully charged at 20:54 hrs.
 - **After docking and reconfiguration**
 - 400 kV Talcher Meramundali direct line
 - 400 kV Angul – Meramundali 1 & 2
 - 400 kV Angul – Talcher
- SCADA plot of process shown below ,



Current Situation:

- With this configuration now Meramundali is being supplied by Angul & Talcher two sources.
- But Angul -Meramundali is not satisfying N-1 most of the times hence in-case of tripping of one circuit other circuit loading to be restricted upto 800 Mw .
- By reducing CPP drawl ,Load regulation
- Gazuwaka reversal and increase in reverse direction, Talcher HVDC & Generation regulation

Tripping of 400 kV Meramundali-Lapanga D/c on 10.06.2023

At 16:21 Hrs, 400 kV Meramundali-Lapanga-1 tripped due to Y_N fault

At Lapanga:

- Y_ph breaker status is showing open for both main bay and tie bay, however, around 108 A current is available in Y_ph.
- After 1 second, tie bay Y_ph CB A/r attempt failed but fault current was very less, no distance Zones picked in DR and three phases also did not trip. Still 108 A current is available in Y_ph.
- At T+1.9 seconds, other two phase of only tie CB opened. R and B ph CB of main bay remained closed.
- As observed from SoE data, at T+3.2 seconds main bay R and B phase opened.

Issues: No A/r attempt by Main CB, single phase tripping by tie CB during failed AR attempt. Current in Y_ph even after opening of CB.

At Meramundali:

- Y_N fault struck the line, A/r attempt taken after 1 second which failed, and all three-phase tripped.

At 16:25 Hrs, 400 kV Meramundali-Lapanga-2 tripped

At Lapanga

- R_B fault struck the line which was seen in Zone-2 from Lapanga. Carrier received from Meramundali, however, line tripped after 400 msec in Zone-2 time.

Issues: Delayed tripping despite carrier receipt

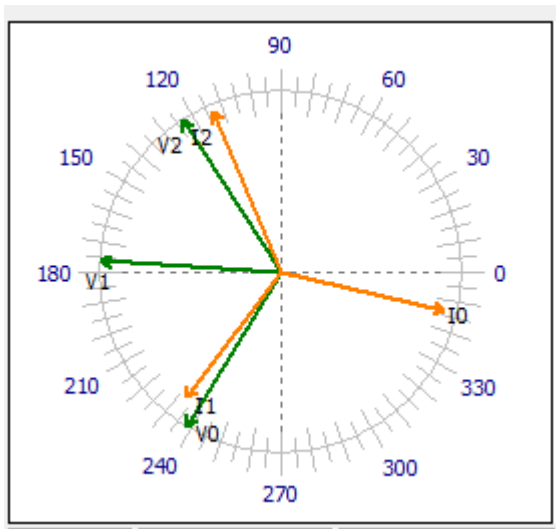
At Meramundali

- R_B fault, which was cleared in 100 msec from Meramundali.

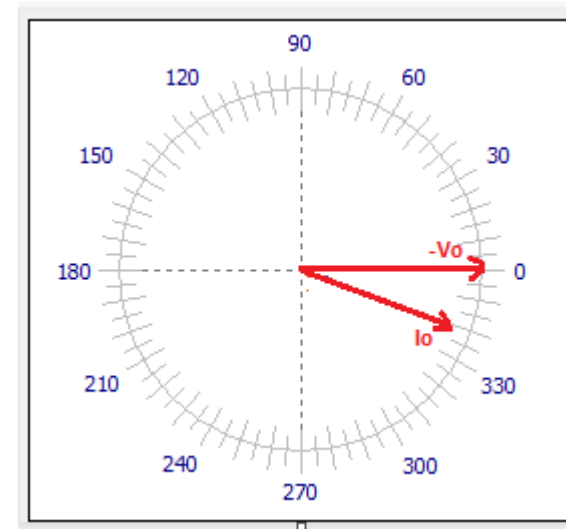
400 kV Meramundali-Lapanga-1

At 17:25:56-Charging attempt of 400 kV Meramundali-Lapanga-1 taken from **Meramundali**. Distance protection (Y_B_N) operated instead of SOTF and line tripped.

At 17:26:54- Charging attempt taken from **Lapanga** end, however, no protection operated, and fault persisted for around 17-18 seconds.



Snapshot of Sequence Components of Back Up relay at Lapanga

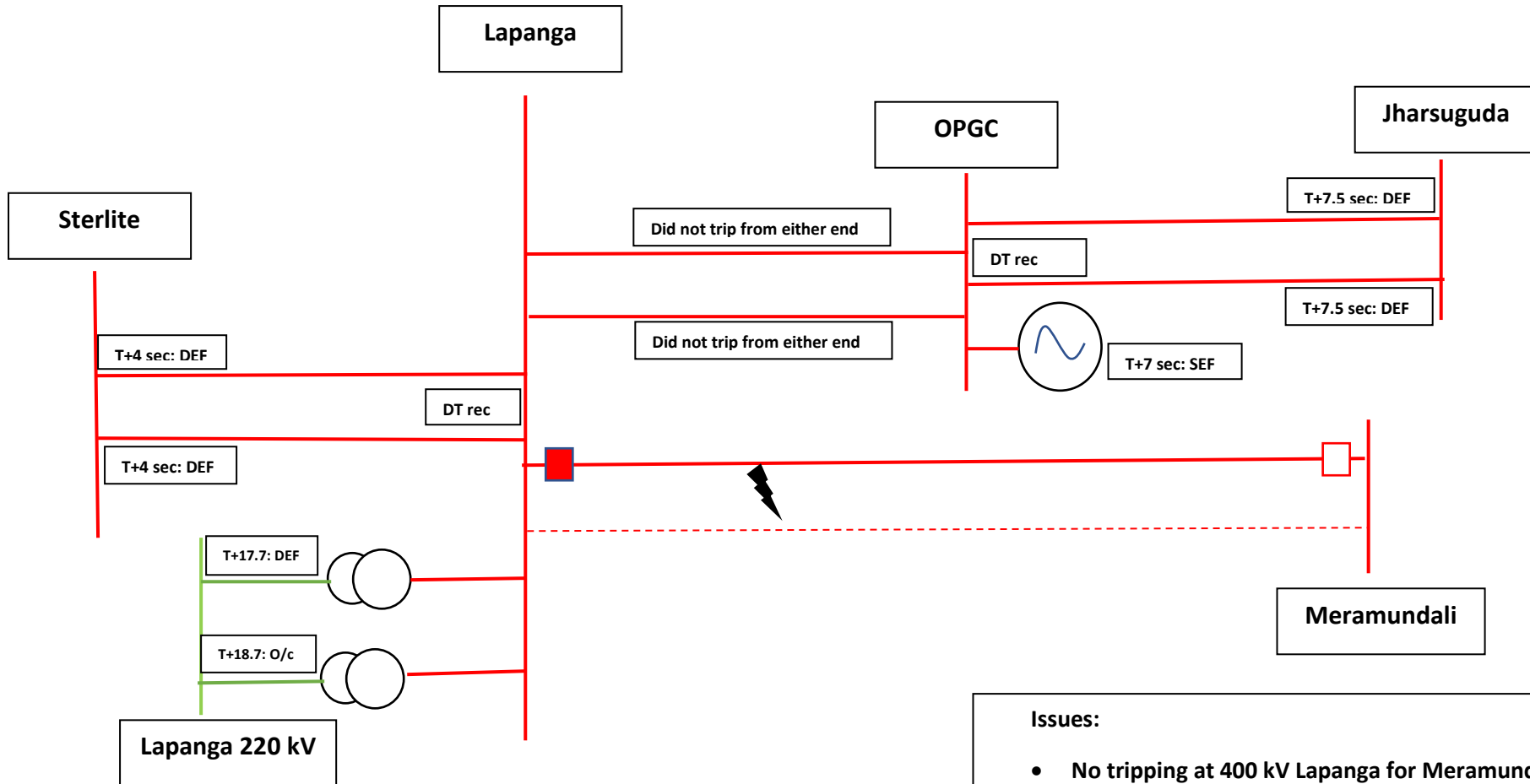


(-Vo: Negative of residual voltage and adjusted by -45 degree (RCA))

Issues:

- Charging attempt from another end immediately after failure from one end
- No protection operation at Lapanga. Fault current was also sufficient. From Back UP DR also, it seems fault was seen in forward direction but neither distance nor DEF picked up.

Disturbance at Lapanga, OPGC at 17:27 hrs on 10.06.2023



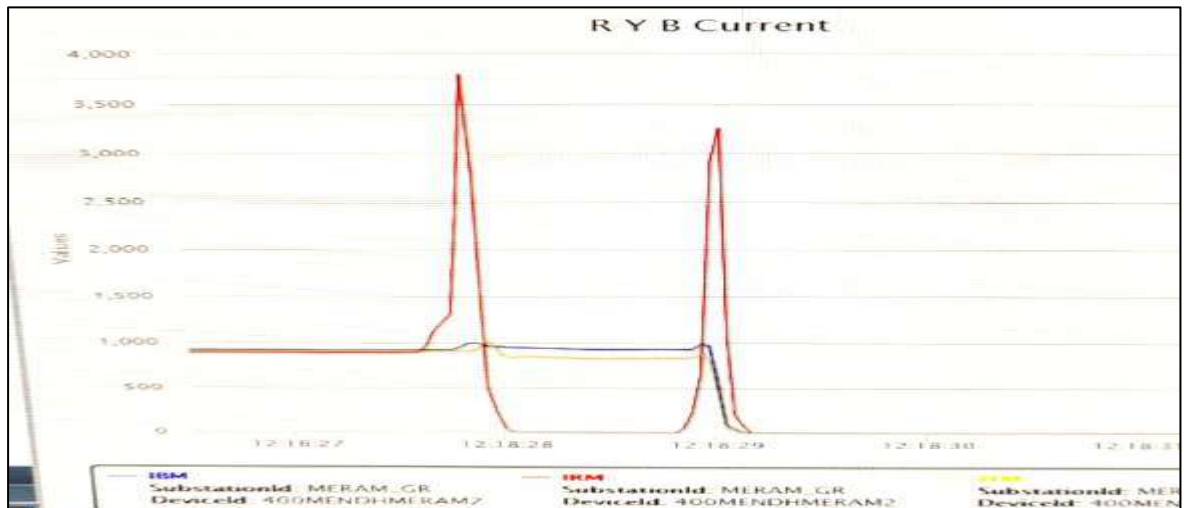
Issues:

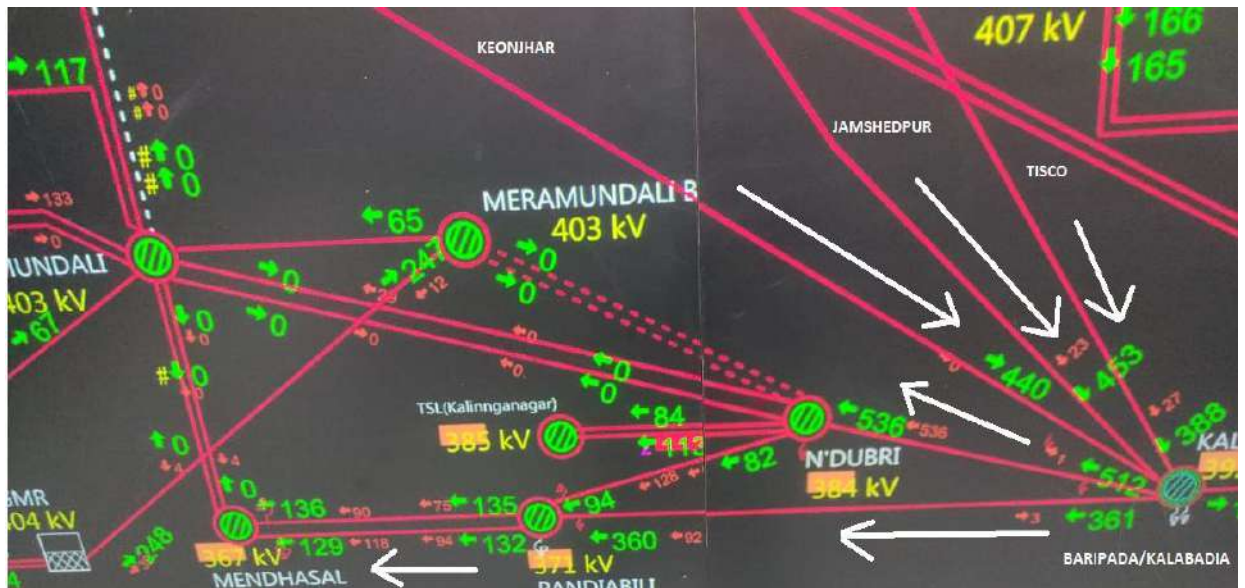
- No tripping at 400 kV Lapanga for Meramundali-1
- No tripping of 400 kV OPGC-Lapanga D/c from OPGC
- GT of U#4 tripped on SEF after 7 seconds
- Different tripping time for ICT-1 & 2 at Lapanga

400 KV Meramundali – Mendhasal D/C multiple tripping Event

Event 1: 12:18 Hrs , Tripping of 400 KV Meramundali – Mendhsal D/C

- Mendhasal ckt-2 tripped on R-n fault at 34 km from Mendhasal , Pre tripping flow was 640MW Each it is suspected that fault was due to sag and clearance issue .ckt-1 tripped on overload, setting at 1200 Amps.
- Bus voltage dipped down to 340 Kv due to huge long haulage of power and low fault level of Mendhasal. Some of the induction and AC loads also got stalled leading to low voltage scenario.
- load shedding of around 500 MW near cuttak , bhadrak , balsore , paradeep was done to improve the voltage , which later was restored slowly.
- With Meramundali -Mendhasal D/C tripping only power source at 400 Kv was Baripada(Kalabadia) which was feeding the load of New dubri , Pandialbali , Mendhasal .
- Baripada was getting power from Keonjhar & Jamshedpur and Keonjhar to baripda flow increased to 650 MW.
- Power which was coming to baripda was going from baripda to pandiabali and baripada to new dubri to feed the load of New dubri , Pandialbali , Mendhasal. Hence loading of Baripada to pandiabali and Baripada to new dubri also increased significantly .
- Baripada -New dubri increased to 650 MW and baripad pandiaballi increased to 550 MW .
- Pandiabali -Mendhasal reversed flow from Pandibali to mendhasal to feed mendhasal load.250 MW Each which was intially taking power from Mendhasal.



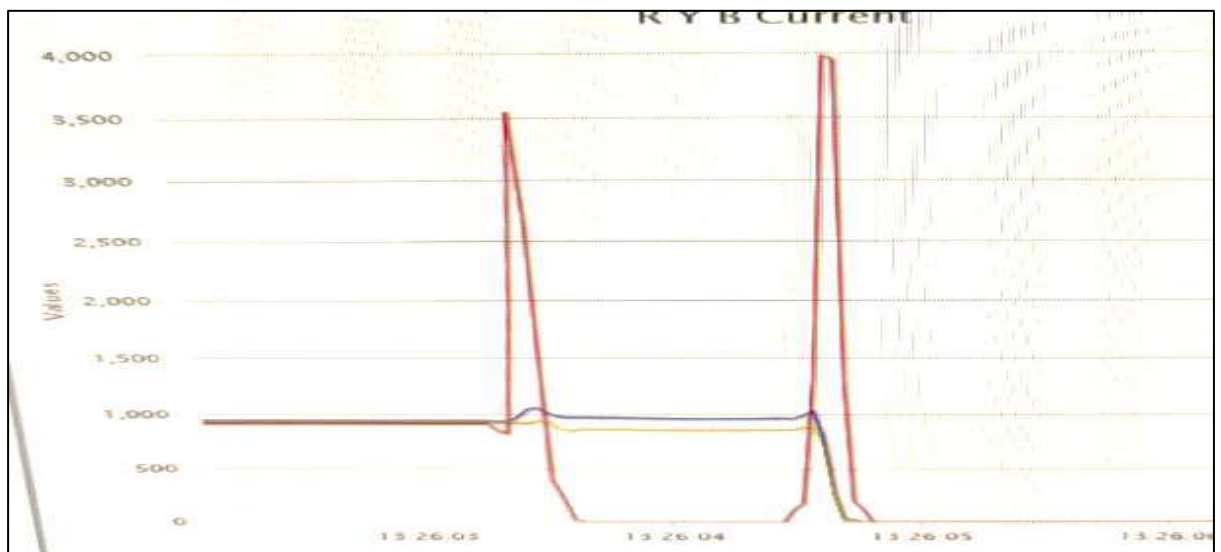


Event 2: 12:50 Hrs , restoration of Both circuits

- Meramundali -Mendhasal ckt 1 was tripped from only Meramundali end and was charged from mendhasal end so Bckup overcurrent setting was bypassed and later charging attempted and line charged and flow of line was 950 MW, after 5 minutes Line -1 also charged and line charged successfully with flow of 600 MW each.
- After charging again Backup O/C was enabled .

EVENT 3: 13:26 HRs ,Again Tripping of Meramundali -Mendhasal D/C

- Mendhasal ckt-2 again tripped on R-n fault at 34 km from Mendhasal , same relay indication this time also.
- Pre tripping flow was 640MW Each it is suspected that fault was due to sag and clearance issue .ckt-1 tripped on overload, setting at 1200 Amps.
- Similar power flow happened again and voltage variations at Mendhsal ,hovering near 360 KV .

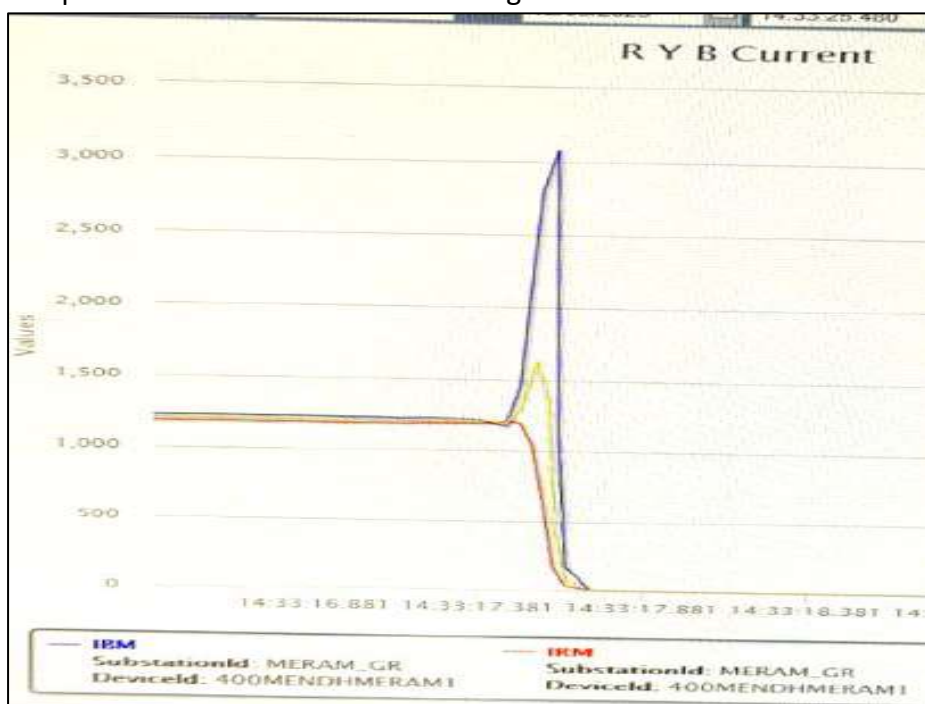


EVENT-4 , 13:52 Hrs ,Charging of Meramundali-Mendhasal -1

- SLDC Odisha charged the Line -1 by increasing Backup over current to 1500 Amps - 1040 MW .
- But as the line was charged flow was more than 1040 MW and it tripped within 2 Minutes.

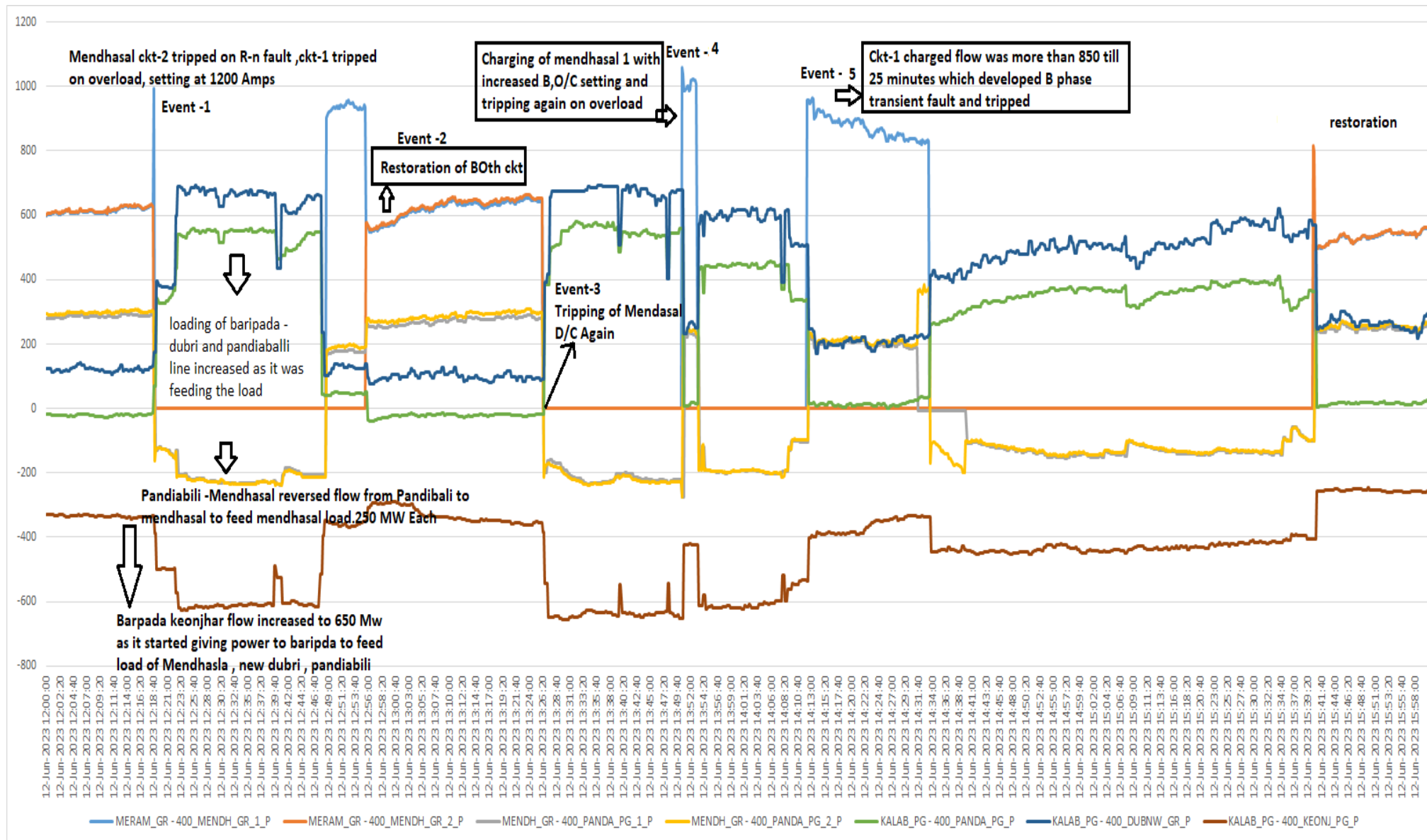
Event 5: at 14:13 Hrs Charging of Mendhasal-Meramundali -1 Again

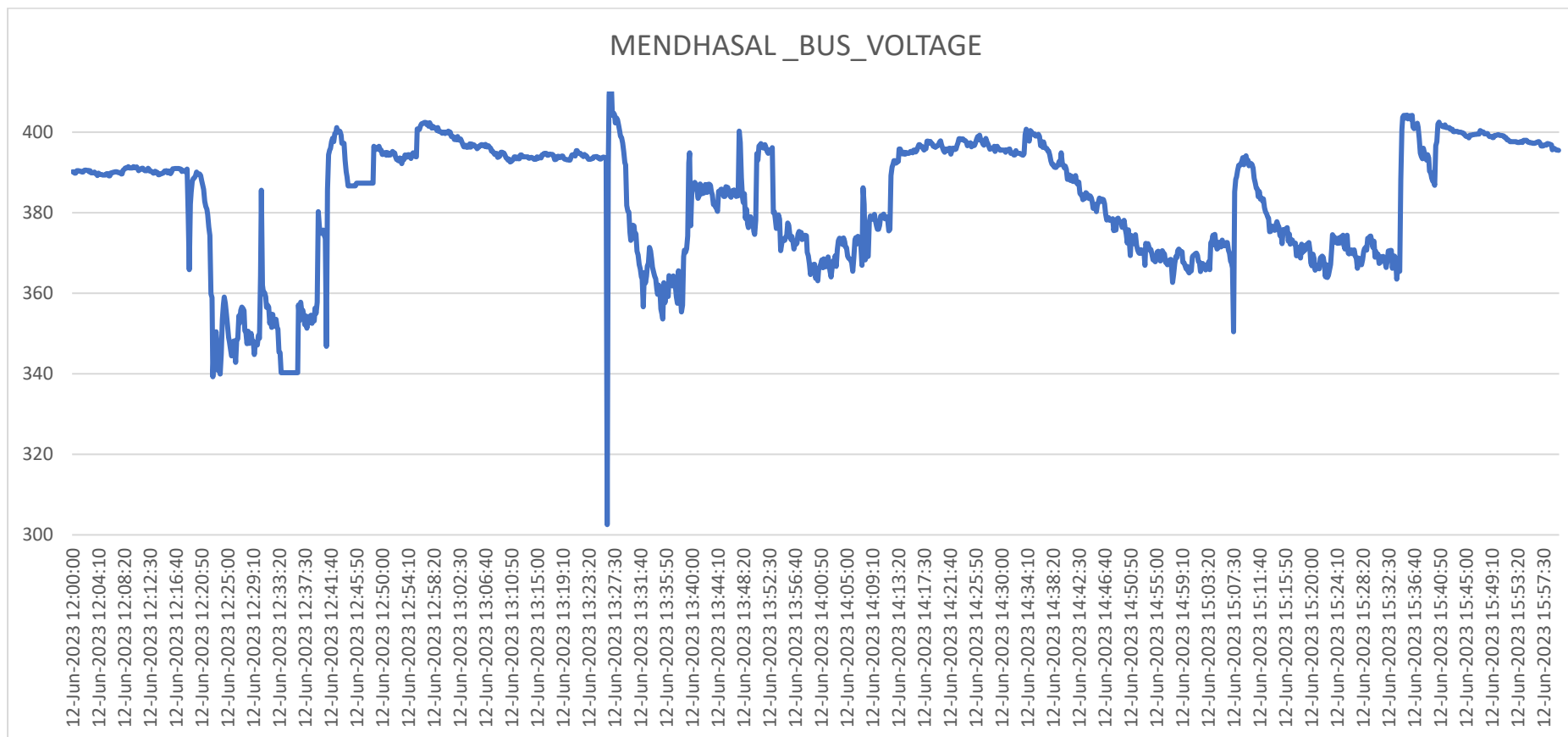
- SLDC Odisha charged the Line -1 and flow touched to 940 MW and some load re-arrangement done at 220 KV level, which reduced loading upto 820 MW also Talcher kolar increased to 1000 MW .
- Flow was more than 850 MW till 25 minutes ,But now ckt-1 developed a transient fault in B phase seems to be due to same sag issue .



Event 6: 15:40 Hrs , Final restoration of both circuits

- Meanwhile some load rearrangement and 220 Kv Network re-configuration was done , so that while charging Meramundali mendasal it do not cause overloading .
- Such as closing of Bhanjanagr-mendhasal and nayagarh-mendhasal loop .
- Shifting of some new dubri load to meramundali .
- In patrolling they have not found any fault so Meramundali Mendhasal D/C charged from Meramundali end and both line was holding and seems to be healthy and finally one by one both lines were charged .





List of important transmission lines in ER which tripped in May-2023

Sl. No.	LINE NAME	TRIP DATE	TRIP TIME	RESTORATION DATE	RESTORATION TIME	Relay Indication LOCAL END	Relay Indication REMOTE END	Reason	Fault Clearance time in msec	Remarks	DR Configuration Discrepancy	DR/ELRECIVE D FROM LOCAL END	DR/ELRECIVE D FROM LOCAL END	UTILITY RESPONSE
1	220KV TSTPP-MERAMUNDALI-2	09-05-2023	14:24	09-05-2023	15:53	TSTPP: R_N, Zone-1, 28.3 km , 3.03 kA	Meeramundali: R_N, Zone-1, 28.27 kA, 3.91 kA	R-Earth	100	A/r successful from Meramundali. Other two phase at TSTPP tripped in PD after 2.1 seconds	DR not time synchronized at TSTPP	Yes	Yes	A/r scheme not working at TSTPP.

2	220KV TENUGHAT- BIHARSARIFF-1	17-05-2023	10:46	17-05-2023	11:33	Tenughat: R_N, Zone-I, 123.4 km, 1.3 kA		R- Eart h	100	Three phase tripping for single phase fault	DR not time synchronized at Biharsharif	Ye s	Ye s	PLCC not available.
3	400KV RAJARHAT- JEERAT-1	19-05-2023	18:51	19-05-2023	19:57	Bus bar protection operated		B- Eart h	100	While taking charging attempt of 400 kV Jeerat- Bakreswar-1 at 18:51 Hrs, flashovr occurred at Bus side CT terminal of Bakreshwar bay and bus bar protection operated.		Ye s	Ye s	BI for close command form control switch is missed for which current of said BKTPP bay was not taken into consideration of of Buszone -B . As the current is mismatched in the Bus-zone , Busbar operates with Zone-B indication and all the bays connected to Bus- Zone -B tripped with 96 operation.
4	400KV JEERAT- NEW JEERAT-2	19-05-2023	18:51	19-05-2023	19:44			B- Eart h	100			Ye s	Ye s	
5	400KV JEERAT- SAGARDIGHI-2	19-05-2023	18:51	19-05-2023	19:53			B- Eart h	100			Ye s	No	
6	220 KV KISHANGANJ(PG)- KISHANGANJ NEW-1	31-05-2023	17:50	31-05-2023	20:20	Kishanganj (PG): Didn't trip	Kishanganj New: Master trip relay operated	No fault	NA	BSPTCL may explain		NA	NA	Output contact of main-1 ZIV relay maloperated.

Configuration of Single pole tripping and Auto reclose for Aided DEF Function

CB Control Configuration

CB CONTROL				
CB Control by	Disabled	07.01		
A/R Single Pole	Enabled	07.07		
A/R Three Pole	Disabled	07.08		

Distance & DEF Function Enable

CONFIGURATION				
Restore Defaults	No Operation	09.01		
Setting Group	Select via Menu	09.02		
Active Settings	Group 1	09.03		
Save Changes	No Operation	09.04		
Copy From	Group 1	09.05		
Copy To	No Operation	09.06		
Setting Group 1	Enabled	09.07		
Setting Group 2	Disabled	09.08		
Setting Group 3	Disabled	09.09		
Setting Group 4	Disabled	09.0A		
Dist. Protection	Enabled	09.0D		
Power-Swing	Disabled	09.10		
Back-up I>	Disabled	09.11		
Neg Sequence O/C	Disabled	09.12		
Broken Conductor	Disabled	09.13		
Earth Fault PROT	Disabled	09.14		
Aided D.E.F	Enabled	09.15		

Distance & PLCC Configuration

GROUP 1				
GROUP 1 DISTANCE EL...				
GROUP 1 DISTANCE SC...				
Program Mode	Standard Scheme	31.01		
Standard Mode	P.U.P Z2	31.02		
Fault Type	Both enabled	31.03		
Trip Mode	1P, Z1 & CR	31.04		
Aid Dist Dly	20.00 ms	31.07		
tReversal Guard	20.00 ms	31.08		
Unblocking Logic	None	31.09		
SOTF/TOR Mode	100000000110000	31.0A		
SOTF Delay	110.0 s	31.0B		
Z1Ext Fail	Disabled	31.0C		
GROUP 1 Weak Infeed		31.0D		
WI:Mode Status	Disabled	31.0E		
tOT Window	40.00 ms	31.0F		

DEF Setting (Default Setting)

GROUP 1		
GROUP 1 DISTANCE EL...		
GROUP 1 DISTANCE SC...		
GROUP 1 AIDED D.E.F		
Aided ch. Status	Enabled	39.01
Polarication	Neg sequence	39.02
V> Voltage Set	1.000 V	39.03
IN Forward	100.0 mA	39.04
Time Delay	0 s	39.05
Scheme Logic	Permissive	39.06
Tripping	Any phase	39.07
IN Rev Factor	600.0e-3	39.09
Block. Time Add.	150.0 ms	39.0A

AR Configuration:

In Block A/R, '**OC Aided DEF Trip**' function should be untick.

DEF Channel Received logic:

4.8.3 Aided Directional Earth Fault (DEF) protection schemes

The option of using separate channels for Directional Earth Fault (DEF) aided tripping, and distance protection schemes, is offered in the P442 and P444 relays.

When a separate channel for DEF is used, the DEF scheme is independently selectable. When a common signalling channel is employed, the distance and DEF must **share** a common scheme. In this case a permissive overreach or blocking distance scheme must be used. The aided tripping schemes can perform single pole tripping.

✓/EN AP/Hb6

Application Notes

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MiCOM P40 Agile P442, P444

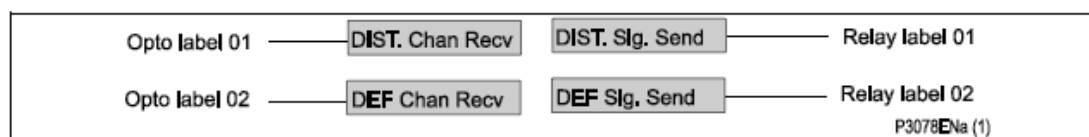


Figure 76: PSL required to activate DEF logic with an independant channel

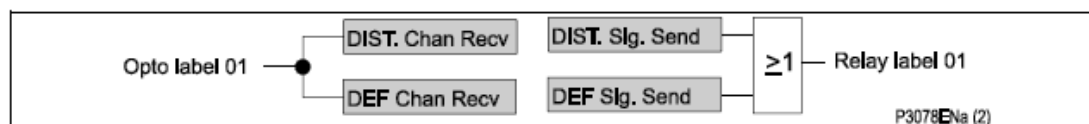


Figure 77: PSL required to activate DEF logic with **shared** channel

Note:

Aided Permission scheme will operate based on Independent and Shared Channel logic in PSL.

4.8.3.2 Aided DEF Schemes

4.8.3.2.1 Aided DEF Permissive Overreach Scheme

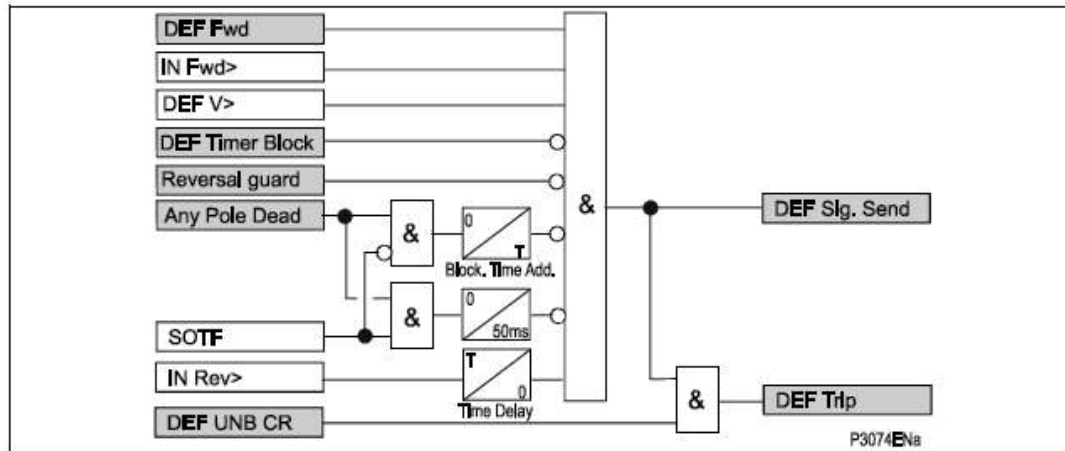


Figure 80: Independent channel – permissive scheme

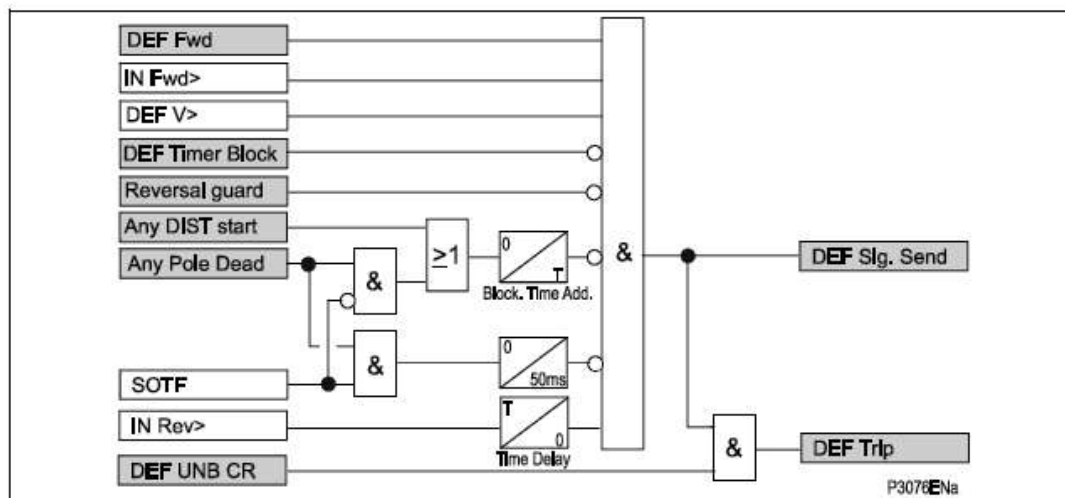
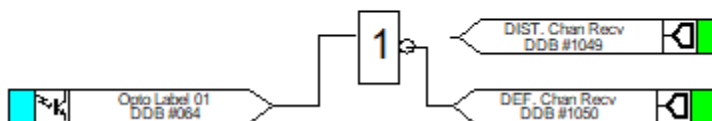


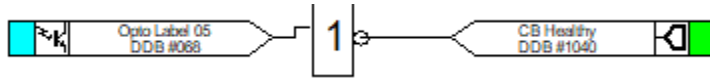
Figure 81: Shared channel – permissive scheme

In PSL logic (the opto input is inverted For testing purpose only)



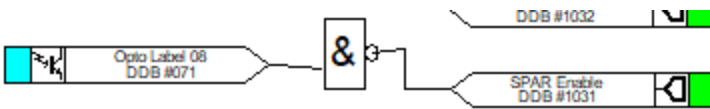
CB Healthy:

In PSL logic (the opto input is inverted For testing purpose only)



Single Pole AR:

In PSL logic (the opto input is inverted for testing purpose only)



SL NO	MONTH	UTILITY	ELEMENT	DETAILS OF ELEMENT	REMARKS
1	OCC_NOV_2022	NTPC (North Karanpura)		660MW New Generating Unit charged a Tandwa,Jharkhand	DATA REQUIRED
2	OCC_NOV_2022	NTPC (North Karanpura)	ICT	400KV MAIN BAY OF 400KV/11.50KV 315 MVA ST-3 AT NORTH KARANPURA	PDMS AND PSCT DONE
3	OCC_NOV_2022	NTPC (North Karanpura)	GT-1	400KV MAIN BAY OF 400KV/21KV 265 MVA GT-1 AT NORTH KARANPURA	PDMS AND PSCT DONE
4	OCC_NOV_2022	NKTL	T/L	400 kV North Karanpura(NTPC)- Chandwa(PG) Transmission Line -1	PDMS AND PSCT DONE AT NORTH KARANPURA END AND DATA REQUIRED CHANDWA END
5	OCC_NOV_2022	NKTL	T/L	400 kV North Karanpura(NTPC)- Chandwa(PG) Transmission Line 2	PDMS AND PSCT DONE AT NORTH KARANPURA END AND DATA REQUIRED CHANDWA END
6	OCC_NOV_2022	JUSNL	T/L	400KV MAIN BAY OF LATEHAR(JUSNL)-1 AT CHANDWA(PG)	PDMS AND PSCT DONE AT CHANDWA END AND DATA REQUIRED AT LATEHAR END
7	OCC_NOV_2022	JUSNL	T/L	400KV MAIN BAY OF LATEHAR(JUSNL)-2 AT CHANDWA(PG)	PDMS AND PSCT DONE AT CHANDWA END AND DATA REQUIRED AT LATEHAR END
8	OCC_DEC_2022	BGCL	ICT	400KV MAIN BAY OF 400KV/220KV/132kv/33kv 500 MVA ICT 2 AT JAKKANPUR JIS	PDMS AND PSCT DONE
9	OCC_DEC_2022	PGCIL	ICT	400KV MAIN BAY OF 400KV/220KV/33kv 315 MVA ICT 2 AT DURGAPUR SS	PDMS AND PSCT DONE
10	OCC_JAN_2023	JUSNL	T/L	400 kV Chandwa (PG) - Latehar (JUSNL) D/C Line	PDMS AND PSCT DONE AT CHANDWA END AND LATEHAR END DATA REQUIRED
11	OCC_JAN_2023	BSPTCL	T/L	220 kV Patna (PG) - Sipara (BSPTCL) D/C Line after reconducting	PDMS AND PSCT DONE
12	OCC_JAN_2023	OPTCL	B/R	400 kV 125 MVAr Bus Reactor at Mendhasal GSS	PDMS AND PSCT DONE
13	OCC_JAN_2023	NTPC	T/L	Main Bays of 400 kV Gaya D/C Line at NTPC sitchyard	NOT CHARGED
14	OCC_JAN_2023	BSPTCL	T/L	132kV Ganwara-Pandaul line(reconducting)	PDMS AND PSCT DONE AT GANGWARA END
15	OCC_JAN_2023	BSPTCL	T/L	132kV Darbhanga-samastipur line(reconducting)	PDMS AND PSCT DONE AT DARBHANGA END
16	OCC_JAN_2023	PGCIL	T/L	PG-Patna-Gaurichak TL CKT-2(reconducting)	DATA REQUIRED
17	OCC_JAN_2023	PGCIL	T/L	PG-Patna-Gaurichak TL CKT-1(reconducting)	DATA REQUIRED

18	OCC_JAN_2023	BGCL	T/L	220kV JAKKANPUR NEW(BGCL)-KHAGAU(BSPTCL)	PDMS AND PSCT DONE AT JAKKANPUR END AND DATA REQUIRED KHAGAU END
19	OCC_JAN_2023	BGCL	T/L	220kV JAKKANPUR NEW(BGCL)-SIPARA(BSPTCL)	PDMS AND PSCT DONE AT JAKKANPUR END AND DATA REQUIRED KHAGAU END
20	OCC_JAN_2023	BSPTCL	T/L	132kV Dumraon-Bikramganj line(reconducting)	In 132kV Dumraon Bikramganj line reconductoring has been done by panther equivalent HTLS conductor. In Distance relay, setting has been kept unchanged as data of both conductor (Panther and HTLS) are almost same.
21	OCC_JAN_2023	OPTCL	B/R	125kva bus reactorat Mendhasal	PDMS AND PSCT DONE
22	OCC_JAN_2023	OPTCL	ICT	132/33kV 20MVA Power TRF-1 AT Lapanga	PDMS AND PSCT DONE
23	OCC_JAN_2023	OPTCL	ICT	132/33kV 20MVA Power TRF-II ATGIS Hinjili	PDMS AND PSCT DONE
24	OCC_FEB_2023	PGCIL	T/L	220 kV Pusauli (PG) - Durgauti (IR) D/C Line	Data required in both end
25	OCC_FEB_2023	OPTCL	ICT	132/33kV 20MVA Power TRF-1 AT ASKA NEW	PDMS AND PSCT DONE
26	OCC_FEB_2023	OPTCL	ICT	132kV Barbil-Kamanda line	Data required in both end
27	OCC_FEB_2023	OPTCL	T/L	132kV Switching station kutra 132Kv along with LILO of kuchinda rajgangpur s/c line to kutra	PDMS AND PSCT DONE
28	OCC_FEB_2023	OPTCL	T/L	132kV Kutra m/s shiva cement s/c line	Data required

29	OCC_FEB_2023	OPTCL	ICT	132/33kV 20MVA Power TRF-1 AT 132/33 kV,GSS,CHANDIPUR	Data required
30	OCC_FEB_2023	OPTCL	T/L	132kV Switching station near M/s Ultrateh Cement ltd at Khamarnuagaon,Khuntuni,132kV LILO arrangement from Arati steel -TS alloys line	Data required
31	OCC_FEB_2023	OPTCL	T/L	12.5 MW Solar power plant at 33kV Level in 132/33kV witchyard M/S ARBEL having connectivity at 132kV With LILO switching station SAINTALA	Data required
32	OCC_FEB_2023	OPTCL	T/L	220kV Switchyard at 220/132/33kV GSS,BAMRA having LILO connectivity 220kV Budhipadar-Tarkera ckt-II	Data required
33	OCC_FEB_2023	OPTCL	ICT	220/132kV160MVA Power Auto TRF-1 AT 220/132/33 kV,GSS,BAMRA	PDMS AND PSCT DONE
34	OCC_FEB_2023	OPTCL	ICT	220/132kV160MVA Power Auto TRF-2 AT 220/132/33 kV,GSS,KURAMUNDA	PDMS AND PSCT DONE
35	OCC_FEB_2023	OPTCL	ICT	220/132kV 40MVA Power Auto TRF-1 AT 220/132/33 kV,GSS,KURAMUNDA	PDMS AND PSCT DONE
36	OCC_MAR_2023	NTPC		NTPC Barh Stage Unit #2, 24 kV, 660 MW is yet to be synchronized	Data required
37	OCC_MAR_2023	NTPC	GT(3*260M	400kV GT#2 of NTPC Barh	Data required
38	OCC_MAR_2023	BGCL	ICT-1	400/220/33kV ICT 1 500MVA at Naubatpur SS	Data required
39	OCC_MAR_2023	OPTCL	T/L	400 kV GMR - Meramundali-B S/C Line after LILO work of 400 kV GMR - Meramundali-A Line at Meramundali-B SS	DATA RECEIVED
40	OCC_MAR_2023	OPTCL	T/L	132kV 2 PH S/C LINE,132kV GSS,KAMAKHYANAGAR FOR EXTENTION OF P/S TO RTSS KAMAKHYANAGAR	Data required
41	OCC_MAR_2023	OPTCL	T/L	400kV GMR-MERAMUNDALI-B SC LINE & MERAMUNDALI-B TO MERAMUNDALI-A LINE AFTER LILO OF GMR-MERAMUNDALI-A SC LINE MERAMUNDALI-B GIS	DATA RECEIVED

42	OCC_MAR_2023	OPTCL	ICT	132/33kV 20MVA POWER TR NO-2 AND 1 132kV FEEDER BAY GSS BIRMAHARAJPUR	Data required
43	OCC_MAR_2023	BSPTCL	T/L	220kV BIHARSARIFF-TTPS S/C(RECONDUCTING)	Data required
44	OCC_MAR_2023	BSPTCL	T/L	132kV SONENAGAR(OLD)-NAGARUNTARI TSS,SCTL(RECONDUCTING)	Data required
45	OCC_MAR_2023	BGCL	ICT	500MVA ICT-1 400/220/132/33kV ,NAUBATPUR	Data required
46	OCC_MAR_2023	BGCL	T/L	132kV KHAGAU-ABIHITA NEW(BGCL) S/L	PDMS AND PSCT DONE
47	OCC_MAR_2023	BGCL	T/L	132kVBIHITA NEW(BGCL)-DIGHA(BSPTCL)	PDMS AND PSCT DONE
48	OCC_MAR_2023	BSPTCL	T/L	132kV RAJGIR ASTHAWAN CKT1&2	Data required
49	OCC_APR_2023	NTPC	GT	NTPC Barh Stage 1 Unit #2 660MW	DATA REQUIRED
50	OCC_APR_2023	OPTCL	ICT	400KV MAIN BAY OF 400KV/220kV 315 MVA ICT-3 AT KALINGANAGAR	DATA REQUIRED
51	OCC_APR_2023	BSPTCL	T/L	220 kV Sitamarhi (PMTL) - Raxaul Line 1 along with associated bays at Raxaul end	DATA REQUIRED
52	OCC_APR_2023	BSPTCL	T/L	220 kV Sitamarhi (PMTL) - Raxaul Line 2 along with associated bays at Raxaul end	DATA REQUIRED

53	OCC_APR_2023	POWERGRID	T/L	132 kV Ranpo (PG) - Samardong (EPD, Sikkim) Line 1	PDMS AND PSCT DONE AT RANGPO END
54	OCC_APR_2023	POWERGRID	T/L	133 kV Ranpo (PG) - Samardong (EPD, Sikkim) Line 2	PDMS AND PSCT DONE AT RANGPO END
55	OCC_MAY_2023	BSPTCL	T/L	220 kV Muzzafarpur (PG) - Amnour (BSPTCL) Line 2 as anti-theft measure from Muzzafarpur end	Data required
56	OCC_MAY_2023	OPTCL	T/L	SYNCHRONIZATION OF 2MW GEDCOL SOLAR PV PLANT HAVING 33kV CONNECTIVITY AT 220/132/33kV,GSS BOLANGIR NEW FOR 2MW SOLAR PV PLANT	Data required
57	OCC_MAY_2023	OPTCL	T/L	220kV LILO LINE LOC NO 227 OF EXITING 220kV NEW DUBURI-BALASORE LINE UPTO GANTRY OF 220/132/33kV GRID S/S DHARMA	Data required
58	OCC_MAY_2023	OPTCL	T/L	SYNCHRONIZATION OF 3.64MW SOLAR PV PLANT HAVING 11kV LEVEL CONNECTIVITY AT 132/33kV,SWITCHYARD OF M/S SHREE CEMENT LTD CONNECTED WITH KHUNTUNI-SHREE CEMENT FEEDER	Data required
59	OCC_MAY_2023	OPTCL	ICT	220/33kV GSS,KANTABADA LILO CONNECTIVITY FROM LOC NO 453 AND 455 OF 220kV CHANDAKA-MENDASHAL CKT-III ALONG WITH 02 NOS OF 220/33 Kv 63mva power trf	Data required

SI No.	Name of the incidence	PCC Recommendation	Latest status
126th PCC Meeting			
1.	Total Power Failure at 220 kV Chandil S/s on 27.04.2023 at 07:12 Hrs	<p>PCC observed that the O/C settings of ICTs at RCP end is set with a conservative value and advised to review the o/c settings of 220/132 kV ICTs at Chandil and RCP S/s with proper coordination.</p> <p>Regarding tripping of 132 kV Chandil – Adityapur in zone-3 from Adityapur end, PCC advised JUSNL to review reach settings of zone 3 distance relay at Adityapur end.</p> <p>JUSNL was advised to review O/C settings of feeders and ICTs at each S/s as per present fault level data available with SLDC Jharkhand</p>	<p><i>JUSNL representative informed that settings had been revised.</i></p> <p><i>PCC advised JUSNL to share revised settings to ERPC.</i></p>
2.	Disturbance at 220 kV Tenughat S/s on 18.04.2023 at 13:19 Hrs	<p>PCC advised TVNL to check time delay set for electrical based over frequency relay and it may be kept disabled if required in order to avoid unnecessary tripping of unit as occurred in this event.</p> <p>PCC advised to review(increase) the high set overcurrent settings (delay and pickup whichever possible) for unit-2 till numerical protection is implemented for that relay.</p>	<p><i>TVNL representtative was not available in the meeting.</i></p>
3.	Repeated Tripping of 400 kV Teesta III-Dikchu line	<p>Teesta III representative informed that as per their internal discussion held after these incidents, proposed O/V settings(stage-2) is 125% with delay of 100 ms which will be implemented after confirmation from ERPC/ERLDC. He further intimated that distance protection settings had also been also reviewed and proposed settings will be shared to ERPC/ERLDC shortly.</p>	<p><i>Teesta III representative informed that O/V settings(stage-2) for unit is 120% with delay of 100 ms and OEM is not allowing to increase settings further so implementation of proposed O/V settings of 125% for line is not possible due to coordination issue of settings with unit. PCC advised Teesta III to</i></p>

			<i>implement O/V settings(stage-2) for line to 120% with delay of 100 ms.</i>
4.	Tripping of 400 kV Barh-Kahalgaon-2 at 08:21 Hrs on 15.04.2023	<p>PCC advised NTPC to test the relay healthiness at Barh end for 400 kV Barh-Kahalgaon-2 feeder.</p> <p>PCC advised NTPC Barh following:</p> <ul style="list-style-type: none"> to share detailed SOP adopted for operation of isolators along with modified scheme of interlocking to ERPC/ERLDC. to share DR/EL and report for future events in timely manner so that proper analysis regarding such incident can be carried out. to test interlinking scheme for other feeders also along with implementing hardware logic if needed. 	<p><i>NTPC representative informed that detailed SOP, DR/EL had been shared to ERPC.</i></p> <p><i>Regarding testing of interlinkig scheme , he informed that testing had been done for 400 kV Barh-Kahalgaon-2.</i></p> <p><i>PCC advised NTPC to test interlinking scheme for other feeders also along with implementing hardware logic if needed.</i></p>
125th PCC Meeting			
5.	Repeated Line tripping of 220 kV Ramchandrapur - Joda in April 2023	Regarding status of commissioning of DTPC in the line, PCC advised the matter may be taken with their telecom wing for early commissioning of the same.	<i>JUSNL representative informed that work order for commissioning of DTPC in the line will be issued shortly and it is expected that work will be completed by July 2023.</i>