भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
पूर्वी क्षेत्रीय विद्युत समिति
Eastern Regional Power Committee
14, गोल्फ क्लब रोड, टालीगंज, कोलकाता-700033
Tel. No.: 033-24239651,24239658 FAX No.:033-24239652, 24239653 Web: **www.erpc.gov.in**

सं./**NO.** पू.क्षे.वि.स./**PROTECTION/2022/** 497 दिनांक /**DATE:12.07.2022**

सेवा में / To,

संलग्न सूची के अनुसार / As per list enclosed.

विषय : दिनांक - 20.06.2022 को आयोजित 115वीं पीसीसी बैठक का कार्यवृत्त ।

Sub: Minutes of the 115th PCC meeting held on 20.06.2022.

Sir,

20.06.2022 को आयोजित **115वीं** पीसीसी बैठक का कार्यवृत्त पू.क्षे.वि.स. की वेबसाइट (**http://www.erpc.gov.in/**) पर उपलब्ध है । कृपया देखें ।

Please find the minutes of the **115th PCC** meeting of ERPC held on **20.06.2022** available at ERPC website (**http://www.erpc.gov.in/**).

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

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

भवदीय / **Yours faithfully,**

for Kumar Satyam 12/07/2022

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

LIST OF ADDRESSES:

Chief Engineer, Trans (O&M) Bihar State Power Transmission Limited, VidyutBhawan, Bailey Road, Patna-800021	Electrical Supeeerintending Engineer (CRITL) Bihar State Power Transmission Limited, VidyutBhawan,Bailey Road, Patna-800021
Chief Engineer(System Operation), SLDC , BSPTCL, Patna-800021	
Chief Engineer (SLDC) Damodar Valley Corporation, GOMD-I Premises, P.O.- DaneshSeikh Lane, Howrah- 711109	Chief Engineer (CTC) Damodar Valley Corporation, P.O. Maithon Dam, Dist. Dhanbad,Jharkhand-828207
Chief Engineer, (CRITL) Jharkhand UrjaSancharan Nigam Limited Kusai Colony, Doranda, Ranchi-834002	Electrical Superintending Engineer (CLD) Jharkhand UrjaSancharan Nigam Limited, KusaiColony,Doranda, Ranchi-834002
Chief General Manager (O&M), OPTCL, Janpath, Bhubaneswar, Odisha – 751 022. FAX: 0674-2542932 cgm.onm@optcl.co.in	Sr. General Manager (PPA), Technical Wing, OHPCL, Orissa State Police Housing & Welfare Corpn. Bldg. VaniviharChowk, Janpath, Bhubaneswar-752022
Chief Load Dispatcher, SLDC OPTCL, P.O. Mancheswar Rly. Colony Bhubaneswar-751017	Chief Engineer (Testing), WBSETCL Central Testing Laboratory, Abhikshan, Salt Lake, Kolkata-700091 (Fax no. 2367-3578/1235)
Chief Engineer (CLD) WBSETCL, P.O.Danesh Sheikh Lane, AndulRoad, Howrah-711109	Addl. Chief Engineer (ALDC) West Bengal Electricity Distribution Company Ltd VidyutBhavan, 7th Floor, Bidhannagar, Sector-I Salt Lake City, Kolkata-700091(Fax-033-2334-5862)
Dy. Chief Engineer (Testing)/ Sr. Manager (Testing) CESC Ltd.,4, SasiSekhar Bose Road, Kolkata-700025	General Manager (O&M) KhSTPS, NTPC Ltd., P.O.Deepti Nagar, Dist. Bhagalpur, Bihar-813203
General Manager(O&M) FSTPS, NTPC Ltd., P.O. Nabarun, Dist. Murshidabad, West Bengal-742236	Dy. General Manager (Engineering), WBPDCL, OS Dept. Corporate Office, 3/C, LA Block, Salt Lake-III, Kolkata-700098 (Fax-033-23350516)
General Manager (O&M) Barh STPS, NTPC Ltd., P.O. NTPC Barh, Dist. Patna, Bihar-803213	General Manager (OS), ERHQ-II, NTPC Ltd., 3rdflr. OLIC Building, Plot no. N 17/2, Nayapalli, Unit-8 Bhubaneswar- 751012 (Fax No. 0674-2540919)
General Manager(O&M), TSTPS, NTPC Ltd., P.O.Kaniha, Dist. Angul, Orissa-759117	General Manager (AM), POWERGRID, Odisha Projects, Sahid Nagar, Bhubaneswar – 751 007
General Manager (OS), ERHQ-I, NTPC Ltd., LoknayakJaiprakashBhawan, (2nd Floor), DakBunglowChawk, Patna-800001	Manager (Electrical), Adhunik Power & Natural Resources Ltd. "Lansdowne Towers, Kolkata-700020 (Fax No. 033-2289 0285)
Executive Director (O&M) NHPC Ltd., NHPC Office Complex, Sector-33, Faridabad, Haryana-121003 (Fax-01292272413)	Electrical Superintending Engineer, TTPS, TenughatVidyut Nigam Ltd., Lalpania, Dist. Bokaro, Jharkhand-829149
Dy. General Manager (Electrical) IB Thermal Power Station, OPGCL Banhapalli, Dist. Jharsuguda-768234, Orissa	General Manager (AM), ER-I Power Grid Corporation of India Ltd., Alankar Place, Boring Road, Patna-800001
Chief Engineer (Trans.) Power Deptt., Govt. of Sikkim, Gangtok-731010	Sr. Manager (CTMC) Durgapur Projects Limited, Durgapur-713201
Executive Director, ERLDC, POSOCO, Tollygunge, Kolkata-700033	The Head Maithon Power Limited, Maithon Office, MA 5 Gogna, Dist. Dhanbad, Jhankand State, PIN-828207
General Manager (AM), ER-II Power Grid Corporation of India Ltd., J-I-15, Block-EP, Sector-V,Salt Lake,Kolkata-91	Head –Regulatory and contracts, IndiGrid Limited , 247 Embassy, Office No 107, 'B' Wing, Hindustan Co. Bus Stop, Gandhi Nagar, L.B.S. Road, Vikhroli West, Mumbai – 400 079. Ph : +91 845509 96408
General Manager (P&O), PTC Ltd., Kanchanjunga Bldg.,18, Barakhamba Road, New Delhi-110001	
Managing Director, Bhutan Power Corporation Post Box no. 580, Thimpu, Bhutan.	Managing Director, Druk Green Power Corprn. P.O. Box-1351, Thimpu, Bhutan.

Associate Director (Commercial and Regulatory) Darbhanga-Motihari Transmission Company Limited (DMTCL),503, Windsor, Off CST Road, Kalina, Santacruz(E), Mumbai-400098	The Plant Head, JITPL, Angul, Odisha (FAX:011-26139256-65)
Shri D. P. Bhagava, Chief Consultant (O&M), TeestaUrja Limited, New Delhi (FAX:011-46529744)	Director (GM Division), Central Electricity Authority Sewa Bhawan, R. K. Puram, New Delhi-110066
Director (NPC), CEA, NRPC Building, Katwaria Sarai, New Delhi- 110016	President, Dans Energy Pvt. Ltd, 5th Floor, DLF Building No. 8, Tower-C, Gurgaon - 722OO2
Director, Shiga Energy Pw. Ltd., 5th Floor, DLF Building No. 8, Tower-C, Gurgaon - 722OO2	DGM (E&I), HALDIA ENERGY LIMITED, BARIK BHAWAN, KOKATA-700072, FAX: 033-22360955
President , TPTL, BhikajiCama Place, New Delhi , 110066	

Minutes
of
115th PCC Meeting

Date:12.07.2022
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 115th PROTECTION COORDINATION SUB-COMMITTEE MEETING HELD ON 20.06.2022 AT 10:30 HOURS

Member Secretary, ERPC chaired the meeting. List of participants is enclosed at **Annexure-A.**

PART – A

ITEM NO. A.1: Confirmation of Minutes of 114th Protection Coordination sub-Committee Meeting held on 13th May 2022 through MS Teams online platform.

The minutes of 114th Protection Coordination sub-Committee meeting held on 13.05.2022 was circulated vide letter dated 30.05.2022.

Members may confirm the minutes of meeting.

Deliberation in the meeting

Members confirmed the minutes of 114th PCC Meeting.

PART – B

ITEM NO. B.1: Disturbance at 400/220/132 kV Lapanga(OPTCL) S/s on 27.05.2022 at 15:56 hrs.

At 15:56 Hrs, B_ph of 220 kV Katapalli-Lapanga-1 cross bus snapped and fell over the 220 kV Main Bus-1 & 2 at Lapanga. This led to complete outage of 220 kV Lapanga S/s. At the same time blackout occurred at Vedanta and Bhushan CPP also.

Total 840 MW captive generation loss and 884 MW captive load loss occurred at Vedanta.

Detail report from ERLDC is attached at **Annexure B.1.**

Relay Indications:

Name	End1	End 2
220 kV Katapalli-Lapanga-1	Z-3, B -N	Z-1, B-N
220 kV Budhipadar Lapanga-1	Z-3, R-Y-B	Z-4, R-Y-B
220 kV Budhipadar Lapanga-2	Z-2, R-Y-B	Z-4, R-Y-B
20 kV Budhipadar Vedanta-1		Tripped on SPS
220 kV Budhipadar Vedanta-2		Tripped on SPS
400/220 kV ICT-1 at Lapanga	Backup O/C	

400/220 kV ICT-2 at Lapanga		Hi set O/C
220/132 kV ICT-1 & 2 at Lapanga	REF	

OPTCL may explain.

Deliberation in the meeting

*OPTCL representative explained the event with help of presentation which is attached at **Annexure B.1.1.** The event was explained as follows:*

Due to burning of T clamp of jumper, B phase cross bus of 220 kV Katapalli-Lapanga-1 snapped over 220 kV Main Bus-1 & 2 of Lapanga resulting in bus fault at Lapanga S/S.

Relay Indications for the connected elements during the disturbance was as follows-

S.No.	***Element Name***	***End 1***	***End 2***
1	*220 kV Lapanga -Budhipadar-1*	*Pick up in zone 4*	*Zone 3(tripped within 100 ms)*
2	*220 kV Lapanga- Budhipadar -2*	*Zone 4*	*Zone 2*
3	*220 kV Lapanga- Katapali-1*	*Zone 1*	*Zone 3*
4	*220 kV Lapanga- Katapali -2*	*Directional overcurrent at 15:52 Hrs(prior to event)*	*Directional overcurrent at 15:52 Hrs (prior to event)*
5	*400/220 kV ICT-1*	*Tripped from hv side on overcurrent protection (1.64 second)*	
6	*400/220 kV ICT-2*	*Tripped from lv side on overcurrent high set protection (80 ms)*	
7	*220/132 kV ICT-1 & 2*	*REF protection*	
8	*220 kV Budhipadar-Vedanta-1*	*-*	*Tripped on SPS*
9	*220 kV Budhipadar-Vedanta-2*	*-*	*Tripped on SPS*

Due to non- availability of bus bar protection at Lapanga end, all the connected feeders got tripped on operation of distance protection.

The followings issues were pointed out during deliberation:

- *The relay at Budhipadar end for 220 kV Lapanga -Budhipadar-1sensed the fault in zone 3 however the tripping occurred instantaneously from Budhipadar end as timer of zone 1 had become high.*
- *Operation of REF protection for 220/132 kV ICT-1 & 2 at Lapanga*
- *LV side current as seen from the relay for 400/220 kV ICT-1 & 2 was different even if the same current was observed on hv side in the ICTs. This resulted in operation of high set for ICT-2 on lv side whereas for ICT-1, high set had not operated and delayed tripping was observed from hv side in directional overcurrent in 1.64 second.*
- *N-1 contingency criteria of 220 kV Katapalli-Lapanga d/c is not being satisfied which is issue of great concern from reliability point of the grid.*

OPTCL representative reported the following:

- *Relay parameters were checked both at Lapanga and Katapali end and found to be in order & no discrepancy was found in the relay settings.*

- *REF stability test of 220/132 kV ICT-1 & 2 were conducted and during the testing, loose connections were found in neutral CT which was rectified immediately.*
- *LV side back up relay of ICT-1will be tested during next available shut down.*
- *In absence of 220 kV Bus-Bar protection, Zone- 4 time setting in all the distance protection relays at Lapanga GSS was further reduced from 300 msec to 250 msec.*
- *The 'B' phase Cross Bus along with the drop jumper of 220 KV Lapanga-Katapali Ckt-1 had been replaced & additional 'L' cut jumpers had been provided in all the phases of both 220 KV Lapanga - Katapali ckt-1&2.*

Regarding tripping of 220 kV Budhipadar-Vedanta d/c, ERLDC representative 220 kV Budhipadar-Vedanta d/c tripped as per logic of SPS at Vedanta & resulted in islanding of Vedanta units with captive load. However, the island did not survive.

PCC enquired status of implementation of bus bar protection to which OPTCL replied that testing of bus bar protection had been completed and commissioning will be done by Aug 2022.

After detailed deliberation, 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.*
- *To ensure healthiness of all substation equipment at 220 kV Lapanga S/s by adopting periodical inspection & preventive maintenance activity in the substation. As N-1 contingency criteria of 220 kV Katapalli-Lapanga d/c is not being satisfied, special attention may be given to the equipment associated with these lines for identification of hotspots & rectification thereof.*

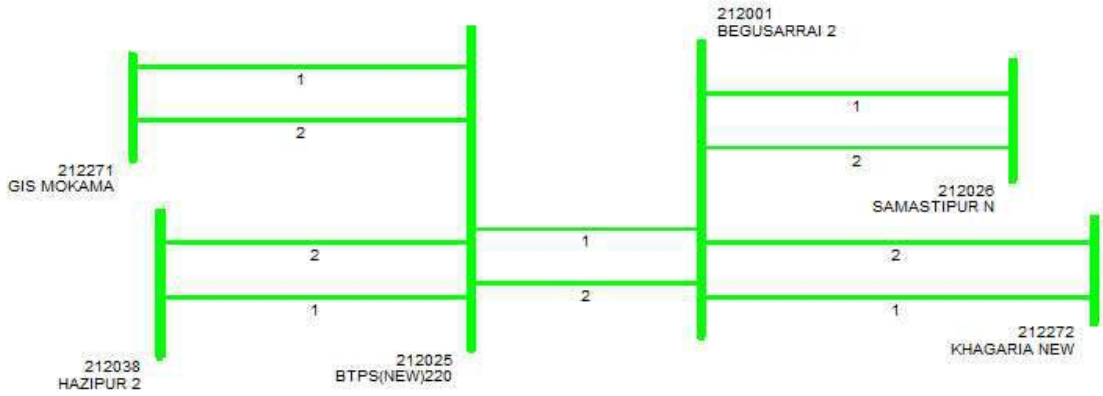
ITEM NO. B.2: Disturbance at 220 kV Barauni(BSPTCL) S/S on 19.05.2022 at 17:25 Hrs

220 kV Barauni-Begusarai D/C got tripped during a fault in 220 kV Begusarai-Samastipur D/C line. With tripping of 220 kV Barauni TPS-Begusarai D/C line, Barauni TPS got islanded with Mokama S/s load however the island did not survive.

Report from ERLDC is attached at **Annexure B.2.**

Relay Indications:

Time	Name	End1	End 2
17:22	220 Kv Begusarai – Samastipur -1	-	B ,Z-2,66KM
17:22	220 Kv Begusarai – Samastipur -2	B ,Z-1,6KM	B ,Z-1,44KM
17:25	220 kV Barauni_TPS- Begusarai-1	O/V	-
17:25	220 kV Barauni_TPS- Begusarai-2	O/V	-



Load Loss: 34 MW
Gen. Loss: 260 MW

Outage Duration: 01:58 Hrs

BSPTCL may explain.

Deliberation in the meeting

BSPTCL representative informed that heavy thunderstorm was reported during the disturbance. At 17:22 Hrs, the disturbance occurred due to falling of a palm tree over 220 kV Begusarai-Samastipur -2 line at about 10 km from Begusarai end. The fault was sensed in zone 1 from both end and line was tripped. Meanwhile, relay at Samastipur end for 220 KV Begusarai-Samastipur -1 sensed the fault in zone 3 and got tripped in high set overcurrent earth fault protection in 110-115 ms.

They submitted that they had disabled the high set setting in the line relay at Samastipur end after the event.

At 17:25 Hrs, 220 kV Barauni_TPS- Begusarai D/C got tripped in overvoltage from Barauni end.

The 220 kV Barauni_TPS- Hazipur-2 was under shutdown and 220kV-Mokama-Biharsariff-DC was kept open to feed Mokama radially.As a result, BTPS plant with 260 MW generation got islanded with 38 MW of Mokama load and due to high generation -load mismatch units got tripped on over frequency.

ERLDC representative enquired about overvoltage settings at Barauni end for which NTPC representative replied that the overvoltage settings for 220 kV Barauni_TPS- Begusarai-1 and 220 kV Barauni_TPS- Begusarai-2 is 249 & 251 kV respectively.

ERLDC representative informed that as per DR at Barauni end, maximum voltage observed at time of incident is 242 kV which is less than overvoltage settings so overvoltage protection should not had operated during the event for which NTPC representative informed that as per their record, voltage of 251 kV was observed at time of incident.. NTPC was advised to share relevant DR/EL with ERPC/ERLDC.

PCC opined that the total power failure at BTPS could have been avoided had 220 kV Mokama-Biharsharif been in service.
SLDC Bihar representative replied that reason for shutdown of 220 kV Mokama to Biharshariff D/C on day of incident will be shared to ERPC/ERLDC.

PCC advised SLDC Bihar to keep 220 kV Mokama-Biharsharif D/C in closed condition whenever both the circuits of 220 kV BTPS-Hazipur is under shutdown or out of service.

ITEM NO. B.3: Disturbance at 400/220 kV Bokaro A(DVC) S/s on 12.05.2022 at 13:56 Hrs

As reported, during testing of main bay of 400 kV Bokaro A-Koderma-2 at Bokaro A, LBB protection had mal-operated and subsequently tripped both the 400 kV buses at Bokaro A.

Gen. Loss: 450 MW
Outage Duration: 00:30 Hrs

DVC may explain.

Deliberation in the meeting

*The detailed report received from DVC is attached at **Annexure B.3**.*

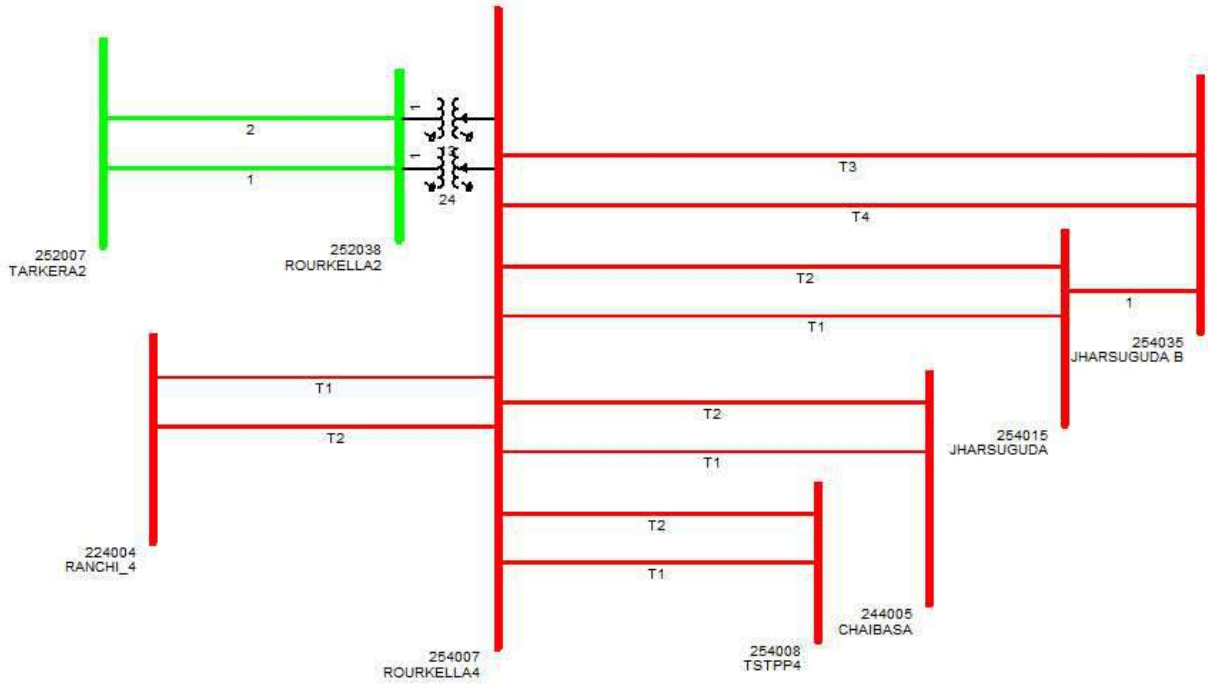
DVC representative informed that their testing wing visited the site after the disturbance and simulated the step-by-step wiring activity as per the scheme required for conducting the DCRM test. There was no tripping observed during this activity.

They therefore apprehended that tripping of both buses on 12.05.2022 had occurred due to inadvertent initiation of a binary input in PU relays of 400kV BTPS-KTPS -1 which was due to wrong shorting connections by O&M team.

ITEM NO. B.4: Disturbance at 400/220 kV Rourkela(PG) S/s on 31.05.2022 at 11:09 Hrs

On 31.05.2022 at 11:09 Hrs, both 400 kV Bus at Rourkela became dead while trying to open line isolator of 400 kV TSTPP-Rourkela-1 at Rourkela end. During the incident, Teed protection had operated however B phase breaker of Talcher-1 at Rourkela was stuck resulting in triggering of LBB protection. Thereafter LBB operated however it didn't function properly due to which all lines got tripped from remote ends in Zone-2. This resulted in total power failure in 400/220 kV Rourkela S/s.

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



Load Loss: Nil, Gen. Loss: Nil
Outage Duration: 00:42 Hrs

Powergrid & TSTPP(NTPC) may explain.

<u>Deliberation in the meeting</u>

The report submitted by NTPC in the meeting is enclosed at ***Annexure B.4.1.***

<u>Event on 30.05.2022:</u>

TSTPP availed the emergency shutdown of 400 kV Rourkela- Talcher -1 in order to take out line reactor at Talcher end. The line brakers were opened and confirmation of the same from remote end was taken before opening of isolator of line reactor.

During opening of line reactor isolator, arcing was observed in B-phase pole of isolator and the arcing remains for about 20 seconds. 400 kV Rourkela- Talcher -2 also got tripped due to the arc fault in vicinity with ckt-1 after 300 ms from Talcher end and DT was sent to Rourkela end. After 20 seconds, arc got extinguished itself after opening of isolator completely and fault was cleared.

<u>Event on 31.05.2022:</u>

Apprehending the induction effect of 400 kV Rourkela-Talcher- 2 on circuit-1 which resulted in arcing of the isolator pole, shutdown was taken for 400 kV Rourkela- Talcher -2 on 31.05.2022. However even after the shutdown of 400 kV Rourkela- Talcher -2, healthy B phase voltage was still observed in circuit 1. The site engineer at Rourkela tried to open the line isolator of circuit-1 which created arcing and fault. Subsequently all the feeders connected to 400 kV Rourkela S/s got tripped in zone-2 protection and ICTs got tripped in back up protection resulting in total power failure at Rourkela S/s.

<u>Analysis:</u>

On investigation it was found that while opening the line on 30.05.2022, the B-phase breaker of 400 kV Rourkela-TSTPP-1 did not open and was in struck condition though the physical indication of breaker status was open. This leads to arcing during opening of line reactor isolator at TSTPP end as well as arcing & fault during opening of line isolator at Rourkela end.

Powergrid representative informed that during the incident on 31.05.2022, TEED protection was operated at Rourkela end, however as breaker was stuck LBB started and issued trip command. During investigation it was found that due to fault output contact of LBB relay, the LBB did not operate and the fault was cleared by tripping of the lines from remote end.

ERLDC informed that as per PMU observation B-phase voltage was present even after the line shutdown and the disturbance could have been avoided if the information had been shared with ERLDC in real time.

NTPC representative informed that at the instance of switching off line on 30.05.2022, analog line voltmeter was in RY selected position showing zero voltage and there was another digital multifunction meter which was self-powered from line voltage and became dead after line was switched off therefore this condition led to interpretation of zero-line voltage. He stated that the analog voltmeter would be replaced soon.

Powergrid representative submitted that standard operating procedure in case of stuck breaker condition was already been devised and available with all the sites. However, in the present case, the site engineer fails to follow the SOP which leads to the disturbance. He informed that necessary directions has already been issued to all the sites for strict following of the SOP and sharing of the information with RTAMC/ERLDC.

On LBB protection, He informed that faulty LBB relay output contacts had already been replaced and the testing of all relays including LBB relay would be done once bus shutdown is availed.

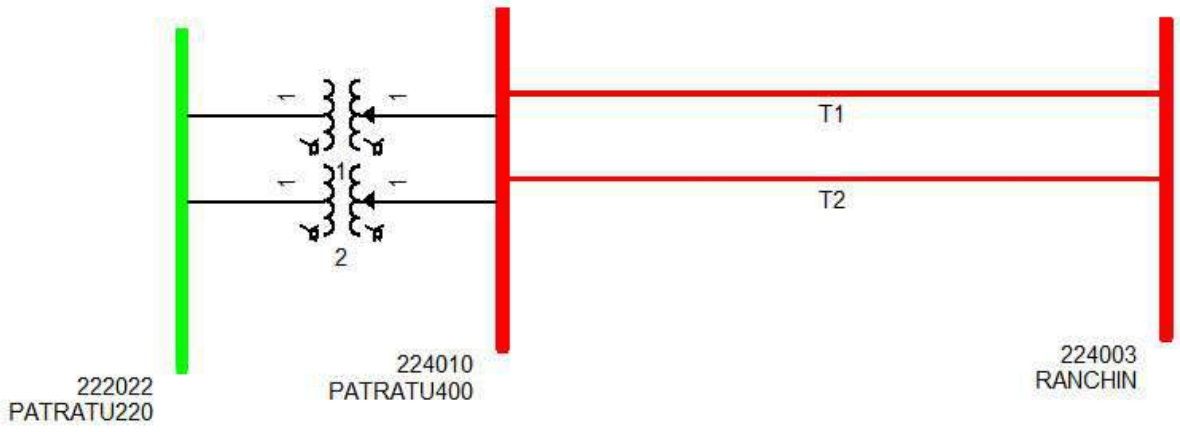
ITEM NO. B.5: Total Power failure at 400/220 kV Patratu(JUSNL) S/s on 14.05.2022 at 16:04 Hrs

400 kV New Ranchi-Patratu D/c got tripped due to B phase to earth fault. This led to total power failure at 400/220 kV Patratu S/s.

Disturbance report is attached at **Annexure B.5.**

Relay Indications:

Time	Name	End 1	End 2	PMU Observations
16:04	400 kV New Ranchi-Patratu-1	New Ranchi: B_N, 2.28 km, 24.5 kA	**-**	145 kV dip in B_ph voltage at New Ranchi. After 450 msec, around 150 kV dip in Y_ph observed at New Ranchi
	400 kV New Ranchi-Patratu-2	New Ranchi: B_N, 2.17 km, 24.37 kA	**-**	



Load Loss: 60 MW
Outage Duration: 01:36 Hrs

JUSNL may explain**.**

Deliberation in the meeting

JUSNL representative informed that on 14.05.2022 at 16:04 Hrs, earth wire of 400 kV Ranchi – Sipat line got snapped and since 400 kV New Ranchi-Patratu and 400 kV Ranchi – Sipat are on same tower at crossing, B phase fault got developed in 400 kV New Ranchi-Patratu line. The line tripped from Patratu end within 100 msec.

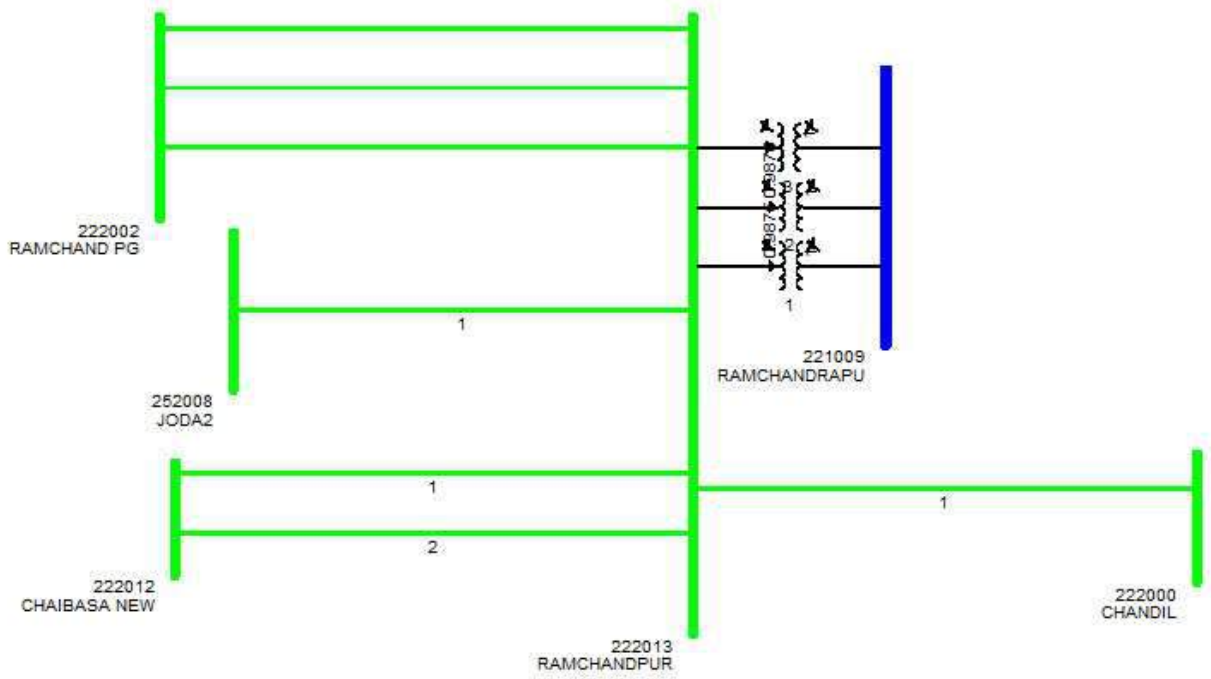
Powergrid representative informed that 400 kV New Ranchi-Patratu d/c got tripped from their end in zone 1 at 2.28 km.

ERLDC representative informed that auto-reclose was successful and fault was also cleared within 100 ms so there is no protection related discrepancy observed in the incident.

ITEM NO. B.6: Disturbance at 220 kV Ramchandrapur(JUSNL) S/S on 21.05.2022 at 01:33 Hrs

R &Y phase bus side jumper of 220 kV Joda-Ramchandrapur-1 got snapped at Ramchandrapur which created a bus fault. Subsequently all the elements of bus-1 & bus coupler got tripped leading to load loss of around 80 MW at Adityapur, Jadugoda & Golmuri area.

Disturbance report is attached at **Annexure B.6.**



Load Loss: 80 MW
Outage Duration: 00:59 Hrs

JUSNL may explain.

Deliberation in the meeting

JUSNL representative informed that R & Y Phase jumper of 220 kV Ramchandrapur – Joda got snapped and created bus fault at 220 KV RCP S/s.

He informed that as bus bar protection was not in service, zone 4 timing was reduced to 300 ms for all the connected feeders at RCP end.

Relay indication for all connected elements at 220 kV Ramchandrapur Bus 1 and Bus 2 was as follows-

S.No.	***Element along with connection to Bus 1/Bus 2***	***End 1***	***End 2***
1	*220 kV Bus Coupler*	*O/C & E/F (tripped within 100 ms)*	
2	*220 kV RCP – Chaibasa-1 (Bus 1)*	*Pick up in zone 4*	*Zone 2, tripped within 100 ms*
3	*220 kV RCP – Chaibasa-2(Bus 2)*	*Picked in zone 4*	*Zone 2, tripped within 100 ms*
4	*220 kV RCP - Chandil (Bus 1)*	*Zone 4 (tripped in 300 ms)*	*Pick up in zone 2*
5	*220 kV RCP - Joda (Bus 1)*	*Zone 4 (tripped in 300 ms)*	*Pick up in zone 2*
6	*400/220 kV ICT 1 (Bus 1)*	*Tripped from hv side within 300 ms*	
7	*400/220 kV ICT 2 (Bus 1)*	*Tripped from hv side within 600 ms*	
8	*400/220 kV ICT 3 (Bus 2)*	*No tripping was observed*	
9	*220/132 kV ICT 2 (Bus 2)*	*Back up O/C and E/f in both HV and LV side (around 600 ms)*	
10	*220/132 kV ICT 3 (Bus 1)*	*Back up O/C and E/f in both HV and LV side*	

		(around 600 ms)

ERLDC representative pointed out the difference of 300 ms duration in tripping of parallel ICTs from Jamshedpur end as 400/220 kV ICT-1 had tripped within 300 ms from their end and 400/220 kV ICT-2 had tripped within 600 ms.

PCC advised Powergrid to review the settings of 400/220 kV ICT 1 and 2 at Jamshedpur end and in case of any settings discrepancy, the settings shall be revised to achieve faster fault clearance timing.

PCC further advised Powergrid to check the current pick up as well as timer settings of 400/220 kV ICT 3 as this ICT should had tripped during the disturbance.

Regarding status of implementation of bus bar protection, JUSNL representative replied that the shutdown was planned on 8th July 2022 for testing & commissioning of the bus bar protection.

On the reason behind tripping of 220 kV RCP – Chaibasa d/c in 100 ms from Chaibasa end in spite of sensing the fault in zone 2, JUSNL representative replied that they had cross verified the zone 2-time settings at Chaibasa end which is 350 ms, however during the disturbance although relay sensed fault in zone 2, zone 1 timer started and subsequently tripping occurred within 100 ms.

PCC opined that this issue might be due to configuration/PSL logic error in the relay and advised JUSNL team to consult the OEM for analysis of the relay response during the above event.

ITEM NO. B.7: Total Power failure at 220 kV Chatra(JUSNL) S/s on 01.05.2022 at 17:40 Hrs

On 01.05.2022 at 17:40 Hrs 220 kV Daltonganj-Chatra D/c tripped from Daltonganj end leading to total power failure at 220/132 kV Chatra S/s. As reported both lines got tripped in zone-3 which indicates the fault was in downstream of chatra S/s.

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

Relay Indications:

Time	Name	End1	End2	PMU Observations
17:40	220 kV Daltonagnj-Chatra-1	Daltonganj: B_N, 0.8 kA	Didn't trip	27 kV dip in B_ph voltage for 800 msec at Daltonganj
	220 kV Daltonagnj-Chatra-2	Daltonganj: B_N, 0.8 kA	Didn't trip	

Load Loss: 13 MW
Outage Duration: 02:48 Hrs

JUSNL & Powergrid may explain**.**

<u>Deliberation in the meeting</u>

Powergrid representative informed that on 01.05.2022 at 15:53 Hrs, 220 kV Daltonganj-Garhwa d/c got tripped in zone 3 from Daltongunj end in 800 ms.

JUSNL representative informed that fault was on downstream side (132 k V) subsequently both 220/132 k V ICTs got tripped.

PCC advised JUSNL to reduce TMS of 220/132 k V 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.

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

A. Total Power failure at 220 kV Garhwa(JUSNL) S/s on 01.05.2022 at 15:53 Hrs

On 01.05.2022 at 15:53 Hrs, 220 kV Daltonganj-Garhwa D/c tripped subsequently total power failure occurred at 220 kV Garhwa S/s.

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

Relay Indications:

Time	Name	End 1	End 2	PMU Observations
15:43	220 kV Daltonganj-Garhwa-2	Daltonganj: R_N, Zone-1, 3.83 kA, 18.34 km,	Garhwa: R_N, Zone-1, 3.4 kA, 65 km	40 kV dip in R_ph and 45 kV dip in Y_ph voltage at Daltonganj.
15:53	220 kV Daltonganj-Garhwa-1	Daltonganj: R_Y, 4.9 km, 3.8 kA	Garhwa: Didn't trip	

Load Loss: 30 MW
Outage Duration: 01:34 Hrs

<u>Deliberation in the meeting</u>

JUSNL representative informed that on day of incident, heavy wind was observed that might had resulted in tripping of 220 kV Daltonganj-Garhwa -2 at 15:43 Hrs and 220 kV Daltonganj-Garhwa -1 at 15:53 Hrs. He further added that patrolling of line was done after the incident however no physical evidence of fault was found.

B. Total Power failure at 220 kV Garhwa(JUSNL) S/s on 23.05.2022 at 19:59 Hrs

220 kV Daltonganj-Garhwa (New) D/c tripped on R-N fault leading to total power failure at 220/132 kV Garhwa S/s.

Load Loss: 30 MW
Outage Duration: 01:21 Hrs

JUSNL may explain.

<u>Deliberation in the meeting</u>

JUSNL representative informed that on 23.05.2022, heavy wind was detected that might had resulted in tripping of 220 kV Daltonganj-Garhwa d/c at 19:59 Hrs.

JUSNL representative informed that inclement weather was reported on the day of disturbance.

It was informed that on 23.05.2022 at 19:59 Hrs, R phase fault got developed in 220 kV Daltonganj-Garhwa-2 which was sensed by relay at Garhwa end in zone 1 and tripped. Similarly, Daltongunj end for 220 kV Daltonganj-Garhwa-2 also sensed the fault in zone 1 and got tripped.

However, during the above incident, relay at Garhwa end for 220 kV Daltonganj-Garhwa-1 also sensed the same fault in zone-4 protection & tripped instantaneously. Daltongunj end relay for circuit-1 sensed the fault in zone 3.

From DR analysis it was observed that the auto-reclose attempt was also taken place after 1 second for circuit-2 and after 1.1 second for circuit-1.

ERLDC representative pointed out that in spite of sensing the fault in zone 4 by relay at Garhwa end for 220 kV Daltonganj-Garhwa-1, instantaneous tripping was occurred and auto-reclose attempt was also made. JUSNL representative replied that the relay settings & CT polarity connections are verified at site and are in order.

JUSNL representative informed that Main-2 relay at Garwah-1 end had picked up the fault in forward direction however Main 1 protection had some issue & detected the fault in reverse direction. He further informed that relay settings as well as configuration file was shared with relay engineer to investigate the reason behind relay sensing the fault in reverse direction.

ITEM NO. B.9: Grid events other than GD/GI

B.9.1: Bus tripping occurred in Eastern Region during April 2022

During May 2022, following incidents of bus bar tripping have been observed in eastern Region.

Element Name	Tripping Date	Reason	Utility
400 kV Main Bus-1 at Saharsa	13.05.22 at 17:12 Hrs	Bus bar protection operated	PMTL
400 kV Main Bus-2 at Kahalgaon (KhSTPP)	17.05.22 at 10:47 Hrs	LBB of Tie CB of U#2 and Bus Reactor#1 operated	NTPC
400 kV Bus-2 at TSTPP	22.05.22 at 03:49 Hrs	Relay of 400 kV TSTPP-Meramundali-2 was not reset at TSTPP end. LBB Protection operated.	NTPC
400 kV North Bus-2 at Pusauli	23.05.22 at 17:42 Hrs	BPI damaged of 400 kV Pusauli-Allahabad line at Pusauli end.	PG ER-1
400 kV Bus-2 at Durgapur	31.05.22 at 11:30 Hrs	Bus bar protection operated	PG ER-2

Concerned utilities may explain.

Deliberation in the meeting

- ***Tripping of 400 kV Main Bus-1 at Saharsa on 13.05.2022 at 17:12 Hrs***

PMTL representative informed that due to heavy wind during the disturbance, entry of foreign substances into the switchyard might have resulted in bus fault and operation of bus bar protection. He informed that thorough inspection of switchyard was done after the incident, however no physical evidence of fault was found.

On enquiry from ERLDC regrading triggering of DR during the event, PMTL representative informed that DR was triggered during the event and differential current was observed in B phase.

- ***Tripping of 400 kV Main Bus-2 at Kahalgaon (KhSTPP) on 17.05.2022 at 10:47 Hrs***

NTPC representative informed that LBB of tie circuit breaker of unit 2 and bus reactor 1 had operated which resulted in tripping of main Bus 2 at KhSTPP.

PCC opined that in case of operation of LBB of tie circuit breaker, main bus 2 should not have tripped. NTPC representative replied that reason behind tripping of main bus 2 will be shared to ERPC/ERLDC after confirmation from site.

- ***Tripping of 400 kV Bus-2 at TSTPP on 22.05.2022 at 03:49 Hrs***

NTPC TSTPP representative was not available in the meeting.

- ***Tripping of 400 kV North Bus-2 at Pusauli on 23.05.2022 at 17:42 Hrs***

Powergrid representative informed that on day of the incident, heavy thunderstorm was reported that resulted in damage of BPI of 400 kV Pusauli-Allahabad line at Pusauli end and created a bus at 400 kV North Bus-2. Subsequently bus bar protection operated.

- ***Tripping of 400 kV Bus-2 at Durgapur on 31.05.2022 at 11:30 Hrs***

Powergrid representative informed that the busbar relay was old (commissioned in 1986) and mal-operated on 31.05.2022 resulting in the disturbance.

He further intimated that replacement of busbar relay with numerical relay has been scheduled in July 22.

B.9.2: Repeated Tripping of Transmission Lines.

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

S.No.	Name of the Element	No. of times Tripped	Remarks	Utility
1	400 kV TSTPP-Meramundali-2	4	Fault in R phase in all instances. around 15 km from Meramundali	Powergrid
2	400 kV PPSP-Bidhannagar-1	4	Fault in R phase in three instances.	WBSETCL
3	220 kV Daltonganj-Garhwa-1	5	This line has tripped in past on multiple occasions duet to ROW and clearance issues as well as damaged Insulators.	JUSNL
4	220 kV Daltonganj-Chatra-2	5	Fault in either B phase or Y_B phase	JUSNL
5	220 kV Daltonganj-Chatra-1	4	Fault in either B phase or Y_B phase	JUSNL

6	220 kV Budhipadar-Korba-1	4	Fault in B phase around 40 km in two instances.	OPTCL

Concerned utilities may explain.

Deliberation in the meeting

- ***Repeated tripping of 400 kV TSTPP-Meramundali-2***

Powergrid representative informed that porcelain insulators were found damaged at various towers at 40 km from Talcher end which is near to the location of ash pond of GMR power plant.

He added that replacement work of insulators is in progress and will be completed at earliest. He also informed that certain tripping had occurred at some of the locations due to bush fire created by villagers.

- ***Repeated tripping of 400 kV PPSP-Bidhannagar-1***

West Bengal representative informed that repeated tripping of line had occurred at location no 395 near 42 km from Bidhannagar end where punctured insulators had been found. He added that insulators had been replaced on 17/05/2022 and after that no further tripping has been observed.

- ***Repeated tripping of 220 kV Daltonganj-Garhwa-1 & 220 kV Daltonganj-Chatra-D/C line***

JUSNL representative informed that concerned site personnel were intimated regarding the tripping and they would submit a report in this regard shortly.

- ***Repeated tripping of 220 kV Budhipadar-Korba-1***

OPTCL representative informed that no physical fault was identified in the mentioned locations however earth wire of the line was found missing between location 3 and 9 that might had caused these tripping. He stated that the earth wire issue would be rectified within July 2022.

ITEM NO. B.10: Tripping Incidence in month of May-2022

Single line tripping incidents in the month of May-2022 which needs explanation from constituents of either of the end is attached.

Concerned utilities may explain.

Deliberation in the meeting

Members explained the tripping incidences. The updated status is enclosed at ***Annexure B.10.***

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.

Members may update the latest status.

Deliberation in the meeting

*Updated status for decisions of previous PCC meetings is given at **Annexure C.1**.*

ITEM NO. C.2: Total Power Failure at 220 kV Hajipur S/s on 05/04/2022 at 18:03 Hrs

The disturbance occurred due to failure of Y-phase LA of 220 kV Barauni-Hazipur circuit-1 at Hazipur end. Subsequently all lines emanating from 220 kV Hazipur tripped resulting in total supply failure at Hazipur & Amnour.

Load Loss: 260 MW
Outage Duration: 00:21 Hrs

In 115th PCC Meeting, after detailed deliberation the followings were decided:

- *SLDC Bihar would coordinate with Barauni end to get the DR/EL from their end for 220 kV Hazipur-Barauni-2 line.*

- *BSPTCL would submit the DR of Hazipur end to ERLDC immediately and further they would investigate the root cause of the tripping of all feeders at Hazipur end during the disturbance and submit a report to ERPC/ERLDC before next PCC Meeting.*

- *The CT switching scheme w.r.t. LBB protection may be checked at Hazipur end.*

BSPTCL may update.

Deliberation in the meeting

PCC advised BSPTCL to submit detailed report of event along with DR/EL to ERPC/ERLDC within a week.

ITEM NO. C.3: Review of Line Reactor Tripping Schemes for mitigating Resonance O/V and secondary arcing--ERLDC

Three phase line reactor tripping scheme is implemented in few lines to avoid resonance overvoltage and secondary arcing problem during dead time of auto reclose. However, as the lines are being reconfigured due to LILO at various places hence for such lines with line reactor, it is important to check the compensation & subsequently review is needed.

At some places after reconfiguration there may be a need of implementing these schemes with proper study, while at some places where it is already implemented there may not be the needed so it may be disabled after validating with study.

Lines where this scheme is already implemented and which had been liloed subsequently are as follows-

1. 400 kV MPL-Ranchi liloed at Dhanbad.
2. 400 kV Patna -NPGC liloed at Jakkanpur.
3. 400 kV Darbhanga -Kishanganj liloed at Sahrsa.

Similarly, wherever line compensation is being changed due to reconfiguration, it should be reviewed and studied beforehand for implementing L/R tripping scheme to avoid any instances of high O/V & stage-2 tripping which impacts the end equipment's health.

Members may discuss.

Deliberation in the meeting

ERLDC representative informed that three phase line reactor tripping scheme is implemented in some of the lines to avoid resonance overvoltage and secondary arcing problem during dead time of auto recloser. However, as the lines are being reconfigured due to LILO at various places, line length is being changed hence for such lines with line reactor there is a need to check the compensation & subsequent review regarding tripping scheme.

He further added that at some places after reconfiguration there may be a need of implementing these schemes with proper study, while at some places where it is already implemented there may not be the needed so it may be disabled after validating with study.

Powergrid representative informed that 3-phase line reactor tripping scheme had been disabled for 400 kV MPL-Ranchi line which was liloed at Dhanbad.

Regarding 400 kV Darbhanga -Kishanganj liloed at Sahrsa end, ERLDC representative informed that 3-phase reactor tripping scheme has been enabled as overvoltage phenomena was observed in recent incidents.

Powergrid was advised to study the requirement of line reactor tripping scheme in 400 kV Patna - NPGC line which has been liloed at Jakkanpur and submit their observation to ERPC/ERLDC.

PCC advised all the transmission utilities to review the requirement of 3-phase reactor tripping scheme for the transmission lines having line reactor whenever the line configuration gets changed.

ITEM NO. C.4: Philosophy of O/V protection settings in 765 kV lines--ERLDC

It has been observed that at various 765 kV S/s in ER, O/V settings had been kept at 105% with 5 seconds or 6 seconds time delay, which appears to be on conservative side. The existing settings may be discussed and reviewed.

Members may discuss.

Deliberation in the meeting

After detailed deliberation, it was decided that for line overvoltage stage-I settings at 765 kV level, the recommendation given by Ramakrishna Committee may be followed. The settings may be set in the range of 106 to 109% and preferably at 108% with time delay of 5 to 6 seconds.

PCC advised concerned transmission utilities to follow the above setting guidelines for stage-I O/V settings at 765 kV Level.

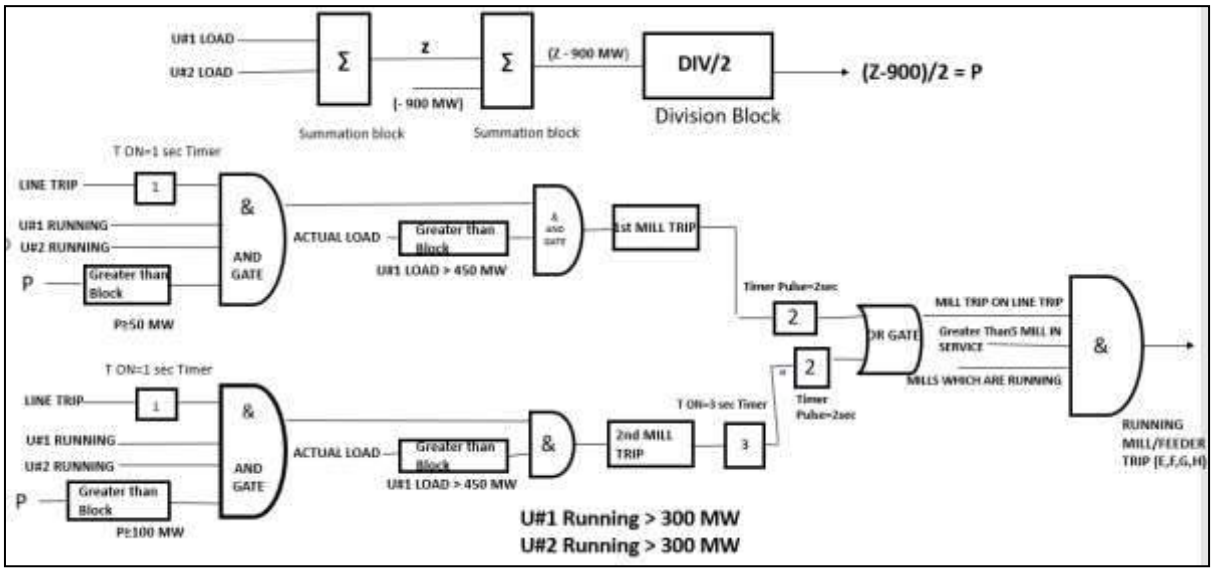
ITEM NO. C.5: SPS schemes implemented at TALA & JITPL

A. **SPS at JITPL end:** To avoid overloading of 400kV Angul - JITPL lines under N-1 contingency and when both units at JITPL are running at full load, SPS at JITPL had been implemented which will trip the mills for fast generation reduction.

When line trip occur with both the units are running with load more than 300 MW & “P” is greater than or equal to 50 MW & unit load is greater than 450 MW then one mill trips from the top.

If P≥100 MW then after 3 sec. one more mill trips from the top elevation

Note: Mill will trip only when more than 4 mills are in running condition.



Following queries regarding the above SPS need to be clarified by JITPL:

- What would be the total reduction with each mill tripping at full generation of both units
- How many mill would trip for reducing load below 900 MW in above case.
- Maximum limit of line loading as observed by SPS at 900 MW.

JITPL may update.

<u>Deliberation in the meeting</u>

JITPL representative was not available in the meeting.

It was decided ERPC Secretariat would send a communication to JITPL for sharing of requisite information regarding SPS at JITPL end.

B. SPS at Tala end:

- Currently only 2 number of circuits are present for Tala generation evacuation, one is direct to Binaguri and one is via Malbase, so in order to avoid overloading of single remaining circuit under N-1 contingency, SPS at Tala end had been incorporated which will trip units depending on the power generation of Tala.

- Manual switch will be used for enabling unit selection which will be tripped depending upon power generation of TALA which is as follows

  - P GEN> 623 & one breaker opened at Tala end – Trip 1 Unit of TALA.
  - P GEN> 810 & one breaker opened at Tala end – Trip 2 Units of TALA.
  - P GEN> 935 & one breaker opened at Tala end – Trip 3 Units of TALA.

  Note: Status of Master Trip will be considered for opening of line.

In a joint meeting it had been decided to explore the possibility for Analog Power sensing based SPS to overcome the shortcomings of existing schemes.

Until power sensing based SPS is being implemented, Malbase protection will be bypassed and protection will be changed at Tala end such that it will covers complete line length so that for fault in section of Malbase to Binaguri also, it trips from Tala end so that, SPS can operate as desired.

Members may note.

Deliberation in the meeting

Members noted.

ITEM NO. C.6: 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.6.**

Concerned utilities are advised to upload the relay settings in PDMS or send the relay settings to erpc-protection@gov.in .

Members may note and comply.

Deliberation in the meeting

PCC advised concerned utilities to upload the relay settings in PDMS or send the relay settings to erpc-protection@gov.in .

ITEM NO. C.7: Compliance of 3rd Party Protection Audit Team Observations

3r 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.7.**

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

Concerned utilities may update.

Deliberation in the meeting

OPTCL representative informed that compliance of observations of third-party protection audit is in progress.

PCC advised concerned utilities to update the compliance status of protection audit observations for their respective substation as given in the annexure.

ITEM NO. C.8: Schedule for 3rd party Protection Audit by ERPC Protection Team.

It is proposed to conduct 3rd Party protection audit for the following substations 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

Members may discuss.

Deliberation in the meeting

ERPC Secretariat informed that protection audit of mentioned substations will be carried out tentatively in second week of July 2022.

PCC advised concerned utilities of Jharkhand to verify and update existing relay data and protection settings available in PDMS before the field visit by audit team.

ITEM NO. C.9: Automation of Protection Settings extraction from PDMS

To facilitate protection co-ordination and protection audit, automation of protection setting extraction from the database is required. In this regard, a model excel sheet was shared with PRDC and automation of extraction of settings from PDMS was also discussed.

In 113th PCC, ERPC secretariat informed that a meeting would be held on 19th April 2022 among ERPC, ERLDC & PRDC to discuss the above issue.

In 114th PCC, PRDC representative informed that development of facility for relay data extraction from protection database is under progress and it is expected to be implemented within 45 days.

PRDC may update.

Deliberation in the meeting

PRDC representative informed that facility for desired relay data extraction from protection database is under progress and it is expected to be completed within 7 days.

ITEM NO. C.10: New Element Integration

C.10.1: FTC of 400 kV Gokarna-New Chanditala D/c

As per information received at ERLDC, 400 kV Gokarna-New Chanditala D/C is going to be first time charged.

Line parameters are as below:

Name	Conductor Type	Length
400 kV Gokarna - New Chanditala D/c	Twin Moose	177.31 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 Gokarna-New Chanditala D/c	400 kV Gokarna-New Chanditala D/c	Gokarna, New Chanditala	WBSETCL	Protection coordination to be done for newly connected element as per ERPC guidelines.
	400 kV Kolaghat-New Chanditala	Kolaghat	WBPDCL	Adjacent longest line for these lines will now be 400 kV Gokarna-New Chanditala D/c (177.31 km-TM). Hence Zone-3 settings at respective S/s may be reviewed keeping in view it should not encroach next voltage level
	400 kV Medinipur-New Chanditala D/c	Medinipur	PMJTL	
	400 kV Arambagh-New Chanditala	Arambagh	WBSETCL	
	400 kV Jeerat-New Chanditala	Jeerat	WBSETCL	
	400 kV Bidhannagar-New Chanditala	Bidhannagar	WBSETCL	

- PLCC end-to-end testing confirmation maybe furnished before FTC of the line.
- All utilities are requested to review the settings accordingly and confirm if any changes required or not. If any changes are envisaged, then updated settings maybe shared with ERLDC and ERPC.

C.10.2: FTC of 220 kV Subhashgram-Baruipur D/c

As per information received at ERLDC, 220 kV Subhashgram (PG)- Baruipur D/c is going to be first time charged.

Line parameters are as below:

Name	Conductor Type	Length
220 kV Subhashgram(PG)-Baruipur D/c	ACSR Zebra	33 km

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

Reason	Settings to be reviewed	At S/s	Utility	Remarks
FTC of 220 kV Subhashgram(PG)-Baruipur D/c	220 kV Subhashgram (PG)-Baruipur D/c	Subhashgram (PG), Baruipur	PG ER-2, WBSETCL	Protection coordination to be done for newly connected elements as per ERPC guidelines.
	220 kV Subhashgram (PG)-NewTown AA-3	NewTown AA-3	WBSETCL	Adjacent longest line will now be 220 kV Subhashgram(PG)-Baruipur D/c (33 km). Hence Zone-3 settings at 220 kV NewTown AA-3 S/s may be reviewed keeping in view it should not

				encroach next voltage level.
	220 kV Subhashgram(PG)-Bantala	Bantala	WBSETCL	Adjacent longest line will now be 220 kV Subhashgram(PG)-Baruipur D/c (33 km). Hence Zone-3 settings at 220 kV Bantala S/s may be reviewed keeping in view it should not encroach next voltage level.

- PLCC end to end testing 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 setting with ERLDC and ERPC at the earliest.

Concerned utilities may update.

Deliberation in the meeting

ERLDC representative confirmed that protection settings had been received from concerned utility.

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Annexure A

List of Participants in 115th PCC Meeting held on 20.06.2022 at 10:30 AM

Full Name	Join Time	Participant ID (UPN)
ERPC Kolkata	6/20/2022, 10:17:20 AM	ERPC@KolkataMST.onmicrosoft.com
U.K.Mishra,OPTCL (Guest)	6/20/2022, 10:17:29 AM	
DGM, EMR, JAJPUR ROAD (Guest)	6/20/2022, 10:17:29 AM	
Yamana Ayyappa	6/20/2022, 10:17:29 AM	ayyappa.y@tvptl.com
rajendra prasad (Guest)	6/20/2022, 10:18:09 AM	
NIRMAL MONDAL (WBSETCL) (Guest)	6/20/2022, 10:19:13 AM	
OPTCL MERAMUNDALI (Guest)	6/20/2022, 10:22:22 AM	
ML (Guest)	6/20/2022, 10:23:18 AM	
SMS SAHOO, DGM(ELECT), OPTCL (Guest)	6/20/2022, 10:24:20 AM	
Amita Nand, BSPTCL (Guest)	6/20/2022, 10:25:25 AM	
DOLAGOBINDA PATEL OPTCL MERAMUNDALI	6/20/2022, 10:26:38 AM	
Manoranjan Panigrahi	6/20/2022, 10:28:02 AM	MPANIGRAHI@NTPC.CO.IN
Dilip Kant Jha EEE	6/20/2022, 10:28:21 AM	
SLDC ODISHA (Guest)	6/20/2022, 10:28:38 AM	
Alok Pratap Singh	6/20/2022, 10:28:52 AM	apsingh@erldc.onmicrosoft.com
DEBDAS MUKHERJEE WBPDCL (Guest)	6/20/2022, 10:29:12 AM	
Rahul Anand	6/20/2022, 10:29:47 AM	RAHULANAND@NTPC.CO.IN
BS (Guest)	6/20/2022, 10:29:49 AM	
Aarif Md Dikchu (Guest)	6/20/2022, 10:29:59 AM	
TEESTA-III VIJAY CHANDRA (Guest)	6/20/2022, 10:30:05 AM	
Mangu Srinivas	6/20/2022, 10:30:21 AM	211321@vedanta.co.in
Rajib Sutradhar	6/20/2022, 10:31:16 AM	rajibsutradhar@erldc.onmicrosoft.com
Dilshad Alam	6/20/2022, 10:32:17 AM	
Akash Modi	6/20/2022, 10:32:28 AM	
Arindam bsptcl	6/20/2022, 10:32:46 AM	
S Konar (Guest)	6/20/2022, 10:33:05 AM	
Akash Kumar Modi	6/20/2022, 10:33:35 AM	akmodi@erldc.onmicrosoft.com
SUDIPTA MAITI	6/20/2022, 10:34:05 AM	sudiptamaiti@dvcindia.onmicrosoft.com
Shabari Pramanick	6/20/2022, 10:34:09 AM	shabari.pramanick@erldc.onmicrosoft.com
Amalendu Nanda	6/20/2022, 10:34:55 AM	amalendu.nanda@opgc.co.in
Amresh Prusti	6/20/2022, 10:35:22 AM	amresh.prusti@opgc.co.in
"prabhat k (TPTL) (Guest)	6/20/2022, 10:35:53 AM	
Gagan Kumar	6/20/2022, 10:36:36 AM	
Gulshan RONGNICHU HEP MBPCL	6/20/2022, 10:36:56 AM	
Saurav Kr Sahay	6/20/2022, 10:37:24 AM	saurav.sahay@erldc.onmicrosoft.com
BSPTCL	6/20/2022, 10:38:11 AM	
Pankaj Mishra Bsptcl	6/20/2022, 10:38:19 AM	
Shirshendu Nandy	6/20/2022, 10:38:26 AM	
Shashikant Sharma	6/20/2022, 10:38:44 AM	

kundan Kumar	6/20/2022, 10:38:56 AM	
Guest	6/20/2022, 10:39:16 AM	
Mingma Lepcha	6/20/2022, 10:39:19 AM	mingma.l@tvptl.com
CRITL	6/20/2022, 10:39:54 AM	
RE, BSPHCL, Kolkata	6/20/2022, 10:40:08 AM	admin@BSPHCL317.onmicrosoft.com
RE, BSPHCL, Kolkata	6/20/2022, 12:10:33 PM	admin@BSPHCL317.onmicrosoft.com
Kurshna samntray	6/20/2022, 10:40:24 AM	krushna.samantray@opgc.co.in
shanker	6/20/2022, 10:42:42 AM	
aditya jha	6/20/2022, 10:42:49 AM	
Saibal Ghosh	6/20/2022, 10:43:30 AM	saibal@erldc.onmicrosoft.com
Deepak v (Guest)	6/20/2022, 10:43:40 AM	
Sarfraj Akhtar Critl Bsptcl	6/20/2022, 10:44:18 AM	
SMS SAHOO,DGM,OPTCL,BHUBANESWAR (Guest)	6/20/2022, 10:46:22 AM	
Ramchandrapur	6/20/2022, 10:46:51 AM	
EEETDHZB	6/20/2022, 10:48:02 AM	
Uma Kanta Mishra	6/20/2022, 10:48:03 AM	
Satyapriya Behera	6/20/2022, 10:50:06 AM	satyapriya.behera@opgc.co.in
SANJAI SINGH (Guest)	6/20/2022, 10:50:14 AM	
Mayank Teotia	6/20/2022, 10:50:58 AM	
MITHUN GAYEN	6/20/2022, 10:51:15 AM	admin@POWERGRID433.onmicrosoft.com
sanjai singh	6/20/2022, 10:51:17 AM	
Prasanna Kumar Sahoo	6/20/2022, 10:51:50 AM	PRASANNASAHOO@NTPC.CO.IN
Purn Prakash Chand	6/20/2022, 10:53:51 AM	purnprakash@erldc.onmicrosoft.com
AEE Latehar (Guest)	6/20/2022, 11:00:13 AM	
Sanjay Sharma Teesta V PS	6/20/2022, 11:00:26 AM	
KUMAR AMRENDRA MADANPURI	6/20/2022, 11:01:51 AM	
Deepak Kumar Singh (Guest)	6/20/2022, 11:02:05 AM	
Sankhadeep Choudhury (Guest)	6/20/2022, 11:02:17 AM	
Amit Kumar	6/20/2022, 11:04:30 AM	
RENU KUMARI	6/20/2022, 11:04:42 AM	
Pallavi Kansal	6/20/2022, 11:04:47 AM	pallavi.k@tvptl.com
DGM CRITL JUSNL	6/20/2022, 11:05:20 AM	
Deepak, EEE, CRITL, BSPTCL	6/20/2022, 11:05:30 AM	
Dharm Das Murmu, CRITL, JUSNL (Guest)	6/20/2022, 11:06:03 AM	
Ch Mohan Rao (Guest)	6/20/2022, 11:06:04 AM	
RENU KUMARI (Guest)	6/20/2022, 11:06:36 AM	
Pritam Mukherjee	6/20/2022, 11:06:42 AM	pritam@erldc.onmicrosoft.com
Anil krishna (Guest)	6/20/2022, 11:08:07 AM	
abhishek bsptcl	6/20/2022, 11:09:30 AM	
SANJEEV KUMAR (Guest)	6/20/2022, 11:09:34 AM	
ASHISH KUMAR	6/20/2022, 11:11:13 AM	

abhishek kumar	6/20/2022, 11:11:27 AM	
jitesh kumar (Guest)	6/20/2022, 11:14:17 AM	
Pooja gautam	6/20/2022, 11:34:03 AM	
shadab hasan	6/20/2022, 11:34:09 AM	
manager GSS CBSA	6/20/2022, 11:34:34 AM	
Rahul	6/20/2022, 11:35:47 AM	
Rupa kumari	6/20/2022, 11:36:26 AM	
Supriya kumari	6/20/2022, 11:37:46 AM	
Md Aarif (Dikchu)	6/20/2022, 11:41:23 AM	
Rambaboo Singh (Guest)	6/20/2022, 11:46:56 AM	
DEEPAK THAKUR, CRITL, BSPTCL	6/20/2022, 11:56:24 AM	
RAHUL RAJ	6/20/2022, 11:59:13 AM	
Vinay Kishku	6/20/2022, 12:01:57 PM	
Laldhari Kumar	6/20/2022, 12:02:22 PM	laldhari@erldc.onmicrosoft.com
Deepak (Guest)	6/20/2022, 12:18:36 PM	
critl	6/20/2022, 12:28:53 PM	
Chandan kumar	6/20/2022, 12:45:54 PM	chandan@erldc.onmicrosoft.com
Sanjay Sharma, Tessta V PS (Guest)	6/20/2022, 1:00:21 PM	
TSD, cbsa-1	6/20/2022, 1:02:51 PM	
emr meramundali (Guest)	6/20/2022, 1:13:56 PM	
gaurav	6/20/2022, 1:51:24 PM	
AD ERPC (Guest)	6/20/2022, 3:19:41 PM	
Rajiv Singh CESC	6/21/2022, 10:37:18 AM	

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: **27-05-2022/2** दिनांक: **31-05-2022**

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

Summary of the event (घटना का सारांश):

At 15:56 Hrs, B_ph of 220 kV Katapalli-Lapanga-1 cross bus snapped and fell over 220 kV Main Bus-1 & 2 at Lapanga. This led to complete outage of 220 kV Lapanga. At the same time blackout occurred at Vedanta and Bhushan CPP also. Total 840 MW captive generation loss and 884 MW captive load loss occurred at Vedanta.

Date / Time of disturbance: 27-05-2022 at 15:56 hrs

- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Lapanga, 220 kV Vedanta S/s
- **Load and Generation loss**.
    - Captive generation loss of 840 MW at Vedanta reported during the event.
    - 884 MW captive load loss occurred at Vedanta

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

- 220 kV Lapanga-Katapalli-2

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Lapanga-Katapalli-1
- 220 kV Budhipadar-Lapanga-D/c
- 220 kV Budhipadar-Vedanta D/c
- 400/220 kV ICT-1 & 2 at Lapanga
- 220/132 kV ICT-1 & 2 at Lapanga

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

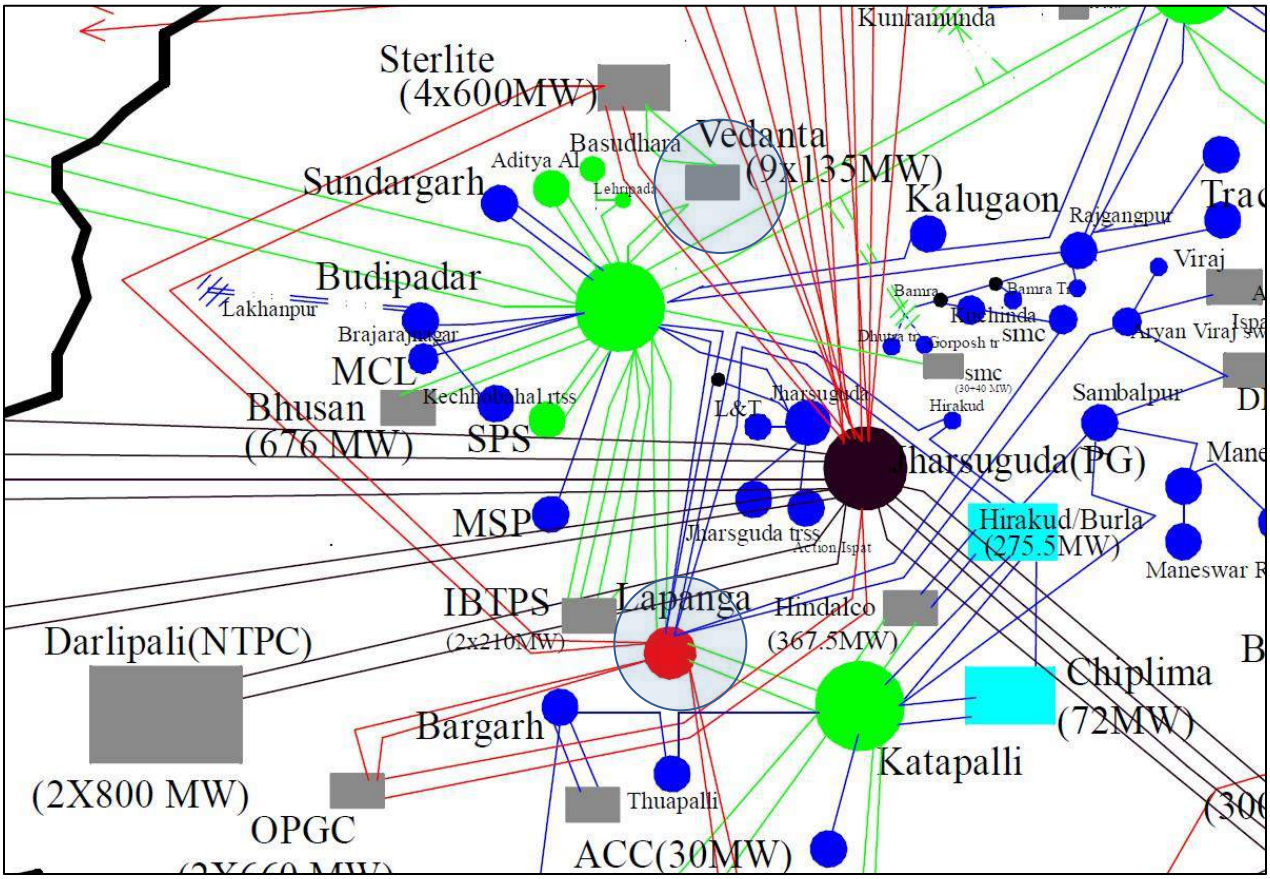


Figure 1: Network across the affected area

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

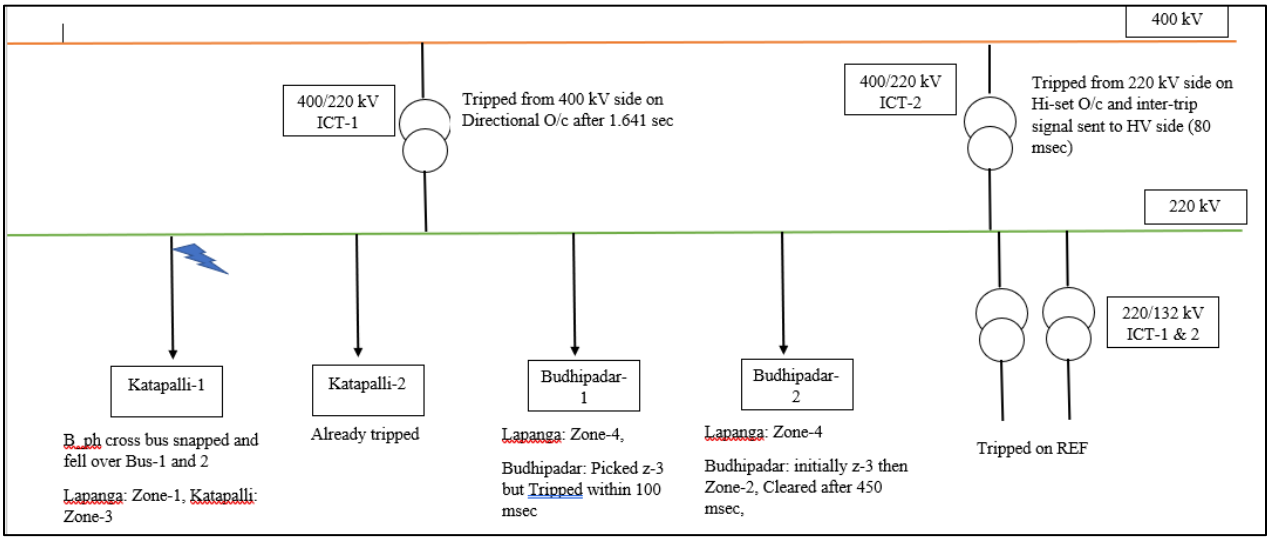
समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
15:56	220 kV Katapalli-Lapanga-1	Z-3 , B -N	Z-1, B-N	13 kV dip in all three phases at Meramundali. Fault clearance time: 1.7 seconds
	220 kV Budhipadar-Lapanga-1	Z-3, R-Y-B	Z-4, R-Y-B	
	220 kV Budhipadar-Lapanga-2	Z-2,R-Y-B	Z-4, R-Y-B	
	220 kV Budhipadar-Vedanta-1		Tripped on SPS	
	220 kV Budhipadar-Vedanta-2		Tripped on SPS	
	400/220 kV ICT-1 at Lapanga	B/UP O/C		
	400/220 kV ICT-2 at Lapanga		Hi set O/C	
	220/132 kV ICT-1 & 2 at Lapanga	REF		

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

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Katapalli-Lapanga-1	28/05/22 ,00:57
220 kV Budhipadar-Lapanga-1	28/05/22 ,01:17
220 kV Budhipadar-Lapanga-2	28/05/22 ,01:17
220 kV Budhipadar-Vedanta-d/c	27/05/22 ,16:11
400/220 kV ICT-1&2 at Lapanga	28/05/22 ,00:30
220/132 kV ICT-1&2 at Lapanga	28/05/22 ,00:43

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



- 220 kV Lapanga-Katapalli-2 tripped 4 times since 13:24 Hrs that day. After 4th tripping, ckt-1 loading was 260 Mw and cross bus of ckt-1 snapped at Lapanga at 15:56 Hrs and fell on both 220 kV buses and created three phase fault. High loading in the remaining circuit-1 may have initiated the fault.
- Bus bar protection at 220 kV Lapanga is not available.
- 220 kV Katapalli-Lapanga-1 tripped from Lapanga in Zone-1 detecting B phase fault and all 3 phase tripped. However, from Katapalli end same line tripped in zone-3 after 1 second.
- 220 kV Budhipadar-Lapanga-1 tripped immediately in Zone-1 from Budhipadar although it sensed the fault in zone-3 , T1 became high. **Time setting to be checked by OPTCL for Budhipadar end**., line tripped in Zone-4 from Lapanga after 300 msec.
- 220 kV Budhipadar-Lapanga-2 tripped after 450 msec in Zone-2 initially it was picked in zone-3 but got reset as current reduced then again with increase in current picked in z-2 from Budhipadar, line tripped in Zone-4 from Lapanga after 300 msec.
- Both 220/132 ATR tripped on REF instantaneously which should not occur , as per information received it has been changed to low impedance scheme so Bias etc to be reviewed **and REF stability to be checked by OPTCL** .
- 400/220 kV ICT-2 tripped on high-set O/c within 80 msec from LV side and sent intertrip command to HV side. As per DR, current in Y_ph and B_ph was above 7 kA in LV side. However, this current is higher than the current value in HV side after adjusting transformation ration. **ICT backup O/C to be tested for healthiness by OPTCL.**
- 400/220 kV ICT-1 tripped from HV side on Directional O/c after 1.64 seconds and fault was isolated from the system. Directional O/c setting to be co-ordinated. At this point all other sources were out and only source was ICT-1 so CT saturation may take place needs to be checked so **ICT backup O/C to be tested for healthiness by OPTCL.**
- At the same time, 220 kV Budhipadar-Vedanta tripped from Vedanta end only as voltage remained less than 0.65 pu and current was more than 600 A for around 350 msec. 220 kV Vedanta Island did not survive causing total power failure at Vedanta S/s.

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**
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)	**OPTCL**
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.	**OPTCL**

Status of Reporting (रिपोर्टिंग की स्थिति):

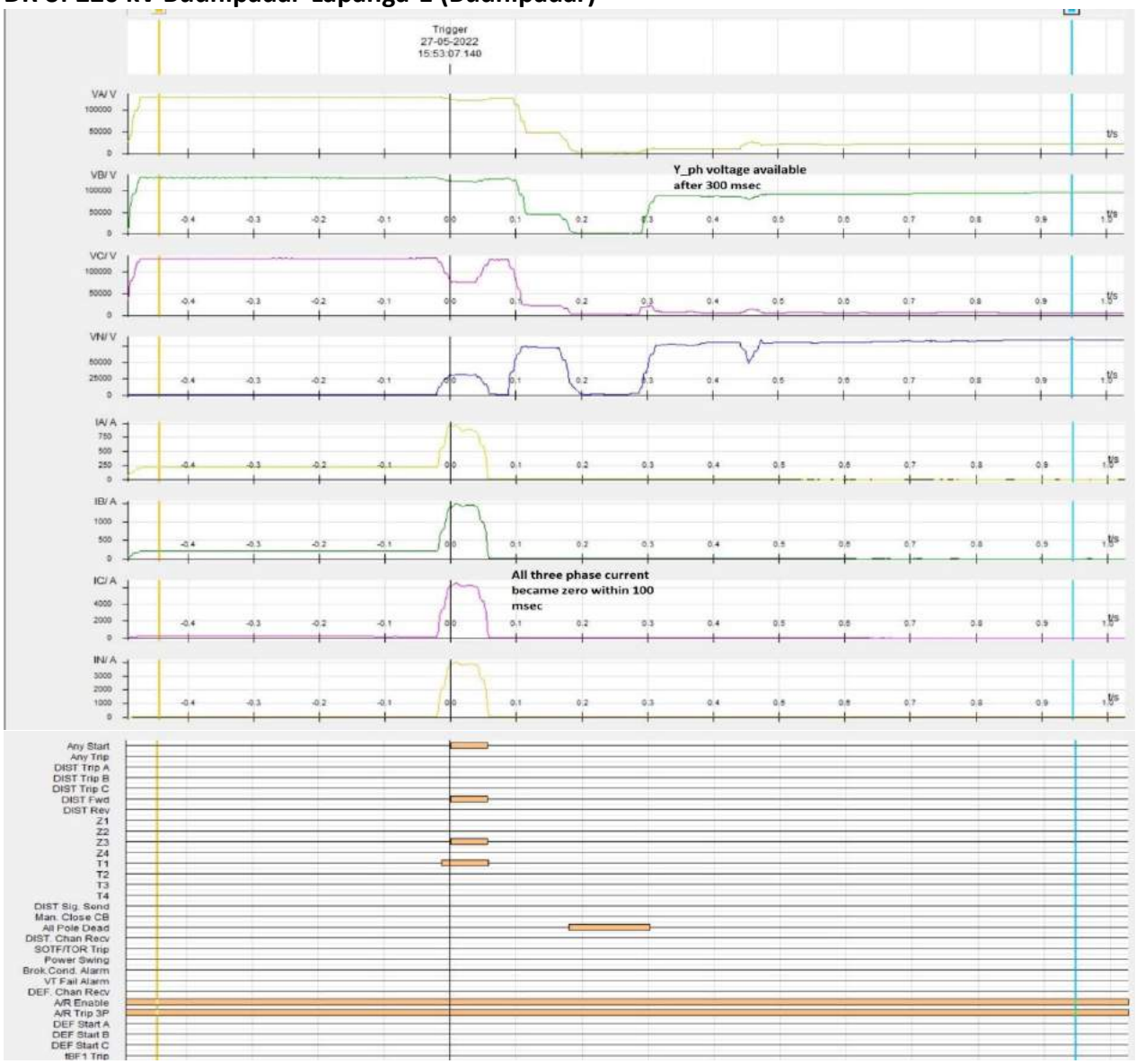
- DR/EL received from OPTCL

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

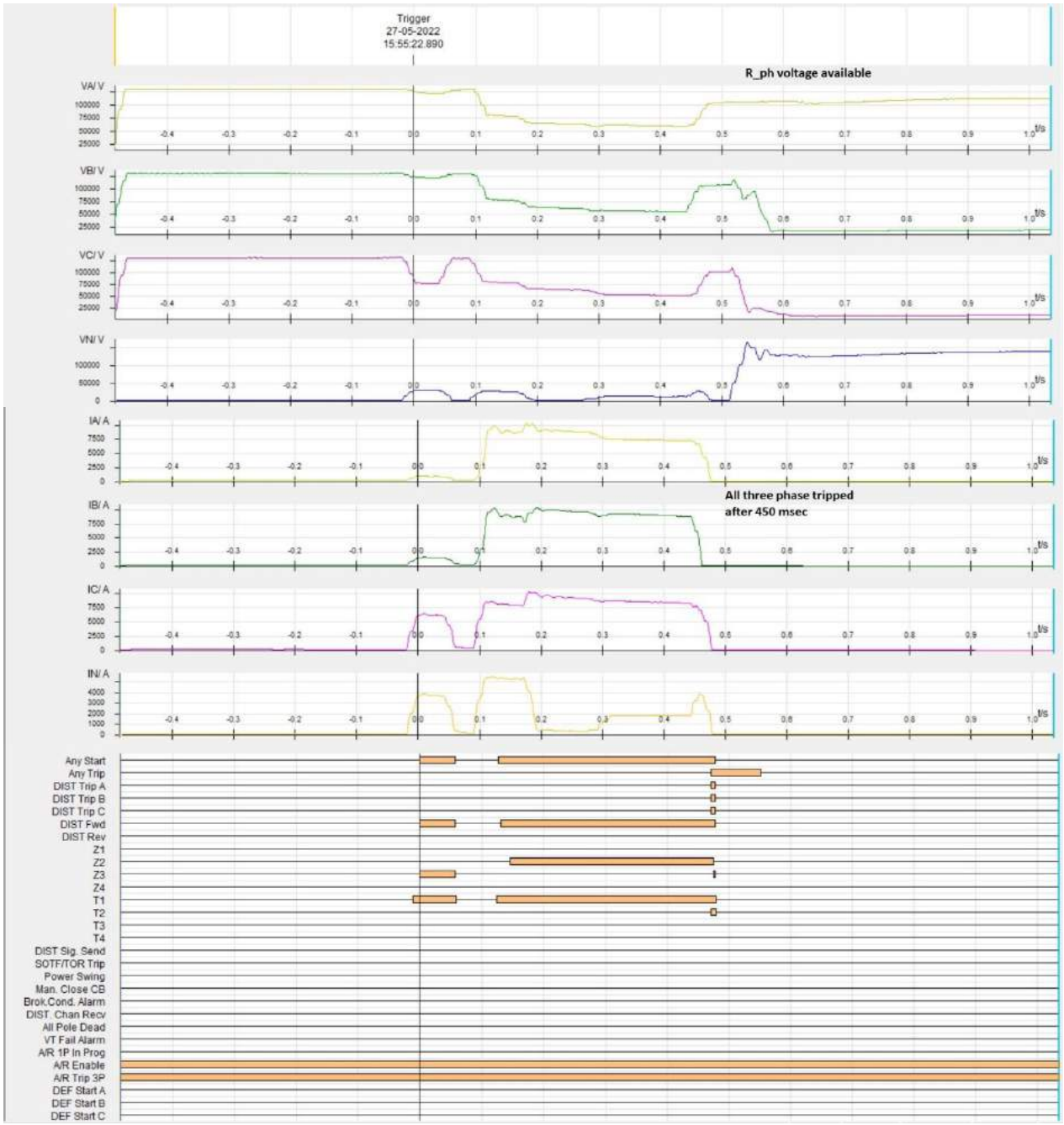
Sequence of event not recorded at time of event.

Annexure 2: DR recorded

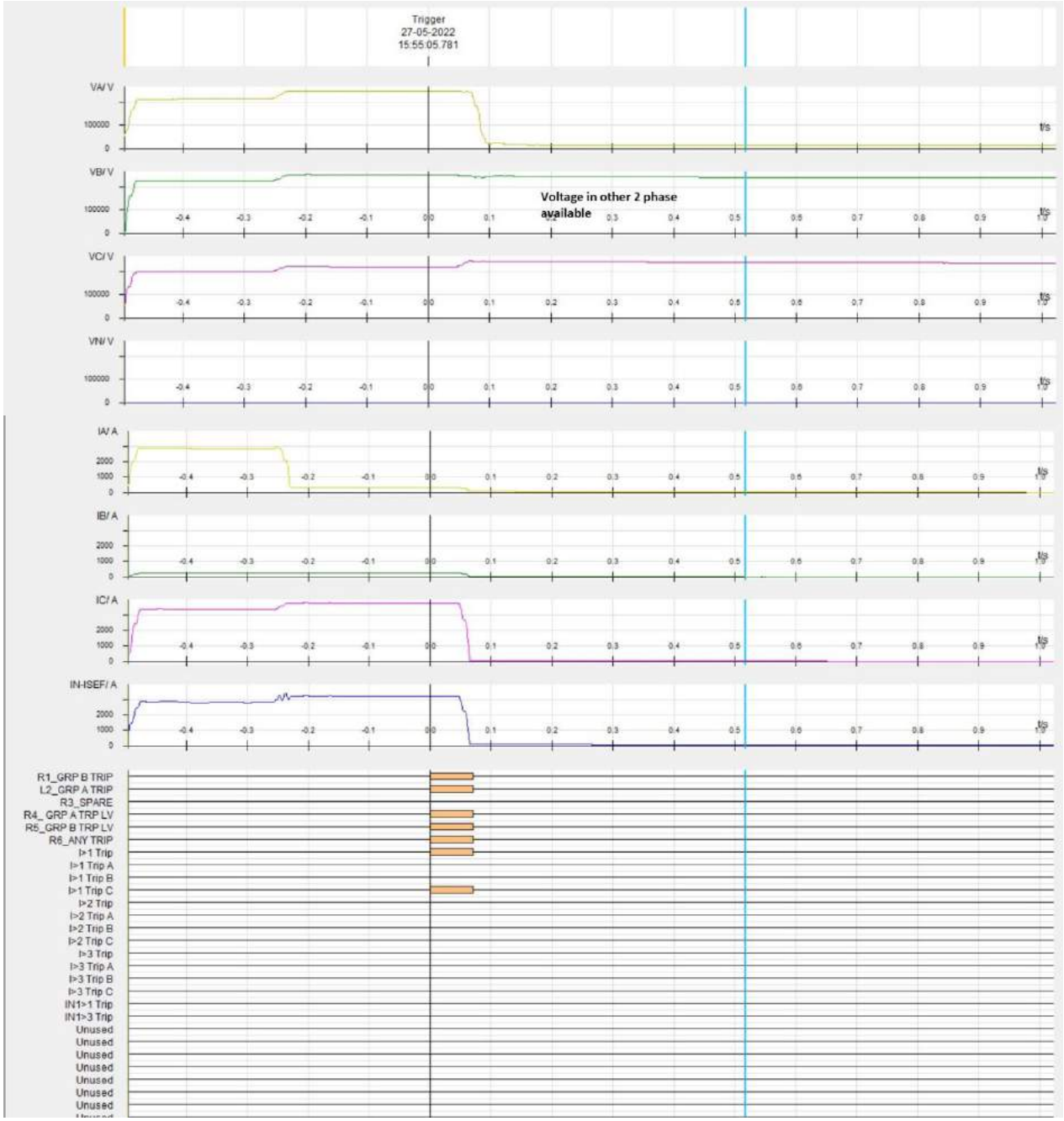
DR of 220 kV Budhipadar-Lapanga-1 (Budhipadar)



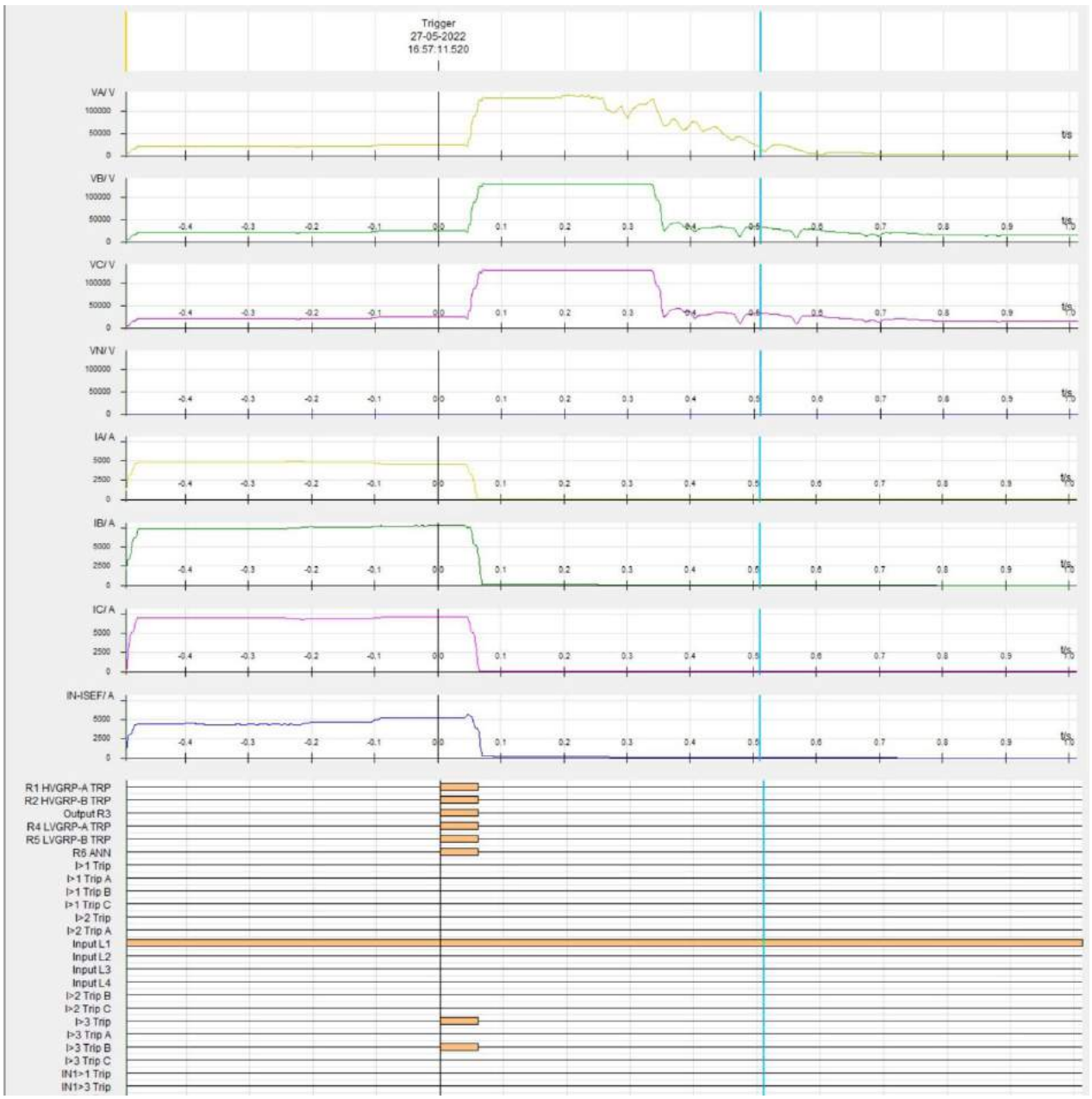
DR of 220 KV Budhipadar-Lapanga-2 (Budhipadar)



DR of 400/220 kV ICT-1 at Lapanga (HV side)



DR of 400/220 kV ICT-2 (LV side)


Trigger
27-05-2022
16:57:11.520
VA/ V
VB/ V
VC/ V
VN/ V
IA/ A
IB/ A
IC/ A
IN-ISEF/ A
t/s
R1 HVGRP-A TRP
R2 HVGRP-B TRP
Output R3
R4 LVGRP-A TRP
R5 LVGRP-B TRP
R6 ANN
I>1 Trip
I>1 Trip A
I>1 Trip B
I>1 Trip C
I>2 Trip
I>2 Trip A
Input L1
Input L2
Input L3
Input L4
I>2 Trip B
I>2 Trip C
I>3 Trip
I>3 Trip A
I>3 Trip B
I>3 Trip C
IN1>1 Trip
IN1>3 Trip

Annexure B.1.1

Disturbance occurred at 400/220/132/33 KV Lapanga GSS on dt 27.05.2022.

Date: 27.05.2022 ,Time- 15:59 Hrs.

Station : 400/220/132/33 KV GSS,Lapanga

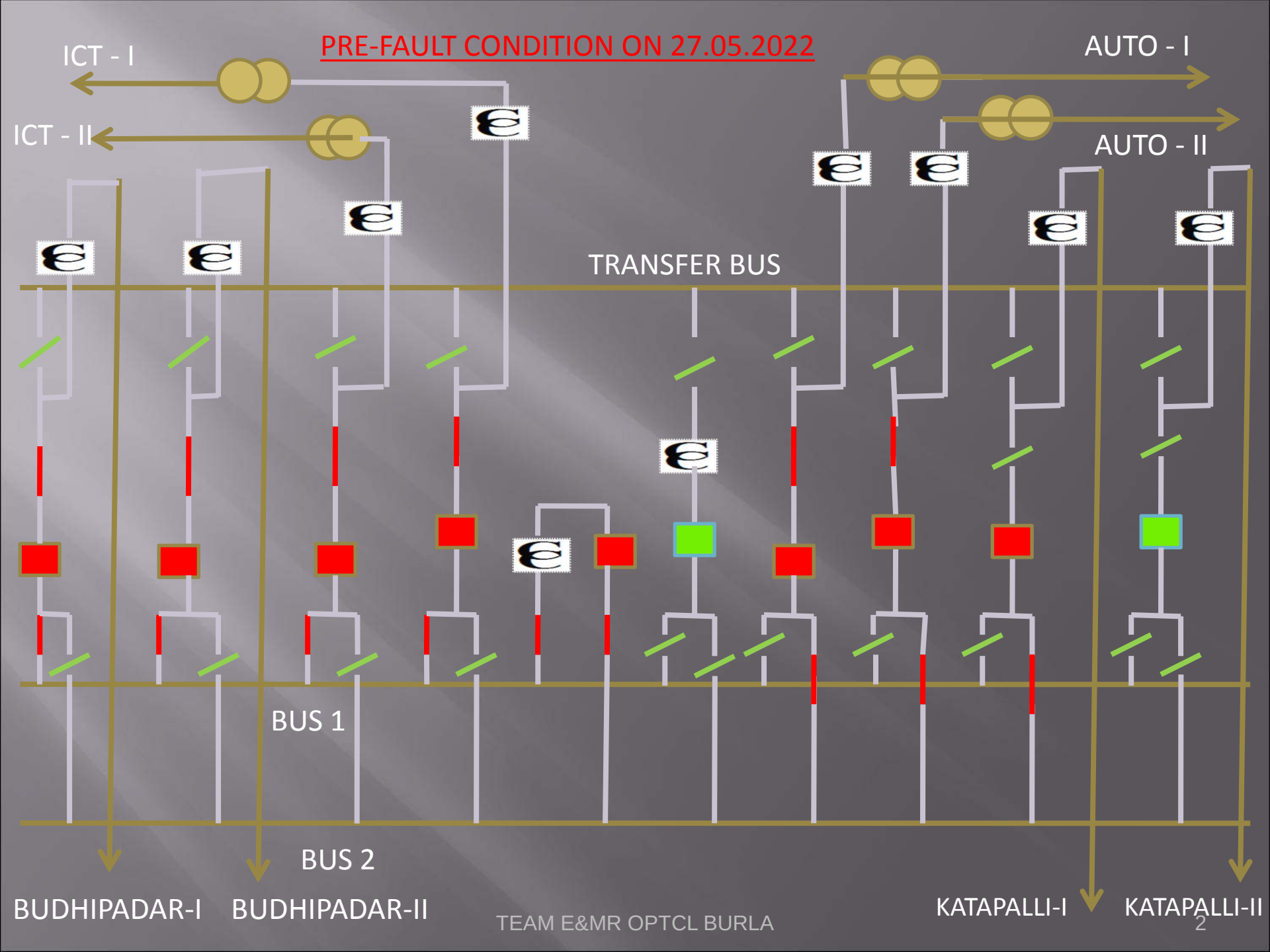
Major Circuits under Tripped / L.C condition prior to the event.

1. **220 KV Lapanga-Katapali ckt-2 : tripped at 15.52 hrs**

FAULT : -

1. **At 15:59 hrs 220 KV Lapanaga-Katapali ckt-1 B-ph cross-bus snapped over 220 KV Bus-1 and Bus -2 resulting in to Bus fault at Lapanga GSS. All connected feeders tripped at Local as well as remote end. This snapping was caused due to burning of the 'T' clamp of the drop jumper.**
2. **As no Bus-bar Protection is available in 220 KV System at Lapanga end, Main-1 protection operated for all the connected Bays.**

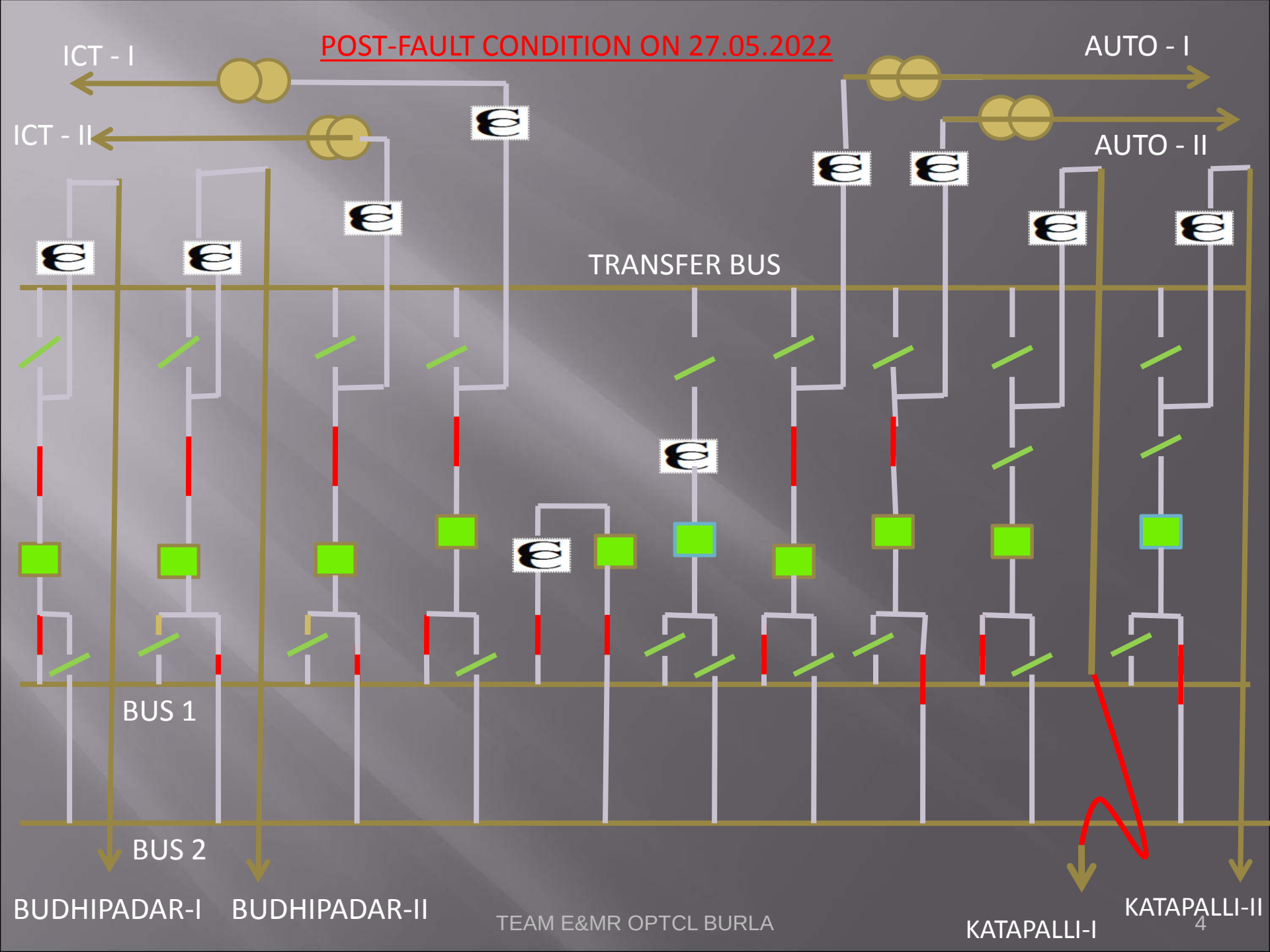
PRE-FAULT CONDITION ON 27.05.2022



Load Flow Condition at 15.00 Hrs

Bay No.	Name of the Feeder	Time Stamp	Load in MW
201	BUDHIPADAR-1	15.00 Hrs.	+30
202	BUDHIPADAR-2	15.00 Hrs.	+28
207	KATAPALI-1	15.00 Hrs.	-225
208	KATAPALI-2	15.00 Hrs.	0
209	ICT -1	15.00 Hrs.	+157
210	ICT -2	15.00 Hrs.	+164
204	AUTO -1	15.00 Hrs.	-76
206	AUTO -2	15.00 Hrs.	-80

POST-FAULT CONDITION ON 27.05.2022



Post Fault Condition at 16.00 Hrs

Bay No.	Name of the Feeder	Breaker Status at local end	Remarks
201	BUDHIPADAR-1	No trip	As per Relay Details
202	BUDHIPADAR-2	Tripped	Tripped with Zone 4 timing
207	KATAPALI-1	Tripped	Tripped with Zone 1 timing
208	KATAPALI-2	Tripped	**Prior to Fault**
209	ICT -1	Tripped	Delayed Tripping
210	ICT -2	Tripped	Tripped with O/C Highset LV
204	AUTO -1	Tripped	Tripped with REF
206	AUTO -2	Tripped	Tripped with REF

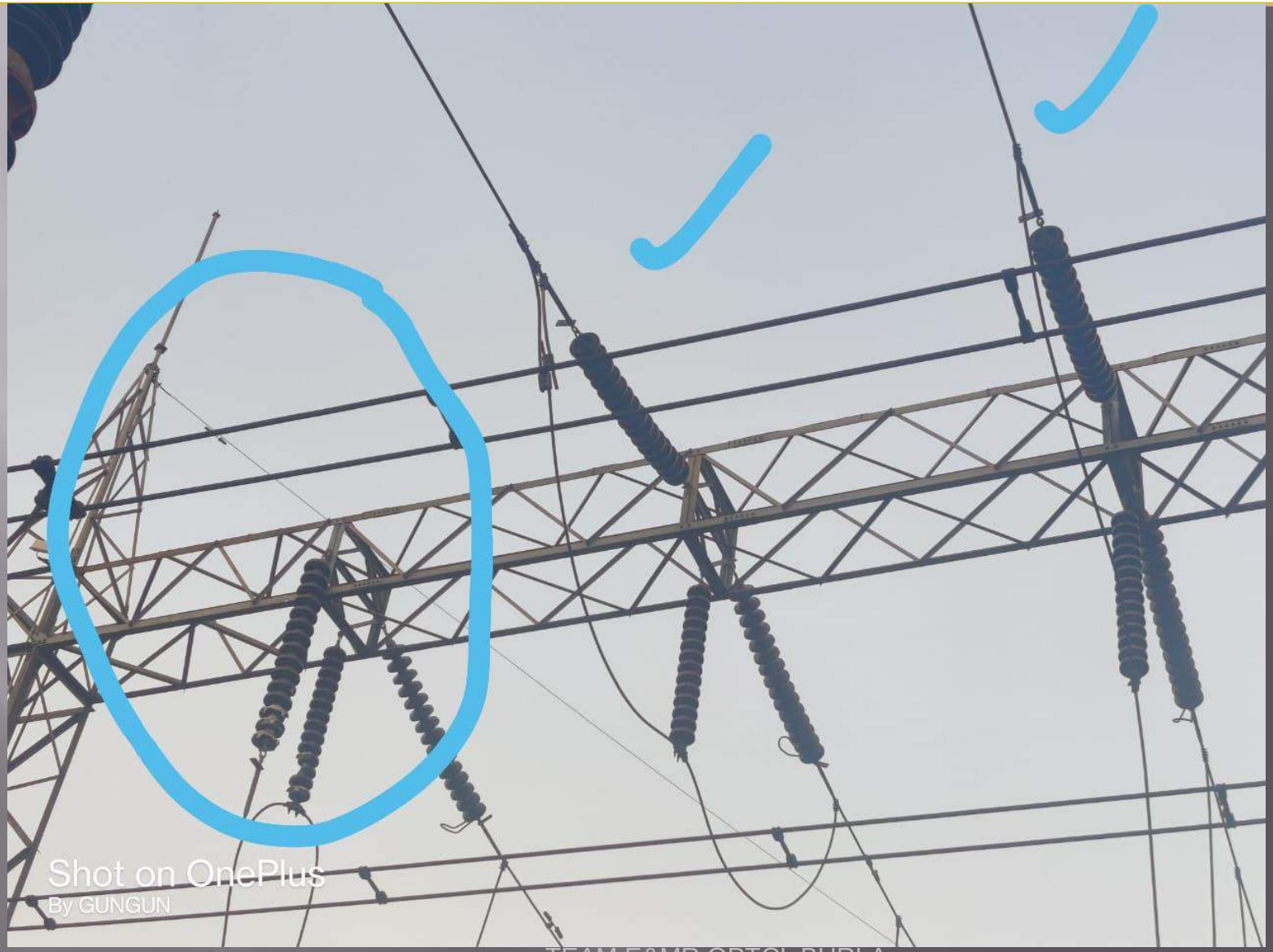
Relay Details of Tripped Feeders :

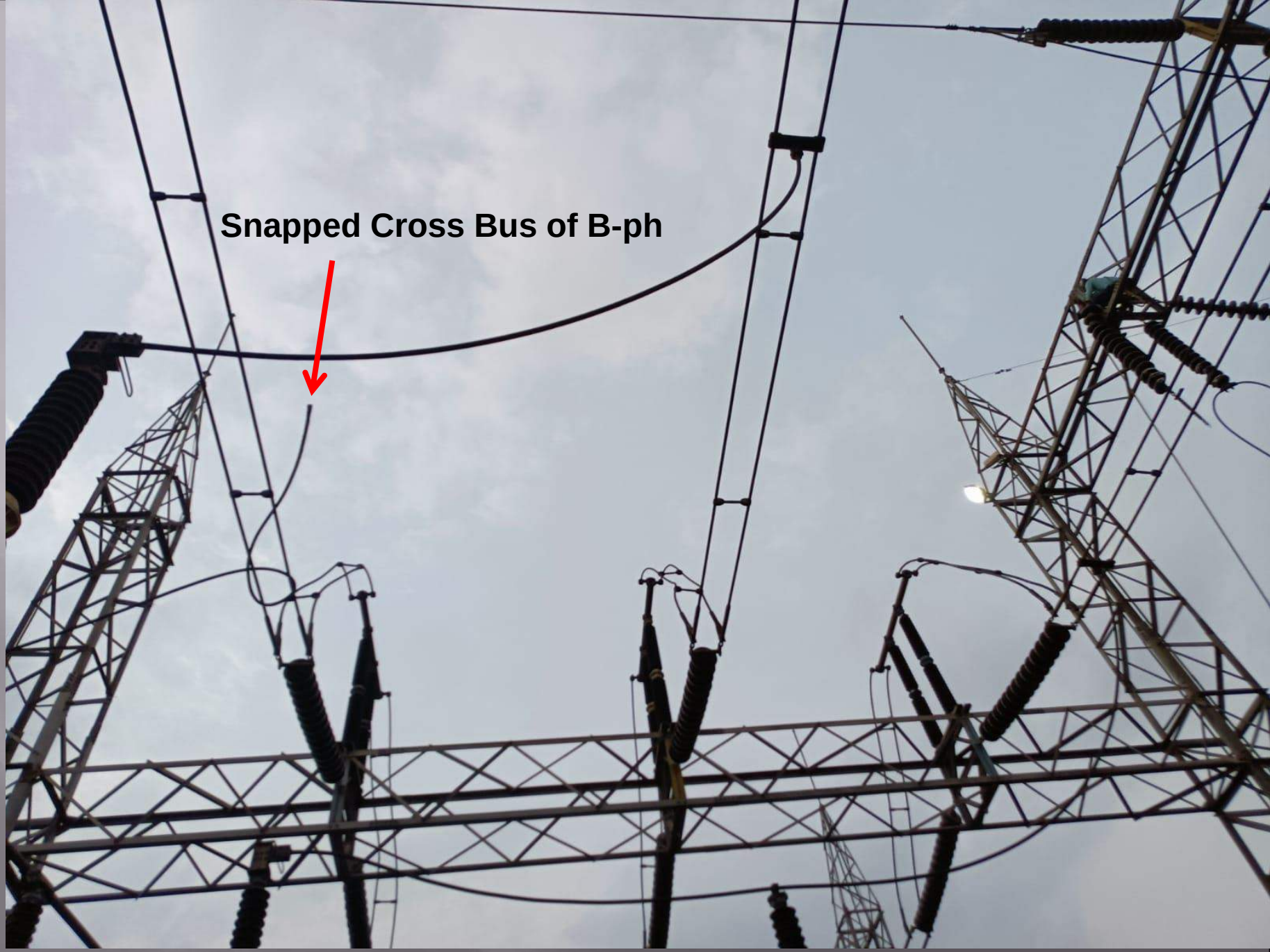
Name of feeder	Time of Tripping	Local End	Remote End	Remarks
BUDHIPADAR-1	15:57 Hrs	Zone-4 pick up only .	Zone-III, FL= BpH-E,FD= 23.44 Kms, IB= 6.251 KA	Relay Trip signal not Recorded in DR
BUDHIPADAR-2	15:57 Hrs	Zone 4, -0.633 km IR=8.512kA,IY= 8.610kA,IB= 8.092kA, 366 msec	Zone-II,R-Y-B pH-E,16.53 Kms, IR= 8.690 KA, IY= 8.707 KA, IB= 7.890 KA	
KATAPALI-1	15:57 Hrs	Zone-1, C-N,47.29 mtrs,27 KA	Zone- 4, 57.49 km, 15.89 KA. (D.P Relay-SEL 311C)	
KATAPALI-2	15:52 Hrs	Dir. O/c 2.06 KA, 740 msec.	Dir. O/c, Dir. IEp, 3.44KA,1381 msec.	
ICT – 1	15:57 Hrs	O/C TRIP IR=2.748kA,IY= 2.745kA, IB= 2.134kA	NA	TRIPPED ON HV SIDE

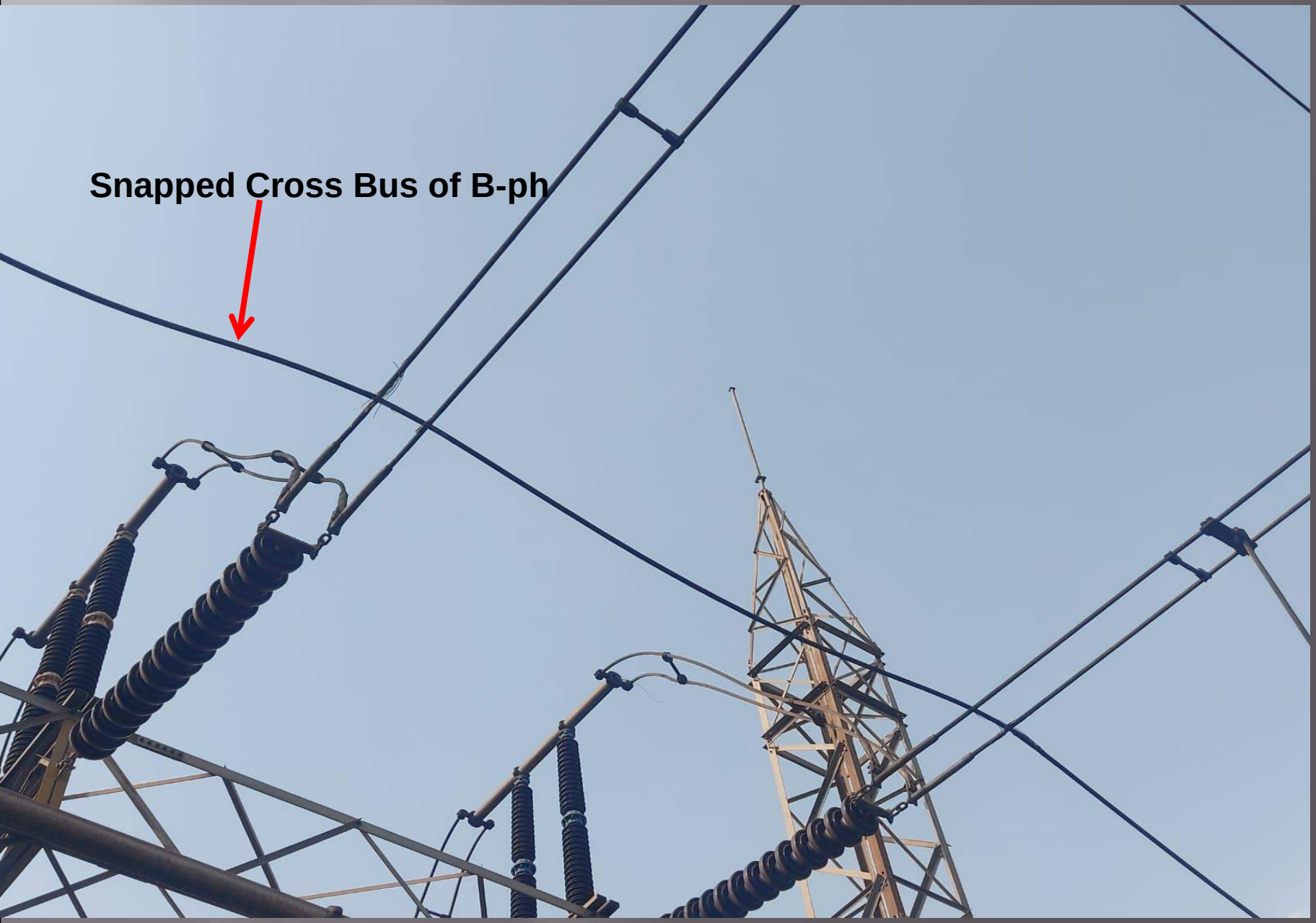
Relay Details of Tripped Feeders :

Name of feeder	Time of Tripping	Local End	Remote End	Remarks
ICT – 2	15:57 Hrs	220 KV O/C HIGHSET, IB=7.102 KA, 129 msec	NA	Tripped with LV O/C high set.
AUTO -1	15:57 Hrs	REF optd, IR=1.74 KA,IY= 1.50KA, IB=1.59KA, (no DR recorded)		Tripped with REF as per LED indication of the Relay
AUTO -2	15:57 Hrs	REF optd, IR= 1.64KA,IY= 4.15KA, IB=2.26KA (DR recorded)		Tripped with REF as per DR

Some photographs of Fault:




Snapped Cross Bus of B-ph


Snapped Cross Bus of B-ph


DAMAGED T clamp

Analysis of Fault:

1. At 15:57 hrs 220 KV Lapanaga-Katapali ckt-1 B-ph cross-bus snapped over 220 KV Bus-1 and Bus -2 resulting in to a Bus fault at Lapanga end. All connected feeders tripped at Local end as well as remote end with details as follows.
2. As there is no Bus-bar Protection in 220 KV System at Lapanga GSS, Main-1 protection of all the connected feeders operated.
3. As ICT-1 did not trip with LV O/C high set but tripped with HV O/C IDMT , ICT -1 continued to feeding fault till 1.6 sec following its IDMT curve.
4. Also 220 KV Lapanaga-Budhpadar ckt-1 did not trip with Zone- 4 (Only Picked Up). This resulted in feeding to the fault from Lapnaga end
5. (also delayed tripping at Budhipadar end observed more than Zone 2 timing) for which disturbance occurred at Budhipadar end too.

Remedial Action :

1. In absence of 220 KV Bus-Bar protection, Zone- 4 time setting in all the D.P Relays at Lapanga GSS was further reduced from 300 msec to 250 msec.
2. Relay parameters checked both at Lapanga and Katapali end and found to be in order.
3. LV side Back up relay of ICT-1 is to be tested again during next available shut down.
4. The 'B' phase Cross Bus along with the drop jumper of 220 KV Lapanga-Katapali Ckt-1 was replaced.
5. Additional 'L' cut jumpers have been provided in all the phases of both 220 KV Lapanga - Katapali ckt-1&2.(Photograph attached for reference)
6. Also necessary steps being taken at OPTCL end for early implementation of 220 KV Bus Bar protection system.


L cut provision in K'pali
ckt-1


L cut provided in K'pali
ckt-2

THANK U

OPTCL

Lifeline of Odisha

TEAM E&MR Division , OPTCL

Burla.

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: **05-05-2022/1** दिनांक: **19-05-2022**

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

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

At 17:25 Hrs. 220 kV Barauni_TPS- Begusarai-D/C tripped. At that time, 220kV Mokama was radially connected with Barauni TPS through 220kv Barauni_TPS-Mokama D/C line & feeding Hatidah, Barh & Varshaliganj area. With tripping of 220 kV Barauni_TPS- Begusarai-D/C line, Barauni TPS (generating 260MW) got islanded along with Mokama S/s (34MW load) but didn't survive.

Date / Time of disturbance: 19-05-2022 at 17:25 hrs.

- **Event type:** GD- 1

Systems/ Subsystems affected: Hatida , Barh , Varshalihanj , & Barauni

Load and Generation loss.

- 34 Mw load loss of Hatida , Barh , Varshalihanj.
- 260 Mw generation loss of Barauni during the event.

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

1. 220kV-Barauni_TPS-Hazipur-DC (under shutdown)
2. 220kV-Mokama-Biharsariff-DC (kept open to feed Mokama radially)

3. Major elements tripped (प्रमुख ट्रिपिंग)

Transmission/Generation element name संचरण लाइन / विधुत उत्पादन इकाईं का नाम	Trip Date बंद होने की तिथि	Trip Time बंद होने का समय	Restoration Date वापस आने की तिथि	Restoration time वापस आने का समय
220 Kv Begusarai – Samastipur -1	19-05-2022	17:22	18:25	
220 Kv Begusarai – Samastipur -2	19-05-2022	17:22	18:25	
220 kV Barauni_TPS- Begusarai-1	19-05-2022	17:25	18:25	
220 kV Barauni_TPS- Begusarai-2	19-05-2022	17:25		
220 kV Barauni_TPS- Hazipur-2	Was under S/D		19-05-2022	19:23

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

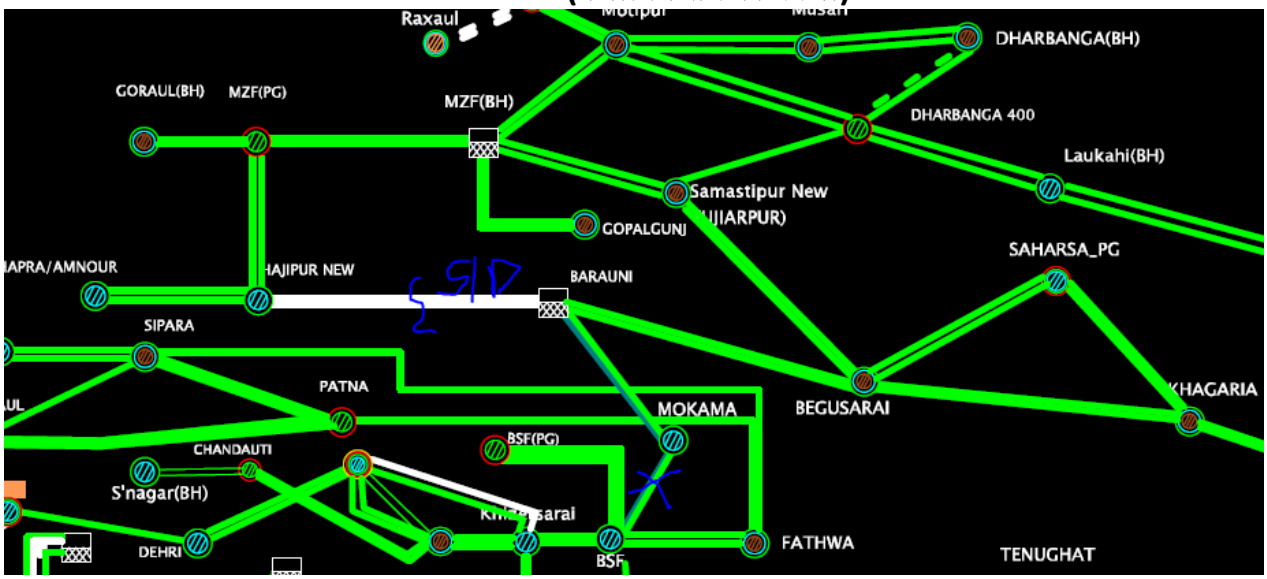


Figure 1: SCADA snapshot for of the system

Relay indication and PMU observation (रिले संकेत और पीएमयू पर्यवेक्षण):
10 kv dip in Y&B Phase

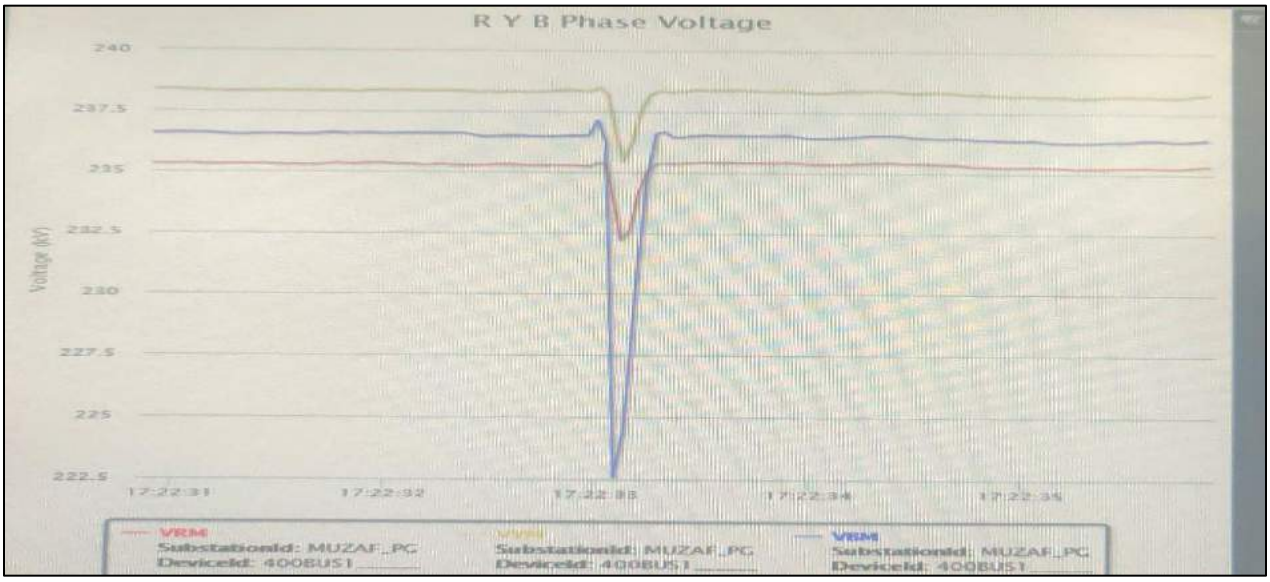


Figure 2: PMU voltage snapshot of 400/220 kV Muzzafferpur S/s

5. Relay Indication

Transmission/Generation element name संचरण लाइन / विधुत उत्पादन इकाईं का नाम	Trip Date बंद होने की तिथि	Trip Time बंद होने का समय	Relay local end	Remote end
220 Kv Begusarai – Samastipur -1	19-05-2022	17:22		B ,Z-2,66KM
220 Kv Begusarai – Samastipur -2	19-05-2022	17:22	B ,Z-1,6KM	B ,Z-1,44KM
220 kV Barauni_TPS- Begusarai-1	19-05-2022	17:25	O/V	
220 kV Barauni_TPS- Begusarai-2	19-05-2022	17:25	O/V	
220 kV Barauni_TPS- Hazipur-2	Was under S/D			

6. Analysis of the event (घटना का विश्लेषण):

- Weather prior to the event was stormy and rainy and During heavy wind ,cyclone, rain , A palm tree found burnt and fallen over 220 KV Begusarai-Samastipur new II transmission line at about 10 KM from Begusarai end. Fault was in cleared in ZONE-1 time from both ends .
- Although ckt-2 fault was cleared in z-1 from both end why Ckt-1 tripped in z-2 from samastipur end .**BSPTCL to explain?**
- **At 17:25 Hrs** 220 kV Barauni_TPS- Begusarai D/C tripped on overvoltage from Barauni end as reported but same needs confirmation from DR as well along with the setting.
- Prior to event 220 kV Barauni_TPS- Hazipur-2 was under shutdown and 220kV-Mokama-Biharsariff-DC (kept open to feed Mokama radially).
- As there was no evacuation path for BTPS units , BTPS plant with 260 Mw generation got islanded with 38 Mw of Mokama load but due to high generation -load mismatch units tripped on over frequency and load loss of 38 Mw also occurred along with 260 Mw generation ,loss.
- 220 kv Mokama to Biharshariff D/C connection may be explored to avoid such situations .

7. Protection issue (सुरक्षा समस्या):

8. Although ckt-2 fault was cleared in z-1 from both end why Ckt-1 tripped in z-2 from samastipur end .**BSPTCL to explain? This should be checked by BSPTCL .**

- DR of Barauni end not yet received to verify the overvoltage tripping.
- In case of Shutdown 220 kv Mokama to Biharshariff D/C connection may be explored to avoid such situations of single evacuation path.

9. 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	**BGCL,BSPTCL**

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.	
DR/EL are not time synchronized	1. Indian Electricity Grid Code 4.6.3 2. CEA Technical Standard for Construction of Electrical Plants and Electric Lines: 43.4.D. 3. CEA (Technical standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1.7.	**BSPTCL**

10. Status of Reporting (रिपोर्टिंग की स्थिति):

DR/EL not received from **BGCL for** 220 kV Barauni_TPS- Begusarai-D/C.

11. Annexure DR: For Barauni – Begusarai DR not available.

Report on 400KV TPF at BTPS

Date of incidence:- 12-05-2022

Brief History:-

BTPS O&M team was planning to do DCRM testing on the circuit breaker (GIS) of 400KV BTPS-KTPS Line#1. The O&M team had planned to close the circuit breaker by manually extending the DC supply to the Terminal Blocks (TB) assigned for the closing of the Circuit Breaker.

After shorting the necessary points in the TB, as soon as the MCB was switched on for closing the circuit breaker, all the 400KV circuit breakers tripped causing 400KV TPF at BTPS.

Investigation Carried Out:-

CTC team visited BTPS on 12-05-2022 for investigating the cause of the above TPF. After going through the DR and events of the PU relays of KTPS Line#1, it was found that the Binary Input assigned for 2nd/3rd stage low SF6 gas pressure of isolator/breaker had got high in both the PU relays of KTPS Line#1. Activation of this Binary Input led to the tripping of all the 400KV breakers as per the logic mentioned the PSL of the PU relays. This had caused TPF of 400KV BTPS bus.

Testing Carried Out:-

CTC & OS&U team visited BTPS - 'A' again on 17-05-2022 to replay the shorting activity, which was the cause of 400 KV TPF on 12-05-2022 during connection of circuit breaker analyzer. Before starting of shorting activity tripping through Bus-Bar Differential/LBB relay was deactivated in all the 400 KV bays (Output Block E & F of PU relays were taken out). OFC connectivity of PU#A & PU#B relays of Line#408 with CU#A & CU#B relay were taken out. Line # 408 was kept in OFF and isolated condition.

After above isolation following shorting (which was supposed to be on 12-05-2022) was done in LCC panel of KTPS Line # 1:

(i) Terminal point 65, 69 and 73 of TB-X04B (for closing command of breaker)
(ii) Terminal point 13,14 and 15 of TB-X10A (for tripping command of breaker)

On application of DC voltage no initiation of Binary Input occurred in PU#A or PU#B relay of KTPS Line#1. The experiment was repeated multiple times but in none of the cases BI 16 got HIGH. It indicated that the shorting of terminal points done by BTPS (O & M) on 12-05-22 may not be at the same points as done by them on 17-05-22.

Probable Cause of TPF on 12-05-22: It was clear from circumstantial evidence of both PU and both CU event records that that that tripping of both buses was due to inadvertent initiation of Binary Input 16 (i.e. 2nd/3rd stage low SF6 gas pressure of isolator/breaker of Line#408) in both PU#A and PU#B relay which as per PSL logic should correctly activate the Bus-Bar interlock protection. It is anticipated (although cannot be proved) that Binary Input 16 got high due to shorting of terminal point 65, 69 and 73 of TB-X04 instead of TB-X04B by mistake.

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: **31-05-2022/1** दिनांक: **10-06-2022**

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

Summary of the event (घटना का सारांश):

At 11:09 Hrs on 31.05.2022, both 400 kV Bus at Rourkela became dead while trying to open line isolator of 400 kV TSTPP-Rourkela-1 at Rourkela end. Teed protection operated, however, B_ph breaker of Talcher-1 at Rourkela was stuck, thereafter LBB operated which didn't function properly due to which all lines tripped from remote ends in Zone-2. Total power failure occurred at 400/220 kV Rourkela S/s. No load loss or generation loss occurred.

- **Date / Time of disturbance:** 31-05-2022 at 11:09 hrs
- **Event type:** GD-1
- **Systems/ Subsystems affected:** 400 kV Rourkela S/s
- **Load and Generation loss**.
    - No load loss or generation loss occurred during the event.

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

- 400 kV TSTPP-Rourkela II
- 400 kV Ranchi-Rourkela-1

Major elements tripped (प्रमुख ट्रिपिंग):

- 400 kV Rourkela-Jharsuguda Q/c
- 400 kV Rourkela-Ranchi-2
- 400 kV Rourkela-Chaibasa D/c
- 400/220 kV 315 MVA ICT-1,2,3&4
- 220 kV Rourkela-Tarkera D/c

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

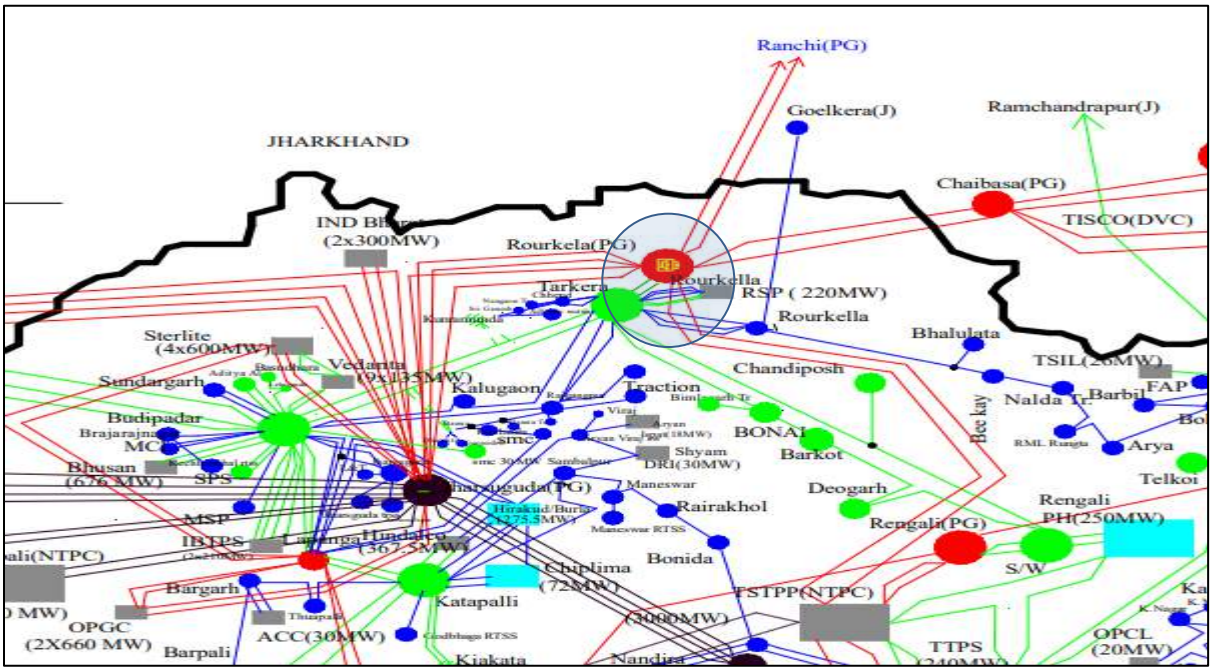


Figure 1: Network across the affected area

Figure 2: SCADA snapshot of the system

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

Chronology of event:

1. CKT-1 opened on 30 May at 17:12 hrs to take out L/R at TALCHER END due to oil leakage, but B phase not opened since then as observed from below PMU plot healthy B phase line voltage was persisting.

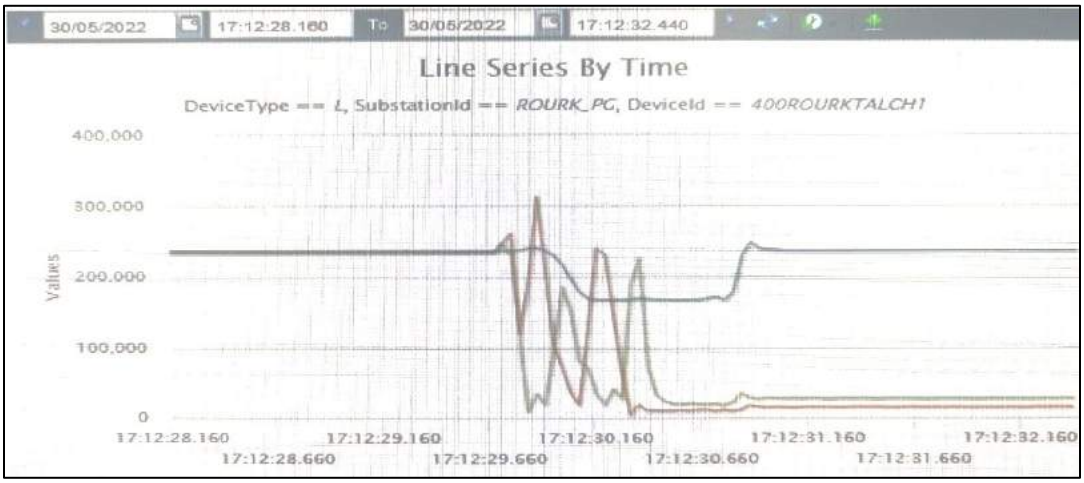
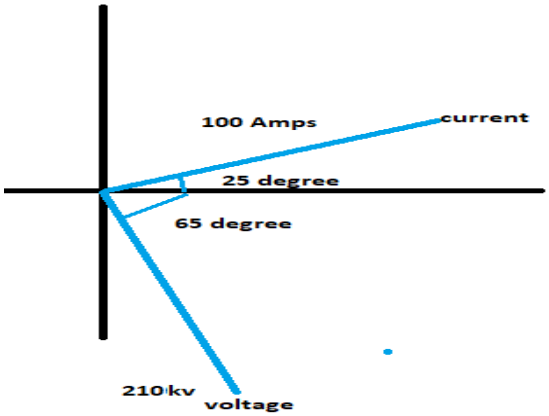


Fig 2: Ckt-1 Line voltage at Rourkella end.

Apart from this R&Y phase also 50 kv voltage was persisting due to unbalance and high zero sequence current mutual coupling induced voltage was of the range of 50kv .

- This line B phase voltage and current was due to stuck breaker condition was also checked by PMU as shown below, Voltage of stuck B phase and current are 90 degree apart and current is leading voltage showing capacitive charging current flow .



2. Although B phase line voltage was extended till the line CVT at Talcher end and Talcher end was also getting healthy B phase voltage (also evident from below pmu plot) still Isolator opening was carried out from Talcher end .**NTPC Talcher to reply.**

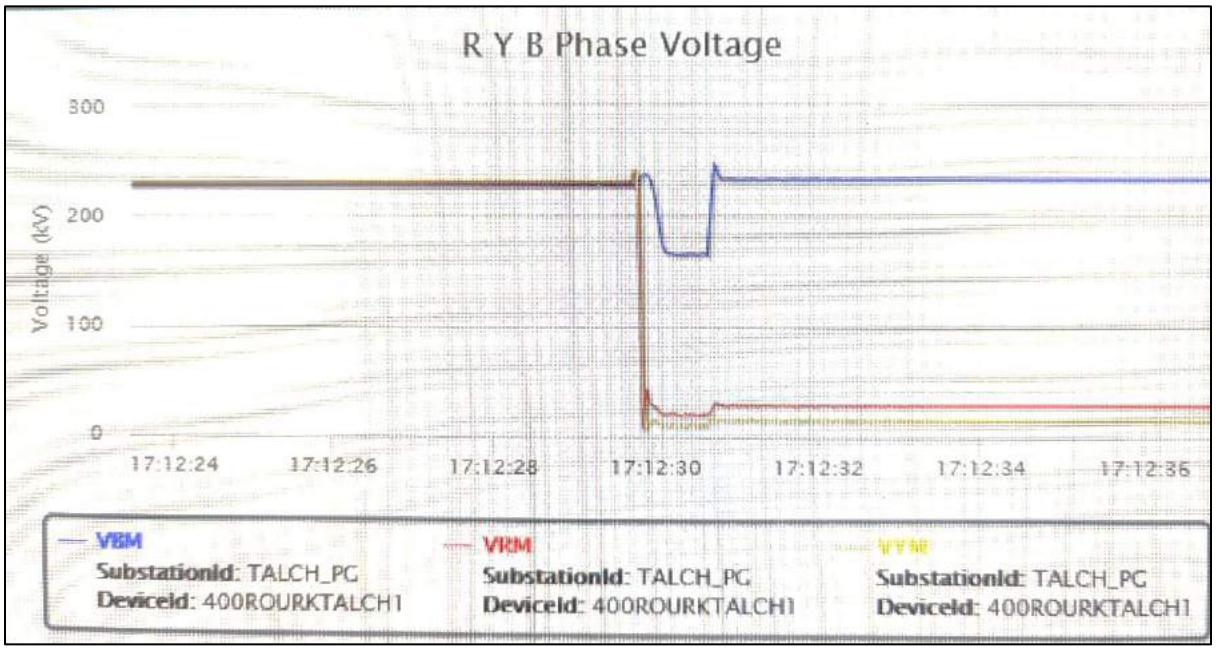


Fig 3: Ckt-1 Line voltage at Talcher end.

3. At 17:32 Hrs on 30 May, as Talcher tried to open B phase L/R isolator this created fault till 20 sec and isolator mechanism also failed and isolator did not opened and got jammed. For line -1 also DT was received, IN>1 ad any trip started as seen from DR but as the B

phase breaker was stuck ,LBB also initiated but it did not extended trip command to other elements due to faulty O/P contacts .So fault in line 1 was persisting till 20 sec.

- During the same time ckt 2 also tripped due to the arc fault in vicinity with ckt-1 after 300 ms from Talcher end and DT was sent to Rourkela. **Ntpc Talcher to intimate yet What protection operated at Talcher end ?**

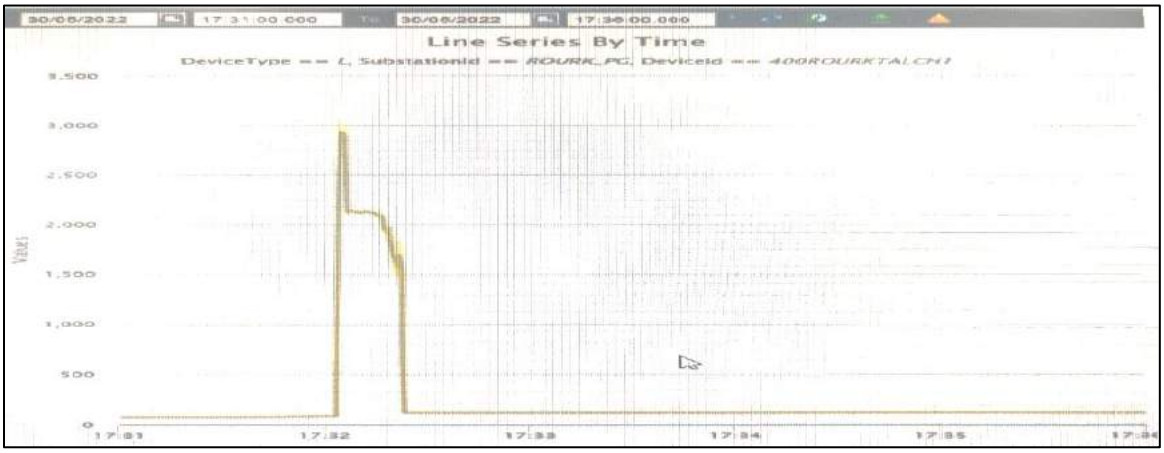


Fig 4: Ckt-1 B phase Line current at Rourkella end

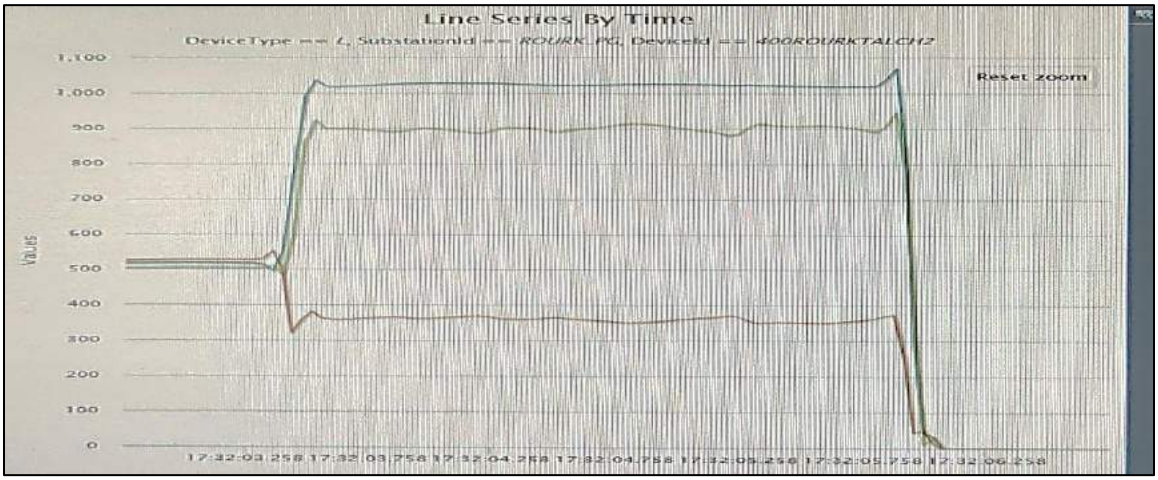


Fig 5: Ckt-2 Line current at Rourkella end

- Why no information regarding arcing fault while line reactor isolator opening of CKT-1 was shared with RLDC ? **NTPC to reply.**
- Although Rourkella S/S and RTAMC was able to see the B phase line current and B phase healthy voltage for ckt-1 from 30 May onwards **no information shared to RLDC in real time else** these co-relations of PMUs can be made and suggested accordingly to take Bus shutdown to attend stuck breaker condition, **could have avoided the blackout event . PG-ER-3 to reply?**

4. On 31st May Ckt 2 S/D was asked as they were seeing MCB and TCB as open ,but they were getting voltage of B phase healthy voltage upto Y-B= 210kv & R-B=190KV and

current of 120 Amps in B phase so to rule out any cross connection with ckt -2 jumper connection etc at 10:45 Hrs ckt -2 was made off .

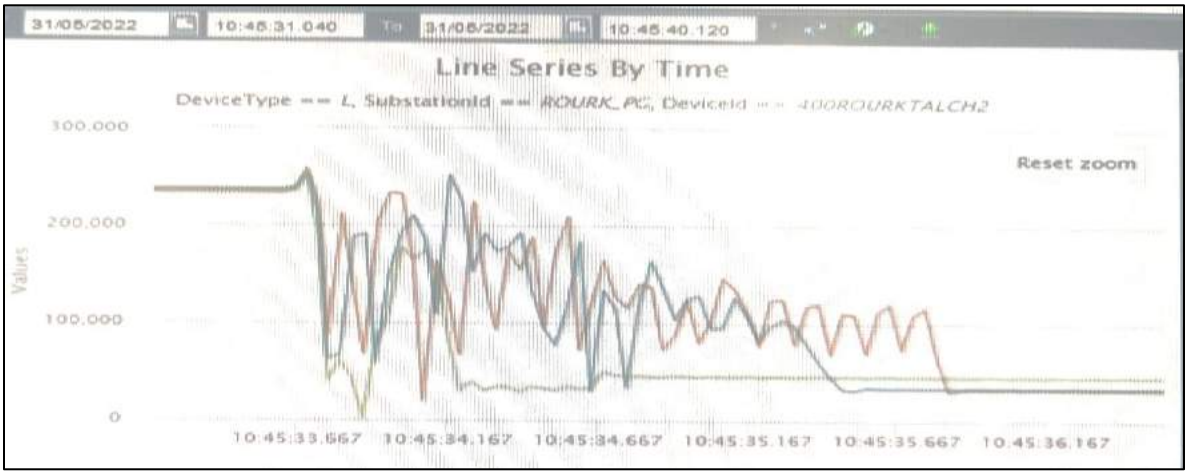


Fig 6: Ckt-2 Line volateg at Rourkella end

Fig 7: Ckt-2 Line current at Rourkella end

5. Still after opening of ckt-2 , B phase voltage was persisting in ckt -1, so at Rourkela they tried to open the isolator, so it was almost online opening where at one end reactor was connected which created arcing and fault. **Even though the possibility of B phase voltage from Ckt-2 was ruled out why line isolator opening at Rourkela end done** ? **PG-ER-3 to reply?**

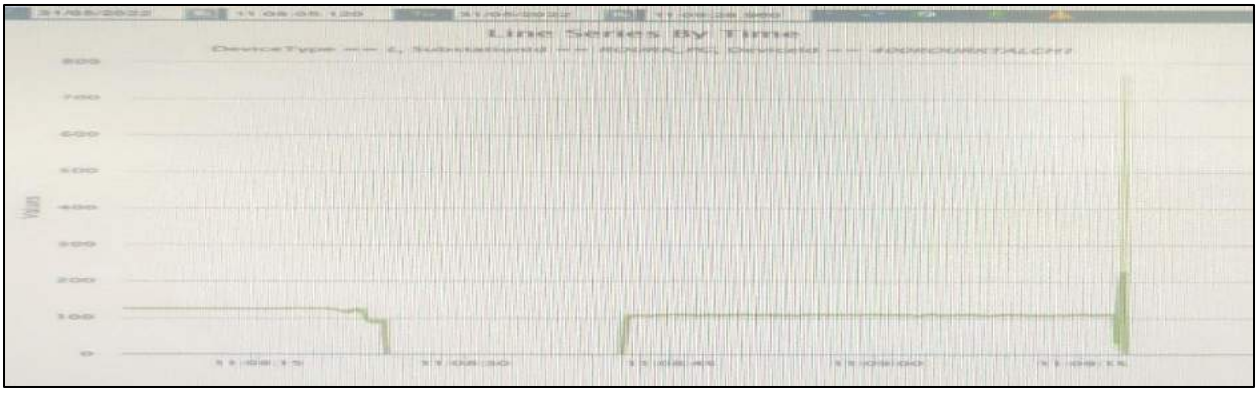
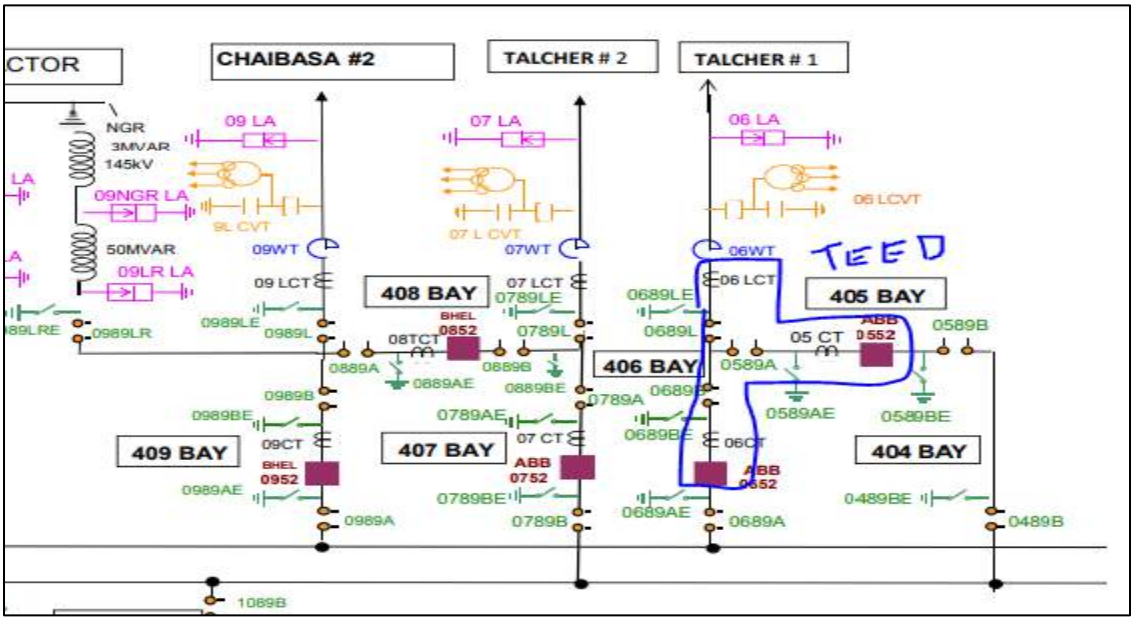


Fig 7: Ckt-1 Line current at Rourkella end

6. Now with fault, Teed protection operated but as breaker was stuck it did not open hence LBB started and gave trip command but this also not operated properly ,and did not extended trip signal to other elements due to faulty o/p contacts, so all lines tripped from remote end in zone-2 and ICT tripped on backup impedance .



As Rourkela substation is quite old and all relay healthiness, auxiliary contacts needs to be ensured for proper protection operation .Many relays are of static nature also leading to non-availability of DR files .Multiple wrong operation from the substation and non -information sharing to RLDC and between utilities led to the situation of blackout of Rourkela substation.

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-3 , NTPC TSTPP**
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)	**PG-ER-3**
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.	**PG-ER-3**

Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL not received from TSTPP.
- LBB is STATIC type so no DR available .

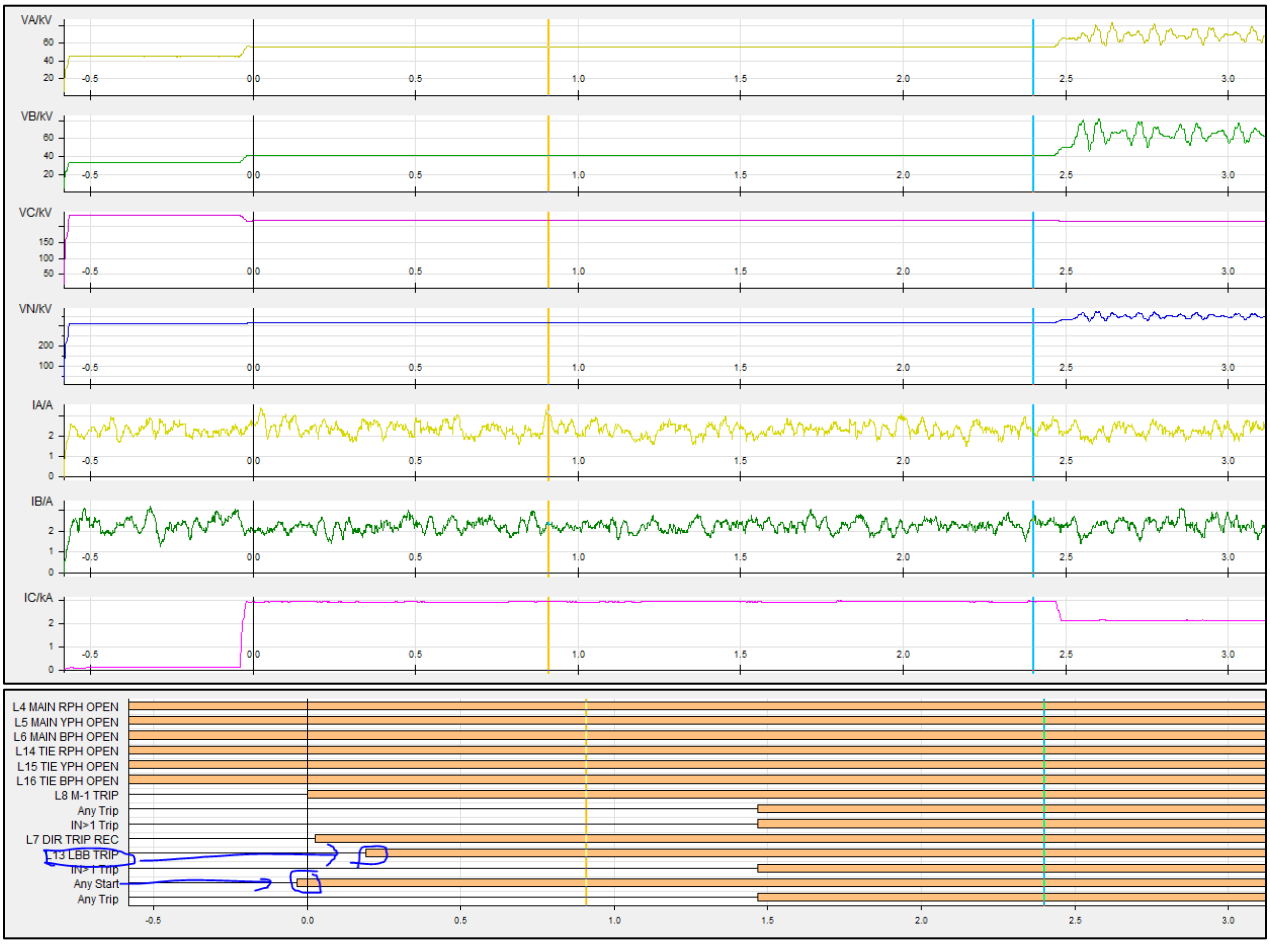
Annexure 1: Sequence of events recorded at ERLDC SCADA data at the time of the event.

Sequence of event not recorded at time of event.

Annexure 2: DR recorded

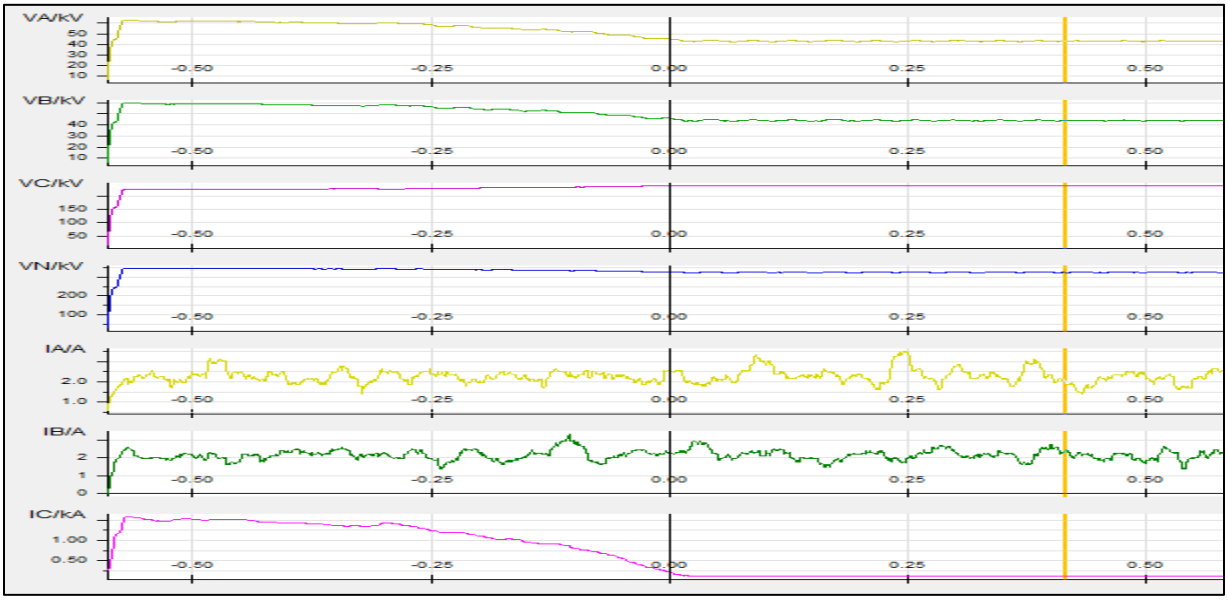
30 MAY AT 17:32 Hrs CKT-1 DR AT ROURKELLA END

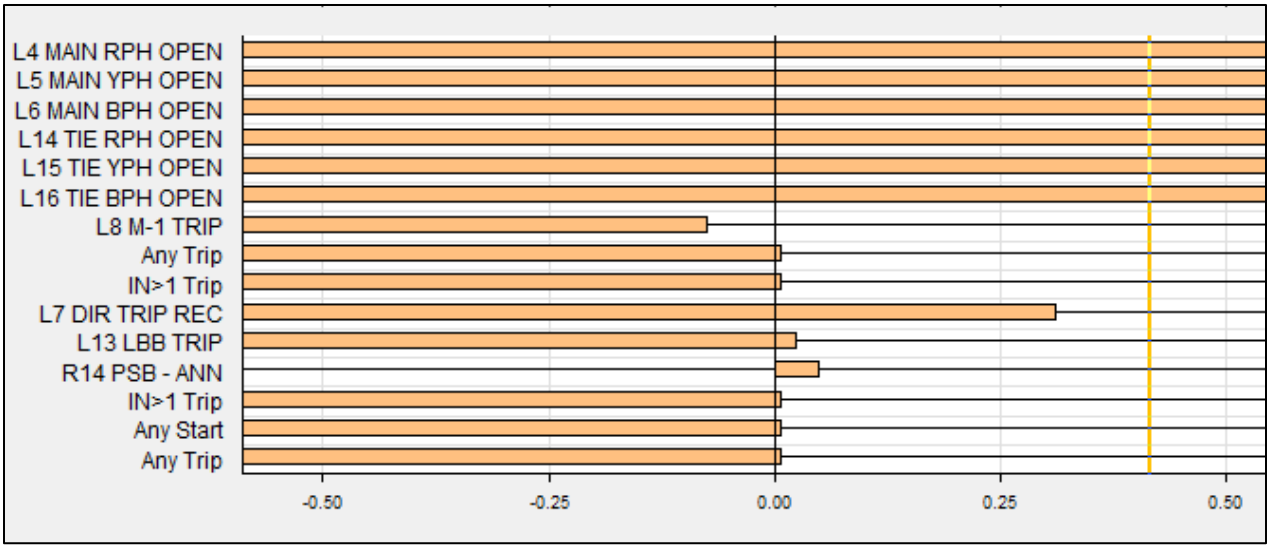
Breaker status of MCB &TCB also showing as Open



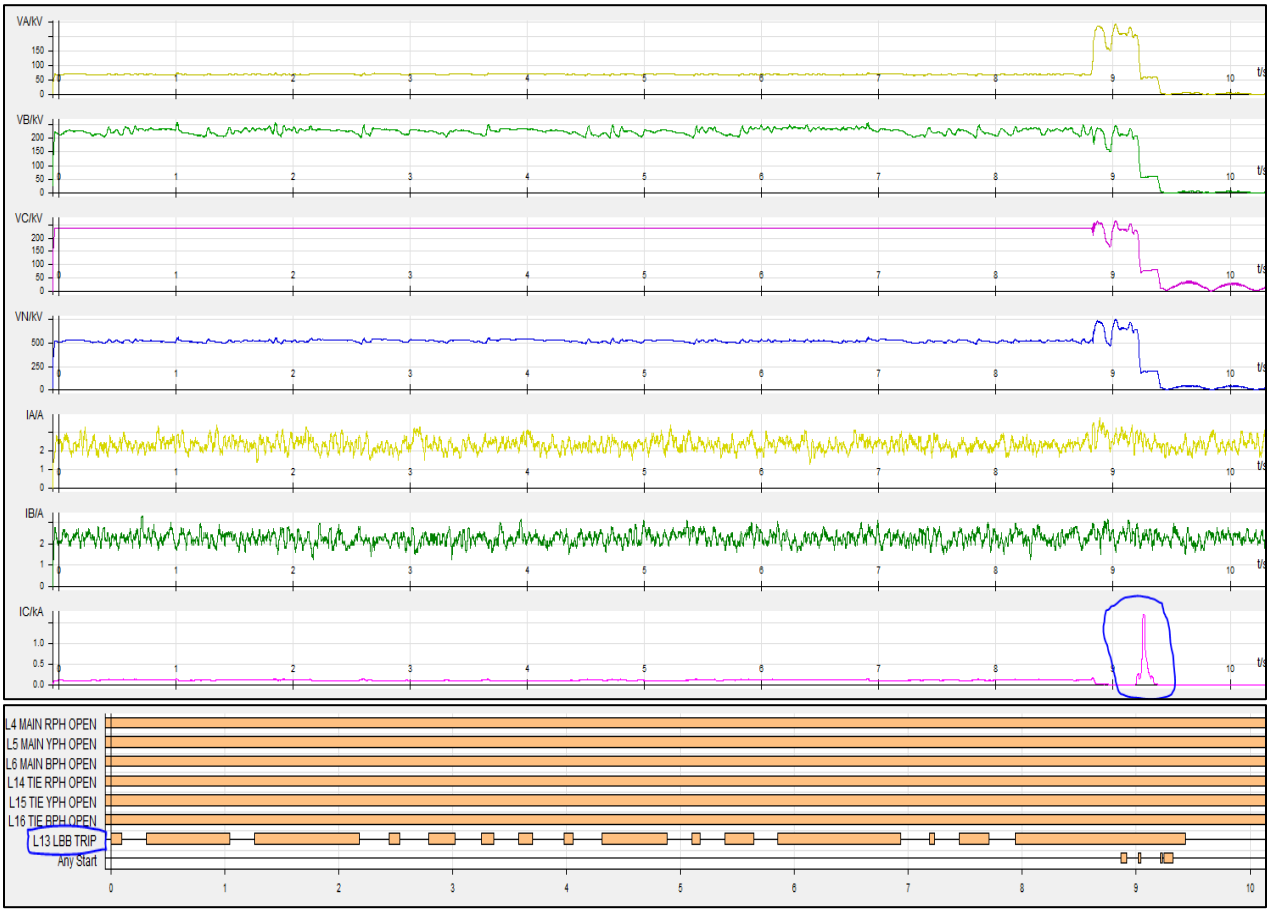
30 MAY AT 17:32 Hrs CKT-1 DR AT ROURKELLA END AFTER 20 SEC

After 20 sec B phase current gradually reduced as arc vanished when isolator of L/R got closed





31st MAY AT 11:09 Hrs CKT-1 DR AT ROURKELLA END (Line isolator opening instant at Rourkela end)



NTPC TSTPP , M PANIGRAHI

EVENT OF 400KV ROURKELA 1 DT 30.05.2022

1)On observing Bushing oil level zero in R ph bushing of 400KV Rourkela 1 line reactor on 30.05.2022 , it was decided to switch off line to take line reactor -1 out of service and to take the line into service without line reactor.

2)In view of 400KV Meramunduli 1 & 2 circuit planned shut down from 04.06.22 to 14.06.22, it was decided to change the defective reactor bushing later on once the Meramunduli line work is over.

3)For this a small duration Rourkela 1 line shut down was planned to take line reactor out of service.No maint activity was planned in this short duration shut down.

4)400KV Rourkela 1 line was switched off at 17:17 hrs after receiving ERLDC shut down code and with proper intimation to PGCIL Rourkela.

5)Main breaker and tie breaker was hand tripped at NTPC Talcher end and the breakers at Rourkela end tripped on inter trip of DT receipt. Breaker OFF from Rourkela end was confirmed over telephone.

6)NTPC end breaker OFF status of each pole was confirmed by operator from site for both Main and tie breaker.

7)Line shunt reactor isolator 689R was opened from remote at 17:31 hrs from the control room for motorized opening of the isolator.

8)Reactor isolator got opened with slight more persisting of arcing in isolator male female arm in B ph.

With complete opening of isolator arcing got quenched.

9)R ph of this isolator did not open full where as Y and B ph got opened fully.

400KV Rourkela 1 PROTECTION operated in circuit off condition

G1_ECAT.BAY6_400KV_ROURKELA_1_TEED_I_II_PROTN_TRIP
H1_ECAT.BAY6_400KV_ROURKELA_1_DIRECT_TRIP_CH_I_II_RECIVED
G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_II_PROTN_TRIP
G1_ECAT.BAY6_400KV_ROURKELA_1_O_V_STAGE_I_II_TRIP

10)During this isolator opening ,400KV Rourkela 2 got tripped.

Protection operated for Rourkela 2

I1_ECAT.BAY7_400KV_ROURKELA_2_MAIN_1_PROTN_TRIP(P444)
I1_ECAT.BAY7_400KV_ROURKELA_2_O_V_STAGE_I_II_TRIP
ROURKELA_2_DIRECT_TRIP_CH_I_II_RECIVED

After few minutes this Rourkela 2 was again charged for line restoration.

11)As the R ph isolator of 400KV Rkl-1 did not open full, it was to be rectified at NTPC end.

12)As there was slight more persisting of arcing in isolator male female arm in B ph of reactor isolator, it was related to presence of line voltage.

13)On further checking line voltage in the voltmeter RY was showing zero voltage and YB and BR was showing voltage.At the instance of line switch OFF, line voltmeter was in RY selected position showing zero voltage.

14) Voltage in other cores of line CVT was checked and presence of voltage in B ph was ascertained. Also line LA counter was showing deflection in B ph.Voltage in phase was showing 227KV that was full line voltage.

15)NTPC end breakers were checked again for opening from local from Mechanical indicator of each phase.This was intimated to PGCIL Rourkela end at 19:00 hrs that there is presence of line voltage in Bph and NTPC end breakers are open. Photos were shared vide whatsapp.

At around 19:30 hrs PGCIL Rourkela also shared that at their end also voltage was showing in B phase and later on intimated over phone that there was no abnormality found at their end.

16) Later on RTAMC ,Bhubaneswar ,PGCIL had discussed the issue of presence of voltage with NTPC-TSTPS at around 21:00 hrs.

17)As breakers were showing open in both ends, NTPC shared to PGCIL one incident of 2017 where one phase voltage was coming in Rourkela 1 with Rourkela 1 in OFF condition and Rourkela 2 in charged condition.

In that event when Rourkela 2 was made off and the line voltage in one phase in Rourkela 1 had disappeared.In that incident later on PGCIL had found some problem in one of the tower with insulator decapping with conductors of Rourkela 1 & 2 coming in proximity.

18)No further activity was carried on 30.05.2022.

ON DT 31.05.2022

19)On 31.05.2022 , at 09:30 am ERLDC was requested to issue shut down code for Rourkela 2 to eliminate the cause of voltage coming from Rourkela 2 circuit to Rourkela 1 circuit.(with a detailed mail mentioning presence of B phase line voltage in 400KV Rourkela 1 circuit.)

20)After getting switch off code from ERLDC and discussion with Rourkela end , Rourkela 2 circuit was switched off at 10:45 hrs . But after this also Rourkela 1 circuit B phase was showing voltage. So it was confirmed that problem lies in Rourkela 1 circuit.

21)Later on line isolator was opened from Rourkela end for 400KV Rourkela-1 circuit . The line voltage showing in B phase became zero at NTPC TSTPS end confirming the problem at Rourkela end.

SUMMARY:

1) At the instance of line switch OFF, Analog line voltmeter was in RY selected position showing zero voltage. There was another digital multifunction meter. It was self powered from line voltage. It became dead after line was switched off. This led to interpretation of zero line voltages.
2) Digital multifunction meter auxiliary supply was from line VT supply of R,Y phase. As there was no supply in RY, this meter's supply went out making the digital display out.
3) There was no damage to isolator because of full opening in B phase where voltage was present.
4) No local operator were involved as the isolator was opened from remote motorized operation.

ACTIONABLE POINTS TO BE FOLLOWED:

5) Digital multifunction meters are to be with DC auxiliary supply so that it works properly in any eventuality.
6) In presence of voltage line side isolators are to be never operated.Always check RY,YB,BR supply.
7) Always do remote operation of isolator.
8) Always use high energy arc flash suit for local operators as PPE .
9) SOP regarding isolation normalization to be followed strictly in letter and spirit.

SOE

[2022-05-30 05:12:18.976 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_CB_652_TRIP_CKT_1_2_FAULTY	Operated		
[2022-05-30 05:12:18.977 PM]	H1_ECAT.BAY6_400KV_ROURKELA_1_652_RYB_PH_CLOSE	No		
[2022-05-30 05:12:19.073 PM]	H1_ECAT.BAY6_400KV_ROURKELA_1_CB_652_COMPRESSOR_START_AC_SUPPLY_FAIL	Yes		
[2022-05-30 05:12:19.556 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_CB_652_TRIP_CKT_1_2_FAULTY	Reset		
[2022-05-30 05:12:29.798 PM]	F1_ECAT.BAY5_400KV_TIE_552_RYB_PH_CLOSE	No		
[2022-05-30 05:12:29.810 PM]	F1_ECAT.BAY5_400KV_TIE_CB_552_TRIP_CKT_1_2_FAULTY	Yes		
[2022-05-30 05:12:29.963 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_O_V_STAGE_I_II_TRIP	Operated		
[2022-05-30 05:12:29.981 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_O_V_STAGE_I_II_TRIP	Reset		
[2022-05-30 05:12:29.987 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_CB_652_TRIP_CKT_1_2_FAULTY	Operated		
[2022-05-30 05:12:30.173 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_I_II_CVT_FUSE_FAIL	Chatter of log item removed		

[2022-05-30 05:19:45.081 PM]	H1_ECAT.BAY6_400KV_ROURKELA_1_CB_652_COMPRESSOR_START_AC_SUPPLY_FAIL	No			
[2022-05-30 05:22:05.301 PM]	E3_ECAT.BAY7_220KV_RENGALI_1_BKR_COMPRESSOR_START_ALARM	Yes			
[2022-05-30 05:26:27.119 PM]	E3_ECAT.BAY7_220KV_RENGALI_1_BKR_COMPRESSOR_START_ALARM	No			
[2022-05-30 05:27:26.056 PM]	D3_ECAT.BAY5_220KV_AT1_CB_552_COMPRESSOR_START_AC_SUPPLY_FAIL	Yes			
[2022-05-30 05:31:48.162 PM]	I1_ECAT.BAY6_400KV_RK_1_LINE_REACTOR_689R_CLOSE	No			
[2022-05-30 05:31:48.484 PM]	I1_ECAT.BAY6_400KV_RK_1_LINE_REACTOR_689R_CLOSE	Chatter of log item removed			
[2022-05-30 05:31:50.642 PM]	D3_ECAT.BAY5_220KV_AT1_CB_552_COMPRESSOR_START_AC_SUPPLY_FAIL	No			
[2022-05-30 05:32:03.471 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_TEED_I_II_PROTN_TRIP	Operated			
[2022-05-30 05:32:03.499 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_CARRIER_CH_I_III_RECIVED	Yes			
[2022-05-30 05:32:03.574 PM]	I1_ECAT.BAY7_400KV_ROURKELA_2_MAIN_1_START_RYB_PH	Chatter of log item removed			
[2022-05-30 05:32:03.697 PM]	H1_ECAT.BAY6_400KV_ROURKELA_1_DIRECT_TRIP_CH_I_II_RECIVED	Operated			
[2022-05-30 05:32:03.	G1_ECAT.BAY6_400KV_ROURKELA_1_CARRIER_CH_I_III_RECIVED	No			

711 PM]					
[2022-05-30 05:32:05.492 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_II_PROTN_TRIP	Operated			
[2022-05-30 05:32:05.503 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_O_V_STAGE_I_II_TRIP	Operated			
[2022-05-30 05:32:05.504 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_II_START_RYB_PH_E_F	Yes			
[2022-05-30 05:32:05.930 PM]	I1_ECAT.BAY7_400KV_ROURKELA_2_MAIN_1_PROTN_TRIP	Operated			
[2022-05-30 05:32:05.945 PM]	I1_ECAT.BAY7_400KV_ROURKELA_2_O_V_STAGE_I_II_TRIP	Operated			
[2022-05-30 05:32:05.952 PM]	J1_ECAT.BAY7_400KV_ROURKELA_2_752_RYB_PH_CLOSE	No			
[2022-05-30 05:32:05.955 PM]	B2_ECAT.BAY8_400KV_RGL1_RKL2_TIE_852_RYB_PH_CLOSE	No			
[2022-05-30 05:32:05.958 PM]	I1_ECAT.BAY7_400KV_ROURKELA_2_CB_752_TRIP_CKT_1_2_FAULTY	Yes			
[2022-05-30 05:32:05.960 PM]	B2_ECAT.BAY8_400KV_RGL1_RKL2_TIE_CB_852_TRIP_CKT_1_2_FAULTY	Yes			
[2022-05-30 05:32:05.977 PM]	I1_ECAT.BAY7_400KV_ROURKELA_2_MAIN_1_PROTN_TRIP	Reset			
[2022-05-30 05:32:05.993 PM]	I1_ECAT.BAY7_400KV_ROURKELA_2_O_V_STAGE_I_II_TRIP	Reset			
[2022-05-30	G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_I_II_POWER_SWING_BLOCK	Yes			

05:32:06. 065 PM]					
[2022-05- 30 05:32:06. 092 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_I_II_POWER_SWING_BLOCK	No			
[2022-05- 30 05:32:06. 109 PM]	B2_ECAT.BAY8_400KV_RGL1_RKL2_TIE_CB_852_COMPRESSOR_START_AC_SUPPLY_FAIL	Yes			
[2022-05- 30 05:32:06. 201 PM]	J1_ECAT.BAY7_400KV_ROURKELA_2_CB_752_COMPRESSOR_START_AC_SUPPLY_FAIL	Yes			
[2022-05- 30 05:32:06. 248 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_I_II_POWER_SWING_BLOCK	Yes			
[2022-05- 30 05:32:06. 275 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_I_II_POWER_SWING_BLOCK	No			
[2022-05- 30 05:32:06. 498 PM]	J1_ECAT.BAY7_400KV_ROURKELA_2_DIRECT_TRIP_CH_I_II_RECIVED	Yes			
[2022-05- 30 05:32:06. 620 PM]	J1_ECAT.BAY7_400KV_ROURKELA_2_DIRECT_TRIP_CH_I_II_RECIVED	No			
[2022-05- 30 05:32:06. 867 PM]	J1_ECAT.BAY7_400KV_ROURKELA_2_DIRECT_TRIP_CH_I_II_RECIVED	Yes			
[2022-05- 30 05:32:06. 989 PM]	J1_ECAT.BAY7_400KV_ROURKELA_2_DIRECT_TRIP_CH_I_II_RECIVED	No			
[2022-05- 30 05:32:07. 545 PM]	J1_ECAT.BAY7_400KV_ROURKELA_2_DIRECT_TRIP_CH_I_II_RECIVED	Yes			
[2022-05- 30 05:32:07. 598 PM]	J1_ECAT.BAY7_400KV_ROURKELA_2_DIRECT_TRIP_CH_I_II_RECIVED	No			
[2022-05-	G1_ECAT.BAY6_400KV_ROURKELA_1_CARRIER_CH_II_FAIL_OUT_OF_	Yes			

30 05:32:16. 077 PM]	SERVICE				
[2022-05-30 05:32:22. 819 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_II_PROTN_TRIP	Reset			
[2022-05-30 05:32:22. 820 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_MAIN_II_START_RYB_PH_E_F	No			
[2022-05-30 05:32:22. 839 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_O_V_STAGE_I_II_TRIP	Reset			
[2022-05-30 05:32:22. 929 PM]	H1_ECAT.BAY6_400KV_ROURKELA_1_DIRECT_TRIP_CH_I_II_RECIVED	Reset			
[2022-05-30 05:32:22. 967 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_TEED_I_II_PROTN_TRIP	Reset			
[2022-05-30 05:32:24. 954 PM]	G1_ECAT.BAY6_400KV_ROURKELA_1_CARRIER_CH_II_FAIL_OUT_OF_ SERVICE	No			

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: **14-05-2022/1** दिनांक: **28-04-2022**

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

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

At 16:04 Hrs, 400 kV New Ranchi-Patratu D/c tripped due to B_N fault. This led to total power failure at 400/220 kV Patratu S/s. Load loss of around 60 MW occurred in Kanke and Burmu area which were radially fed from Patratu.

- **Date / Time of disturbance:** 14-05-2022 at 16:04 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 400/220 kV Patratu S/s
- **Load and Generation loss**.
  - No generation loss occurred during the event.
  - 60 MW load loss reported during the event by SLDC Jharkhand

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

- NIL

3. Major elements tripped (प्रमुख ट्रिपिंग)

- 400 kV New Ranchi-Patratu D/c

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

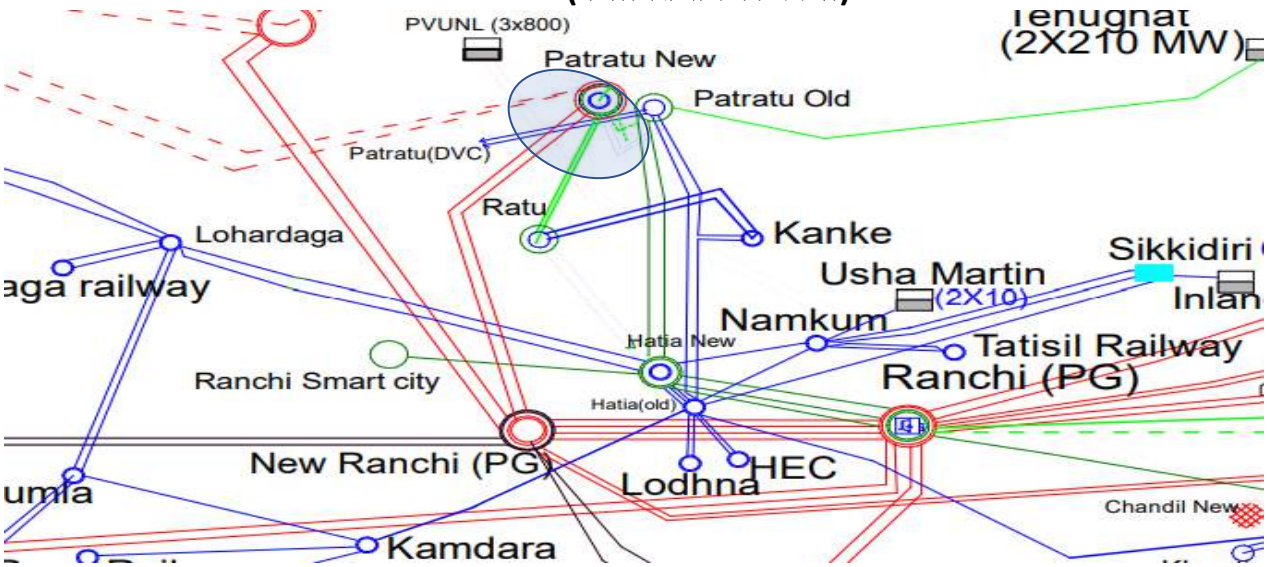
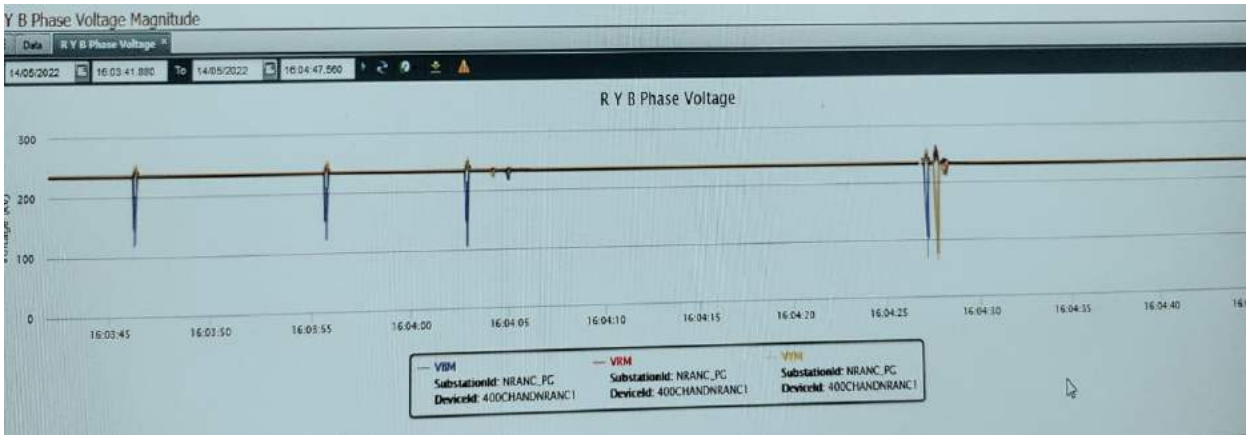


Figure 1: Network across the affected area

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
16:04	400 kV New Ranchi-Patratu-1	New Ranchi: B_N, 2.28 km, 24.5 kA	-	145 kV dip in B_ph voltage at New Ranchi. After 450 msec, around 150 kV dip in Y_ph observed at New Ranchi
	400 kV New Ranchi-Patratu-2	New Ranchi: B_N, 2.17 km, 24.37 kA	-	



PMU Voltage snapshot of 400 kV New Ranchi S/s

5. Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
400 kV New Ranchi-Patratu-1	17:40
400 kV New Ranchi-Patratu-2	17:52

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

- From PMU, SoE data and relay indications provided, it seems a B_ph fault struck Ckt-1 first at 16:03:55 Hrs. A/r attempt seems successful, however, line tripped again in reclaim time.
- At 16:04:02 Hrs, B_ph fault struck Ckt-2. A/r attempt seems successful, however, line tripped again in reclaim time.
- Proper analysis couldn't be done due to unavailability of DR from both ends. It is requested to send the DRs at the earliest.

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	**JUSNL, PG**

8. Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL yet to be received from PG ER-1 and JUSNL.

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

TIME	STATION	DESCRIPTION	STATUS
16:03:55.697	NRANC_PG	400_PATRA_JH_2_Main_CB	Open
16:04:02.862	NRANC_PG	400_PATRA_JH_1_Main_CB	Open

Annexure 2: DR recorded

DR not received yet.

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घटना संख्या: **05-05-2022/1** दिनांक: **21-05-2022**

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

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

At 01:33 Hrs R & Y Phase jumper (Bus side) of 220 kV Ramchandrapur – Joda got snapped and created bus fault. Eventually, all the elements of Bus- I and Bus coupler got tripped which further lead to total power failure at 220 kV Ramchandrapur GSS. Total load loss was around 80 MW at Adityapur, Jadugoda and Golmuri area.

Date / Time of disturbance: 21-05-2022 at 01:33 hrs.

- **Event type:** GD- 1

Systems/ Subsystems affected: Adityapur, Jadugoda and Golmuri
Load and Generation loss.

- 80 Mw load loss of Adityapur, Jadugoda and Golmuri.

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

- Nil.

3. Major elements tripped (प्रमुख ट्रिपिंग)

Transmission/Generation element name संचरण लाइन / विधुत उत्पादन इकाईं का नाम	Trip Date बंद होने की तिथि	Trip Time बंद होने का समय	Restoration Date वापस आने की तिथि	Restoration time वापस आने का समय
220KV-RCP-JAMSHEDPUR-D/C	21/05/2022	01:33	21/05/2022	03:43,03:46
220KV-JODA-RCP-1	21/05/2022	01:33	21/05/2022	04:32
220KV- RCP - CHANDIL	21/05/2022	01:33	21/05/2022	03:48
220KV- RCP- CHAIBASA-I	21/05/2022	01:33	21/05/2022	02:33
220KV- RCP- CHAIBASA-II	21/05/2022	01:33	21/05/2022	02:32

4. 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):

12 kv dip in Y&R Phase with fault clearance of 600 ms.

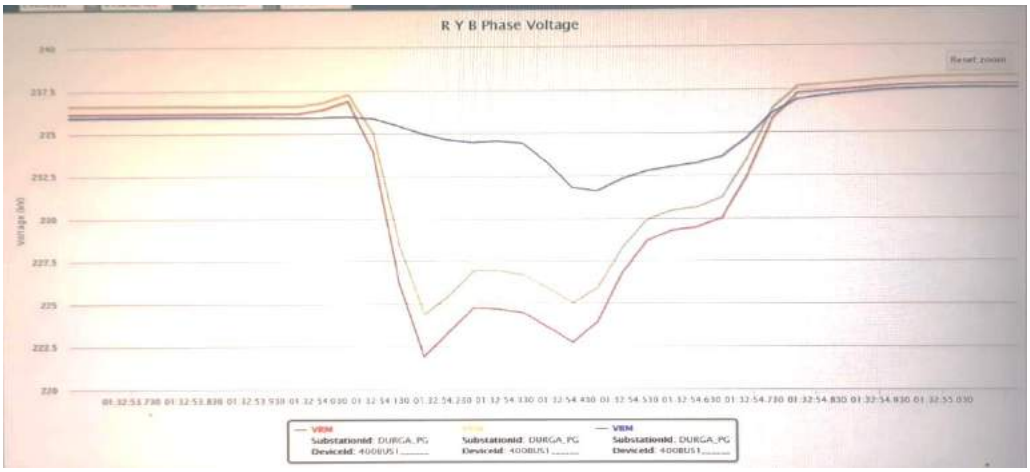
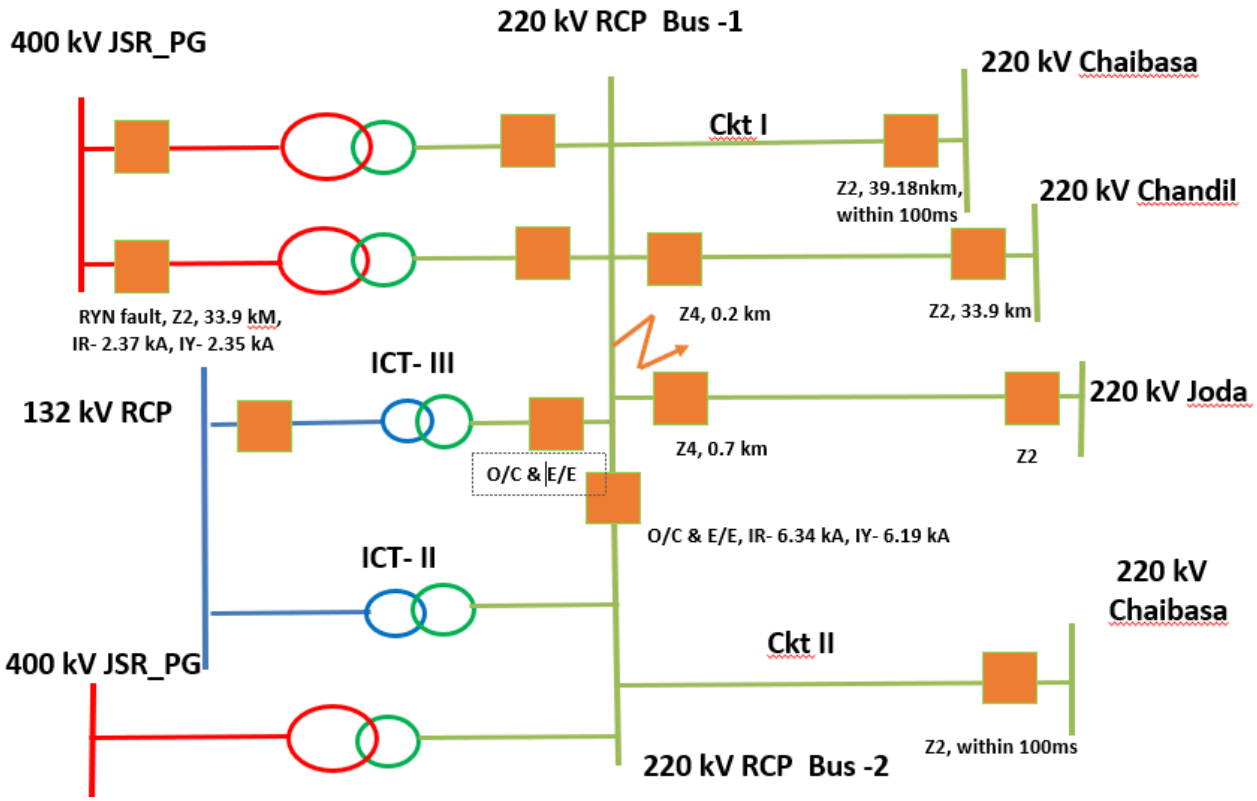


Figure 2: PMU voltage snapshot of 400/220 kV Durgapur S/s

5. Relay Indication

Element Name	Relay indication at End 1	Relay indication at End 2	Remarks
220 kV Bus Coupler	RYN fault, O/C & E/F, IR- 6.34 kA, IY- 6.19 kA, IB – 0.21 kA (within 100 ms)		
220 kV RCP – Chaibasa ckt- 01	Did not tripped.	RYN fault, Z2 (within 100 ms), 39.18 kM, IR- 2.37 kA, IY- 2.37 kA	
220 kV RCP – Chaibasa ckt- 02	Did not tripped.	RYN fault, Z2 SOTF/TOR (within 100 ms), IR- 1.82 kA, IY – 2.56 kA	
220 kV RCP - Chandil	RYN fault, Z4, 0.2 km, IR- 3.33 kA, IY – 3.30 kA	RYN fault, Z2, 33.9 km, IR -2.37 kA, IY- 2.35 kA	tZ4- 300 ms
220 kV RCP - Joda	RYN fault, Z4, 0.7 km, IR- 1.47 kA, IY – 1.57 kA, IB – 0.14 kA	RN fault, Z2	tZ4- 300 ms
220 KV Jamshedpur-Ramchandrapur I, II	Both ICT Tripped from HV side. ICT 1- within 300 ms. ICT- 2 Within 600ms.		
150 MVA, 220/132 kV ICT - III	Back up O/C and E/f in both HV and LV side (Electromechanical relay)		

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



- At 01:33 Hrs R & Y Phase jumper (Bus side) of 220 kV Ramchandrapur – Joda got snapped and created bus fault, prior to event Busbar was out of service due to some rectification work & timing of zone-4 was set to 300 ms for all feeders.
- All emanating lines from Ramchandrapur picked Zone-4 and all remote ends picked zone-2 and 220 Kv RCP-Joda & Chandil line tripped in zone -4 after 300 ms from RCP end.
- Bus coupler between Bus-1 & 2 tripepd within 100 ms on o/C e/F .
- While the Chaibasa line-1 which also picked zone-2 from its end tripped within 100 ms from Chaibasa ,which should not occur and from DR it appears with Zone-2 ,T1 became high which corresponds to zone-1 timing .Also from DR it appears that at Chaibasa end line voltage for ckt 1 was persisting till the Bus -1 became dead and fault got isolated as RCP end breaker was closed as z0ne-4 got reset with tripping of line from chaibasa end within 100ms.**Timer for zone-2 to be checked by JUSNL .**
- 400/220 kv ICT 1&2 tripped from HV side sensing the same fault on Back up ,O/C ,ICT-1 tripped within 300 Ms and ICT-2 within 600 ms. Reason for difference of 300 ms duration for parallel ICT to be checked ,faster fault clearance could have been achieved.
- 220/132 KV ict-III on bus 1 tripped on O/C e/f , which also seems to be operated after 600 ms as bus 2 voltage was low till that time as bus-2 was connected via 132 kv level to Bus -1.
- Also it appears that 400/220 kv ICT-3 did not tripped which was on Bus-2 and on the same bus chaibasa line-2 was also there which tripped instantaneously from chaibasa end although sensed

the fault in zone-2 ,same as the case with line -1 ,but after 600 ms healthy line voltage was observed AS RCP end breaker was closed as z0ne-4 got reset with tripping of line from chaibasa end within 100ms. So the only source to Bus- 2 which was providing healthy line voltage was 400/220 kv ICT-3. **Reason for non-tripping of 400/220 kv ICT -3 to be explained** ?

- **Whether 220/132 KV ict-II on bus 2 tripped or not? If not it must have been feeding some load** .

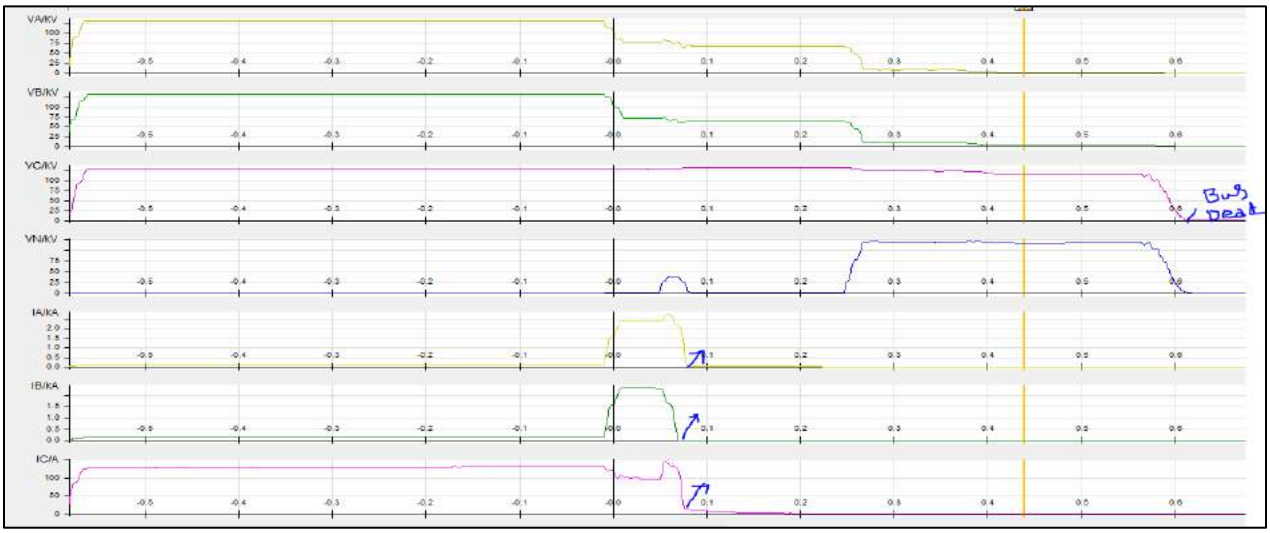
7. Non-compliance observed (विनियमन का गैर-अनुपालन):

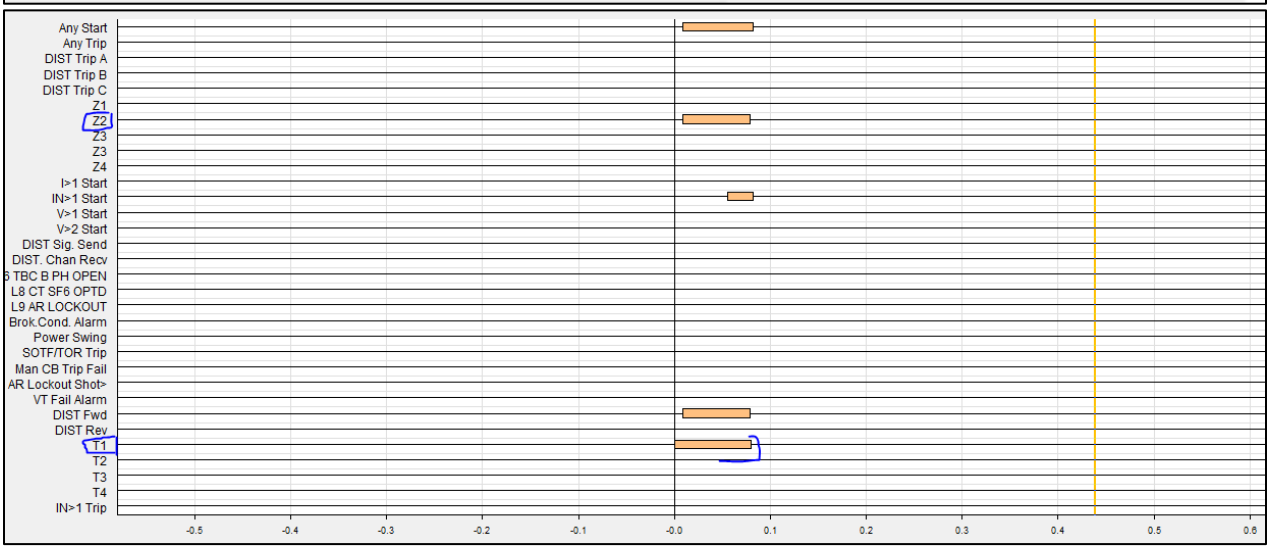
Issues	Regulation Non-Compliance	Utility
DR/EL not provided within 24 Hours	1. IEGC 5.2 (r) 2. CEA grid Standard 15.3	**JUSNL**
Incorrect/ mis-operation / unwanted operation of Protection system	1. CEA Technical Standard for Construction of Electrical Plants and Electric Lines: 43.4.A. 2. CEA (Technical standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1. (6.1, 6.2, 6.3)	**JUSNL**
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.	**JUSNL**
DR/EL are not time synchronized	1. Indian Electricity Grid Code 4.6.3 2. CEA Technical Standard for Construction of Electrical Plants and Electric Lines: 43.4.D. 3. CEA (Technical standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1.7.	**JUSNL**

8. Status of Reporting (रिपोर्टिंग की स्थिति):

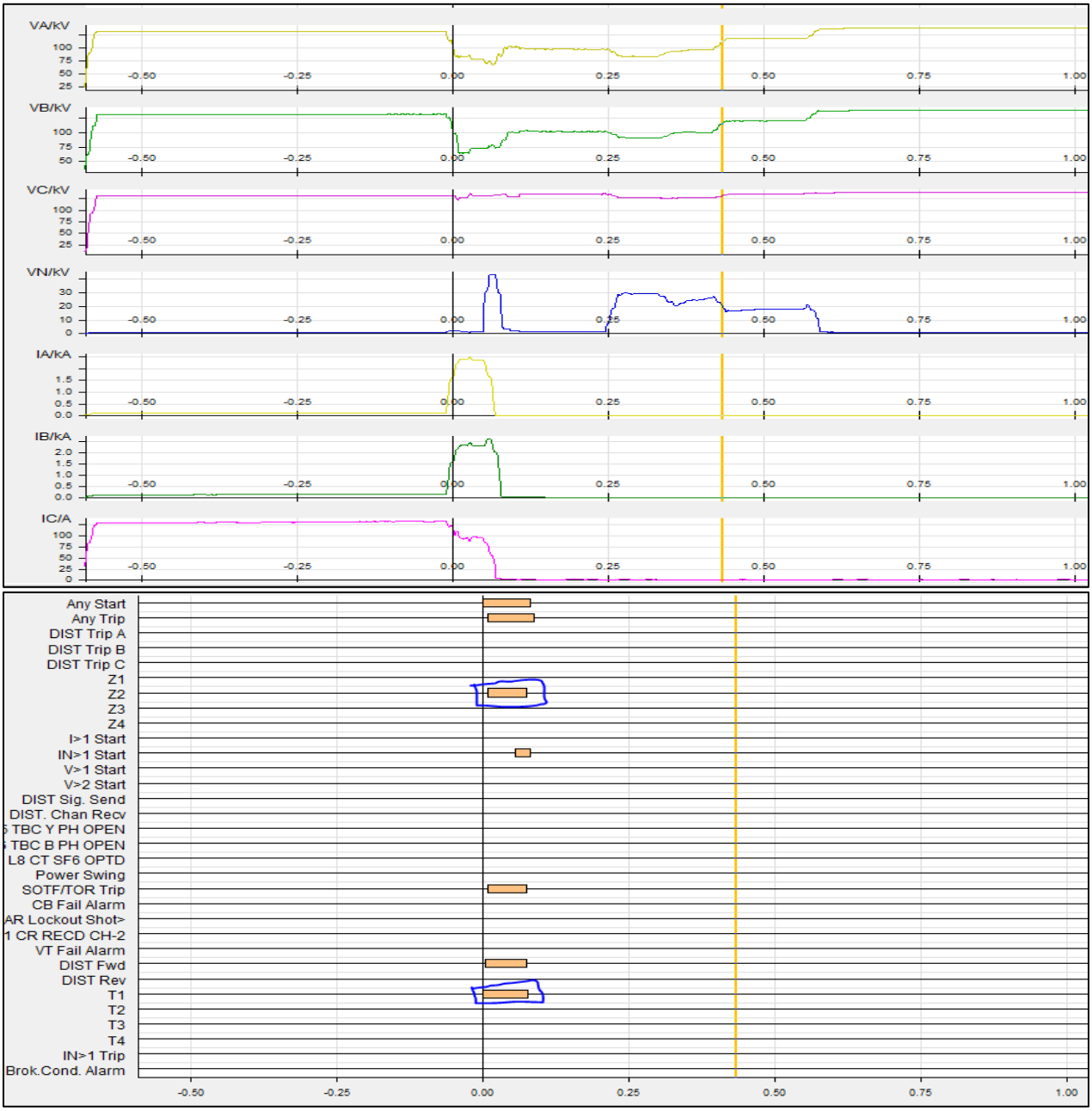
9. Annexure DR:

DR of Chaibasa end for RCP line-1

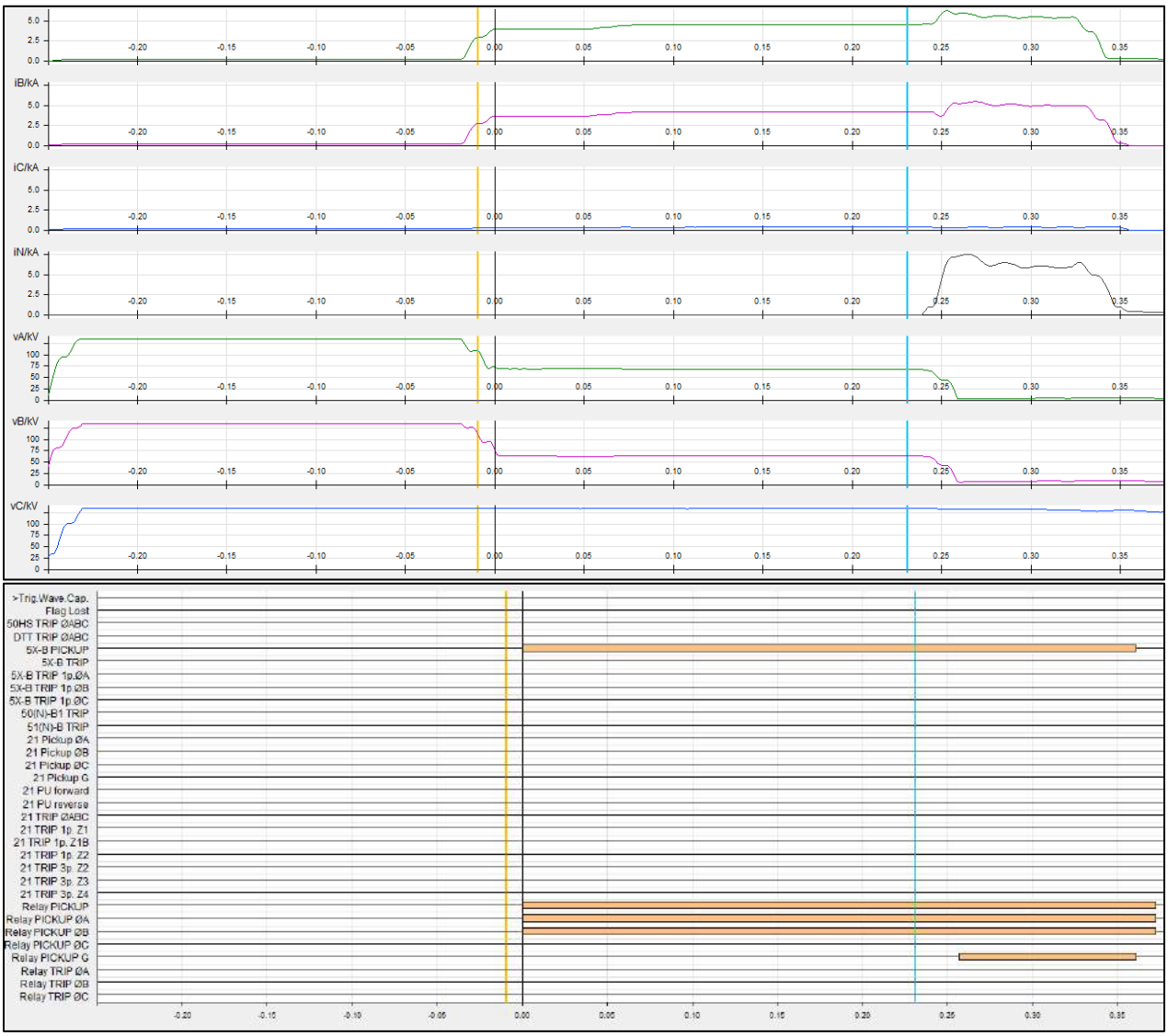




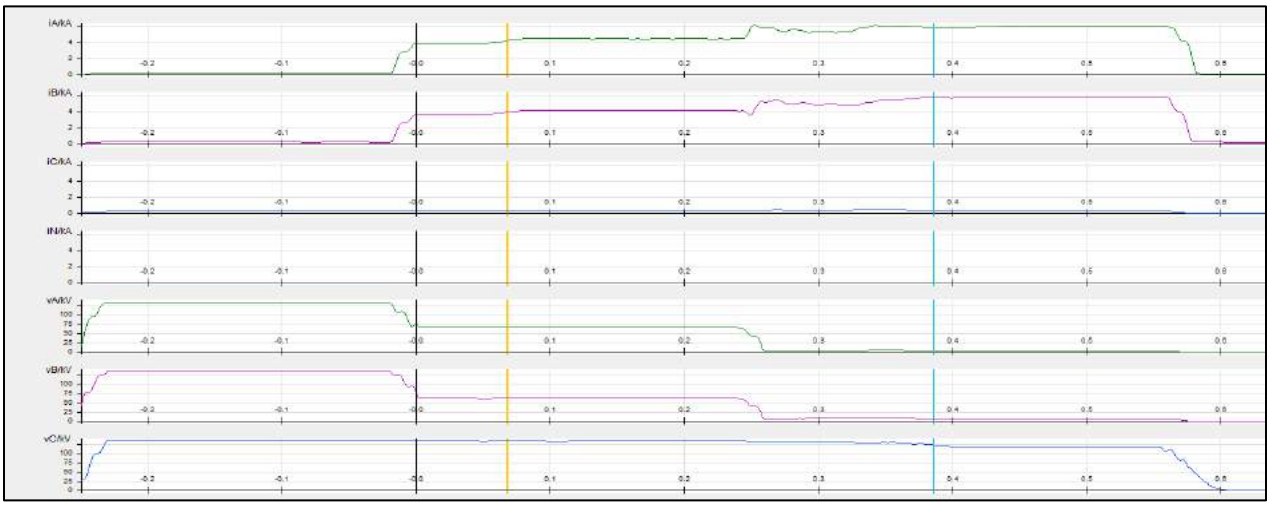
DR of Chaibasa end for RCP line-2:



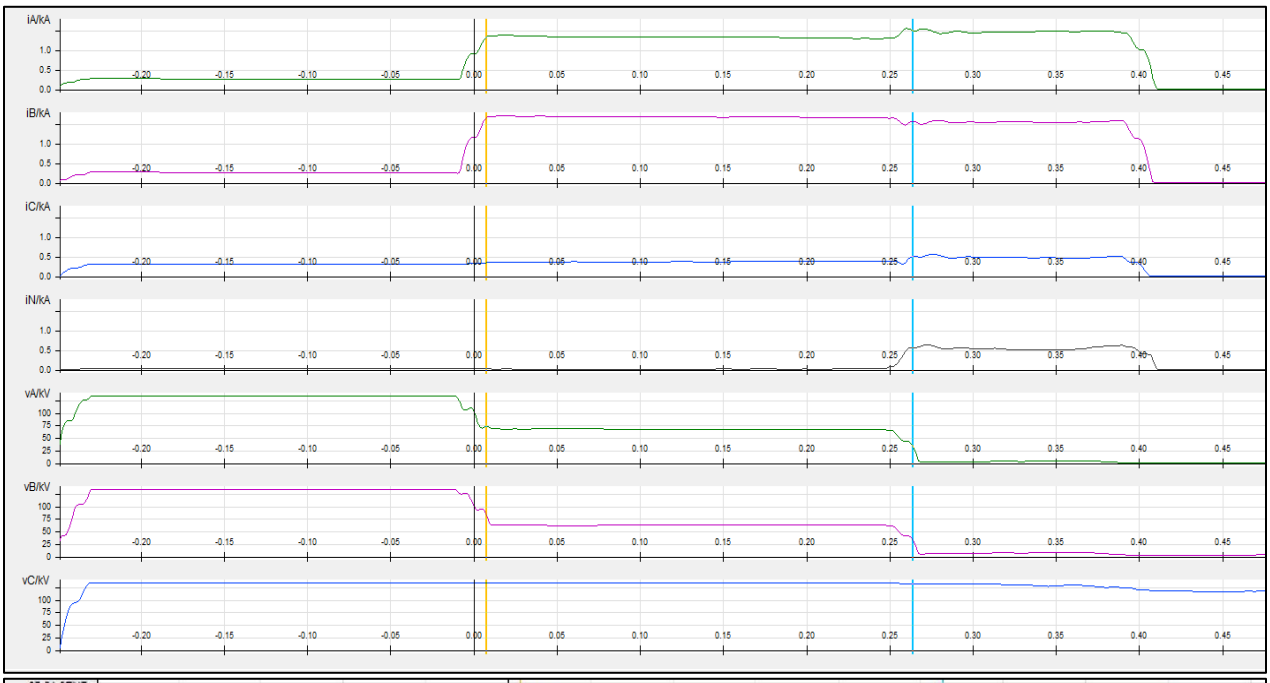
400/220 KV ICT-1 DR:

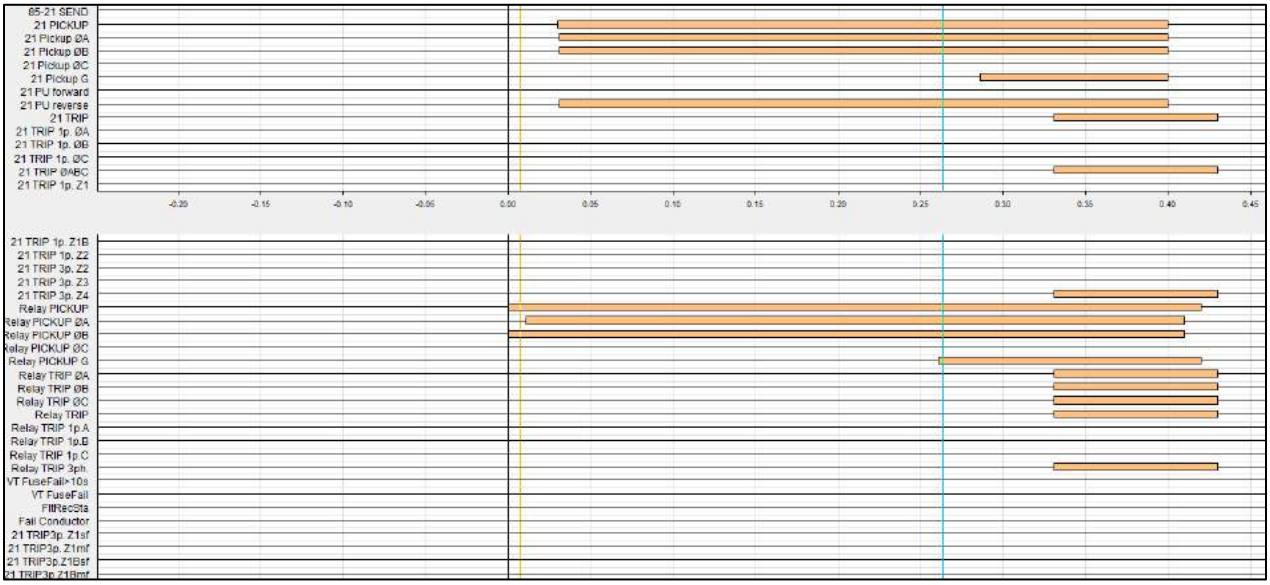


400/220 KV ICT-2 DR:



RCP-JODA AT RCP 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: **01-05-2022/2** दिनांक: **28-05-2022**

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

Summary of the event (घटना का सारांश):

At 17:40 Hrs, 220 kV Daltonganj-Chatra D/c tripped from Daltonganj end only, leading to total power failure at 220/132 kV Chatra S/s. Load loss of 13 MW reported during the event by Jharkhand SLDC.

Date / Time of disturbance: 01-05-2022 at 17:40 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 13 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)

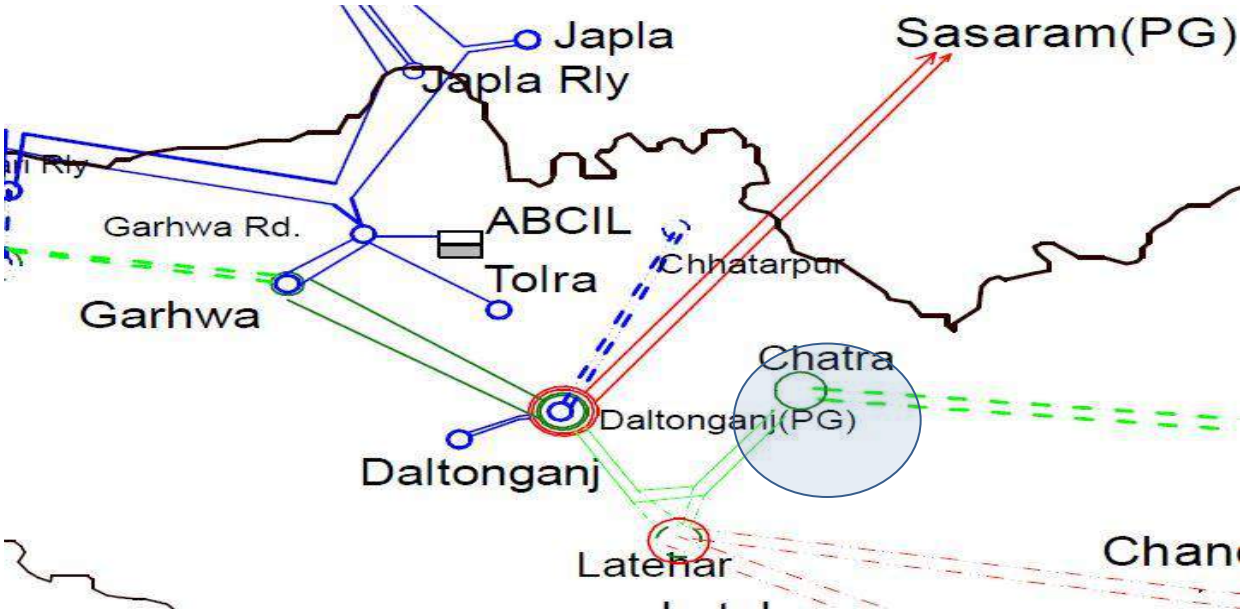


Figure 1: Network across the affected area

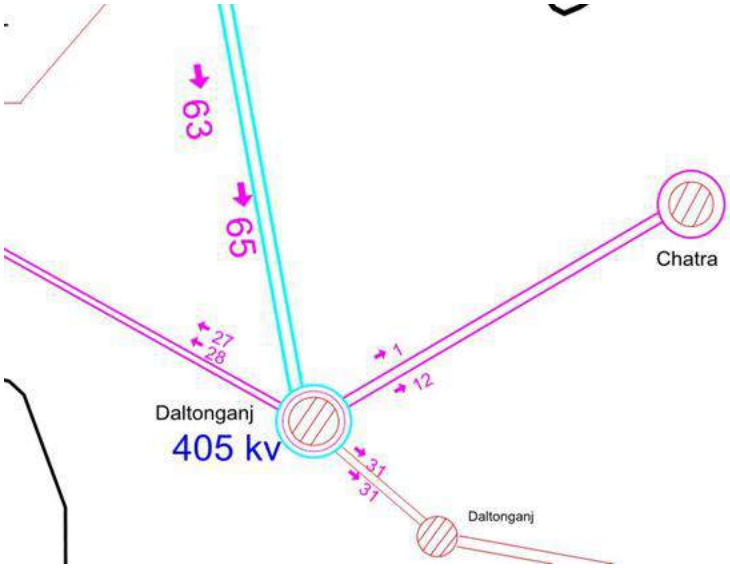


Figure 2: SCADA snapshot of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
12:44	220 kV Daltonagnj-Chatra-1	Daltonganj: B_N, 0.8 kA	Didn't trip	27 kV dip in B_ph voltage for 800 msec at Daltonganj
	220 kV Daltonagnj-Chatra-2	Daltonganj: B_N, 0.8 kA	Didn't trip	

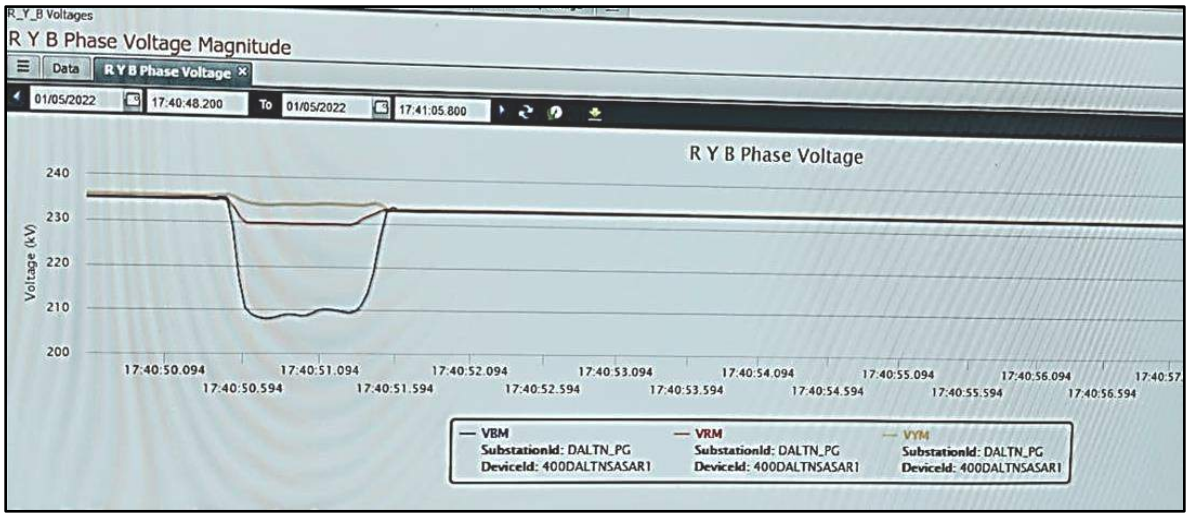


Figure 3: PMU snapshot of 400/220 kV Daltonganj S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Daltonganj-Chatra-1	20:28
220 kV Daltonganj-Chatra-2	20:29

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

- 220 kV Daltonganj-Chatra-1 tripped from Daltonganj due to fault in B_ph after 800 msec in Zone-3.
- As reported, both lines tripped from Daltonganj in Zone-3. DR of ckt-2 was not submitted.
- From above details, it seems that there was a fault in downstream of Chatra which was fainally cleared by Daltonganj in Zone-3.
- JUSNL to co-ordinate protection setting of 220/132 kV ICTs w.r.t 220 kV lines, so that 220 kV lines should not trip for downstream faults.

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-I**

Status of Reporting (रिपोर्टिंग की स्थिति):

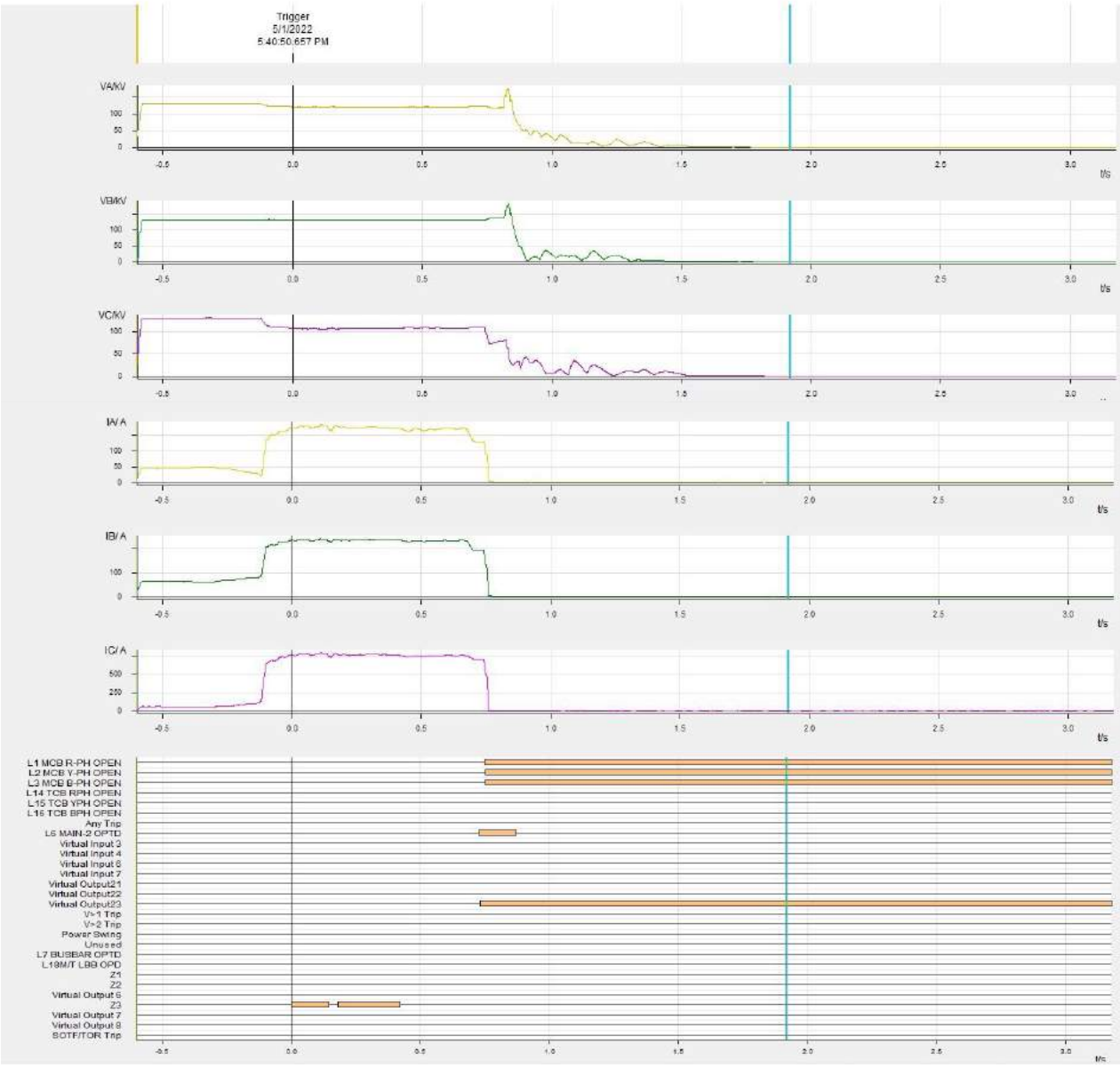
- Complete DR/EL yet to be received from PG ER-I

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

TIME	STATION	DESCRIPTION	STATUS
17:40:51.402	DALTN_PG	220_LATHEHAR_1_CB	Open
17:40:51.473	DALTN_PG	220_LATHEHAR_2_CB	Open

Annexure 2: DR recorded

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



पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
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घटना संख्या: **01-05-2022/1** दिनांक: **28-05-2022**

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

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

At 15:53 Hrs on 01st May 2022, 220 kV Daltonganj-Garhwa-1 tripped leading total supply failure at Garhwa and radially fed downstream S/s as 220 kV Daltonganj-Garwah tripped already at 15:43 Hrs. As reported by SLDC Jharkhand, 30 MW load loss occurred at Garhwa and Meral area.

- **Date / Time of disturbance:** 01-05-2022 at 15:53 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 220/132 kV Garhwa S/s
- **Load and Generation loss**.
  - No generation loss occurred during the event.
  - 30 MW load loss reported during the event by SLDC Jharkhand

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

- 220 kV Daltonganj-Garhwa-2 (Tripped at 15:43 Hrs)

3. Major elements tripped (प्रमुख ट्रिपिंग)

- 220 kV Daltonganj-Garhwa-1

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

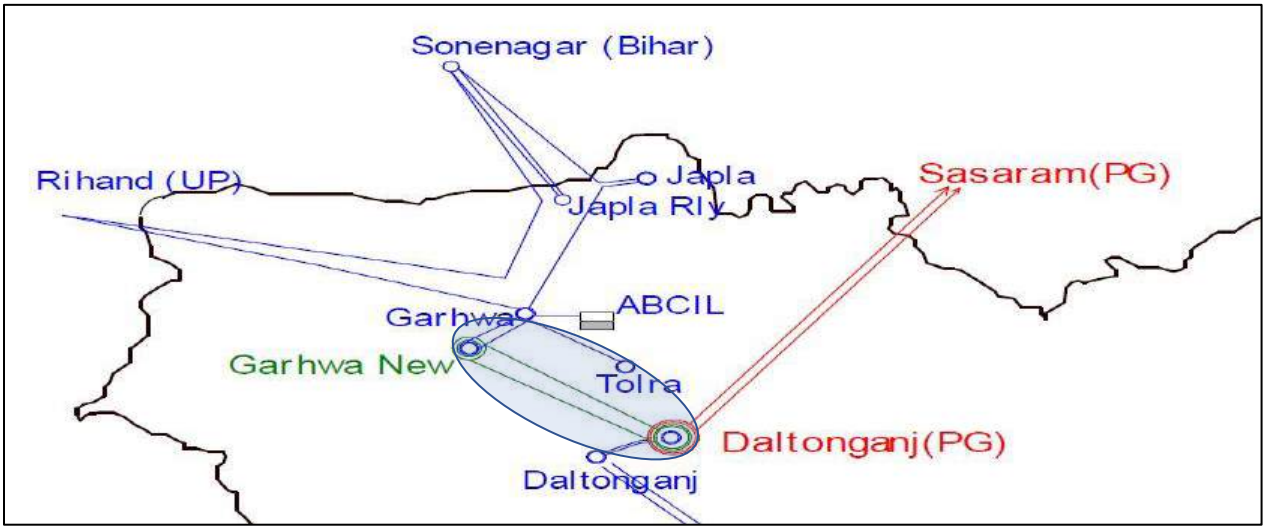


Figure 1: Network across the affected area

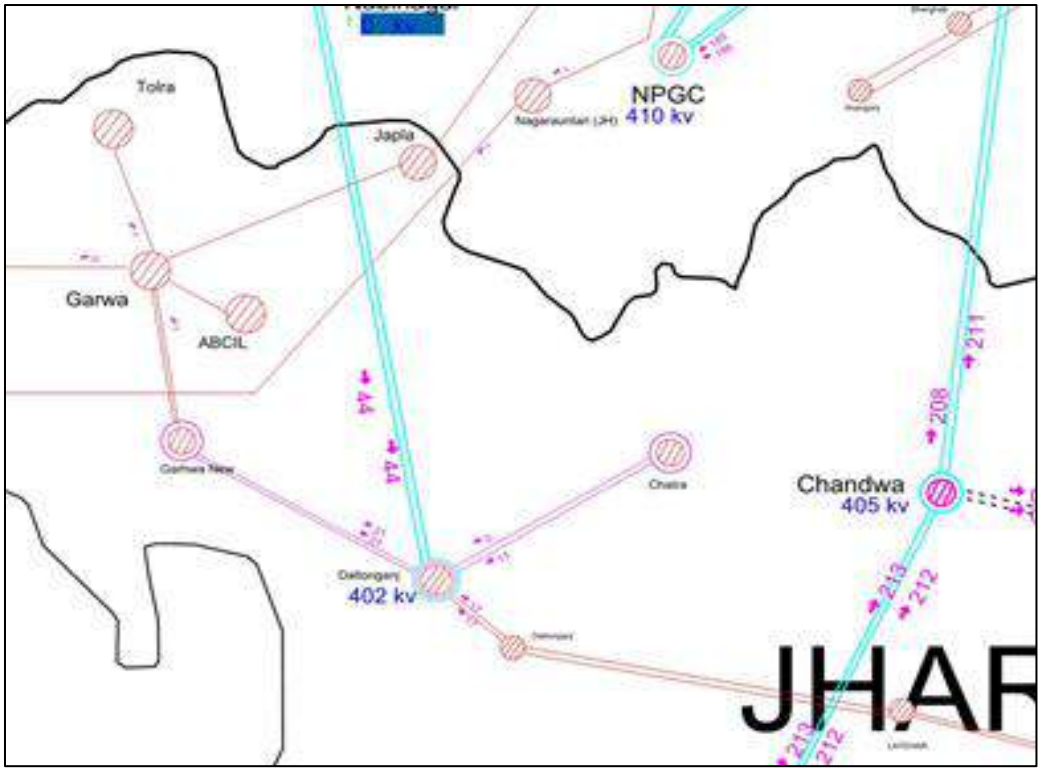
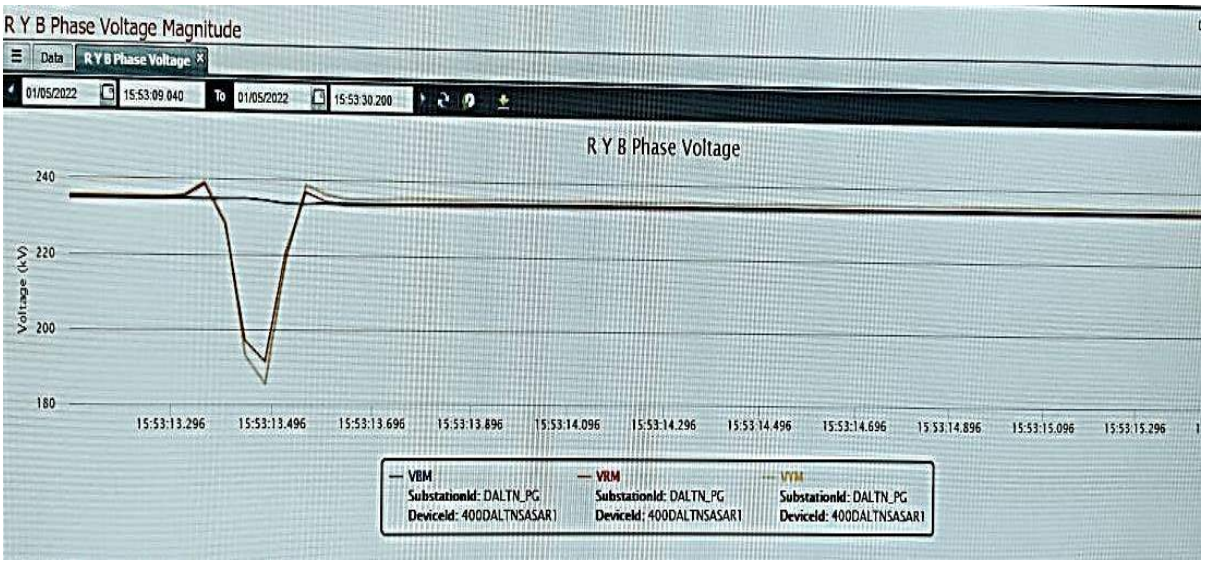


Figure 2: SCADA snapshot for of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
15:43	220 kV Daltonganj-Garhwa-2	Daltonganj: R_N, Zone-1, 3.83 kA, 18.34 km,	Garhwa: R_N, Zone-1, 3.4 kA, 65 km	40 kV dip in R_ph and 45 kV dip in Y_ph voltage at Daltonganj.
15:53	220 kV Daltonganj-Garhwa-1	Daltonganj: R_Y, 4.9 km, 3.8 kA	Garhwa: Didn't trip	



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

5. Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Daltonganj-Garhwa-1	19:06
220 kV Daltonganj-Garhwa-2	17:27

6. Analysis of the event (घटना का विश्लेषण):

- At 15:43 Hrs, 220 kV Daltonganj-Garhwa-2 tripped due to R_N fault. A/r attempt taken from both ends failed after 1 sec.
- At 15:53 Hrs, 220 kV Daltonganj-Garhwa-1 tripped due to R_Y fault and total power failed at Garhwa.

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	**JUSNL, PG**

8. Status of Reporting (रिपोर्टिंग की स्थिति):

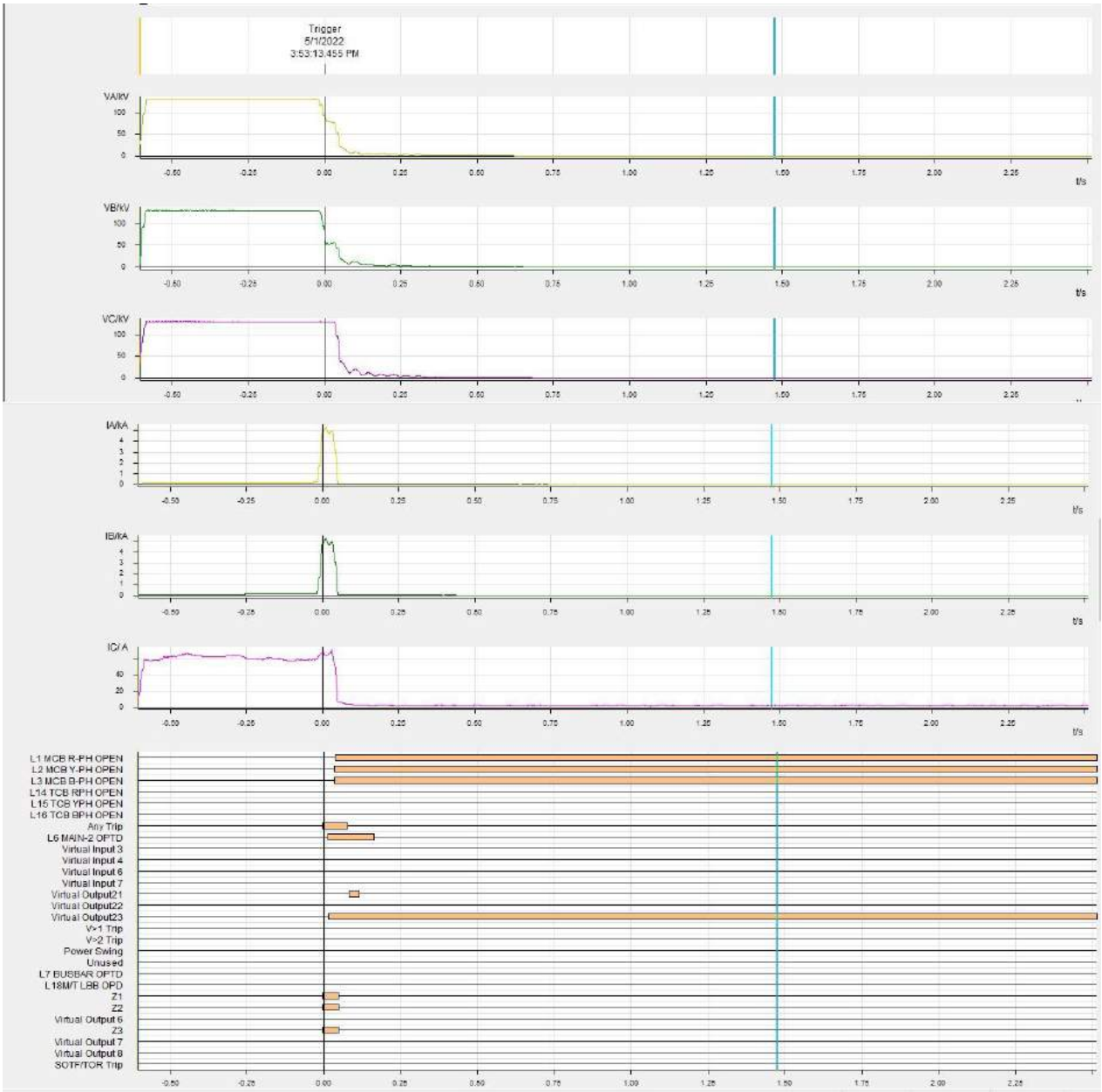
- DR/EL received from PG ER-1 and JUSNL.

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

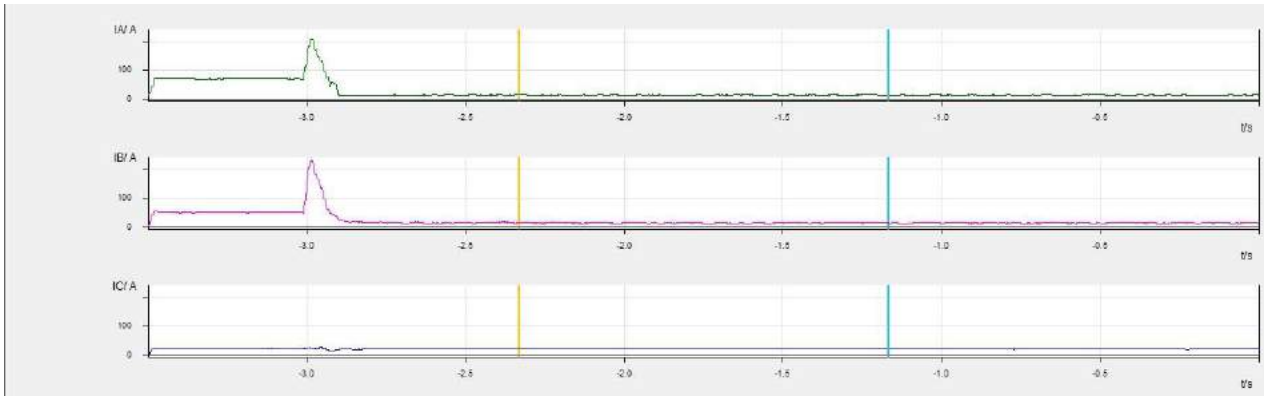
TIME	STATION	DESCRIPTION	STATUS
15:43:12.684	DALTN_PG	220_GARHWA_2_CB	Closed
15:43:12.745	DALTN_PG	220_GARHWA_2_CB	Open
15:43:13.488	DALTN_PG	220_GARHWA_1_CB	Open

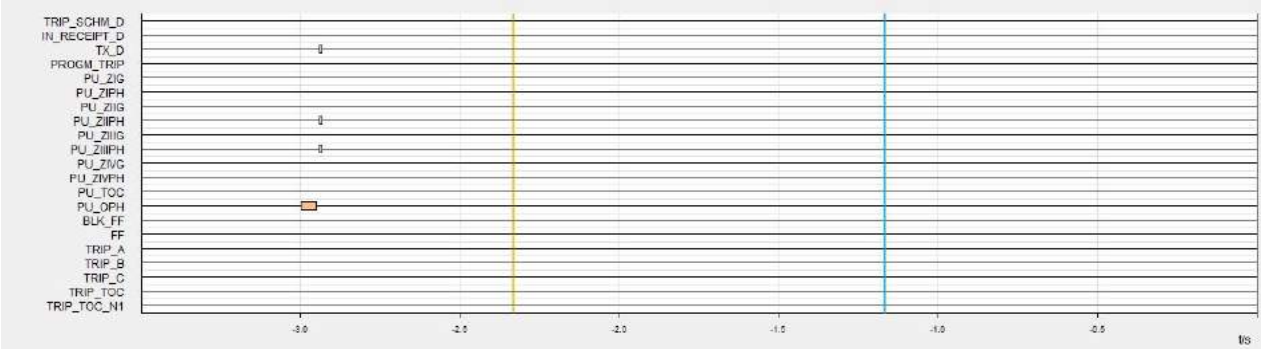
Annexure 2: DR recorded

220 kV Daltonganj-Garhwa-1 (Daltonganj)

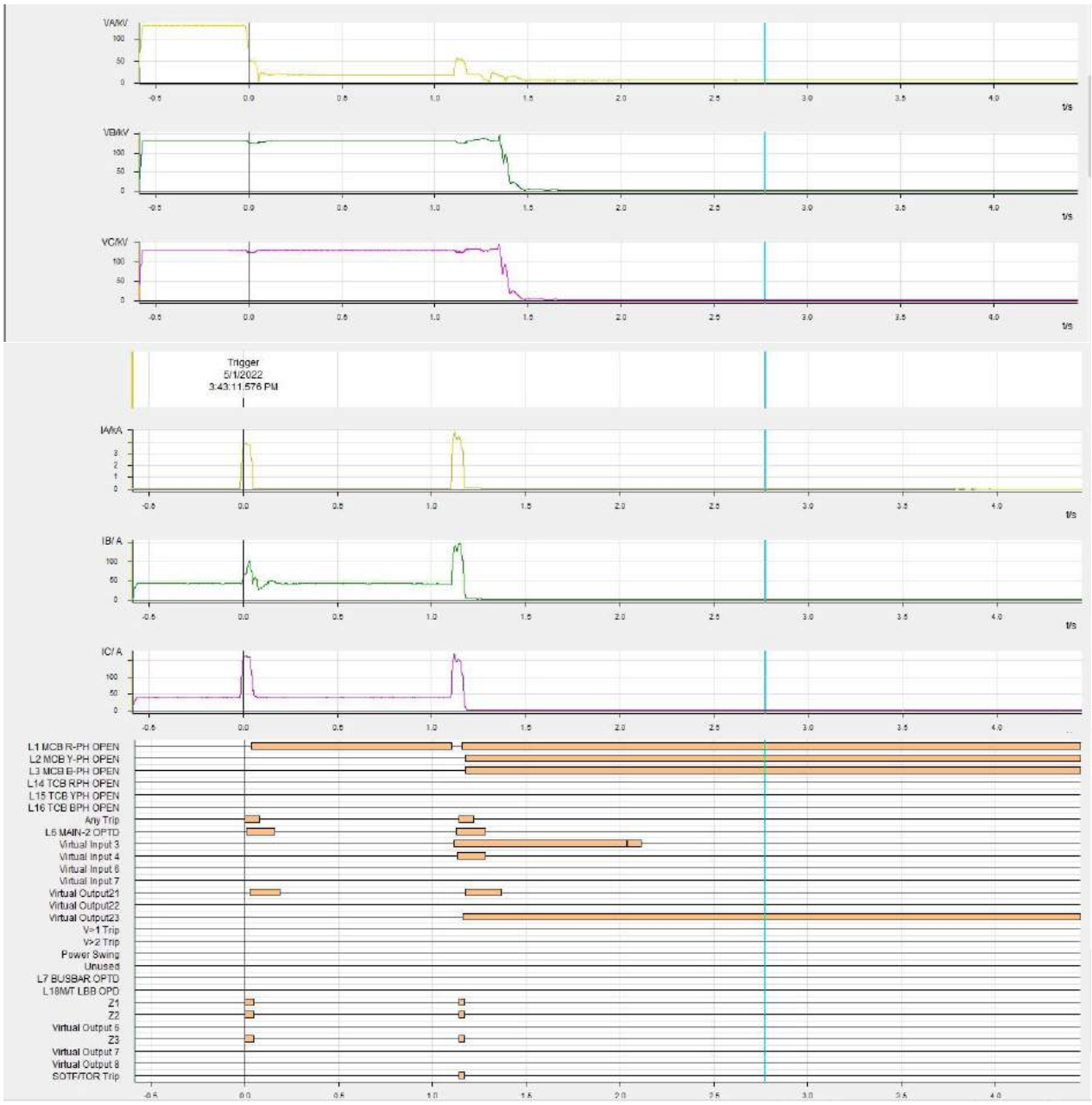


220 kV Daltonganj-Garhwa-1 (Garhwa)

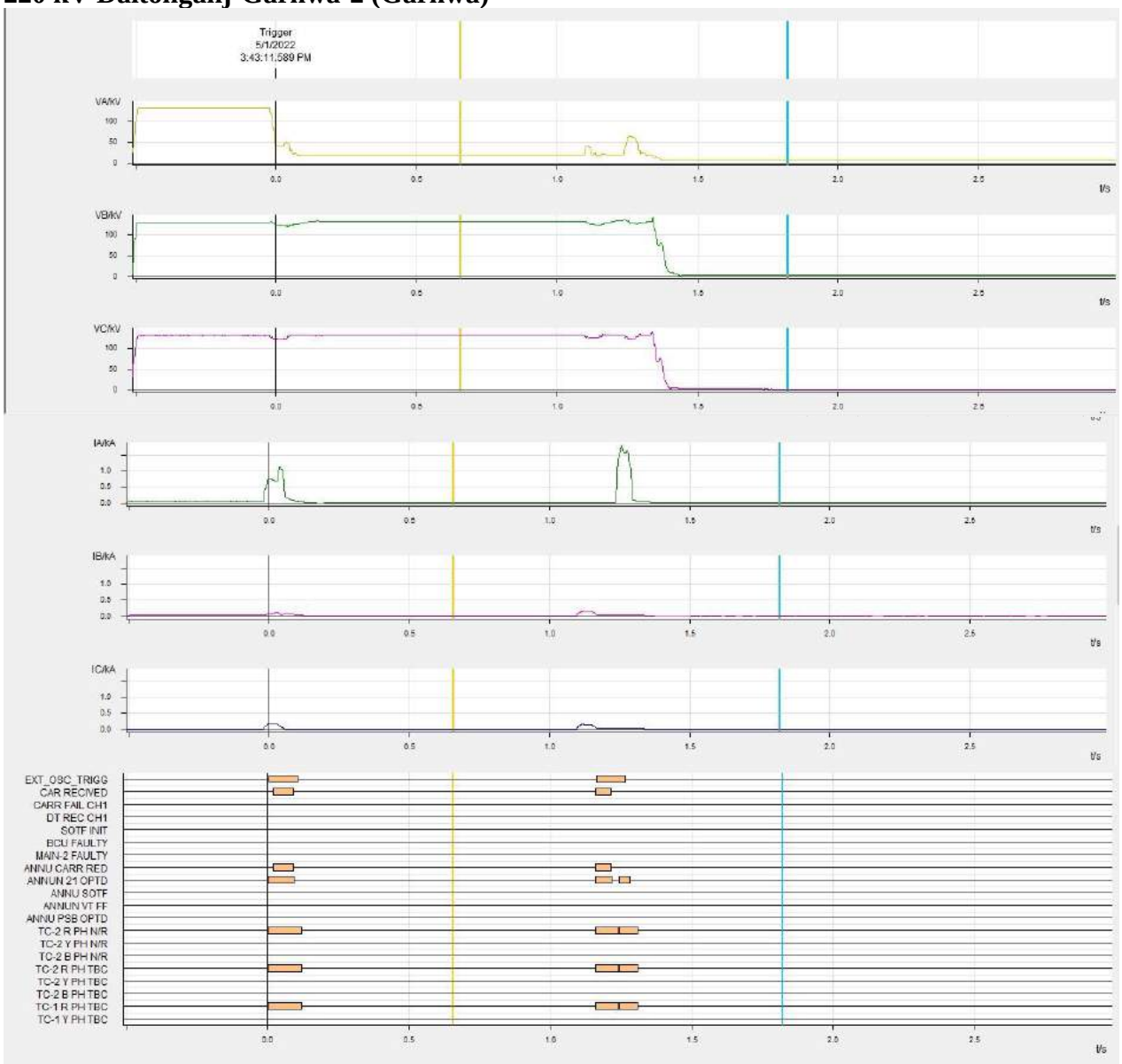




220 kV Daltonganj-Garhwa-2 (Daltonganj)



220 kV Daltonganj-Garhwa-2 (Garhwa)



List of important transmission lines in ER which tripped in May-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	220KV-SUBHASGRAM(PG)-NEW TOWN-1	01-05-2022	23:00	01-05-2022	23:37	Subhasgram : R-N, 21.145 km, 6.420 kA	New Town : R-N, Z -1, 2.59 km	R-Earth	100	Three phase tripping for single phase fault		Yes	No	Unhealthy PLCC channel. Replaced by DTPC
2	220KV-CHAIBASA(PG)-CHAIBASA(JUSNL)-1	04-05-2022	09:30	04-05-2022	16:34		Chaibasa(JUSNL): CT SF6 operation	No fault	NA	Details maybe shared by JUSNL		NA	No	Power supply to main-2 relay contacts was loose.
3	765KV-ANGUL-SRIKAKULAM-1	05-05-2022	14:46	05-05-2022	16:42	Angul: B_N, Z-1, 242 km, Ib= 2.89 kA		B-Earth	100	A/r successful from Angul end only		Yes	NA	A/r relay not functioning at Srikakulam. Matter referred to OEM

4	220KV-DARBHANGA(DMTCL)-LAUKAHI-2	06-05-2022	17:54	06-05-2022	19:00	Darbhanga : B_N Z-2, 102.8 km , 1.789 kA		B-Earth	100	Three phase tripping at Laukahi	DR not time synchronized at Laukahi	No	Yes	PLCC Channel-1 is becoming unhealthy during the time of fault. Channel-2 is already unhealthy
5	220KV-DARBHANGA(DMTCL)-LAUKAHI-1	06-05-2022	17:54	06-05-2022	19:50		Laukahi: B-Ph Z-1, 4.28 km, 5.89 kA	B-Earth	100	Three phase tripping at Laukahi	DR not time synchronized at Laukahi	No	Yes	
6	400KV-SAHARSA-DARBHANGA (DMTCL)-2	09-05-2022	00:24	09-05-2022	03:17	Saharsha :Y-N, Z-1, 3.3 km, 13.13 kA	Darbhanga :Y_N,49 km, 1.75 kA	Y-Earth	100	O/V St.-2 operated after 400 msec. Line reactor didn't trip during single phase tripping at Darbhanga.		Yes	Yes	Line reactor trip time changed to instantaneous during single phase tripping
7	220 KV-DALKHOLA-PURNEA-1	13-05-2022	04:35	13-05-2022	06:33	Dalkhola: R_N, Zone-1, 11.45 km, 7.39 kA	Purnea: R_N, 25.689 km, 5.6 kA, A/r successful	R-Earth	100	Other two phase tripped after 1.1 second at Dalkhola. A/r successful at Punrea		Yes	Yes	A/r command didn't extend to CB closing coil, assigned outpur contact wire found loose

8	220KV-CHANDIL-SANTALDIH-1	13-05-2022	12:30	13-05-2022	12:50	Chandil: B_N, Zone-1, 18.1 km, 1.97 kA	Santaldih: B_N, Zone-2, 101.33 km, 1.585 kA	B-Earth	500	Tripped in Zone-2 time from Santaldih. Single phase tripping at Chandil	DR length less at Chandil	Yes	Yes	Modem-2 card faulty at Chandil. Replaced.
9	220 KV DARBHANGA(DMTCL)-LAUKAHI-1	13-05-2022	16:22	13-05-2022	17:17	Darbhanga: R_N, 57.55 km, 2.448 kA	Laukahi: R_N, 3.08 kA	R-Earth	100	Three phase tripping for single phase fault		No	Yes	PLCC Channel-1 is becoming unhealthy during the time of fault. Channel-2 is already unhealthy
10	220 KV DARBHANGA(DMTCL)-LAUKAHI-2	13-05-2022	16:22	13-05-2022	22:39	Darbhanga: R_N, 59.5 km, 2.74 kA		R-Earth	100	Three phase tripping at Laukahi		No	Yes	
11	400KV PATNA-BALIA-1	13-05-2022	18:38	13-05-2022	19:41	Patna: O/V St.1		O/V	NA	Voltage in R_ph & B_ph touched 480 kV while Y_ph voltage was 230 kV. O/V St.1 operated at Patna. PG may explain		Yes	NA	Voltage selection relay malfunctioned.

12	220 KV CHANDIL-SANTALDIH-1	15-05-2022	17:22	15-05-2022	17:37	Chandil: Y_N, Zone-1, 39.1 km, 2.95 kA	Santaldih: Didn't trip	Y-Earth	100	A/r was in blocked condition at Chandil. Three phase tripped	DR length less	Yes	Yes	Modem-2 card faulty at Chandil. Replaced.
13	220 KV BUDHIPADAR-RAIGARH-1	15-05-2022	21:51	15-05-2022	23:47	Budhipadar: R_N, Zone-1, 1.4 km, 22.8 kA	Raigarh: R_N, 37 km, 2.47 kA	R-Earth	100	Three phase tripping for single phase fault		Yes	NA	A/r scheme put in service without PLCC on 18.06.22
14	400 KV NEW PPSP-NEW RANCHI-1	17-05-2022	04:58	17-05-2022	08:18	New PPSP: Didn't trip	New Ranchi: PLCC malfunction	No fault	NA	Details maybe shared by PG/WBSETCL		No	No	PLCC malfunctioned at New Ranchi. DT set high
15	400 KV BIHARSHARIF-BALIA-2	19-05-2022	14:20	19-05-2022	15:45	Biharsharif: Y_N, 27.48 km, 9.5 kA		Y-Earth	100	Three phase tripping for single phase fault. No A/r observed		Yes	NA	Y_ph breaker stuck at tripping instance. After 100 msec, LBB attempted three phase tripping which was successful.

16	400 KV MUZAFFARPUR-GORAKHPUR-1	19-05-2022	16:11	19-05-2022	19:20	Muzaffarpur: R_N, 9.78 kA		R-Earth	100	Three phase tripping for single phase fault		Yes	NA	As reported, DT received from Gorakhpur, however same can not be corroborated through DR
17	220 KV MUZAFFARPUR-HAJIPUR-2	19-05-2022	16:25	19-05-2022	18:28		Hajipur: B_N, 51.95 km, 1.344 kA	B-Earth	100	Three phase tripping for single phase fault		No	Yes	Carrier unhealthy
18	400 KV MUZAFFARPUR-DHALKEBAR-2	19-05-2022	16:39	20-05-2022	01:53	Muzaffarpur: R_N, 43.6 km, 6.2 kA		R-Earth	100	PG may explain. Multiple A/r attempts at Muzaffarpur		No	No	Closing coil got stuck. Continuous closing attempt taken
19	220 KV SAHARSA-KHAGARIA-1	21-05-2022	00:56	21-05-2022	02:58	Saharsa: R_N, 6.3 kA, DT received	Khagaria: LBB operated	R-Earth	100	DT received at Saharsa. Bus bar protection operated at Khagaria. BSPTCL may explain.		Yes	Yes	LBB timer was set to zero inadvertently
20	220 KV SAHARSA-KHAGARIA-2	21-05-2022	00:56	21-05-2022			Khagaria: LBB operated	R-Earth	100	DT received at Saharsa. Bus bar protection operated at Khagaria. BSPTCL may explain.		Yes	Yes	

21	400 KV MALDA-NEW PURNEA-1	21-05-2022	01:59	21-05-2022	02:34	Malda: Y_N, 7.73 kA, 32.54 km	New Purnea: A/r successful	Y-Earth	100	A/r successful at New Purnea. DT received at Malda after 1 sec. PG may explain.		Yes	Yes	Faulty auxilliary relay. A/r lockout occurred. DT channel configuration issue. Resolved
22	220 KV RANCHI-HATIA-3	21-05-2022	13:05	21-05-2022	13:57	Ranchi: B_N, 27.9 km, 5 kA		B-Earth	100	A/r successful from Ranchi only		Yes	Yes	Carrier unhealthy at Hatia
23	220 KV BUDHIPADAR-KORBA-1	21-05-2022	17:55	22-05-2022	16:10	Budhipadar: R_N, 1 km, 23.5 kA		R-Earth	100	Three phase tripping for single phase fault		Yes	NA	A/r scheme put in service without PLCC on 07.06.22
24	220 KV BUDHIPADAR-RAIGARH-1	21-05-2022	18:27	22-05-2022	16:13	Budhipadar: Y_N, 6.1 km, 12.19 kA		Y-Earth	100	Three phase tripping for single phase fault		Yes	NA	A/r scheme put in service without PLCC on 18.06.22
25	220 KV BUDHIPADAR-KORBA-1	23-05-2022	19:31	24-05-2022	00:51	Budhipadar: Pole discrepancy		No fault	NA	OPTCL may explain		Yes	NA	A/r scheme put in service without PLCC on 07.06.22
26	765 KV ANGUL-SRIKAKULAM-1	23-05-2022	22:37	23-05-2022	23:37	Angul: Y_N, 3.945 kA, 276.4 km		Y-Earth	100	A/r successful from Angul end only. Three phase tripping occurred at Srikakulam		Yes	NA	A/r relay not functioning at Srikakulam. Matter referred to OEM

27	400 KV JAMSHEDPUR-ADHUNIK-1	26-05-2022	09:55	26-05-2022	19:27	Jamshedpur: DEF operated		R-Earth	600	R_ph current became zero at Jamshedpur first. Other two phases tripped after 14 seconds. Details maybe shared by PG/APNRL		Yes	No	Differential relay maloperated at Jamshedpur. Owned by APNRL
28	400 KV RENGALI-INDRAVATI-1	28-05-2022	17:58	28-05-2022	21:05	PRV operated due to DC earth fault at sudden pressure switch of NGR		No fault	NA	DT sent from Indravati. Details maybe shared by PG		Yes	Yes	Due to moisture ingress, NGR PRV operated
29	220 KV BUDHIPADAR-KORBA-1	29-05-2022	14:34	29-05-2022	20:27	Budhipadar: B_N, 37.7 km, 2.58 kA	Korba: B_N, Zone-2, 1.041 kA	B-Earth	100	Three phase tripping for single phase fault		Yes	NA	A/r scheme put in service without PLCC on 07.06.22
30	220 KV BUDHIPADAR-KORBA-1	31-05-2022	14:53	31-05-2022	17:05	Budhipadar: B_N, 23.3 kA	Korba: R_N, Zone-2, 217.35 km, 0.868 kA	B-Earth	100	Three phase tripping for single phase fault		Yes	NA	A/r scheme put in service without PLCC on 07.06.22

ANNEXURE-C.1

Sl No.	Name of the incidence	PCC Recommendation	Latest status
114th PCC Meeting			
1.	Disturbance at 220 kV Ramgarh (DVC) S/s on 09/04/2022 at 12:31 Hrs	PCC advised DVC to explore the possibility of reducing the bus coupler overcurrent setting so as to enable it to isolate the bus fault in case of the failure of busbar protection. Initially the setting may be reduced and coordinated for relays at substations where busbar is out of service or the busbar relay is of electro-mechanical type	
2.	Total Power Failure at 220 kV Garhwa S/S on 05/04/2022 at 12:19 Hrs	Both Powergrid & JUSNL were advised to reverify whether the fault was present in the circuit-2. PCC opined that SOTF shall be enabled for zone-1 operation too to avoid single phase tripping during fault in reclaim time.	*JUSNL representative informed that SOTF had been enabled for zone 1 however it is not working for three phase tripping.* *JUSNL was advised to consult OEM in this regard.*
3.	Total Power Failure at 400 kV Teesta V S/s on 23/04/2022 at 12:37 Hrs	PCC advised Powergrid to test the healthiness of PLCC of the line in coordination with NHPC.	*NHPC representative informed that end to end testing of PLCC had been completed.*
4.	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.	
5.	Information regarding auto-synchronization settings	Powergrid ER-II representative informed that they would share their *practice and auto-synchronization* settings to ERPC and ERLDC. PCC opined that ERLDC may send a separate communication with a format for required details with concerned utilities and advised all the utilities to share the requisite information to ERLDC.	*Powergrid representative informed that BCU of different make like ABB, GE, Siemens etc is used in their substation and auto- synchronisation practice will change according to make of BCU. He further informed that parameters settings are as follows-* *Voltage settings – 10%* *Frequency settings- 0.1-0.2 Hz*

			Phase angle settings- less than 20 degrees. *PCC advised all the utilities to share the requisite information to ERLDC for practice and auto-synchronization settings.*
113th PCC Meeting			
6.	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.	
7.	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 A/R testing was not done due to PLCC issue at Tenughat end . He added that during inspection, card issue was found in PLCC at Tenught end for which replacement work is in progress.The work will be completed within one month. *JUSNL representative informed that it will take another one month to complete the work.*
8.	Total Power failure at 220 kV Garhwa(JUSNL) S/s on 30.03.2022 at 18:22 Hrs	PCC advised JUSNL to review the ICT overcurrent setting in coordination with Powergrid. The zone-3 timer setting at Daltonganj end may be increased to 1000msec and TMS of overcurrent relay for 220/132 kV ICT at Garwah may be reduced accordingly by JUSNL.	*JUSNL representative informed that overcurrent settings of 220/132 kV ICT at Garhwa end had been revised in coordination with zone 3 settings at Daltongunj end.*

		114th PCC advised Powergrid & JUSNL to review the settings at respective end in line with the decision of 113th PCC meeting.	
111th PCC Meeting			
9.	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. In 114th PCC, PRDC was advised to complete the study at the earliest.	*ERLDC representative informed that they had received study from PRDC and their observation will be shared to PRDC by next week.* *PCC advised PRDC to share DEF relay settings for Sikkim complex with concerned utilities after necessary modification as per observation by ERLDC.*
106th PCC Meeting			
10.	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 informed that work order had been placed and issue will be resoled by July 2022.*
11.	Grid event at 132 kV Motihari (DMTCL) S/S on 21-04-2021 at 20:19 hrs	In 109th PCC Meeting, PMTL representative informed that they are in process of placing the work order with TBEA authorized partners. The quotation has been received and work order would be placed by end of December 2021. In 114th PCC, PMTL representative informed that material had been received at site and the work sould be completed within May 22.	*PMTL representative informed that work had been completed.*

Annexure C.6

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

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.