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.: 033-24239651,24239659 FAX No.:033-24239652, 24239653 Web: **www.erpc.gov.in**

NO. ERPC/PROTECTION/2022/ 844 **DATE: 04.10.2022**

सेवा में / To,

संलग्न सूची के अनुसार / As per list enclosed.

विषय : पू.क्षे.वि.स., कोलकाता में दिनांक - 20.09.2022 को आयोजित 118वीं पीसीसी बैठक का कार्यवृत्त ।
Sub: Minutes of the 118th PCC meeting held at ERPC, Kolkata on 20.09.2022.

Sir,

पू.क्षे.वि.स, कोलकाता में आयोजित 86वीं 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 **118th PCC** meeting of ERPC held on **20.09.2022** at **ERPC, Kolkata** 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.

This issues with the approval of Member Secretary, ERPC.

भवदीय / Yours faithfully,

(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
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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)
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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)
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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)
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Chief Engineer (Trans.) Power Deptt., Govt. of Sikkim, Gangtok-731010	Sr. Manager (CTMC) Durgapur Projects Limited, Durgapur-713201
Executive Director, ERLDC, POSOCO, Tollygunge, Kolkata-700033	The Head Maithon Power Limited, Maithon Office, MA 5 Gogna, Dist. Dhanbad, Jhankand State, PIN-828207
General Manager (AM), ER-II Power Grid Corporation of India Ltd., J-I-15, Block-EP, Sector-V,Salt Lake,Kolkata-91	Head –Regulatory and contracts, IndiGrid Limited , 247 Embassy, Office No 107, 'B' Wing, Hindustan Co. Bus Stop, Gandhi Nagar, L.B.S. Road, Vikhroli West, Mumbai – 400 079. Ph : +91 845509 96408
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 118th PCC Meeting

Date:20.09.2022
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 118th PROTECTION COORDINATION SUB-COMMITTEE MEETING HELD ON 20.09.2022 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 117th Protection Coordination sub-Committee Meeting held on 22nd August 2022 through MS Teams online platform.

The minutes of 117th Protection Coordination sub-Committee meeting held on 22.08.2022 was circulated vide letter dated 12.09.2022.

Deliberation in the meeting

Members confirmed the minutes of 117th PCC Meeting.

PART – B

ITEM NO. B.1: Disturbance at 220 kV Burmu(JUSNL) S/S on 01.08.2022 at 11:56 Hrs

At 11:56 Hrs, 220 kV Patratu-Burmu(Ratu) D/C line tripped on R_N fault leading to total power failure at 220/132 kV Burmu S/s. 400/220 kV ICT-1 at Patratu also tripped at the same time.

Relay Indications:

Name	End1	End2	PMU Observations
400/220 kV ICT-1 at Patratu	Backup O/c		18 kV dip in R_ph voltage at New Ranchi. Fault clearance time: 400 msec
20 kV Patratu-Burmu (Ratu)-1	Patratu: R_N, 2.34 kA	Burmu: R_N, 0.95 kA	
220 kV Patratu-Burmu (Ratu)-2	Patratu: R_N, 2.35 kA	Burmu: R_N, 1.36 kA	

Load Loss: 80 MW
Outage Duration: 01:05 Hrs

Disturbance report is attached at Annexure-B1.

JUSNL may explain.

Deliberation in the meeting

Based on the DR analysis, ERLDC representative shared their observation as follows:

- *R-phase fault struck both the circuits of 220 kV Patrartu-Burmu line which was sensed by the ralay at Burmu end in zone-1 protection and relay at Patratu end in zone-2 protection.*
- *Both the lines tripped from Burmu end within 100 msec whereas from Patratu end the lines tripped in zone-2 timing.*
- *At the same time, 400/220 kV ICT-1 at Patratu also tripped on back up overcurrent*

protection. As the burmu substation is radially fed from Patratu, there was total power failure in the 220 kV Burmu S/s.

Regarding non-operation of carrier-aided protection in the above line, JUSNL representative informed that the PLCC status was healthy at both end of the line however carrier receipt at patratu could not be verified during the event. PCC advised JUSNL that the carrier protection scheme may be checked and end to end testing shall be carried out to test the healthiness of PLCC/carrier communication for the line.

Regarding tripping of the ICT-1 at Patratu end, he intimated that the handover process of Patratu New S/s to JUSNL has not yet been completed and the issue has been communicated to the working agency i.e., M/s Powergrid for taking necessary action.

PCC observed that the ICT might have tripped due to improper time setting coordination between the relay of ICT and the downstream transmission line. JUSNL was advised to review the time setting of backup overcurrent relay of both the ICTs and coordinate the same to avoid unwanted tripping of the transformer for faults at lower voltage level.

ERLDC representative reported that the ICT-1 is out of service since this event on 01.08.2022. On enquiry regarding the reason of the outage & status of restoration of ICT-1, JUSNL representative replied that during testing of the ICT some deviation was found in reports of DGA analysis. Further, the OEM testing team has been deployed to investigate and resolve the issue.

PCC advised JUSNL to comply with the above observations of PCC in coordination with Powergrid.

ITEM NO. B.2: Disturbance at 400 kV Dikchu S/s on 10.08.2022 at 11:57 Hrs

400 kV Bus-2 at Dikchu S/s is out of service since May-21. 400 kV Teesta 3-Dikchu & 400 kV Rangpo-Dikchu are in one dia with main bay of Teesta-3 line is out of service.

At 11:57 Hrs, 400 kV Rangpo-Dikchu tripped due to B_N fault. Consequently 400 kV Teesta 3-Dikchu also tripped due to tripping of tie bay leading to tripping of both units at Dikchu due to loss of evacuation path.

Generation Loss: 105 MW
Outage Duration: 00:30 Hrs

Dikchu HEP may explain.

Deliberation in the meeting

The disturbance was explained by ERLDC representative as follows:

- *R phase to ground fault occurred in 400 kV Rangpo-Dikchu line & the fault was cleared within 100 msec.*
- *At Rangpo end, the relay sensed the fault in zone-1 and autorecloser was successful. However, relay at dikchu end sensed the fault in zone-2 protection. Though carrier was received from Rangpo end relay, autorecloser lockout appeared in the BCU panel and subsequently three phase tripping occurred at main bay of Dikchu end.*
- *Further, Y & B phase breaker of tie bay at Dikchu tripped after 450 msec. The reason of which could not be identified.*

Dikchu HEP representative informed that status of autorecloser relay was showing healthy and as such they could not find out the reason for autorecloser lockout & tripping of tie breakers after 450 msec during the disturbance. He intimated that the vendor has been communicated about the issue and the relay service engineer is going to visit the site to investigate this issue.

Further, after tripping of both the bays of 400 kV Rangpo-Dikchu line at Dikchu end, there was loss of evacuation path for Dikchu units as main bay of 400 kV Dikchu-Teesta III is out since May-21. This led to tripping of both the units at Dikchu HEP.

TUL representative expressed their concern on loss of one of their evacuation path during this incident and further stated that the autorecloser issue may be resolved immediately so that tripping of the line during single phase to ground transient fault may be avoided. Dikchu HEP representative replied that the service engineer is scheduled to visit within 15 days.

PCC advised Dikchu HEP to expedite the visit of relay engineer and resolve the issue by Sep-22.

On restoration of main bus -2 at Dikchu S/s, Dikchu HEP representative updated that as per the communication with the vendor, the breaker will be received at site by Nov-22 and thereafter the main bay as well as main bus-2 will be restored immediately.

Representative of TPTL raised their concern about inordinate delay in restoration of the main bus-2 at Dikchu HEP which hampers the reliability of evacuation path from Dikchu as well as Teesta III HEPs. He stated that as per the deliberation in previous PCC meetings, the main bus-2 is supposed to be restored by Sep-22 however the same has now been shifted to Nov-22.

Dikchu representative stated that the delay is mostly on vendor side as some of the parts is supposed to be exported outside India which is taking a lot of time.

PCC also raised serious concern about long outage of the main bus-2 of Dikchu HEP and advised DIkchu HEP to continuously take up with the vendor for supply of the breaker at the earliest.

Further, Dikchu HEP was advised to submit a firm time-line for restoration of the main bus-2 which would be monitored in PCC meeting.

ITEM NO. B.3: Total Power failure at 220/132 kV Bantala(WBSETCL) S/s on 23.07.2022 at 08:46 Hrs

At 10:13 Hrs, total power failure occurred at 220/132 kV KLC Bantala S/s. As per the information received, Y_ph PT of 220 kV Bus-1 burst leading to tripping of all associated feeders and transformers.

Relay Indications:

Name	End1	End2	PMU Observations
220 kV Bus-1 at Bantala (KLC)	Feeders tripped from remote end		62 kV dip in Y_ph voltage and later 40 kV dip in R_ph voltage at Subhashgram. Fault clearance time:350 msec
20 kV Subhahsgram-Bantala (KLC)	Subhashgram: R_Y, Zone-2, Ir: 7.26 kA, Iy: 6.87 kA, 18.96 km	Didn't trip	
220 kV Bantala (KLC)-NewTown AA3	Didn't trip	NewTown AA 3: R_Y_N, Zone-2, 13.33 km, Ir: 7.97 kA, Iy: 7.16 kA	
220/132 kV ICT-1&2 at Bantala (KLC)			

Load Loss: 56 MW
Outage Duration: 00:10 Hrs

Disturbance report received from ERLDC is enclosed at **Annexure-B3**.

WBSETCL may explain.

Deliberation in the meeting

220 kV Bantala S/s is having single main and transfer bus switching arrangement.

WBSETCL representative informed that the disturbance occurred due to bursting of Y- phase PT of 220 kV Bus-1. As the busbar protection was out of service at the time of disturbance, 220 kV Subhashgram-Bantala and 220 kV NewTown AA 3- Bantala tripped from remote end in zone-2 time after 350 msec to clear the fault. There was no tripping of the transformers at Bantala.

On busbar protection, he updated that it was out of service due to failure of Y phase unit. The defective relay has been replaced and busbar protection is now in service.

ITEM NO. B.4: Major grid events other than GD/GI

B4.1: Bus tripping occurred in Eastern Region during August 2022

Element Name	Tripping Date	Reason	Utility
220 kV Main Bus-1 at Naubatpur	03.08.22 at 17:03 Hrs	Bus bar protection operated, No fault in PMU.	BGCL/PG ER-2

Concerned utility may explain.

Deliberation in the meeting

BGCL representative informed that Naubatpur station has been recently commissioned and there was wiring issue in one of GD(Gas density) relay which mal operated during DC fault and resulted in busbar operation on 03.08.2022. There was no fault in the station.

He added that the wiring issue has been rectified.

B4.2: Repeated Tripping of Transmission Lines and associated issues

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

S.No.	Name of the Element	No. of times Tripped	Remarks	Utility
1	132 kV Rihand-Garhwa	7	Tripped from Rihand end only	JUSNL
2	220kV-Daltonganj-Chatra-2	4	B phase involved in all faults ,A/R successful only from Daltonganj	JUSNL
3	400 kV Koderma-Bokaro-1	4	All are B-earth between 70-80 Km from KTPS	PG-ER-1

4	400 kV Koderma-Bokaro-2	3	2 times B-earth Fault	PG-ER-1

Concerned utilities may explain.

Deliberation in the meeting

132 kV Rihand-Garhwa:

JUSNL representative updated that the permission from Forest dept of UP was received and thereafter the tree cutting was completed on 16.09.2022. Further he informed that out of seven trippings mentioned, only 2-3 trppings were on account of the fault in the line and the rest tripping were from Rihand end due to various other reason.

220kV-Daltonganj-Chatra-2:

JUSNL representative informed that tree-cutting work at various location has been started after receiving the necessary permission from Forest dept. It is expected that the all the vegetation related issue would be cleared by Oct-22.

400 kV Koderma-Bokaro-1 & 2:

Powergrid representative informed that out of five events, two are due to tower collapse and remaining three events are on account of insulator flashover and subsequently unsuccessful A/R operation. He submitted that further patrolling is being carried out in complete line section to check earthing as well as clearance issues. All the issues would be resolved by Oct-22.

ITEM NO. B.5: Bus Tripping at Malda S/s

The bus tripping event at 400 kV Malda S/s in recent times is given below:

Sr No	Element Name	Tripping Date	Tripping Time	Reason
1	400 kV Main Bus - 2 at Malda	04-09-2022	05:57	Bus bar maloperation at Malda
2	400 kV Main Bus - 1 at Malda	04-09-2022	05:57	Bus bar maloperation at Malda
3	400 kV Main Bus - 1 at Malda	17-12-2021	15:24	Due to very old electromechanical 402 LBB relay of 400KV TBC Bay (Presently 400KV Purnea CKt-I charged through TBC Bay), spurious trip was initiated from the LBB relay
4	400 kV Main Bus - 1 at Malda	23-10-2021	06:22	Suspected mal-operation of TBC LBB.
5	400 kV Main Bus - 1 at Malda	13-03-2021	22:20	TBC bus side isolator problem

It is gathered that the TBC LBB relay is a very old electromechanical relay which has caused spurious tripping of busbar relay.

Powergrid may explain and submit its action plan to resolve the issue.

Deliberation in the meeting

Powergrid representative informed that Malda is an old substation commissioned in the year 1986. Due to ageing of the equipment, protection panel & control panel, these are prone to failure and it is very difficult to ensure healthiness of the integrated system. He intimated that complete replacement of the protection system at Malda has been approved under ADD CAP by the

commission in the present tariff block. Accordingly, the tendering is in progress and the work would be taken up in due course of time.

As a short-term measure, they are going to replace the LBB relay of TBC bay for which wiring in existing LBB scheme needs certain modification to incorporate new LBB relay. As this work requires shutdown of 400 kV bus, they are planning to replace the relay in the winter i.e. by Dec-22.

ITEM NO. B.6: Tripping Incidence in month of August-2022

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

Concerned utilities may explain.

Deliberation in the meeting

Members explained the tripping incidences. The updated status is enclosed at ***Annexure B.6.***

PART- C :: OTHER ITEMS

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

The decisions of previous PCC meetings are attached at Annexure.

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: DEF protection setting review in Sikkim complex in view of LILO of 400 kV Teesta 3-Kishanganj at Rangpo

After LILO of 400 kV Teesta 3-Kishanganj at Rangpo, review of DEF settings for all lines emanating from Teesta-3, Dikchu, Rangpo was necessitated. In 111th PCC meeting, it was decided that PRDC would carry out the study for DEF relay setting coordination for Sikkim Complex with revised configuration of transmission network.

Subsequently the study was carried out and shared with ERLDC for verification of network configuration and fault level data.

In 117th PCC meeting ERLDC observed that the network configuration and fault level informations are in order.

The DEF settings based on the revised study is enclosed at **Annexure-C2.**

Concerned utilities are requested to implement the revised settings in DEF relay at their respective end.

Concerned utilities may note.

Deliberation in the meeting

PCC advised concerned utilities of Sikkim Complex to implement the revised settings of DEF relay as enumerated in the report at their respective end and confirmation of the same shall be intimated to ERPC/ERLDC.

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

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

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

In 117th PCC meeting, NTPC Darlipalli representative informed that the recommendation regarding overvoltage settings have already been complied with and for power swing blocking setting, the matter has been sent to their corporate wing for their comments.

Concerned utilities may update.

Deliberation in the meeting

*OPTCL vide email dated submitted their compliance. The compliance report is enclosed at **Annexure-C3.1**.*

*ERPC Secretariat updated that report of 3rd party protection audit observations for the substations in Jharkhand has been circulated vide letter dated 19.09.2022. The report is enclosed at **Annexure C3.2**. PCC advised JUSNL, Powergrid & DVC to go through the observations and take necessary action for compliance.*

ITEM NO. C.4: Schedule for 3rd party Protection Audit by ERPC Protection Team.

Protection audit of following substations is proposed to be held in the month of Sep/Oct-22.

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

Members may discuss.

Deliberation in the meeting

It was decided that the protection audit would be planned after the festive period.

ITEM NO. C.5: 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.

In 116th PCC meeting, concerned utilities are advised to upload the relay settings in PDMS or send the relay settings to erpc-protection@gov.in . The settings data was received from Powergrid ER-1 & PMTL.

Subsequently vide email dated 05.09.22, all concerned utilities were requested to send the

protection settings data for the newly commissioned elements. Requisite information was received from Bihar, OPTCL, WBSETCL.

PRDC may update. Members may note & comply.

Deliberation in the meeting

Members noted for compliance.

ITEM NO. C.6: Collection of Protection Setting data by PRDC

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

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

In 117th PCC meeting, PRDC representative updated that substation visit for data collection had been completed for the substations in Bihar & Jharkhand. For rest of the substations, the visit would be planned at the earliest.

PRDC may update.

Deliberation in the meeting

PRDC representative informed that the Substation visit in Sikkim would be completed by Oct-22.

PCC advised PRDC to update the already collected protection setting data into the database at the earliest.

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पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Government of India Enterprise)
Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033.
CIN: U40105DL2009GOI188682
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घटना संख्या: **01-08-2022/1** दिनांक: **24-08-2022**

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

Summary of the event (घटना का सारांश):

At 11:56 Hrs, 220 kV Patratu-Burmu(Ratu) /c tripped due to R_N fault leading to total power failure at 220/132 kV Burmu S/s. 400/220 kV ICT- at Patratu also tripped at the same time. Load loss of 80 MW reported at Kanke and Burmu by Jharkhand SLDC.

Date / Time of disturbance: 01-08-2022 at 11:56 hrs

- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Burmu(Ratu) S/s
- **Load and Generation loss**.
    - No generation loss was reported during the event.
    - Around 80 MW load loss reported during the event at Kanke and Burmu by Jharkhand SLDC.

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

- NIL

Major elements tripped (प्रमुख ट्रिपिंग):

- 400/220 kV ICT-1 at Patratu
- 220 kV Patratu-Burmu(Ratu) D/c

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

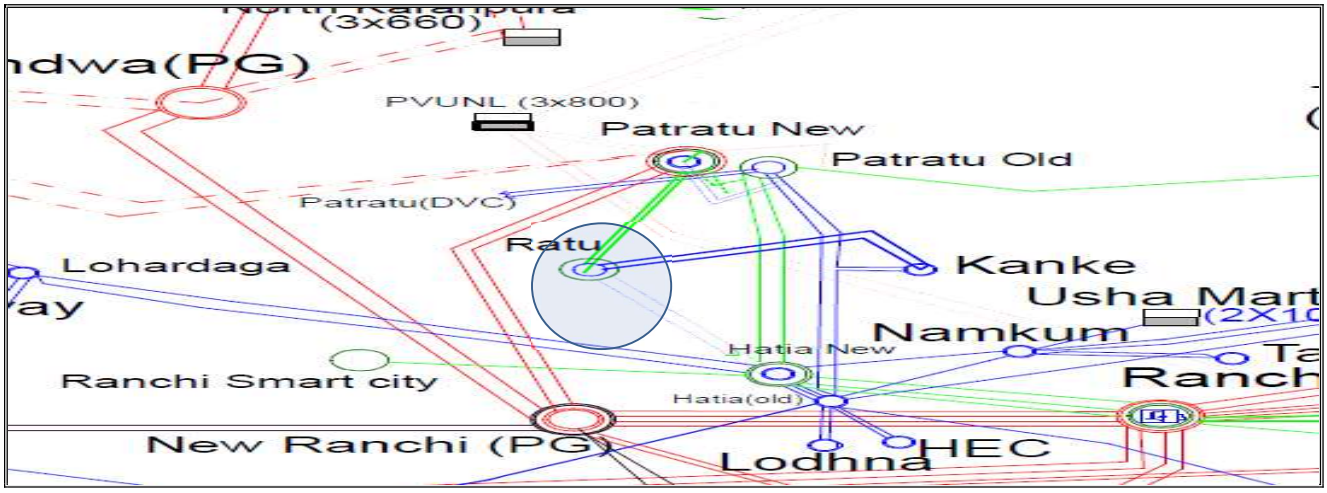


Figure 1: Network across the affected area

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
11:56	400/220 kV ICT-1 at Patratu	BackUp O/c		18 kV dip in R_ph voltage at New Ranchi. Fault clearance time: 400 msec
	220 kV Patratu-Burmu (Ratu)-1	Patratu: R_N, 2.34 kA	Burmu: R_N, 0.95 kA	
	220 kV Patratu-Burmu (Ratu)-2	Patratu: R_N, 2.35 kA	Burmu: R_N, 1.36 kA	

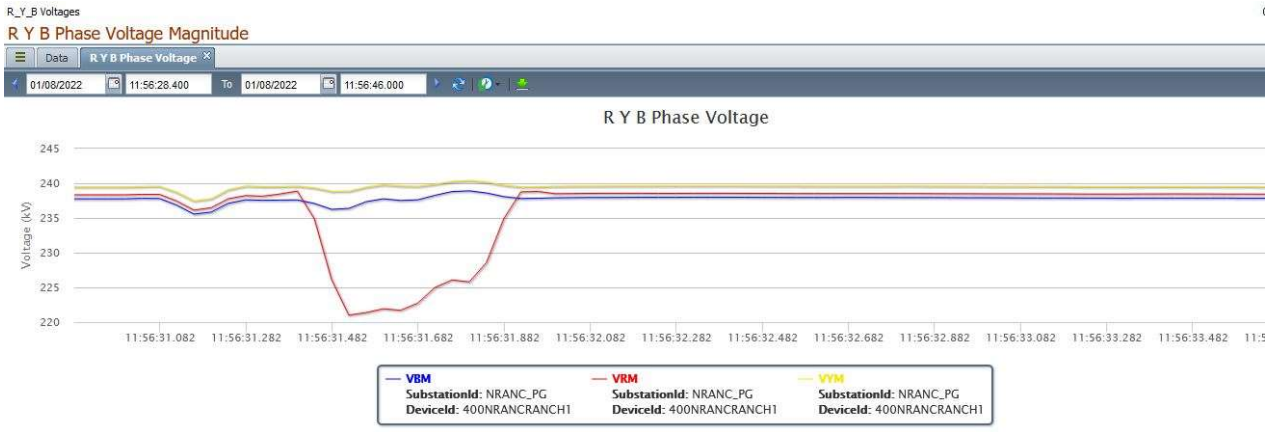


Figure 2: PMU snapshot of 400/220 kV New Ranchi S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
400/220 kV ICT-1 at Patratu	18:24
220 kV Patratu-Burmu (Ratu)-1	13:01
220 kV Patratu-Burmu (Ratu)-2	13:02

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

- R_ph fault struck both lines which was seen in Zone-2 from Patratu end and in Zone-1 from Burmu end.
- Both lines tripped from Burmu end within 100 msec. However, both lines opened in Zone-2 time from Patratu end. Whether carrier protection is healthy or not. JUSNL may confirm.
- At the same time, 400/220 kV ICT-1 at Patratu also tripped on Back-up O/c. Time co-ordination to be done to avoid tripping of ICT for faults at lower voltage level.
- DR triggering criteria for 220 kV Patratu-Burmu-2 at Patratu is set as **Any Trip.** The same may be changed to **Any Start.**

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

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

Status of Reporting (रिपोर्टिंग की स्थिति):

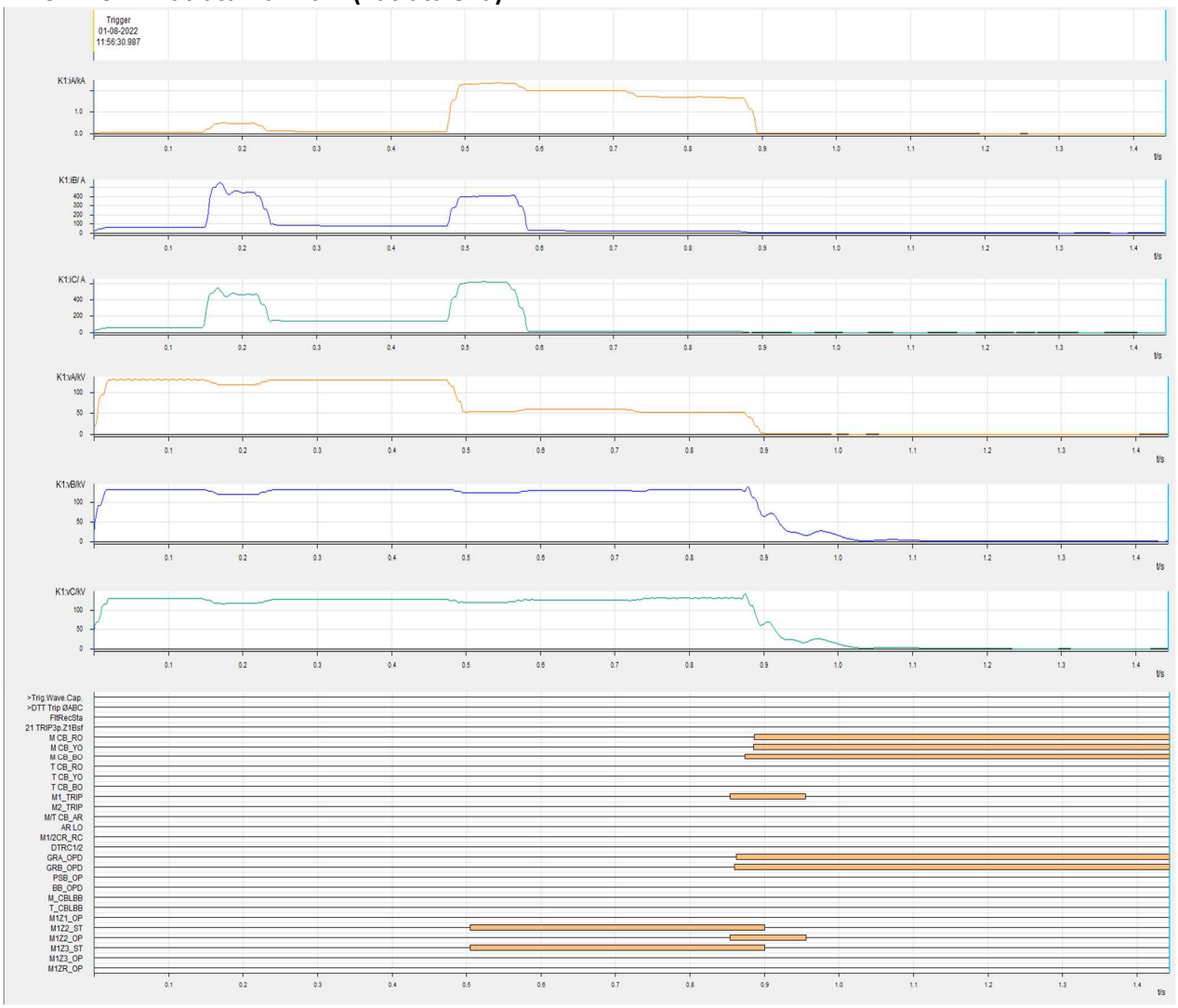
- Complete DR/EL yet to be received from JUSNL.

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

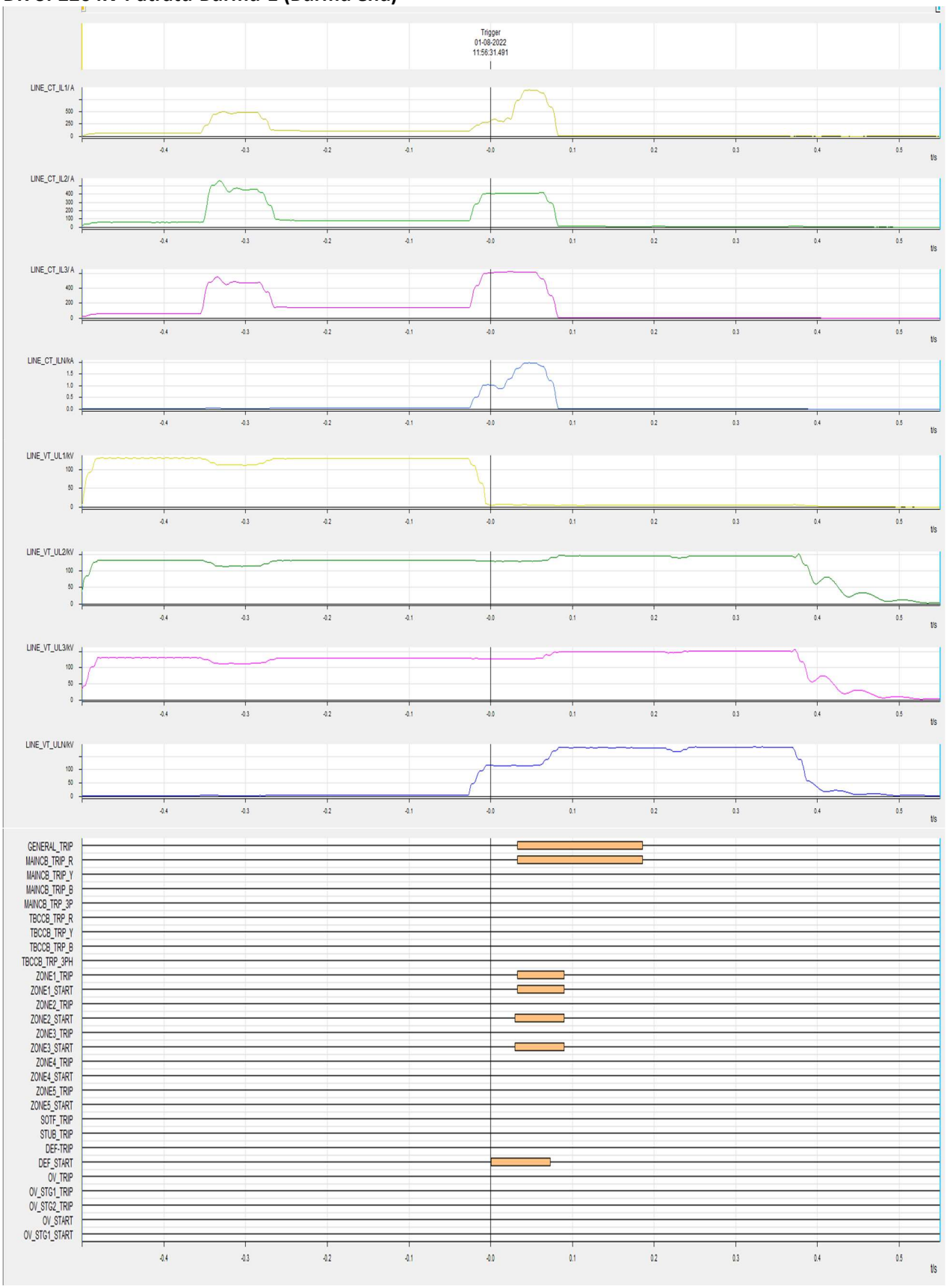
Sequence of Events not recorded at the time of event.

Annexure 2: DR recorded

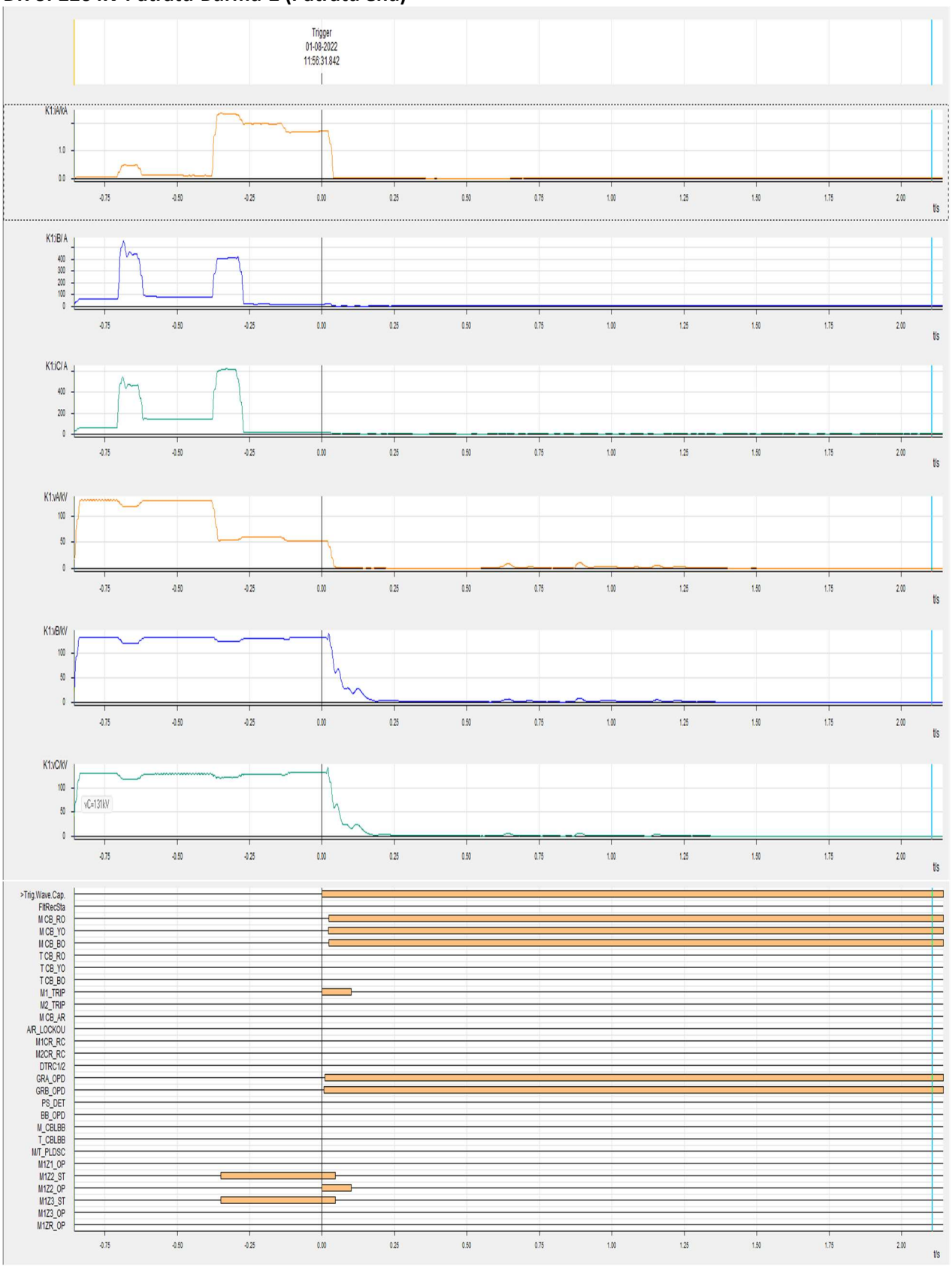
DR of 220 kV Patratu-Burmu-1 (Patratu end)



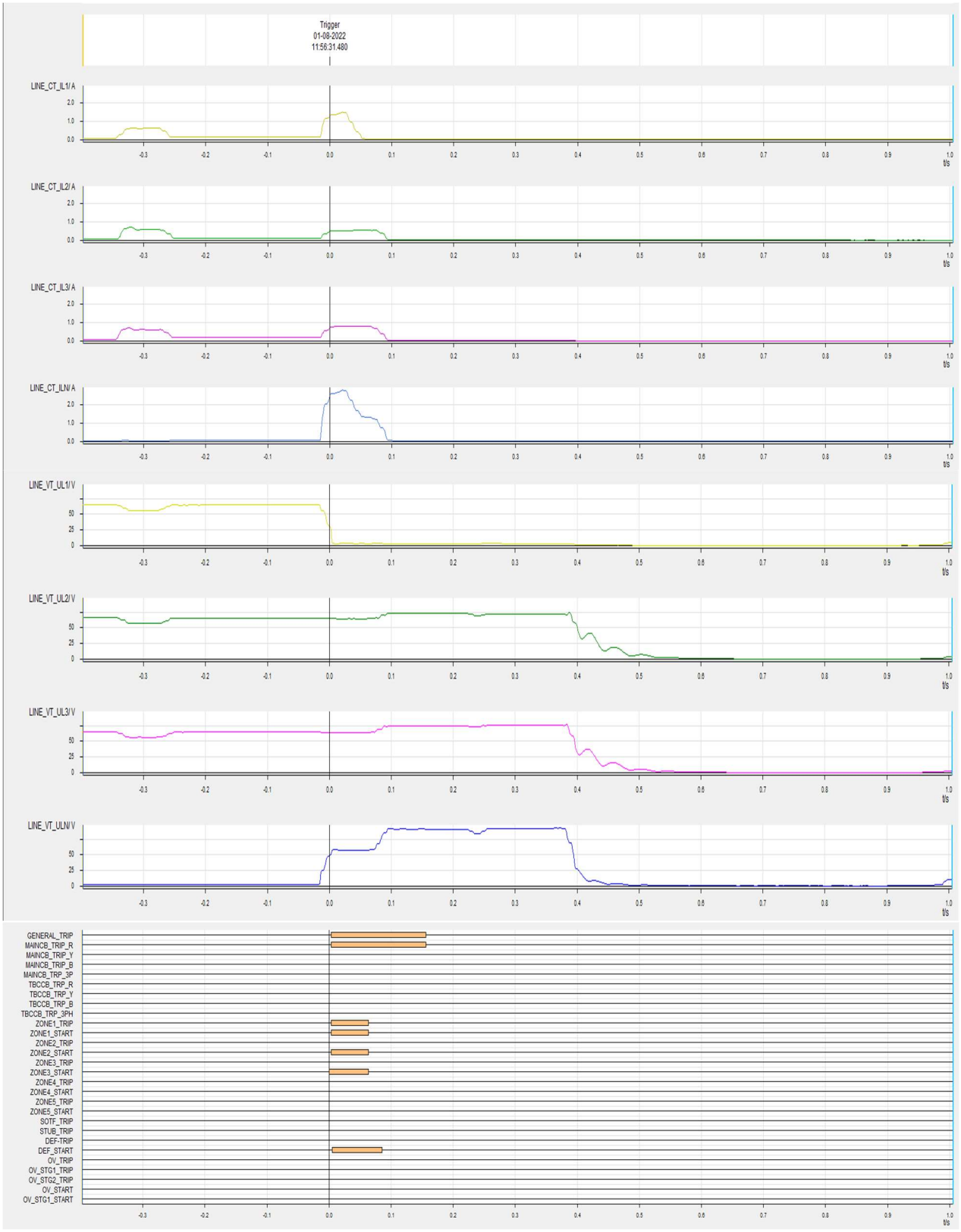
DR of 220 kV Patratu-Burmu-1 (Burmu end)



DR of 220 kV Patratu-Burmu-2 (Patratu end)



DR of 220 kV Patratu-Burmu-2 (Burmu 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: **26-08-2022/1** दिनांक: **31-08-2022**

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

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

At 10:13 Hrs on 26th August 2022, total power failure occurred at 220/132 kV KLC Bantala S/s. As reported, Y_ph PT of 220 kV Bus-1 burst, leading to tripping of all associated feeders and transformers. 56 MW load loss reported during the event by SLDC West Bengal.

- **Date / Time of disturbance:** 26-08-2022 at 10:13 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 220/132 kV Bantala S/s
- **Load and Generation loss**.
  - No generation loss occurred during the event.
  - 56 MW load loss reported during the event by SLDC West Bengal.

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

- NIL

3. Major elements tripped (प्रमुख ट्रिपिंग)

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

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

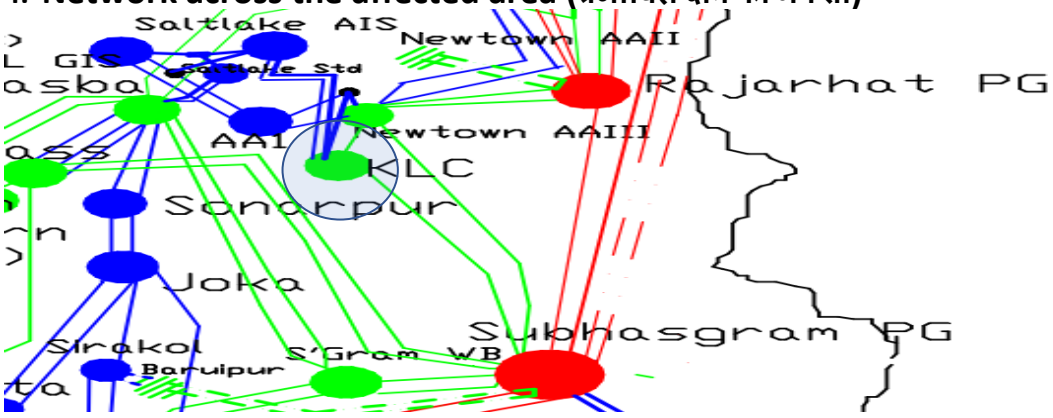


Figure 1: Network across the affected area

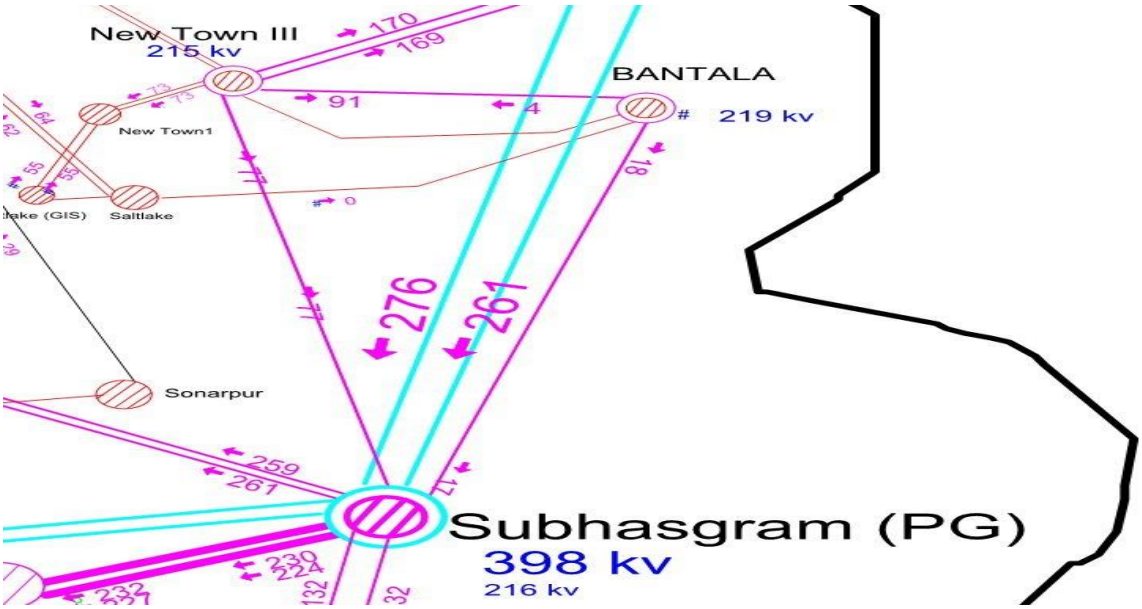


Figure 2: SCADA snapshot for of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
10:13	220 kV Bus-1 at Bantala (KLC)	Feeders tripped from remote end		62 kV dip in Y_ph voltage and later 40 kV dip in R_ph voltage at Subhashgram. Fault clearance time: 350 msec
	220 kV Subhahsgram-Bantala (KLC)	Subhashgram: R_Y, Zone-2, Ir: 7.26 kA, Iy: 6.87 kA, 18.96 km	Didn't trip	
	220 kV Bantala (KLC)-NewTown AA 3	Didn't trip	NewTown AA 3: R_Y_N, Zone-2, 13.33 km, Ir: 7.97 kA, Iy: 7.16 kA	
	220/132 kV ICT-1&2 at Bantala (KLC)	-		

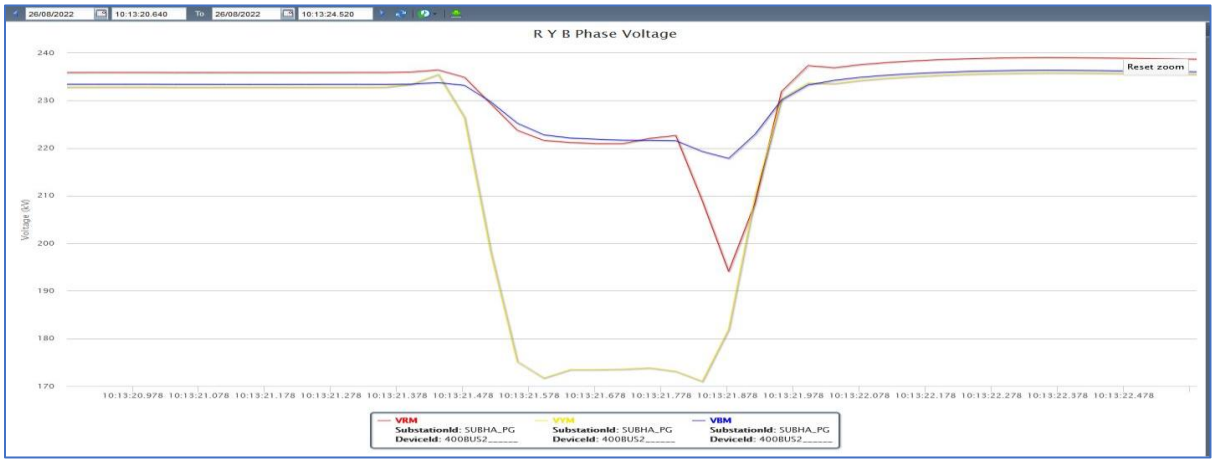


Figure 3: PMU Voltage snapshot of 400/220 kV Subhashgram S/s

5. Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Bus-1 at Bantala (KLC)	10:57
220 kV Subhashgram-Bantala (KLC)	11:19
220 kV Bantala (KLC)-NewTown AA 3	10:57
220/132 kV ICT-1&2 at Bantala (KLC)	-

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

- Y_ph PT of 220 kV Bus-1 burst. Bantala has single main and transfer scheme.
- As informed, Bus bar protection was kept out of service due to failure of Y_ph unit of bus bar relay. Since when the Busbar was out of service , why Intimation of same was not given to ERLDC& ERPC.
- 220 kV Subhashgram-Bantala and 220 kV NewTown AA 3- Bantala tripped from remote ends in Zone-2 time after 350 msec.
- Z-4 timings of lines may be reduced till the Busbar in not in service.
- Expected timeline for restoration of Busbar may be intimated.
- ICT tripping occurred on which protection? **(WBSETCL to explain).**

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

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

8. Status of Reporting (रिपोर्टिंग की स्थिति):

- DR/EL yet to be received from WBSETCL for ICT & PG-ER-2 for subhasgram line.

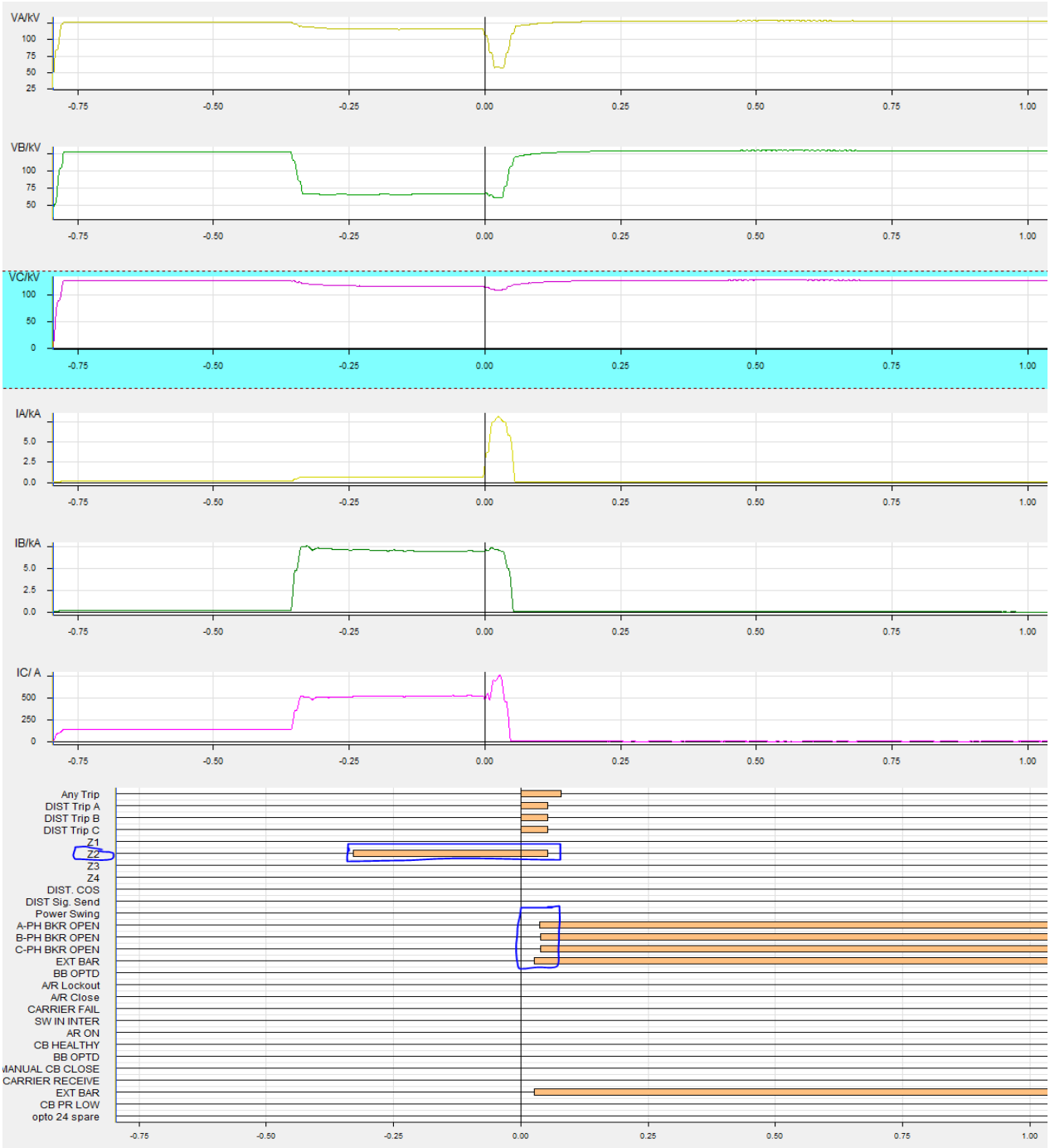
Annexure 1: Sequence of events recorded at ERLDC SCADA data at the time of the event.

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

Annexure 2: DR recorded

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

NEW TOWN BANTALA AT NEWTOWN END:



Annexure- B6

List of important transmission lines in ER which tripped in August-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/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE
1	220 KV DARBHANGA (DMTCL)-LAUKAHI-2	01-08-2022	19:50	01-08-2022	20:27		Laukahi: R_N, 13.81 km, 4.54 kA	R-Earth	100	Three phase tripping at Laukahi. A/r successful from Darbhanga after 700 msec	No	Yes	DMTCL	BSPTCL	Carrier channel-2 is not healthy since April'22
2	220 KV DARBHANGA (DMTCL)-LAUKAHI-1	05-08-2022	10:22	05-08-2022	11:53	Darbhanga: B_N, 1.9 kA	Laukahi: B_N, 17 km, 3.5 kA	B-Earth	350	Tripped in zone-2 time from Darbhanga despite carrier receipt. A/r attempt unsuccessful from Laukahi end	Yes	No	DMTCL	BSPTCL	Carrier channel-2 is not healthy since April'22
3	220 KV CHANDIL-RANCHI-1	05-08-2022	13:57	05-08-2022	14:23	Chandil: B_N, 7.9 km, 2.18 kA	Ranchi: B_N, 2.18 kA	B-Earth	350	Tripped in Zone-2 time from Ranchi. Carrier channels not healthy	No	Yes	JUSNL	PG ER-1	Shutdown taken on 20-09-22. Carrier channles testing to be done
4	220 KV DARBHANGA (DMTCL)-SAMASTIPUR-1	07-08-2022	12:08	07-08-2022	13:17	DMTCL: B_N, Zone-1	Samastipur: B_N, 1.3 kA	B-Earth	1500	Resitive fault. Other two phase at DMTCL opened after 300 msec of fault clearance	Yes	No	DMTCL	BSPTCL	PLCC issue
5	220 KV BEGUSARAI-SAHARSA-1	07-08-2022	13:44	07-08-2022	15:58	Begusarai: Master Trip relay operated	Saharsa: Didn't trip	No fault	NA	BSPTCL may explain	No	NA	BSPTCL	PMTL	Supervision relay burnt. Rectified on 11.08.22
6	220 KV BEGUSARAI-SAHARSA-2	07-08-2022	13:44	07-08-2022	15:58	Begusarai: Master Trip relay operated	Saharsa: Didn't trip	No fault	NA	220 KV BEGUSARAI-KHAGARIA D/C tripped at the same time. BSPTCL may explain	No	NA	BSPTCL	PMTL	
7	220 KV BEGUSARAI-SAHARSA-1	07-08-2022	16:50	11-08-2022	16:52	Begusarai: Master Trip relay operated	Saharsa: Didn't trip	No fault	NA	BSPTCL may explain	No	NA	BSPTCL	PMTL	
8	220 KV BEGUSARAI-SAHARSA-2	08-08-2022	03:50	11-08-2022	16:54	Begusarai: Master Trip relay operated	Saharsa: Didn't trip	No fault	NA	BSPTCL may explain	No	NA	BSPTCL	PMTL	
9	220 KV JODA-RAMCHANDRAPUR-1	10-08-2022	20:07	11-08-2022	13:26	Joda: Y_B, 1.54 km, 6.5 kA	Ramchandrapur: Y_B, 120.5 km, Zone-2, Iy: 2.2 kA, Ib: 2.07 kA	Y-B	350	Phase to phase fault. Carrier channels not healthy	No	No	OPTCL	JUSNL	Carrier channel not available
10	400 KV BIHARSHARIF-NEW PURNEA-1	11-08-2022	14:26	13-08-2022	14:43	Biharsharif: B_N, 75.3 km, 4.4 kA	New Purnea: B_N, 139.5 km, 2.93 kA	B-Earth	100	Other two phase at New Purnea tripped after 2.5 seconds. A/r attempt by Biharsharif after 2 seconds which failed due to persisting fault	Yes	Yes	PG ER-1	PG ER-1	Timer issue @ Biharsharif. Carrier failed @ New Purnea at that instance
11	400 KV ALIPURDUAR-JIGMELLING-1	15-08-2022	10:33			Alipurduar: O/V operated	Jigmelling: DT received	No fault	NA	Tripped on O/V from Alipurduar. Voltage was around 424 kV	No	NA	PG ER-2	BHUTAN	Issue in secondary of B_ph CVT. Under observation
12	220 KV ALIPURDUAR-BIRPARA-2	16-08-2022	07:01	16-08-2022	07:11	Alipurduar: Y_B, 57.8 km, Iy: 1.37 kA, Ib: 2.75 kA	Birpara: B_N, 11.7 km, 3.5 kA, A/r successful	Y-B	100	Single phase fault observed from Birpara and A/r successful.	No	No	PG ER-2	PG ER-2	
13	400 KV PPSP-BIDHANNAGAR-1	17-08-2022	04:47	17-08-2022	05:06	PPSP: R_N, Zone-1, 58.6 km	Bidhannagar: R_N, 130 km, 2.788 kA	R-Earth	100	A/r not kept in service as per OEM advise	No	Yes	WBSEDCL	WBSETCL	
14	220 KV BARIPADA-BALASORE-2	17-08-2022	20:06	18-08-2022	19:51	Baripada: Y_B, 17.7 km, Iy: 6.66 kA, Ib: 8.07 kA	Balasore: B_N, Zone-1, 49.3 km, 2.69 kA	Y-B-Earth	100	Phase-to-phase fault. A/r attempt taken from Balasore end after 1 sec which failed due to persistent fault	Yes	No	PG ODISHA	OPTCL	B_ph conductor snapped at loc. 81
15	220 KV ALIPURDUAR-BIRPARA-1	19-08-2022	06:00	19-08-2022	06:18	Alipurduar: R_B, 57.5 km, Ir: 2.85 kA, Ib: 1.3 kA	Birpara: R_N, 12.06 km, 3.67 kA, A/r successful	R-Earth	100	Single phase fault observed from Birpara and A/r successful.	No	No	PG ER-2	PG ER-2	Reach issue in Micom relay at Alipurduar
16	220 KV ALIPURDUAR-BIRPARA-2	19-08-2022	06:00	19-08-2022	06:40	Alipurduar: R_B, 45.89 km, Ir: 2.8 kA, Ib: 3.98 kA	Birpara: R_B, 10.37 km, Ir: 3.5 kA, Ib: 7.5 kA	R-B-Earth	100	Phase to phase fault	No	No	PG ER-2	PG ER-2	
17	220 KV RANCHI-HATIA-2	20-08-2022	09:42	20-08-2022	17:05	Ranchi: B_N, 28.7 km, 4.9 kA, A/r successful		B-Earth	100	A/r successful at Ranchi. Three phase tripping at Hatia. Tripped at 10:07 Hrs from Ranchi end	No	Yes	PG ER-1	JUSNL	Carrier channel healthy but A/r didn't occur at Hatia. Under investigation
18	220 KV KARMNASHA-SAHUPURI-1	23-08-2022	15:52	23-08-2022	17:34	Karmnasha: O/c (Y_ph, 1.98 kA)		Y-Earth	400	Tripped on O/c after 400 msec. Distance relay pickedup but line tripped prior to operation of distance relay.	Yes	NA	BSPTCL	NR	O/c settings to be reviewed

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/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE
19	400 KV RANCHI-RAGHUNATHPUR-3	29-08-2022	00:21	29-08-2022	01:05	Ranchi: B_N, 94.57 km, 4.07 kA	Raghunathpur: B_N, 77.43 km, 5.109 kA, A/r successful	B-Earth	100	No auto reclsoe occurred from ranchi end while a/r successful from RTPS	YES	No	PG ER-1	DVC	Channel configuration issue at Ranchi. Carrier received in only one channel
20	400 KV PPSP-BIDHANNAGAR-2	30-08-2022	11:39	30-08-2022	12:10	PPSP: R_N, 139.4 km	Bidhannagar: R_N, Zone-1, 43.8 km, 6.38 kA	R-Earth	100	NO A/R scheme	No	No	WBSEDCL	WBSETCL	Fault in PPSP-Bidhannagar line. Bidhannagar-Chanditala tripped as Bidahnnagar saw reverse fault in Zone-1. Under observation
21	400 KV BIDHANNAGAR-NEW CHANDITALA-2	30-08-2022	11:39	30-08-2022	12:22	Bidhannagar: B_N, 329 km, 0.31 kA	Chanditala: DT received, broken conductor	B-Earth	100	NO A/R from chanditala ,and bidhannagar end sensed R phase and B Phase cb opened and rest 2 phase were opened for 1.5 seconds and tripped after that due to suspected PD operation.	YES	YES	WBSETCL	WBSETCL	

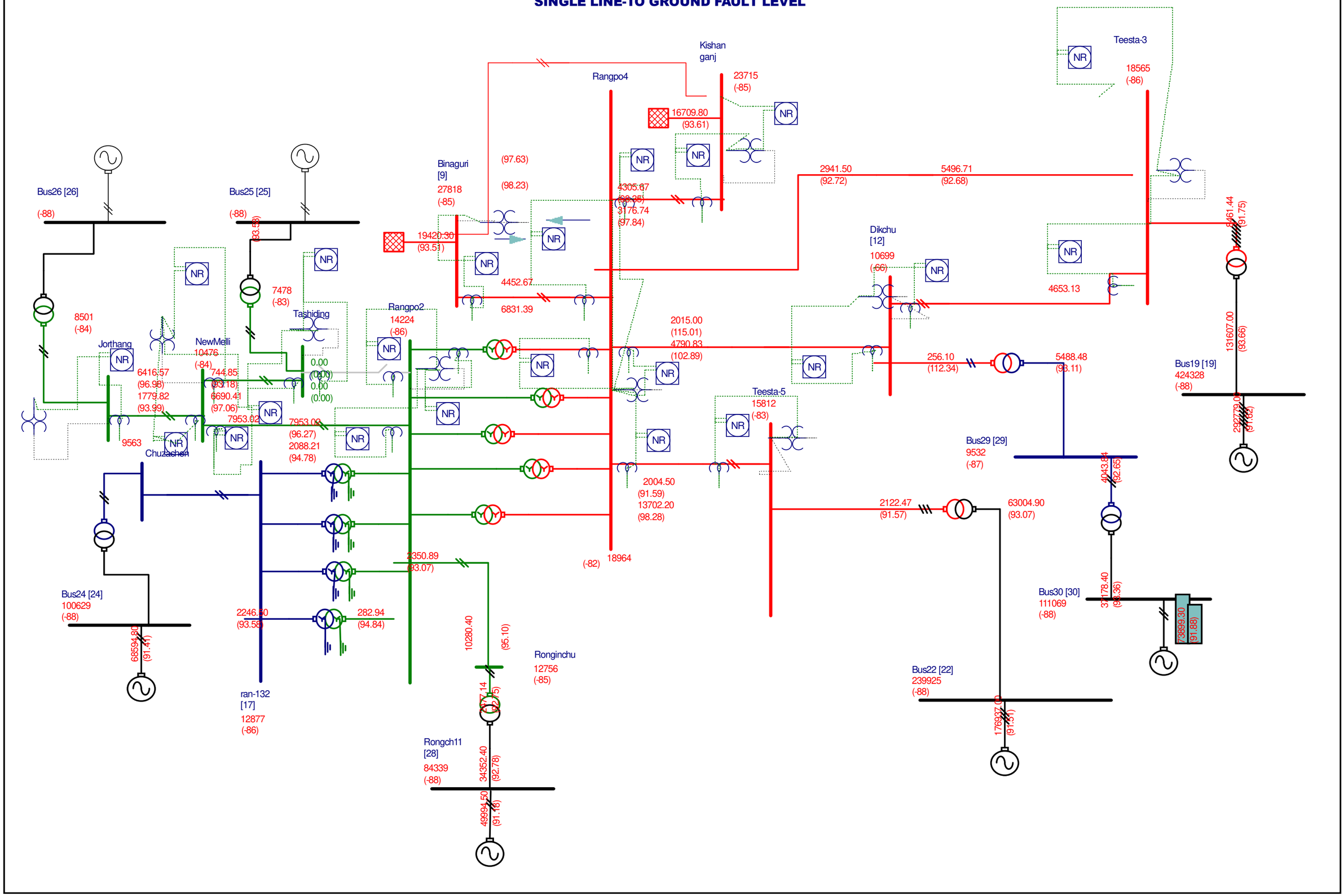
ANNEXURE-C.1

Sl No.	Name of the incidence	PCC Recommendation	Latest status
117th PCC Meeting			
1	Disturbance at 220kV Hajipur (BSPTCL) S/s on 31.07.2022 at 00:28 Hrs	*BSPTCL was advised to set zone-4 timing of all connected feeders at Hazipur S/s to 250 msec.*	*BSPTCL representative updated that zone-4 timer settings at Hazipur s/s has been revised to 250 msec.*
2	Total Power failure at 220 kV Joda (OPTCL) S/s on 27.07.2022 at 11:30 Hrs	*OPTCL representative replied that they would take necessary action for implementing autorecloser without PLCC at TTPS end. Further he informed that OPGW for the above line has been commissioned and after completion of DTPC commissioning work, the A/R scheme with OPGW communication would be implemented subsequently.*	*OPTCL updated that their team would visit to TTPS S/s within a week. Further they are coordinating with NTPC for early implementation of A/R without PLCC in 220 kV Joda-TTPS line.*
116th PCC Meeting			
3.	Disturbance at 400/220 kV Meramundali(OPTCL) S/s on 20.06.2022 at 16:31 Hrs	Regarding dead time setting of 330 msec in New Duburi line, PCC advised to set the dead time setting of autorecloser to one second as per the general practice. PCC opined that Meramundali being an important substation in Odisha system, necessary measure may be taken to ensure healthiness of all the protection system in the substation at the earliest and advised OPTCL to submit a timeline for restoration of LBB protection for all the concerned bays at Meramundali end. I*n 117th PCC,* OPTCL updated that the dead time setting has been revised as per the sugegstion of PCC.	*Regarding LBB, he updated that the procurement process has already initiated. The order would be placed by Sep-22. He added that as per OEM intimation, the delivery schedule would be delayed(around 14 to 16 weeks) due to semiconductor issues.*
4.	Total Power failure at 220 kV Chatra(JUSNL) S/s on 17.06.2022 at 11:36 Hrs	PCC advised JUSNL to share PUTT scheme implemented at Chatra end to ERPC/ERLDC for review. PCC further advised JUSNL to ensure implementation of weak infeed protection at Chatra end with a delay of	*In 118th PCC, JUSNL representative updated that the work could not be completed due to non-availability of relay engineer.* *PCC advised JUSNL CRITL team to visit the*

		50 ms for current reversal guard timer for 220 kV Daltonganj-Chatra D/C line. JUSNL was also advised to configure the disturbance recorders at Chatra end as per the guidelines approved by PCC.	*Chatra Station and try to resolve the issue by their in-house team.*
113th PCC Meeting			
5.	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. In 114th PCC, JUSNL representative updated that analog card failure was found in PLCC panel. New card is already received at site. The card would be replaced when service engineer visits the site.	

Annexure-C2

SIKKIM NETWORK
SINGLE LINE-TO GROUND FAULT LEVEL



Line	Relay Connected at	CT Ratio in A	Fault Location	Fault Current seen by the Relay	Existing			Proposed			
					Ie> in A (Primary)	TMS	Top in sec	Ie> in A (Primary)	TMS	Top in sec	TMS (correct)
Binaguri-Rangpo	Rangpo end	2000/1	Binaguri	4453	200	0.568	1.241985	400	0.564	1.6	0.56
Binaguri-Rangpo	Binaguri end	2000/1	Rangpo	6831	200	0.638	1.220696	400	0.667	1.6	0.67
Kishangunj-Rangpo	Rangpo end	3000/1	Kishangunj	3177	1200	0.514	3.65964	600	0.387	1.6	0.39
Kishangunj-Rangpo	Kishangunj end	3000/1	Rangpo	4306	400	0.28	0.805367	600	0.459	1.6	0.46
Rangpo- Dikchu	Rangpo end	3000/1	Dikchu	4791	200	0.61	1.302136	600	0.333	1.1	0.33
Rangpo- Dikchu	Dikchu end	3000/1	Rangpo	2015	600	1.5 (DT)	1.5	600	0.21	1.2	0.21
Rangpo- TeesthaV	Rangpo end	2000/1	Teestha V	13702	200	0.6	0.952209	400	0.575	1.1	0.58
Rangpo- TeesthaV	TeesthaV end	2000/1	Rangpo	2005	-	-		400	0.281	1.2	0.28
Rangpo-Teestha III	Rangpo end	3000/1	Teestha III	5497	1200	0.28	1.268379	600	0.356	1.1	0.4
Rangpo-Teestha III	Teestha III end	2000/1	Rangpo	2942	-	-		400	0.349	1.2	0.35
Dikchu-Teestha III	Dickchu end	3000/1	Teestha III	4653	400	1.5 (DT)	1.5	600	0.358	1.2	0.36
Dikchu-Teestha III	Teestha III end	3000/1	Dikchu	5832	-	-		600	0.399	1.2	0.40
Rangpo 220Kv Bus											
Rangpo- Newmelli	Rangpo end	1600/1	Newmelli	7953	320	0.399	0.841655	320	0.427	0.9	0.43
Rangpo- Newmelli	Newmelli end	1600/1	Rangpo	2088	320	0.33	1.208623	320	0.246	0.9	0.25

Tasheding-Newmelli	Tasheding end	800/1	Newmelli	745	160	0.24	1.075464	160	0.223	1	0.22
Tasheding-Newmelli	Newmelli end	1600/1	Tasheding	6690	320	0.314	0.701258	320	0.403	0.9	0.40
Newmelli-Jorethang	Newmelli end	400/1	Jorethang	6417	-	0.473		80	0.589	0.9	0.59
Newmelli-Jorethang	Jorethang end	400/1	Newmelli	1780	300	0.09	0.347553	300	0.155	0.6	0.16
Rangpo - Ronginchu	Rangpo end	1600/1	Ronginchu	10280	208	0.52	0.897307	208	0.522	0.9	0.52
Rangpo - Ronginchu	Ronginchu end	400/1	Rangpo	2351	60	0.5 (DT)	0.5	80	0.500	1	0.50

This is the condition by taking peak generation at all individual substation

Annexure-C3

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.

Annexure-C3.1

NAME OF THE GSS	REMARKS BY ERPC	COMPLIENCE BY OPTCL
400/220/132/33 KV GSS , LAPANGA	1. Event logger is not available for 220 kV System. The same shall be provided.	1.220 KV EVENT LOGGING INTEGRATED WITH 400 KV SAS EVENT LOGGER .
	2.Time synchronising equipment is not available for 220 kV system .	2. TIME SYNCH TO BE DONE WITH EXISITNG 400 KV TIME SYNCH AS NO 220 KV TIME SYNCH IS AVAILABLE.
	3.Busbar/LBB protection is not available for 220 kV system . The same shall be commissioned at the earliest.	UNDER PROCESS.
	4.Autorecloser is implemented without PLCC for all the 220 kV feeders. It was informed that OPGW for these lines are under commissioning.	done
	5.OPGW/DTPC commissioning may be expedited and thereafter carrier based autorecloser as well as intertripping scheme may be implemented for 220 kV lines.	UNDER PROCESS.
	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.	TO BE DONE.
	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.	ALL SETTINGS ARE UPDATED AS PER ERPC GUIDELINE.
	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.	8. SETTING FILES PREPARED .WILL BE DONE ACCORDINGLY.
	9.Autorecloser in 400 kV Lapanga-Meramundali line is having some issue. The same may be rectified.	9. Intimated to OEM for corrections in BCU logic .
	10.Power swing blocking enabled for all zones. It may reviewed and blocking may be done all the zones except zone-1.	10.To be done.
	11.Grading in terms of time/voltage setting shall be done in Overvoltage settings of 400 kV lines.	11. Grading done and Implemented in relays.

COMPLIANCE REPORT OF PROTECTION AUDIT CARRIED OUT ON 26.04.2022 AT BUDHIPADAR GRID S/S.

Sl. No.	Issue raised by Audit team	Compliance
1	Time synchronization equipment is not working	It is presently working but synchronization with some of the Relays to be done.
2	Main-1 relay of 220KV Budhipadar-Lapanga-1 & Main-2 relay of Budhipadar-SMC feeder defective	New relay(Siemens, 7SA522) commissioned for Main-1 of Lapanga-1. Main-2 D.P Relay of SMC feeder to be replaced.
3	Main-1 DP relay of following feeders are static type to be replaced with numerical 1) 220 Kv Budhipadar-IBTPS Line-1,2,3 and 4. 2) 220 kv Budhipadar-Tarkera Line 1 and 2. 3) 220 kv Budhipadar-Raigarh PG	Budhipadar-Tarker-1 and 2 , Budhipadar-IBTPS-1 and 2 replaced by numerical relay.
4	DC earth fault for 220KV Source-1 & Source-2	Very old single strand cables are to be replaced. Checking is under progress.However, the D.C Fault will be rectified during Automation of the S/S which is under progress.
5	PLCC is not in service. A/R scheme present without PLCC for Tarkera & Lapanga feeder	In addition to Tarkera & Lapanga, A/R scheme without PLCC implemented for 220KV Korba-1, Raigarh P.G & Lephripada feeder. OPGW available for IBTPS-3 & IBTPS-4.
6	PLCC for 220KV Raigarh PG and Korba-1 not working since long	To be discussed with Korba.
7	Zone setting to be reviewed as per phylosophy of ERPC and setting to be done as per present networking configuration of remote end,	Zone settings are updated as per ERPC Guideline
8	Oil leakage from 160 MVA Auto-1	Oil leakage through Breather arrested .
9	Bus bar Protection BU for some feeder defective and available for single bus protection presently. Zone-4 setting for feeders corresponding to Bus bar protection OUT are to be reduced to 250ms	All defective BU s of 220 KV Bus bar Proction are rectified and presently Bus bar Proction is in Healthy and Active condition . Zone-4 setting revised to 500ms.
10	Vegetation shall be cleared & proper PCC & gravelling should be done in the switchyard.	Vegetation is being cleard from corridor during S/D of the feeder. Regarding PCC and gravelling matter to be discussed with higher Authority.

Annexure-A

Protection Audit Recommendations for the Stations audited by protection audit team of ERPC

Sl No.	Name of Substation	Owner	Date of Audit	Remarks/Recommendation
1	400/220 kV Jamshedpur S/s	Powergrid	20.07.2022	1.Time synchronization for some of the relays are not as per the GPS clock. The same may be rectified.
				2.Zone-2 timer setting for all 400 kV lines is set to 500 msec. The same may be reviewed in line with ERPC Protection guidelines.
				3. TMS value of backup overcurrent IDMT relay is different for three ICTs whereas the pickup value is same for all the ICTs. Similarly TMS of backup earthfault relay for ICT-1 & ICT-2 is different than ICT-3. It is recommended to set TMS value for overcurrent relay as well as backup E/F relays uniform among all three ICTs.
2	400/220 kV Chaibasa S/s	Powergrid	21.07.2022	1.Switchyard equipments are in good and healthy condition. Switchyard area as well as overall station is well maintained.
				2.Though Overvoltage stage 1 settings are graded in time or voltage magnitude between the two ckts of Rourkella or Chaibasa or jamshedpur ,they are not so clearly graded as whole(Rourkella 1 and Jamshedpur 1 having identical settings).This part may be reviewed and the shorter line may be made to have higher magnitude or time value relative to the longer lines. No two 400 KV line should have exactly same settings in voltage triggering value or time delay.

3	220/132 kV Chandil(JUSNL) S/s	JUSNL	20.07.2022	**General:**
				1. Uniform protection philosophy shall be adopted across JUSNL network in line with ERPC Protection philosophy.
				2. Protection co-ordination to be done as and when there is change in network configuration or commissioning of new lines.
				3. Review of implemented protection settings need to be carried out periodically for JUSNL system..
				4.Measures shall be taken to ensure healthiness of busbar/LBB protection relay & PLCC system in the substation.
				1. Time synchronising equipment in substation is not available.
				2.For 220 kV Ranchi Feeder, only main-I protection relay is present along with separate back-up overcurrent relay. Main-2 protection relay shall be installed for this line.
				3. Peak load served by the station is 240 MVA,however three out of four 100 MVA 220/132 KV ATR are functional. 4th ATR is out since 30.4.2020 and replacement status is not available.N-1 relibility criteria is being not satisfied during peak condition. Steps may be taken at the earliest to bring 4th ATR into service.
				4.Oil leakage found in ATR-1. However due to high demand, the shutdown is not being allowed and the issue can not be attended. The same may be looked into urgently.
				5.220 kV is having sing main & transfer bus scheme. As intimated by S/s incharge, proposal for bus sectionalizer in 220 kV bus is under consideration.
				6.Busbar/LBB protection is not available.
				7.Zone 4 delay time for all 220 kV lines is 300 ms.it may be made 250 ms as Bus bar protection is not commissioned.
				8.Disturbance recorders shall be configured as per the DR standard guidelines of ERPC.
				9. For Santaldih ckt, zone 2 reach has been setting has been done as 18.97 Ω which seems to be on the higher as it is appearing to be 120% of line length + 50% of Shortest adjacent line. As per ERPC guideline, the same for 220 KV line should be either 120% of line length or (100% of length+ 50% of shortest adjacent line).
				10.For Ramchandrapur line, zone 3 value is 23.87 Ω. However, this value is encroaching the 2x150 MVA 220/132 KV ATR impedance in Ramchandrapur as seen from chandil,so the time delay of zone 3 may be suitably reviewed and coordinated with fault clearing time of the said ATR.
				11.Only one DC battery source is found in service while other is in spare and not in service simultaneously. For 220 KV, Two separate Dc sources are recommended feeding to main 1 and main 2 relays with separate trip coils as per CEA construction standards.
				12.Power swing block is enabled for all the zones in 220 kV lines. It is recommended to block zone 2 and above with unblocking time of 2 seconds
				13.REF protection for ATRs is not available in all but one. For one ATR, though REF protection is avaialble, REF has been kept disabled after it maloperated during through faults. It is advised to implement REF protection for all the transformers.
				14.DC earth leakage was found. Battery connectors were found to have oxidized etching marks. Action may be taken to rectify the above issue.
				15.PLCC channels are not healthy for Ranchi line.For Sanataldih circuit, the autorecloser dead time setting may be checked and set to 1 sec.
				16.Bus CVT is being used for distance protection relay of 220 kV feeders. Provision for line CVT in 220 kV Feeders may be envisaged and implemented.
				17.PCC & Gravelling may be done for complete area of 220 kV Switchyard.
				18.LA counter is missing in ATR-2. The same may be provided.
				19.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.

4	220 kV Ramchandrapur	JUSNL	21.07.2022	1. Bus 2 PT is not in service. Only bus 1 PT is present and it is being used in distance relay for covering short line section between the 220 KV side 400/220 KV Jamshedpur ICT terminals to 220 KV Ramchandrapur bus .Bus-2 PT may be replaced at the earliest.
				2.Requirement of distance protection on RCP end for the line section of 220 kV RCP-Jamshedpur(PG) may be reviewed. In case distance protection remain in operation, provision for line CVT may be envisaged where distance protection is in service.
				3.Only one DC battery source is found in service while other is in spare and not in service simultaneously. For 220 KV level, Two separate Dc sources are recommended feeding to main 1 and main 2 relays with separate trip coils as per CEA construction standards. Necessary action may be taken to operate two sources in parallel.
				4.DR is not GPS time synchronised. The same may be rectified.
				5. DR time window may be increased. DR configuration may be done in line with guidelines approved in ERPC PCC meeting.
				6.Busbar relay panel is placed in old control room without Air Conditioning.Action may be taken to place the busbar panel in a AC room.
				7.Zone settings for chandil line shall be reviewed in line with ERPC protection philosophy.
				8. Zone-2 & zone-3 reach setting may be reviewed for Chaibasa fedder
				9.Zone-3 setting may be reviewed for 220 kV RCP-Joda feeder.
				10. LBB relays are not for individual bay as a result LBB protection is not functional although busbar protection is in service. As per CEA grid connectivity regulation, LBB is mandatory for 220 kV S/s. Action may be taken to implement the same.
				11.Power swing block is enabled for all the zones in 220 kV lines. It is recommended to block zone 2 and above with unblocking time of 2 seconds
				12.Autoreclose scheme is implemented without PLCC . Dead time is seen to be 1.2 sec ,while recommendation is 1 sec. Reclaim time is 3 seconds while recommendation is 25 seconds.Above settings may be reviewed.
				13.PLCC is healthy only for 220 kV Chaibasa lines. For rest 220 kV feeders, steps may be taken to address the PLCC issue and put into service at the earliest.
				14.N-1 relaibility criteria is not being satisfied for 200/132 kV ATRs in both peak & off-peak period.Out of 3 ATRs available, one is out of service due to bushing failure since long wheras another transformer is being operated in very critical condition having heavy oil leakge. As per the reports submitted in S/s, the parametes w.r.t. transformer oil and bushing is not as per the standard. It is recommended that complete overhauling/replacement of ATR-2 may be done at the earliest. SImilarly action may be taken for bushing replacement for ATR-1 which is out of service since long.
				15.PCC & Gravelling may be done for transformer bays in 220 kV Switchyard.
				16.REF protection is not in service for both the 220/132kV transformers. The same may be implemented.

5	220 kV Chaibasa S/s	JUSNL	21.07.2022	1. Disturbance recorders are not time synchronised.
				2. DR time window may be increased. DR configuration may be done in line with guidelines approved in ERPC PCC meeting.
				3. Zone-2 reach setting & zone-3 timer setting for Ramchandrapur feeder shall be reviewed in line with ERPC protection philosophy.
				4. Overvoltage protection was seen to be enabled with stage 1 at 110%,5 sec delay. The same may be disabled or set to a higher value(greater than 112 %).
				5.For Ramchandrapur feeders, autorecloser is not in service for both the circuits due to issue in BCU panel. The issue may be looked into at the earliest.
				6. Zone-3 & Zone-4 reach setting to be reviewed for 220 kV Chaibasa-Chaibasa(PG) line.
				7. In 150 MVA 220/132 KV ATR, low set current pickup setting in backup O/C relay is 1048 A ,which is 260% of transformer rated current. This current pick up setting may be reviewed.
				8.The bus bar protection relay is not functional due to fibre communication error as shown in relay display. Being a imporatant protection in the substation, immediate measure shall be taken to rectify the issue and bring the busbar relay into service.
				9. Air conditioning is not working in the kiosks housing the relay panel for different bays. AC shall be provided for proper functioning of protection system panels & to prevent failure of numerical protection systems.
				10.It is seen in the switchyard that both bus side isolators of 220 KV Chaibasa Chaibasa ckt 2 and 220 KV Chaibasa Ramchandrapur ckt 1 are in closed condition. This may be immediately changed to a single bus only as whenever there is a bus fault in either of 220 KV bus,both lines will trip during fault clearance. Necessary modification may be made in wiring of bus bar relay and Peripheral units.
				11.DC earth leakage was observed in one of the DC sources. The same may be attended.
6	220 kV Jamshedpur S/s	DVC	22.07.2022	1.PLCC is not working for 220 kV JSD-Jindal line. Therefore autorecloser scheme is kept disabled for the line. PLCC panel is present at Jamshedpur end however there is no information of PLCC at JSPL end. The matter may be taken up with appropriate authority for commissioning PLCC in the line.
				2. Disturbance recorder configuration to be done as per DR standard guidelines by ERPC. CB close status(CB open shall be configured in DR instead of CB Close) to be rectified and DR window size to be increased in DR.
				3. Time synchronising equipment in substation control room is not working. The same may be rectified & put into service.
				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.For JSPL circuit, Zone 2 reach is encroaching half of next shortest adjacent line,so time delay is seen to be 500 ms. Alternatively,reach may be reduced from 120% of length to line length plus 50% of SAL ,while time delay can be maintained at 350 msec. To be reviewed.
				6. Zone-2 reach setting for Bokaro line may be reviewed considering the shortest adjacent line as 220 kV BTPS-CTPS.
				7.As informed by S/s Incharge, in the LBB protection there is no provision of sending DT signal to other end of the line. The scheme may be reviewed and transmitting DT signal to other end in LBB protection may be incorporated.