Agenda
for
127th PCC Meeting

Date:22/06/2023
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

AGENDA FOR 127th PROTECTION COORDINATION SUB-COMMITTEE MEETING TO BE HELD ON 22.06.2023 AT 10:30 HRS AT ERPC CONFERNECE HALL

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.

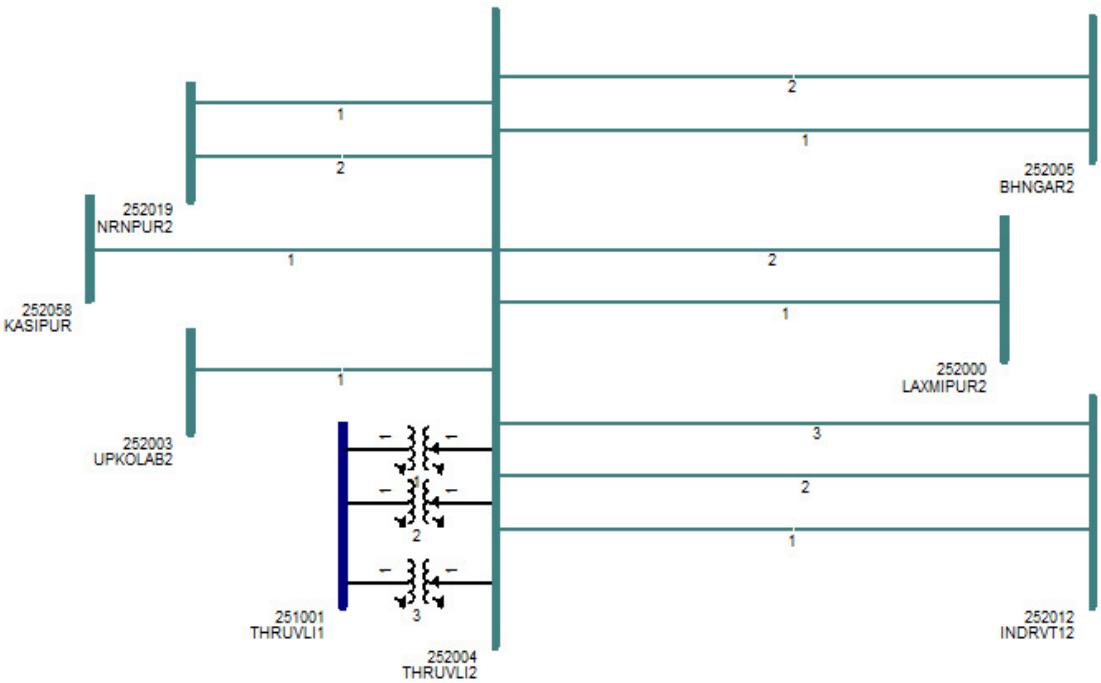
The minutes of 126th Protection Coordination sub-Committee meeting held on 17.05.2023 was circulated vide letter dated 02.06.2023.

Members may confirm.

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.** Presentation submitted by OPTCL is enclosed at **Annexure B.1.2.**

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

OPTCL may explain.

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.

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.

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.

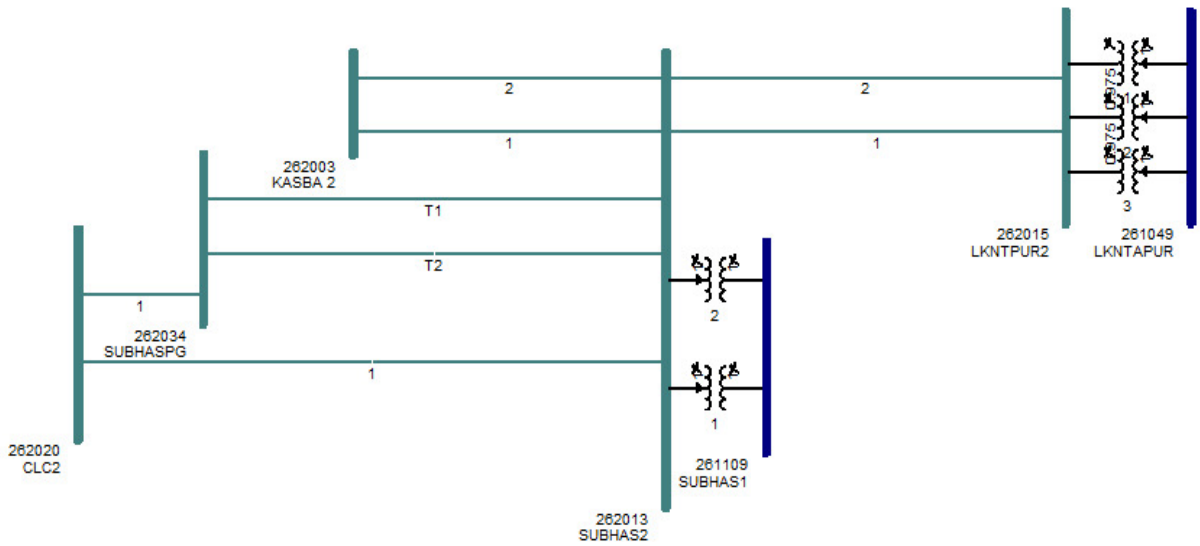
Detailed report from ERLDC is attached at **Annexure B.4.**

Load Loss: 28 MW
Outage Duration: 01:42 Hrs

JUSNL may explain.

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.

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.

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.

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. Details of event is attached at **Annexure B.6.C.**

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 still 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.

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.

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.

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.

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 at **Annexure B.9.**

Members may discuss.

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.

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.

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.

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 maybe 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 Muzafarpur-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.

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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, टालिगंज, कोलकाता - 700033
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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 / विधुत उत्पादन इकाईं 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)

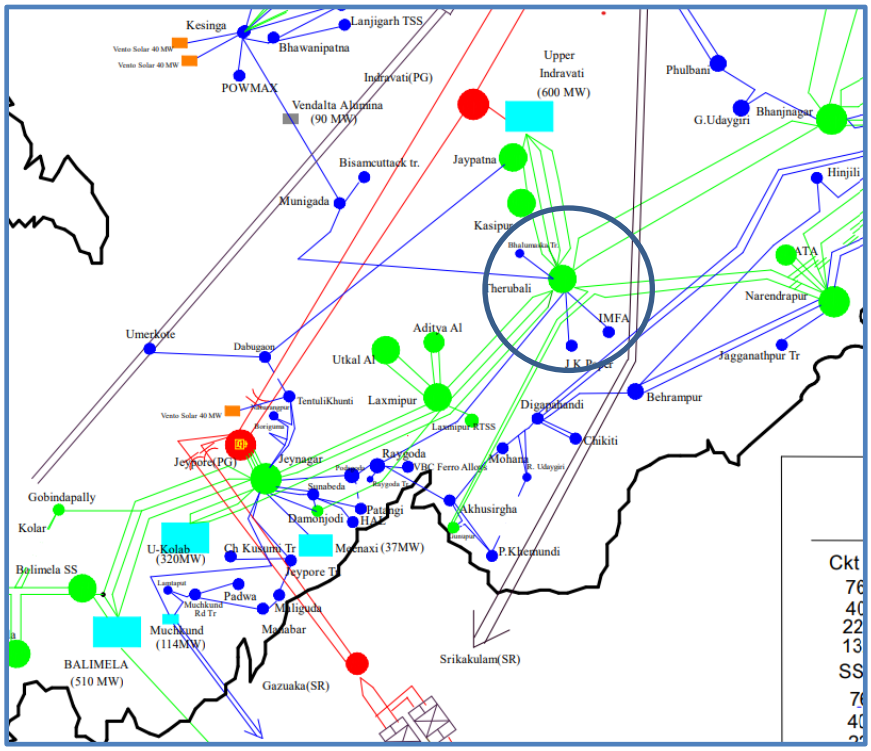


Figure 1: Network across affected area

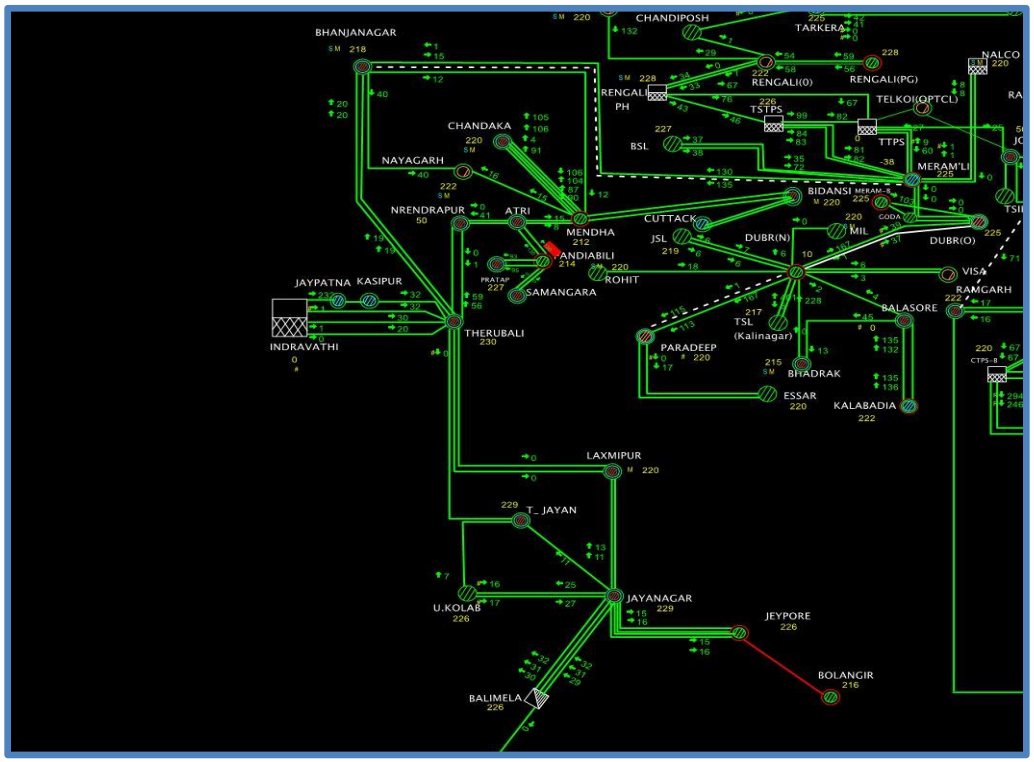


Figure 2: SCADA snapshot of the system

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*

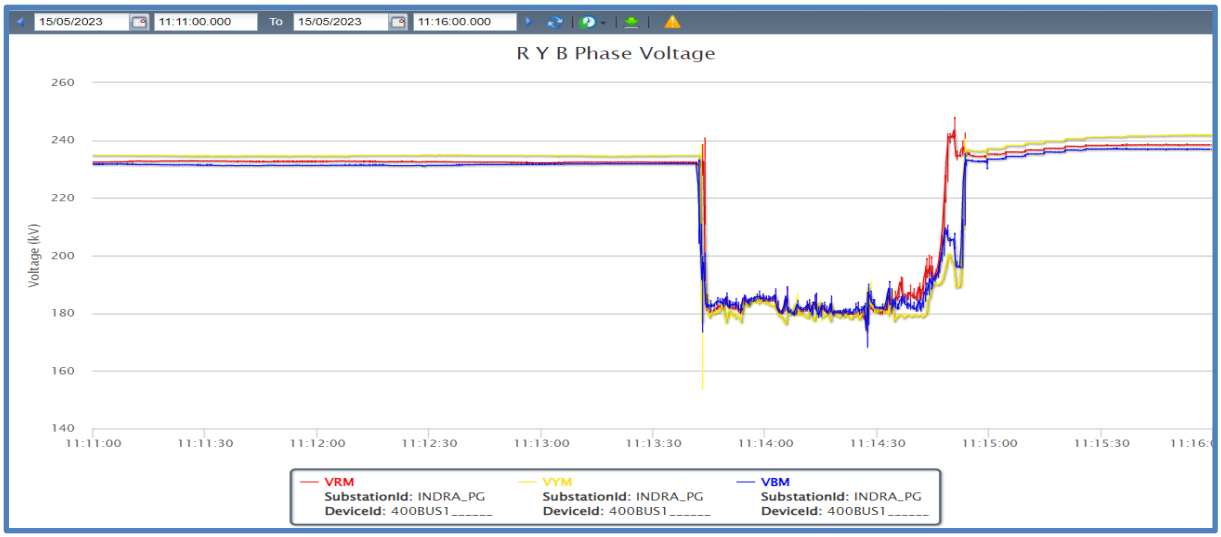


Figure 2: PMU voltage snapshot of 400/220 kV Jeypore S/s

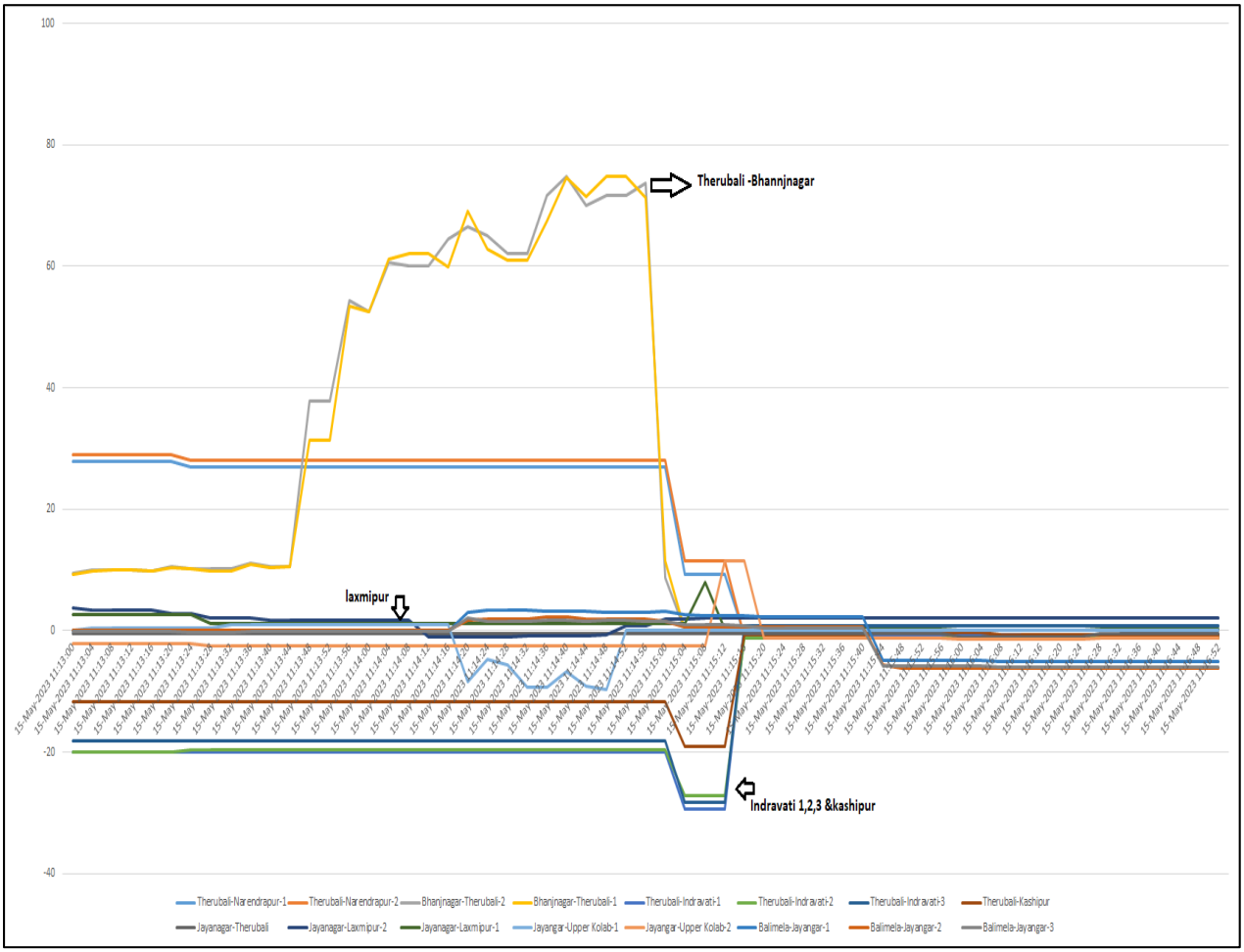
Analysis of the event (घटना का विश्लेषण) & Protection issue (सुरक्षा समस्या):

Sequence of Events:

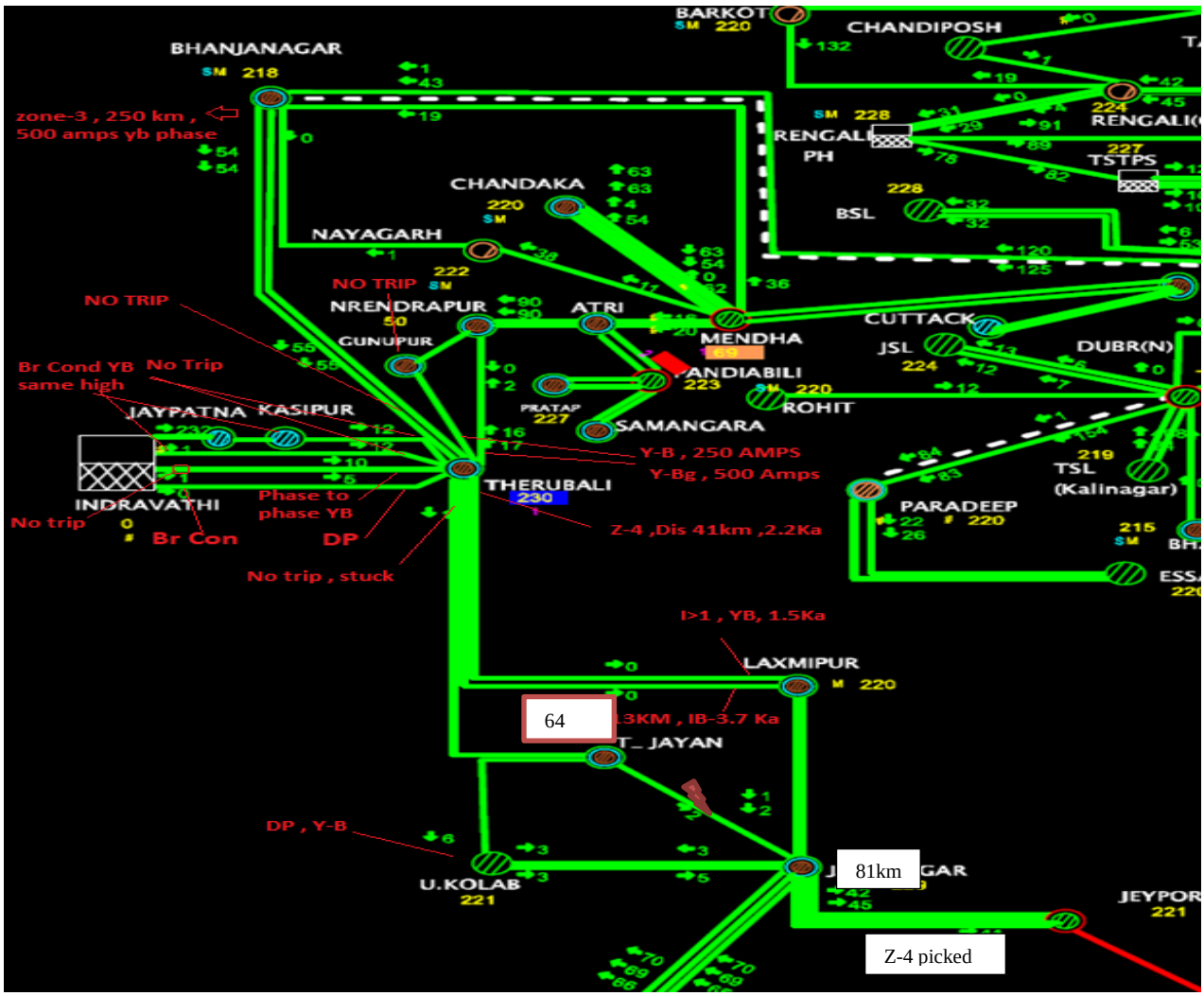
- T+0: B_ph fault struck 220 kV Therubali-Laxmipur-2 and B_ph CB opened from Laxmipur end
- T+620 msec: Another fault struck Y_ph of the line, however, at this instance only Y_ph breaker tripped at Laxmipur instead of three phase.
- T+1000 msec: Three phase A/r attempt of 220 kV Therubali-Laxmipur-2 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.

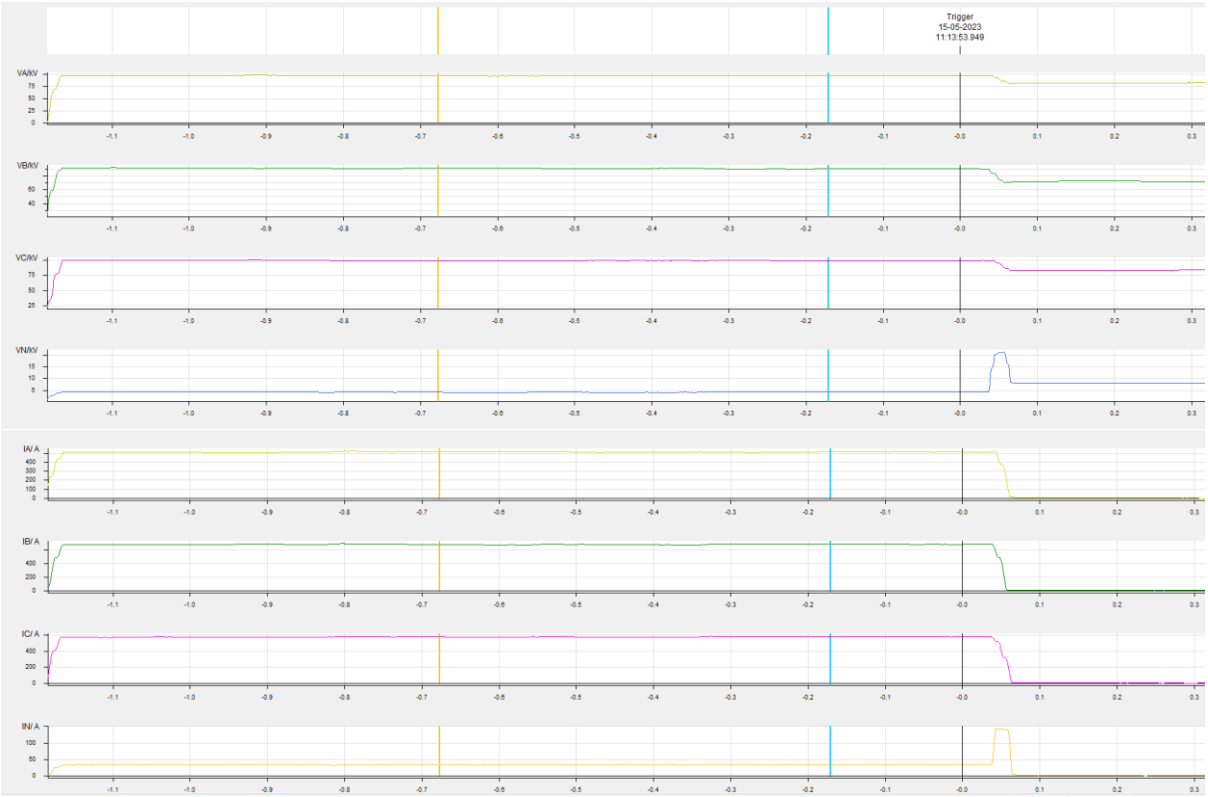
At Therubali end, fault was not cleared due to non-tripping of its main & tie CB at Theruballi GSS end. It was found that the DC supply failed in its own CR panel due to blown control circuit fuse. On further checking, it was found that the spring charge indication bulb terminal shorted in its main CB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

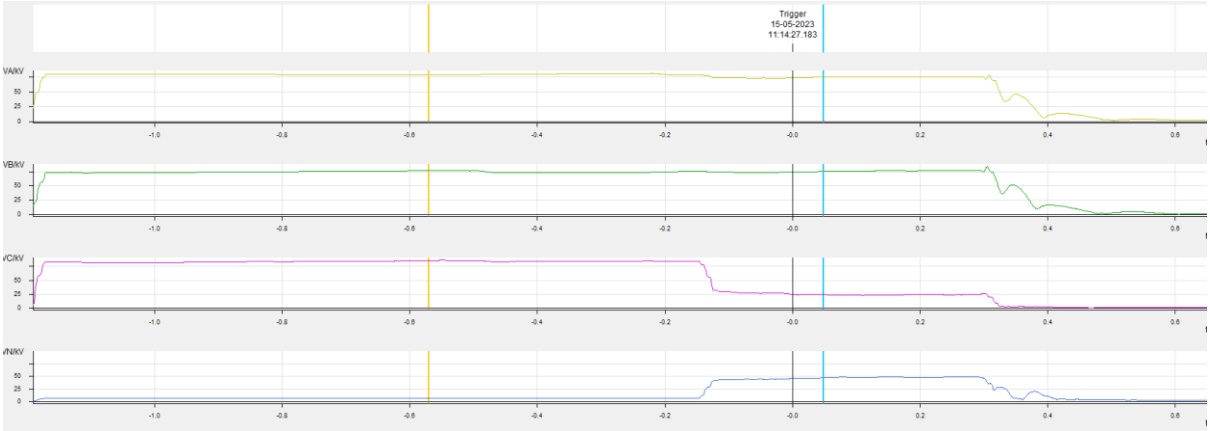
at Therubali end. Y phase converted to Y-B, sensing fault in zone-3 but dropped due to current reduction ,

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:

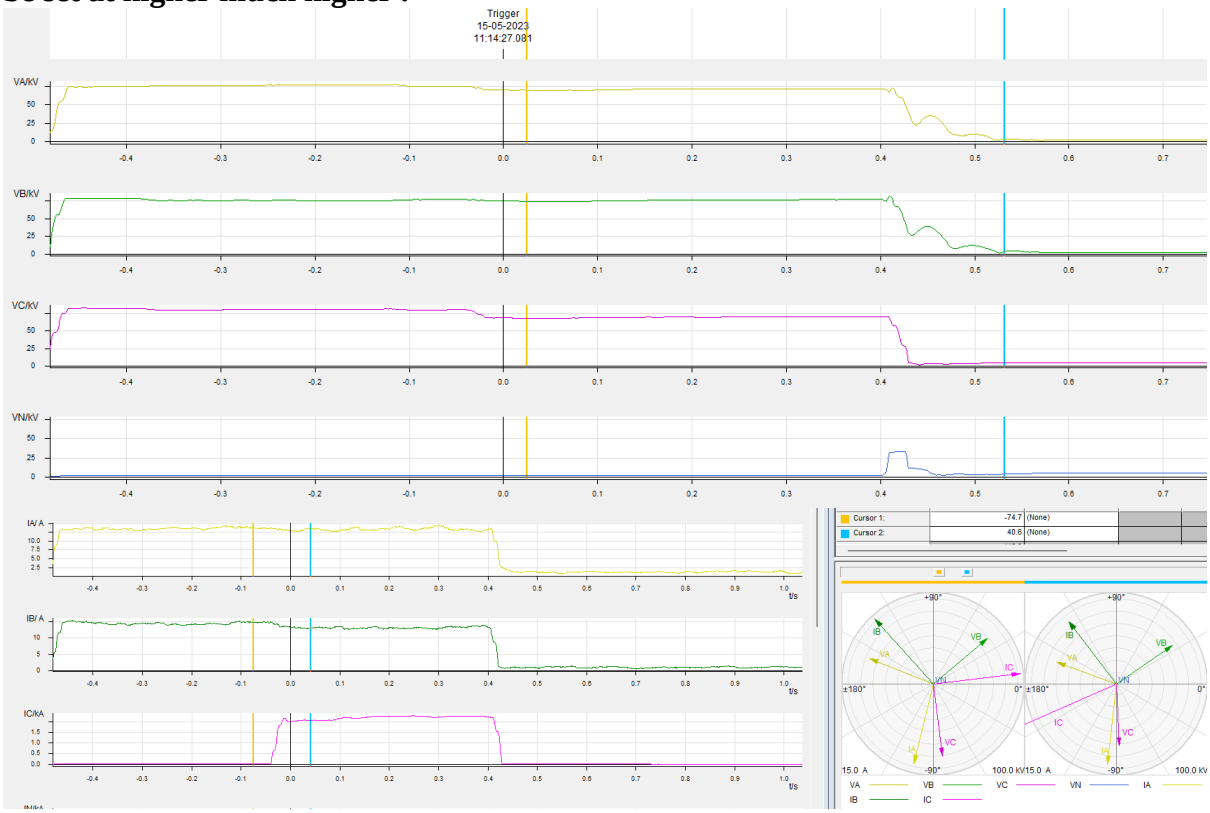
At Laxmipur end finally Line voltage became zero which means breaker also opened from Therubali end after 45 seconds.



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.

Annexure B.1.2

220KV SYSTEM DISTURBANCE REPORT

OPTCL
Lifeline of Odisha

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.

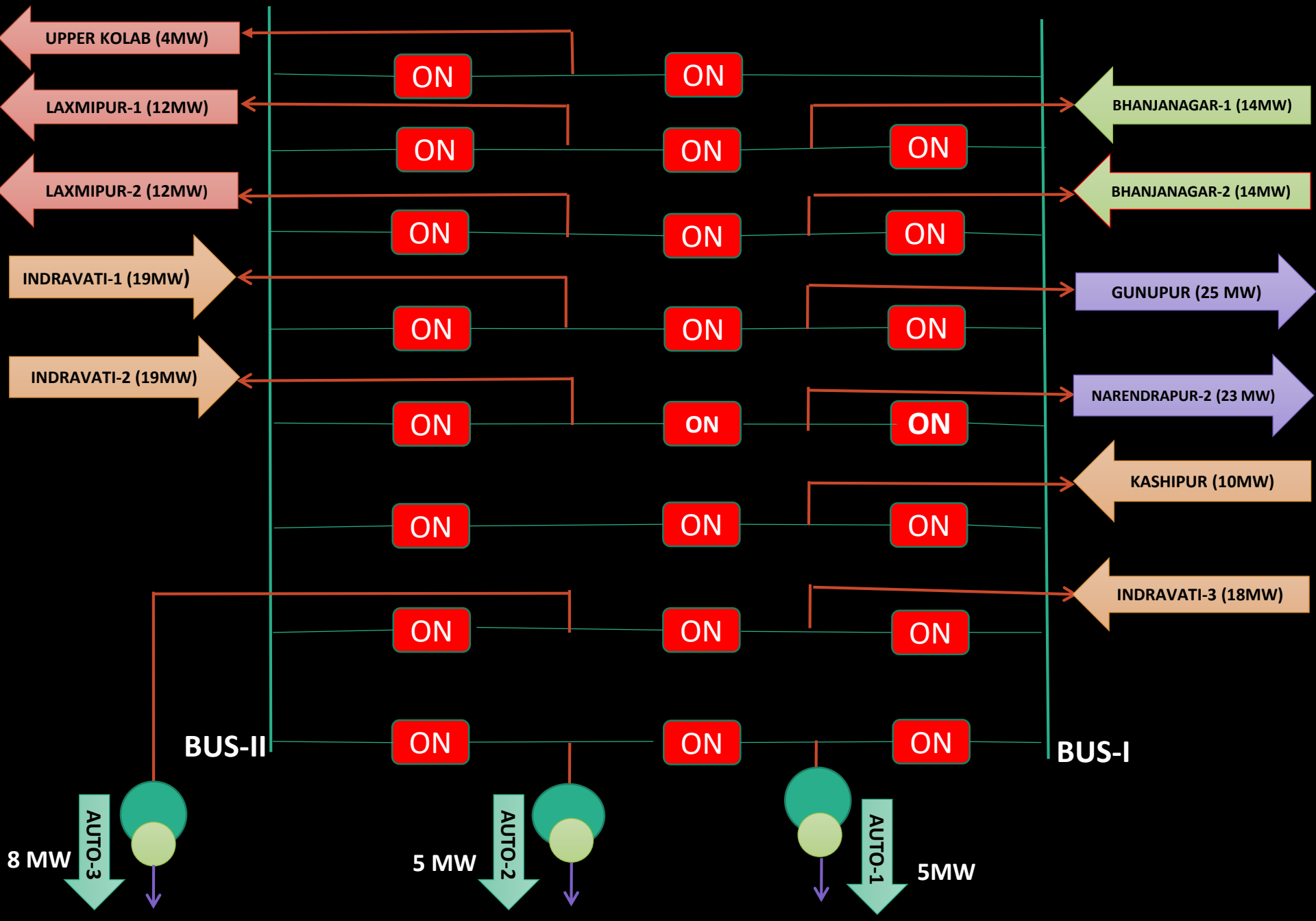
Bus-2: Upper Kolab, Laxmipur-1, Laxmipur-2, Indravati-1, Indravati-2, Auto-3 and Auto-2.

Weather Condition : Sunny

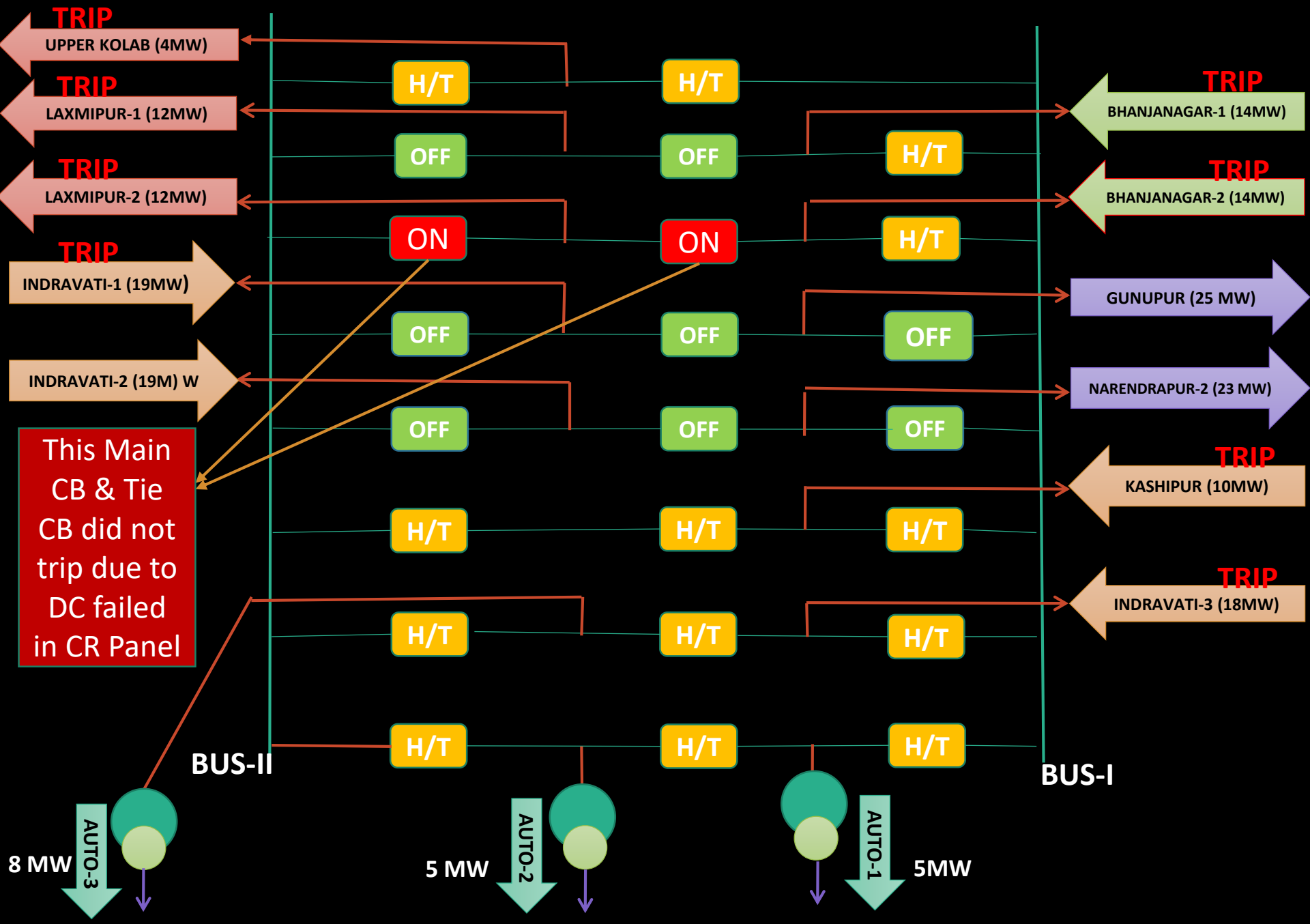
Pre-Fault Load Flow in 220KV bays :

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

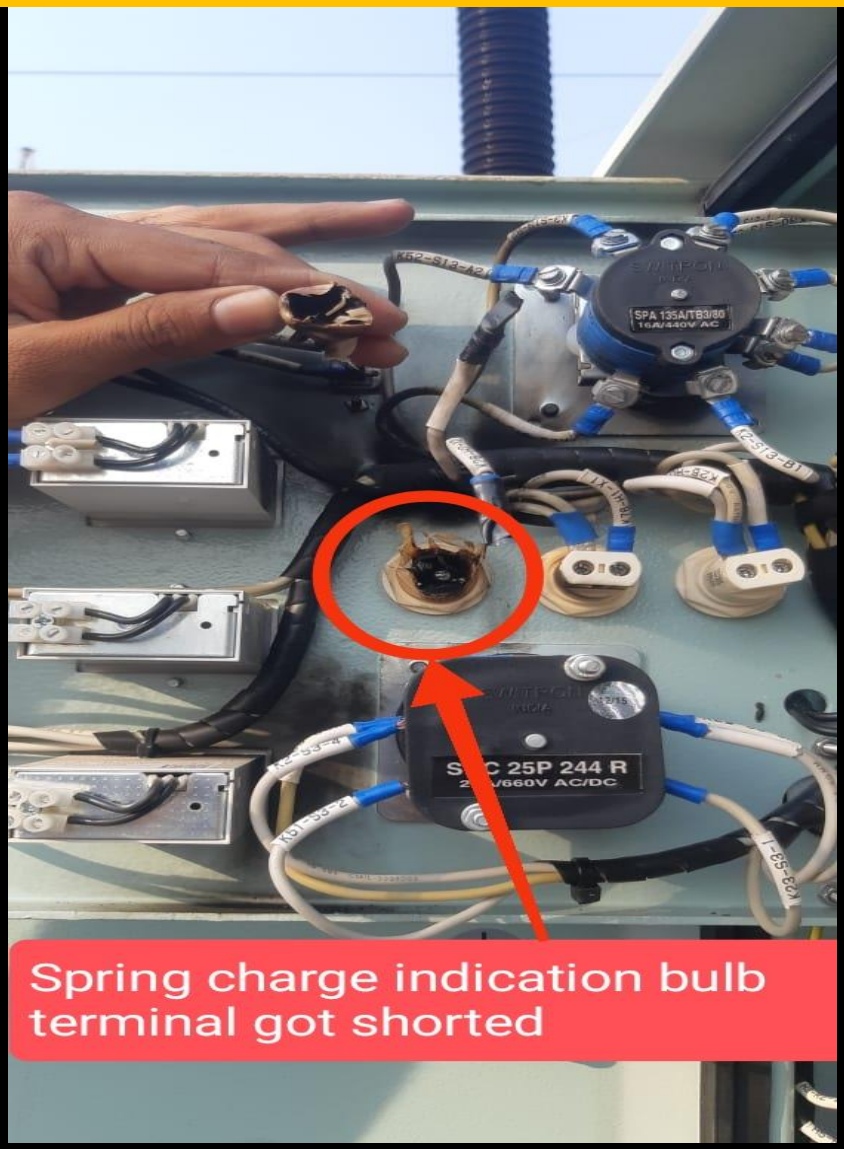
PRE FAULT LOAD PATTERN OF DIFFERENT 220KV FEEDERS



POST FAULT CONDITION



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



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	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

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

ग्रिड-इंडिया GRID-INDIA
ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
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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: **18-05-2023/1** 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 14:08 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 है):

- NIL

Major elements tripped (प्रमुख ट्रिपिंग):

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

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

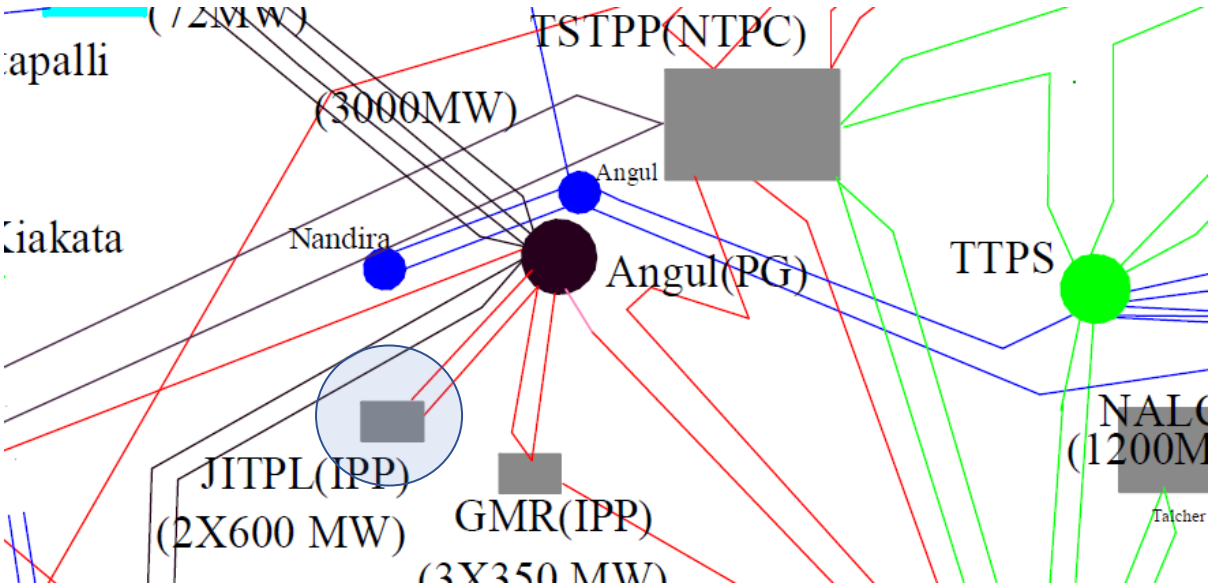


Figure 1: Network across the affected area

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	-	

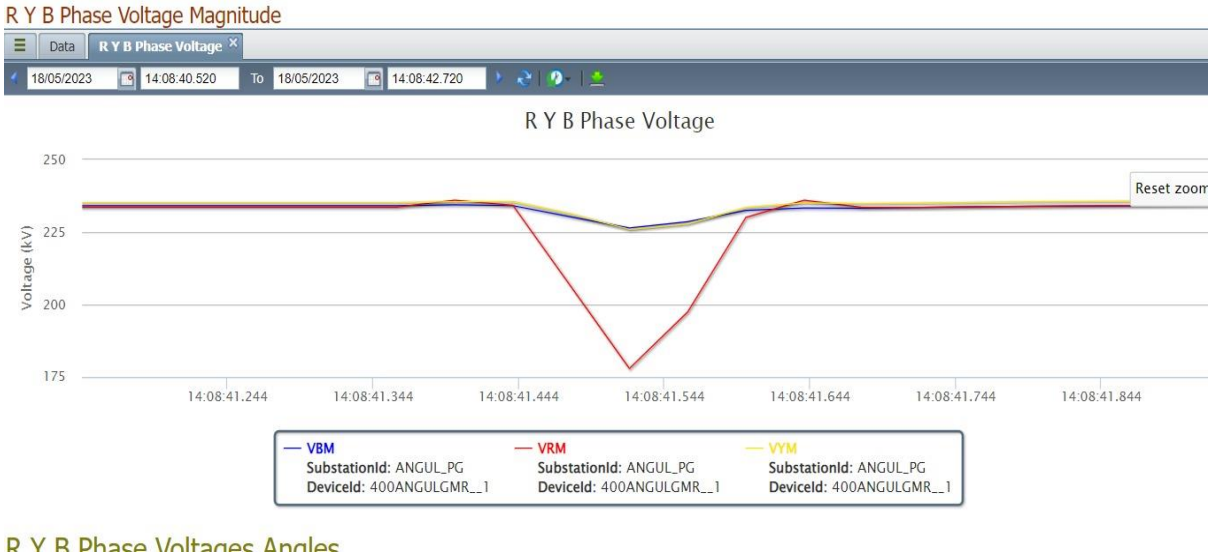


Figure 2: PMU snapshot of 765/400 kV Angul S/s

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):

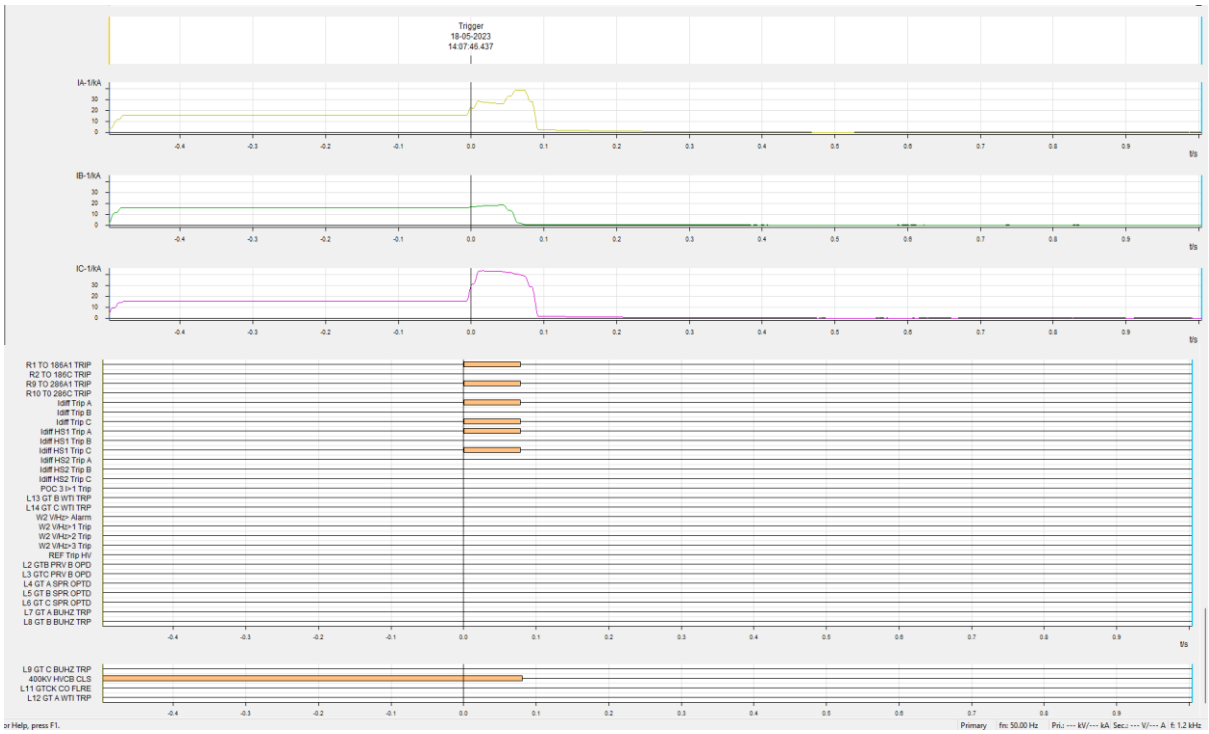
- DR/EL received from JITPL.

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



Annexure-3: Report from 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.

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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		

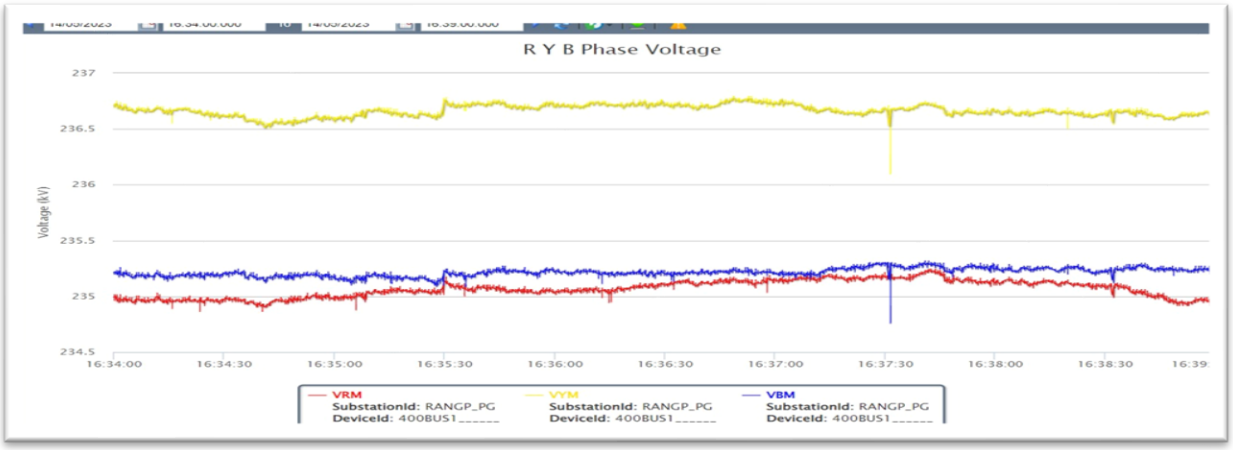


Figure 1: PMU Voltage snapshot of 400/220 kV Rangpo S/s

Restoration (पूर्वावस्था की प्राप्ति)

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)

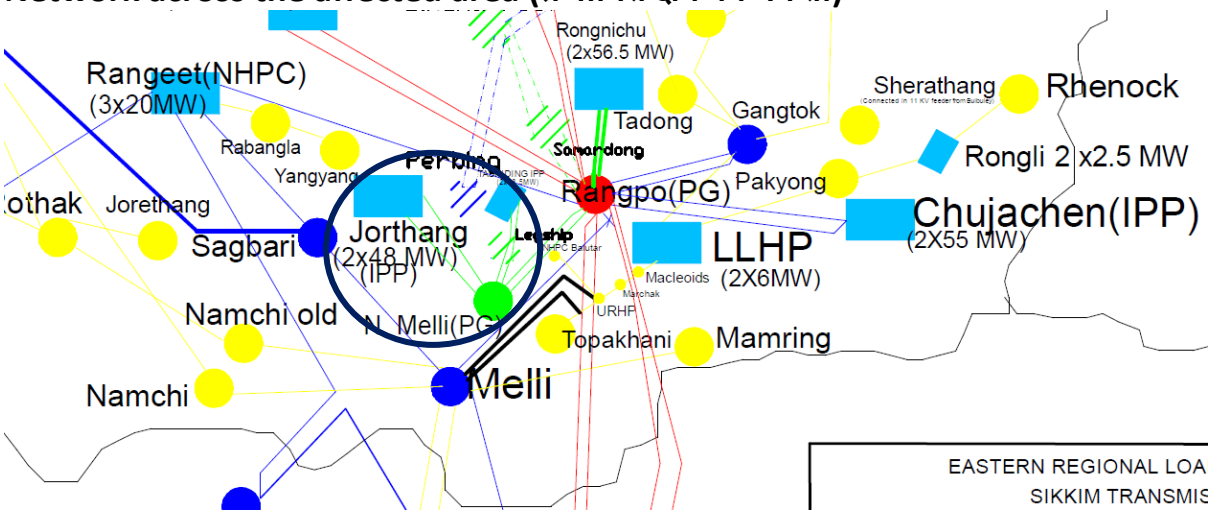


Figure 2: Network across the affected area

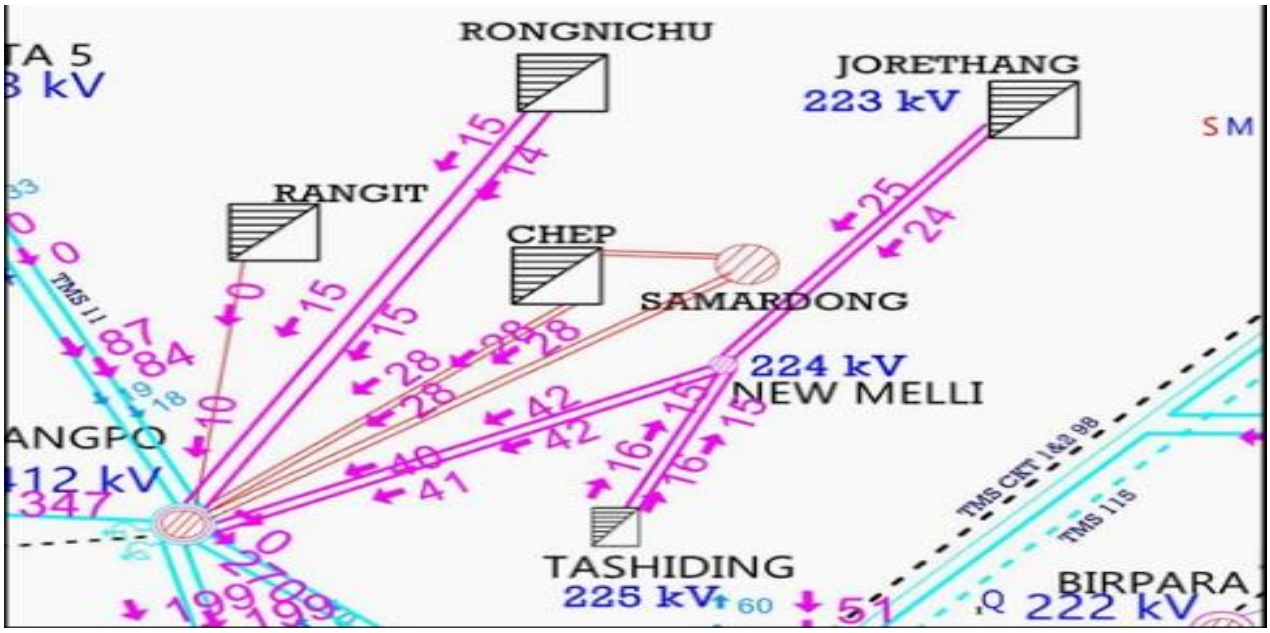


Figure 3: SCADA snapshot of the affected area

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):

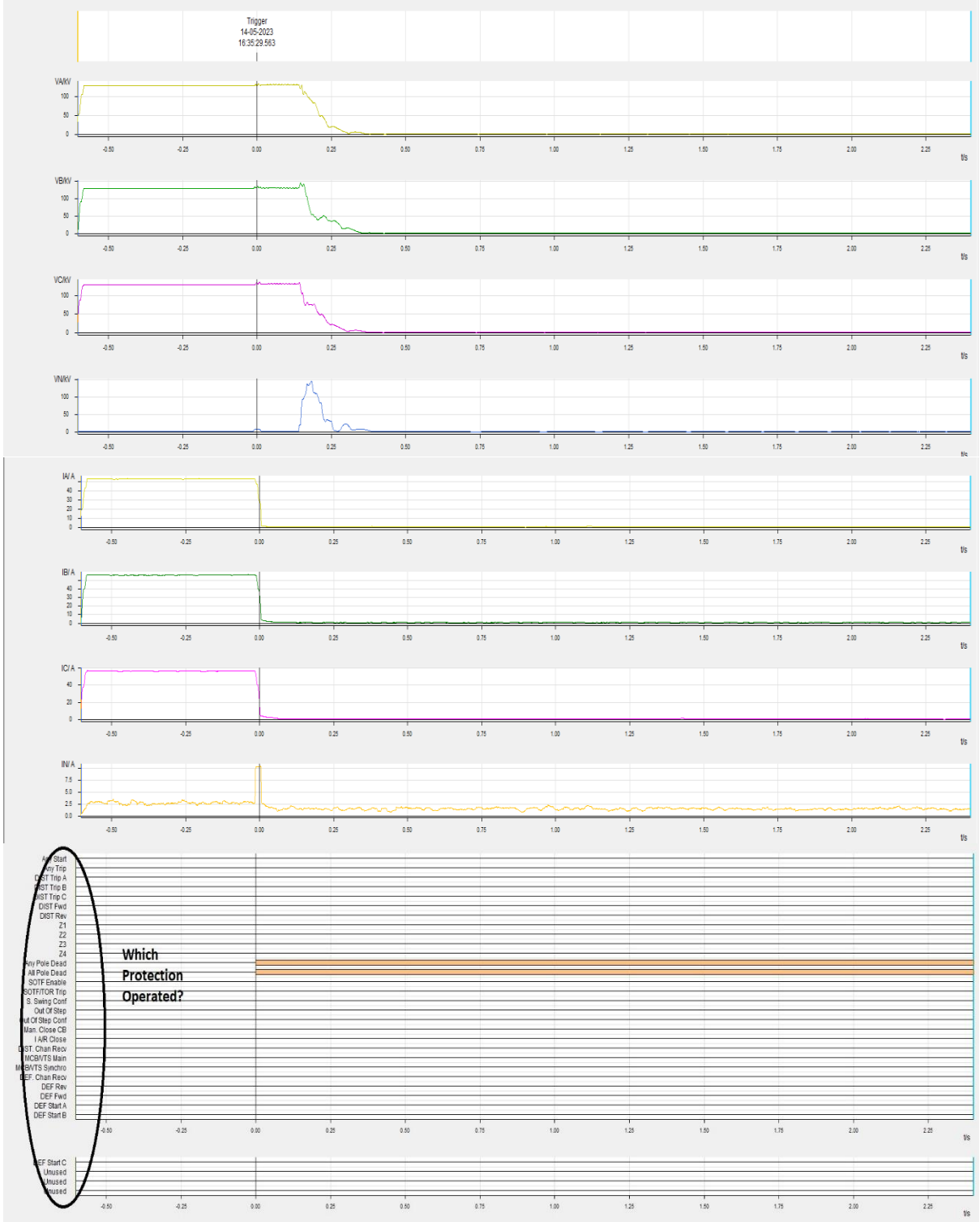
- DR/EL received from Jorethang.

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)



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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 है):

- 220 kV Daltonganj-Latehar-1

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Daltonganj-Chatra-1

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

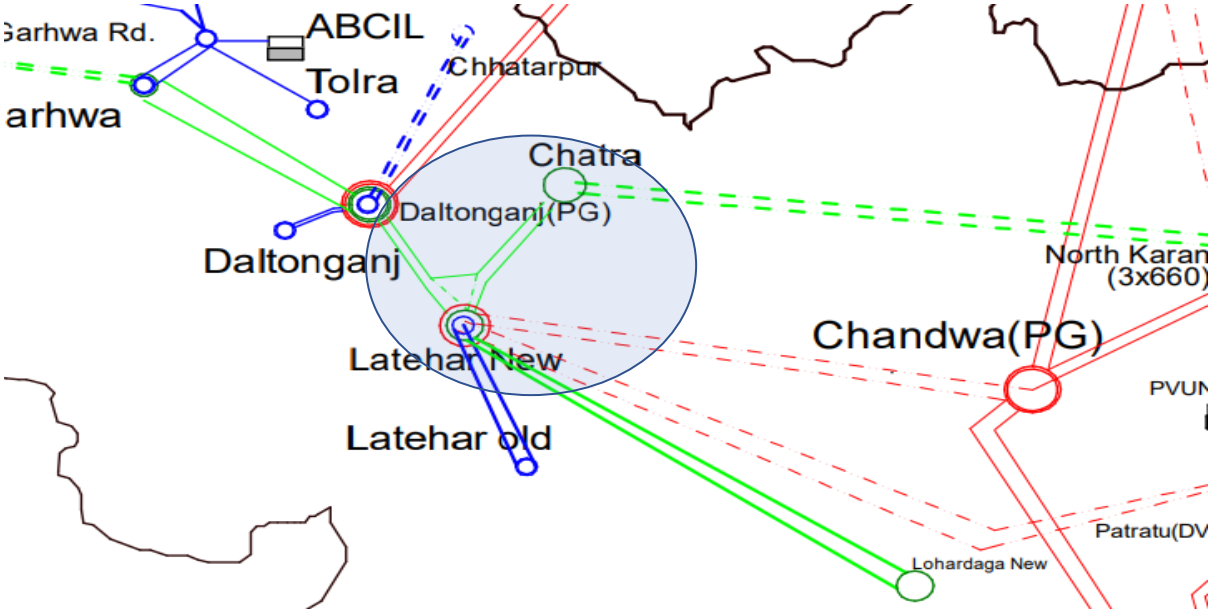


Figure 1: Network across the affected area

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

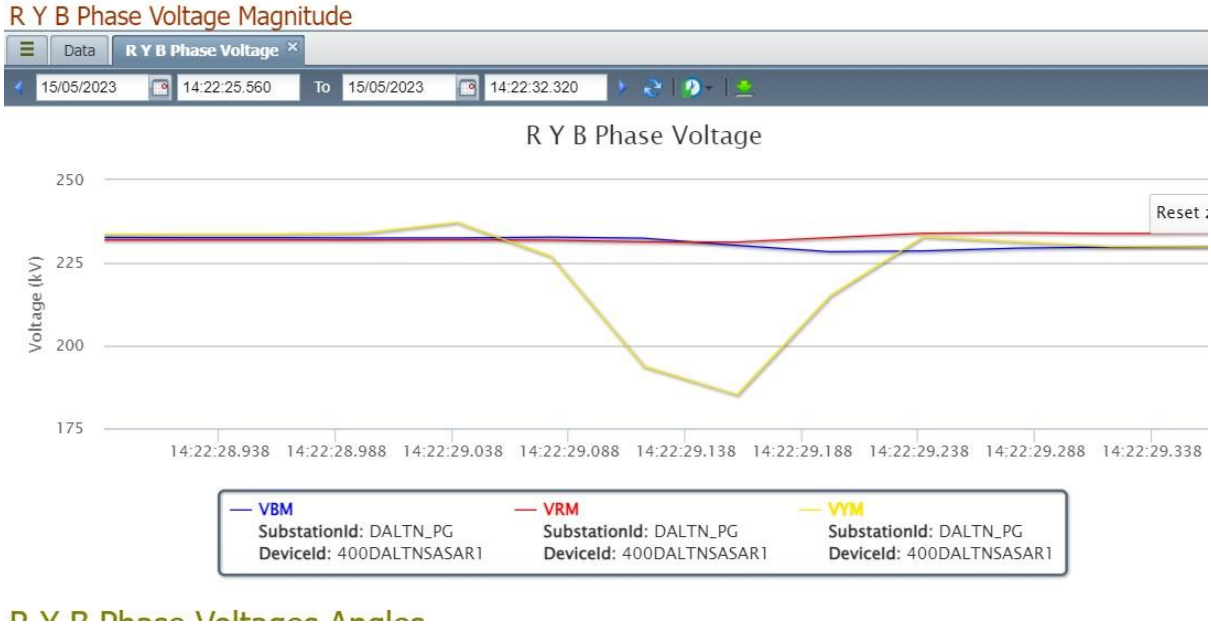


Figure 2: PMU snapshot of 400/220 kV Daltonganj S/s

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**

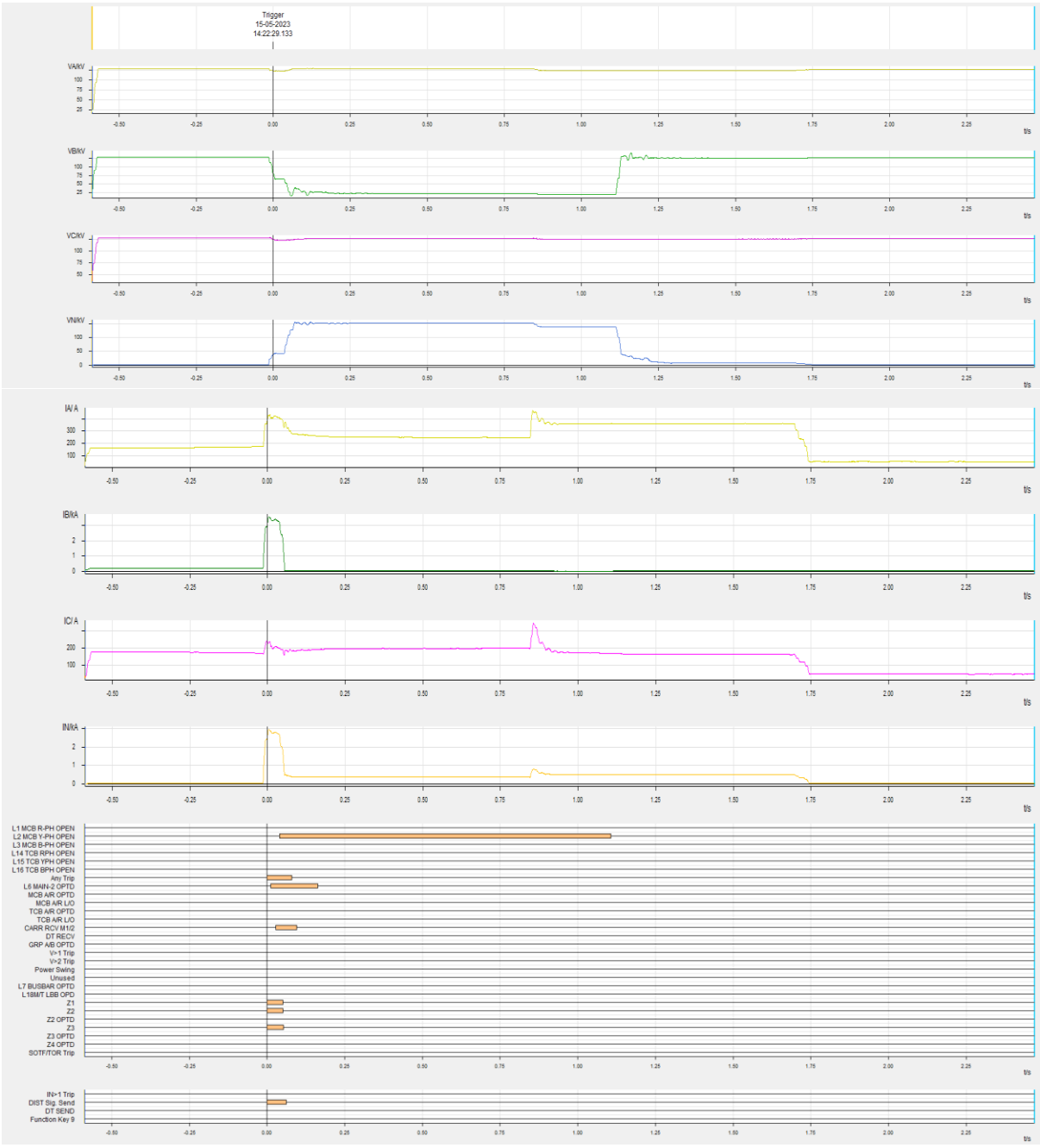
Status of Reporting (रिपोर्टिंग की स्थिति):

- 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.

Annexure 2: DR recorded

DR of 220 kV Daltonganj-Chatra (Daltonganj)



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, टालिगंज, 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: **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 है):

- 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)

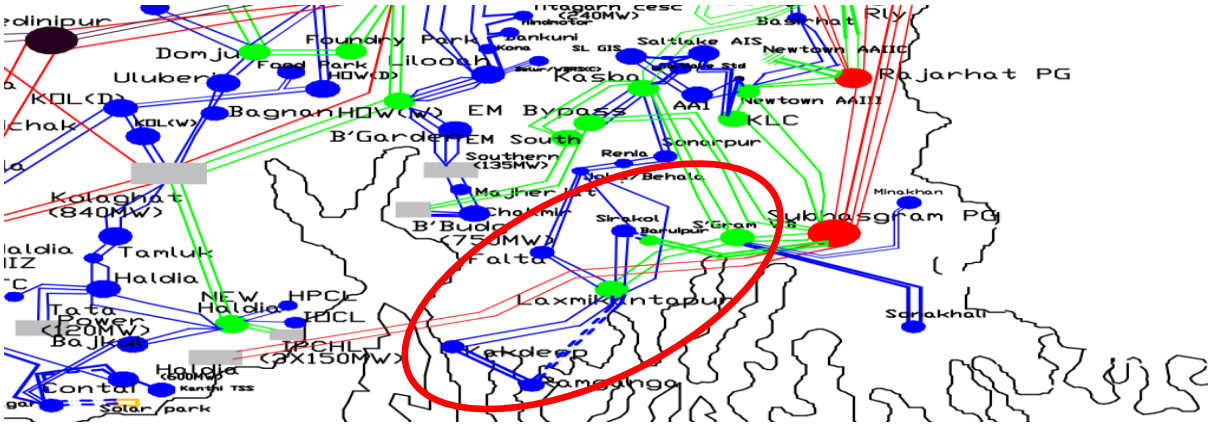


Figure 1: Network across the affected area

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 Subhahsgram-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)		-	

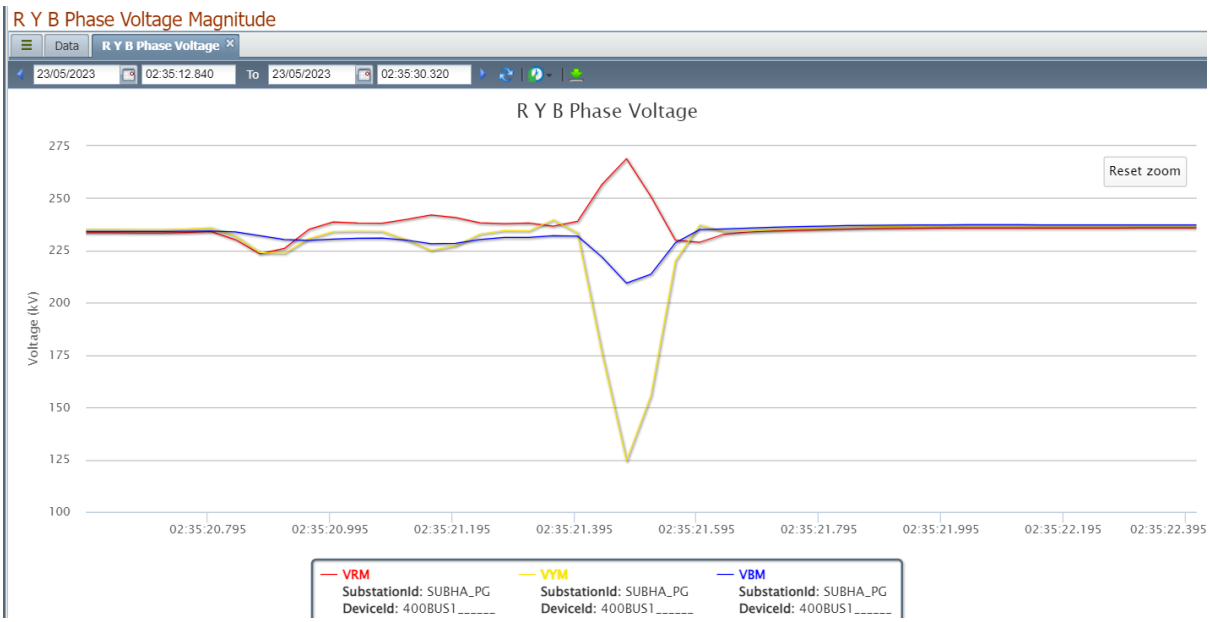


Figure 1: PMU Voltage snapshot of 400/220 kV Subhashgram S/s

- **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 Subhshgram-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-Lakshmkantpur-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 then 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.

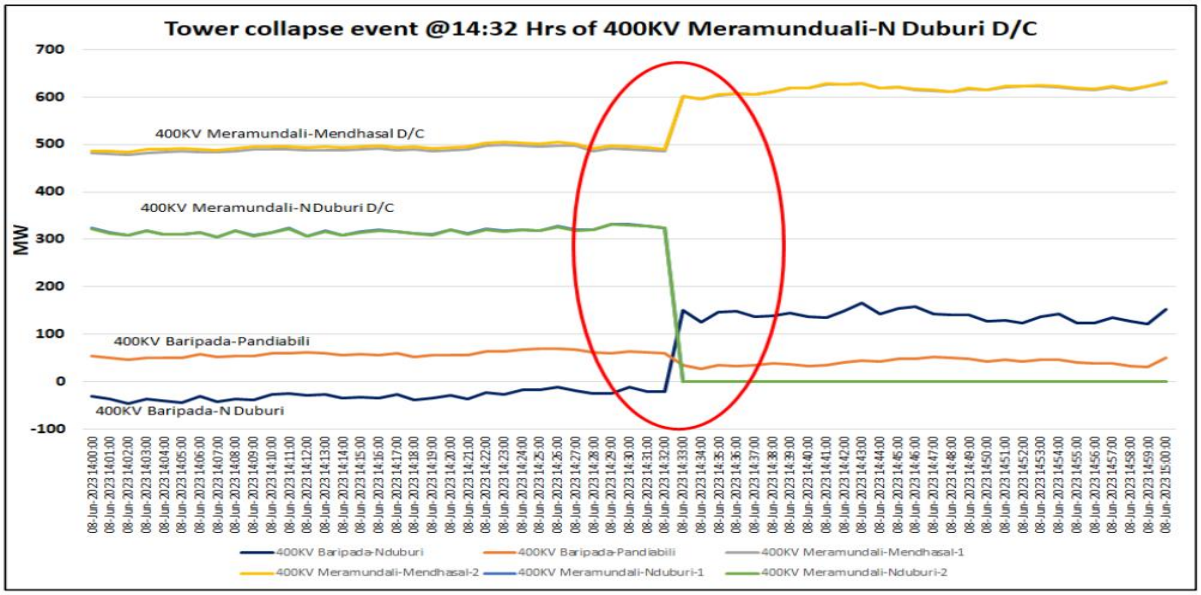
Annexure 2: DR recorded

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 collpae

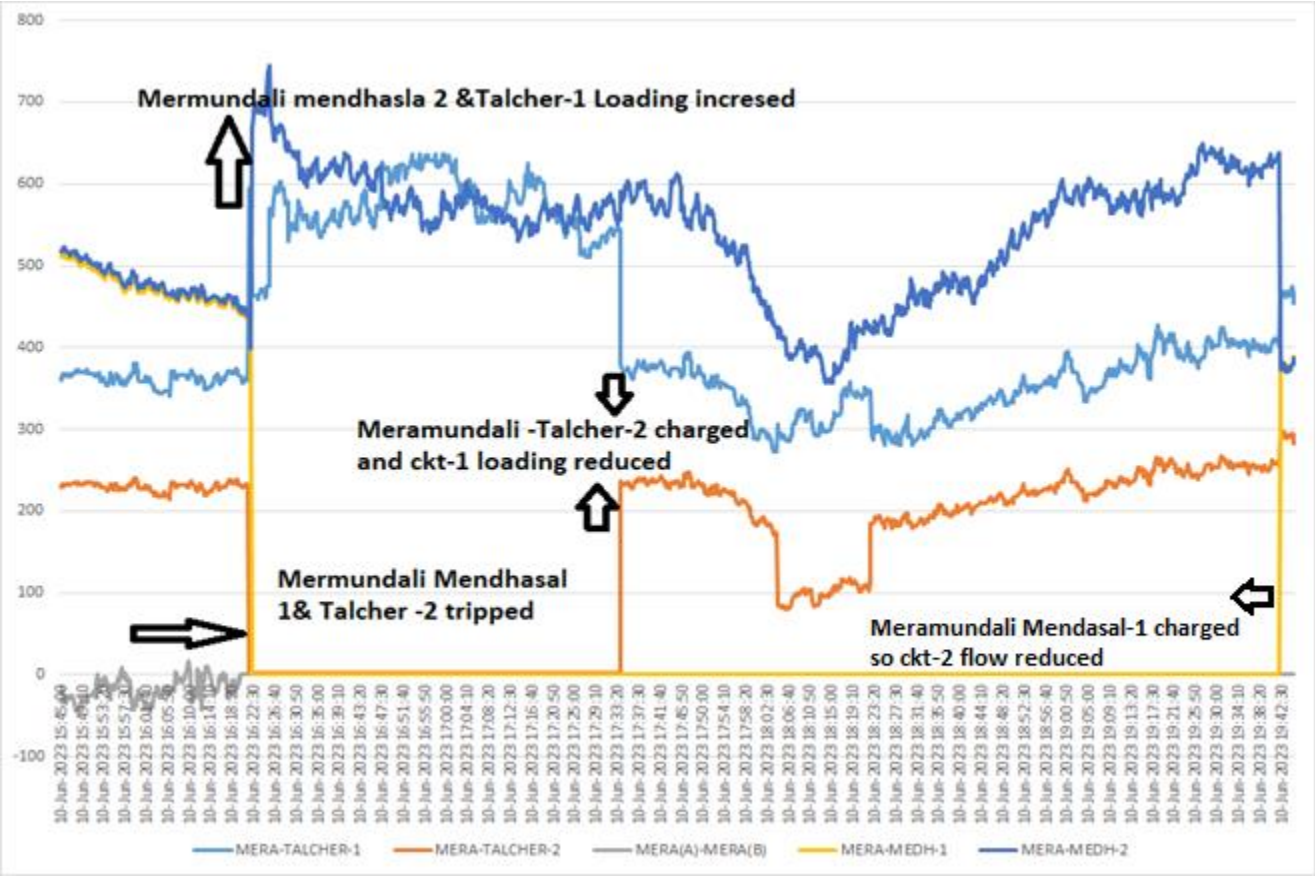
From below scada it is evident as New dubri D/C tripped , it lead to increase in loading of Meramundali -Mendhasal D/C as power was wheeling from meramundali to mendhasal and then to New dubri. Also it was violating N-1 during High demand period .

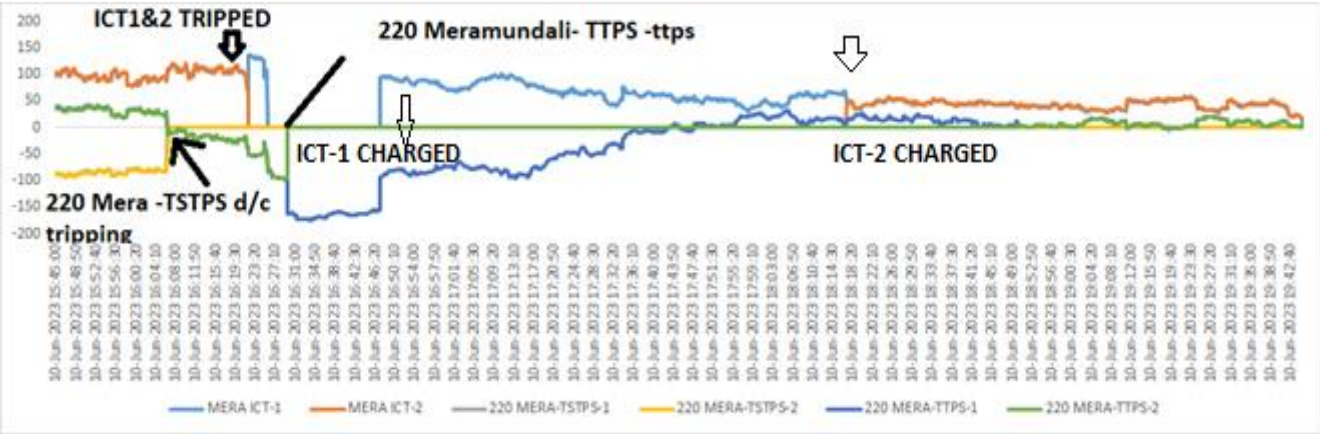


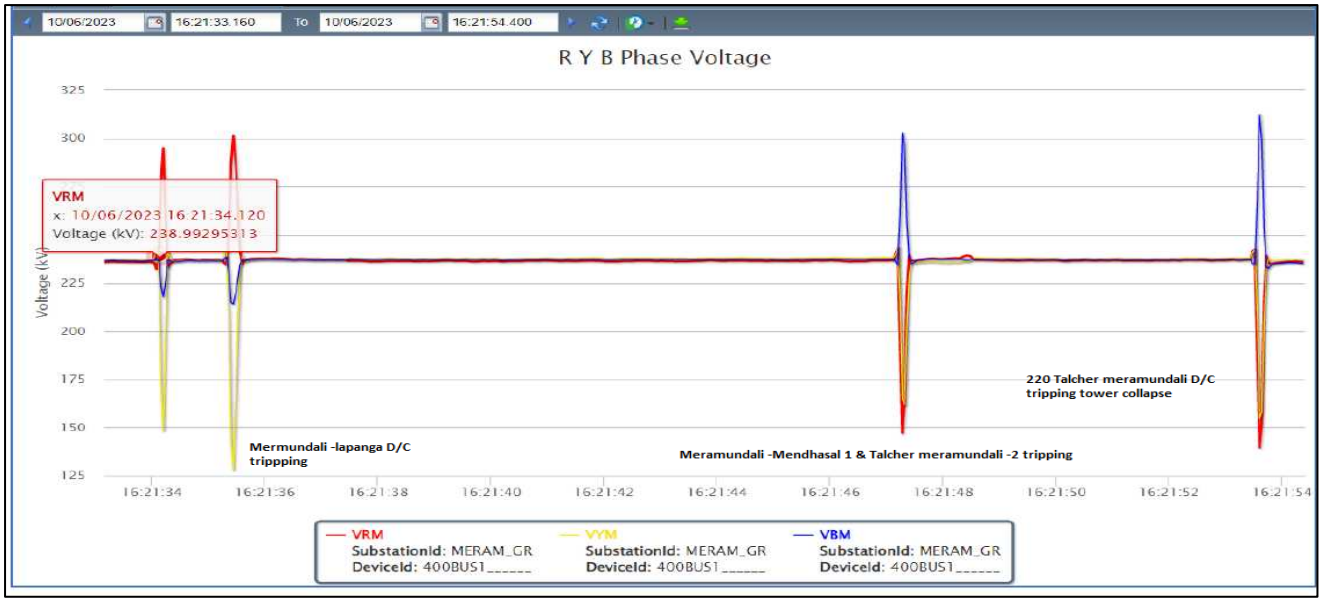
Event 2(10th June at 16:21 Hrs) :-

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

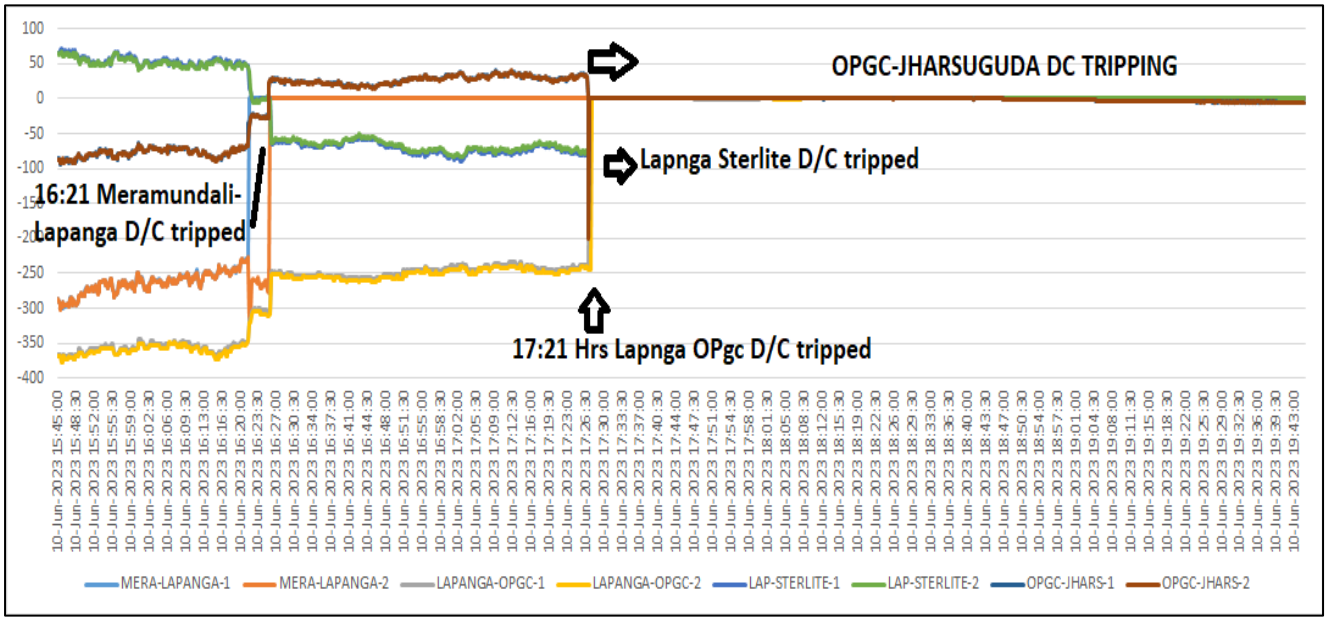


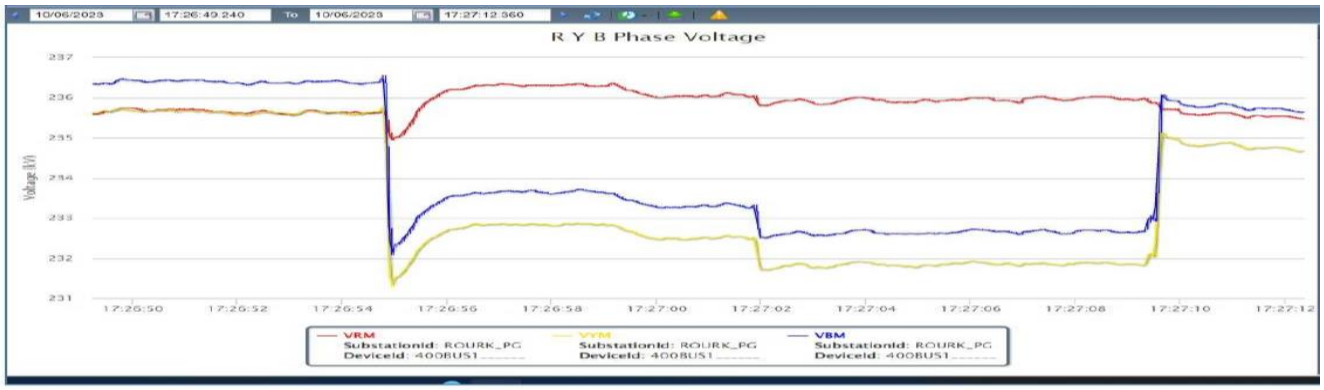




Event 3(10th June at 17:27 Hrs) :-

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.

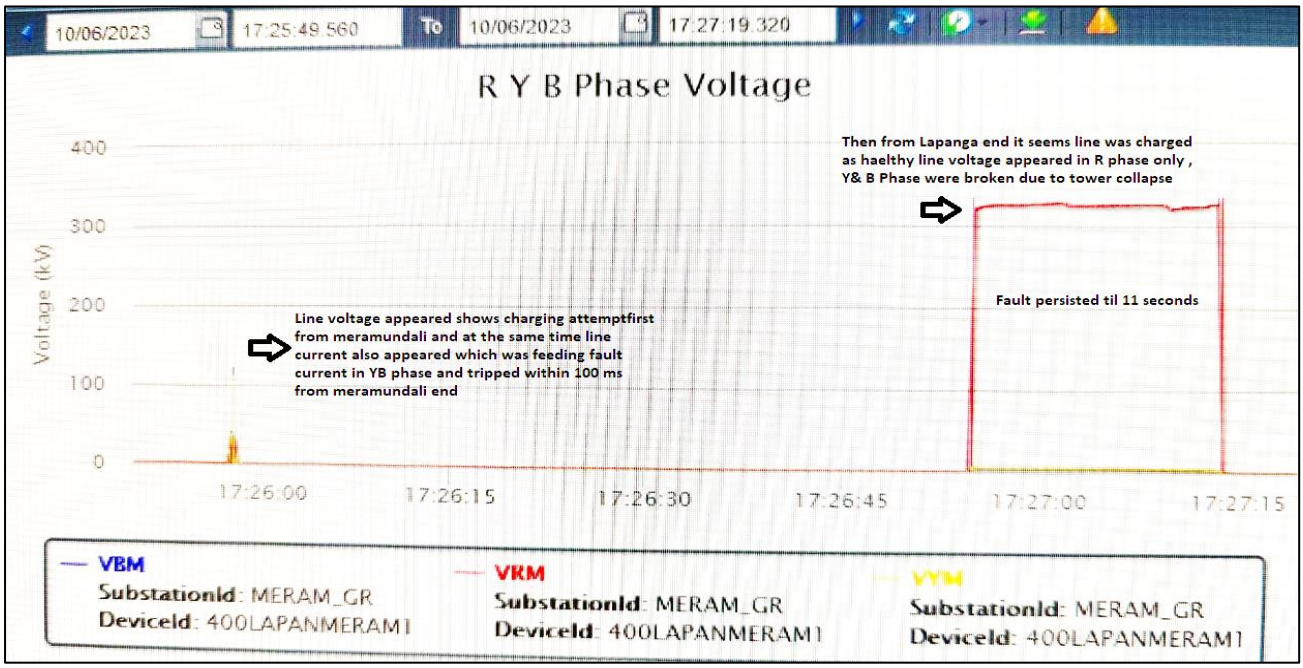


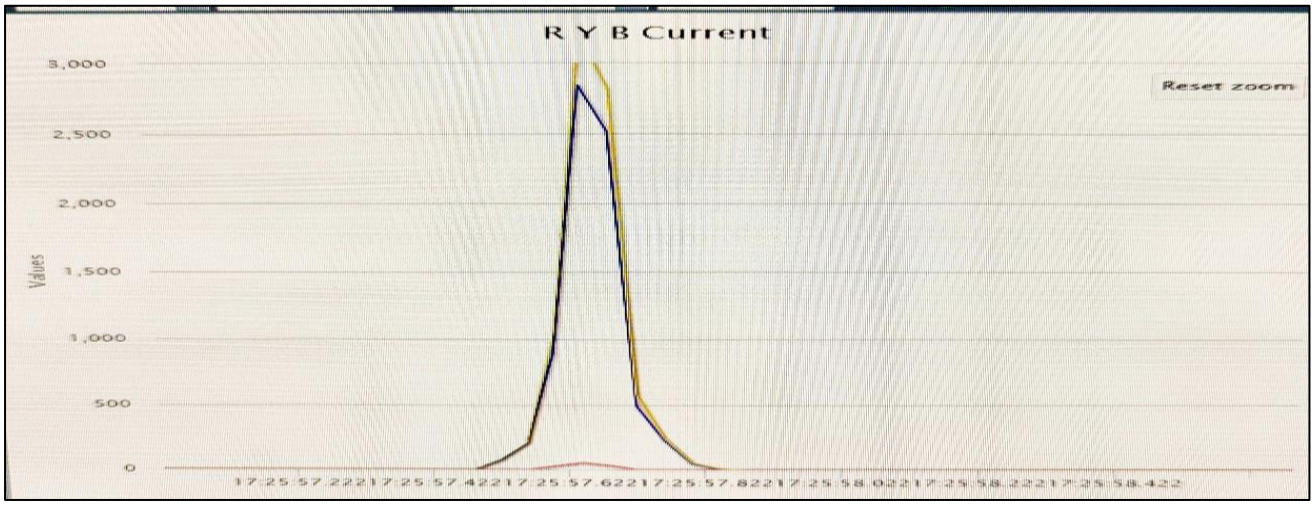


Lapanga and OPGC became dead with above tripping.

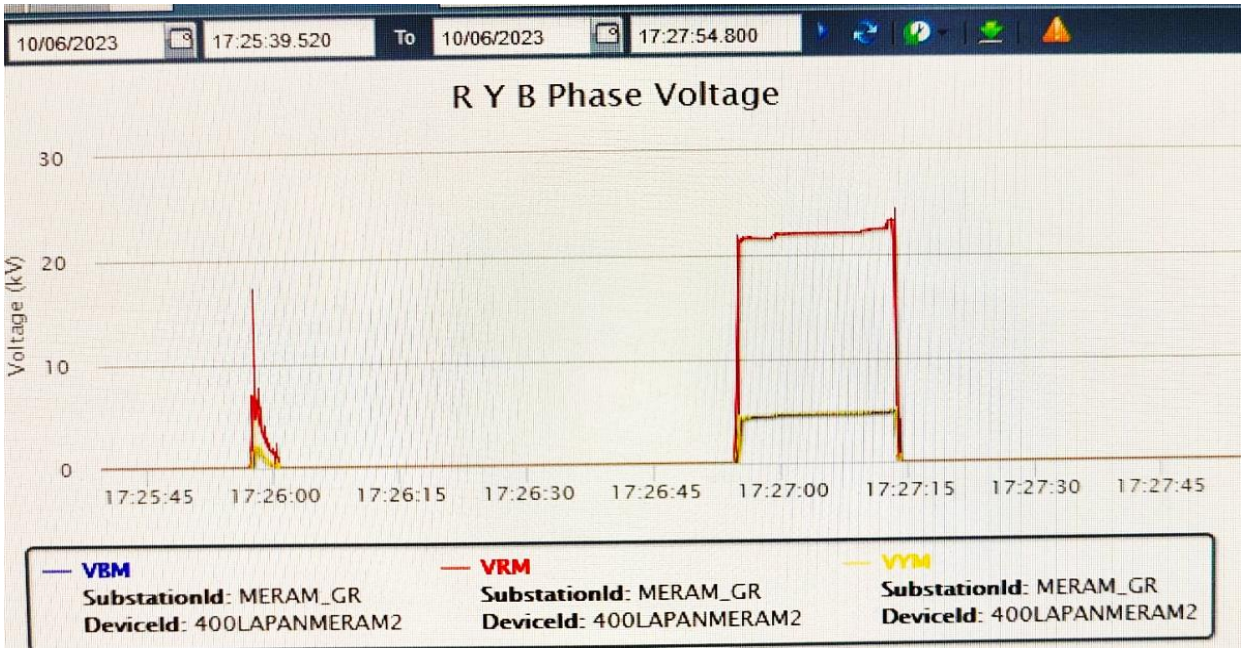
Finding:

- **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 .



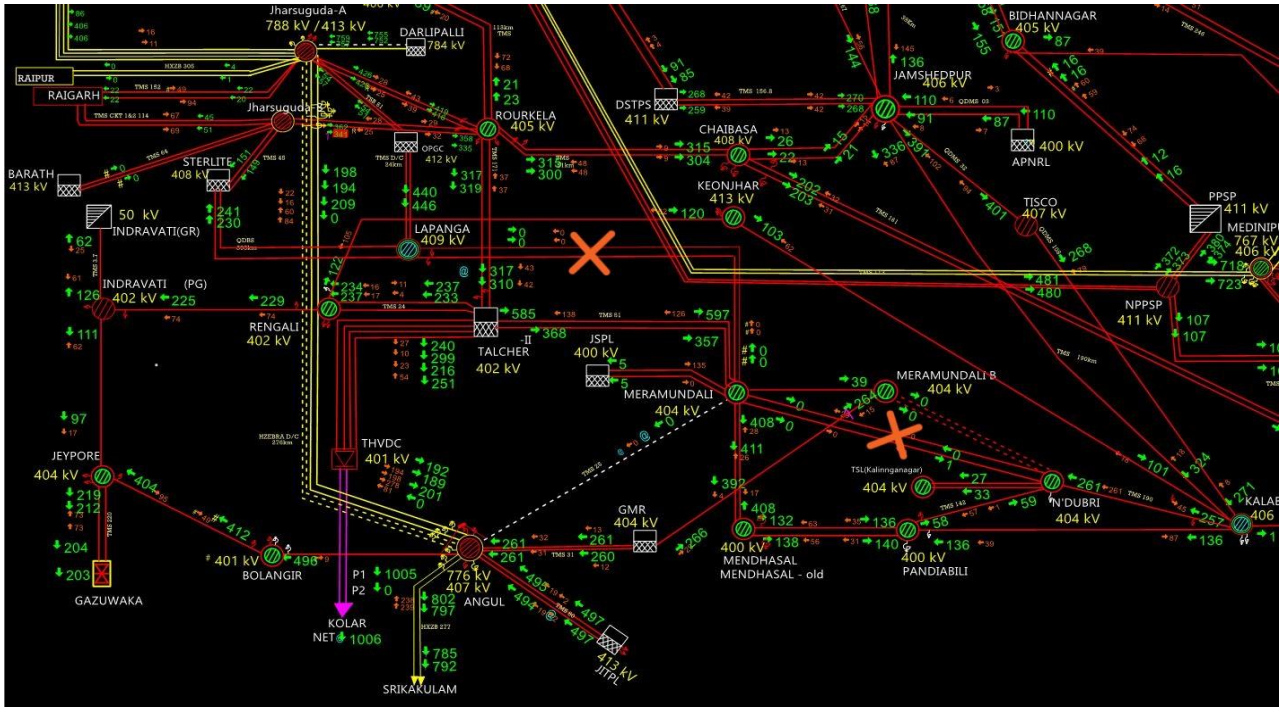


Induced voltage in circuit -2 as shown below also indicates the same .



Currently Under Outage:

Transmission/Generation element name संचरण लाइन / वधुत उत्पादन इकाईं का नाम	Trip Date बंद होने की ति थ	Trip Time बंद होने का समय	Restoration Date वापस आने की ति थ
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)

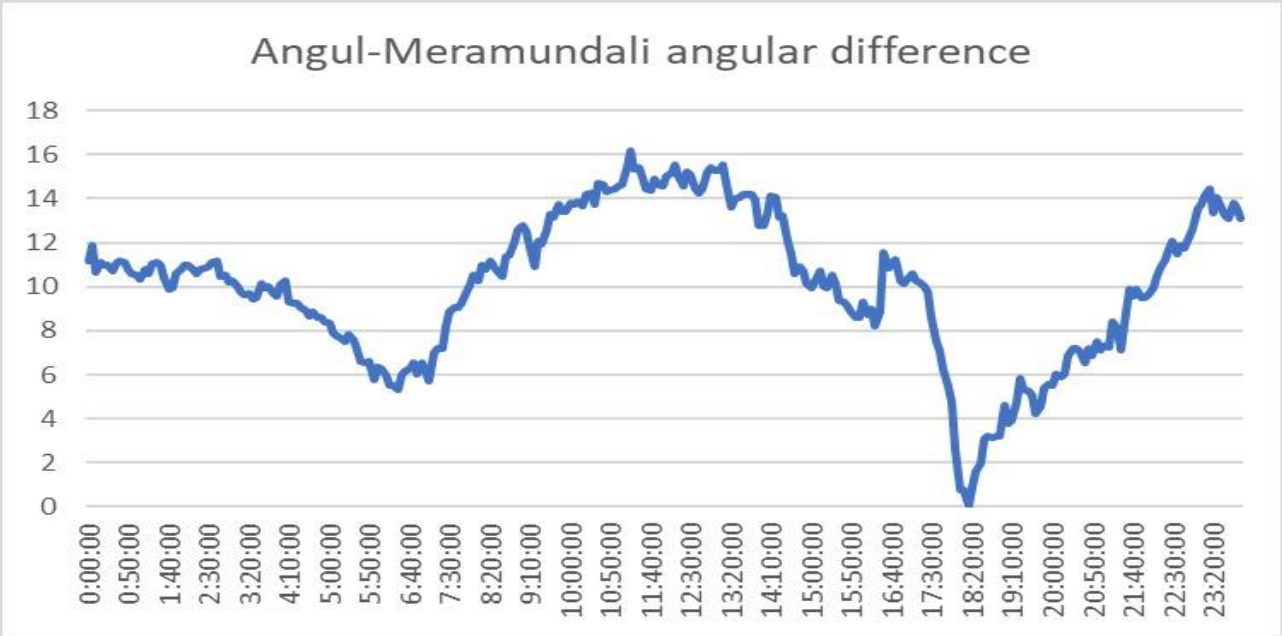


Due to Outage of Lapanga -Meramundali D/C and Meramundali -New Dubri D/C ,Meramundali was connected via only Talcher D/C hence to increase the reliability of Meramundali and nearby load centres , Docking of Talcher Meramundali at Angul .

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)

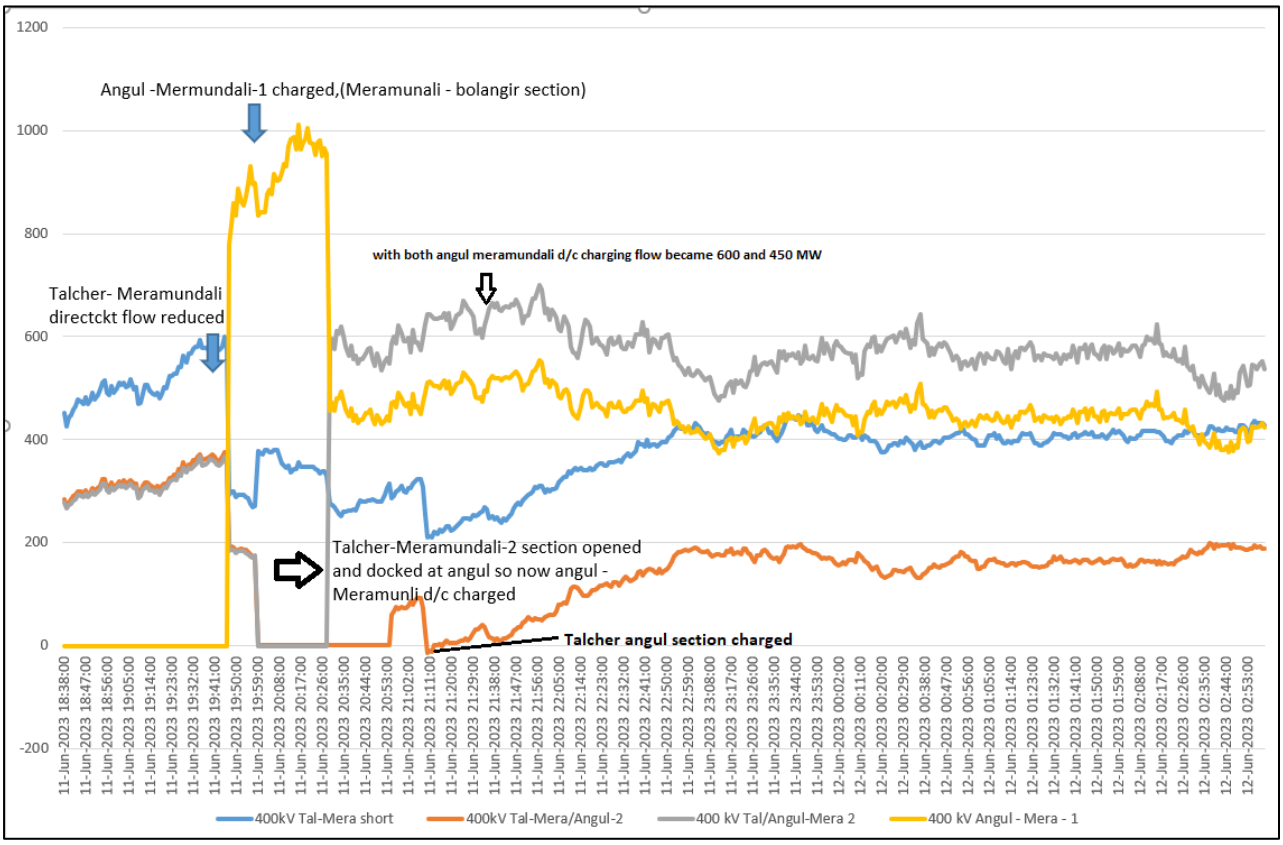
So based on previous day (10 June) angular separation plot it was decided to close angul-meramundali (Docking) between 17:30 to 19:00 Hrs to limit the loading while closing the line .



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

- **For redcuing 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 ,



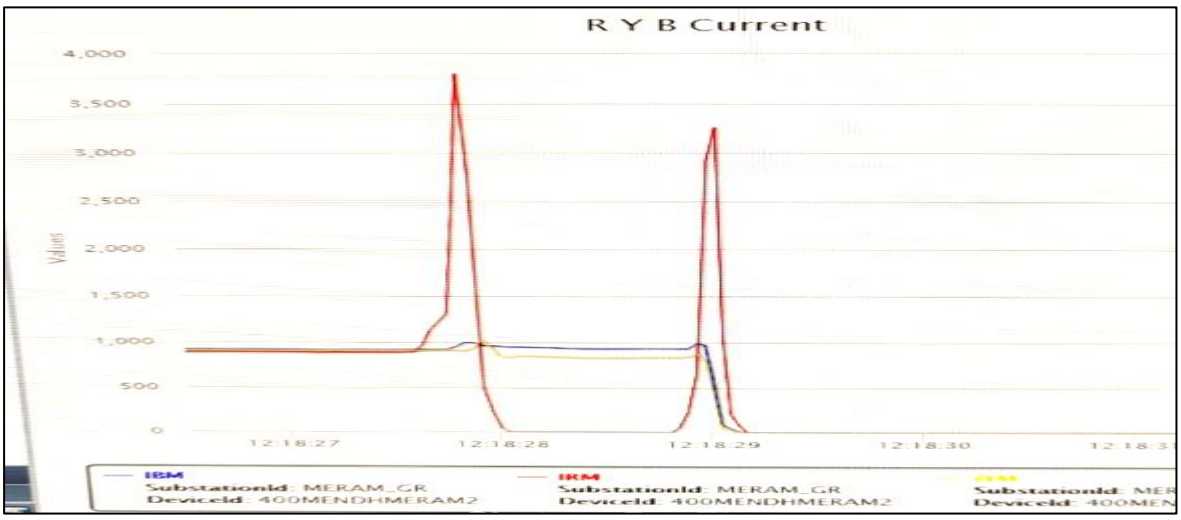
Current Situation:

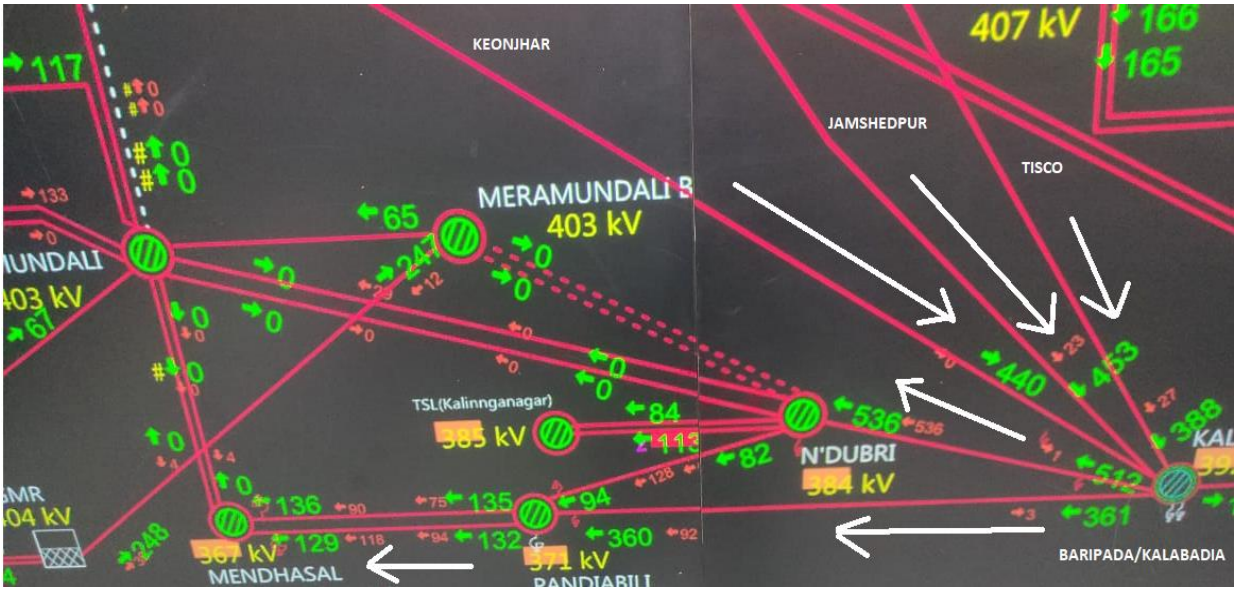
- With this configuration now Meramundali is being supplied by Angul & Talcher two sources.
- But Angul -Meramundali is not satisfying N-1 most of the times hence in-case of tripping of one circuit other circuit loading to be restricted upto 800 Mw .
- By reducing CPP drawl ,Load regulation
- Gazuwaka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

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 .
- Pandiabili -Mendhasal reversed flow from Pandibali to mendhasal to feed mendhasal load.250 MW Each which was intially taking power from Mendhasal.



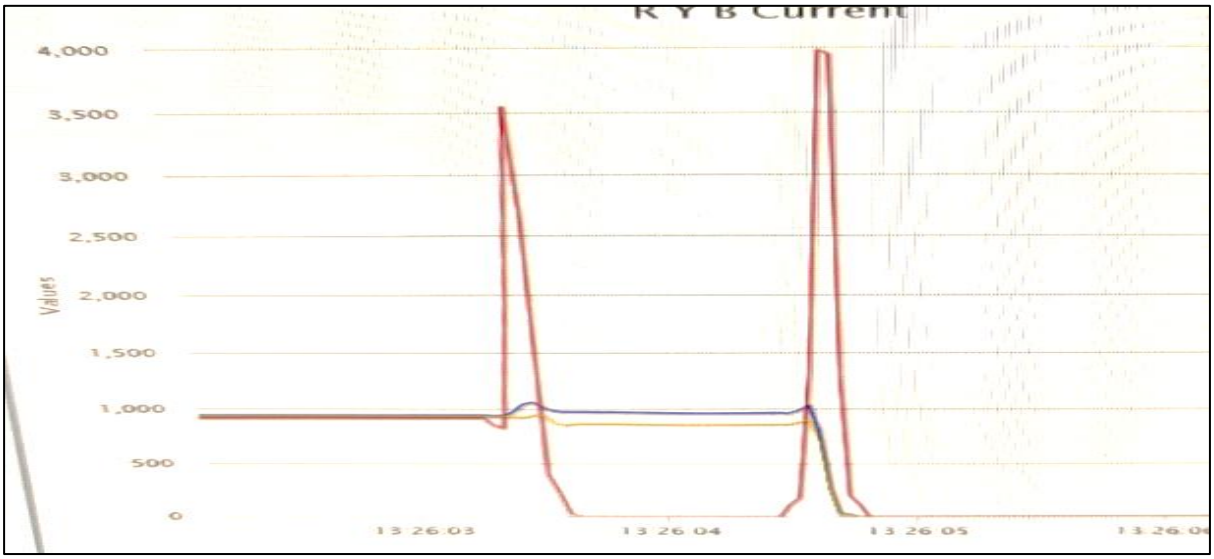


Event 2: 12:50 Hrs , restoration of Both circuits

- 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 .

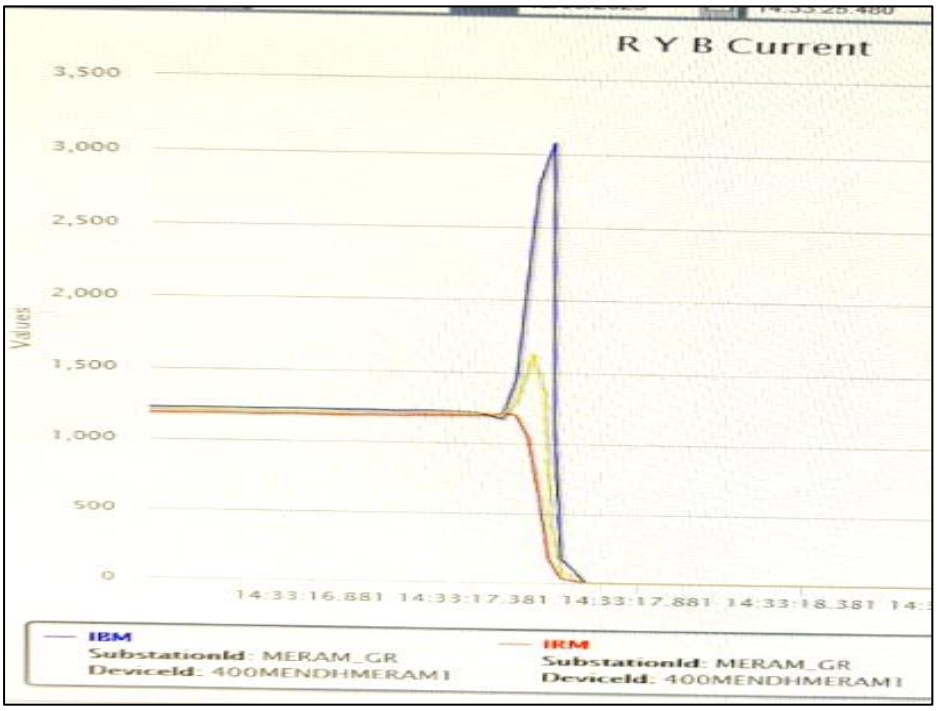


EVENT-4 , 13:52 Hrs ,Charging of Meramundali-Mendhasal -1

- SLDC Odhisha 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 triped within 2 Minutes.

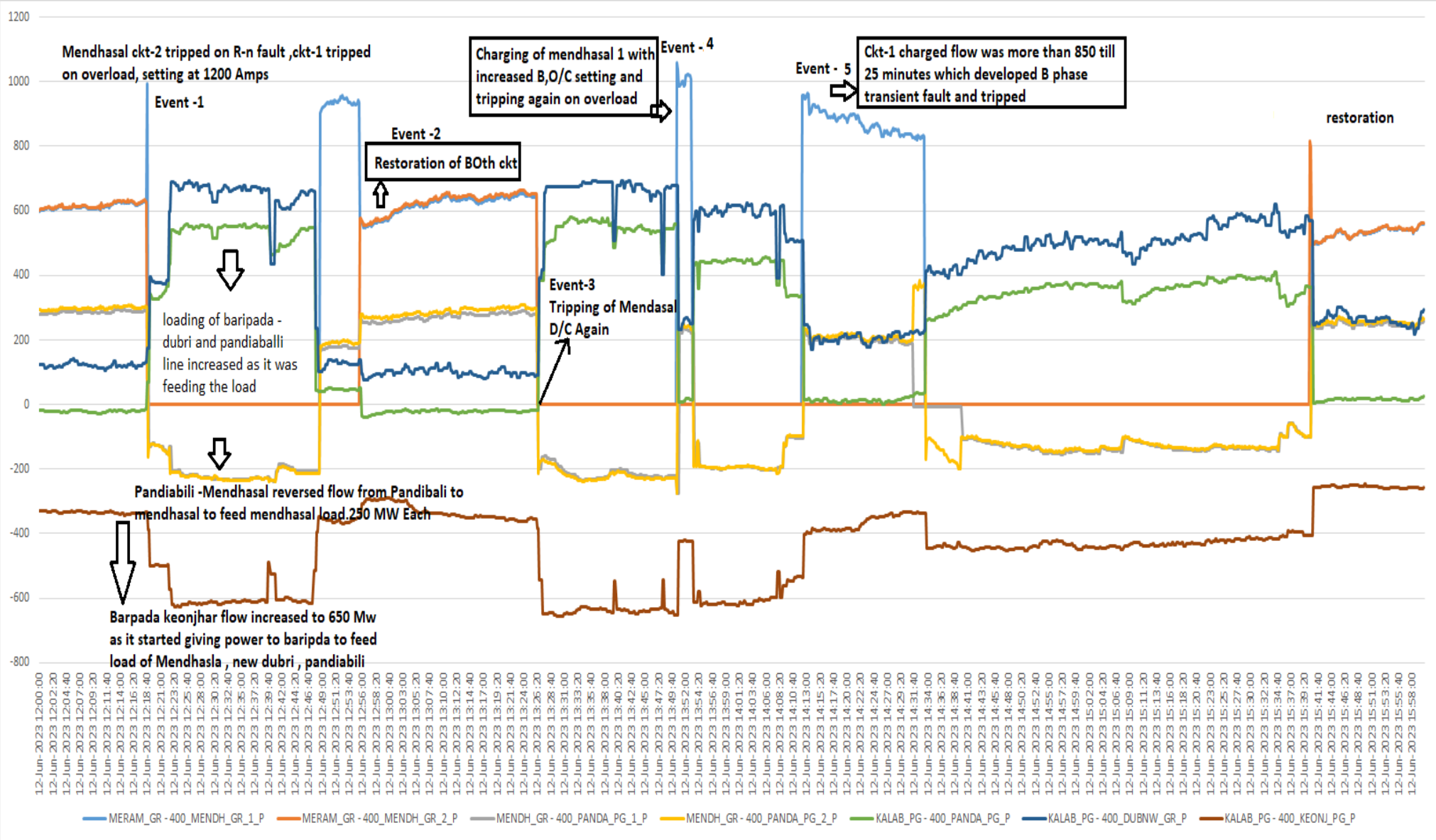
Event 5: at 14:13 Hrs Charging of Mendhasal-Meramundali -1 Again

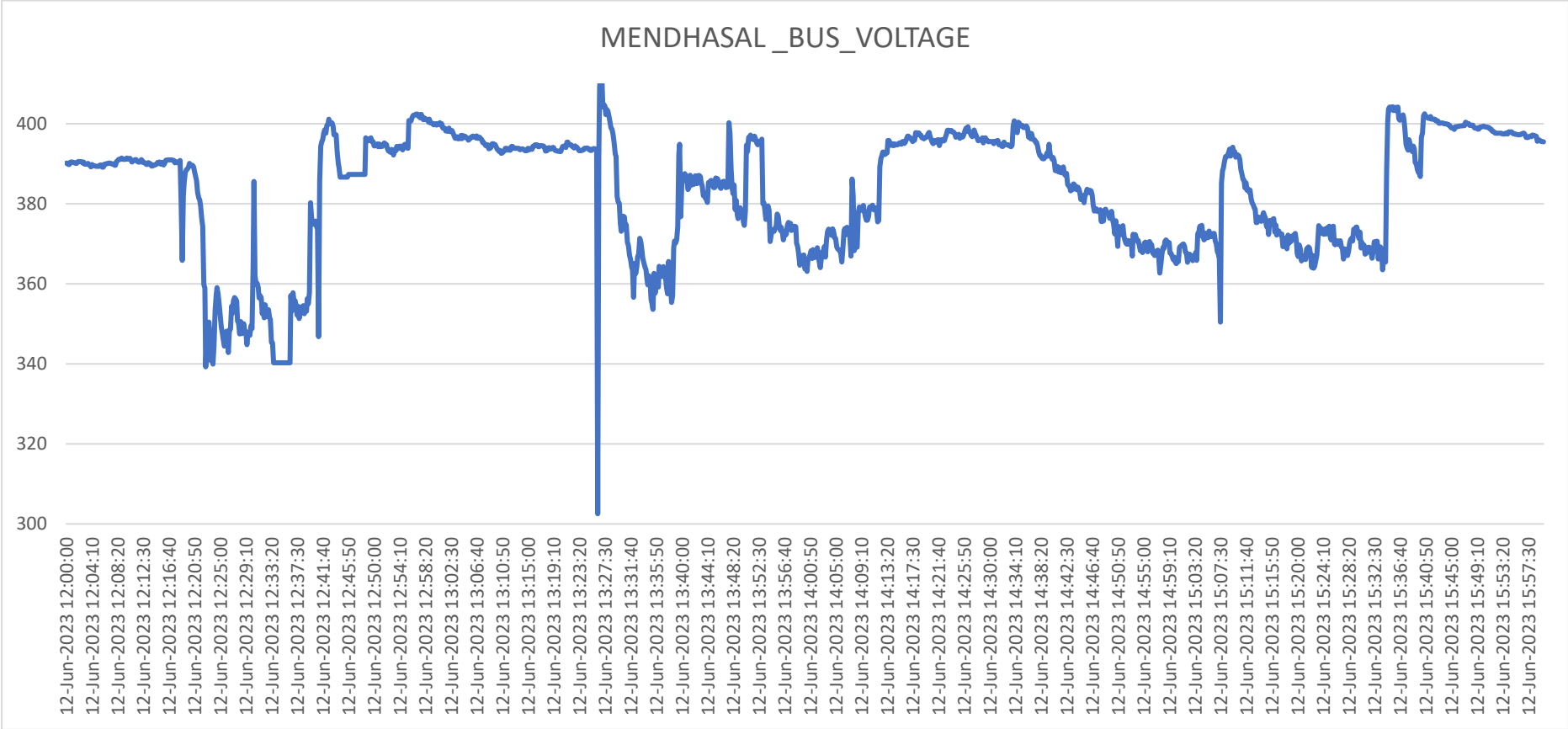
- SLDC Odisha charged the Line -1 and flow touched to 940 MW and some load re-arrangement done at 220 KV level, which reduced loading upto 820 MW also Talcher kolar increased to 1000 MW .
- Flow was more than 850 MW till 25 minutes ,But now ckt-1 developed a transient fault in B phase seems to be due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


Mendhasal ckt-2 tripped on R-n fault ,ckt-1 tripped on overload, setting at 1200 Amps
Event -1
Event -2
Restoration of BOth ckt
Charging of mendhasal 1 with increased B,O/C setting and tripping again on overload
Event - 4
Event - 5
Ckt-1 charged flow was more than 850 till 25 minutes which developed B phase transient fault and tripped
restoration
Event-3
Tripping of Mendasal D/C Again
loading of baripada - dubri and pandiaballi line increased as it was feeding the load
Pandiabili -Mendhasal reversed flow from Pandibali to mendhasal to feed mendhasal load.250 MW Each
Barpada keonjhar flow increased to 650 Mw as it started giving power to baripda to feed load of Mendhasla , new dubri , pandiabili
1200
1000
800
600
400
200
0
-200
-400
-600
-800
MERAM_GR - 400_MENDH_GR_1_P
MERAM_GR - 400_MENDH_GR_2_P
MENDH_GR - 400_PANDA_PG_1_P
MENDH_GR - 400_PANDA_PG_2_P
KALAB_PG - 400_PANDA_PG_P
KALAB_PG - 400_DUBNW_GR_P
KALAB_PG - 400_KEONJ_PG_P


MENDHASAL _BUS_VOLTAGE
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360
340
320
300
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12-Jun-2023 12:12:30
12-Jun-2023 12:16:40
12-Jun-2023 12:20:50
12-Jun-2023 12:25:00
12-Jun-2023 12:29:10
12-Jun-2023 12:33:20
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12-Jun-2023 12:41:40
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12-Jun-2023 12:54:10
12-Jun-2023 12:58:20
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12-Jun-2023 13:06:40
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12-Jun-2023 14:59:10
12-Jun-2023 15:03:20
12-Jun-2023 15:07:30
12-Jun-2023 15:11:40
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12-Jun-2023 15:24:10
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12-Jun-2023 15:36:40
12-Jun-2023 15:40:50
12-Jun-2023 15:45:00
12-Jun-2023 15:49:10
12-Jun-2023 15:53:20
12-Jun-2023 15:57:30

Annexure B.9

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/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END
1	220KV DALTONGANJ-LATEHAR(JUSNL)-1	04-05-2023	13:10	04-05-2023	14:29	Daltonganj: B_N, Zone-1, 35.127 km, 1.969 kA	Latehar: B_N, 1.16 kA	B-Earth	4700	Highly resistive fault. Tripped in Zone-2 time from Daltonganj. Delayed carrier received as fault detected when it came in Zone reach at Latehar		Yes	Yes

2	400KV PATNA-SAHARSA-2	04-05-2023	13:53	04-05-2023	18:25	Patna: R_B, Zone-1, 176 km, 4.59 kA	Saharsa: R_B, Zone-1, 47.5 km, Ir= .24 kA, Ib= 6.38 kA	R-B-Earth	100	Phase to phase fault		Yes	No
3	400KV LAPANGA-STERLITE-1	06-05-2023	01:00	06-05-2023	02:57	Lapanga: Didn't trip	Sterlite: DT received	No fault	NA	DT received at Sterlite. OPTCL may explain		NA	No
4	400KV BINAGURI-TALA-2	07-05-2023	22:13	08-05-2023	11:34	Binaguri: B_N, 1.41 kA, DT received	Tala: B_N	B-Earth	100	DT received at Binaguri and three phase tripped		Yes	NA
5	220KV CHUKHA-BIRPARA-1	09-05-2023	08:47	13-05-2023	16:17	Chukha:B_N, Zone-1, 9.45 kA	Birpara: B_N, 2.94 kA	B-Earth	500	Tripped in Zone-2 from Birpara despite carrier received. A/r successful from Chukha, tripped again within reclaim time		NA	Yes

6	400KV ALIPURDUAR (PG)-BINAGURI-4	09-05-2023	11:42	09-05-2023	18:16	Alipurduar: B_N, 60.7 km, 3.935 kA	Binaguri: B_N, 55.4 km, 5.59 kA	B-Earth	650	Gradually evolving resistive fault. A/r successful. Tripped again within reclaim time. At Binaguri, before A/r attempt of tie bay, fault appeared again and all three phase of main bay tripped. After 180 msec, tie bay A/r attempted and failed.		Yes	Yes
7	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 sucessful from Meramundali. Other two phase at TSTPP tripped in PD after 2.1 seconds	DR not time synchronized at TSTPP	Yes	Yes
8	220KV TENUGHAT-BIHARSARIFF-1	10-05-2023	13:12	10-05-2023	13:48	Tenughat: Overcurrent and earth fault	Biharshariff: O/c E/F, 1.03 kA	R-Earth	500	Tripped on DEF at Biharsharif after 500 msec. DEF settings may be reviewed		No	Yes

9	400KV MEDINIPUR-KHARAGPUR-1	10-05-2023	16:01	10-05-2023	18:18	Medinipur: R_N, Zone-1, 76 km	Kharagpur: R_N, Zone-1, 8.631 km, 13.4 kA	R-Earth	100	Initially fault in R_ph. Fault in Y_ph after 500 msec.	DR not time synchronized at Kharagpur. Drift of around 4 minutes	Yes	Yes
10	400KV MEDINIPUR-KHARAGPUR-2	10-05-2023	16:05	10-05-2023	18:20	Medinipur: R_N,Zone-1, 100 km,3.4 kA	Kharagpur: R_N, Zone-1, 4.38 km, 13.7 kA	R-Earth	100	Initially fault in R_ph. Fault in Y_ph after 100 msec.		Yes	Yes
11	220KV CHUKHA-BIRPARA-2	11-05-2023	08:24	11-05-2023	09:55	Chukha: Bus bar protection operated	Birpara: Didn't trip	R-B	100	As per PMU, phase to phase fault occurred.		NA	NA
12	220KV DARBHANGA (DMTCL)-DARBHANGA-1	11-05-2023	13:10	11-05-2023	14:10	Darbhanga:B_N, Zone-1, 1.03 km, 10.03 kA	Darbhanga:B_N, Zone-1, 1.7 km, 4.23 kA	B-Earth	100	Carrier aided DEF operated at Darbhanga (BSPTCL).		No	No
13	400KV RAJARHAT-FSTPP-1	11-05-2023	13:22	11-05-2023	15:09		FSTPP: DT received	No fault	NA	DT received at FSTPP. PG ER-2 may explain.		NA	Yes

14	220KV JODA-RAMCHANDRAPUR-1	12-05-2023	08:07	12-05-2023	10:24	Joda: Didn't trip	Ramchandarpur: Tripped	No fault	NA	JUSNL/OPTCL may explain	DR not time synchronized at Ramchandrapur	NA	Yes
15	220KV SITAMARHI-RAXAUL(NEW)-2	13-05-2023	18:26	13-05-2023	19:34		Raxaul: Y_B, Iy:2.78 kA, Ib: 2.85 kA	Y-B	100	Phase to phase fault		No	Yes
16	220KV SITAMARHI-RAXAUL(NEW)-1	13-05-2023	18:26	13-05-2023	19:14		Raxaul: Y_B, Iy:2.84 kA, Ib: 2.88 kA	Y-B	100	Phase to phase fault		No	Yes
17	220KV JODA-RAMCHANDRAPUR-1	14-05-2023	03:04	14-05-2023	03:52	Joda: Didn't trip	Ramchandarpur: O/C E/f	R-Y	2100	R and Y phase current became zero. Line tripped on DEF after 2.1 seconds from Ramchandrapur. JUSNL may share findings		NA	Yes
18	765KV SASARAM-FATEHPUR-1	14-05-2023	11:33	14-05-2023	12:21	Fathepur: DT received		No fault	NA	PG ER-1 may explain		No	NA
19	220KV SITAMARHI-RAXAUL(NEW)-1	14-05-2023	19:34	15-05-2023	18:52	Sitamarhi: Y_B, 62.8 km, Ib:3.55 kA, Iy:3.55 kA		Y-B	100	Phase to phase fault		No	No

20	220KV SITAMARHI-MOTIPUR-1	14-05-2023	20:42	14-05-2023	22:12		Bus bar protection operated at Motipur	Y-Earth	100	Bus bar protection operated at Motipur. BSPTCL may explain.		No	Yes
21	220KV SITAMARHI-MOTIPUR-2	14-05-2023	20:42	14-05-2023	22:14			Y-Earth	100			No	Yes
22	220KV DARBHANGA (DMTCL)-MOTIPUR-1	14-05-2023	20:42	14-05-2023	21:58			Y-Earth	100			No	Yes
23	220KV DARBHANGA (DMTCL)-MOTIPUR-2	14-05-2023	20:42	14-05-2023	21:58			Y-Earth	100			No	Yes
24	220KV DARBHANGA (DMTCL)-SAMASTIPUR-1	14-05-2023	21:50	14-05-2023	23:13	Darbhanga: Didn't trip	Samastipur: B_E, 26.6 km, 2.6 kA	B-Earth	100	A/r successful from Darbhanga only		No	No
25	220KV SAHARSA-BEGUSARAI-1	14-05-2023	22:30	15-05-2023	13:01		Begusarai: R_N, 2.43 kA	R-Earth	100	A/r successful. Tripped again within reclaim time		No	Yes
26	220KV SAHARSA-BEGUSARAI-2	14-05-2023	23:03	15-05-2023	13:01		Begusarai: B_N, 2.99 kA	B-Earth	100	A/r successful. Tripped again within reclaim time		No	Yes

27	220KV DALKHOLA-PURNEA-2	14-05-2023	23:24	15-05-2023	00:03	Dalkhola :Y_B, 40 km, Iy= 2 kA, Ib= 2.1 kA		Y-B-Earth	100	As per DR of Dalkhola, O/c E/f operated immediately. PG ER-2 may explain.		Yes	No
28	220KV KHAGARIA-NEW PURNEA-1	14-05-2023	23:24	15-05-2023	21:18	Khagaria: Y_B, 99 km, 1.5 kA		Y-B-Earth	100	Phase to phase fault		Yes	No
29	220KV MAITHON-DHANBAD-1	15-05-2023	14:06	15-05-2023	14:53		Dhanbad: Didn't trip	No fault	NA	Zone-3 picked at Maithon and line tripped immediately. PG ER-2/DVC may explain		Yes	NA
30	400KV RANCHI-RAGHUNATHPUR-3	15-05-2023	14:48	15-05-2023	20:06	Ranchi: Y_N, 153.9 km, 2.75 kA	Raghunathpur: Y_N, Zone-1, 15.74 km, 13.85 kA	Y-Earth	100	A/r successful. Tripped again within reclaim time		Yes	Yes
31	400KV KHARAGPUR-CHAIBASA-1	15-05-2023	15:01	15-05-2023	17:33	Kharagpur: B_N, Zone-1, 123 km, 1.5 kA	Chaibasa: B_N, 0.5 km, 15.4 kA	B-Earth	100	A/r successful. Tripped again within reclaim time		Yes	No
32	400KV PPSP-BIDHANNAGAR-1	15-05-2023	15:27	15-05-2023	15:51	PPSP: R_N, Zone-1, 159 km	Bidhannagar: R_N, Zone-1, 26.28 km, 3.4 kA	R-Earth	100	A/r disabled as per OEM advise		No	Yes

33	400KV PPSP-BIDHANNAGAR-2	15-05-2023	15:27	15-05-2023	15:54	PPSP: Y_N, Zone-1, 151 km	Bidhannagar:Y_N, Zone-1, 26 km, 6.5 kA	Y-Earth	100	A/r disabled as per OEM advise		No	Yes
34	400KV MEDINIPUR-KHARAGPUR-2	15-05-2023	17:09	15-05-2023	18:02	Medinipur: R_N, 38 km, 6.3 kA	Kharagpur: R_N, Zone-1, 69.9 km, 4.013 kA	R-Earth	100	A/r successful. Tripped again within reclaim time	DR not time synchronized at Kharagpur. Drift of around 4 minutes	Yes	Yes
35	400KV MEDINIPUR-NEW CHANDITALA-2	15-05-2023	17:09	15-05-2023	18:14	Medinipur:B_N, 39.1 km , Ir=6.76 kA, Ib= 6.24 kA	New Chanditala: B_N, Zone-1, 48.97 km, 4.951 kA	B-Earth	100	Fault in R_ph after 600 msec and three phase tripped		Yes	Yes
36	220KV BARIPADA-BALASORE-2	15-05-2023	19:09	16-05-2023	13:57	Baripada:B_N, 76.3 km, 2.01 kA		B-Earth	100	Three phase tripping for single phase fault at Baripada. A/r attempt failed at Balasore		Yes	No
37	400KV PPSP-BIDHANNAGAR-2	16-05-2023	14:44	16-05-2023	15:02	PPSP: R_N, Zone-1, 130.3 km	Bidhannagar: R_N, Zone-1, 27.86 km, 6.96 kA	R-Earth	100	A/r disabled as per OEM advise		No	Yes

38	220KV TENUGHAT-BIHARSARIFF-1	17-05-2023	10:46	17-05-2023	11:33	Tenughat: R_N, Zone-1, 123.4 km, 1.3 kA		R-Earth	100	Three phase tripping for single phase fault	DR not time synchronized at Biharsharif	Yes	Yes
39	400KV DURGAPUR-JAMSHEDPUR-1	17-05-2023	11:02	17-05-2023	14:54	Durgapur: Y_N, Zone-1, 94.3 km, 2.96 kA	Jamshedpur: Y_N, Zone-1, 59 km, 5.3 kA	Y-Earth	100	A/r failed after 1 second		Yes	Yes
40	400KV PUSAULI(PG)-NABINAGAR(BRBCL)-1	17-05-2023	13:18	17-05-2023	13:59	Pusauli:R_N, 53.53 km, 7.2 kA	Nabinagar:R_N, 43 km, 4.77 kA	R-Earth	100	A/r failed after 1 second		Yes	No
41	400KV PUSAULI(PG)-NABINAGAR(BRBCL)-1	17-05-2023	14:03	17-05-2023	22:20		Nabinagar: R_N, 43 km	R-Earth	100	A/r failed after 1 second		Yes	No
42	400KV DURGAPUR-SAGARDIGHI-1	17-05-2023	15:32	17-05-2023	16:58	Durgapur:B_E, 58 km, 7.96 kA	Sagardighi: B_E, Zone-1, 95.2 km, 3.32 kA	B-Earth	100	Three phase tripping for single phase fault		Yes	No
43	400KV JEERAT-BAKRESWAR-1	17-05-2023	16:21	17-05-2023	16:57	Jeerat:R_E, Zone-2,139.4 km, 3.155 kA	Bakreswar: R_E, Zone-1, 37 km, 3 kA	R-Earth	100	A/r failed after 1 second		Yes	No
44	220KV SAHARSA-BEGUSARAI-1	17-05-2023	22:08	17-05-2023	23:24	Saharsa:R_N, Zone-1, 25.01 km, 5.18 kA	Begusarai: R_N, Zone-1, 161.05 km, 2.4 kA	R-Earth	100	A/r successful. Tripped again within reclaim time		No	Yes

45	220KV KHAGARIA-NEW PURNEA-1	17-05-2023	23:19	18-05-2023	17:56	Khagaria: B_N, Zone-1, 88.38 km, 1.837 kA	Purnea: B_N, Zone-1, 34.4 km, 1.19 kA	B-Earth	100	A/r successful. Tripped again within reclaim time		Yes	No
46	400KV GOKARNA-SAGARDIGHI-2	18-05-2023	02:04	18-05-2023	03:15	Gokarno:B_N, Zone-1, 8.9 kA	Sagardighi: B_N, Zone-1, 52.1 km, 6.124 kA	B-Earth	100	Phase to phase fault during A/r attempt		Yes	No
47	400KV GOKARNA-SAGARDIGHI-1	18-05-2023	02:04	18-05-2023	02:54	Gokarno: B_N, Zone-1, 13.48 km, 13 kA	sagardighi: B_N, Zone-1, 26.39 km	B-Earth	100	Phase to phase fault during A/r attempt		Yes	No
48	400KV DURGAPUR-KHSTPP-1	18-05-2023	02:27	18-05-2023	03:14	Durgapur:B_N, Zone-1, 77.1 km, 3.14 kA	Kahalgaon: B_N, Zone-1, 146.5 km, 2.866 kA	B-Earth	100	A/r attempt failed after 1 second from Durgapur. Three phase tripping at Kahalgaon.		Yes	No
49	400KV DSTPS(ANDAL)-RAGHUNATHPUR-2	18-05-2023	10:48	18-05-2023	15:39	DSTPS:B_N, Zone-1, 54.81 km, 6.96 kA	Raghunathpur:B_N, Zone-1, 12.56 km, 12.85 kA	B-Earth	100	A/r failed after 1 second		Yes	Yes
50	400KV RAJARHAT-FSTPP-1	18-05-2023	14:07	18-05-2023	14:29	Rajarhat: Didn't trip	FSTPP: DT received	No fault	NA	PG ER-2 may explain		NA	No

51	400KV MAITHON-DURGAPUR-2	18-05-2023	14:17	18-05-2023	15:43	Maithon: Y_N, 2.9 km, 18.6 kA	Durgapur:Y_N, 16.9 km, 2.35 kA	Y-Earth	100	A/r successful. Fault in R_ph during reclaim time		No	No
52	220KV MAITHON-DUMKA-1	18-05-2023	14:32	18-05-2023	15:14	Maithon: B_N, 9.84 kA, A/r successful	Dumka: B_E, Zone-1, 48.59 km, 1.6 kA	B-Earth	100	A/r successful from Maithon only. Three phase tripping at Dumka		No	No
53	400KV DSTPS(ANDAL)-RAGHUNATHPUR-1	18-05-2023	14:40	18-05-2023	19:39	DSTPS:B_N, Zone-1, 37.86 km, 6.679 kA	Raghunathpur: B_N, Zone-1, 38.99 km, 6.56 kA	B-Earth	100	A/r successful. Tripped again within reclaim time		Yes	Yes
54	400KV PPSP-BIDHANNAGAR-1	18-05-2023	14:54	18-05-2023	15:47	PPSP: B_N, Zone-1, 1156.8 km	Bidhannagar: B_E, Zone-1, 24.52 km, 7.797 kA	B-Earth	100	A/r disabled as per OEM advise		No	Yes
55	765KV MEDINIPUR-NEW JEERAT-2	18-05-2023	16:49	18-05-2023	17:31	Medinipur: B_N, 20.8 km, 7.47 kA	New Jeerat:B_N, 105.4 km, 3.76 kA	B-Earth	100	A/r failed after 1 second		Yes	Yes
56	400KV MEDINIPUR-KHARAGPUR-2	19-05-2023	16:32	19-05-2023	17:06	Medinipur: Y_N, Zone-1, 66.2 km, 4.2 kA	Kharaghpur: Y_N, Zone-1, 35.85 km, 6.39 kA	Y-Earth	100	A/r successful. Tripped again within reclaim time		Yes	Yes
57	400KV ARAMBAGH-BAKRESWAR-1	19-05-2023	17:50	19-05-2023	18:13	Arambagh: Y_N, Zone-1, 13.2 km, 12.10 kA	Bakreswar: Y_N, Zone-1, 96.83 km, 2.86 kA	Y-Earth	100	Three phase tripping for single phase fault		Yes	No

58	400KV JEERAT-BAKRESWAR-1	19-05-2023	18:31	20-05-2023	17:50	Jeerat: B_N, Zone-1, 91.53 km, 4.573 kA	Bakeshwar: B_N, Zone-1, 68.55 km, 3.346 kA	B-Earth	100	A/r failed after 1 second		Yes	No
59	400KV RAJARHAT-JEERAT-1	19-05-2023	18:51	19-05-2023	19:57	Bus bar protection operated		B-Earth	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.		Yes	Yes
60	400KV JEERAT-NEW JEERAT-2	19-05-2023	18:51	19-05-2023	19:44			B-Earth	100			Yes	Yes
61	400KV JEERAT-SAGARDIGHI-2	19-05-2023	18:51	19-05-2023	19:53			B-Earth	100			Yes	No
62	400KV-MERAMUNDALI-LAPANGA-1	19-05-2023	19:38	19-05-2023	21:43	Meramundali:Y_E, Zone-1, 104.2 km, 2.12 kA	Lapanga:Y_E, Zone-1, 4.18 kA	Y-Earth	100	A/r failed after 1 second		Yes	Yes
63	220KV CHUKHA-BIRPARA-1	19-05-2023	22:55	19-05-2023	23:34	Chukha: R_Y, Zone-1, R_Y, Ir= 2.28 kA, Iy= 2.372 kA	Birpara:R_Y, Zone-1, 39.58 km, Ir= 6.65 kA, Iy= 6.53 kA	R-Y	100	Phase to phase fault		NA	Yes
64	220KV RANCHI-MTPS(DVC)-1	20-05-2023	13:13	20-05-2023	23:05	Ranchi: YB_N, 196.07 km, 1.4 kA		Y-B	400	Resistive fault. O/c E/f operated at Mejia. DVC may review DEF settings	DR not time synchronized at Mejia	Yes	Yes
65	400KV BINAGURI-TALA-1	20-05-2023	13:32	23-05-2023	11:08	Binaguri: B_N, 1.6 kA		B-Earth	2000	Resistive fault.		Yes	No

66	220KV CHANDAUTI (PMTL)-SONENAGAR-2	21-05-2023	13:41	21-05-2023	15:28	Chandauti: B_N, Zone-1, 1.17 kA		B-Earth	2200	Resistive fault.		No	No
67	765KV ANGUL-SRIKAKULAM-2	21-05-2023	14:46	21-05-2023	16:06	Angul: Y_B_N, Iy:5.5 kA, Ib: 5.1 kA		Y-B-Earth	100	Phase to phase fault		Yes	No
68	220KV KHAGARIA-NEW PURNEA-1	21-05-2023	19:05	21-05-2023	19:52	Khagaria: Y_N, Zone-1, 21.88 km, Iy= 4.76 kA, Ib= 4.75 kA,	New purena: Y_B, 75 km, Iy= 2.1 kA, Ib= 2.1 kA	Y-B	100	Phase to phase fault		Yes	No
69	220KV PUSAULI-DEHRI-1	22-05-2023	12:52	22-05-2023	18:00	Sasaram: B_N, 12.7 km, 4.05 kA	Dehri: B_N, Zone-1, 46.72 km, 1.022 kA	B-Earth	100	A/r successful. Tripped again within reclaim time		Yes	No
70	220KV SAHARSA-BEGUSARAI-1	23-05-2023	09:10	23-05-2023	12:43	Sasaram: R_N, 25 km, 5.19 kA	Begusarai: R_N, Zone-1, 60.63 km, 2.367 kA	R-Earth	100	A/r successful. Tripped again within reclaim time		No	Yes
71	220KV SAHARSA-BEGUSARAI-2	23-05-2023	09:37	23-05-2023	12:33		Begusarai: R_N, 2.81 kA, A/r successful	R-Earth	100	A/r successful from Begusarai only. Three phase tripping at Saharsa		No	Yes

72	400KV DHANBAD-RANCHI-1	23-05-2023	14:37	23-05-2023	15:16	Dhanbad: B_N, 1.9 km, 12.88 kA	Ranchi:B_N, 165.2 km, 2.99 kA	B-Earth	100	A/r successful from Ranchi only		No	Yes
73	400KV KOLAGHAT-KHARAGPUR-2	23-05-2023	15:24	23-05-2023	16:37	Kolaghat: R_N, Zone-1, 10 km, 10.9 kA	Kharaghpur: R_N, Zone-1, 96.8 km, 2.66 kA	R-Earth	100	A/r successful. Tripped again within reclaim time		No	Yes
74	400KV NEW DUBURI-MEERAMUNDALI-2	23-05-2023	15:27	24-05-2023	16:01	New Duburi: R_N, 75 km, 7 kA	Meeramundali: B_N, 19.8 kA	R-Earth	100	Fault in B_ph after 100 msec		Yes	Yes
75	400KV NEW JEERAT-SUBHASGRAM(PG)-1	23-05-2023	19:47	24-05-2023	10:21	New jeerat: Y_N, 129 km, 2.53 kA	Subhasgram: Y_N, 1.5 km, 18.6 kA	Y-Earth	100	A/r successful. Tripped again within reclaim time		Yes	Yes
76	220KV CHAIBASA(PG)-CHAIBASA(JUSNL)-1	24-05-2023	10:58	24-05-2023	11:26	Chaibasa (PG): Didn't trip		No fault	NA	JUSNL may explain		NA	Yes
77	400KV BAHARAMPUR-SAGARDIGHI-1	24-05-2023	13:59	24-05-2023	15:05	Baharampur: DT received	Sagardighi: Didn’t trip	No fault	NA	DT received at Baharampur. WBPDCL may explain.		Yes	No

78	400KV BARIPADA-KEONJHOR(PG)-1	24-05-2023	16:25	24-05-2023	18:43	Baripada: Y_N, Zone-1, 135 km, 3.6 kA	Keonjhar:Y_N, Zone-2, 125 km, 1.5 kA	Y-Earth	100	A/r successful. Tripped again within reclaim time		Yes	Yes
79	400KV ROURKELA-CHAIBASA-1	24-05-2023	16:39	24-05-2023	18:13		Chaibasa: DT received	No fault	NA	Teed protection operated at Rourkela. PG Odisha may explain		Yes	Yes
80	400KV ROURKELA-JHARSUGUDA-4	24-05-2023	16:39	24-05-2023	18:34	Rourkela: Y_B, Zone-1, 60 m, Iy= 31 kA, Ib= 31 kA	Jharsuguda: Y_B, 117 km, Iy= 3.8 kA, Ib= 3.8 kA	Y-B	100	Phase to phase fault		Yes	Yes
81	765 KV SASARAM-FATEHPUR-1	24-05-2023	21:08	25-05-2023	00:41	Sasaram: DT received	-	No fault	NA	PG ER-1 may explain		No	NA
82	220 KV RANCHI-CHANDIL-1	24-05-2023	21:47	24-05-2023	22:18	Ranchi: R_B, 17.8 km, Ir=Ib=10 kA	Chandil: R_B, 84.7 km, Ir: 2.22 kA, ib: 2.33 kA	R-B-Earth	100	Phase to phase fault	DR length less at Chandil	No	Yes
83	220KV TTPS-TSTPP-1	24-05-2023	22:05	25-05-2023	18:58		TSTPS: Y_N, Zone-1, 6.154 km, 11.90 kA	Y-Earth	100	Three phase tripping for single phase fault		No	No

84	220 KV RANCHI-MEJIA (MTPS)-1	25-05-2023	14:13	25-05-2023	15:55	Ranchi: R_N, 53.44 km, 3.182 kA	Mejia: R_N, 158 km, 1.12 kA	R-Earth	100	A/r kept disabled at Mejia	DR length less at Mejia	No	Yes
85	220 KV MAITHON-DHANBAD-2	25-05-2023	16:02	26-05-2023	00:11	Maithon: R_N, 51.6 km, 3 kA	Dhanbad: R_N, 4.7 km	R-Earth	100	Fault in Y_ph after 480 msec		Yes	Yes
86	400 KV RANCHI-RAGHUNATHPUR-3	25-05-2023	16:21	25-05-2023	18:51	Ranchi: Y_N, 154.6 km, 2.8 kA	Raghunathpur: Y_N, 13.8 km, 9.36 kA	Y-Earth	100	A/r successful. Tripped again within reclaim time	DR length less at Raghunathpur	No	Yes
87	400 KV DSTPS-RAGHUNATHPUR-2	25-05-2023	16:28	25-05-2023	19:02	DSTPS: B_N, Zone-2, 90 km, 3.6 kA	Raghunathpur: B_N, 18 kA	B-Earth	100	A/r successful. Tripped again within reclaim time	DR length less at Raghunathpur	Yes	Yes
88	400 KV MAITHON-MEJIA-3	25-05-2023	16:29	25-05-2023	17:50	Maithon: Y_B_N, 46 km, 8.17 kA	Mejia: Y_B_N, Iy: 5.09 kA, Ib: 4.56 kA	Y-B-Earth	1600	Resistive phase to phase fault		Yes	Yes
89	220 KV DALTONGANJ-CHATRA-1	25-05-2023	16:34	25-05-2023	18:11	Daltonganj: Y_B, 3.5 km, 4.5 kA	Chatra: Y_B, 0.648 kA	Y-B	100	Phase to phase fault		No	No
90	220 KV SASARAM-NADOKHAR-1	25-05-2023	16:37	25-05-2023	17:42	DT received at Sasaram		No fault	NA	BSPTCL/PG ER-1 may explain		No	NA

91	220 KV SASARAM-NADOKHAR-2	25-05-2023	16:37	25-05-2023	18:06	DT received at Sasaram		No fault	NA	BSPTCL/PG ER-1 may explain		No	NA
92	400 KV RENGALI-KEONJHOR-1	25-05-2023	16:48	26-05-2023	14:25	Rengali: B_N, Zone-1, 41.77 km, 6.06 kA	Keonjhor: B_N, 72.3 km, 1.75 kA	B-Earth	100	A/r successful. Tripped again within reclaim time		Yes	Yes
93	765 KV NEW RANCHI-MEDINIPUR-1	25-05-2023	17:01	25-05-2023	18:41	New Ranchi: Y_N, 201 km, 3.2 kA	Medinipur: Y_N, 75.8 km, 4.53 kA	Y-Earth	100	A/r failed after 1 second	DR pre-fault recording is less. Total DR length is of 10 seconds	No	Yes
94	400 KV PPSP-BIDHANNAGAR-2	25-05-2023	17:06	25-05-2023	19:59	PPSP: Y_N, 124 km	Bidhannagar: Y_N, 54.95 km	Y-Earth	100	A/r disabled as per OEM advise		No	Yes
95	400 KV PPSP-BIDHANNAGAR-1	25-05-2023	17:31	25-05-2023	20:01	PPSP: R_N, 151.3 km	Bidhannagar: R_N, 26.14 km	R-Earth	100	A/r disabled as per OEM advise		No	Yes

96	400 KV MAITHON-DUGRAPUR-2	25-05-2023	17:38	25-05-2023	18:35	Maithon: Y_N, 7.03 kA	Durgapur: Y_N, 7.88 kA	Y-Earth	100	R_B_Earth fault after 250 msec		Yes	Yes
97	400 KV DURGAPUR-KHSTPP-1	25-05-2023	17:48	25-05-2023	19:15	Durgapur: Y_N, 8.9 km, 9.1 kA	Kahalgaon: Y_N, 218 km, 1.9 kA	Y-Earth	100	Three phase tripping for single phase fault		Yes	No
98	400 KV DURGAPUR-SAGARDIGHI-2	25-05-2023	18:05	25-05-2023	20:01		Sagardighi: B_N, 64.3 km, 5.08 kA	B-Earth	100	A/r successful at Durgapur. Other two phase at Sagardighi tripped on PD		Yes	No
99	220 KV SILIGURI-KISHANGANJ-2	25-05-2023	20:23	25-05-2023	21:45	Siliguri: R_Y, 56 km, Ir: 6.2 kA, Iy: 3.6 kA	Kishanganj: R_Y, 50 km, Ir: 3.8 kA, Iy: 3.9 kA	R-Y	100	Phase to phase fault		Yes	No
100	220 KV DALTONGANJ-GARHWA-1	26-05-2023	11:27	26-05-2023	12:44	Daltonganj: R_N, 13.7 km, 4.06 kA		R-Earth	100	A/r failed after 1 second		No	No

101	400 KV NEW PPSP-NEW RANCHI-1	26-05-2023	12:32	26-05-2023	17:50	New PPSP: R_N, 106 km, 2.7 kA		R-Earth	100	O/V St.2 appeared at New Ranchi and DT sent to remote end		Yes	Yes
102	400 KV NEW PPSP-NEW RANCHI-2	26-05-2023	12:32	26-05-2023	16:33	New PPSP: B_N, 231 km, 4.01 kA	New Ranchi: B_N, 1.2 km, 23.26 kA	B-Earth	100	O/V St.2 appeared at New PPSP and DT sent to remote end		No	No
103	220 KV CHANDAUTI-SONENAGAR-2	26-05-2023	17:28	26-05-2023	18:17		Sonenagar: Y_B, 8.441 km, Iy: 3.276 kA, Ib: 3.358 kA	Y-B	100	Phase to phase fault		No	Yes
104	400 KV BARH-PATNA-3	26-05-2023	19:49	26-05-2023	20:37	Barh: B_N, A/r unsuccessful	Patna: B_N, 32 km, 9.15 kA, A/r successful	B-Earth	100	A/r successful from Patna only. Other two phase at Barh tripped due to pole discrepancy		No	No
105	220 KV BEGUSARAI-SAHARSA-1	26-05-2023	21:13	26-05-2023	22:43	Begusarai: R_N, 2.44 kA	Saharsa: R_N, 25.02 km, 5.112 kA	R-Earth	100	A/r successful. Tripped again within reclaim time		Yes	No

106	400 KV DHANBAD-MAITHON RB-2	26-05-2023	21:28	26-05-2023	21:38	Dhanbad: Y_N, 5.543 km, 7.885 kA, A/r successful	Maithon RB: Y_N, 16.3 km, 8.48 kA	Y-Earth	100	Other two phase at Maithon RB tripped due to pole discrepancy		No	No
107	220 KV RANCHI-MEJIA (MTPS)-1	29-05-2023	13:11	29-05-2023	14:14	Ranchi: R_N, 43.8 km, 3.1 kA	Mejia: R_N, 159.59 km, 1.124 kA	R-Earth	100	A/r kept disabled at Mejia		No	No
108	400 KV PPSP-BIDHANNAGAR-1	29-05-2023	18:04			PPSP: Y_N, 141.4 km	Bidhannagar: Y_N, 4.4 km, 12.37 kA	Y-Earth	100	A/r disabled as per OEM advise		No	Yes
109	220 KV RANCHI-CHANDIL-1	30-05-2023	14:04	30-05-2023	15:13	Ranchi: B_N, 15 km, 4.6 kA	Chandil: B_N, 120 km	B-Earth	100	A/r failed after 1 second		No	Yes
110	220 KV RANCHI-CHANDIL-1	30-05-2023	15:54	31-05-2023	16:37	Ranchi: B_N, 16 km, 4.9 kA	Chnadil: B_N, 110.5 km	B-Earth	100	Three phase tripping for single phase fault at Chandil		No	Yes
111	400 KV NEW PPSP-NEW RANCHI-1	31-05-2023	13:02	31-05-2023	13:57		New Ranchi: DT received	No fault	NA	WBSETCL/PG ER-1 may explain		No	No

112	400 KV NEW PPSP-NEW RANCHI-2	31-05-2023	14:53	31-05-2023	15:25		New Ranchi: DT received	No fault	NA	WBSETCL may explain		No	No
113	400 KV MERAMUNDALI-LAPANGA-2	31-05-2023	16:35	31-05-2023	19:13	Meramundali: B_N, 109 km, 2.28 kA	Lapanga: B_N, 101 km, 3.4 kA, A/r unsuccessful	B-Earth	100	A/r successful. Tripped again within reclaim time		Yes	Yes
114	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

Annexure C.2

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)-KHAGAUL(BSPTCL)	PDMS AND PSCT DONE AT JAKKANPUR END AND DATA REQUIRED KHAGAUL END
19	OCC_JAN_2023	BGCL	T/L	220kV JAKKANPUR NEW(BGCL)-SIPARA(BSPTCL)	PDMS AND PSCT DONE AT JAKKANPUR END AND DATA REQUIRED KHAGAUL 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 KHAGAUL-BIHITA 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

ANNEXURE-C.3

Sl 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	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. 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. 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	
2.	Disturbance at 220 kV Tenughat S/s on 18.04.2023 at 13:19 Hrs	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. 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.	
3.	Repeated Tripping of 400 kV Teesta III-Dikchu line	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.	

4.	Tripping of 400 kV Barh-Kahalgaon-2 at 08:21 Hrs on 15.04.2023	PCC advised NTPC to test the relay healthiness at Barh end for 400 kV Barh-Kahalgaon-2 feeder. PCC advised NTPC Barh following: • 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.	
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.	