Agenda
for
117th PCC Meeting

Date:22.08.2022
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

AGENDA FOR 117th PROTECTION COORDINATION SUB-COMMITTEE MEETING TO BE HELD ON 22.08.2022 AT 10:30 HOURS

PART – A

ITEM NO. A.1: Confirmation of Minutes of 116th Protection Coordination sub-Committee Meeting held on 18th July 2022 through MS Teams online platform.

The minutes of 116th Protection Coordination sub-Committee meeting held on 18.07.2022 was circulated vide letter dated 16.08.2022.

Members may confirm the minutes of meeting.

PART – B

ITEM NO. B.1: Disturbance at 220 kV IB TPS(OPGC) S/S on 03.07.2022 at 01:39 Hrs

At 01:39 Hrs, 220 kV IBTPS-Budhipadar-2,3,4 tripped successively due to multiple faults along with both station transformer. IBTPS U#2 tripped due to loss of all fuel. At 01:45 hrs, IBTPS U#1 also tripped due to loss of auxiliary supply.

Detailed report received from ERLDC is attached at **Annexure B.1.**

Relay Indications:

Time	Name	End 1	End 2	PMU observations
01:39	220 kV IBTPS-Budhipadar-3	IBTPS: R_N, Zone-1, 13 kA	Budhipadar: R_N, Zone-2, 30.1 km(118.8%), 3.15 kA	Three successive faults observed from PMU
	220 kV IBTPS Budhipadar-4	IBTPS: R_N, Zone-4, 4.00 kA	Budhipadar: R_B, Zone-2, 23.4 km, Ir=Ib=8.78 kA	
	220 kV IBTPS-Budhipadar-2	IBTPS: R_N, Zone-4, 4.00 kA	Budhipadar: Didn't trip	
	210 MW IBTPS U#2	Loss of all fuel		
01:45	210 MW IBTPS U#1	Loss of auxiliary supply		

Gen. Loss: 323 MW, Load Loss: Nil
Outage Duration: 01:58 Hrs

OPGC & OPTCL may explain.

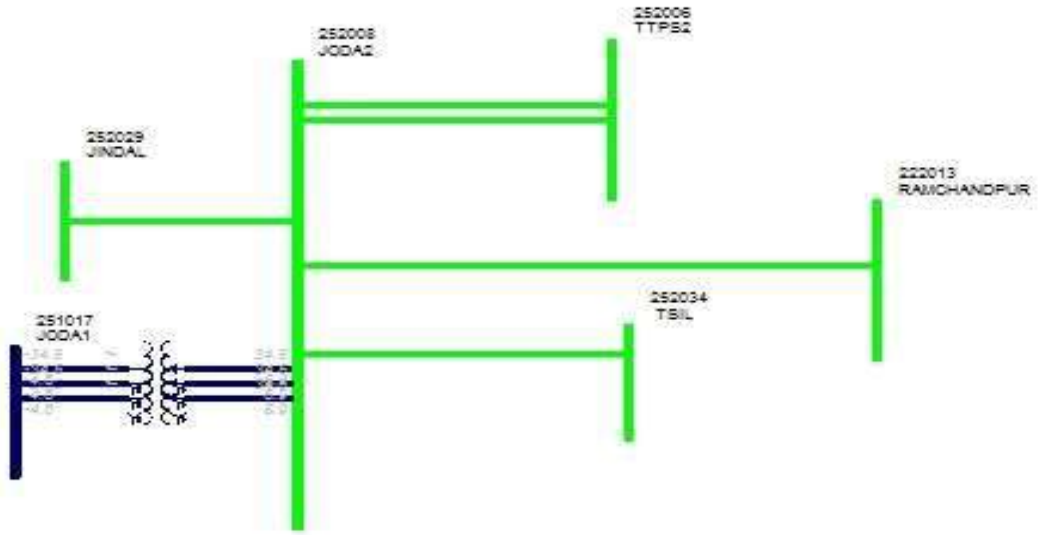
ITEM NO. B.2: Total Power failure at 220 kV Joda (OPTCL) S/s on 27.07.2022 at 11:30 Hrs

At 11:30 Hrs, 220 kV Joda-TTPS-2 tripped due to R_N fault. Prior to this, 220 kV Joda-TTPS-1 had already tripped due to phase-to-phase fault. Total power supply failed at Joda along with TSIL and JSPL(CPPs). Both CPPs went into islanded mode however didn't survive.

Disturbance report received from ERLDC is attached at **Annexure B.2.**

Relay Indications:

Time	Name	End1	End2	PMU Observations
11:30	220 kV Joda-TTPS-2	-	TTPS: R_N, Zone-2, 134.1 km, 1.22 kA	6 kV dip in R_ph voltage at TTPS. Fault clearance time: 500 msec
	220 kV Joda-JSPL	Loss of supply		
	220 kV Joda-TSIL	Loss of supply		



Load Loss: 150 MW
Outage Duration: 00:20 Hrs

OPTCL may explain.

ITEM NO. B.3: Disturbance at 400/220 kV Keonjhor S/S on 12.07.2022 at 09:27 Hrs

220 kV side of Keonjhor S/s became dead during isolator switching operation of 400 kV Baripada-Keonjhor. It is reported that during opening of bus side isolator of dia element of Baripada line, bus fault occurred and 400 kV Bus-2 at Keonjhor tripped. Inter-trip command was sent to LV CB of both 400/220 kV ICTs and 220 kV side also became dead.

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

Relay Indications:

Time	Name	End1	End2	PMU Observations
09:27	400 kV Bus-2 at Keonjhor	Bus bar protection operated		160 kV dip in R_ph voltage at Keonjhor S/s. Fault clearance time < 100 msec
	400/220 kV ICT-1 & 2 at Keonjhor	Tripped from 220 kV side due to inter-trip signal		
	80 MVAr Bus Reactor-1 at Keonjhor	Bus bar protection operated		

Load Loss: 8 MW
Outage Duration: 01:03 Hrs

Powergrid may explain.

ITEM NO. B.4: Total power failure at 220 kV Alipurduar(WBSETCL) S/s on 14.07.2022 at 17:43 Hrs

220 kV Bus-1 at Alipurduar (WBSETCL) got tripped during restoration of 220 kV Alipurduar-Alipurduar (WBSETCL) circuit-1. At the same time, 220 kV Alipurduar-Alipurduar(WBSETCL)-2 also tripped. Consequently, both 220 kV Bus at Alipurduar (WBSETCL) become dead.

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

Relay Indications:

Time	Name	End 1	End 2	PMU Observations
17:43	220 kV Bus-1 at Alipurduar (WBSETCL)	Bus bar protection operated		30 kV dip in B_ph at Alipurduar. Fault clearance time< 100 msec
	220 kV Alipurduar-Alipurduar (WBSETCL)-2	Alipurduar: B_N, 13 kA	Alipurduar (WBSETCL): Didn't trip	

Load & Generation Loss : Nil
Outage Duration: 00:35 Hrs

WBSETCL may explain.

ITEM NO. B.5: Total Power failure at 220/132 kV Bantala(WBSETCL) S/s on 23.07.2022 at 08:46 Hrs

As per the information received, LBB of 220 kV KLC Bantala-NewTown AA3 operated at Bantala. As Bantala S/s has Single main and transfer scheme, power supply interrupted due to bus tripping.

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

Relay Indications:

Time	Name	End1	End2	PMU observations
08:46	220 kV Bus-1 at Bantala (KLC)	B_ph LBB of 220 kV Bantala-NewTown AA 3 operated at Bantala. All elements tripped as Bantala has Single main and transfer scheme.	-	No fault observed as per PMU
	220 kV Subhahsgram-Bantala (KLC)		-	
	220 kV Bantala (KLC)-NewTown AA 3		-	
	220/132 kV ICT-1&2 at Bantala (KLC)		-	

Load Loss: 52 MW
Outage Duration: 01:24 Hrs

WBSETCL may explain.

ITEM NO. B.6: Total Power failure at 220 kV Ramchandrapur(JUSNL) S/s on 09.07.2022 at 14:27 Hrs

On 14.07.2022 at 14:27 Hrs, during testing of 220 kV bus bar differential panel at 220/132 kV Ramchandrapur S/S, spurious tripping command generated to the main Bus-1, which led to tripping of all connected feeders from main Bus -1. Subsequently total power failure occurred at 220/132 kV Ramchandrapur S/S.

Detailed report from ERLDC is attached at **Annexure B.6.**

Load Loss: 60 MW
Outage Duration: 00:34 Hrs

JUSNL may explain.

ITEM NO. B.7: Disturbance at 220kV Hajipur (BSPTCL) S/s on 31.07.2022 at 00:28 Hrs

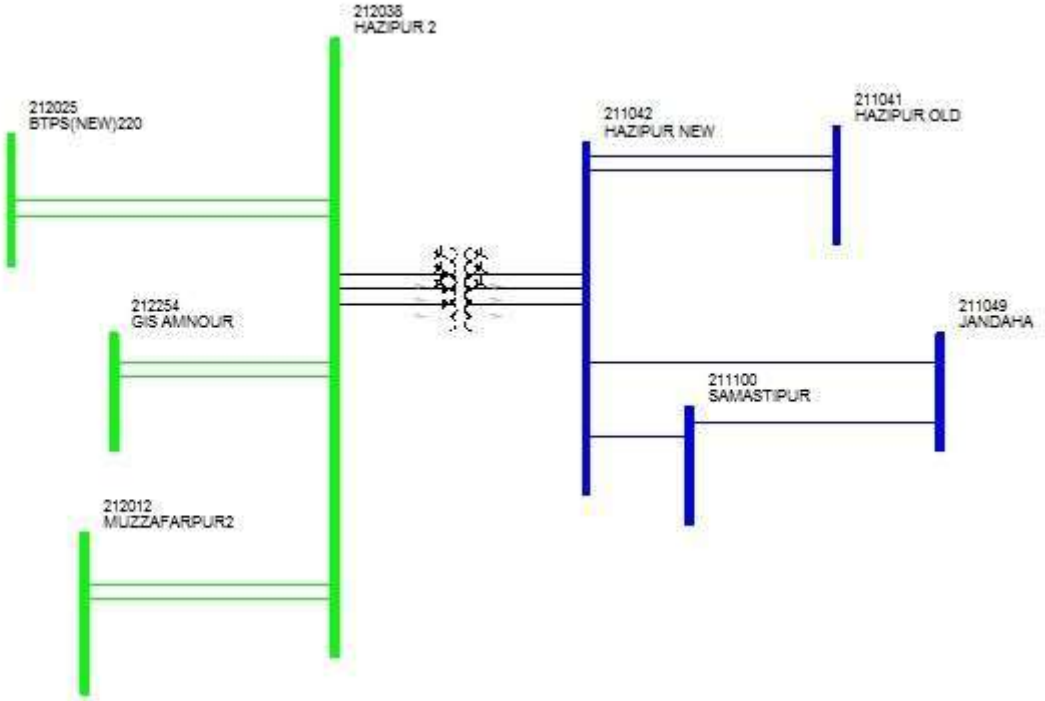
At 00:28 hrs, Y phase CT of 220 kV Barauni-Hajipur-1 got burst at Hajipur end. Subsequently both buses at Hajipur got tripped.

Disturbance report is attached at **Annexure B.7.**

Relay Indications:

Time	Name	End1	End2	PMU Observations
00:28	220 kV Main Bus-1&2 at Hajipur	-	-	15 kV dip in Y_ph voltage at Muzaffarpur. Fault clearance time: 100 msec
	220 kV Muzaffarpur (PG)-Hajipur D/c	-	-	

	220 kV Barauni TPS-Hajipur D/c	-	Y_ph CT of Ckt-1 burst	
	220 kV Hajipur-Amnour D/c	Radial supply		



Load Loss: 320 MW
Outage Duration: 00:41 Hrs

BSPTCL may explain.

ITEM NO. B.8: Repeated Disturbances at 220kV Chatra (JUSNL) S/s

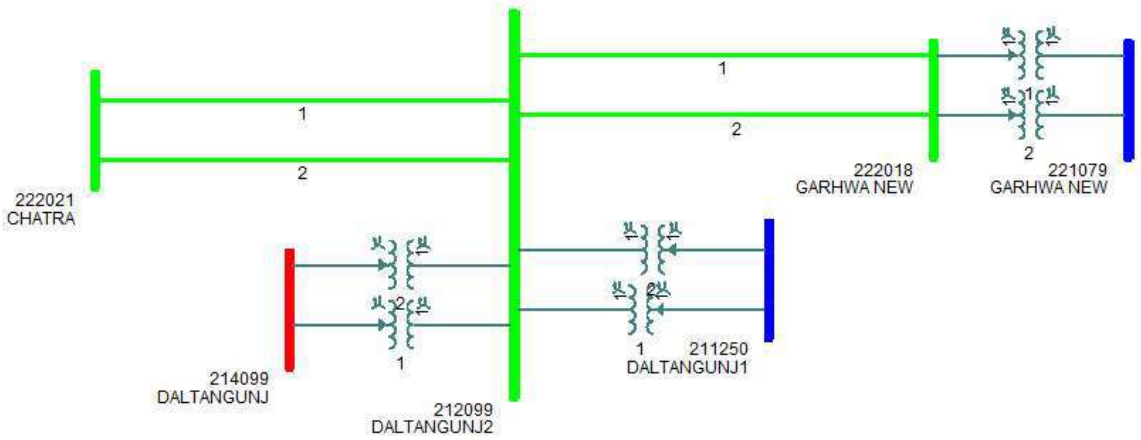
A. Total Power failure at 220 kV Chatra(JUSNL) S/s on 01.07.2022 at 13:50 Hrs

At 13:48 Hrs, 220 kV Daltonganj-Chatra 1 tripped on R phase fault. At 13:50 Hrs, 220 kV Daltonganj-Chatra-2 also tripped on R phase fault leading to total power failure at 220/132 kV Chatra S/s.

Disturbance report is attached at **Annexure B.8.A.**

Relay Indications:

Time	Name	End1	End2	PMU Observations
13:48	220 kV Daltonagnj-Chatra-1	Daltonganj: R_N, 8.51 kA, A/r successful	Chatra: R_N, 0.147 kA, Zone-2, 373 km	75 kV dip in R_ph voltage at 1st instance. 80 kV dip in R_ph voltage at 2nd instance. Fault clearance time< 100 msec in both instances.
13:50	220 kV Daltonagnj-Chatra-2	Daltonganj: R_N, 6.19 kA, A/r successful	Chatra: R_N, 0.122 kA, Zone-2, 323 km	



Load Loss: 23 MW
Outage Duration: 01:06 Hrs

JUSNL may explain.

B. Total Power failure at 220 kV Chatra(JUSNL) S/s on 14.07.2022 at 16:17 Hrs

At 16:17 Hrs, 220 kV Daltonganj-Chatra 1 & 2 tripped within an interval of 48 seconds. Consequently, 220/132 kV Chatra S/s became dead.

Detailed report from ERLDC is attached at **Annexure B.8.B.**

Relay Indications:

Name	End1	End2	PMU Observations
220 kV Daltonagnj-Chatra-1	Daltonganj: B_N, 97 km, 1.21 kA	Chatra: B_N, 392 km, 0.5 kA	1st tripping: Gradual dip in B_ph voltage. Fault clearance time around 3 seconds. 2nd tripping: 22 kV dip in Y_ph and 24 kV dip in B_ph at Daltonganj. Fault clearance time<100 msec
220 kV Daltonagnj-Chatra-2	Daltonganj: Y_B, Iy=Ib=2.48 kA	-	

Load Loss: 20 MW
Outage Duration: 00:44 Hrs

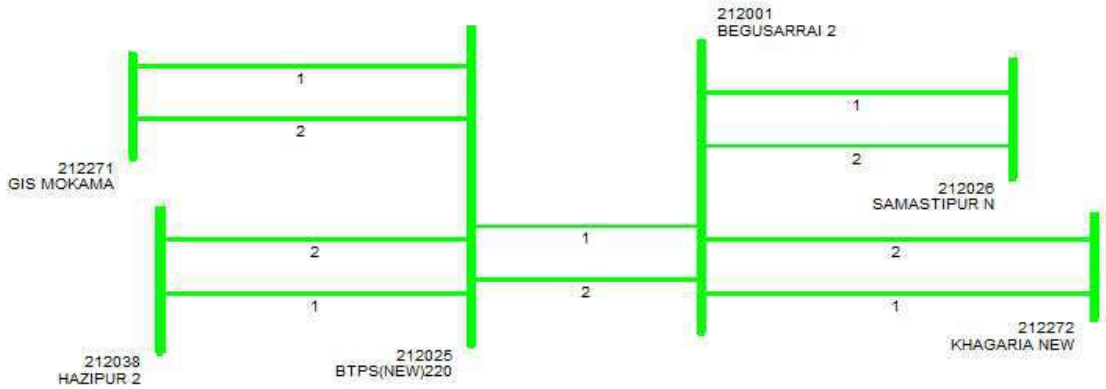
JUSNL may explain.

ITEM NO. B.9: Repeated Disturbances at 220kV BTPS (NTPC)

A. Disturbance at 220kV BTPS (NTPC) on 06.07.2022 at 15:34 Hrs

On 06/07/2022 at 15:34 hrs, 220kV Begusarai S/S became dead and all emanating lines tripped from Begusarai end due to blast of Y phase CT of 220kV bus coupler bay at Begusarai. At the same time 220 kV Barauni- Hajipur -I, tripped from Barauni end on overcurrent (overload) protection resulting in tripping of Barauni unit 8 & 9 due to overspeed.

Detailed report from ERLDC is attached at **Annexure B.9.A.**



Load Loss: 223 MW, Gen. Loss: 460 MW
Outage Duration: 00:36 Hrs

BSPTCL & BTPS may explain.

B. Disturbance at 220kV BTPS (NTPC) on 11.07.2022 at 21:04 Hrs

R-phase high level jumper of 132kV Main Bus at GSS Begusarai got snapped resulting in tripping of all feeders connected to Begusarai S/S. At the same time 220 kV Barauni- Hajipur -1 tripped from Barauni end on overcurrent resulting in tripping of Barauni unit 8 & 9 due to loss of evacuation path.

Disturbance report is attached at **Annexure B.9.B.**

Load Loss: 300 MW, Gen. Loss: 460 MW
Outage Duration: 00:33 Hrs

BSPTCL & BTPS may explain.

ITEM NO. B.10: Tripping of 220 kV TLDP IV-NJP line. (Agenda by NHPC)

A. Tripping of 220 kV TLDP IV-NJP circuit 2 on 20/06/2022 at 18:37 Hrs

On 20/06/2022 at 18:37 Hrs, three phase tripping occurred on single phase fault in 220 kV TLD-IV-NJP circuit 2.

Relay Indications:

Name	TLD-IV end	Remarks
220 kV TLD-IV-NJP circuit 2	B-N phase, 1.1 kA,IN>2 trip Zone 2 started	69.57 kV dip in B phase voltage at TLD-IV end. Due to non- receipt of carrier signal three phase tripping occurred.

B. Tripping of 220 kV TLDP IV-NJP circuit 1 and circuit 2 on 27/07/2022 at 07:01 Hrs

On 27/07/2022 at 07:01 Hrs, three phase tripping occurred on single phase fault in 220 kV TLD-IV-NJP circuit 1 and 2.

Relay Indications:

Time	Name	TLD-IV end	Remarks
07:01	220 kV TLD-IV-NJP circuit 1	R-N phase, 897 A, DT received, A/R started in R phase, zone 2 started	71.81 kV dip in R phase voltage at TLD-IV end. Upon receipt of carrier signal A/R operation started, however within 26 ms Direct trip was received from NJP end and three phase tripping occurred.
07:01	220 kV TLD-IV-NJP circuit 2	R-N phase, 947 A, IN>2 trip Zone 2 started	75.49 kV dip in B phase voltage at TLD-IV end. Due to non-receipt of carrier signal three phase tripping occurred.

Due to non-receipt of carrier signal, auto-reclose operation was blocked and three phase tripping had occurred twice on single phase fault in 220 kV TLD-IV-NJP circuit 2 on 20/06/2022 and 27/07/2022.

Similarly due to receipt of Direct trip (DT) signal from remote end, auto-reclose operation was blocked and three phase tripping occurred on single phase fault in 220 kV TLD-IV-NJP circuit 1 on 27/07/2022.

NHPC & WBSETCL may explain.

ITEM NO. B.11: Major grid events other than GD/GI

B11.1: Bus tripping occurred in Eastern Region during July 2022

During July 2022, following incidents of bus bar tripping have been observed in Eastern Region.

Element Name	Tripping Date	Reason	Utility
220 kV Main Bus-2 at Rangpo	11.07.22 at 10:03 Hrs	Gas zone tripping command initiated from Rongnichu-2 bay at Rangpo	PG ER-2
400 kV Main Bus-2 at PPSP	18.07.2022 at 23:35 Hrs	-	WBSEDCL
220 kV Main Bus-2 at Ramchandrapur	22.07.2022 at 07:06 Hrs	Bus bar protection operated	JUSNL
220 kV Main Bus-1 at Ramchandrapur	26.07.2022 at 16:28 Hrs	Bus bar protection operated	JUSNL

220 kV Main Bus-1 at Ramchandrapur	27.07.2022 at 10:55 Hrs	Bus bar protection operated	JUSNL
400 kV Main Bus-1 at Ranchi	28.07.22 at 17:26 Hrs	LBB operated	PG ER-1
220 kV Main Bus-1 at Mendhasal	30.07.2022 at 00:11 Hrs	-	OPTCL

Concerned utilities may explain.

B11.2: Repeated Tripping of Transmission Lines and associated issues

Following lines had tripped repeatedly in the month of July'22.

S.No.	Name of the Element	No. of times Tripped	Remarks	Utility
1	132 Kahalgaon (BSEB)-Lalmatia-1	16	Tripped due to O/c in R phase most of the time. Charged within an hour barring 2-3 instances	BSPTCL/ JUSNL
2	132 kV Deoghar-Sultanganj	7	Fault around 8 km or 23 km from Sultanganj	BSPTCL/JUSNL
3	132 kV Banka (PG)-Sultanganj-2	6	Fault in R phase around 31 km or 45 km from Banka	BSPTCL
4	132 kV Rihand-Garhwa	6	Tripped from Rihand end only	JUSNL

Concerned utilities may explain.

ITEM NO. B.12: Non-submission of detailed report of Grid events from utilities

Delay in submission of detailed report of Grid Events along with DR/EL had been observed despite repeated reminders. Reporting status for Grid Events for the month of July'22 is given below:

GD/GI Details	Date/Time of Disturbance	Reporting Status	Utility
GD-1 at Chatra	01-07-2022 13:50	DR/EL received	JUSNL
GI-1 at IB TPS	03-07-2022 01:39	Not received yet	OPTCL, OPGC
GD-1 at Barauni	06-07-2022 15:34	Report Received on 03.08.22 alongwith DR/EL	BSPTCL
GD-1 at Ramchandrapur	09-07-2022 14:27	Not received yet	JUSNL
GD-1 at Begusarai, Barauni	11-07-2022 21:04	Report Received on 03.08.22 alongwith DR/EL	BSPTCL
GD-1 at Keonjhor	12-07-2022 09:27	Report received on 13.07.22	PG Odisha
GD-1 at Chatra	14-07-2022 16:17	DR/EL received	JUSNL

GD-1 at Alipurduar	14-07-2022 17:43	Report received on 28.07.22	WBSETCL
GD-1 at Bantala (KLC)	23-07-2022 08:46	Report received on 29.07.22	WBSETCL
GD-1 at Joda, JSPL	27-07-2022 11:30	Not received yet	OPTCL
GD-1 at Hajipur, Amnour	31-07-2022 00:28	Not received yet	BSPTCL

Members may discuss.

ITEM NO. B.13: Tripping Incidence in month of July-2022

Single line tripping incidents in the month of July-2022 which needs explanation from constituents of either end is attached at **Annexure B.13.**

Concerned utilities may explain.

PART- C :: OTHER ITEMS

ITEM NO. C.1: Follow-up of Decisions of the Previous Protection Sub-Committee Meeting(s)

The decisions of previous PCC meetings are attached at **Annexure C.1.**

Members may update the latest status.

ITEM NO. C.2: Compliance of 3rd Party Protection Audit Team Observations

3rd party protection audit of various substations in Odisha was carried out from 25.04.2022 to 28.04.2022 by audit team. The observation of audit team is attached at **Annexure C.2.**

In 114th PCC meeting, concerned utilities were advised to comply the recommendations submitted by audit team.

Concerned utilities may update.

ITEM NO. C.3: Schedule for 3rd party Protection Audit by ERPC Protection Team.

3rd Party protection audit for the following substations have been carried out by ERPC Protection audit team in the month July-22.

1. 400 kV Jamshedpur (Powergrid) S/s
2. 220 kV Ramchandrapur (JUSNL) S/s
3. 220 kV Chandil (JUSNL) S/s
4. 220 kV Jamshedpur (DVC) S/s
5. 400/220 kV Chaibasa (Powergrid) S/s
6. 220 kV Chaibasa New (JUSNL) S/s

For the month of Sep-22, protection audit of following substations has been planned.

1. 220 kV Barauni TPS(NTPC)
2. 220 kV Begusarai S/s(BSPTCL)
3. 220 kV Hajipur S/s(BSPTCL)
4. 220 kV Mokama S/s
5. 400/220 kV Saharsa S/s(PMTL)

Members may discuss.

ITEM NO. C.4: Submission of protection settings in PDMS

Relay settings of various newly added transmission elements are not available in the protection database. Also, existing settings of some the relays have been revised due to change in network configuration however the settings have not been updated in PDMS. A list has been prepared based on the information available through OCC/PCC forum and the same is enclosed at **Annexure C.4.**

In 116th PCC meeting, concerned utilities are advised to upload the relay settings in PDMS or send the relay settings to erpc-protection@gov.in . Subsequently the settings data was received from

Powergrid ER-1 & PMTL.

PRDC may update. Members may note & comply.

ITEM NO. C.5: Schedule of Training Program on PSCT and PDMS by PRDC

As part of 5th year support period, PRDC is going to conduct online training program for Bihar, Odisha as per the following schedule.

Sl No.	Date	State
1	24.08.2022-25.08.2022	Bihar
2	31.08.2022-01.09.2022	Odisha

Members may note.

ITEM NO. C.6: Collection of Substation data by PRDC

In 116th PCC meeting, substation visit of following new substations have been planned by PRDC team to collect the necessary protection settings data.

SL NO	NEW SUBSTATION	VOLTAGE LEVEL	UTILITY	State
1	SAHARSA	400/220 kV	PMTL	Bihar
2	CHATRA	220 kV	JUSNL	Bihar
3	KARAMNASA(NEW)	220 kV	BSPTCL	Bihar
4	JAKKANPORE	400/220 kV	BGCL	Bihar
5	NAUBATPUR	400/220 kV	BGCL	Bihar
6	RAXUAL	220 KV	BSPTCL	Bihar
7	MOKAMAH	220 kV	BGCL	Bihar
8	SAHUPURI	220 kV	BSPTCL	Bihar
9	NPGCL	400 kV	NTPC	Bihar
10	GOBINDPUR	220 kV	NKTL	Jharkhand
11	JAINAMORE	220 kV	JUSNL	Jharkhand
12	DHANBAD	220 kV	JUSNL	Jharkhand
13	Rongichu	220 kV	MBPCL	Sikkim
14	Jorethang	220 kV	Dans Energy	Sikkim
15	MERAMUNDALI B	400 kV	OPTCL	Odisha

PRDC may update the present status.

ITEM NO. C.7: New Element Integration

C.6.1: FTC of 400 kV New Jeerat-Subhasgram D/c line

As per information received, 400 kV New Jeerat-Subhashgram D/c is going to be first time charged.

Line parameters are as below:

Name	Conductor Type	Length

400 kV New Jeerat-Subhashgram D/c	Quad Moose	107 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 400 kV New Jeerat-Subhashgram D/c	400 kV New Jeerat-Subhashgram D/c	New Jeerat, Subhashgram	PMJTL, PG ER-2	Protection coordination to be done for newly connected elements as per ERPC guidelines.
	400 kV Jeerat-New Jeerat D/c	Jeerat	WBSETCL	Adjacent longest line will now be 400 kV New Jeerat-Subhashgram D/c (107 km). Hence Zone-3 settings may be reviewed keeping in view it should not encroach next voltage level.
	400 kV Jeerat-Subhashgram			
	400 kV Rajarhat-Subhashgram	Rajarhat	PG ER-2	
	400 kV Haldia (HEL)-Subhashgram	Haldia	HEL (CESC)	

- 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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पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)
Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033.
CIN: U40105DL2009GOI188682
फ़ोन: 033- 24235755, 24174049 फैक्स : 033-24235809/5029 Website:www.erldc.org, Email ID- erldc@posoco.in

घटना संख्या: **03-07-2022/1** दिनांक: **10-08-2022**

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

Summary of the event (घटना का सारांश):

At 01:39 Hrs, 220 kV IBTPS-Budhipadar-2,3,4 tripped successively due to multiple faults along with both station transformer at IBTPS. IBTPS U#2 tripped due to loss of all fuel. At 01:45 Hrs, IBTPS U#1 also tripped due to loss of auxiliary supply. Total 323 MW generation loss occurred at IBTPS.

- **Date / Time of disturbance:** 03-07-2022 at 01:39 hrs
- **Event type:** GI-1
- **Systems/ Subsystems affected:** 220 kV IBTPS S/s
- **Load and Generation loss**.
  - 323 MW generation loss occurred during the event at IBTPS.
  - 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 IBTPS-Budhipadar-2,3,4
- 210 MW U#1 and U#2 at IBTPS

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

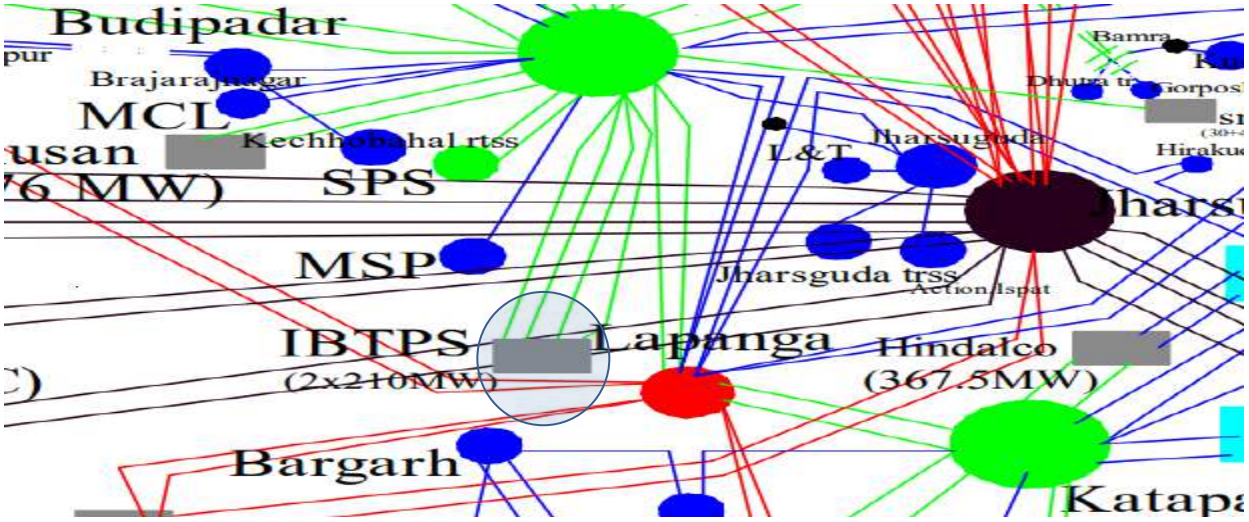


Figure 1: Network across the affected area

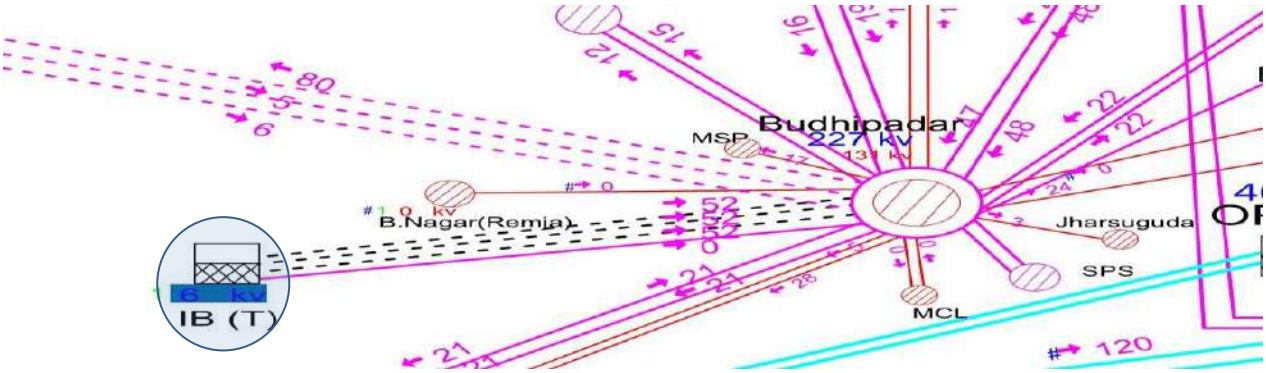


Figure 2: SCADA snapshot of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
01:39	220 kV IBTPS-Budhipadar-3	IBTPS: R_N, Zone-1, 13 kA	Budhipadar: R_N, Zone-2, 30.1 km(118.8%), 3.15 kA	Three successive faults observed from PMU.
	220 kV IBTPS Budhipadar-4	IBTPS: R_N, Zone-4, 4.00 kA	Budhipadar: R_B, Zone-2, 23.4 km, Ir=Ib=8.78 kA	
	220 kV IBTPS-Budhipadar-2	IBTPS: R_N, Zone-4, 4.00 kA	Budhipadar: Didn't trip	
	210 MW IBTPS U#2	Loss of all fuel		
01:45	210 MW IBTPS U#1	Loss of auxiliary supply		

Figure 3: PMU Voltage snapshot of 220/132 kV Budhipadar S/s

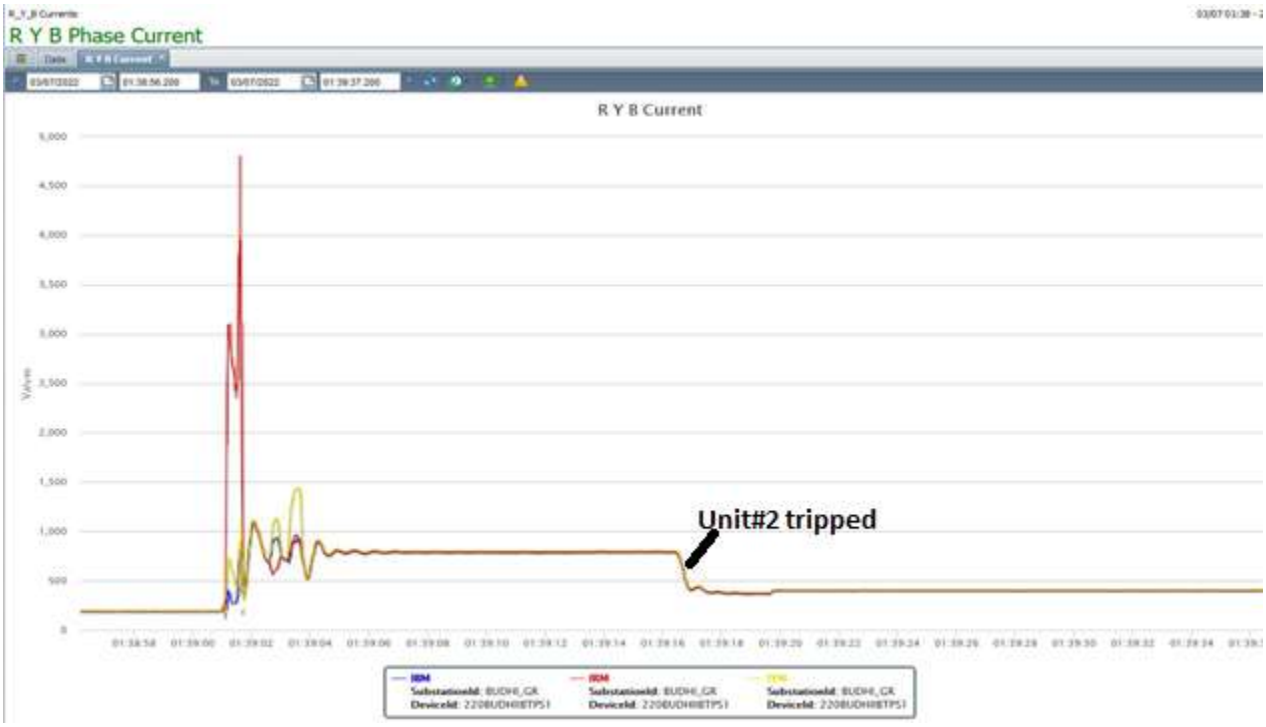


Figure 4: PMU Current snapshot of 220 kV Budhipadar-IBTPS-1 (Budhipadar end)

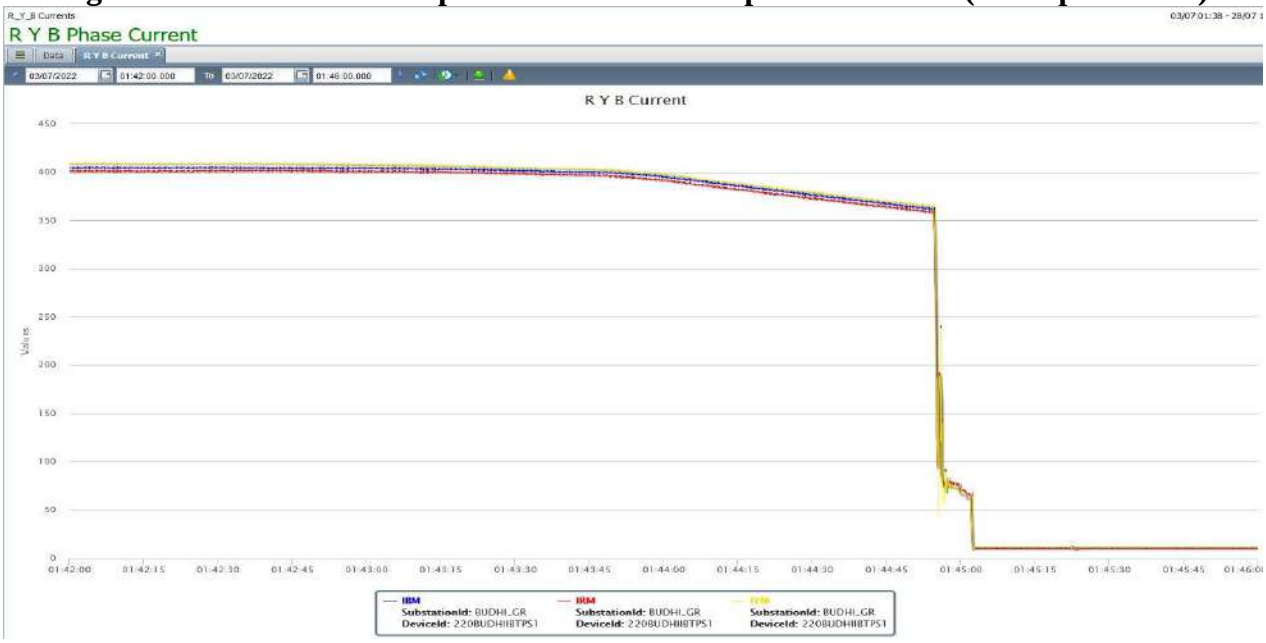


Figure 5: PMU Current snapshot of 220 kV Budhipadar-IBTPS-1 (Budhipadar end)

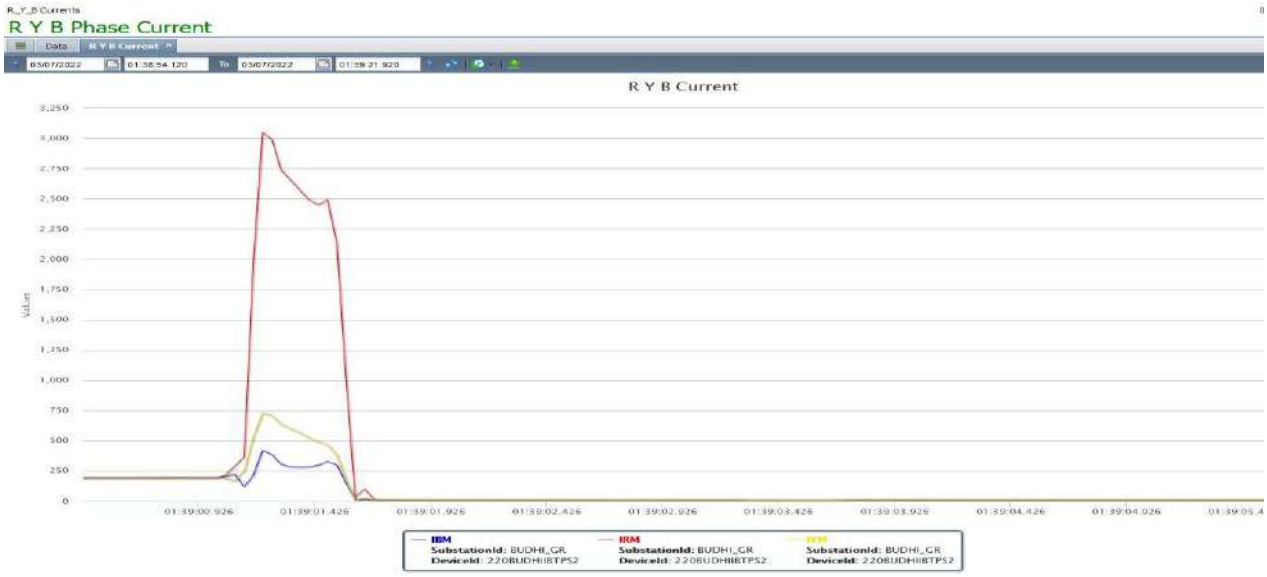


Figure 6: PMU Current snapshot of 220 kV Budhipadar-IBTPS-2 (Budhipadar end)

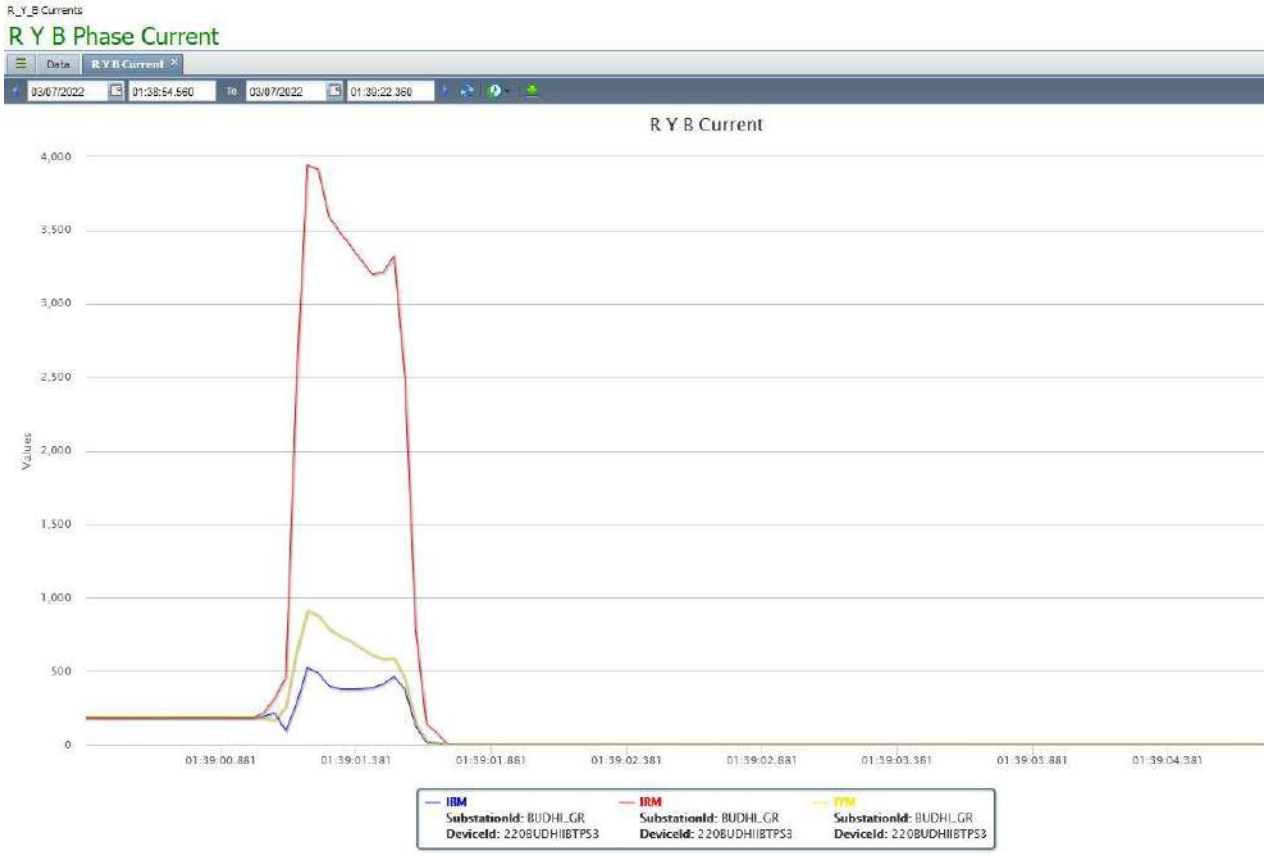


Figure 7: PMU Current snapshot of 220 kV Budhipadar-IBTPS-3 (Budhipadar end)

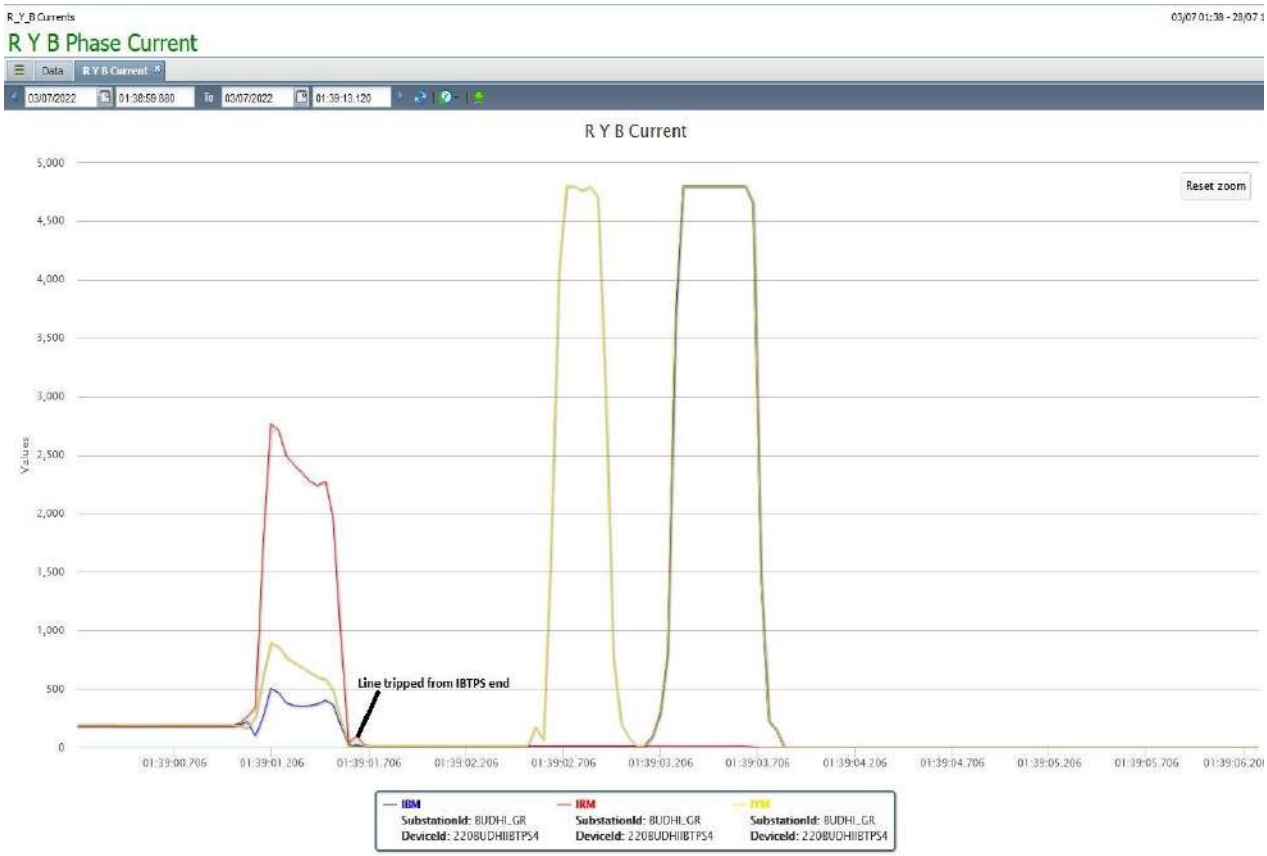


Figure 8: PMU Current snapshot of 220 kV Budhipadar-IBTPS-4 (Budhipadar end)

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV IBTPS-Budhipadar-3	04:03
220 kV IBTPS-Budhipadar-4	18:53
220 kV IBTPS-Budhipadar-2	03:19
210 MW IBTPS U#1	14:01
210 MW IBTPS U#2	10:49

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

- As per PMU, three successive faults observed at the time of incident.
- As reported, B_ph line isolator drop of 220KV Budhipadar IB Ckt IV found snapped and Yph CB pad clamp found damaged inside220KV Budhipadar switchyard.
- Ground wire snapped between loc no. 89 and loc no. 92 upto loc no. 93. Loc no. 93 inside IBTPS boundary and loc no 89 to 92 outside IBTPS boundary.
- Sequence of Events (As per PMU):

Time	Event	Remarks
01:39:01.120	R_ph fault struck 220 kV IBTPS-3	Fault persisted for around 450 msec.
01:39:01.600	220 kV Budhipadar-IBTPS-3 tripped due to R_N fault. 220 kV Budhipadar-IBTPS-2 & 4 also tripped from IB TPS end only.	Fault in Ckt-3 was seen in Zone-1 from IBTPS, however, delayed fault clearance was observed.
01:39:02.600	Y_ph fault struck 220 kV Budhipadar-IBTPS-4 which persisted for around 400 msec but line didn't trip from Budhipadar end.	
01:39:03.120	Y_B fault struck 220 kV Budhipadar-IBTPS-4 which was cleared in around 500 msec. Line tripped from Budhipadar end.	
01:39:16.400	210 MW U#2 tripped due to loss of all fuel.	
01:44:54.760	210 MW U#1 tripped due to loss of auxiliary supply.	

- Whether 220 kV Budhipadar-IBTPS-1 tripped or not. **OPTCL and OPGC to confirm**.
- When did 220 kV Budhipadar-IBTPS-3 tripped from IBTPS end? **OPGC to confirm**.
- Tripping details of station transformers may be furnished. **OPGC to furnish.**
- 220 kV Budhipadar-IBTPS 2 & 4 tripped in Zone-4. Zone-4 time delay at IBTPS end of all lines may be revised to 500 msec as per ERPC guideline at the earliest. **OPGC to confirm.**
- DR/EL as well as detailed report not submitted yet. SLDC Odisha may take up with OPTCL and OPGC.

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	**OPTCL, OPGC**

Status of Reporting (रिपोर्टिंग की स्थिति):

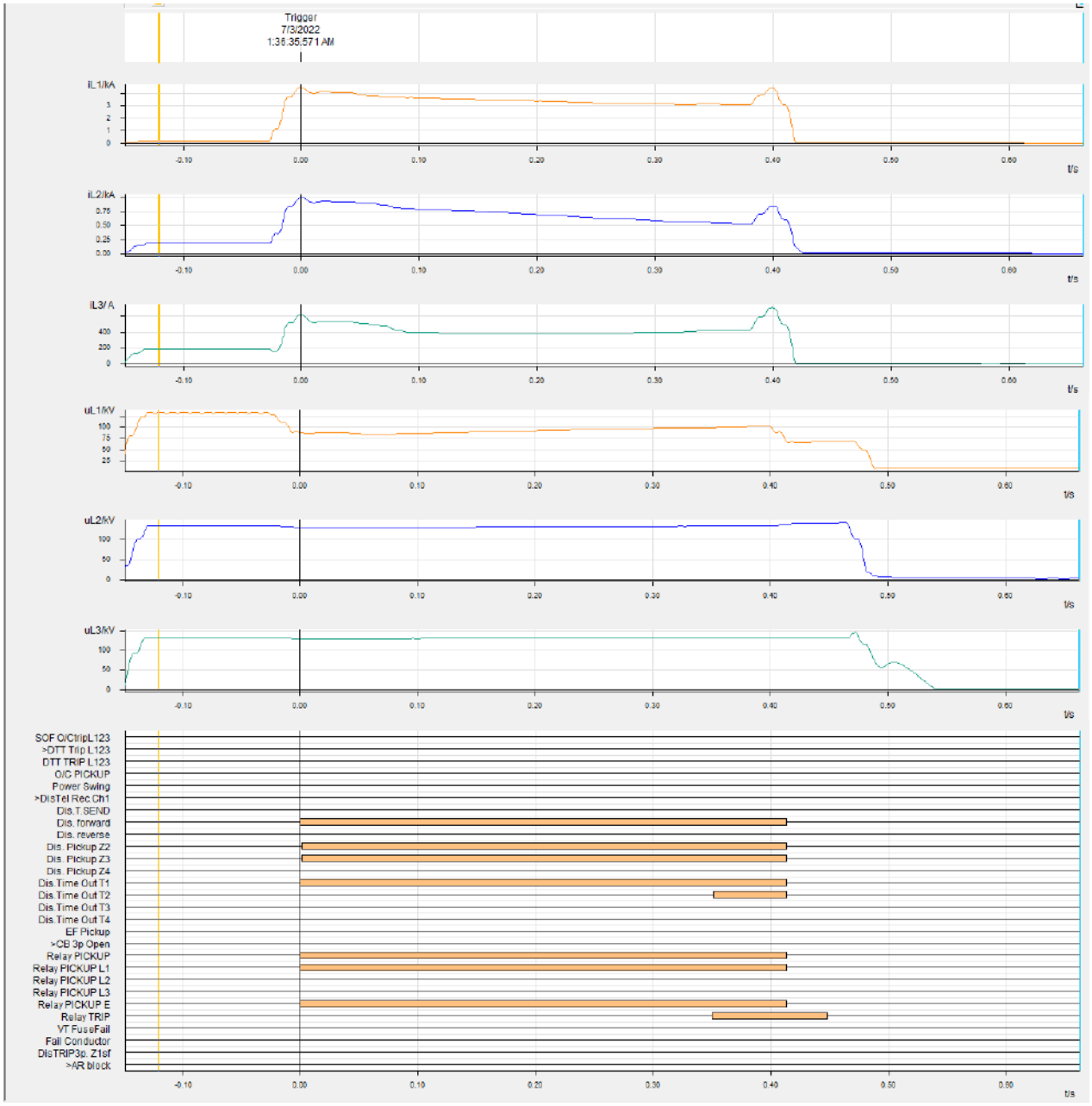
- DR/EL yet to be received from OPGC

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

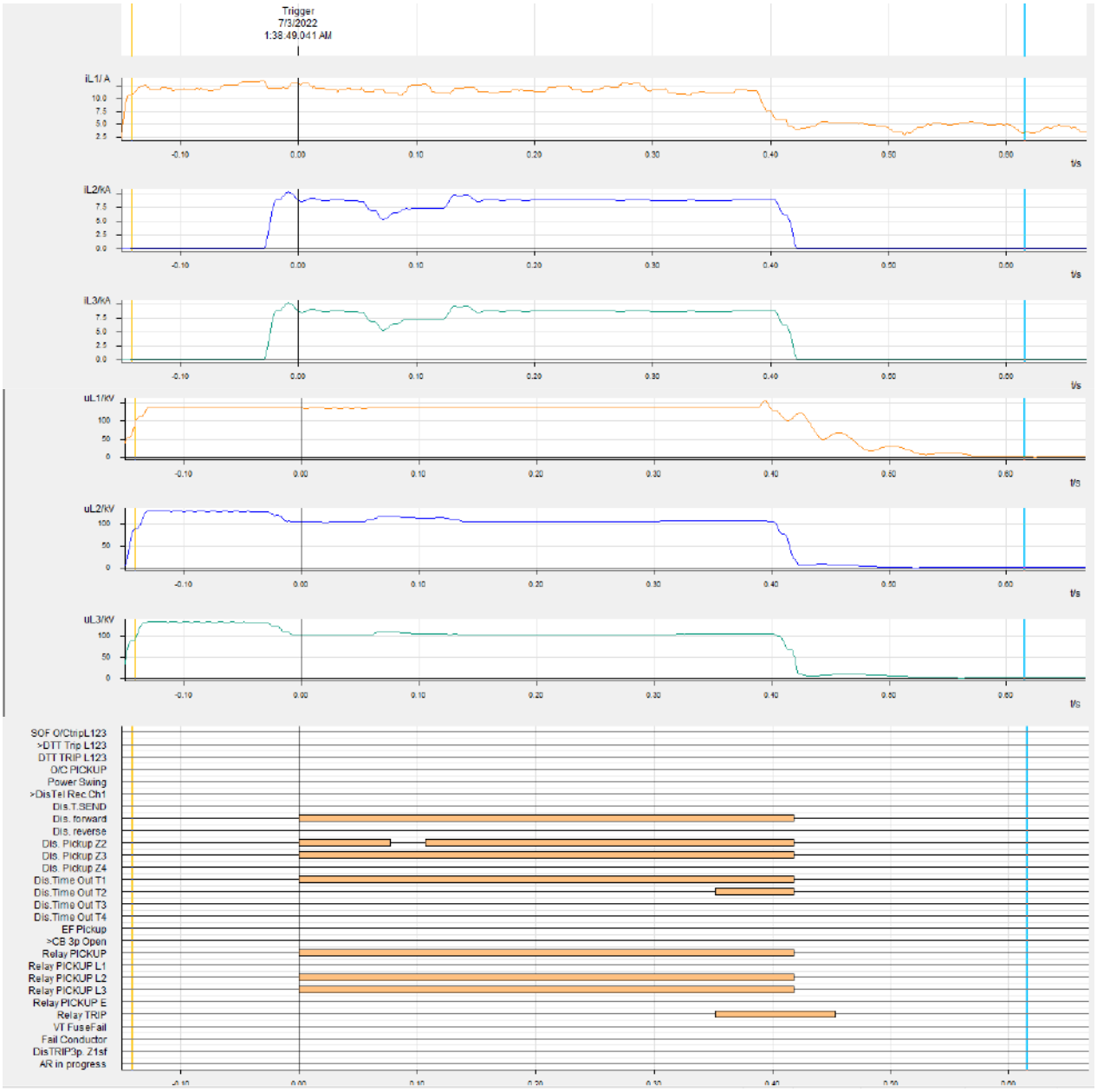
Sequence of event not recorded at time of event.

Annexure 2: DR recorded

DR of 220 kV Budhipadar-IBTPS-3 (Budhipadar end)



DR of 220 kV Budhipadar-IBTPS-4 (Budhipadar end)



पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)
Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033.
CIN: U40105DL2009GOI188682
फ़ोन: 033- 24235755, 24174049 फैक्स : 033-24235809/5029 Website:www.erldc.org, Email ID- erldc@posoco.in

घटना संख्या: **27-07-2022/1** दिनांक: **10-08-2022**

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

Summary of the event (घटना का सारांश):

At 11:30 Hrs, 220 kV Joda-TTPS-2 tripped due to R_N fault. Prior to this, 220 kV Joda-TTPS-1 already tripped at 10:25 Hrs due to phase-to-phase fault. Total power supply failed at Joda along with TSIL and JSPL(CPPs) as both CPPs went into islanded mode with Joda S/s which didn't survive. Total 150 MW load loss reported at Joda by Odisha SLDC.

- **Date / Time of disturbance:** 27-07-2022 at 11:30 hrs
- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Joda S/s
- **Load and Generation loss**.
    - No generation loss occurred during the event.
    - Around 150 MW load loss reported during the event by Odisha SLDC

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

- 220 kV Joda-TTPS-1 (Tripped at 11:25 Hrs)
- 220 kV Jamshedpur (DVC)-JSPL (Switched off at 09:26 Hrs)
- 220 kV Joda-Ramchandrapur (Under breakdown since 16:27 Hrs, 26.07.22)

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Joda-TTPS-2
- 220 kV Joda-JSPL
- 220 kV Joda-TSIL

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

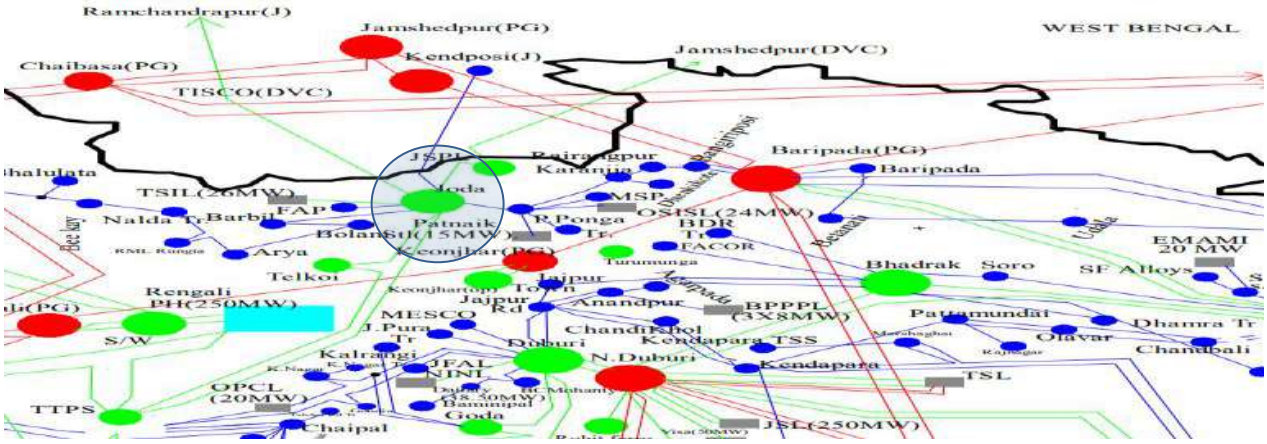


Figure 1: Network across the affected area

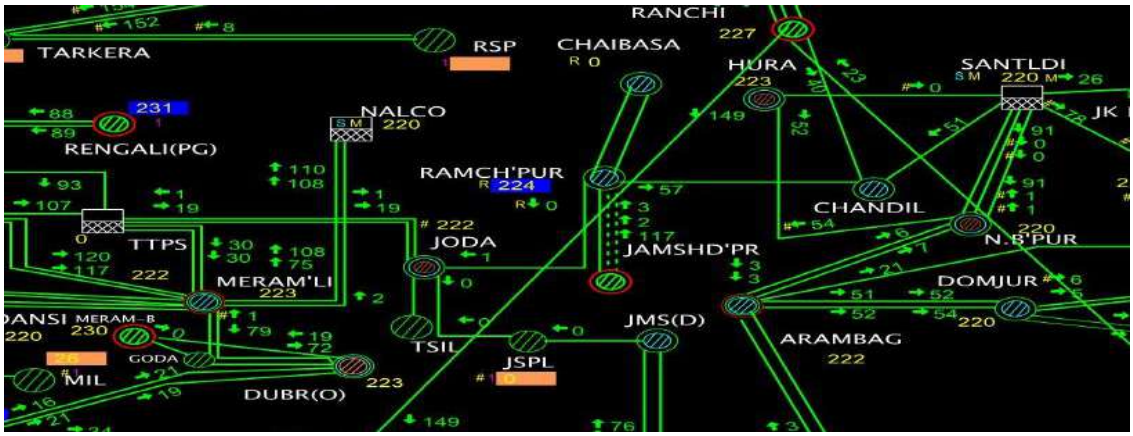


Figure 2: SCADA snapshot of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
11:30	220 kV Joda-TTPS-2	-	TTPS: R_N, Zone-2, 134.1 km, 1.22 kA	6 kV dip in R_ph voltage at TTPS. Fault clearance time: 500 msec
	220 kV Joda-JSPL	Loss of supply		
	220 kV Joda-TSIL	Loss of supply		

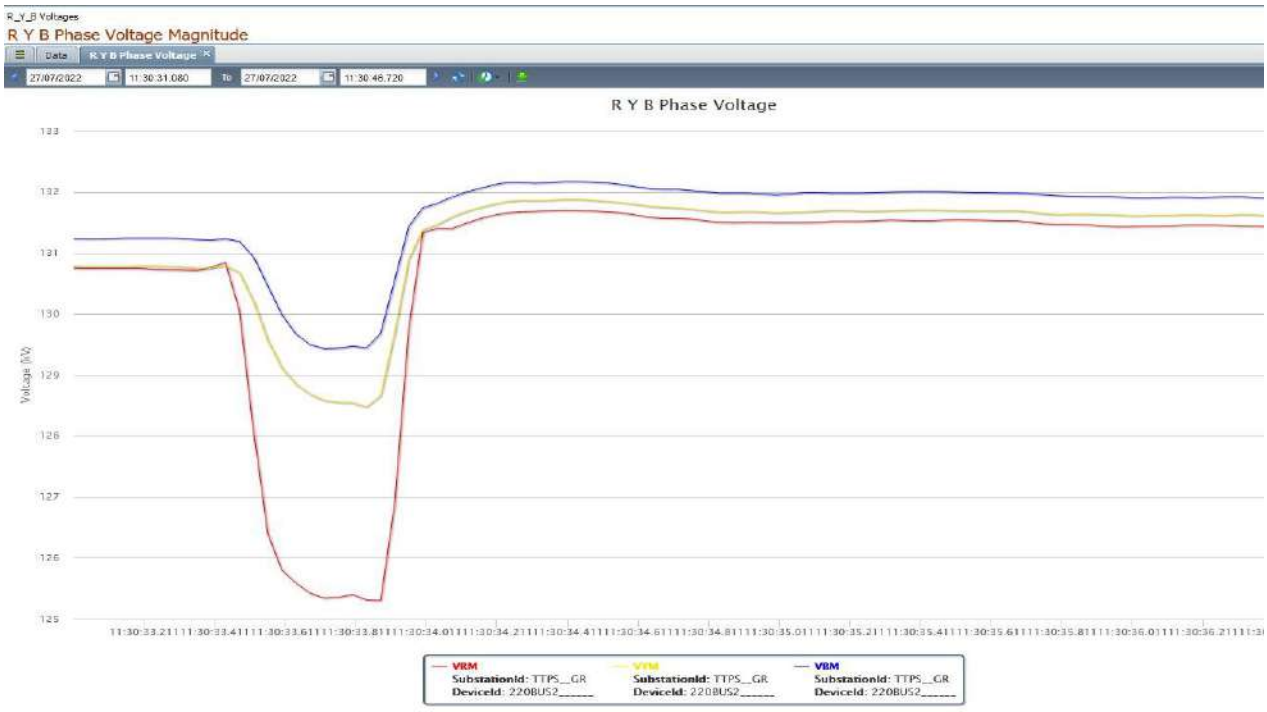


Figure 3: PMU snapshot of 220 kV TTPS S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Joda-TTPS-2	11:45
220 kV Joda-JSPL	11:50
220 kV Joda-TSIL	11:49

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

- 220 kV Joda-TTPS-1 tripped at 10:25 Hrs due to phase-to-phase fault.
- At 11:30 hrs, 220 kV Joda-TTPS-2 also tripped due to R_N fault. Line tripped in Zone-2 time from TTPS end. Status of carrier protection maybe updated by OPTCL.
- Consequently, Joda S/s along with CPPs JSPL and TSIL went into islanded mode, which didn't survive.
- Load loss details of JSPL and TSIL not received yet.

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	**OPTCL**

Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL yet to be received from OPTCL

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

Sequence of event not recorded at time of event.

Annexure 2: DR recorded

DR/EL not received.

पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
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घटना संख्या: **12-07-2022/1** दिनांक: **29-07-2022**

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

1. Summary of the event (घटना का सारांश):

At 09:27 Hrs on 12th June 2022, 220 kV side of Keonjhor S/s became dead during isolator switching operation for shutdown of 400 kV Baripada-Keonjhor. As reported, due to opening of bus side isolator of dia element of Baripada line instead of its own bus side isolator at Keonjhor, bus fault occurred and 400 kV Bus-2 at Keonjhor tripped. Inter-trip command sent to LV CB of both 400/220 kV ICTs and 220 kV side became dead. As reported 8 MW load loss occurred in radially fed Keonjhor area.

- **Date / Time of disturbance:** 12-07-2022 at 09:27 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 400/220 kV Keonjhor, 220/132 kV Keonjhor (OPTCL)
- **Load and Generation loss**.
  - No generation loss occurred during the event.
  - 8 MW load loss reported during the event.

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

- 400 kV Baripada-Keonjhor (Shutdown being availed)

3. Major elements tripped (प्रमुख ट्रिपिंग)

- 400 kV Bus-2 at Keonjhor
- 400/220 kV ICT-1 & 2 at Keonjhor
- 80 MVAr Bus Reactor 1 at Keonjhor

4. Network across the affected area (प्रभावित क्षेत्र का नक्शा)

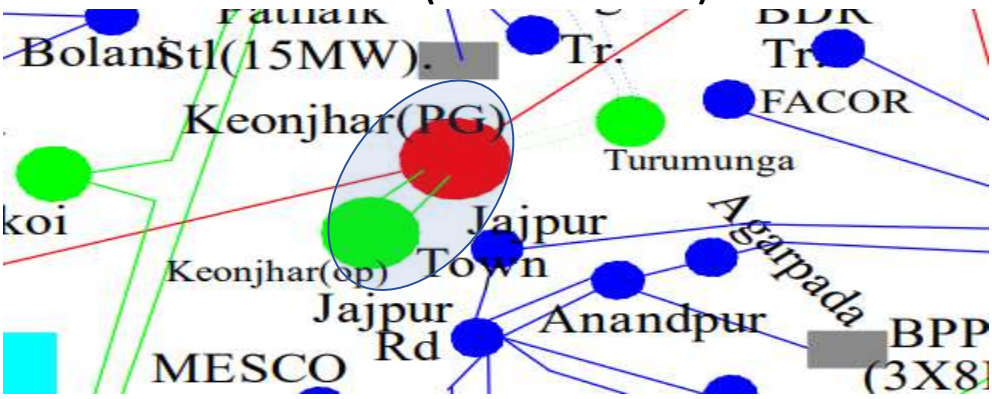


Figure 1: Network across the affected area

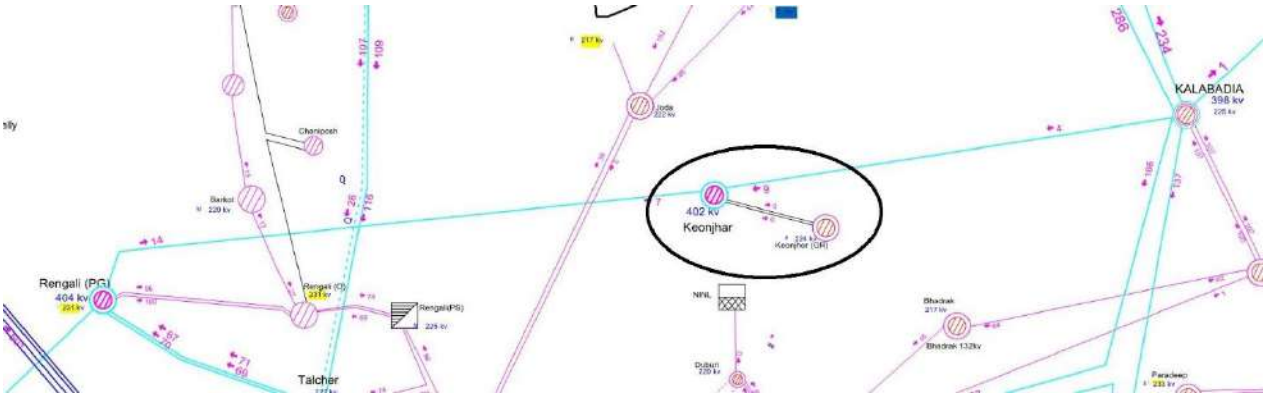
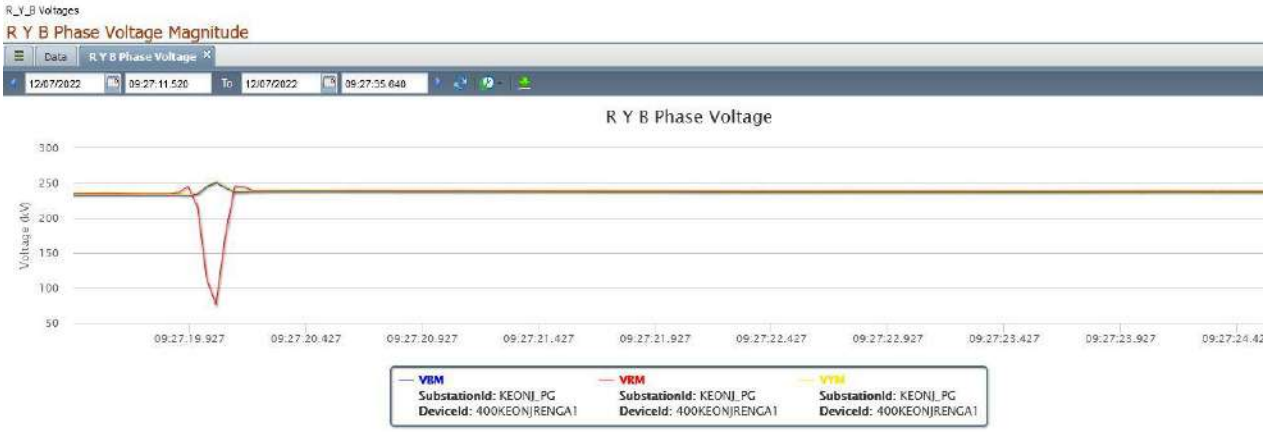


Figure 2: SCADA snapshot for of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
09:27	400 kV Bus-2 at Keonjhor	Bus bar protection operated		160 kV dip in R_ph voltage at Keonjhor S/s. Fault clearance time < 100 msec
	400/220 kV ICT-1 & 2 at Keonjhor	Tripped from 220 kV side due to inter-trip signal		
	80 MVAr Bus Reactor-1 at Keonjhor	Bus bar protection operated		



PMU Voltage snapshot of 400/220 kV Keonjhor S/s

5. Restoration (पूर्वावस्था की प्राप्ति)

Transmission/Generation element name	Restoration time
400 kV Main Bus-2 at Keonjhor	10:38
400/220 kV ICT-1&2 at Keonjhor	10:30
80 MVAr Bus Reactor-1 at Keonjhor	14:42

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

- Shutdown of 400 kV Baripada-Keonjhor was being availed. During opening of isolator of main bay of the line at Keonjhor end, bus side isolator of main bay of its dia element was opened inadvertently, which led to operation of bus bar protection and 400 kV Bus-2 tripped. **PG Odisha may confirm whether interlocking scheme is available or not to avoid opening of isolator with CB in close position.**
- 400/220 kV ICT-1 & 2 tripped as inter-trip command relayed to 220 kV CBs after operation of bus bar protection of 400 kV Bus-2. As reported, status of tie CB wasn't taken to extend tripping command to LV side as per logic. **PG Odisha may confirm whether this logic is modified.**
- Report from PG Odisha is attached at Annexure 3.

7. 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 Odisha**

8. Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL yet to be received from PG Odisha.

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

DR/EL not received yet.

Preliminary report on Bus tripping at Keonjhar on 12.07.22

STATION:	**400/220KV Keonjhar S/s**
Tripping event Date & Time	12/07/2022 09:27:17 hrs
Details	During planned S/D of 400KV Baripada line, BUS-2 and 220KV side CBs of ICT-1 & 2 tripped.
Connectivity	**400KV side: Bus-1:** Baripada, Rengali. **Bus-2:** B/R-1 & 2 and ICT-1 &2 **220KV side:** Ramky-1&2

Sequence of Events of Keonjhar S/S Tripping/ Bus-2 Fault dt.12.07.2022

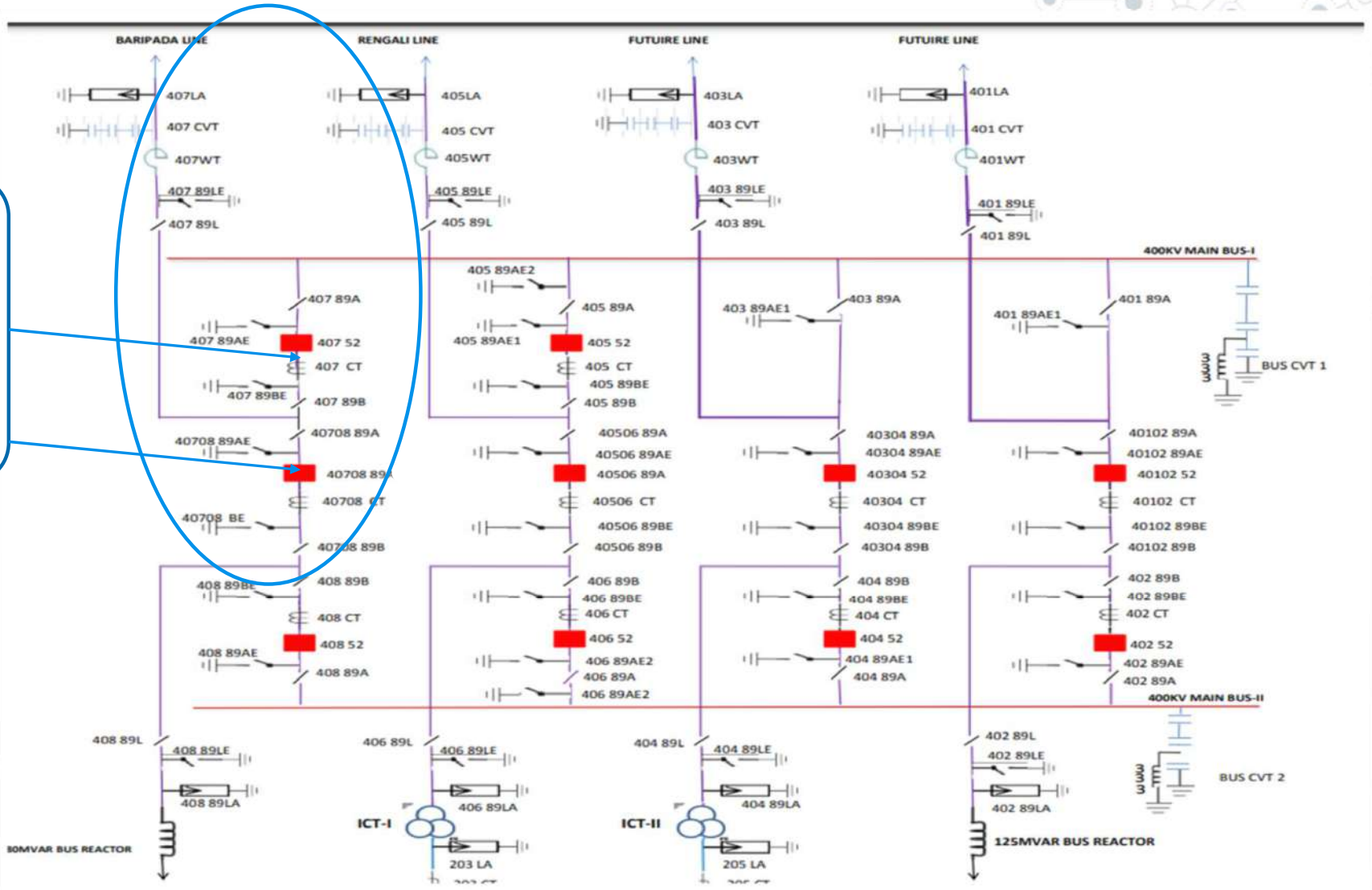
Sl.no.	Time	Equipment Id	Status
1	09:02:33	4070852 CB (Tie Bay)	Opened for S/D Mtc
2	09:02:52	40752 CB (Main Bay)	Opened for S/D Mtc
3	09:23:09	407LIS (Keonjhar-Baripada Line Isolator)	Open
4	09:23:53	40789B	Open
5	09:24:44	4070889A	Open
6	09:25:18	4070889B	Open
7	09:25:39	40789A	Open Command issued but not Executed
8	09:27:08	40652	86A Trip Relay Operated
9	09:27:09	40852	Open (BR-1)
10	09:27:10	408	86B Trip Relay optd(BR-1)
11	09:27:12	203 ICT-1 T/F Sec	86TRIP RLY OPTD
12	09:27:12	205 ICT-2 T/F Sec	86TRIP RLY OPTD
13	09:27:14	406 -ICT-1	86B Trip Relay optd
14	09:27:14	404 ICT-2	86B Trip Relay optd
15	09:27:14	40452 CB	OPEN
16	09:27:14	40652 CB	OPEN
17	09:27:14	40252 CB	OPEN

Analysis

1. The 400KV Keonjhar -Baripada Line Isolation was already done (Both Main (40752 CB) and Tie (407-0852CB) Opened from RTAMC, then 400KV Keonjhar -Baripada line Isolator 40789L opened from RTAMC.
2. As per the Technical circular NO. 03/99 the Connected Isolators of the Main and Tie CB was to be opened to prevent Stress on the CB. Then Both the Isolator (4070889A & 4070889B Isolators) of Tie CB opened from RTAMC.
3. Then Command was given from RTAMC for Opening of the Isolator 40789A and 40789B connected to Main CB.
4. The Isolator 40789B of the Main Bay operated /Opened from RTAMC but due to communication failure, bus side isolator of main bay (407 89A) of 400KV BUS-1 was not operated from remotely at RTAMC.
5. Then it was communicated to check the Isolator from Keonjhar s/s end .
6. **Then due to Manual error in Opening of charged Isolator – 408-89A in a single Phase (R-phase) instead of 407-89A Isolator during the operation leads to Bus Fault in 400kv Bus-2 .**
7. Bus protection operation is found to be OK as fault created within its zone.
8. Tripping of ICT-1 & ICT-2, 220KV CBs through Inter-trip is as per the present scheme which is not taking the status of Tie CB to extend Inter-Trip on BB protection operation. Scheme needs to be modified by incorporating the status of Tie CB in 220KV side in series with the B/B protection.
9. Further investigation is in progress for the said Tripping and necessary corrective Action.

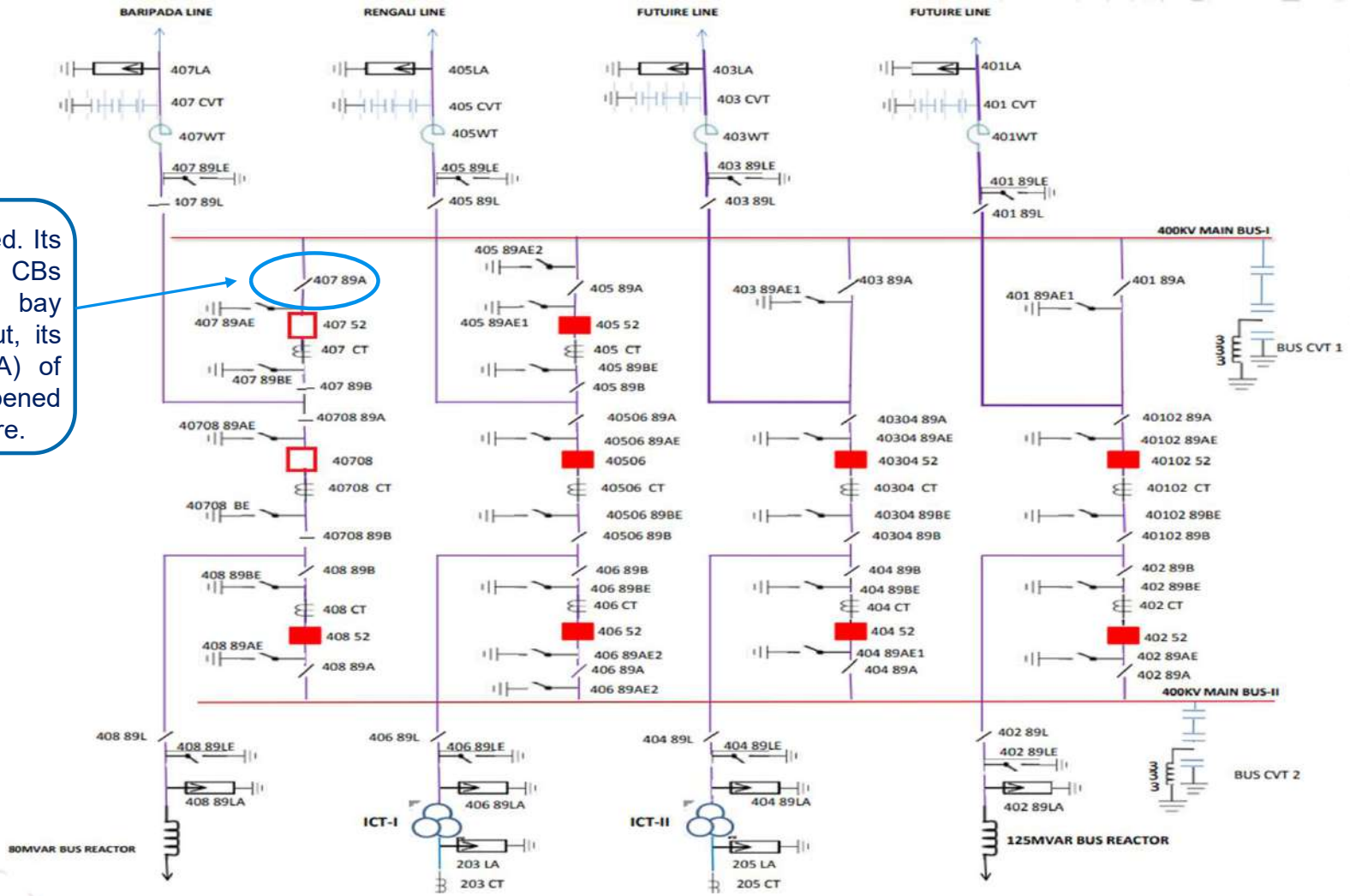
Before Shutdown (Normal Condition)

S/D of Baripada line was availed from Remote end. For this, 407 Main and Tie bay CB at Keonjhar S/s was to be opened from RTAMC.



Before Tripping (During Shutdown):

S/D of Baripada line availed. Its associated main & Tie CBs along with respective bay isolators were opened. But, its bus side isolator (40789A) of main Bay could not be opened due to communication failure.

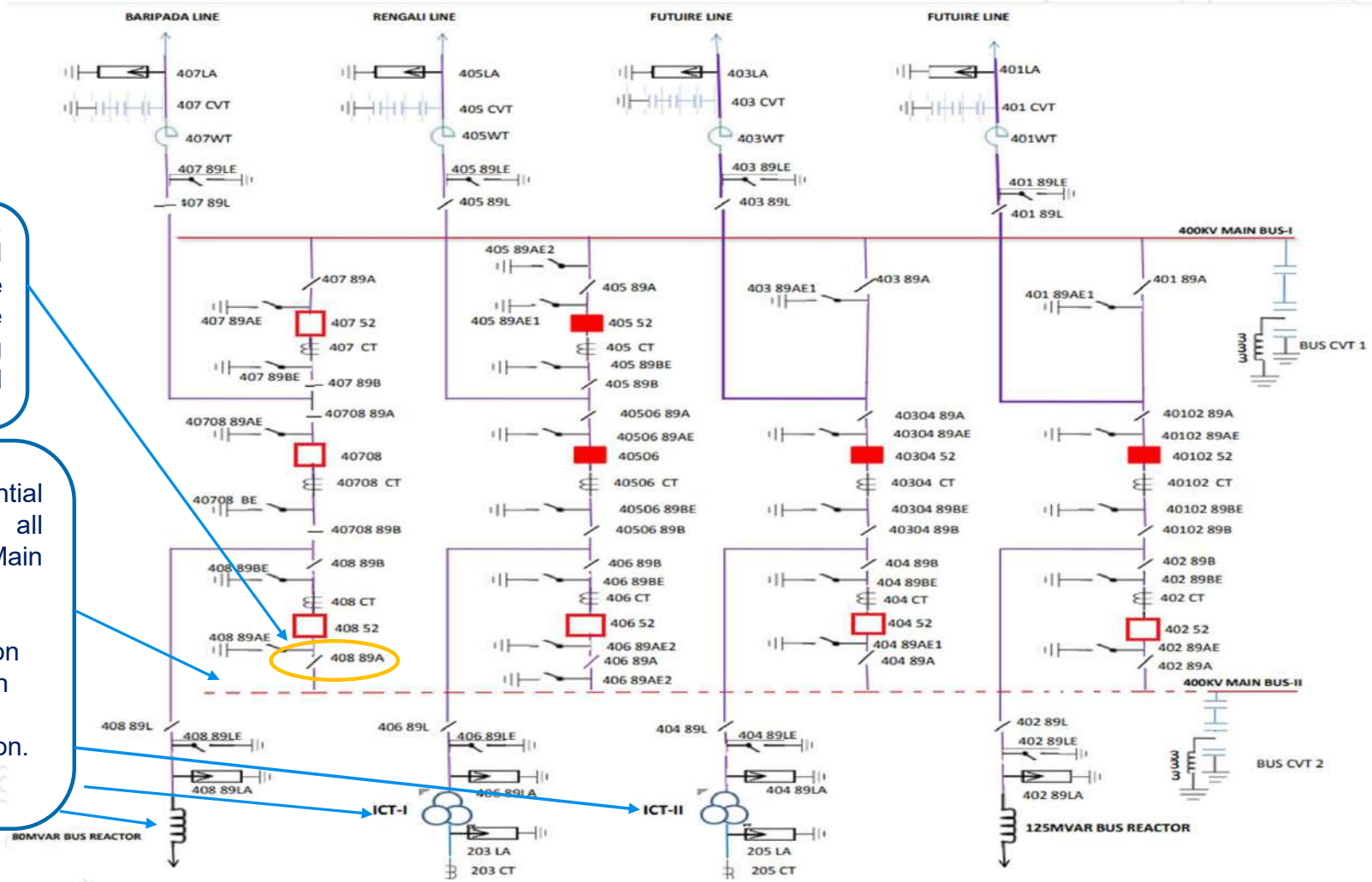


After Bus Fault

Instead of 40789A, 40889A was opened at site by mistake which lead to the Bus fault and tripping of connected elements.

Tripped elements:

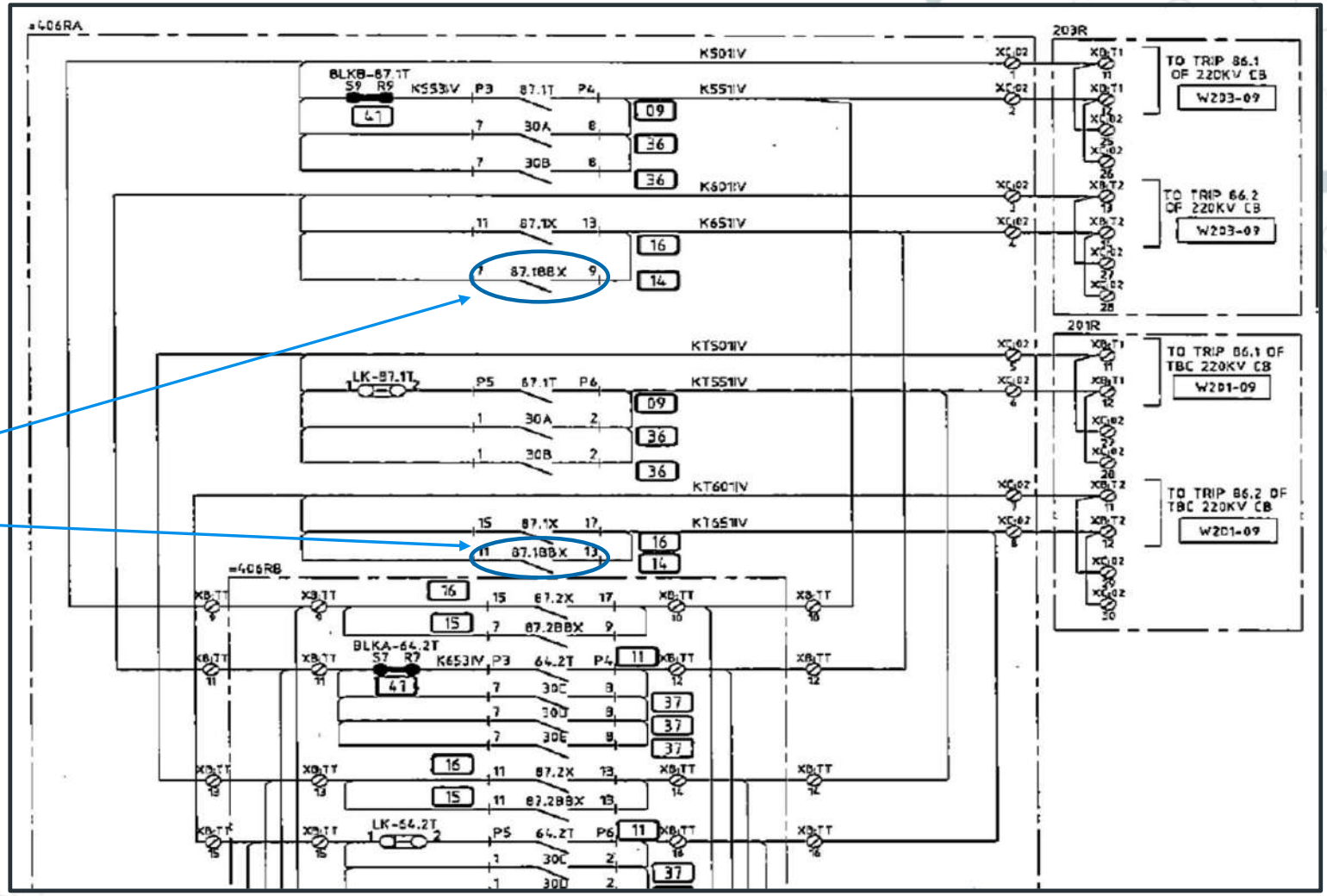
1. **Bus-2** differential operated tripped all associated Main CBs.
2. **ICT-1 & 2:** 220KV side CBs tripped on inter trip from Main CB upon BB protection operation.
3. 80 MVAR Bus Reactor of Bus-2.



Analysis…

Tripping of ICT-1 & ICT-2, 220KV CBs through inter trip is as per shown scheme which is not taking the status of Tie CB to extend inter trip on BB relay operation. Scheme needs to be modified.

BB operation picks up this contact



पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
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घटना संख्या: **14-07-2022/1** दिनांक: **29-07-2022**

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

1. Summary of the event (घटना का सारांश):

At 17:43 Hrs on 14th July 2022, 220 kV Bus-1 Alipurduar (WBSETCL) tripped during restoration of 220 kV Alipurduar-Alipurduar (WBSETCL)-1. At the same time, 220 kV Alipurduar-Alipurduar(WBSETCL)-2 tripped from PG end only. Consequently, both 220 kV Bus at Alipurduar (WBSETCL) became dead. No load loss or generation loss occurred as supply at 132 kV was intact through other links.

- **Date / Time of disturbance:** 14-07-2022 at 17:43 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 220/132 kV Alipurduar (WBSETCL) S/s
- **Load and Generation loss**.
  - No generation loss occurred during the event.
  - No load loss occurred during the event.

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

- 220 kV Alipurduar-Alipurduar (WBSETCL)-1

3. Major elements tripped (प्रमुख ट्रिपिंग)

- 220 kV Bus-1 at Alipurduar (WBSETCL)
- 220 kV Alipurduar-Alipurduar (WBSETCL)-2

4. Network across the affected area (प्रभावित क्षेत्र का नक्शा)

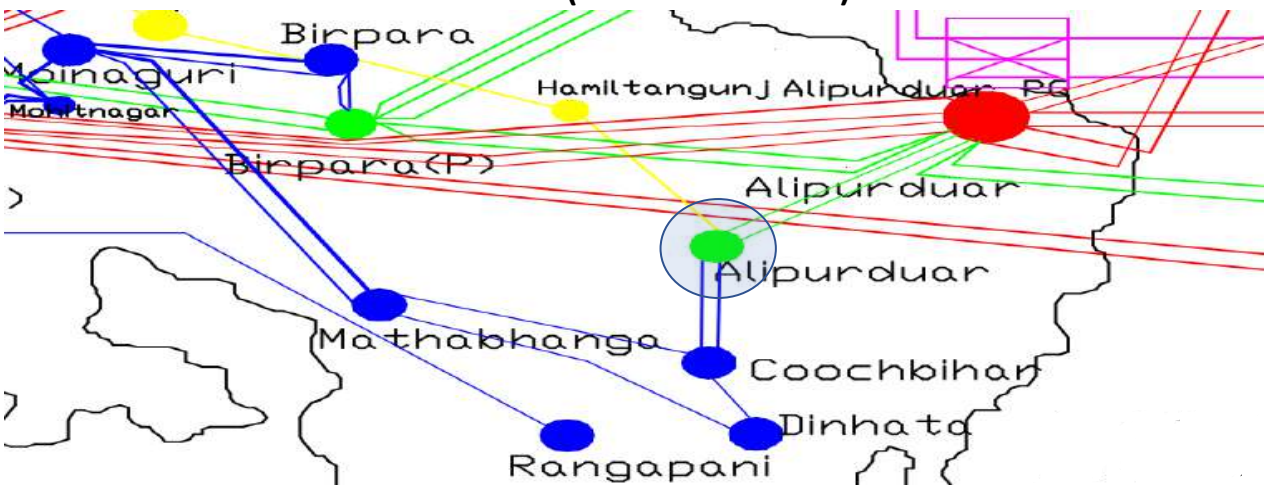


Figure 1: Network across the affected area

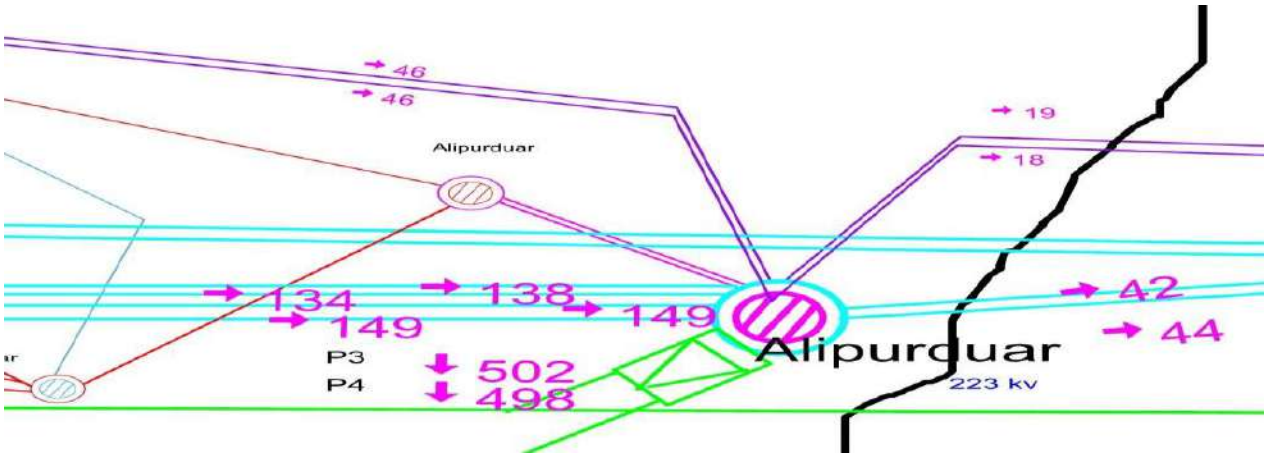
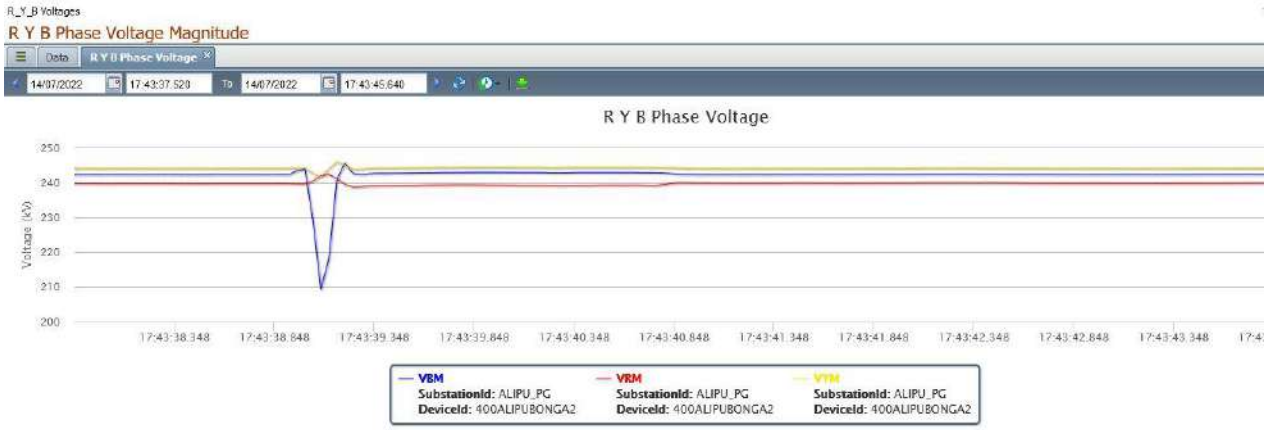


Figure 2: SCADA snapshot for of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
17:43	220 kV Bus-1 at Alipurduar (WBSETCL)	Bus bar protection operated		30 kV dip in B_ph at Alipurduar. Fault clearance time< 100 msec
	220 kV Alipurduar-Alipurduar (WBSETCL)-2	Alipurduar: B_N, 13 kA	Alipurduar (WBSETCL): Didn't trip	



PMU Voltage snapshot of 400/220 kV Alipurduar S/s

5. Restoration (पूर्वावस्था की प्राप्ति)

Transmission/Generation element name	Restoration time
220 kV Bus-2 at Alipurduar (WBSETCL)	18:18
220 kV Alipurduar-Alipurduar (WBSETCL)-2	18:18

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

- As reported, while closing Bus-1 isolator for normalization of 220 kV Alipurduar-Alipurduar (WBSETCL)-1 at WBSETCL end, leakage of gas from B_ph chamber of the breaker was observed. SF6 gas pressure low and SF6 lockout alarm appeared.
- Due to SF6 lockout Gas-Zone tripping operated and 220 kV Bus-1 tripped.
- On physical inspection, it was found that diaphragm of B_ph gas chamber burst out due to huge pressure inside and cover plate of the diaphragm named "filter" was displaced.
- 220 kV Alipurduar-Alipurduar-2 tripped from PG end only. Although fault was seen in Zone-2, B_ph tripped immediately within 100 msec, other two phases tripped after 1.7 seconds. **PG may explain.**
- Whether 2*220/132 kV ATRs at Alipurduar (WBSETCL) tripped? **WBSETCL may confirm.**

7. 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, PG ER-2**

8. Status of Reporting (रिपोर्टिंग की स्थिति):

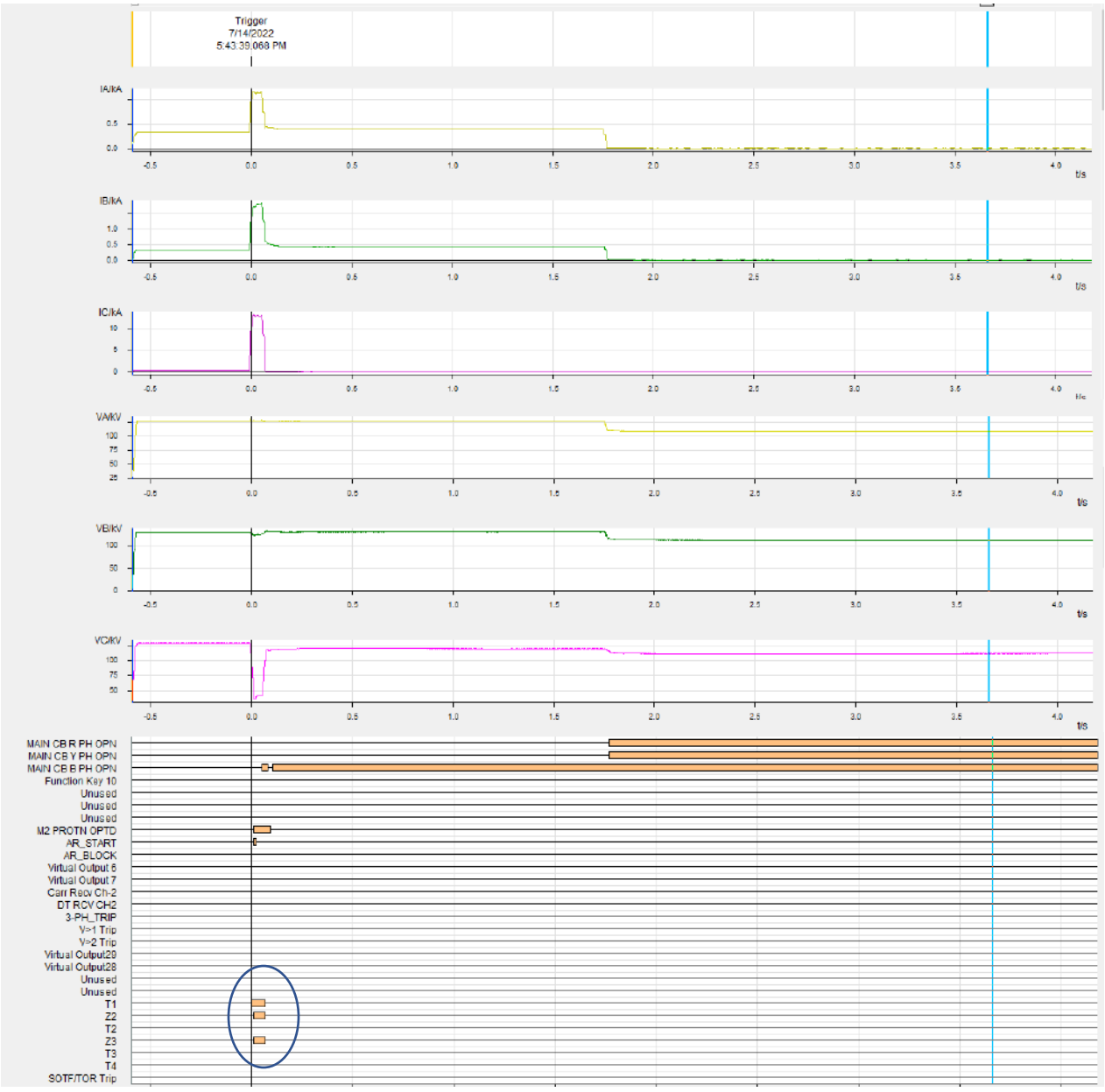
- DR/EL received from PG ER-2.
- Complete DR/EL yet to be received from WBSETCL.

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

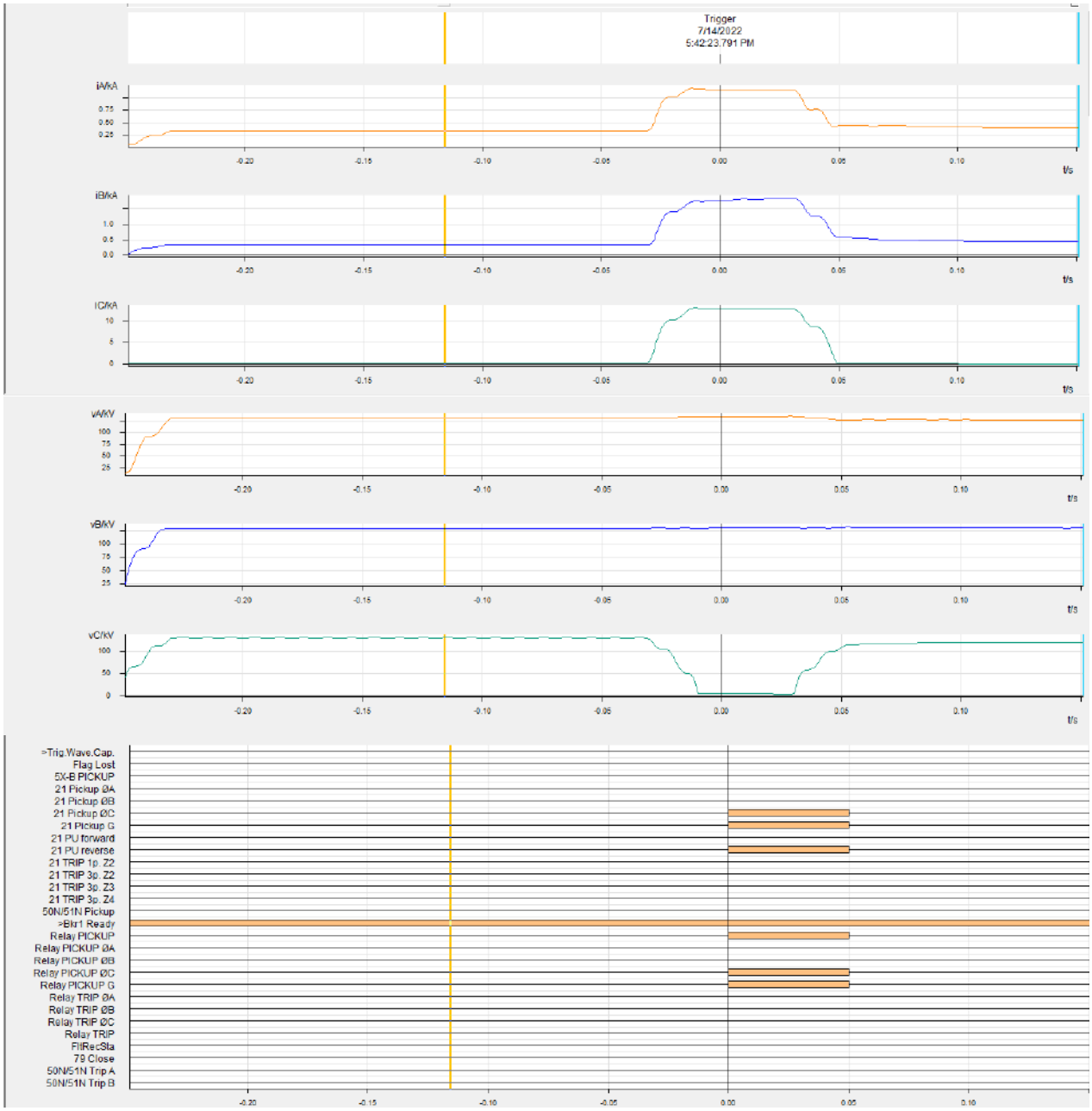
Sequence of events not recorded at the time of the event.

Annexure 2: DR recorded

DR of 220 kV Alipurduar-Alipurduar-2 (PG end)



DR of 220 kV Alipurduar-Alipurduar-2 (WBSETCL end)



पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)
Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033.
CIN: U40105DL2009GOI188682
फ़ोन: 033- 24235755, 24174049 फैक्स : 033-24235809/5029 Website:www.erldc.org, Email ID- erldc@posoco.in

घटना संख्या: **23-07-2022/1** दिनांक: **29-07-2022**

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

1. Summary of the event (घटना का सारांश):

At 08:46 Hrs on 23rd July 2022, total power failure occurred at 220/132 kV KLC Bantala S/s. As reported, LBB of 220 kV KLC Bantala-NewTown AA 3 operated at Bantala. As Bantala S/s has Single main and transfer scheme, power supply interrupted due to bus tripping. 52 MW load loss reported during the event by SLDC West Bengal.

- **Date / Time of disturbance:** 23-07-2022 at 08:46 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 220/132 kV Bantala S/s
- **Load and Generation loss**.
  - No generation loss occurred during the event.
  - 52 MW load loss reported during the event by SLDC West Bengal.

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

- NIL

3. Major elements tripped (प्रमुख ट्रिपिंग)

- 220 kV Bus-1 at Bantala (KLC)
- 220 kV Subhashgram-Bantala (KLC)
- 220 kV Bantala (KLC)-NewTown AA 3
- 220/132 kV ICT-1 & 2 at Bantala (KLC)

4. Network across the affected area (प्रभावित क्षेत्र का नक्शा)

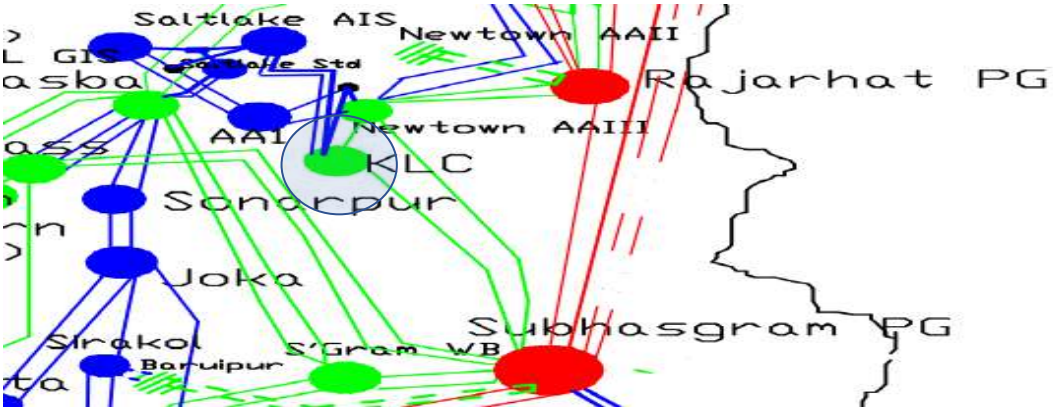


Figure 1: Network across the affected area

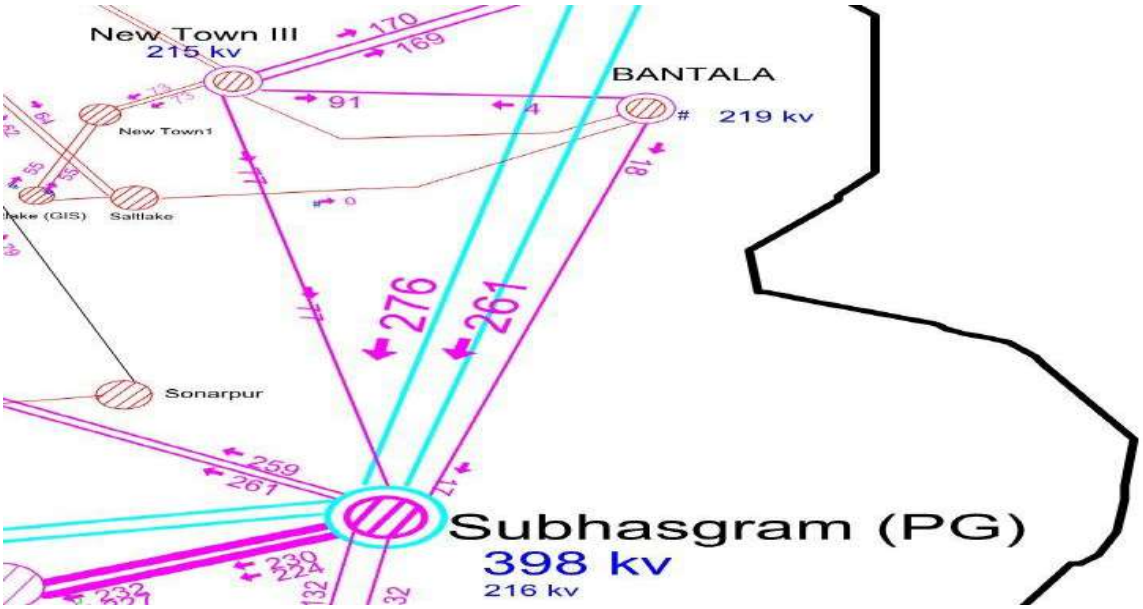
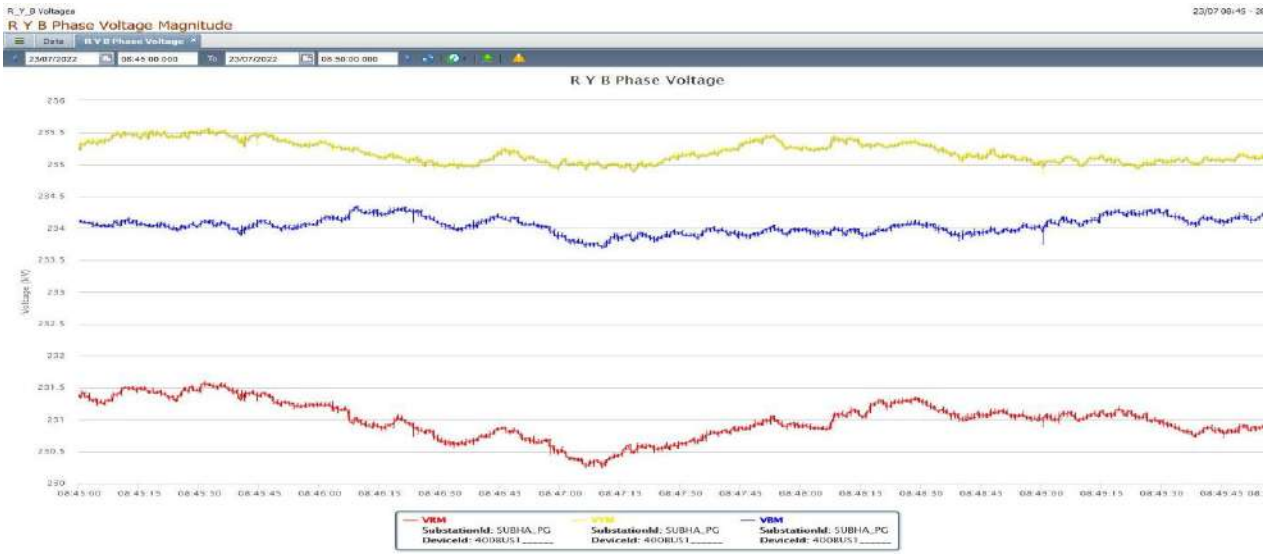


Figure 2: SCADA snapshot for of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
08:46	220 kV Bus-1 at Bantala (KLC)	B_ph LBB of 220 kV Bantala-NewTown AA 3 operated at Bantala. All elements tripped as Bantala has Single main and transfer scheme.	-	No fault observed as per PMU
	220 kV Subhahsgram-Bantala (KLC)		-	
	220 kV Bantala (KLC)-NewTown AA 3		-	
	220/132 kV ICT-1&2 at Bantala (KLC)		-	



PMU Voltage snapshot of 400/220 kV Subhashgram S/s

5. Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Bus-1 at Bantala (KLC)	10:09
220 kV Subhashgram-Bantala (KLC)	10:09
220 kV Bantala (KLC)-NewTown AA 3	15:20
220/132 kV ICT-1&2 at Bantala (KLC)	15:00/10:10

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

- B_ph LBB of 220 kV Bantala (KLC)-NewTown AA 3 operated at Bantala.
- As reported, relay terminal 13,14 of B phase single phase auxiliary trip relay of 220 kV NewTown AA 3 (86B2) was found shorted through combiflex plinth resulting Positive from Bus Transfer TC1 (K101T) which was extended to B phase LBB initiation wire. Report from WBSETCL is attached at Annexure-3.
- PG ER-2 may confirm whether 220 kV Bantala-Subhashgram tripped from their end.
- 220/132 kV Bantala S/s has single main and transfer scheme. Possibility of Double main and transfer scheme maybe explored for improved reliability.

7. 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, PG ER-2**

8. Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL yet to be received from WBSETCL, PG ER-2.

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

DR/EL yet to be received from WBSETCL, PG ER-2.

Annexure-3

Incident report at KLC-Bantala 220KV Substation on 23.07.2022 (Detailed Report)

OCCURRENCE REPORT

(1) Date & Time of Occurrence

23.07.2022 08:46hrs

(2) Name of the Substation/Generating Station

.KLC BANTALA 220KV S/S WBSETCL

(3) Details of Occurrence

Total power failure at KLC 220KV Substation occurred at 08.46 Hrs on 23.07.2022.
All 220KV CB's tripped on LBB at that time as in 220 KV side One main and One transfer scheme is present. No Master trip(86) was observed on 220 KV bays at that time.
Both 220KV KLC-PGCIL Ckt and 220KV KLC-NAA-III Ckt were charged at 09:43 hrs and stood .But at the time of charging 220 KV side with 160MVA 220/132 KV TR-II total 220 KV system tripped with LBB again.At around 10:11 hrs entire system normalized after necessary checking as per instruction of SLDC except 160MVA Tr-I and 220KV KLC-NAA-III Ckt.

After necessary checking done by Testing wing 160 MVA 220/132 KV TR-I was normalised at 15: Hrs and 220 KV KLC-NTAA3 ckt was normalised at 15:20 Hrs.

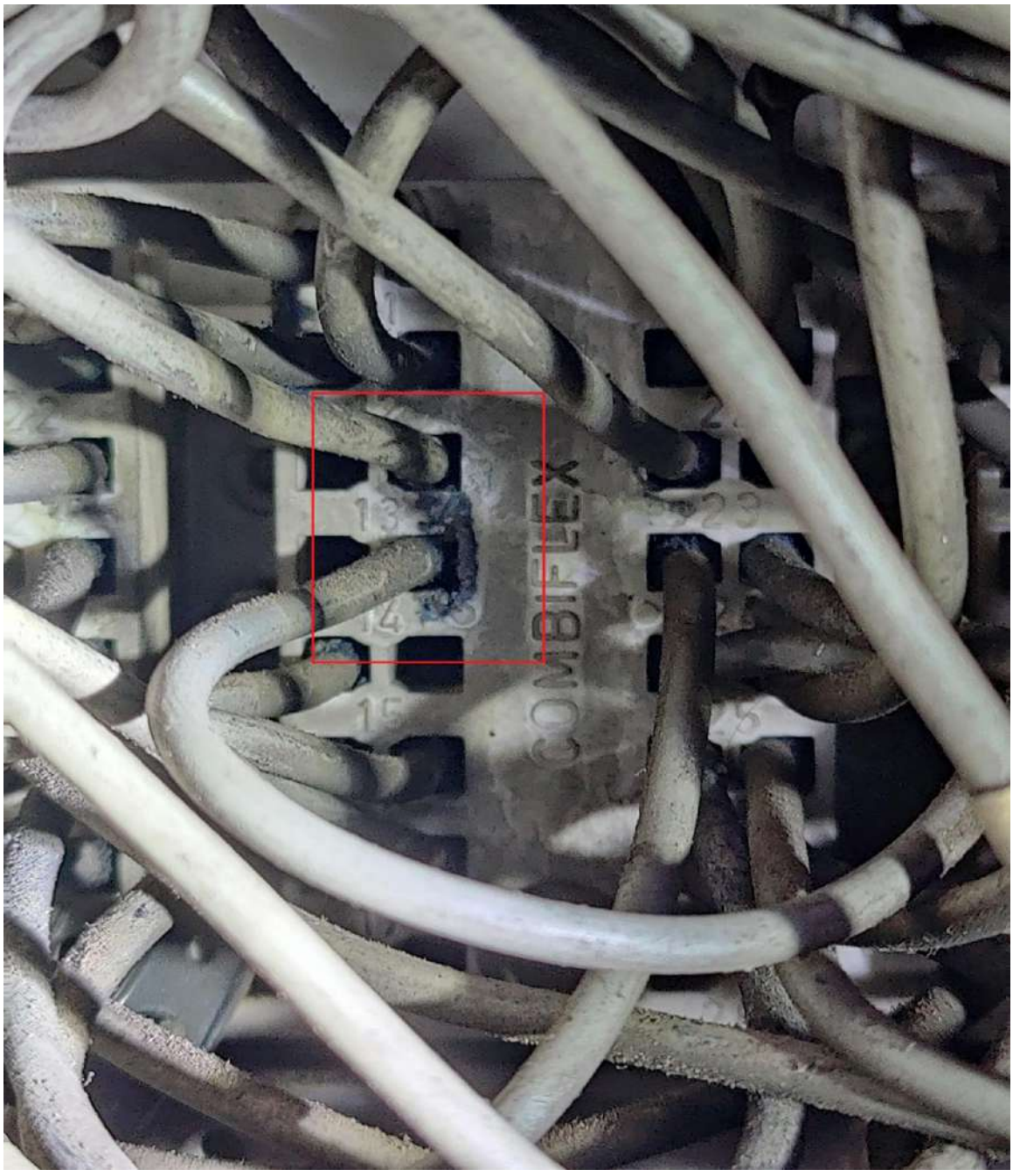
(4) Total load LOSS : 52MW

At the time of occurrence, the disposition of the feeders was as below

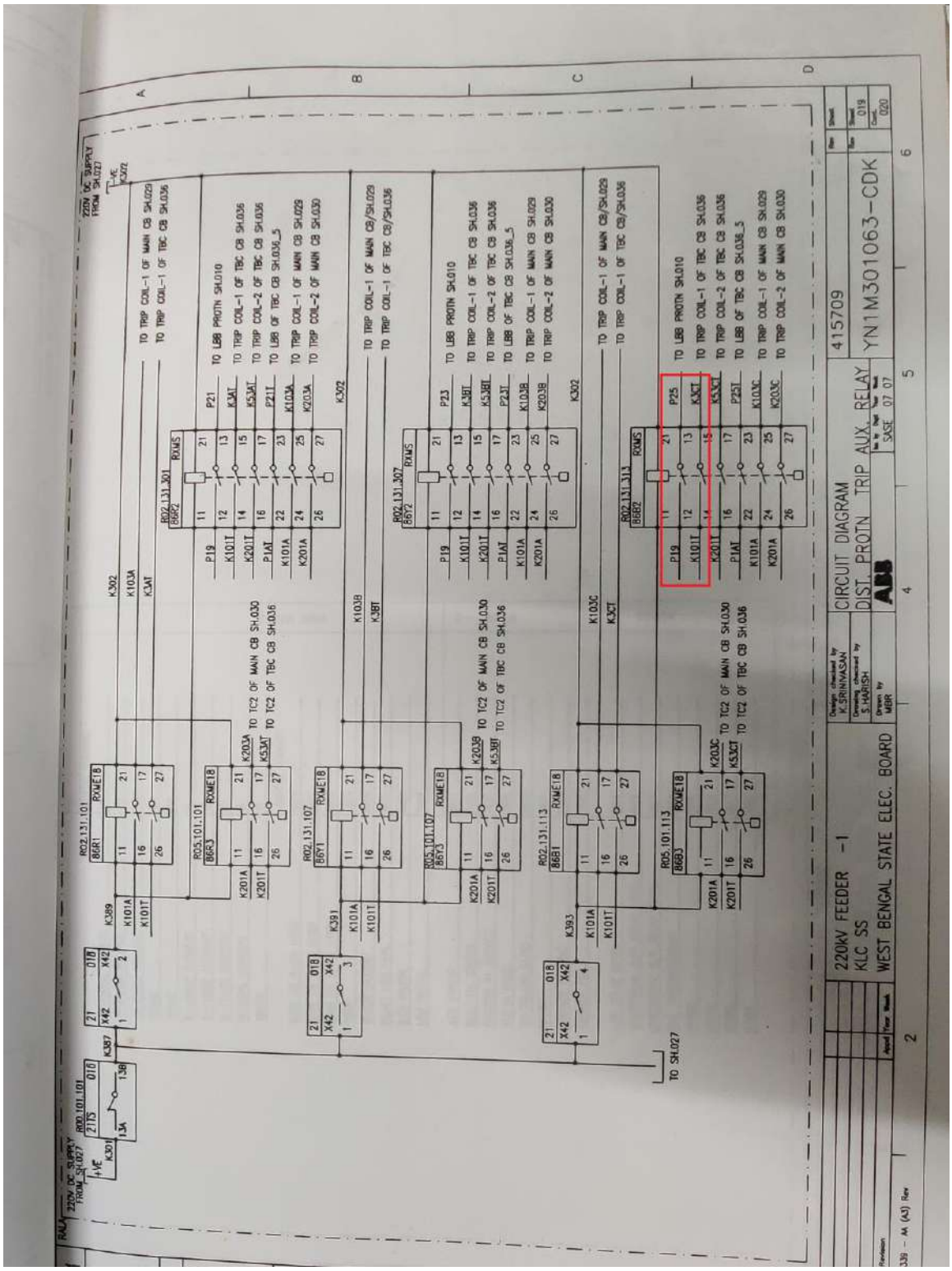
1. All 220KV feeders were running under normal condition.
2. 220KV Bus transfer bay was not engaged.
3. All 132KV, 33KV and 11KV feeders were running were normal condition.

OBSERVATIONS

During Checking of Testing Wing it was found that in NTAA-III 220 KV bay LBB initiation was coming on B phase as relay terminal 13,14 of B phase single phase auxiliary trip relay (86B2) was found shorted through combiflex plinth (Picture 1) resulting Positive from Bus Transfer TC1 (K101T) was extended to B phase LBB initiation wire(P25)(Picture 2).Due to severe chemical pollution in the area ,contaminations in relay contacts,plinth shorting,relay malfunction are quite frequently observed in KLC substation.



Picture 1- Relay terminal 13,14 of B phase single phase auxiliary trip relay (86B2) was found shorted through combiflex plinth.



Picture 2- Positive from Bus Transfer TC1 (K101T) was extended to B phase LBB initiation wire(P25)

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घटना संख्या: **11-07-2022/1** दिनांक: **29-07-2022**

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

Summary of the event (घटना का सारांश):

On 09/07/2022 At 14:27 Hrs during testing of 220 kV bus bar differential panel at 220/132 kV Ramchandrapur S/S, spurious tripping command generated to the main Bus-1 ,which led to tripping of all connected feeders from main Bus -1 ,which are 400/220kV 315 MVA ICT 1&2 at Jamshedpur, 220kV-Ramchandrapur-Chandil-1, 220kV-Ramchandrapur-Joda-1, 220KV-Ramchandrapur-Chaibasa-1. This has resulted in total power failure at 220/132 kV Ramchandrapur S/S. Total load loss was around 60 MW.

Date / Time of disturbance: 09-07-2022 at 14:27 hrs

- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Ramchandrapur S/S.
- **Load and Generation loss**.
  - Nil generation loss occurred during the event.
  - Around 60 MW load loss reported during the event.

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

- 220KV-RAMCHANDRAPUR-JAMSHEDPUR-3
- 220 KV RAMCHANDRAPUR-CHAIBASA-2

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
400KV/220KV 315 MVA ICT 1	09/07/2022	14:27	09/07/2022	15:01
400KV/220KV 315 MVA ICT 2	09/07/2022	14:27	09/07/2022	15:02
220KV-JODA-RAMCHANDRAPUR-1	09/07/2022	14:27	09/07/2022	15:04
220KV-CHANDIL-RAMCHANDRAPUR-1	09/07/2022	14:27	09/07/2022	15:02
220KV-RAMCHANDRAPUR-CHAIBASA(JUSNL)-1	09/07/2022	14:27	09/07/2022	14:43

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

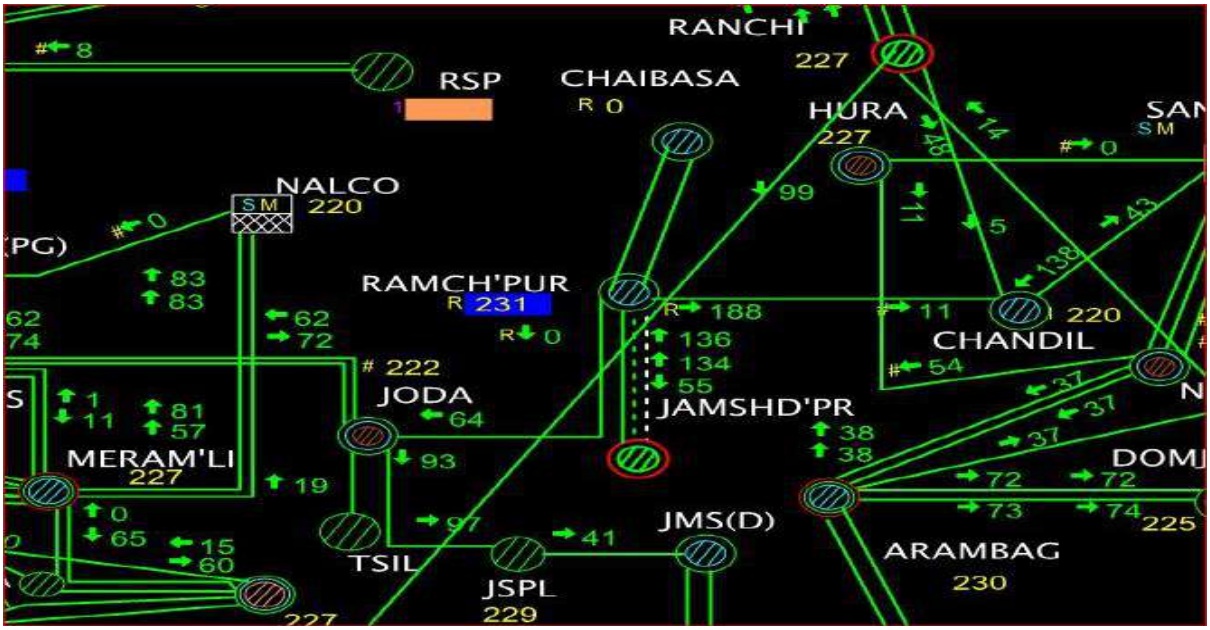

Figure 1: SCADA snapshot of the system

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

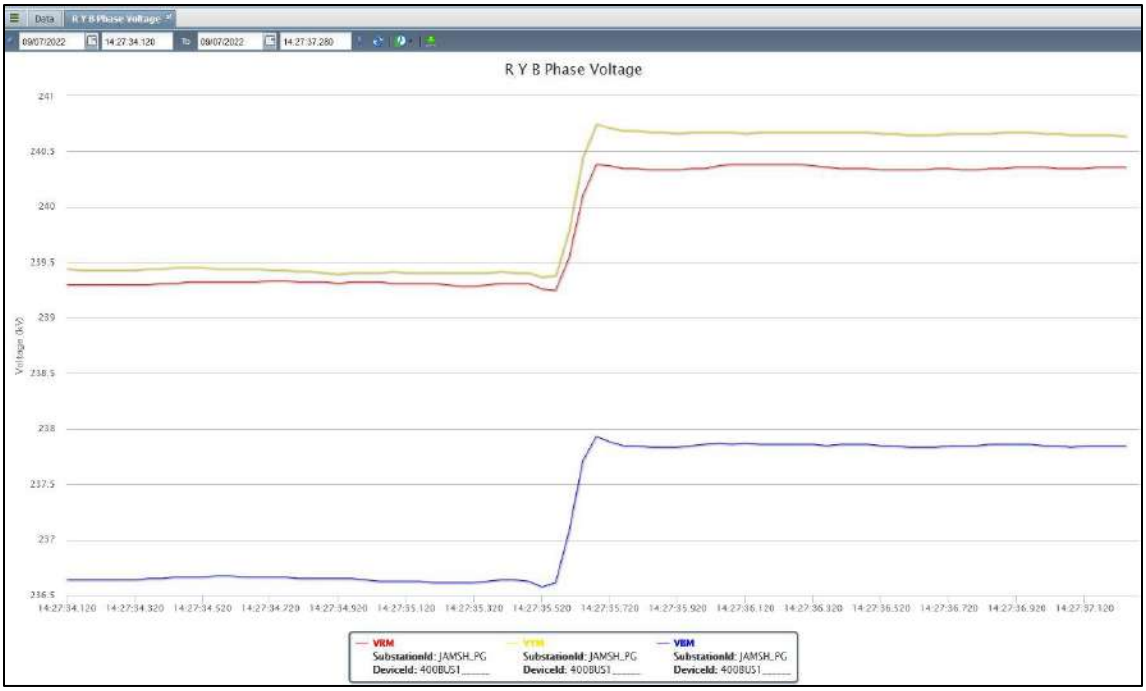

Figure 2: PMU snapshot of 400/220 kV Jamshedpur S/s

Sl. No.	Name of the Element	Relay Indication	PMU OBSERVATION
1	220KV-RCP-JAMSHEDPUR-D/C	Master Trip	No voltage dip observed which indicates that there was no fault and tripping command initiated was of spurious in nature.
2	220KV-JODA-RAMCHANDRAPUR-1	Master Trip	
3	220KV-CHANDIL-RAMCHANDRAPUR-1	Master Trip	
4	220KV-RAMCHANDRAPUR-CHAIBASA(JUSNL)-1	Master Trip	

Restoration (पूर्वावस्था की प्रप्ति)

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
400KV/220KV 315 MVA ICT 1	09/07/2022	14:27	09/07/2022	15:01
400KV/220KV 315 MVA ICT 2	09/07/2022	14:27	09/07/2022	15:02
220KV-JODA-RAMCHANDRAPUR-1	09/07/2022	14:27	09/07/2022	15:04
220KV-CHANDIL-RAMCHANDRAPUR-1	09/07/2022	14:27	09/07/2022	15:02
220KV-RAMCHANDRAPUR-CHAIBASA(JUSNL)-1	09/07/2022	14:27	09/07/2022	14:43

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

- At 14:27 Hrs during testing of 220 kV bus bar differential panel at 220/132 kV Ramchandrapur S/S, spurious tripping command generated to the main Bus-1 ,which led to tripping of all connected feeders from main Bus -1 ,which are 400/220kV 315 MVA ICT 1&2 at Jamshedpur, 220kV-Ramchandrapur-Chandil-1, 220kV-Ramchandrapur-Joda-1, 220KV-Ramchandrapur-Chaibasa-1.
- Remaining 2 elements from Ramchandrapur s/s which are 220KV-RAMCHANDRAPUR-JAMSHEDPUR-3 & 220 KV RAMCHANDRAPUR-CHAIBASA-2 were under shutdown.
- This has led to tripping of all the circuits from 220 kv Ramchandrapur s/s and resulted into 60 Mw of load loss.
- Whether 132 kv Loop of Adityapur also tripped at the same time which resulted to load loss if so then under what protection.(JUSNL to update).
- All the elements were on Bus -1 only , Sufficient precaution should have been taken to carry out any testing work .

- **Repeated Grid Events at 220 Kv Ramchandrapur has been observed details along with discrepancy mentioned below**

Total 4 number of events has occurred in Ramchandrapur where unwanted Bus tripping has been observed after the commissioning of New Busbar at Ramchandrapur .Brief Details of the events are mentioned below ,along with major issues identified and actions to be taken .Matter may be taken seriously for early resolution on priority basis .

(1) 09 JULY 14:27 Hrs:

Disturbance at 220 kV Ramchandrapur at 14:27 hrs: During the testing of the Bus-Bar differential panel at 220 kV Jamshedpur (Ramchandrapur) spurious tripping command generated to the main Bus-01 connected feeder elements tripped.

(2) 22 JULY 07:06 Hrs:

Grid event at 220 KV Ramchandrapur (Jusnl) s/s at 7:06 hrs in the morning today

There was Y-N fault at 132 KV Adityapur Chandil. Chandil end operated in zone 1 distance, Adityapur saw the fault in zone 2 and tripped with delay which was correct. The fault was also seen in 220/132 KV ATR at Ramchandrapur,which due to erroneous setting of I pickup at high set earth fault relay of 1A(almost equal to ATR full load current at 132 KV side) tripped and sent intertrip to 220 KV Side.

Now ,as bus bar differential protection is recently commissioned at 220 KV Ramchandrapur. This relay is expected to receive LBB initiation signal from LBB relay connected to panel of 220 KV side of 150 MVA atr 2 and initiate bus tripping in a genuine case of breaker failure .In the present case,in stead of LBB relay contact, breaker contact was directly connected to Bus bar relay and just as the inter trip occurred at 220 KV whole 220 KV bus II tripped due to busbar operation.

(3) 26 JULY ,16:28 Hrs :

At 16:28 hrs 220KV-JODA-RAMCHANDRAPUR tripped due B ph fault, 11.8 km from Ramchandrapur. At the same time due to Bus differential protection operation of Bus-I at 220 kV Ramchandrapur all lines from bus 1 tripped. In this case also Busbar operated due to LBB initiation ,although fault was cleared within 100ms .Hence in this case also it appears that input to busbar became through by breaker contacts instead of LBB initiation.

(4) 27 JULY 10:55 Hrs.

At 10:55 hrs following elements tripped due to suspected Bus differential protection mal operation of Bus-I at 220 kV Ramchandrapur. In this case also Busbar operated due to LBB initiation, although fault was cleared within 100ms .Hence in this case also it appears that input to busbar became through by breaker contacts instead of LBB initiation.

Major issue to be rectified & Action Point

1) **Un-necessary operation of Busbar during any line tripping from Ramachandrapur** has been observed.

   Now ,as bus bar differential protection is recently commissioned at 220 KV Ramchandrapur. This relay is expected to receive LBB initiation signal from LBB relay connected to panel of 220 KV side of any element and initiate bus tripping in a genuine case of breaker failure .In the present case, instead of LBB relay contact, breaker contact was directly connected to Bus bar relay . Jusnl Critel to check and disconnect all contacts related to LBB in bus bar relay of both buses until individual LBB peripheral units/LBB relay is configured at each bay. (Presently LBB relay is not configured at each bay) .

   Ensure the healthiness of Busbar system properly for both the buses via testing (opening of breaker) to avoid any such events in future.

   2) low setting of 132 KV side 220/132 KV ATR in high set non directional earth fault relay.

   3) Despite bus bar relay operation, there was no tripping of 220 KV bus coupler, so its wiring has to be checked.

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	**JUSNL**

Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL not received from JUSNL.

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

Sequence of event not recorded at time of event.

Annexure 2: DR recorded

पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
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घटना संख्या: **31-07-2022/1** दिनांक: **16-08-2022**

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

Summary of the event (घटना का सारांश):

At 00:28 hrs, Y_ph CT of 220 kV Barauni-Hajipur-1 burst at Hajipur end. Both buses at Hajipur tripped. Power supply to Hajipur and Amnour failed. Around 320 MW load loss in Hajipur and Amnour area reported by Bihar SLDC

- **Date / Time of disturbance:** 31-07-2022 at 00:28 hrs
- **Event type:** GD- 1
- **Systems/ Subsystems affected:** 220/132 kV Hajipur, Amnour S/s
- **Load and Generation loss**.
  - No generation loss occurred during the event
  - 320 MW load loss reported during the event

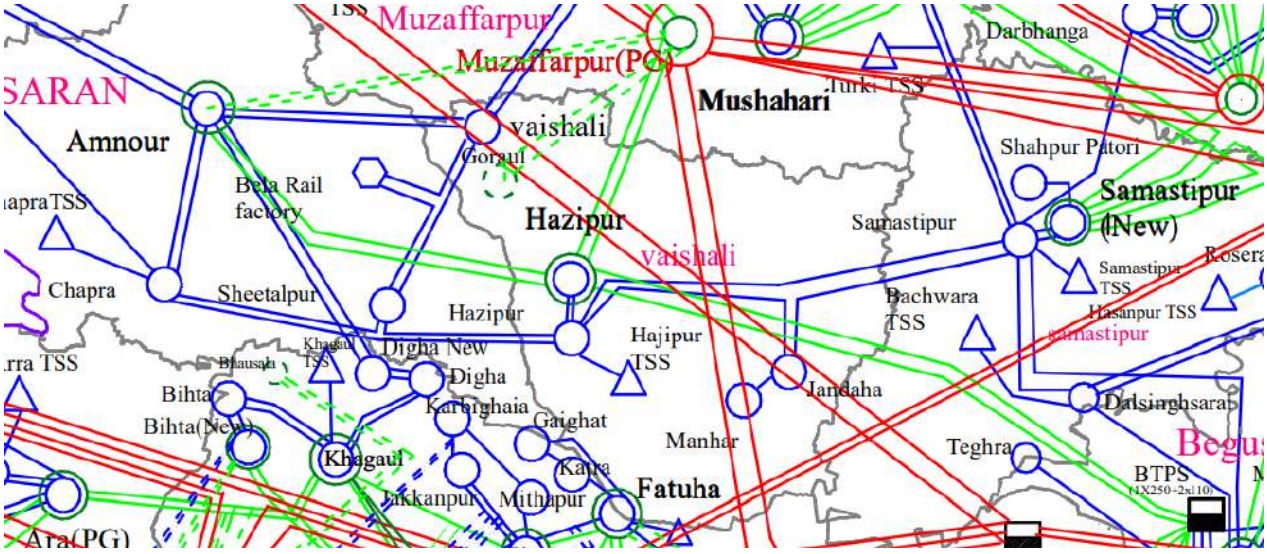
Important Transmission Line/element if out (महत्वपूर्ण संचरण लाइने जो बंद है):

NIL

Major elements tripped (प्रमुख ट्रिपिंग)

- 220 kV Main Bus-1 & 2 at Hajipur
- 220 kV Muzaffarpur(PG)-Hajipur D/c
- 220 kV Barauni TPS-Hajipur D/c
- 220 kV Hajipur-Amnour D/c

Network across the affected area (प्रभावित क्षेत्र का नक्शा)



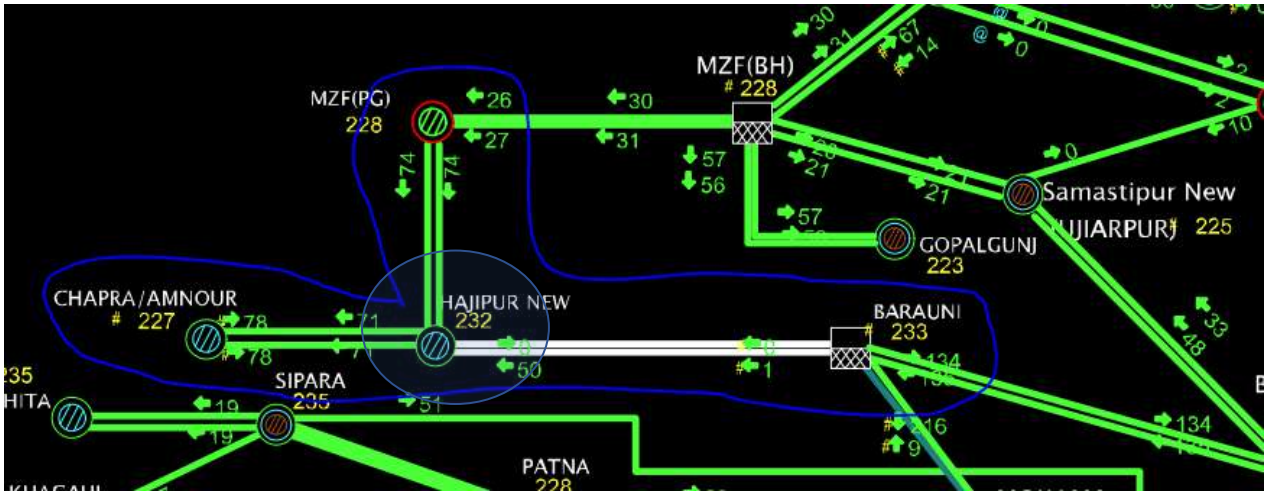


Figure 1: SCADA snapshot for of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
00:28	220 kV Main Bus-1&2 at Hajipur	-	-	15 kV dip in Y_ph voltage at Muzaffarpur. Fault clearance time: 100 msec
	220 kV Muzaffarpur (PG)-Hajipur D/c	-	-	
	220 kV Barauni TPS-Hajipur D/c	-	Y_ph CT of Ckt-1 burst	
	220 kV Hajipur-Amnour D/c	Radial supply		

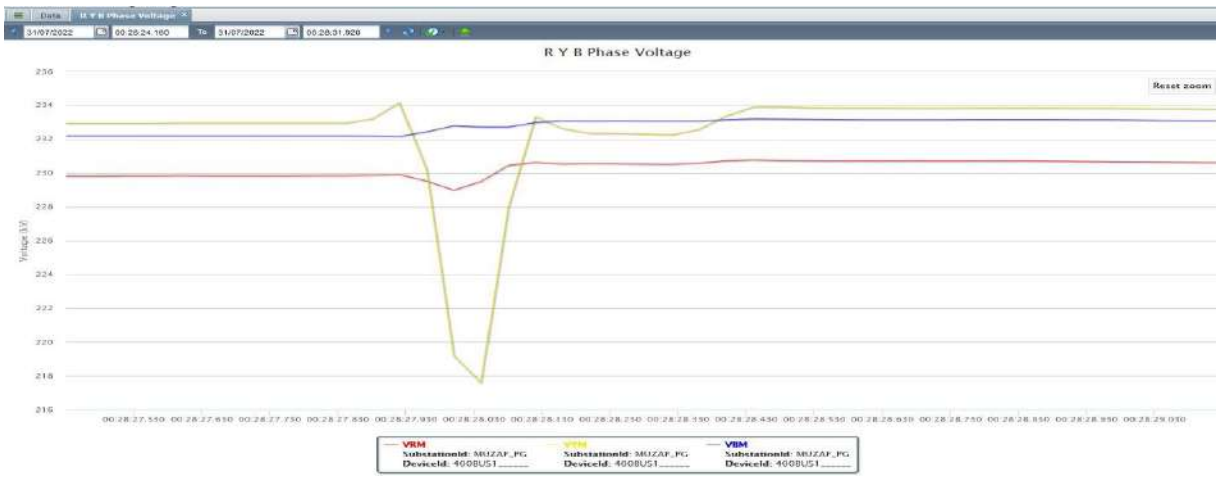


Figure 2: PMU voltage snapshot of 400/220 kV Muzzaffarpur S/s

Restoration (पूर्वावस्था की प्राप्ति)

Transmission/Generation element name	Restoration time
220 kV Main Bus-1 & 2 at Hajipur	01:09
220 kV Muzaffarpur-Hajipur-1	01:52
220 kV Muzaffarpur-Hajipur-2	01:52
220 kV Barauni-Hajipur-1	-
220 kV Barauni-Hajipur-2	01:09
220 kV Hajipur-Amnour-1	01:58
220 kV Hajipur-Amnour-2	01:17

Analysis of the event (घटना का विश्लेषण):

- At 00:28 Hrs ,Y_ph CT of 220 kV Barauni-Hajipur-1 burst at Hajipur end. From PMU it appears fault was cleared within 100 msec. Same fault was also sensed by Muzzaffarpur- Hajipur D/C and tripped immediately .
- 220 kV Barauni-Hajipur-2 also tripped immediately.
- Power supply to Amnour also got interrupted as it was supplied radially through 220 kV Hajipur-Amnour D/c.

Protection issue (सुरक्षा समस्या):

- All 220 kV emanating lines from Hazipur tripped within 100 msec. Details of tripping of all lines are yet to be received from BSPTCL, Powergrid ER-1.
- Status of bus bar protection at Hajipur may be updated.

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	**BSPTCL, Powergrid ER-1, Barauni TPS**
Incorrect/ mis-operation / unwanted operation of Protection system	1. CEA Technical Standard for Construction of Electrical Plants and Electric Lines: 43.4.A. 2. CEA (Technical standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1. (6.1, 6.2, 6.3)	**BSPTCL**
Non-Availability of Numerical Bus Bar/LBB Protection at 220 kV and above S/s	1. CEA Technical Standard for Construction of Electrical Plants and Electric Lines 43.4.A 2. CEA Technical Standard for Construction of Electrical Plants and Electric Lines 43.4.C.4 3. CEA (Technical standards for connectivity to the Grid) Regulation, 2007 – 6.1, 6.4.	**BSPTCL**

Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL not received from **PG-ER-1, BSPTCL, Barauni TPS.**

पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)
Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033.
CIN: U40105DL2009GOI188682
फ़ोन: 033- 24235755, 24174049 फैक्स : 033-24235809/5029 Website:www.erldc.org, Email ID- erldc@posoco.in

घटना संख्या: **01-07-2022/1** दिनांक: **29-07-2022**

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

Summary of the event (घटना का सारांश):

At 13:48 Hrs, 220 kV Daltonganj-Chatra 1 tripped due to R_N fault. At 13:50 Hrs, 220 kV Daltonganj-Chatra-2 also tripped due to R_N fault leading to total power failure at 220/132 kV Chatra S/s. Load loss of 23 MW reported during the event by Jharkhand SLDC.

Date / Time of disturbance: 01-07-2022 at 13:50 hrs

- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Chatra
- **Load and Generation loss**.
    - No generation loss was reported during the event.
    - Around 23 MW load loss reported during the event at Chatra by Jharkhand SLDC.

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

- NIL

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Daltonganj-Chatra D/c

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

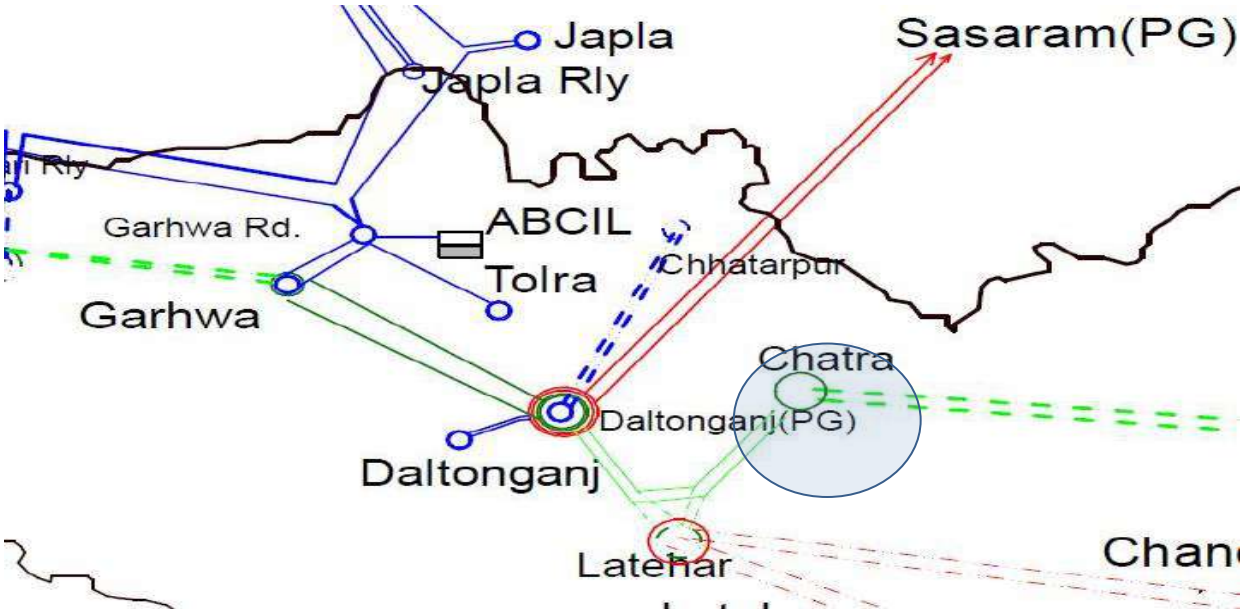


Figure 1: Network across the affected area

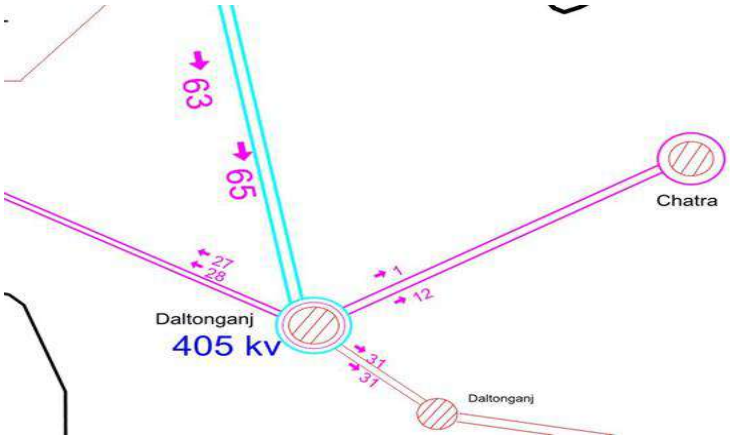


Figure 2: SCADA snapshot of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
13:48	220 kV Daltonagnj-Chatra-1	Daltonganj: R_N, 8.51 kA, A/r successful	Chatra: R_N, 0.147 kA, Zone-2, 373 km	75 kV dip in R_ph voltage at 1st instance. 80 kV dip in R_ph voltage at 2nd instance. Fault clearance time< 100 msec in both instances.
13:50	220 kV Daltonagnj-Chatra-2	Daltonganj: R_N, 6.19 kA, A/r successful	Chatra: R_N, 0.122 kA, Zone-2, 323 km	

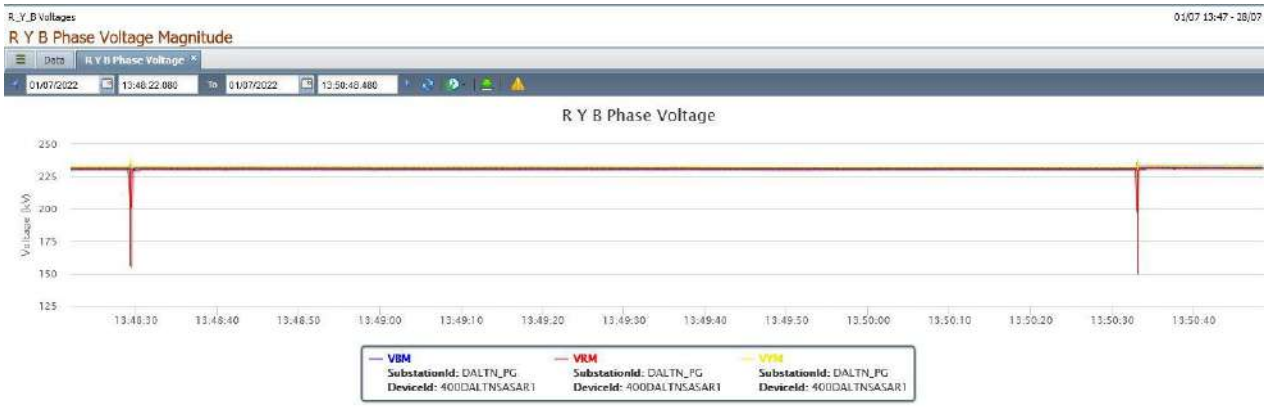


Figure 3: PMU snapshot of 400/220 kV Daltonganj S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Daltonganj-Chatra-1	14:56
220 kV Daltonganj-Chatra-2	21:46

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

- 220 kV Daltonganj-Chatra-1 tripped at 13:48 Hrs due to R_N fault. A/r successful from Daltonganj end only.
- 220 kV Daltonganj-Chatra-2 also tripped at 13:50 Hrs due to R_N fault. A/r successful from Daltonganj end only.
- Multiple fault signatures recorded in Daltonganj PMU between 13:48 Hrs to 14:00 Hrs.
- JUSNL to confirm whether there was any A/r attempt from Chatra end.
- DR channels of both lines to be configured properly at Chatra.

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):

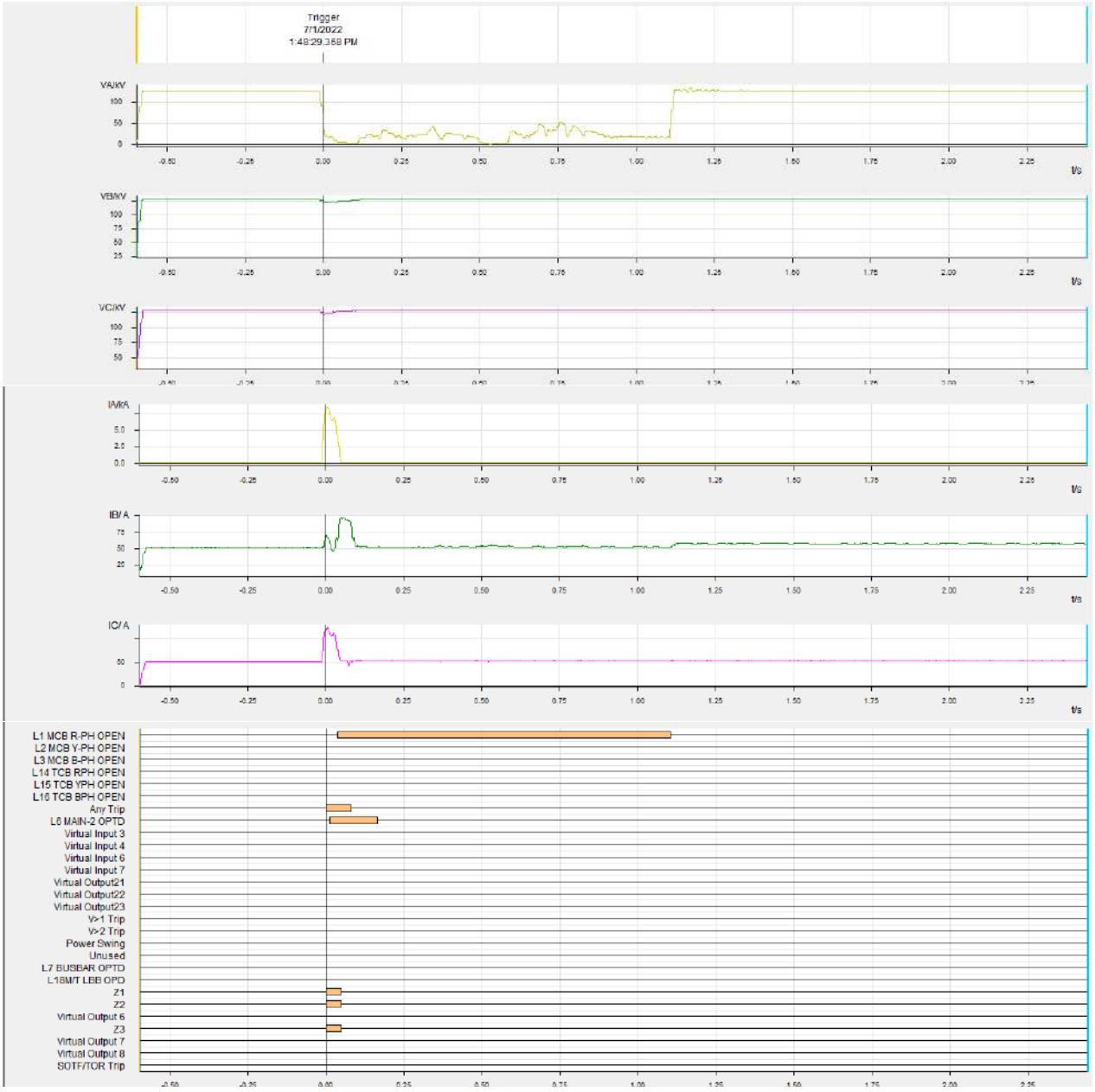
- Complete DR/EL yet to be received from JUSNL

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

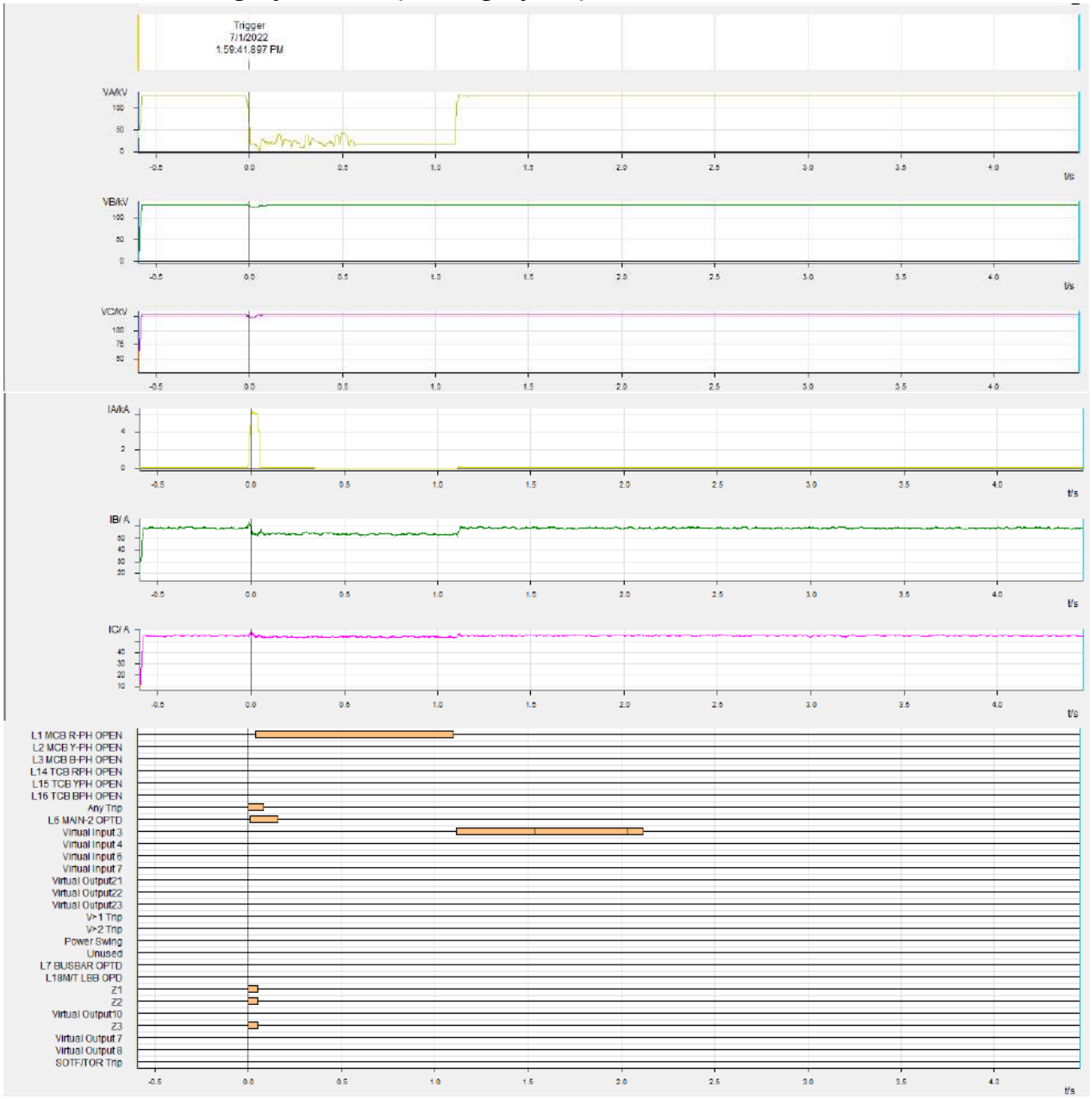
Sequence of Events not recorded at the time of event.

Annexure 2: DR recorded

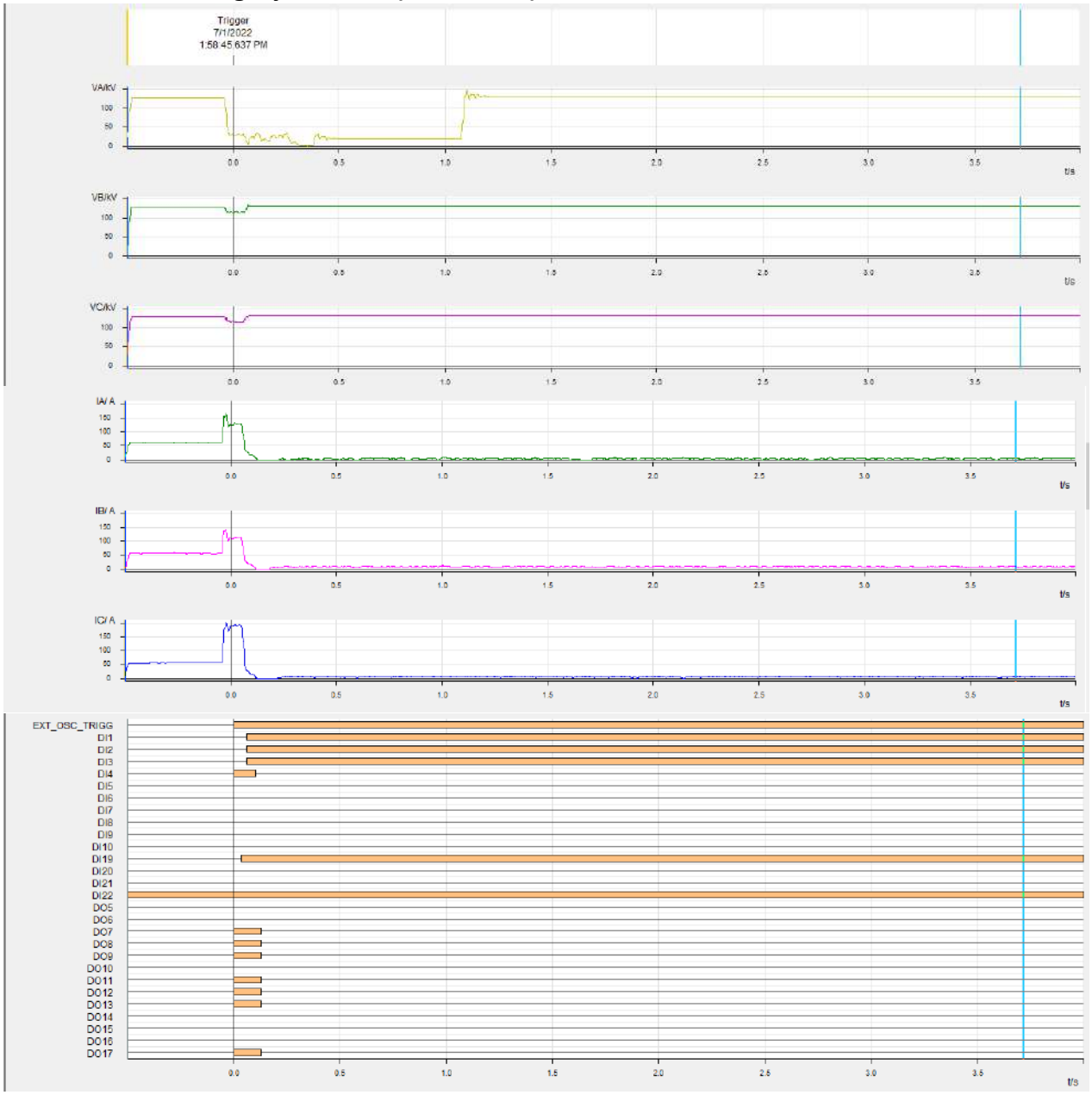
DR of 220 kV Daltonganj-Chatra-I (Daltonganj end)



DR of 220 kV Daltonganj-Chatra-2 (Daltonganj end)



DR of 220 kV Daltonganj-Chatra-2 (Chatra end)



पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
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Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033.
CIN: U40105DL2009GOI188682
फ़ोन: 033- 24235755, 24174049 फैक्स : 033-24235809/5029 Website:www.erldc.org, Email ID- erldc@posoco.in

घटना संख्या: **14-07-2022/1** दिनांक: **28-07-2022**

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

Summary of the event (घटना का सारांश):

At 16:17 Hrs, 220 kV Daltonganj-Chatra 1 & 2 tripped within an interval of 48 seconds. Consequently, 220/132 kV Chatra S/s became dead. Load loss of 20 MW reported during the event by Jharkhand SLDC. Inclement weather reported during the event at Chatra.

Date / Time of disturbance: 14-07-2022 at 16:17 hrs

- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Chatra
- **Load and Generation loss**.
    - No generation loss was reported during the event.
    - Around 20 MW load loss reported during the event at Chatra by Jharkhand SLDC.

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

- NIL

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Daltonganj-Chatra D/c

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

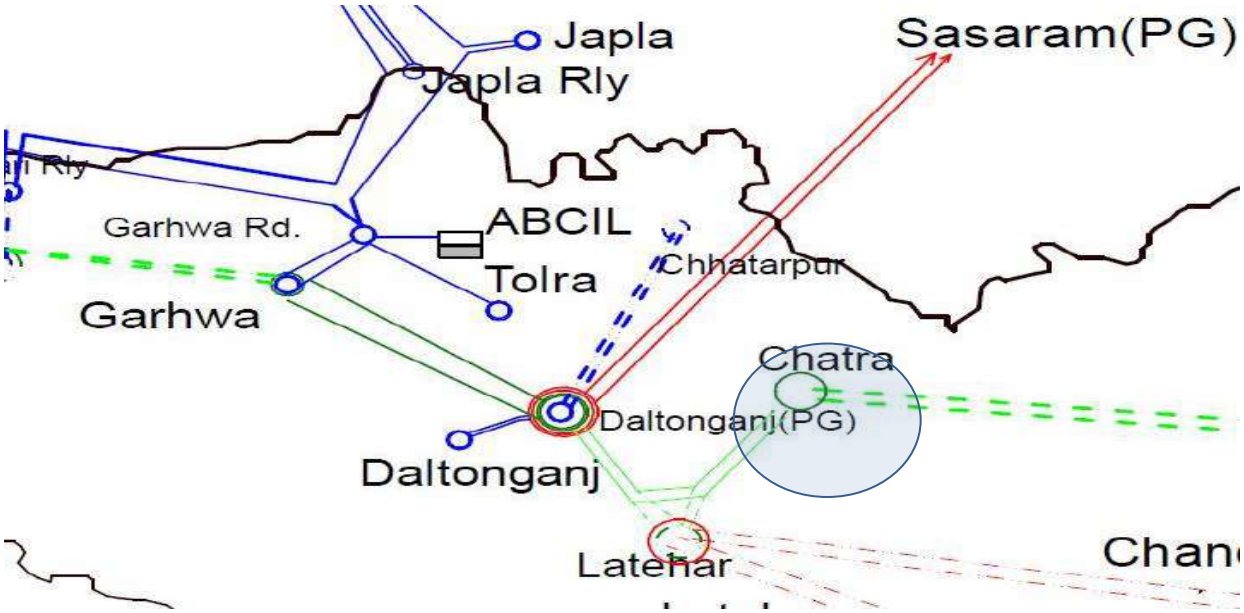


Figure 1: Network across the affected area

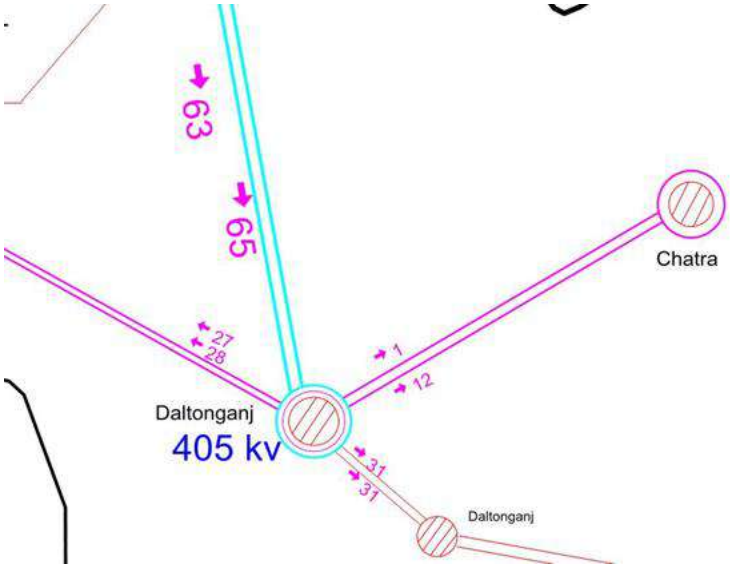


Figure 2: SCADA snapshot of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
16:48	220 kV Daltonagnj-Chatra-1	Daltonganj: B_N, 97 km, 1.21 kA	Chatra: B_N, 392 km, 0.5 kA	1st tripping: Gradual dip in B_ph voltage. Fault clearance time around 3 seconds. 2nd tripping: 22 kV dip in Y_ph and 24 kV dip in B_ph at Daltonganj. Fault clearance time<100 msec
	220 kV Daltonagnj-Chatra-2	Daltonganj: Y_B, Iy=Ib=2.48 kA	-	

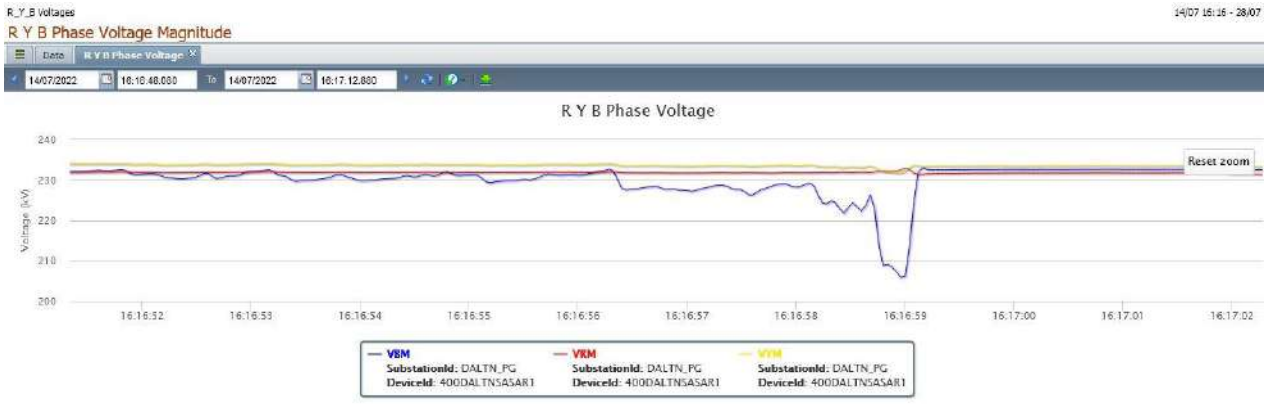


Figure 3: PMU snapshot of 400/220 kV Daltonganj S/s (16:16 Hrs)

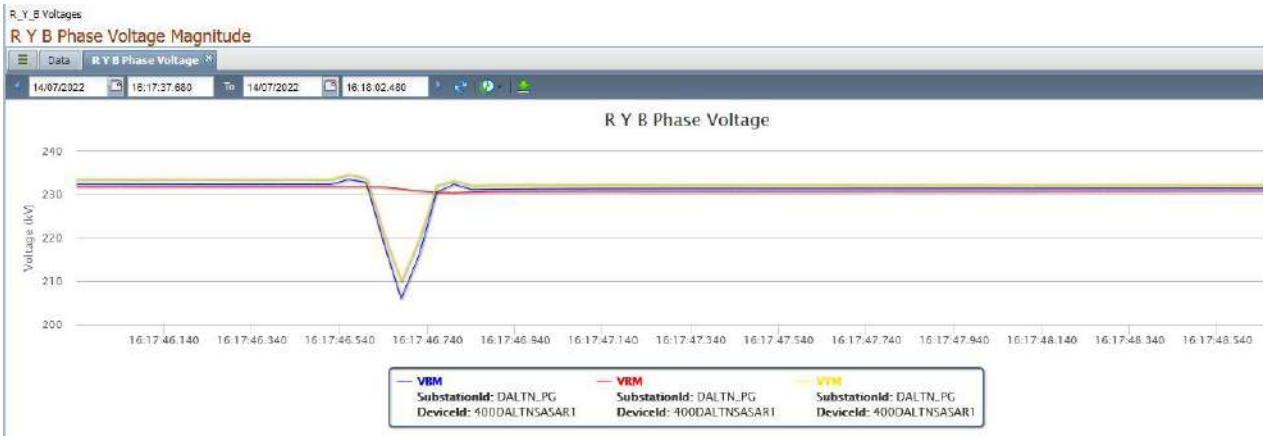


Figure 4: PMU snapshot of 400/220 kV Daltonganj S/s (16:17 Hrs)

Restoration (पूर्वावस्था की प्राप्ति)

Transmission/Generation element name	Restoration time
220 kV Daltonganj-Chatra-1	17:01
220 kV Daltonganj-Chatra-2	18:05

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

- 16:16:58.768 Hrs: B_Ph fault struck 220 kV Daltonganj-Chatra-1. Fault was seen in Zone-2 from Daltonganj. After 250 msec, DEF relay got high and tripped the line instantaneously from Daltonganj. **DEF settings at Daltonganj end to be reviewed.**
- 16:17:46.672 Hrs: Phase-to-phase (Y_B) fault struck 220 kV Daltonganj-Chatra-2 and the line tripped within 100 msec.

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):

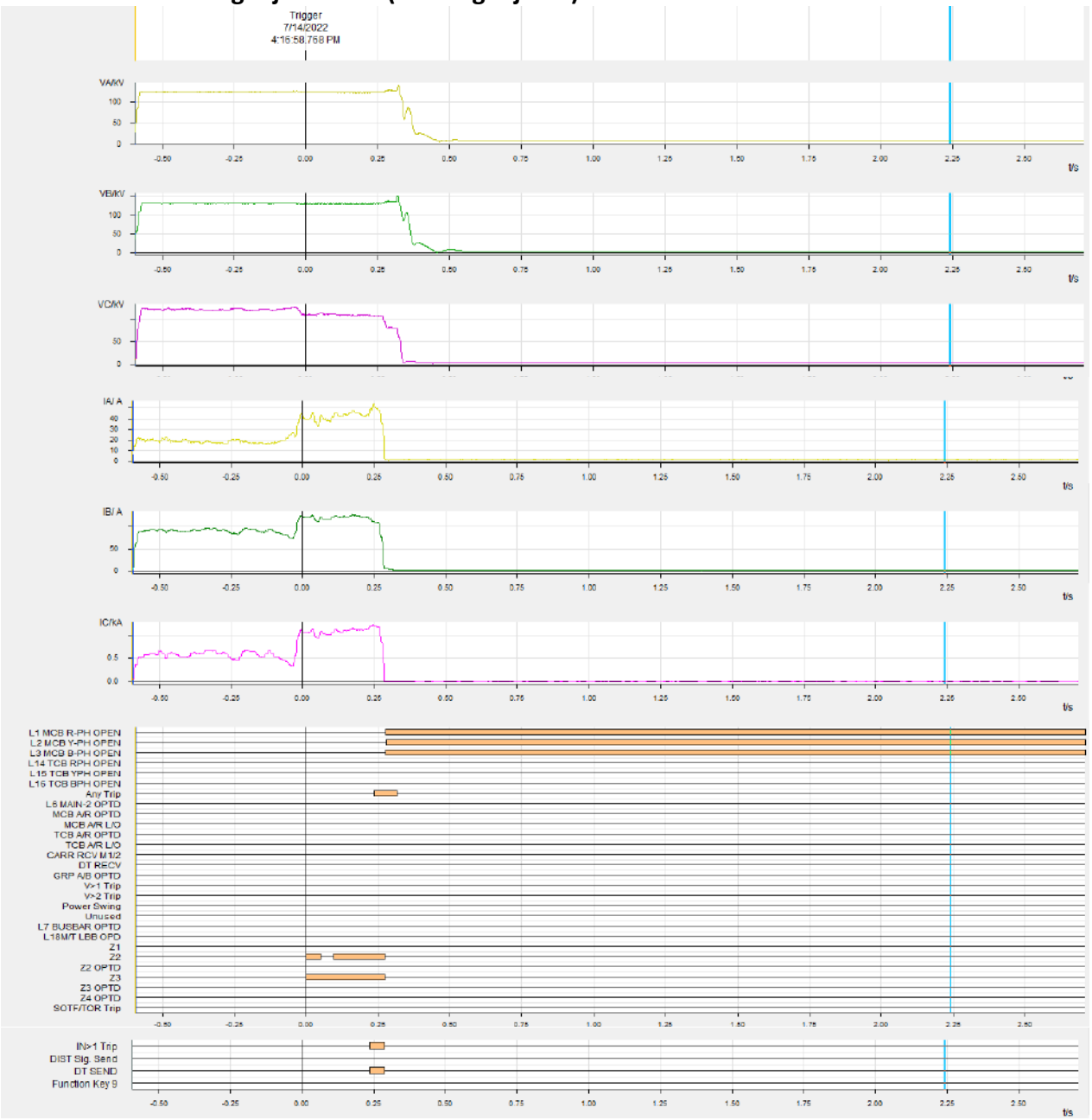
- DR/EL yet to be received from JUSNL

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

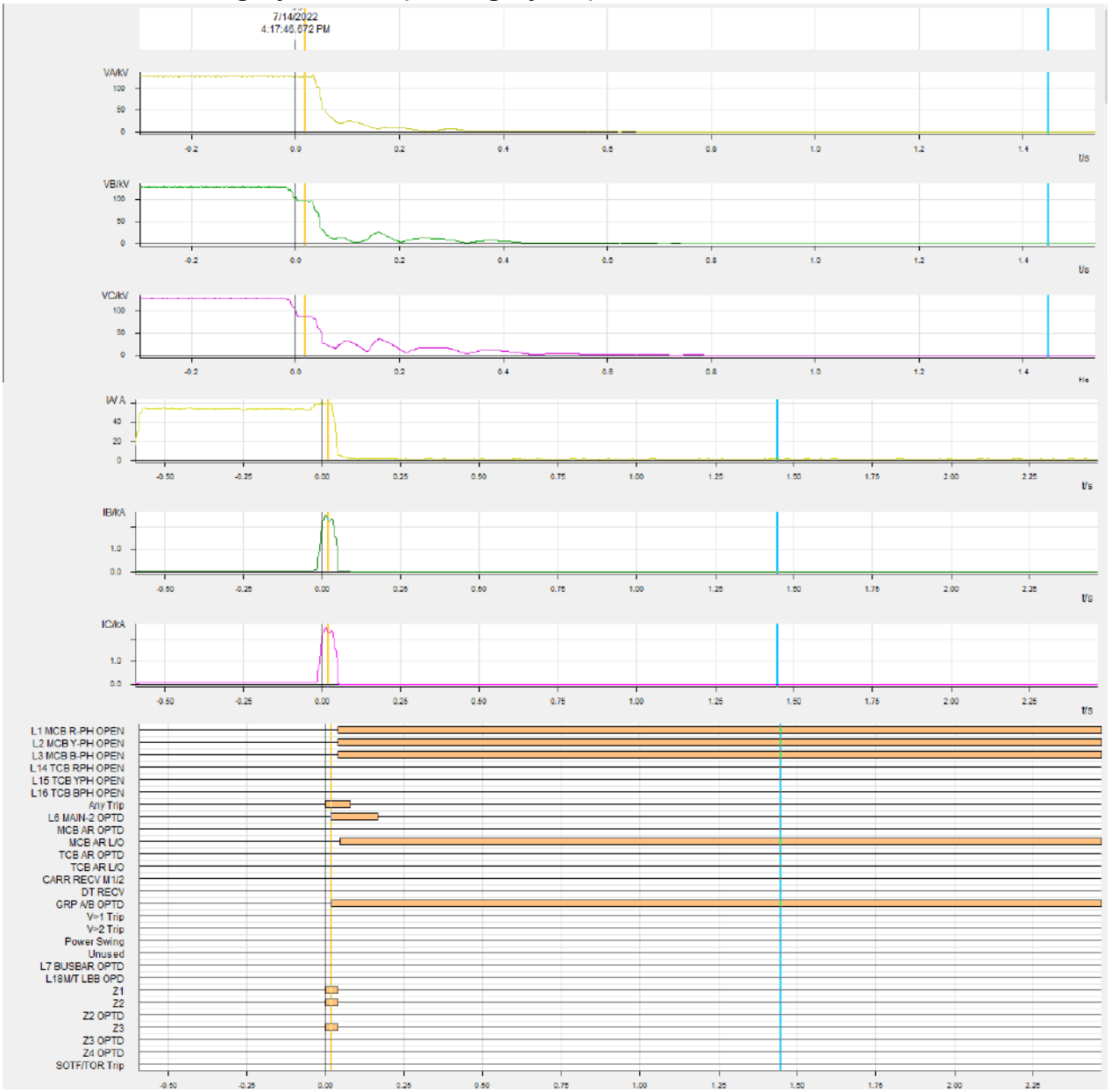
TIME	STATION	DESCRIPTION	STATUS
16:16:59.040	DALTN_PG	220_LATHEHAR_1_CB	Open
16:17:46.703	DALTN_PG	220_LATHEHAR_2_CB	Open

Annexure 2: DR recorded

DR of 220 kV Daltonganj-Chatra-I (Daltonganj end)



DR of 220 kV Daltonganj-Chatra-2 (Daltonganj end)



पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
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घटना संख्या: **11-07-2022/1** दिनांक: **29-07-2022**

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

Summary of the event (घटना का सारांश):

At 15:34 hrs on 06/07/2022, 220kV Begusarai S/S became dead and all emanating lines tripped from Begusarai due to blast of Y phase CT of 220kV bus coupler bay at Begusarai. At the same time 220 kV Barauni- Hajipur -I, single remaining circuit from Barauni for power evacuation tripped from Barauni end on overcurrent (overload) resulting in tripping of Barauni unit 8 & 9 due to overspeed.

Date / Time of disturbance: 14-06-2022 at 14:57 hrs

- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Begusarai & 200 Kv Barauni S/s
- **Load and Generation loss**.
    - 460 MW generation loss occurred during the event.
    - Around 300 MW load loss reported during the event.

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

- 220 kV Bihar Sharif Mokama D/C were out of service & Mokama load was radial on Barauni.
- 220 kV Barauni- Hajipur-II Out due to tower collapse.

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
220KV Begusarai Samastipur New Ckt II	06-07-2022	15:34hrs
220KV Begusarai Samastipur New Ckt II	06-07-2022	15:34hrs
220KV Begusarai BTPS Ckt I	06-07-2022	15:34hrs
220KV Begusarai BTPS Ckt II	06-07-2022	15:34hrs
220KV Begusarai Khagaria New Ckt I	06-07-2022	15:34hrs
220KV Begusarai Khagaria New Ckt II	06-07-2022	15:34hrs
220KV Barauni - Hajipur	06-07-2022	15:34hrs

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

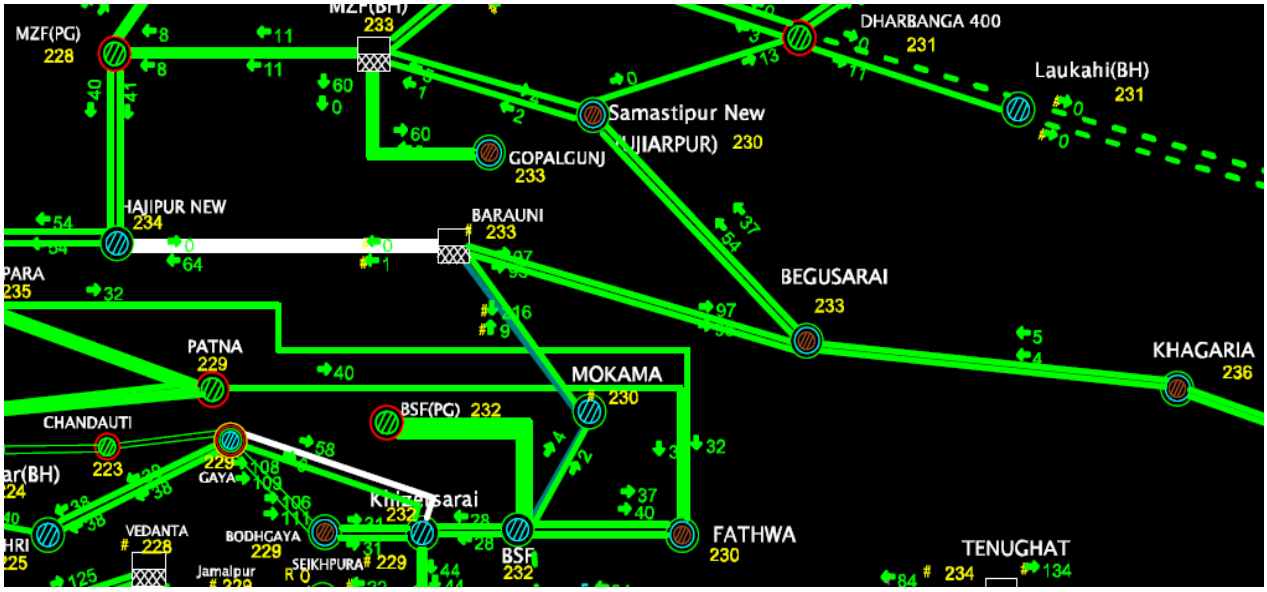


Figure 1: SCADA snapshot of the system

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

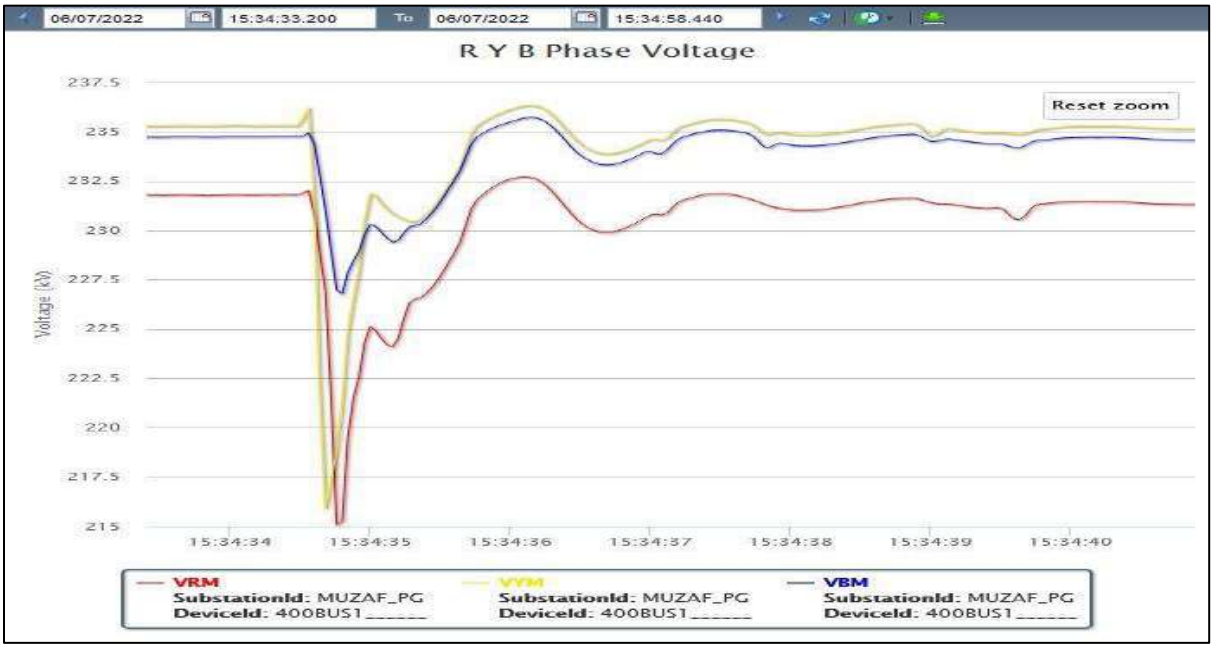


Figure 2: PMU snapshot of 400/220 kV Muzaffarpur S/s

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
14:57	220KV Begusarai BTPS Ckt I	Zone-1 ,R-Y		20 kv dip in R-Y phase ,fault cleared in 600 ms.
	220KV Begusarai BTPS Ckt II	Zone-1 ,R-Y		
	220KV Barauni - Hajipur	Overcurrent		
	220KV Begusarai Khagaria D/C		Z2,94 KM,Iy=1100A	
	Barauni Unit 8 & 9	Overspeed		
	220KV Begusarai Samastipur New Ckt D/C		Z2,50 KM,Iy=1500A	

Restoration (पूर्वावस्था की प्रप्ति)

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
220KV Begusarai Samastipur New Ckt II	06-07-2022	15:34hrs	06-07-2022	16:25hrs
220KV Begusarai Samastipur New Ckt II	06-07-2022	15:34hrs	06-07-2022	16:20hrs
220KV Begusarai BTPS Ckt I	06-07-2022	15:34hrs	06-07-2022	18:00hrs
220KV Begusarai BTPS Ckt II	06-07-2022	15:34hrs	06-07-2022	18:02hrs
220KV Begusarai Khagaria New Ckt I	06-07-2022	15:34hrs	06-07-2022	16:10hrs
220KV Begusarai Khagaria New Ckt II	06-07-2022	15:34hrs	06-07-2022	16:10hrs
220KV Barauni - Hajipur	06-07-2022	15:34hrs	06-07-2022	15:40 hrs

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

- At 15:34 due to blast of Y phase CT of 220kV bus coupler bay at Begusarai & there is no Busbar at 220 kv level, so all remote end lines cleared the fault.
- 220 kv BTPS-Begusarai D/C tripped in Zone-1 from BTPS end.
- Now with the tripping of BTPS-Begusarai D/C only remaining circuit for the evacuation of two running units of BTPS with total generation of 460 MW was BTPS-Hazipur -I as Hazipur-II was out due to tower collapse.
- As total generation of 460 MW started flowing from HAZIPUR-1 it tripped on overload.
- Bihar Shariff -Mokama was kept opened and Mokama load was radially on BTPS, and BTPS generation with 460 MW generation formed an island with 40 MW Mokama load and BTPS units tripped on overspeed due to surplus generation within island . If this loop was kept intact, Unit tripping at BTPS could have been avoided, same recommendation was already given by PCC during one past incidence.
- 220 kv Begusarai-Samastipur D/C sensed fault on Zone -2 from samastipur end but ckt -1 tripped withing 100 ms & ckt-2 within 200 ms, this needs to be checked. (**BSPTCL to update)**
- 220 KV Begusarai-Khagaria D/C tripped on Zone -2 from khagaria end.
- **Implementation of BUSBAR to be expedited. BSPTCL to update.**

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	**BSPTCL**

Status of Reporting (रिपोर्टिंग की स्थिति):

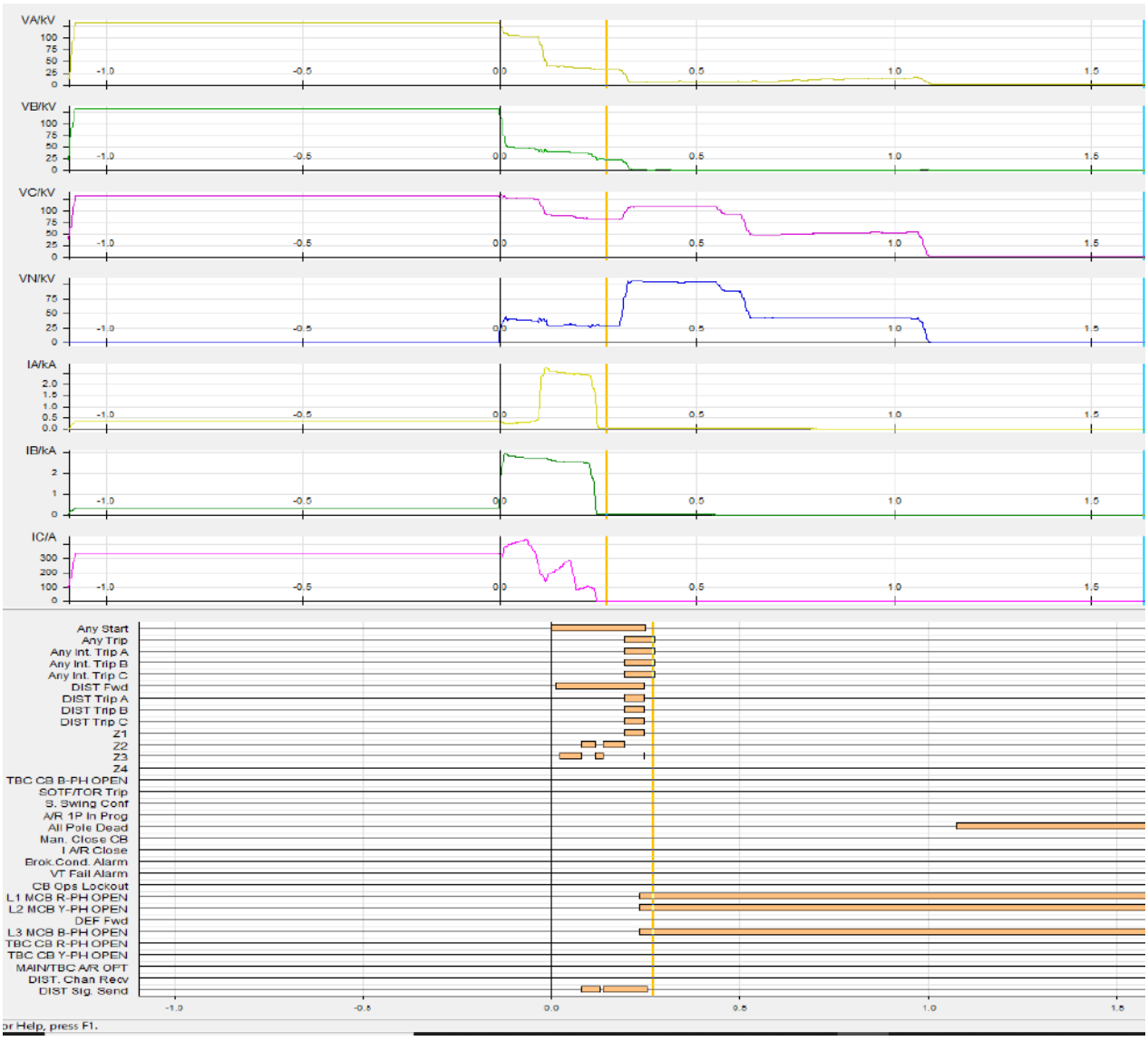
- DR/EL received from BTPS.
- DR/EL received from BSPTCL.

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

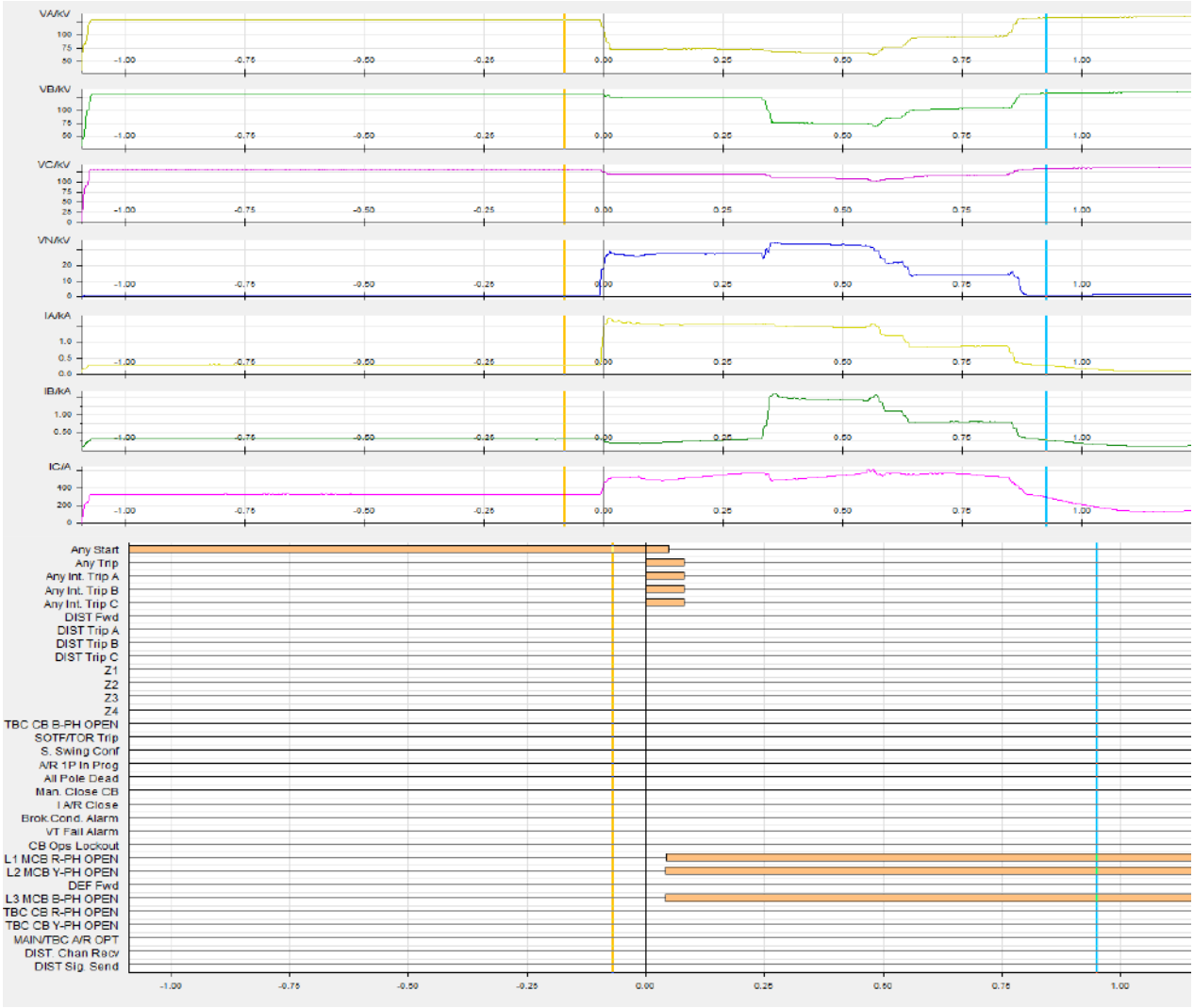
Sequence of event not recorded at time of event.

Annexure 2: DR recorded

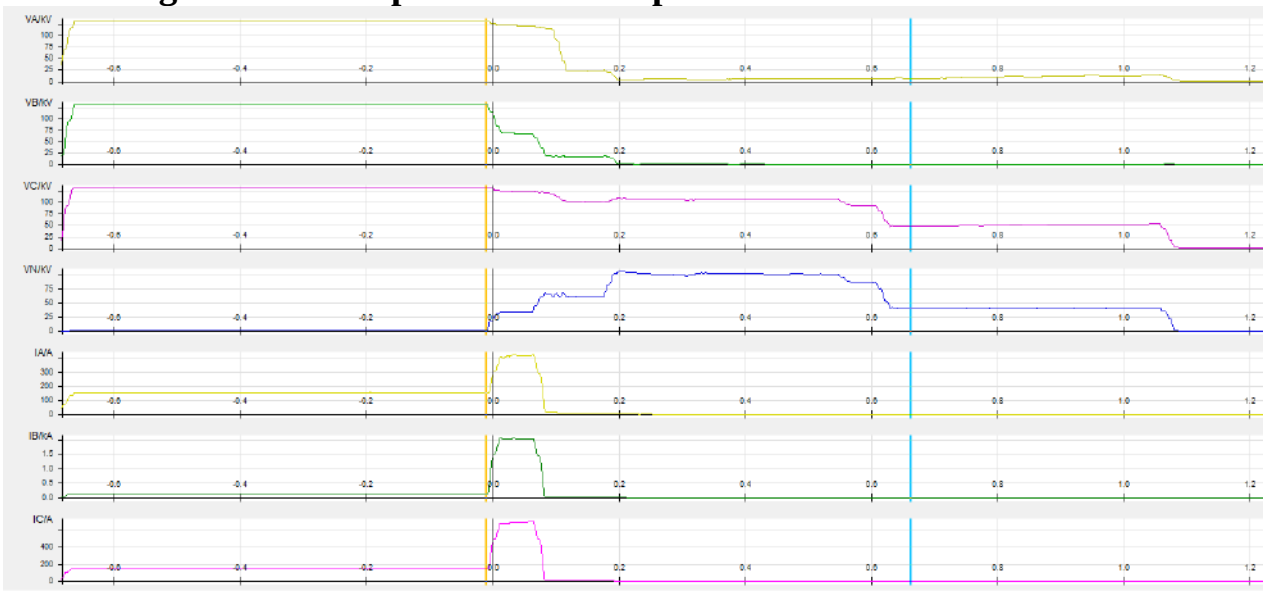
220 kv BTPS-BEGUSARI I at BTPS end

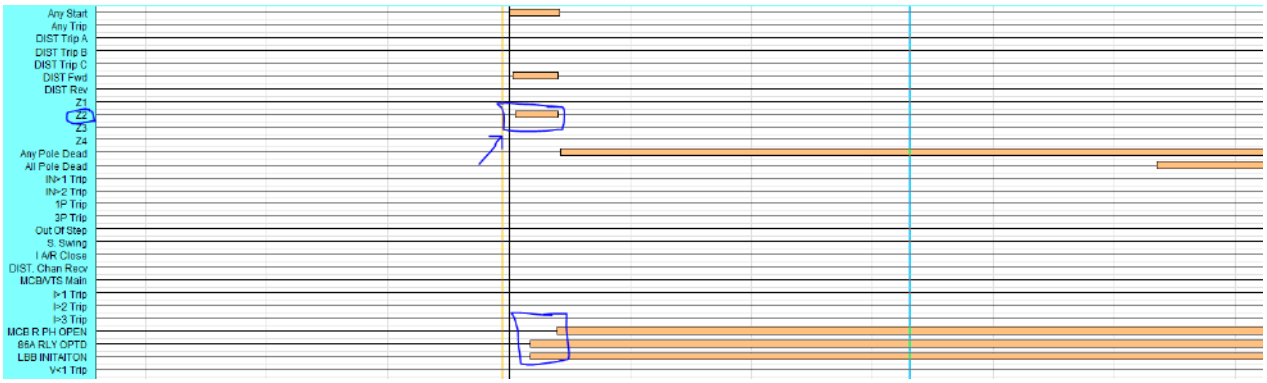


220 kv BTPS-HAZIPUR II at BTPS end

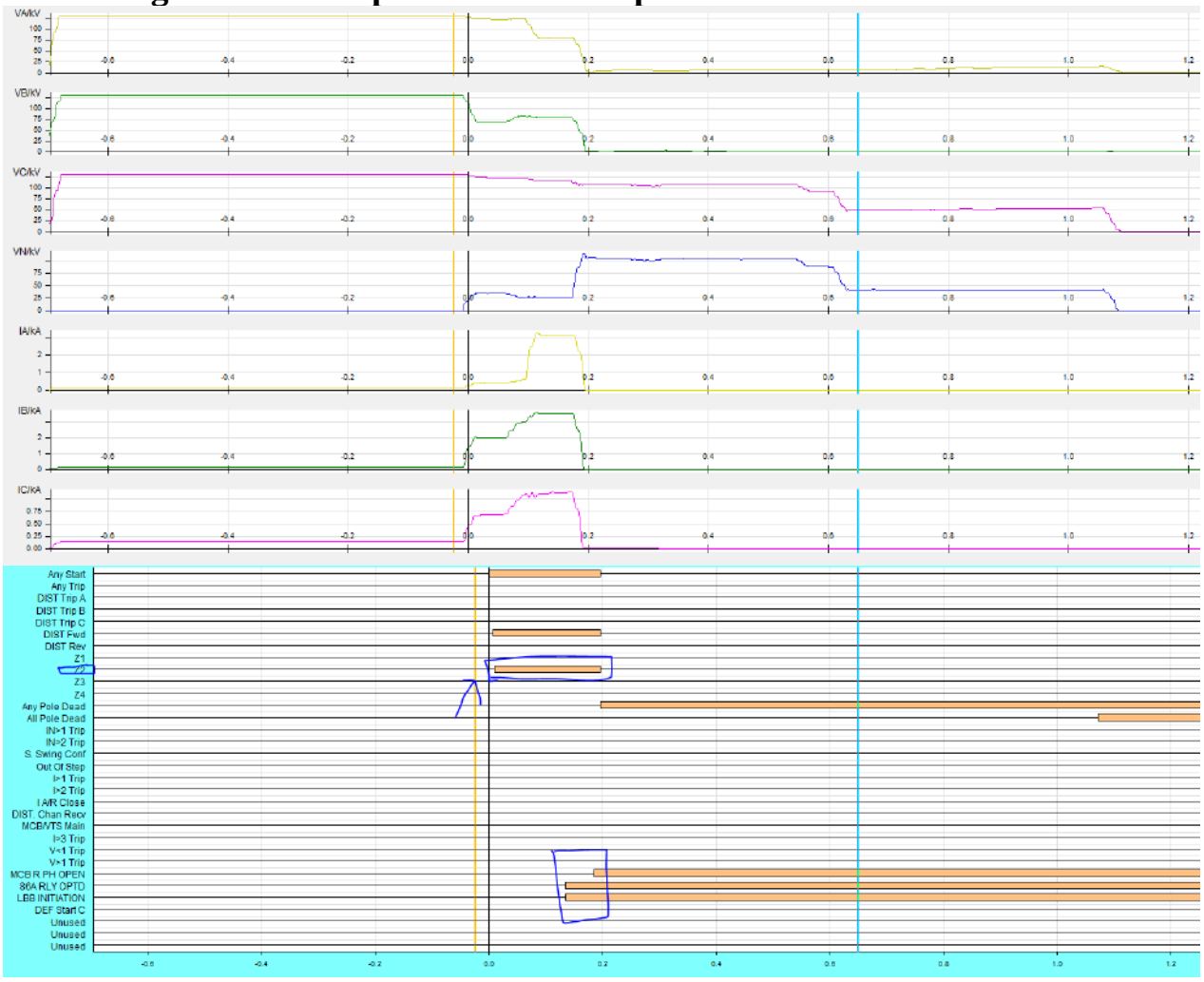


220 kv Begusarai-samstipur-I at Samastipur end :

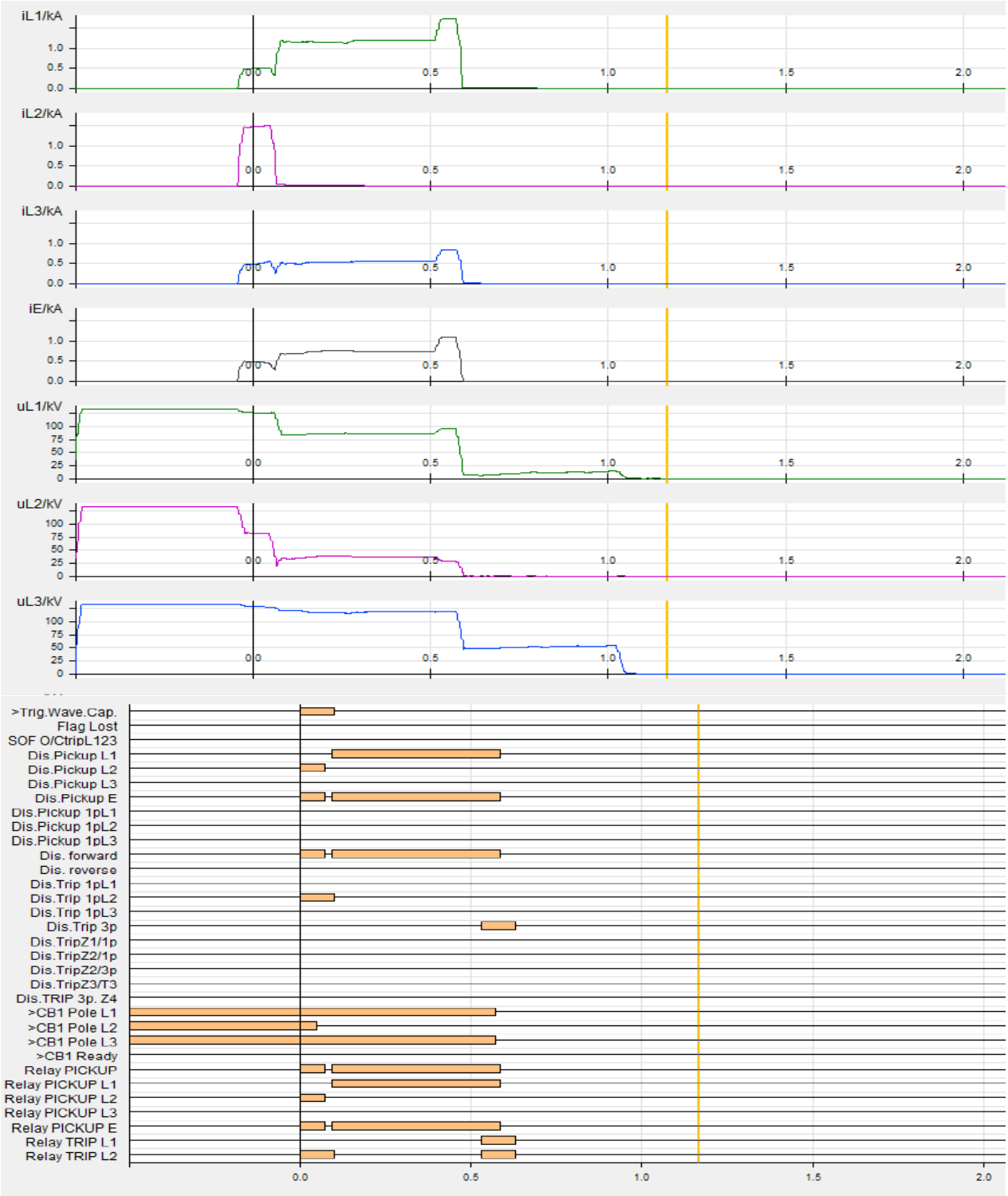




220 kv Begusarai-samstipur-II at Samastipur end:



220 kv Begusarai-Khagaria-I at Khagaria end:



पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)
Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033.
CIN: U40105DL2009GOI188682
फ़ोन: 033- 24235755, 24174049 फैक्स : 033-24235809/5029 Website:www.erldc.org, Email ID- erldc@posoco.in

घटना संख्या: **11-07-2022/1** दिनांक: **29-07-2022**

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

Summary of the event (घटना का सारांश):

At 21:03 hrs R-phase High Level jumper of 132KV Main Bus at GSS Begusarai got snapped resulting in tripping of all feeders connected to Begusarai S/S.
At the same time 220 kV Barauni- Hajipur single remaining circuit tripped from Barauni end on overcurrent resulting in tripping of Barauni unit 8 & 9 due to loss of evacuation path.

Date / Time of disturbance: 14-06-2022 at 14:57 hrs

- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Begusarai & 200 Kv Barauni S/s
- **Load and Generation loss**.
    - 460 MW generation loss occurred during the event.
    - Around 300 MW load loss reported during the event.

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

- 220 kV Bihar Sharif Mokama D/C were out of service & Mokama load was radial on Barauni.
- 220 kV Barauni- Hajipur-II Out due to tower collapse.

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
220KV Begusarai Samastipur New Ckt II	11-07-2022	21:03hrs
220KV Begusarai Samastipur New Ckt II	11-07-2022	21:03hrs
220KV Begusarai BTPS Ckt I	11-07-2022	21:03hrs
220KV Begusarai BTPS Ckt II	11-07-2022	21:03hrs
220KV Begusarai Khagaria New Ckt I	11-07-2022	21:03hrs
220KV Begusarai Khagaria New Ckt II	11-07-2022	21:03hrs
220KV Barauni - Hajipur	11-07-2022	21:03hrs
Barauni Unit 8	11-07-2022	21:03hrs
Barauni Unit 9	11-07-2022	21:03hrs

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

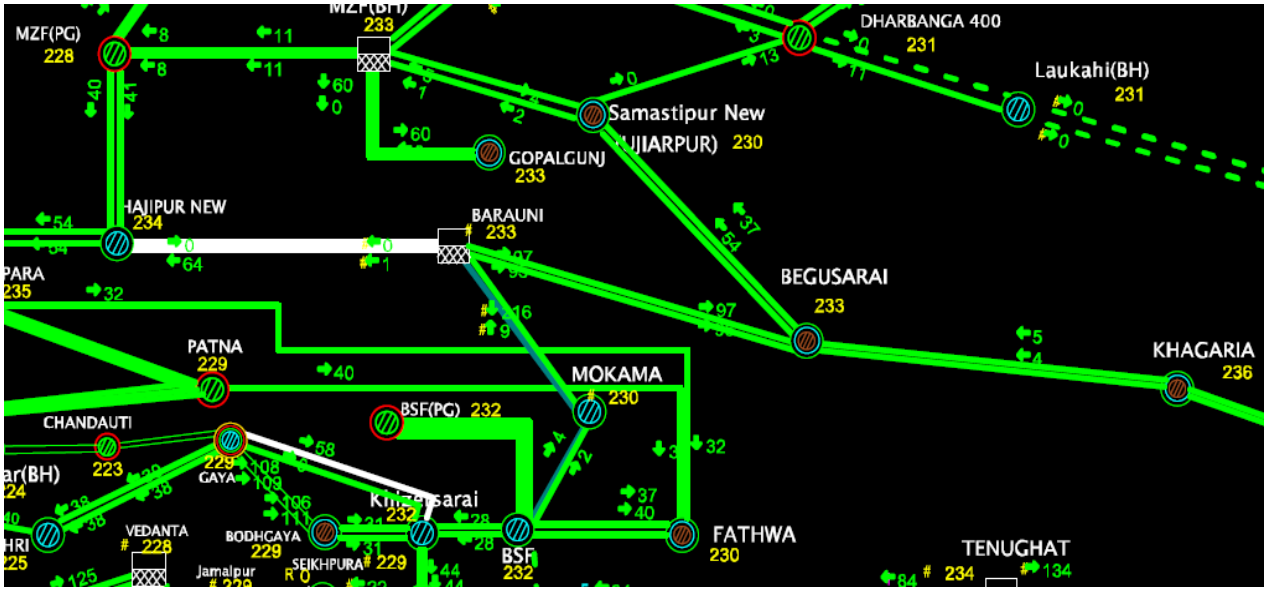


Figure 1: SCADA snapshot of the system

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

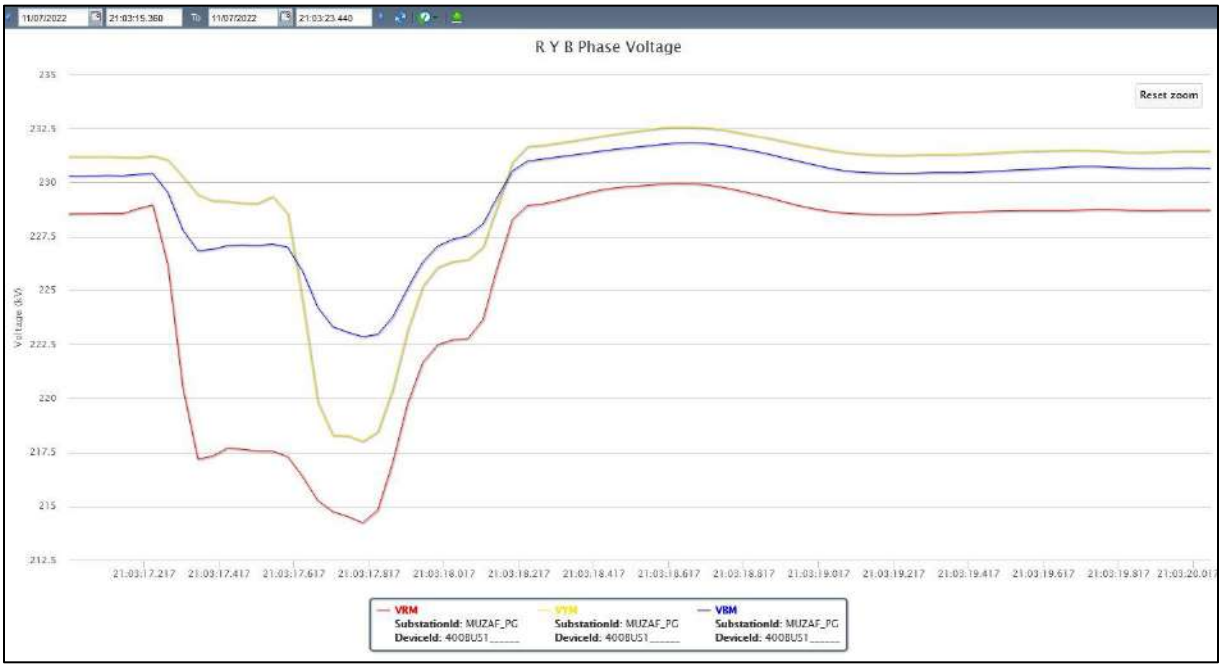


Figure 2: PMU snapshot of 400/220 kV Muzaffarpur S/s

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
14:57	220KV Begusarai BTPS Ckt I	Zone-3 ,R-Y		R-Y Phase fault with 1 second of fault clearance
	220KV Begusarai BTPS Ckt II	Zone-3 ,R-Y		
	220KV Barauni - Hajipur	Overcurrent		
	220KV Begusarai Khagaria D/C		Directional O/C,Ir=800A	
	Barauni Unit 8 & 9	Overspeed		
	220KV Begusarai Samastipur New Ckt D/C	Non directional O/C,Ir=1KA	Zone-2	
	220/132 ATR	B/up Overcurrent		

Restoration (पूर्वावस्था की प्रप्ति)

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
220KV Begusarai Samastipur New Ckt II	11-07-2022	21:03hrs	11-07-2022	21:37hrs
220KV Begusarai Samastipur New Ckt II	11-07-2022	21:03hrs	11-07-2022	23.55hrs
220KV Begusarai BTPS Ckt I	11-07-2022	21:03hrs	11-07-2022	23:10hrs
220KV Begusarai BTPS Ckt II	11-07-2022	21:03hrs	11-07-2022	23:05hrs
220KV Begusarai Khagaria New Ckt I	11-07-2022	21:03hrs	11-07-2022	21:57hrs
220KV Begusarai Khagaria New Ckt II	11-07-2022	21:03hrs	11-07-2022	21:37hrs
220KV Barauni - Hajipur	11-07-2022	21:03hrs	11-07-2022	21:21 hrs
Barauni Unit 8	11-07-2022	21:03hrs	Restored	
Barauni Unit 9	11-07-2022	21:03hrs	11-07-2022	4:38 hrs

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

- At 21:03 hrs R-phase High Level jumper of 132KV Main Bus at GSS Begusarai got snapped, & there is no Busbar at 132 kv level, so all remote end lines will clear the fault.
- 220/132 kv ICT at Begusarai should have tripped first from 220 kv side and there should not be any tripping of line at 220 kv level but ICT did not cleared the fault which resulted into tripping of all 220 kv lines from remote end. (**BSPTCL to explain)**
- 220 kv BTPS-Begusarai D/C tripped in Zone-3 from BTPS end.
- Now with the tripping of BTPS-Begusarai D/C only remaining circuit for the evacuation of two running units of BTPS with total generation of 460 MW was BTPS-Hazipur -I as Hazipur-II was out due to tower collapse.
- As total generation of 460 MW started flowing from HAZIPUR-1 it tripped on overload.
- Bihar Shariff -Mokama was kept opened and Mokama load was radially on BTPS, and BTPS generation with 460 MW generation formed an island with 40 MW Mokama load

and BTPS units tripped on overspeed due to surplus generation within island. If this loop was kept intact, Unit tripping at BTPS could have been avoided, same recommendation was already given by PCC during one past incidence.

- 220 kv Begusarai-Samastipur D/C tripped from Begusarai end on non-directional high set stage-2 o/c.
- 220 KV Begusarai-Khagaria D/C tripped from khagaria end on directional high set stage-2 o/c. setting as mentioned below,

a. Non directional O/C setting of 700A, DT-**800ms** in 220 KV Samastipur new D/C (Begusarai end).

b. Directional O/C setting of 700A, DT-**450ms** in 220 KV Begusarai D/C (Khagaria new end).

Justification of keeping such protection may be explained and it needs to be disabled**.** **(BSPTCL to explain)**

- 220/132 ATR tripped on Backup Overcurrent after 1 sec approx. and fault got isolated so B/up overcurrent should be co-ordinated in such a way that for fault at downstream ICT should trip first before tripping of any 220 kv line. **(BSPTCL to explain)**

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	**BSPTCL**

Status of Reporting (रिपोर्टिंग की स्थिति):

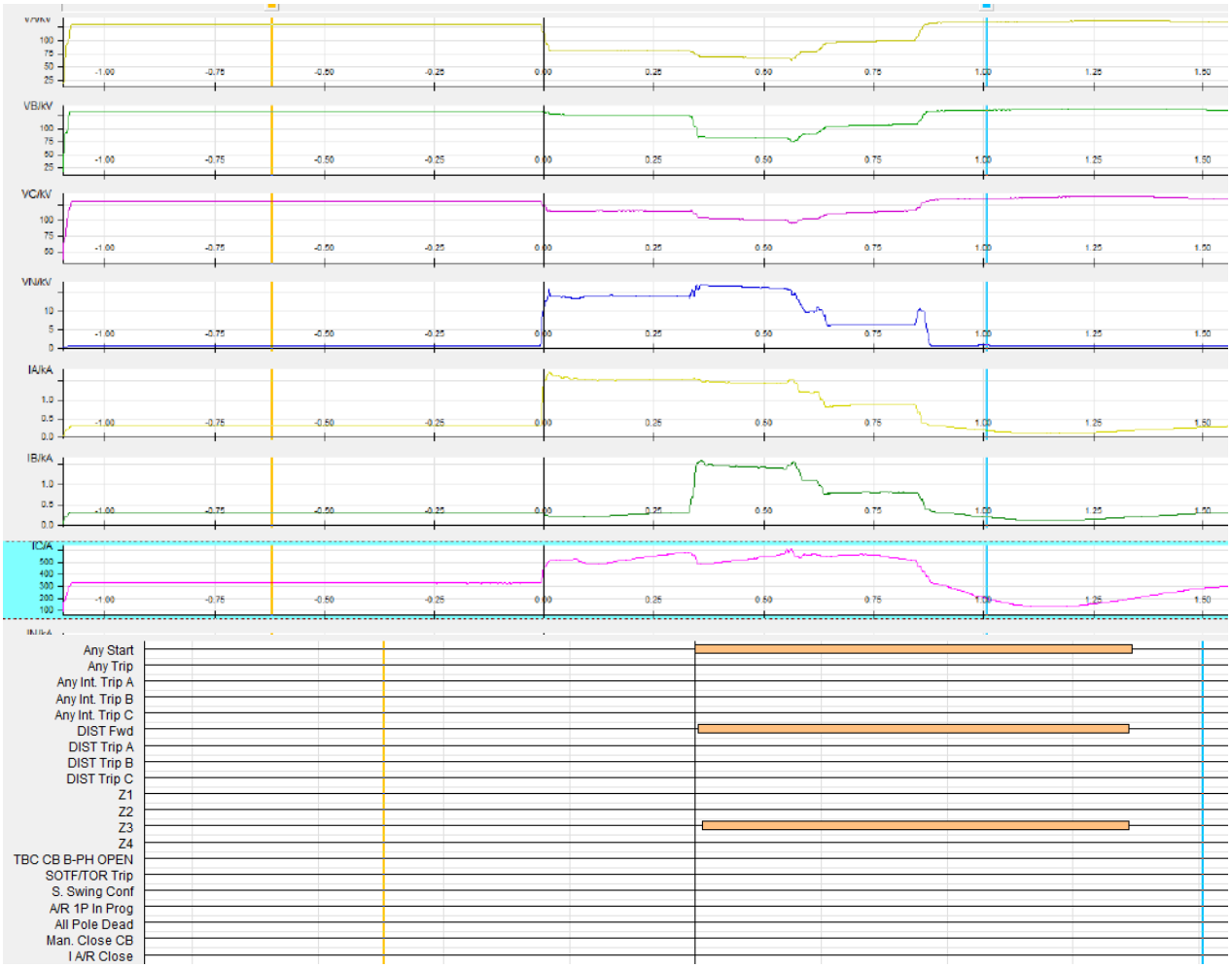
- DR/EL received from BTPS.
- DR/EL received from BSPTCL.

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

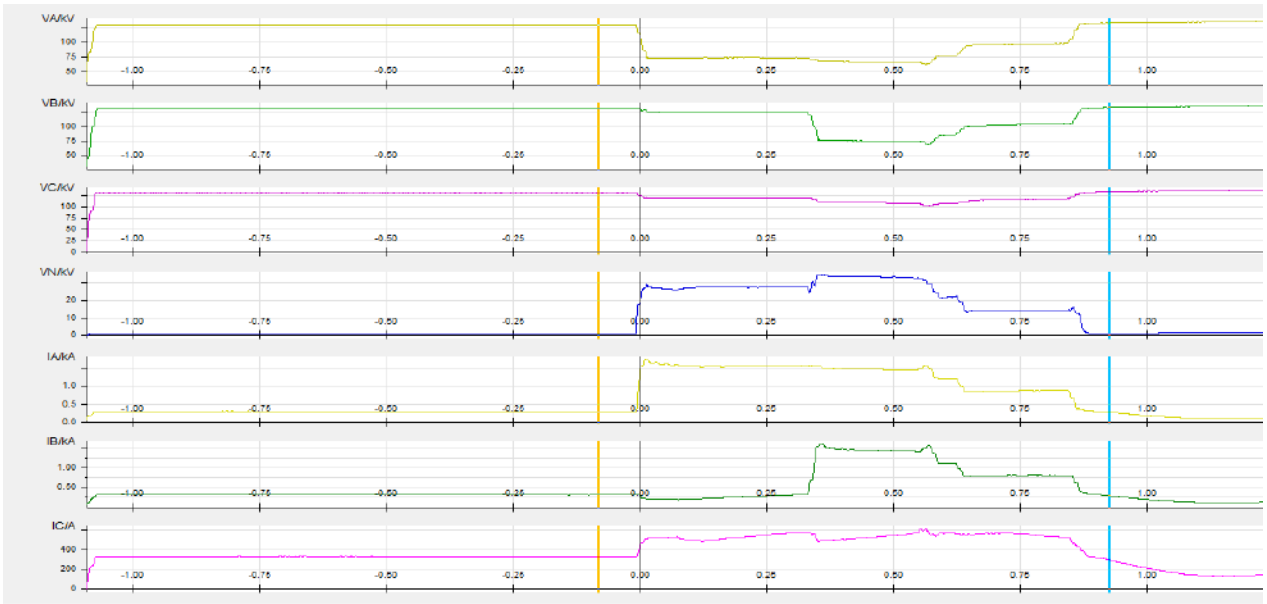
Sequence of event not recorded at time of event.

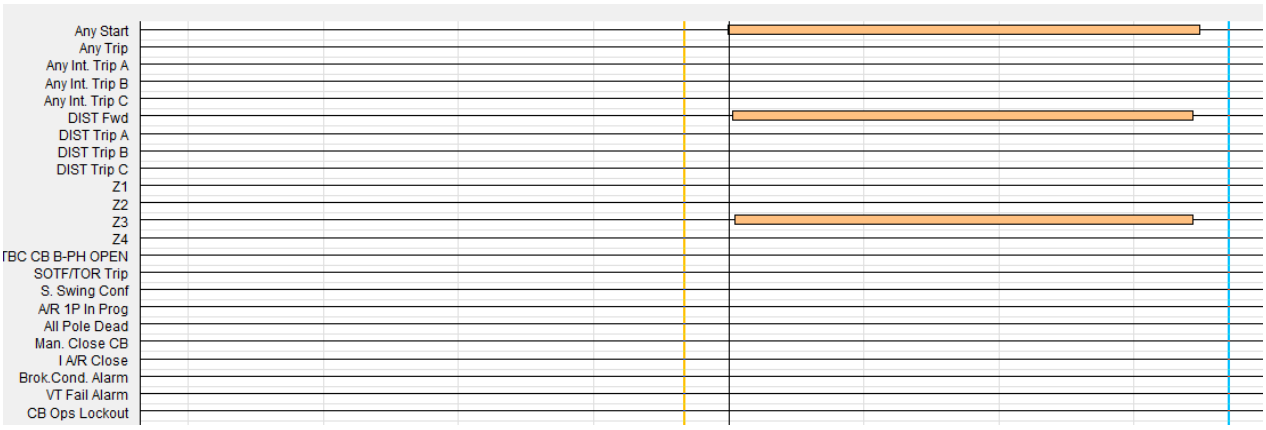
Annexure 2: DR recorded

220 kv BTPS-BEGUSARI I at BTPS end

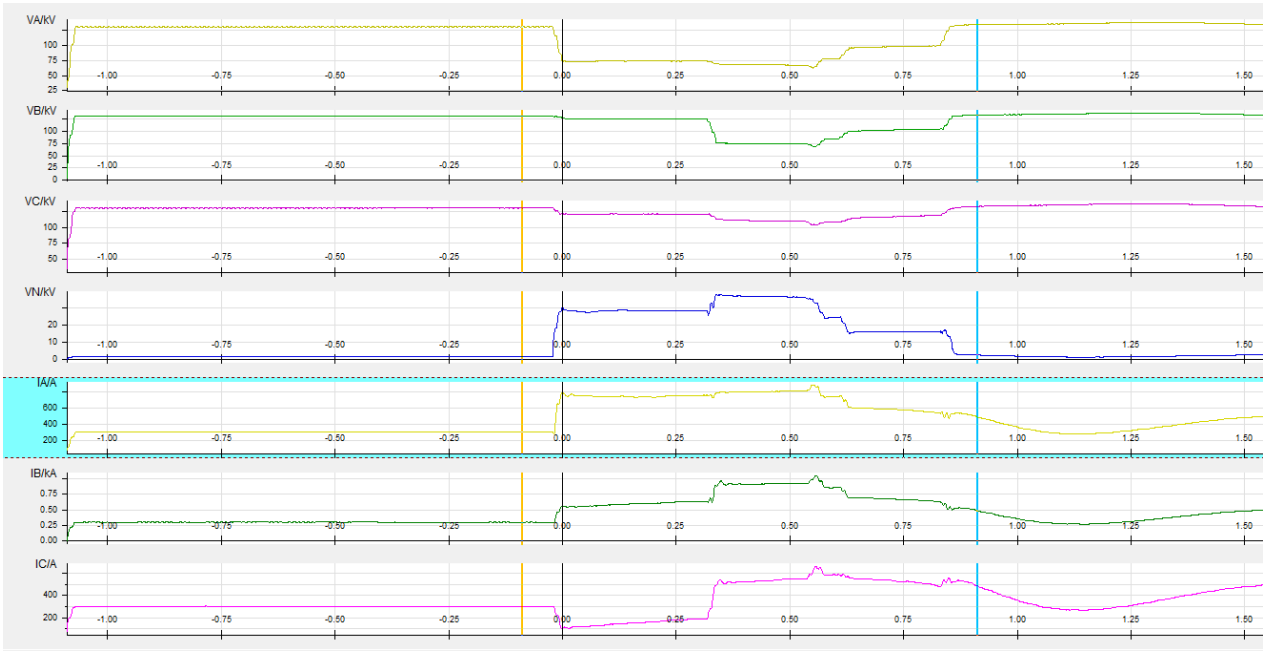


220 kv BTPS-BEGUSARI II at BTPS end

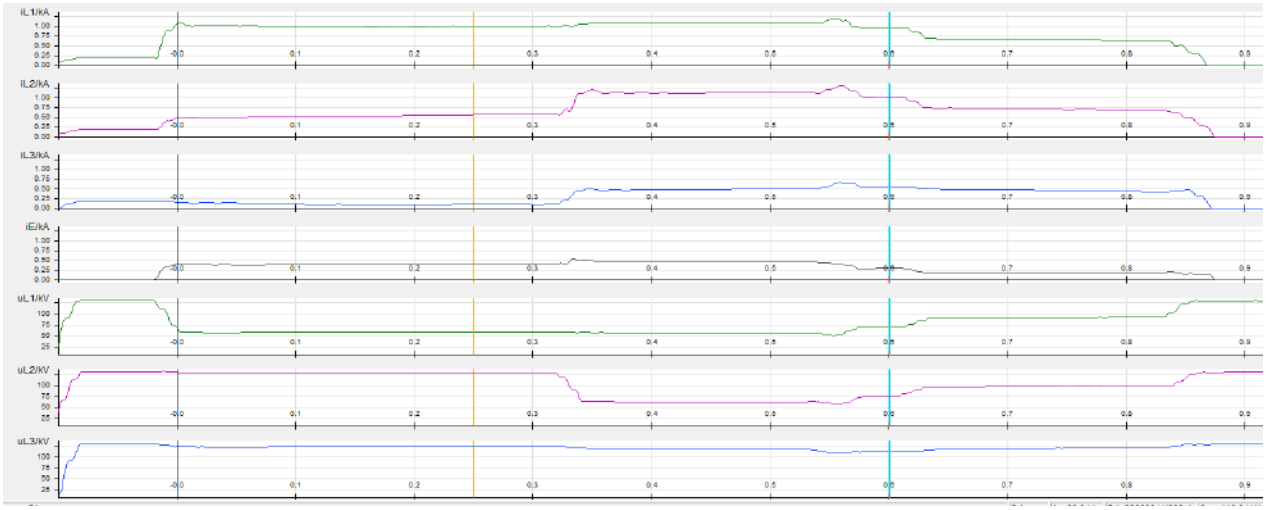


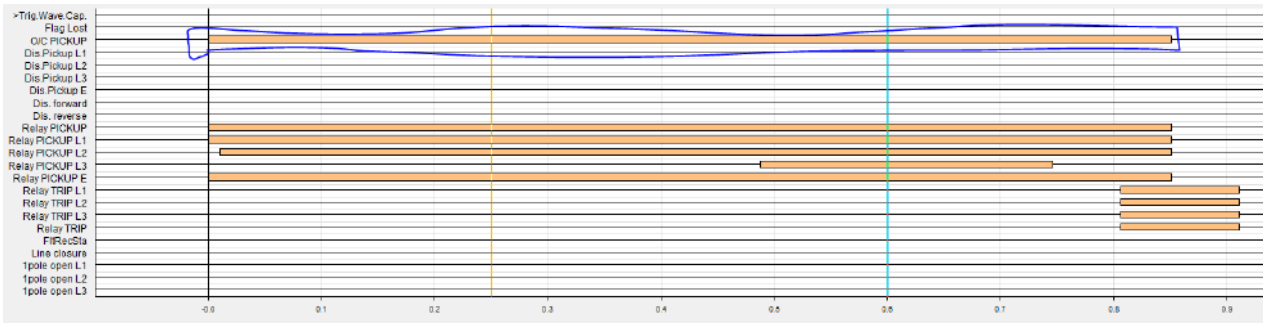


220 kv BTPS-HAZIPUR I at BTPS end

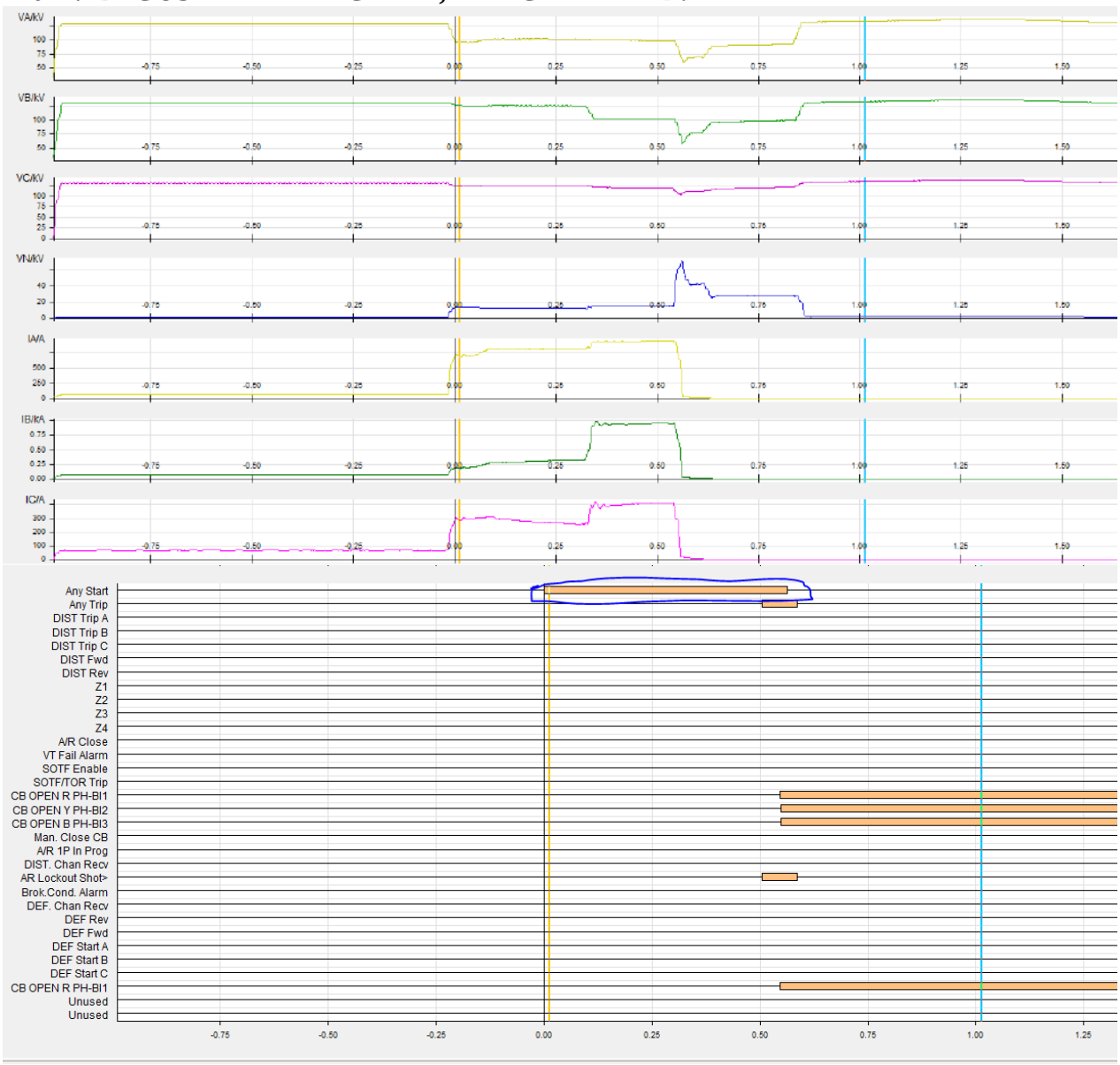


220 kV BEGUSARAI -SAMSTIPUR, BEGUSARAI END:





220 kV BEGUSARAI -KHAGARIA, KHAGARIA END:



List of important transmission lines in ER which tripped in July-2022

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	UTILITY RESPONSE
1	400 KV JHARSUGUDA-RAIGARH-3	01-07-2022	01:42	01-07-2022	02:29	Jharsuguda: Y_N, 90.57 km, 4.225 kA	Raigarh: Y_N, 49.05 km, 5.91 kA, A/r successful	Y-Earth	100	Three phase tripping for single phase fault at Jharsuguda. A/r successful from Raigarh		Yes	NA	

2	400 KV PATNA-NAUBATPUR-1	01-07-2022	03:54	01-07-2022	04:36	Patna: R_N, 11.16 km, 17.8 kA	Naubatpur: R_N, 9.8 km, 7.76 kA	R-Earth	100	Three phase tripping for single phase fault		Yes	No	
3	400 KV BINAGURI-MALBASE-1	01-07-2022	07:14	01-07-2022	07:36	Binaguri: R_N		R-Earth	100	A/r successful from Binaguri only		Yes	NA	
4	220 KV RANCHI-MEJIA (MTPS)-1	01-07-2022	12:07	01-07-2022	13:50	Ranchi: R_B, 20 km, Ir: 4.38 kA, Ib: 8.34 kA	Mejia: R_B, 223.68 km, Ir: 1.03 kA, ib: 1.26 kA	R-B-Earth	100	Phase-to-phase fault		Yes	No	
5	400 KV JEERAT-BAKRESWAR-1	01-07-2022	16:24	01-07-2022	17:34	Jeerat: Y_N, 117.3 km, 3.549 kA	Bakreswar: A/r successful	Y-Earth	100	A.r successful from Bakreswar end only. Other two phase tripped at Jeerat after 1.5 second. A/r command triggerred but A/r didn't occur		Yes	No	
6	400 KV JAKKANPUR-PATNA-1	02-07-2022	16:24	02-07-2022	19:55	Patna: R_Y, 4.6 km, Ir=Iy=21.26 kA	Jakkanpur: Y_N, 14.4 km	Y-Earth	100	Intially fault in R_ph. Another fault struck Y_ph within 100 msec		No	Yes	
7	400 KV ALIPURDUAR-JIGMELLING-2	03-07-2022	12:55	03-07-2022	15:23	Alipurduar: R_Y_B, 18.73 km, Ir: 12.26 kA, Iy: 3.85 kA, Ib: 4.03 kA	Jigmelling: Didn't trip	R-Y-B-Earth	100	Three phase A/r successful from Jigmelling		Yes	NA	
8	765 KV JHARSUGUDA-RAIPUR-2	04-07-2022	03:33	04-07-2022	07:29	Jharsuguda: B_N, Zone-1, 159.2 km, 4.96 kA	Raipur: B_N, 132 km, 5.49 kA	B-Earth	100	A/r failed after 1 sec		No	NA	

9	400 KV JHARSUGUDA-ROURKELA-1	04-07-2022	22:14	05-07-2022	03:07	Jharsuguda: Y_N, 114.7 km, 3.742 kA	Rourkela: Y_N, 27.7 km, 10.337 kA	Y-Earth	100	DT received at Jharsuguda after 200 msec and all three phase tripped		Yes	No	
10	400 KV RANCHI-SIPAT-1	06-07-2022	02:38	06-07-2022	16:58	Ranchi: R_N, 402.33 km, 1.069 kA	Sipat: R_N, 49.12 km, 6.182 kA	R-Earth	100	A/r failed after 1 sec		Yes	NA	
11	400 KV RANCHI-RAGHUNATHPUR-2	06-07-2022	13:05	06-07-2022	13:59	Ranchi: B_N, 130.07 km, 2.85 kA	Raghunathpur: B_N, Zone-1, 1.69 kA	B-Earth	100	A/r successful. Tripped again within reclaim time		Yes	Yes	
12	400 KV JEERAT-NEW JEERAT-1	07-07-2022	07:32	07-07-2022	15:52	Jeerat: B_N, Zone-1, 16.8 km	New Jeerat: B_N, 6.4 km, 9.17 kA	B-Earth	100	A/r failed after 1 sec		Yes	No	
13	220 KV CHUKHA-BIRPARA-1	07-07-2022	21:04	07-07-2022	21:38	Tripped from Chukha only	Birpara: Didn't trip	No fault	NA	Tripped from Chukha only.		NA	NA	
14	220 KV CHUKHA-BIRPARA-2	07-07-2022	21:04	07-07-2022	22:22	Tripped from Chukha only	Birpara: Didn't trip	No fault	NA	Tripped from Chukha only.		NA	NA	
15	220 KV TSTPP-MERAMUNDALI-2	08-07-2022	00:01	08-07-2022	13:27	TSTPP: Y_N, 8.5 km, 11.2 kA	Meramundali: Y_N, Zone-1, 31.55 km, 4.5 kA. A/r successful	Y-Earth	100	A/r successful at Meramundali. Other two phase at TSTPP tripped after 2.1 second		Yes	Yes	

16	220 KV RENGALI (PH)- TSTPP-1	08-07-2022	00:40	09-07-2022	16:33	Rengali (PH): Y_N, 45.44 km	TSTPP: Y_N, 9.2 km, 8.6 kA	R-Y-Earth	350	Tripped in Zone-2 time from Rengali (PH)	DR channels not configured at TSTPP end	No	Yes	
17	220 KV BUDHIPADAR-RAIGARH-1	08-07-2022	17:57	09-07-2022	02:17	Budhipadar: Y_B, 30.4 km, Iy: 8.17 kA, Ib: 5.35 kA	Raigarh: Y_B, 53.44 km	Y_B-Earth	100	Phase to phase fault		Yes	NA	
18	220 KV BUDHIPADAR-KORBA-2	08-07-2022	17:57	08-07-2022	20:10	Budhipadar: B_N, 48.8 km, 4.45 kA; A/r successful	Korba: B_N, 1.193 kA	B-Earth	100	A/r successful from Budhipadar. Three phase A/r scheme is in service.		Yes	NA	
19	400 KV ALIPURDUAR-BINAGURI-2	09-07-2022	11:52	10-07-2022	08:57	Alipurduar: R_Y, Zone-2, 109.1 km, Ir: 1.94kA, Iy: 2.18 kA	Binaguri: R_Y, Zone-1, 4.5 km, Ir: 23.41 kA, Iy: 23.47 kA	R-Y	100	Phase to phase fault		Yes	Yes	
20	220 KV KHAGARIA-NEW PURNEA-1	09-07-2022	12:59	09-07-2022	15:00	Khagaria: Didn't trip	Tripped during testing of DC voltage for investigation of DC Earth problem at New Purnea	No fault	NA	Tripped during DC Earth fault testing. BSPTCL/PG ER-1 may explain		No	No	

21	220 KV KATAPALLI-BOLANGIR-1	12-07-2022	22:55	13-07-2022	00:03	Katapalli: R_N, Zone-1, 77.87 km, 1.758 kA, A/r successful	Bolangir: R_N, Zone-1, 41.2 km, 1.68 kA	R-Earth	100	A/r successful from Katapalli only. Three phase A/r in service. PLCC channel not healthy		Yes	No	
22	220 KV KATAPALLI-BOLANGIR-1	13-07-2022	21:44	13-07-2022	22:13	Katapalli: R_N, Zone-1, 65.8 km, 2.73 kA, A/r successful	Bolangir: R_N, 40.5 km, 2.59 kA	R-Earth	100	A/r successful from Katapalli only. Three phase A/r in service. PLCC channel not healthy		Yes	No	
23	220 KV MAITHON-KALYANESHWARI-2	14-07-2022	21:38	14-07-2022	23:07	Maithon: Didn't trip	Kalyaneshwari: Master trip	Broken Conductor	NA	Broken conductor apeeared. DVC may explain the logic implemented. Current unbalance observed.		No	Yes	
24	400 KV NEW PURNEA-MUZAFFARPUR-2	16-07-2022	09:17	16-07-2022	12:26	New Purnea: R_B, 213 km, Ir=Ib=2.6 kA	Muzaffarpur: R_B, 20.3 km, Ir=Ib=16.8 kA	R-B	100	Phase-to-phase fault		Yes	Yes	
25	220 KV JINDAL-JAMSHEDPUR-1	17-07-2022	13:32	17-07-2022	14:27		Jamshedpur: Y_N, 0.884 kA	Y-Earth	500	Tripped in Zone-2 from Jamshedpur. PLCC scheme not available		No	Yes	
26	220 KV SAHARSA-KHAGARIA-1	18-07-2022	19:29	19-07-2022	14:44	Sparking observed in line isolator at Saharsa end		No fault	NA	DT sent to Khagaria. Line was handtripped from Saharsa		Yes	No	

27	765 KV MEDINIPUR-NEW JEERAT-1	18-07-2022	23:43	19-07-2022	00:33	Medinipur: B_N, 42.5 km, 5.6 kA	New Jeerat: B_N, 118.5 km, 2.66 kA	B-Earth	100	A/r operated successfully but line tripped again within reclaim time		No	No	
28	400 KV BARH-PATNA-1	19-07-2022	07:10	19-07-2022	08:18	DC failure in DCDB at Barh	Patna: DT received	No fault	NA	Tripped due to DC failure. NTPC Barh may explain		Yes	Yes	
29	400 KV BARH-KAHALGAON-2	19-07-2022	07:10	19-07-2022	07:54	DC failure in DCDB at Barh		No fault	NA	Tripped due to DC failure. NTPC Barh may explain		Yes	No	
30	220 KV ALIPURDUAR-BIRPARA-1	20-07-2022	00:13	20-07-2022	00:53	Alipurduar: R_B, Ir: 9.9 kA, Ib: 5.76 kA	Birpara: R_B, 49.98 km, Ir:2.8 kA, Ib: 2.4 kA	R-B-Earth	100	Phase-to-phase fault		Yes	Yes	
31	220 KV ALIPURDUAR-BIRPARA-2	20-07-2022	00:13	20-07-2022	00:36	Alipurduar: B_N, Ib: 7.36 kA, Ir: 1.31 kA	Birpara: R_B, Ir: 1.31 kA, Ib: 3.13 kA	R-B-Earth	100	Phase-to-phase fault seen from Birpara. However, only B_ph tripped at Alipurduar, although R_ph voltage and current suggest fault was in both R_ph and B_ph. Zone settings at Alipurduar may be checked.		Yes	Yes	

32	200 KV GAYA-DEHRI-1	20-07-2022	00:34	20-07-2022	19:14	Gaya: R_N, 51 km, 2.92 kA	Dehri: R_N, 34.77 km, 2.482 kA	R-Earth	100	Another fault struck Y_ph after 800 msec		Yes	Yes	
33	400 KV TALA-BINAGURI-4	20-07-2022	07:51	20-07-2022	10:15		Binaguri: Y_B, 105.468 km, 4.681 kA	Y-B_Earth	100	Phase to phase fault		NA	Yes	
34	400 KV BINAGURI-MALBASE-1	20-07-2022	07:51	20-07-2022	08:38	Binaguri: Y_B, 114.239 km, 5.208 kA		Y-B-Earth	100	Phase to phase fault		Yes	NA	
35	220 KV JEYPORE-JAYANAGAR-2	20-07-2022	20:18	20-07-2022	20:58	Jeypore: R_N, 0.73 km, 12.544 kA, A/r successful	Jayanagar: R_N, 11 kA	R-Earth	100	A/r successful from Jeypore only		No	No	
36	400 KV MEDINIPUR-NEW CHANDITALA-1	21-07-2022	13:04	21-07-2022	18:47	Medinipur: R_Y, 76.21 km, Ir:5.872 kA, Iy: 5.011 kA	New Chanditala: R_Y, 27 km, Ir: 11.1 kA, Iy: 10.3 kA	R-Y-Earth	100	Phase to phase fault		No	Yes	
37	400 KV BIHARSHARIF-KODERMA-1	21-07-2022	15:21	21-07-2022	17:52	Biharsharif: R_B, 36.6 km, Ir=Ib=9.3 kA	Koderma: R_B, 74.2 km, Ir: 6.36 kA, Ib: 6.52 kA	R-B-Earth	100	Phase to phase fault		Yes	Yes	
38	400 KV BARH-PATNA-2	22-07-2022	15:40	22-07-2022	16:12	Barh: R_N, 55.4 km, 6.1 kA	Patna: R_N, 37.38 km, 9 kA, A/r successful	R-Earth	100	A/r successful at Patna. Other two phase at Barh tripped after 2.5 seconds		Yes	Yes	
39	400 KV NEW PPSP-NEW RANCHI-1	22-07-2022	17:02	22-07-2022	17:45		New Ranchi: DT received	No fault	NA	DT received at new Ranchi		Yes	Yes	

40	400 KV JAMSHEDPUR-MAITHON-1	22-07-2022	19:41	23-07-2022	13:15	Jamshedpur: Y_N, 95.6 km, 3.9 kA	Maithon: Y_N, 46.2 km, 5.9 kA	Y-Earth	100	A/r failed after 1 sec		Yes	No	
41	220 KV RANCHI-MEJIA (MTPS)-1	23-07-2022	12:52	23-07-2022	18:25	Ranchi: R_B, 77.4 km, Ir: 2.84 kA, Ib: 2.78 kA	Mejia: R_B, 163.16 km, Ir:1.48 kA, Ib: 1.56 kA	R-B-Earth	100	Phase to phase fault		Yes	Yes	
42	400 KV TALA-BINAGURI-2	23-07-2022	16:11	26-07-2022	20:35	Tala: B_N, 31 km	Binaguri: B_N, 122 km, 1.12 kA	B-Earth	100	A/r successful. Line tripped again within reclaim time		NA	No	
43	220 KV BEGUSARAI-SAHARSA-2	24-07-2022	12:14	24-07-2022	13:00	Main-1 relay maloperated at Begusarai		No fault	NA	Main-1 relay maloperated at Begusarai		No	No	
44	400 KV TALA-BINAGURI-1	24-07-2022	22:15	24-07-2022	22:59		Binaguri: R_N, 119 km, 4.7 kA	R-Earth	100	Three phase tripping for single phase fault.		NA	Yes	
45	400 KV TALA-BINAGURI-1	25-07-2022	01:36	28-07-2022	20:57	Tala: R_N, 10 km, 8.1 kA	Binaguri: R_N, 121 km, 3.66 kA	R-Earth	100	A/r failed after 1 sec		NA	Yes	

46	400 KV ARAMBAGH-NEW PPSP-2	25-07-2022	14:17	25-07-2022	14:46	Arambag: B_N, 161.2 km, 2.283 kA	New PPSP: B_N, 24.6 km, 4.95 kA	B-Earth	100	A/r failed after 1 sec		Yes	Yes	
47	400 KV KODERMA-BOKARO-1	27-07-2022	01:21	08-04-2022	21:52	Koderma: B_N, 78.4 km, 4.2 kA		B-Earth	100	Another fault appeared in R_ph after 800 msec		Yes	No	
48	400 KV KODERMA-BOKARO-2	27-07-2022	01:21	08-04-2022	22:18	Koderma: R_N, 87.4 km, 4.45 kA	Bokaro: R_N, 31.65 km, 2.99 kA	R-Earth	100	Another fault appeared in B_ph after 800 msec		Yes	No	
49	765 KV JHARSUGUDA-RAIPUR-1	26-07-2022	20:36	27-07-2022	10:35	Jharsuguda: Y_B_N, 7.5 km, Iy: 33 kA, Ib: 29 kA	Raipur: Y_B_N, 304 km, Iy: 4.5 kA, Ib: 4.5 kA	Y-B-Earth	100	Phase to phase fault		No	NA	
50	220 KV JODA-RAMCHANDRAPUR-1	26-07-2022	16:27	27-07-2022	12:49	Joda: B_N, Zone-2, 126 km, 1.326 kA	Ramchandrapur: B_N, 11.8 km, 7.75 kA	B-Earth	400	Tripped in Zone-2 time from Joda. Carrier protection not healthy		No	No	
51	400 KV BIHARSHARIF-KODERMA-1	28-07-2022	16:18	28-07-2022	17:10	Biharsharif: Didn't trip	Koderma: DT received	No fault	NA	Details maybe shared by PG ER-1/ DVC. No fault observed from PMU data		NA	No	

52	400 KV RANCHI-RAGHUNATHPUR-3	28-07-2022	17:26	28-07-2022	18:40	Ranchi: Didn't trip	Raghunathpur: DT received	No fault	NA	LBB of main bus-1 at Ranchi operated. PG ER-1 may explain		Yes	Yes	
53	400 KV RANCHI-NEW RANCHI-1	28-07-2022	17:26	28-07-2022	19:10	Ranchi: R_N, 53.18 km, 5.89 kA	New Ranchi: R_N, 49.26 km, 6.4 kA	R-Earth	180	DT received at New Ranchi after 180 msec. PG ER-1 may explain.		Yes	Yes	
54	400 KV NABINAGAR (NPGC)-JAKKANPUR-2	28-07-2022	17:56	28-07-2022	19:56	NPGC: B_N, 93.3 km, 3.16 kA	Jakkanpur: B_N, 18.6 km, 10.5 kA	B-Earth	100	Three phase tripping at NPGC end. A/r successful from Jakkanpur		Yes	No	
55	400 KV BARH-MOTIHARI-2	28-07-2022	19:41	28-07-2022	20:32	Barh: B_N, 98.37 km, 4.2 kA	Motihari: B_N, 113 km, 0.43 kA	B-Earth	100	A/r successful from both sides. However, after 3 seconds DT received at Motihari and line tripped from Motihari only		Yes	Yes	
56	400 KV BIHARSHARIF-VARANASI-1	28-07-2022	16:13	29-07-2022	13:30	Biharsharif: R_N, 53.18 km, 5.89 kA	Varanasi: R_N, 275.8 km, 1.6 kA	R-Earth	100	A/r failed after 1 sec		Yes	NA	

57	400 KV TALA-BINAGURI-1	28-07-2022	23:09	08-04-2022	16:06		Binaguri: R_Y, 120.8 km, Ir: 3.553 kA, iy: 3.854 kA	R-Earth	100	Initially fault in R_ph. A/r successful. After 200 msec phase to phase fault appeared		NA	No	
58	400 KV TSTPP-MERAMUNDALI-2	29-07-2022	10:44	29-07-2022	11:29	TSTPP: DT received	Meramundali: O/V St-2 in B_ph	No fault	NA	Problem with B_ph CVT at Meramundali. System voltage was within limits.		Yes	Yes	
59	400 KV TSTPP-MERAMUNDALI-2	29-07-2022	11:33			TSTPP: DT received	Meramundali: O/V St-2 in B_ph	No fault	NA	Problem with B_ph CVT at Meramundali. System voltage was within limits.		Yes	Yes	
60	220 KV MAITHON-DUMKA-1	29-07-2022	11:38	29-07-2022	12:15	Maithon: B_N, 2.57 kA		B-Earth	250	Resistive fault, evolved gradually. Distance protection operated at Maithon. A/r failed after 1 sec		Yes	No	
61	400 KV FSTPP-BAHARAMPUR-1	29-07-2022	14:34	29-07-2022	21:47	Farakka: R_N, 68.45 km, 6.3 kA	Baharampur: R_N, 6.35 kA, 21.2 km	R-Earth	100	A/r failed after 1 sec		No	Yes	

62	400 KV JEERAT-SAGARDIGHI-1	29-07-2022	14:38		15:25	Jeerat: R_N, 14.25 km, 13.68 kA	Sagardighi: R_N, 173 km, 2.48 kA	R-Earth	100	A/r failed after 1 sec		Yes	Yes	
63	220 KV BEGUSARAI-SAHARSA-2	29-07-2022	16:29		17:35	Begusarai: Clock synchronization error	Saharsa: Didn't trip	No fault	NA	Main-1 relay maloperated at Begusarai		No	NA	
64	220 KV SILIGURI-KISHANGANJ-1	29-07-2022	18:16	29-07-2022	19:24	Siliguri: R_Y, 11.29 km, Ir: 11.58 kA, Iy: 6.0 kA	Kishanganj: R_Y, 96.17 km, Ir=Iy=2.94 kA	R-Y-Earth	100	Phase to phase fault		Yes	Yes	
65	220 KV SILIGURI-KISHANGANJ-2	29-07-2022	18:16	29-07-2022	19:06	Siliguri: Y_N, Zone-1, 11.81 km, 5.25 kA, A/r successful	Kishanganj:R_Y_N, 99.01 km, 2.22 kA	R-Y-Earth	100	Phase to phase fault. Kishanganj end saw phase-to-phase fault		No	Yes	
66	400 KV PATNA-NAUBATPUR-1	29-07-2022	19:38	29-07-2022	21:04	Patna: Didn't trip	Naubatpur: LBB of tie bay of Patna-1 and main bay of Patna-2 operated	No fault	NA	No fault observed in PMU. LBB maloperated at Naubatpur. BGCL may explain.		NA	No	
67	400 KV PATNA-NAUBATPUR-2	29-07-2022	19:38	29-07-2022	21:04			No fault	NA			NA	No	

68	400 KV BARH-MOTIHARI-2	29-07-2022	19:41	29-07-2022	21:08	Barh: R_B, 9.5 km, Ir: 19.7 kA, Ib: 22.62 kA	Motihari: R_B, 262 km, Ir: 1.99 kA, Ib: 1.94 kA	R_B_N	100	Phase-to-phase fault		Yes	Yes	
69	220 KV NEW PURNEA-MADHEPURA-1	30-07-2022	11:53	30-07-2022	13:04	New Purnea: Y_B, 44.1 km, Iy: 4.65 kA, Ib: 4.55 kA	Madhepura: Y_B, 50.3 km	Y-B	100	Phase-to-phase fault	DR of another instance uploaded from Madhepura	Yes	No	
70	220 KV JODA-RAMCHANDRAPUR-1	31-07-2022	14:47	31-07-2022	15:32	Joda: Didn't trip	Ramchandrapur: R_N, 112.1 km	R-Earth	100	Three phase tripping for single phase fault		No	No	
71	220 KV DALTONGANJ-CHATRA-2	31-07-2022	18:10	31-07-2022	19:11	Daltonganj: B_N, 107.2 km, 1.13 kA	Chatra: B_N, 54.61 km, 1.065 kA	B-Earth	100	Three phase tripping for single phase fault.	DR channels not configured at Chatra	No	No	
72	400 KV MAITHON-MEJIA-1	31-07-2022	22:31	31-07-2022	23:49	Maithon: Master trip relay	Mejia: Didn't trip	No fault	NA	Distance protection operated at Maithon. No fault observed. PG ER-2 may explain.		Yes	NA	

ANNEXURE-C.1

Sl No.	Name of the incidence	PCC Recommendation	Latest status
116th PCC Meeting			
1.	Total Power failure at 220 kV Atri (OPTCL) S/s on 14.06.2022 at 14:57 Hrs.	PCC advised OPTCL to consult with OEM for detailed analysis of the event & relay response thereof. PCC advised Powergrid to analyze the operation of distance relay in zone-2 from Pandiabili end instead of zone-1 protection.	
2.	Disturbance at 400/220 kV Meramundali(OPTCL) S/s on 20.06.2022 at 16:31 Hrs	Regarding dead time setting of 330 msec in New Duburi line, PCC advised to set the dead time setting of autorecloser to one second as per the general practice. PCC opined that Meramundali being an important substation in Odisha system, necessary measure may be taken to ensure healthiness of all the protection system in the substation at the earliest and advised OPTCL to submit a timeline for restoration of LBB protection for all the concerned bays at Meramundali end.	
3.	Total Power failure at 220 kV Chatra(JUSNL) S/s on 17.06.2022 at 11:36 Hrs	PCC advised JUSNL to share PUTT scheme implemented at Chatra end to ERPC/ERLDC for review. PCC further advised JUSNL to ensure implementation of weak infeed protection at Chatra end with a delay of 50 ms for current reversal guard timer for 220 kV Daltonganj-Chatra D/C line. JUSNL was also advised to configure the disturbance recorders at Chatra end as per the guidelines approved by PCC.	
4.	Repeated tripping of 132 kV Sultanganj-Deoghar-1	PCC advised BSPTCL & JUSNL to coordinate with each other and ensure proper relay setting coordination at both the end.	

5.	Repeated tripping of 132 kV Kahalgaon (BSPTCL)-Lalmatia	PCC advised JUSNL to carry out detailed analysis of all the trippings of the line such as fault location, relay indication, review of zone settings in the relay and a report may be shared with ERLDC/ERPC in this regard.	
115th PCC Meeting			
1.	Disturbance at 400/220/132 kV Lapanga(OPTCL) S/s on 27.05.2022 at 15:56 hrs.	PCC advised following to OPTCL • The discrepancy observed in the distance relay at Budhipadar end for 220 kV Lapanga -Budhipadar-1 line need to be investigated. OPTCL may consult with relay OEM to analyze the event. • To test the healthiness of lv side back up overcurrent relay of 400/220 kV ICTs at Lapanga and submit the observations to ERPC/ERLDC.	Regarding discrepancy observed in the distance relay at Budhipadar end for 220 kV Lapanga -Budhipadar-1 line, OPTCL representative informed that team would visit Budhipadar substation in next week to investigate the issue. Regarding testing of lv side backup overcurrent relay of 400/220 kV ICTs at Lapanga, OPTCL representative informed that relay was tested and found to be in order.
2.	Total Power failure at 220 kV Chatra(JUSNL) S/s on 01.05.2022 at 17:40 Hrs	PCC advised JUSNL to reduce TMS of 220/132 kV ICT in coordination with zone 3-time settings at Daltongunj end so that tripping of 220 kV Daltonganj-Chatra D/c before tripping of 220/132 k V ICT at Garhwa end can be avoided in future	In 116th PCC meeting, JUSNL representative informed that their team would visit Chatra substation shortly to review the ICT TMS setting. Powergrid was advised to coordinate with JUSNL for the same.
114th PCC Meeting			
1.	Repeated tripping of 220 kV Tenughat-Biharsharif line	PCC advised BSPTCL to share the observation of OEM with TVNL immediately and coordinate with TVNL in order to implement PLCC at respective ends.	BSPTCL representative informed that observation of OEM had been shared with TVNL however no

			response had been received from them.
113th PCC Meeting			
1.	Disturbance at 220/132 kV CTPS A (DVC) S/s on 18.03.2022 at 20:05 Hrs	PCC advised DVC to check power swing block settings for 220 kV CTPS B - BTPS B D/c line at BTPS end. The DR at BTPS end may also be checked. PCC advised DVC to recheck the settings of pole slip protection in the CTPS units. In case the settings are in order, then study may be carried out to find out the critical clearing time for the units for a 3-phase fault at CTPS bus.	
2.	Disturbance at 220 kV Tenughat (TVNL) S/S On 24.03.2022 at 21:37 hrs	PCC advised JUSNL to complete the A/R testing for 220 kV Tenughat-Govindpur line and put the autorecloser in service at the earliest.	JUSNL representative informed that Powergrid is carryout the job and the relay had been taken by Powergrid for inspection & testing however the same has not been restored yet.
111th PCC Meeting			
1.	DEF protection setting review in Sikkim complex in view of LILO of 400 kV Teesta 3-Kishanganj at Rangpo	In 111th PCC, PCC decided that M/s PRDC would carry out the study for DEF relay setting coordination for Sikkim Complex with revised configuration of transmission network. PRDC was advised to coordinate with ERLDC for necessary information related to the study. 115th PCC advised PRDC to modify the study report as per the observation by ERLDC.	PRDC representative informed that revised study report had been shared to ERLDC. ERLDC was advised to go through the revised study and submit their observations, if any.
106th PCC Meeting			
1.	Total Power Failure at Dumka S/s on 15/05/2021 at 12:01 Hrs	JUSNL intimated that there was card issue in PLCC panel. The OEM (M/s ABB) had been communicated regarding the issue and the same would be resolved by September' 21.	JUSNL representative updated that informed that work order had been placed and the issue will be resoled by July 2022.

			JUSNL representative updated that fresh proposal had been placed due to some issue in the existing proposal.

Protection Audit Recommendations for the Stations audited protection audit team of ERPC				
Sl No.	**Name of Substation**	**Owner**	**Date of Audit**	**Remarks/Recommendation**
1	765/400 kV Sundergarh S/s	Powergrid	25.04.2022	1.Switchyard equipments are in good and healthy condition. Switchyard area as well as overall station is well maintained.
				2.Provision for nameplate with bay/line name may be done in front of SPR(Kiosk) in switchyard for easy identification.
2	400/220/132 kV Lapanga(OPTCL) S/s	OPTCL	26.04.2022	1.Event logger is not available for 220 kV System. The same shall be provided.
				2.Time synchronising equipment is not available for 220 kV system.
				3.Busbar/LBB protection is not available for 220 kV system . The same shall be commissioned at the earliest.
				4.Autorecloser is implemented without PLCC for all the 220 kV feeders. It was informed that OPGW for these lines are under commissioning.
				5.OPGW/DTPC commissioning may be expedited and thereafter carrier based autorecloser as well as intertripping scheme may be implemented for 220 kV lines.
				6.For 220 kV control room housing the relay panels, air conditioning shall be provided for proper functioning of protection system panels & to prevent failure of numerical protection systems.
				7.Zone settings(zone-2, zone-3 & zone-4) in distance protection relay may be reviewed for all the 400 & 220 kV lines in line with the ERPC Protection philosophy.
				8.Group protection for 400 kV Lapanga-Meramundali line may be enabled and two group settings may be kept in the relay. One group considering 400 kV M'mundali-Bolangir in service and another group setting when 400 kV M'mundali-Bolangir is not in service. Group to be selected as per the actual configuration.
				9.Autorecloser in 400 kV Lapanga-Meramundali line is having some issue. The same may be rectified.
				10.Power swing blocking enabled for all zones. It may reviewed and blocking may be done all the zones except zone-1.
				11.Grading in terms of time/voltage setting shall be done in Overvoltage settings of 400 kV lines.
3	220/132 kV Budhipadar(OPTCL) S/s	OPTCL	26.04.2022	1. Time synchronising equipment in substation control room is not working. The same may be rectified & put into service.
				2.Main-I relay of 220 kV Budhipadar-Lapanga-I feeder and main-2 relay of 220 kV Budhipadar-SMC feeder was found to be defective and not in operation. Defective relay shall be changed with spare/new relay immediately.

				3.Main-1 relay of following fedders are of static type. 220 kV Budhipadar-IB TPS line, 220 kV Budhipadar-Tarkera D/c line, 220 kV Budhipadar-Raigarh PG. All Electro Static Relays may be replaced with latest version of Numerical relays for quick and accurate analysis of Trippings.
				4.DC earth leakage were found in both DC-I & II sources. The same may be attended. Continous monitoring of dc earth leakage measurements to be done.
				5.PLCC is not in service for most of the lines. Autorecloser w/o PLCC is implemented for some of the feeders like 220 kV Tarkara D/C, 220 kV Lapanga D/C feeder. For rest of the feeders auto recloser was not in service.
				It was informed that OPGW for these lines are under commissioning. OPGW/DTPC commissioning may be expedited and thereafter carrier based autorecloser as well as intertripping scheme shall be implemented for 220 kV lines.
				6.For 220 kV Budhipadar-Korba-1 &2, the PLCC is not working and found to be out of service since long. Being inter-regional line, matter may be taken up with appropriate authority for restoring the PLCC communication in the line. Alternatively, It is suggested that carrier communication through OPGW network may be planned & implemented.
				7.Zone settings for all 220 kV lines need to be reviewed in line ith ERPC Protection Philosophy & considering the present network configuration at the remote end substations.
				8.Busbar protection is available for a single bus only. For other bus, it is out of service due to defective bay units. It is advised to restore the busbar protection for the second bus at the earliest. Similarily zone-4 settings of feeders corresponding to the bus for which busbar is out of service may be reduced to 250 msec.
				9. Oil leakages was observed in 220/132 kV Auto-I. Action may be taken to address the same.
				10.Vegetation shall be cleared & proper PCC and gravelling should be done in the switchyard.
				General:
				1. Uniform protection philosophy may be adopted across OPTCL network
				2. Protection co-ordination to be done as and when there is change in network configuration or commissioning of new lines
				3. O/V voltage/time gradation to be done for S/s level
				4. Periodic internal review of implemented protection settings
4	220 kV IB TPS	OPGC	27.04.2022	1. Event logger is not available for 220 kV system. The same shall be provided.
				2. Zone-2 tmer setting may be reviewed considering the shortest line at remote end(budhipadar) for all 220 kV lines

				3. Zone-4 reach and time delay may be reviewed for all 220 kV lines
				4. Zone-3 time delay may be reviewed as it is encroaching next voltage level (220 kV Lines)
				5. PLCC not operational for all four 220 kV feeders. It was informed that OPGW/DTPC based communication system will be commissioned in near future.
				6. OPGW/DTPC commissioning may be expedited and thereafter carrier based autorecloser as well as intertripping scheme may be implemented for 220 kV lines.
				7. Busbar relay is of static type. It was informed that renovation & upgradation of 220 kV switchyard is under proposal stage.
5	400 kV OPGC S/s	OPGC	27.04.2022	1. At 400 kV level, it was found the both main-1 & main-2 relays of outgoing transmission lines are of same make & model employing different characteristic. It is recommended that different make & model for main-1 &2 relay is preferable and same may be implemented.
				2. Overvoltage setting for the lines need to be reviewed. Time grading / voltage grading may be done in the overvoltage settings for different lines/for overall substation
				3. DR time window may be increased. DR configuration may be done in line with guidelines approved in ERPC PCC meeting.
				4. Overcurrent protection in 400 kV lines may be disabled.
				5. Provision for sending DT signal to other end during operation of DEF protection may be implemented.
				6. Line length for 400 kV OPGC-Lapanga line may be verfied in consultation with OPTCL.
				7. Zone-2 & Zone-3 settings of all 400 kV lines need to be reviewed and set as per the ERPC Protection philosophy.
				8. Adjacent shortest and longest line length maybe verified and zone settings maybe implemented accordingly
				9. Power swing block enabled for all zones. May be reviewed
6	765 kV Darlipali(NTPC) S/s	NTPC	28.04.2022	1. Time grading to be done in stage-I overvoltage settings for 765 kV Darlipalli-Jharsuguda D/c line.
				2. Power Swing blocking enabled for all zones. May be reviewed.
				3. Relay setting data is not available in Protection database of ERPC. The same may be updated at the earliest.

SL NO	UTILITY	ELEMENT	DETAILS OF ELEMENT
1	PMTL	ICT	400/220kV 500MVA ICT-1 AT SAHARSA
2	PGCIL	ICT	400/220kV 315MVA ICT-4 AT JEYPORE
3	PMTL	T/L	400 kV-SAHARSA KISHANGANJ-1 (LILO OF 400 kV Patna-Kishanganj-1 at Saharsa)
4	PMTL	T/L	400kV-PATNA SAHARSA-1 (LILO OF 400 kV Patna Kishanganj-1 at Saharsa)
5	PMTL	ICT	220kV MAIN BAY OF 400KV/220KV 500 MVA ICT 1 AT SAHARSA
6	PMTL	T/L	220kV MAIN BAY OF KHAGARIA-1 AT SAHARSA
7	PMTL	T/L	220kV MAIN BAY OF KHAGARIA-2 AT SAHARSA
8	PMTL	T/L	220KV MAIN BAY OF BEGUSARAI-1 AT SAHARSA
9	PMTL	T/L	220KV MAIN BAY OF BEGUSARAI-2 AT SAHARSA
10	PMTL	T/L	132KV MAIN BAY OF SONEBARSA (BH) -1 AT SAHARSA
11	PMTL	T/L	132KV MAIN BAY OF MADHEPURA (BH) -1 AT SAHARSA
12	BSPTCL	T/L	220KV-BEGUSARAI KHAGARIA-1
13	BSPTCL	T/L	220KV-KHAGARIA NEW PURNEA
14	BSPTCL	T/L	132KV MADHEPURA (BH)- SAHARSA(PMTL)-1
15	BSPTCL	T/L	132KV SONEBARSA (BH)- SAHARSA(PMTL)-1
16	NKTL	T/L	220KV MAIN BAY OF GOVINDPUR -1 AT DHANBAD (NKTL)
17	NKTL	T/L	220KV MAIN BAY OF GOVINDPUR -2 AT DHANBAD (NKTL)
18	NKTL	T/L	220KV MAIN BAY OF JAINAMORE -2 AT DHANBAD (NKTL)
19	NKTL	T/L	220KV MAIN BAY OF JAINAMORE -1 AT DHANBAD (NKTL)
20	PGCIL	T/L	400KV DURGAPUR KAHALGAON 2
21	PGCIL	T/L	400KV DURGAPUR KAHALGAON 1
22	PMTL	T/L	400KV MAIN BAY OF PATNA -1 AT SAHARSA
23	TVNL	ICT	400KV MAIN BAY OF 400KV/220KV 250 MVA ICT 1 AT TENUGHAT
24	JUSNL	ICT	220KV MAIN BAY OF 400KV/220KV 250 MVA ICT 1 AT TENUGHAT
25	JUSNL	T/L	400KV TIE BAY OF NEW RANCHI -2 AND FUTURE AT PATRATU
26	JUSNL	T/L	400KV MAIN BUS - 1 AT PATRATU
27	JUSNL	ICT	400kV MAIN BAY OF 400/220KV 315MVA ICT-2 AT PATRATU
28	JUSNL	ICT	220kV MAIN BAY OF 400/220KV 315MVA ICT-2 AT PATRATU
29	JUSNL	T/L	400KV-NEW RANCHI- PATRATU-1
30	JUSNL	T/L	400KV-NEW RANCHI- PATRATU-2
31	JUSNL	T/L	400KV MAIN BUS-2 AT PATRATU
32	JUSNL	T/L	400KV MAIN BAY OF NEW RANCHI -2 AT PATRATU
33	PGCIL	T/L	LILO of 400 kV Teesta III Kishanganj S/C at Rangpo SS (400KV-RANGPO-TEESTA- III 1)
34	OPTCL	B/R	125MVAR 400KV B/R-1 AT MEERAMUNDALI
35	JUSNL	T/L	400KV TIE BAY OF NEW RANCHI -1 AND FUTURE AT PATRATU
36	NKTL	ICT	400KV MAIN BAY OF 400KV/220KV 500 MVA ICT 2 AT MERAMUNDALI B
37	OPTCL	T/L	400KV MAIN BUS - 1 AT MERAMUNDALI B

SL NO	UTILITY	ELEMENT	DETAILS OF ELEMENT
38	PGCIL	ICT	400/220KV 500MVA ICT-2 AT MERAMUNDALI B
39	BSPTCL	T/L	LILO of 220 KV PUSAULI SAHUPURI-I AT KARAMNASHA(NEW) (220KV KARAMNASHA (NEW)- SAHUPURI-1)
40	BSPTCL	T/L	LILO of 220 KV PUSAULI SAHUPURI-I AT KARAMNASHA(NEW) (220KV KARAMNASHA (NEW)- PUSAULI-1)
41	BSPTCL	T/L	'LILO of 220 KV Gaya Chandauti D/C LILO at Bodhgaya(220KV-CHANDAUTI (PMTL)-BODHGAYA-1)
42	BSPTCL	T/L	'LILO of 220 KV Gaya Chandauti D/C LILO at Bodhgaya(220KV-CHANDAUTI (PMTL)-BODHGAYA-2)
43	PGCIL	ICT	400KV MAIN BAY OF 400KV/220KV 315 MVA ICT 3 AT BINAGURI
44	PGCIL	ICT	220KV MAIN BAY OF 400KV/220KV 315 MVA ICT 3 AT BINAGURI
45	PGCIL	ICT	220KV MAIN BAY OF 400KV/220KV 500MVA ICT5 AT MALDA (PG)
46	PGCIL	ICT	400KV MAIN BAY OF 400KV/220KV 500MVA ICT5 AT MALDA (PG)
47	PGCIL	ICT	220KV MAIN BAY OF 220KV/132KV 100MVA ICT4 AT RANGPO
48	PGCIL	ICT	132KV MAIN BAY OF 220KV/132KV 100MVA ICT4 AT RANGPO
49	PGCIL	T/L	LILO OF 400 KV TEESTA III-KISHANGANJ S/C AT RANGPO SS(400KV KISHANGANJ(PG)-RANGPO-2)
50	JUSNL	ICT	400KV MAIN BAY OF 400KV/220KV 315MVA ICT1 AT PATRATU
51	BSPTCL	T/L	LILO of 132 KV RAFIGUNJ CHANDAUTI(BH)-I AT CHANDAUTI(PMTL) (132KV-CHANDAUTI (PMTL)- CHANDAUTI (BH)-2)
52	BSPTCL	T/L	LILO of 132 KV RAFIGUNJ CHANDAUTI(BH)-I AT CHANDAUTI(PMTL) (132KV-CHANDAUTI (PMTL)-RAFIGANJ (BH)-1)
53	BSPTCL	T/L	LILO of 132 KV SONENAGAR CHANDAUTI(BH)-I AT CHANDAUTI(PMTL) (132KV-CHANDAUTI (PMTL)-CHANDAUTI (BH)-1
54	OPTCL	T/L	220KV-BOLANGIR (PG)- KESINGA-1
55	BGCL	T/L	LILO of 400 KV PATNA BALIA-3 AT NAUBATPUR(BGCL) (400KV NAUBATPUR(BH)- BALIA-1)
56	BGCL	T/L	LILO of 400 KV PATNA BALIA-3 AT NAUBATPUR(BGCL) (400KV-PATNA NAUBATPUR(BH)-1
57	BGCL	T/L	LILO of 400 KV PATNA BALIA-4 AT NAUBATPUR(BGCL) (400KV NAUBATPUR(BH)- BALIA-2)
58	BGCL	T/L	LILO of 400 KV PATNA BALIA-4 AT NAUBATPUR(BGCL) (400KV-PATNA NAUBATPUR(BH)-2)
59	PGCIL	ICT	220KV MAIN BAY OF 400KV/220KV 315 MVA ICT 1 AT PATRATU
60	BGCL	T/L	400KV MAIN BAY OF PATNA -1 AT NAUBATPUR(BH)
61	BGCL	T/L	00KV MAIN BAY OF PATNA -2 AT NAUBATPUR(BH
62	BGCL	T/L	400KV MAIN BAY OF BALIA-1 AT NAUBATPUR(BH)
63	BGCL	T/L	400KV TIE BAY OF BALIA-1 AND PATNA-2 AT NAUBATPUR(BH)
64	BGCL	T/L	400KV MAIN BAY OF BALIA-2 AT NAUBATPUR(BH)
65	BGCL	ICT	400KV MAIN BAY OF 500 MVA ICT-2 AT NAUBATPUR(BH)
66	BGCL	ICT	400KV TIE BAY OF BALIA -2 AND 500 MVA ICT-2 AT NAUBATPUR(BH)
67	OPTCL	ICT	220KV MAIN BAY OF 400KV/220KV 500 MVA ICT 1 AT MERAMUNDALI B
68	OPTCL	ICT	400KV MAIN BAY OF 400KV/220KV 500 MVA ICT 1 AT MERAMUNDALI B
69	BGCL	T/L	400KV MAIN BUS - 2 AT NAUBATPUR(BH)
70	BGCL	T/L	400KV MAIN BUS - 1 AT NAUBATPUR(BH)
71	JUSNL	ICT	400KV MAIN BAY OF 400KV/220KV 315 MVA ICT 1 AT PATRATU
72	SIKKIM	T/L	220KV-NEW MELLI-TASHIDING-2
73	BSPTCL	T/L	220KV SAHARSA(PMTL)- KHAGARIA(NEW)-1
74	PGCIL	ICT	400KV MAIN BAY OF 400KV/220KV 315 MVA ICT 2 AT FARAKKA(NTPC)

SL NO	UTILITY	ELEMENT	DETAILS OF ELEMENT
75	PGCIL	ICT	200KV MAIN BAY OF 400KV/220KV 315 MVA ICT 2 AT FARAKKA(NTPC)
76	PGCIL	ICT	400KV MAIN BAY OF 400KV/220KV500 MVA ICT 4 AT MUZAFFARPUR
77	PGCIL	ICT	200KV MAIN BAY OF 400KV/220KV500 MVA ICT 4 AT MUZAFFARPUR
78	BGCL	ICT	400KV MAIN BAY OF 400KV/220KV500 MVA ICT 1 AT JAKKANPUR
79	BSPTCL	T/L	220KV-SAHARSA(PMTL)-KHAGARIA(NEW)-2
80	BGCL	T/L	220KV-ARRAH (PG)-NAUBATPUR(BH)-2
81	PGCIL	T/L	LILO of 400 KV PATNA- NABINAGAR(NPGC)-1 AT JAKKANPUR(BGCL)400KV-JAKKANPUR(BH)-PATNA-1)
83	PGCIL	T/L	LILO of 400 KV PATNA- NABINAGAR(NPGC)-2 AT JAKKANPUR(BGCL) (400KV-JAKKANPUR(BH)-PATNA-2)
85	PGCIL	T/L	LILO of 400 KV KISHANGANJ- DARBHANGA(DMTCL)-1 AT SAHARSA(PMTL) (400KV-SAHARSA-DARBHANGA (DMTCL)-1)
86	PGCIL	T/L	LILO of 400 KV KISHANGANJ-DARBHANGA(DMTCL)-1 AT SAHARSA (PMTL) 400KV-SAHARSA-KISHANGANJ-3)
87	PGCIL	T/L	LILO of 400 KV KISHANGANJ-DARBHANGA(DMTCL)-1 AT SAHARSA(PMTL) (400KV-SAHARSA-DARBHANGA (DMTCL)-1)
88	PGCIL	T/L	LILO of 400 KV KISHANGANJ-DARBHANGA(DMTCL)-2AT SAHARSA(PMTL) (400KV-SAHARSA-DARBHANGA (DMTCL)-2)
89	PGCIL	T/L	220KV-RANGPO-NEW MELLI-2