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/2023/1451 दिनांक /**DATE:14.02.2023**

सेवा में / To,

संलग्न सूची के अनुसार / As per list enclosed.

विषय : दिनांक - 16.01.2023 को आयोजित 122वीं पीसीसी बैठक का कार्यवृत्त।

Sub: Minutes of the 122nd PCC meeting held on 16.01.2023.

Sir,

16.01.2023 को आयोजित **122वीं** 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 **122nd PCC** meeting of ERPC held on **16.01.2023** available at ERPC website (**http://www.erpc.gov.in/**).

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

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

भवदीय / Yours faithfully,

14.02.23.

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

LIST OF ADDRESSES:

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Chief Engineer(System Operation), SLDC , BSPTCL, Patna-800021	
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
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Executive Director, ERLDC, POSOCO, Tollygunge, Kolkata-700033	The Head Maithon Power Limited, Maithon Office, MA 5 Gogna, Dist. Dhanbad, Jhankand State, PIN-828207
General Manager (AM), ER-II Power Grid Corporation of India Ltd., J-I-15, Block-EP, Sector-V,Salt Lake,Kolkata-91	Head –Regulatory and contracts, IndiGrid Limited , 247 Embassy, Office No 107, 'B' Wing, Hindustan Co. Bus Stop, Gandhi Nagar, L.B.S. Road, Vikhroli West, Mumbai – 400 079. Ph : +91 845509 96408
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Managing Director, Bhutan Power Corporation Post Box no. 580, Thimpu, Bhutan.	Managing Director, Druk Green Power Corprn. P.O. Box-1351, Thimpu, Bhutan.

Associate Director (Commercial and Regulatory) Darbhanga-Motihari Transmission Company Limited (DMTCL),503, Windsor, Off CST Road, Kalina, Santacruz(E), Mumbai-400098	The Plant Head, JITPL, Angul, Odisha (FAX:011-26139256-65)
Shri D. P. Bhagava, Chief Consultant (O&M), TeestaUrja Limited, New Delhi (FAX:011-46529744)	Director (GM Division), Central Electricity Authority Sewa Bhawan, R. K. Puram, New Delhi-110066
Director (NPC), CEA, NRPC Building, Katwaria Sarai, New Delhi- 110016	President, Dans Energy Pvt. Ltd, 5th Floor, DLF Building No. 8, Tower-C, Gurgaon - 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
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Minutes
of
122nd PCC Meeting

Date:14/02/2023
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 122nd PROTECTION COORDINATION SUB-COMMITTEE MEETING HELD ON 16.01.2023 AT 10:30 HOURS THROUGH MS TEAMS ONLINE MEETING PLATFORM

Member Secretary chaired the meeting. List of participants in enclosed at **Annexure A.**

PART – A

ITEM NO. A.1: Confirmation of Minutes of 121st Protection Coordination sub-Committee Meeting held on 16th December 2022 through MS Teams online platform.

The minutes of 121st Protection Coordination sub-Committee meeting held on 16.12.2022 was circulated vide letter dated 10.01.2023.

Members may confirm.

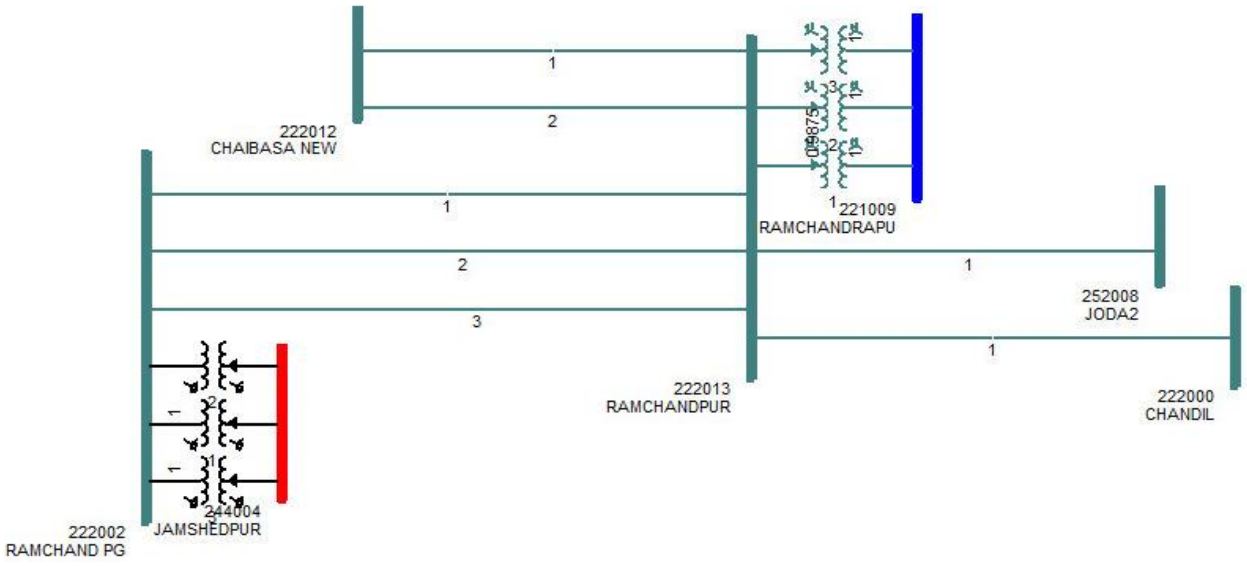
Deliberation in the meeting

Members confirmed the minutes of 121st PCC Meeting.

PART – B

ITEM NO. B.1: Total Power failure at 220 kV Ramchandrapur(JUSNL) S/s on 17.12.2022 at 11:23 Hrs.

On 17.12.2022 at 10:45 hrs, there was CT burst for B phase of 220 kV Ramchandrapur-Chaibasa-1 at Ramchandrapur leading to operation of Bus Bar protection. Subsequently 220 kV Bus-1 got tripped. At 11:23 Hrs, 220 kV Main Bus-2 was made off by tripping remaining feeders as a precautionary step in order to extinguish fire caused by CT blast. Consequently, total supply failed at Ramchandrapur.



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

Load Loss: 296 MW
Outage Duration: 01:50 Hrs

JUSNL may explain.

Deliberation in the meeting

JUSNL representative informed that on 17.12.2022 at 10:45 Hrs, B phase CT of 220 kV Ramchandrapur-Chaibasa-1 at Ramchandrapur got burst that resulted in bus fault in 220 kV Bus-1 at Ramchandrapur. Subsequently bus bar protection operated and resulted in tripping of 220 kV Bus-1.

At the same time 132 kV Ramchandrapur-Adityapur D/c also tripped from Adityapur end in zone-1 protection for same bus fault.

Consequently 220/132 kV ICT 2 at Ramchandrapur got overloaded. In order to avoid overloading of 220/132 kV ICT 2 at Ramchandrapur, 132 kV Ramchandrapur-Jadugoda was hand tripped from Ramchandrapur end at 10:49 Hrs. As bursting of CT had resulted in fire, so 220 kV Bus-2 at Ramchnadrapur was switched off at 11:23 Hrs by hand-tripping remaining feeders as a precautionary measure to extinguish fire.

Regarding spurious operation of distance relay at Adityapur end for 132 kV Ramchandrapur-Adityapur, JUSNL representative informed that as per relay fault record, the fault location is in zone 1 at 38 km and 40 km for both circuits (500 %) which is incorrect operation. The reach settings and zone settings were checked for relays of both circuits however no discrepancy was found. Power swing setting was also checked and it was found to be disabled for zone 1 distance protection.

PCC advised JUSNL to test the concerned relay for 132 kV Ramchandrapur-Adityapur D/c at Adityapur end in consultation with relay OEM and share observation to ERPC/ERLDC after testing.

PCC further advised JUSNL/SLDC Jharkhand for maintaining uniform feeder distribution for each bus at Ramchandrapur as well as for other substations.

ERPC representative enquired JUSNL about replacement of CT having oil leakage issue of 220 kV Joda- Ramchandrapur line for which JUSNL representative replied that faulty CT had already been replaced.

ITEM NO. B.2: Disturbance at 400 kV Barh(NTPC) S/s on 22.12.2022 at 07:26 Hrs

On 22.12.2022 at 07:26 Hrs, 400 kV Barh-Patna-3 tripped due to B phase fault in the line. Auto-reclose attempt was failed after dead time, however other two healthy phase of the line didn't trip at Barh end. After around 11 seconds, other two phase got tripped and at the same time 660 MW U#1 at Barh also got tripped.

Relay Indications:

Time	Name	End 1	End 2	PMU observations
07:26	400 kV Barh-Patna-3	Barh: B_N, 18.5 km, 25.06 kA	Patna: B_N, 68.9 km, 8.6 kA	5 kA fault recorded at Patna. Fault clearance time 100 msec. Other two phase at Barh remained closed.
	660 MW U#1 at Barh	GT tripped		

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

Gen. Loss: 620 MW
Outage Duration: 09:08 Hrs

NTPC may explain.

Deliberation in the meeting

The event was explained by NTPC representative as follows:

- *At 07:26 Hrs, B phase fault was developed in 400 kV Barh-Patna-3 line. The relay at Barh end sensed the fault in zone-1 at 18 km from Barh and line got tripped from both ends.*
- *The auto-reclose attempt was initiated and was not successful since fault was permanent in nature. All three phases of main breaker got open however two healthy phases for tie breaker did not open after dead time.*
- *After 11 second, these two phases of tie breaker got opened and at the same time unit 1 at Barh also got tripped.*

Powergrid representative informed that B phase pilot insulator flashover had occurred at 18 km from Barh end that resulted in B phase fault in line.

Regarding tripping of unit 1, he informed that Buchholz relay of Generating transformer had operated during the event that had resulted in unit tripping. Reason behind operation of Buchholz relay was investigated and no gas accumulation was observed in Buchholz relay. He added that DGA test result was also found to be satisfactory and therefore opined that the tripping may be due to flow of of such heavy current (75 k A) for a small span of time which had increased the transformer vibration leading to spurious Buchholz operation. Regarding remedial measure, he intimated that Buchholz relay with mercury float switch had been replaced with magnetic reed switches in the Generator Transformer.

Regarding non opening of two healthy phases of tie breaker after dead time of auto-recloser, He informed that shutdown was taken on 23.12,2022 to investigate this discrepancy during which pole discrepancy test was done for tie breaker and issue was found in breaker interpole cabling of B phase which was subsequently rectified.

He further informed that on 24.12.2022, 400 kV Barh-Patna 3-line shutdown was taken on emergency basis for protection relay and associated trip circuit/auto reclose checking in which following testing were done-

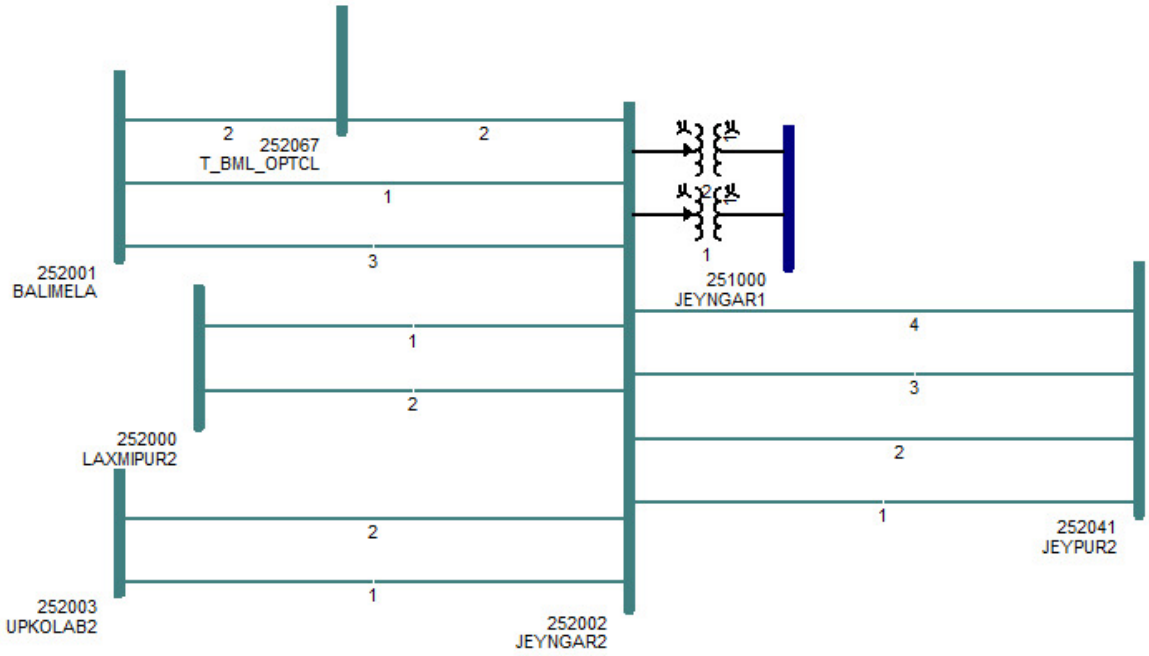
a. *Zone protection settings of relay were checked by secondary injection method and found ok.*
b. *Auto-recloser operation was attempted for both main and tie breaker subsequently attempt was successful for main breaker of 400 kV Barh-Patna 3, but unsuccessful for tie breaker.*
c. *On further analysis it was observed that 'CB not ready' status was being read by the auto recloser relay which ultimately led to auto reclose lockout and 3-phase tripping.*
d. *Further 86 relay operations due to auto reclose lockout was having a sluggish response i.e.*
e. *relay had operated after approximately 10-15 seconds subsequently relay wiring and 86 relay was checked thoroughly however no anomaly was found and hence for precaution, 86 relay was replaced by new one.*
f. *'CB not ready' status which was being read by the relay was caused due to lack of adequate hydraulic pressure in the breaker so pressure setting modification was done.*

ERLDC enquired about reporting of voltage spike during the event of 570 kV to which NTPC representative replied that issue had caused due to double earthing at S/s which had been rectified.

ERLDC representative enquired NTPC about reason behind opening of two healthy phases of main breaker after 850 ms of start of A/r operation to which NTPC representative replied that checking of main breaker scheme will be carried out after taking the line shutdown.

ITEM NO. B.3: Total Power failure at 220/132 kV Jayanagar (OPTCL) and 220 kV Balimela HEP S/s on 24.12.2022 at 12:05 Hrs

On 24.12.2022 at 12:05 Hrs, 220/132 kV Jayanagar and 220 kV Balimela S/s became dead. One running unit, U#5 at Balimela got tripped during the event. As per PMU, there was a high resistive fault in R phase which got persisted for around 5 seconds and subsequently evolved to a R_B_N fault.



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

Detailed report from ERLDC is attached at **Annexure B.3.1.**

Gen. Loss: 20 MW
Outage Duration: 02:35 Hrs

OPTCL and OHPC may explain.

Deliberation in the meeting

OPTCL representative explained the event as follows:

- *At 12:05 hrs, B-phase fault of high resistive nature was occurred in 220 kV Jayanagar-Laxmipur circuit-2. The fault was sensed by relay at Jayanagar end in zone 1 and line got tripped from Jayanagar end. However, distance protection did not pick up at Laxmipur end*

and tripping occurred by DEF protection after a long time delay from Laxmipur end. The fault current was also observed in relays of circuit-1 of 220 kV Jaynagar-Laxmipur line.

- *Relays at Jeypore end for 220 kV Jeypore -Jayanagar D/C also sensed the fault and tripped in DEF protection. The other two circuits of 220 kV Jeypore-Jaynagar was in off condition prior to the disturbance.*
- *220 kV U. Kolab- Therubali S/c also tripped in non -directional earth fault protection from U. Kolab end during the event.*
- *Further, because of these tripping, bus voltage at Jayanagar got raised to 257 kV subsequently 220/132 kV ICTs got tripped in over flux protection and remaining 220 kV Balimela HEP- Jayanagar S/c got tripped in overvoltage protection from Balimela end.*
- *These tripping resulted in isolation of 220 k V Jayanagar, Balimela and U.Kolab bus and subsequently these buses became dead. Further two running units at U.Kolab and one unit at Balimela got tripped due to loss of evacuation path.*

PCC enquired OPTCL about physical fault location to which OPTCL representative replied that patrolling was done after the event and severe vegetation issues were found in line corridor. so they expected that because of clearance issues, fault might had occurred. Subsequently bamboo tree cutting work was done in order to avoid tripping incidents in future.

On enquiry from ERLDC regarding non operation of distance protection from Laxmipur end for 220 kV Jayanagar- Laxmipur circuit 2 during the event, OPTCL representative replied that during the time of incident, voltage at Laxmipur end was fluctuating severely that might be reason for non-pickup of distance protection. ERLDC representative replied that as per DR of 220 kV Jayanagar-Laxmipur circuit-1, voltage was steady in nature at Laxmipur end.

PCC advised OPTCL to test the distance protection relay of 220 kV Jayanagar- Laxmipur circuit-2 at Laxmipur end.

ERLDC representative stated that fault current was also sufficient (> 1 k A for 1 second) for operation of DEF for 220 kV Jayanagar- Laxmipur circuit 1 but it was observed from DR that DEF command was dropping continuously which resulted in delayed clearance from Laxmipur end.

PCC advised OPTCL to test DEF relay at Laxmipur end for 220 kV Jayanagar- Laxmipur circuit-1 in coordination with relay OEM and in case the relay is found faulty, the same needs to be replaced at the earliest. Further it was advised to check & ensure zero sequence polarization was set in relay instead of negative sequence polarization.

During analysis of event, it was opined that backup overcurrent should have operated at Laxmipur end for 220 kV Jayanagar- Laxmipur D/C line as fault current was persisting for 5-6 seconds. So it was recommended to test backup overcurrent relay too at Laxmipur end for 220 kV Jayanagar-Laxmipur D/c.

Regarding operation of non- directional earth fault protection for 220 kV U. Kolab- Therubali S/c from U. Kolab end, OHPC representative replied that non directional setting had been made to directional for E/F at U.Kolab end for 220 kV U. Kolab- Therubali S/c. PCC advised OHPC to change non directional E/F protection to directional E/F protection for other feeders also.

Regarding tripping of 220 kV Balimela HEP- Jayanagar S/c in overvoltage protection from Balimela end, OPTCL representative replied that as per confirmation from Balimela end overvoltage settings had been changed to 260 kV with time settings 30 seconds from existing setting of 250 kV with 5 seconds.

ITEM NO. B.4: Tripping Incidence in month of Decemeber-2022

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

Concerned utilities may explain.

Deliberation in the meeting

Members explained the tripping incidences. The updated status is enclosed at ***Annexure B.4.***

PART- C :: OTHER ITEMS

ITEM NO. C.1: Increased number of Fog related tripping of transmission lines

It has been observed that in December 2022 and January 2023 the transmission lines specially which are connecting Eastern -Northern region is facing repeated auto reclosers due to flashovers and these repeated flashovers is causing insulator puncture subsequently breakdown of line.

List of lines which have tripped repeatedly in last 30 days have been shown below.

Sr. No	Name	Fog Related Tripping
1	400KV BARH-PATNA-1	8
2	400KV BARH-KHSTPP-1	3
3	400KV-BIHARSARIFF(PG)-KODERMA--2	5
4	400KV-BIHARSARIFF(PG)-VARANASI-1	4
5	400KV-BIHARSARIFF(PG)-VARANASI-2	3
6	400KV-BIHARSARIFF(PG)-BALIA-2	1
7	400KV-MUZAFFARPUR-GORAKHPUR-1	2
8	400KV-MUZAFFARPUR-GORAKHPUR-2	2
9	220KV-MUZAFFARPUR-HAJIPUR-1	2
10	400KV-PATNA-SAHARSA-1	1
11	765KV-FATEHPUR-PUSAULI-1	1

Utilities may update & discuss.

Deliberation in the meeting

Powergrid representative informed that these lines are facing repeated auto reclosers due to repeated flashovers resulting in insulator puncture and ultimately leading to tripping of lines. He further informed that after carrying out detailed investigation it had been found that because of dust accumulation due to higher air pollution level, repeated flashover of insulators is occurring. Regarding remedial measure, he informed that insulators cleaning and replacement is planned by availing shutdown that will minimize number of tripping incidents.

ITEM NO. C.2: Implementation of Single-Phase Auto recloser feature in DEF Relays for the 400 kV transmission lines of TPTL-(Agenda by TPTL)

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

Subsequently TPTL had contacted with the relay suppliers of 400 kV D/C Teesta III HEP – Kishanganj transmission line at Teesta III end and Kishanganj end. The supplier of P442 relay at Teesta III HEP end, i.e., M/s GE Renewable Energy has confirmed that single phase tripping and auto reclose is possible in aided DEF protection function in the P442 relay. Further, as per the relay manual of MiCOM P127 relay, supplied by M/s Areva (formerly M/s Schneider) at Teesta III end, auto reclosure feature is available in DEF protection function of the relay. At Kishanganj end it was also confirmed by the relay supplier, i.e., M/s Hitachi Energy (formerly M/s ABB Power Systems India) that single phase auto reclose is available in DEF protection function of REL670 relay.

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

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

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

Concerned utilities may update.

Deliberation in the meeting

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

PCC advised TPTL to make a detailed presentation on proposed scheme & its logic and on implementation of the scheme at relay level along with wiring & communication channel detailing in next PCC meeting.

ITEM NO. C.3: Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022

Under section 177 of the Electricity Act, 2003 (36 of 2003) read with clause (b) of section 73 of the said Act, Central Electricity Authority has notified the CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022 w.e.f 23/12/2022. The same is available at CEA website.

Members may note.

Deliberation in the meeting

Members noted.

ITEM NO. C.4: 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 information are in order.

The DEF settings based on the revised study is enclosed at **Annexure C.4.**

Confirmation of implementation of proposed settings had been received by all concerned utilities except Powergrid ER-II.

Powergrid ER-II may update.

Deliberation in the meeting

It was informed that confirmation of implementation of proposed settings had been received by all concerned utilities except Powergrid ER-II.

Powergrid ER-II representative was not available in the meeting.

ITEM NO. C.5: 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.5**.*

ITEM NO. C.6: List of lines having OPGW for 220 kV and above level.

During analysis of protection performance of various utilities of eastern region during the previous PCC meetings, it was observed that one of the main reasons for single line tripping is either due to non-availability of PLCC/auto recloser or spurious DT triggering.

Further, for many of the lines auto recloser scheme has been planned to be implemented after commissioning of OPGW/DTPC in the concerned lines.

In this regard, all the utilities are requested to provide the list of 220 kV and above lines where

I. OPGW based communication scheme have already been implemented
II. Upgradation to OPGW has been planned/OPGW work is under progress.

Further, wherever OPGW have been installed, PLCC may be replaced with DTPC.

In 121st PCC Meeting, ERPC secretariat representative informed that as per analysis of performance of protection system of various utilities of eastern region, non-availability of PLCC/auto recloser or spurious DT triggering is observed to be key reason behind large number of single line tripping incident so it is proposed that OPGW based communication scheme may be commissioned in concerned lines along with implementation of DTPC in place of PLCC for reducing number of tripping incidents.

In this regard, he requested all utilities to provide the list of 220 kV and above lines where:

I. OPGW based communication scheme have already been implemented
II. Upgradation to OPGW has been planned/OPGW work is under progress.

PCC advised all utilities to share the list of lines as mentioned above to ERPC.

Members may discuss.

Deliberation in the meeting

ERPC representative informed that as per Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, it is mandated to implement OPGW based communication scheme in lines above 132 kV. So, he requested all utilities to provide the list of 220 kV and above lines where:

I. OPGW based communication scheme have already been implemented
II. *Upgradation to OPGW has been planned/OPGW work is under progress*.

PCC advised all utilities to share the list of lines as mentioned above to ERPC.

ITEM NO. C.7: Compliance of Third-Party Protection Audit Observations

The compliance status of Third-Party Protection Audit observations is as follows:

Name of Constituent	Total observations	Complied
Powergrid	7	3
NTPC Darlipalli	3	2
OPTCL	21	7
OPGC	17	4
JUSNL	46	16
DVC	7	2

Concerned utilities may update.

Deliberation in the meeting

Members noted.

Present status of compliances is attached at ***Annexure C.7.***

ITEM NO. C.8: New Element Integration

A) Charging of 220 kV Rengali (PH)-TSTPP and 220 kV TSTPP-TTPS after diversion works.

There has been change in line length of 220 kV Rengali (PH)-TSTPP and 220 kV TSTPP-TTPS after diversion works.

Revised line length is as below:

Name of the element	Line Length (km)	
	Before	After
220 kV Rengali (PH)-TSTPP	29.5	**25.9**
220 kV TSTPP-TTPS	34.5	**35.8**

Protection setting at TSTPP (NTPC) and TTPS end may be revised and confirmed at the earliest to facilitate FTC of both lines. Status of PLCC may also be intimated.

Concerned utilities may update.

Deliberation in the meeting

ERLDC representative informed that confirmation of implementation of revised settings had been received from concerned utilities.

******

Annexure A

List of Participants in 122nd PCC Meeting held on 16/01/2023 at 10:30 AM

Name	First join	Email
ERPC Kolkata	16/1/23, 10:23:31 am	ERPC@KolkataMST.onmicrosoft.com
NIRMAL MONDAL (WBSETCL) (Guest)	16/1/23, 10:23:41 am	
SANTANU KUMAR BAHALI	16/1/23, 10:23:41 am	SANTANUBAHALI@NTPC.CO.IN
Amit Parida, Dy. Mgr(El.) OHPC, KOLAB	16/1/23, 10:23:42 am	
ABAKASH ADHIKARY	16/1/23, 10:23:45 am	abakash.adhikary@dvc.gov.in
Aarif Md (DIkchu HEP)	16/1/23, 10:25:35 am	
Dharm Das Murmu	16/1/23, 10:26:09 am	
Akash Kumar Modi	16/1/23, 10:27:33 am	akmodi@erldc.onmicrosoft.com
AVINASH SHUKLA	16/1/23, 10:27:51 am	AVINASHSHUKLA@NTPC.CO.IN
Ramchandrapur jusnl	16/1/23, 10:28:22 am	
suryakanta pradhan	16/1/23, 10:28:23 am	rajahkd1984@gmail.com
Somnath Chatterjee	16/1/23, 10:28:54 am	schatterjee@tatapower.com
SMS SAHOO, DGM(ELECT), OPTCL, BHUBANESWAR (Guest)	16/1/23, 10:29:11 am	
Rahul Anand	16/1/23, 10:29:40 am	RAHULANAND@NTPC.CO.IN
Sudeep Kumar, ER1	16/1/23, 10:29:44 am	
Pravin Ram	16/1/23, 10:29:46 am	
Amresh Prusti	16/1/23, 10:31:11 am	amresh.prusti@opgc.co.in
critl bsptcl	16/1/23, 10:31:12 am	
Sougato Mondal	16/1/23, 10:31:23 am	saugato@erldc.onmicrosoft.com
Parag Chatterjee	16/1/23, 10:31:33 am	paragchatt@gmail.com
Alok Pratap Singh	16/1/23, 10:31:41 am	apsingh@erldc.onmicrosoft.com
Arindam bsptcl	16/1/23, 10:32:10 am	
Prasant Senapathy	16/1/23, 10:32:38 am	Prasant.Senapathy@gmrgroup.in
SLDC,ODISHA (Guest)	16/1/23, 10:33:43 am	
Prabhat Kumar	16/1/23, 10:33:57 am	prabhat@tvptl.com
s konar (Guest)	16/1/23, 10:34:10 am	
EMR BBSR (Guest)	16/1/23, 10:35:41 am	
suraj	16/1/23, 10:35:44 am	
Vijay Chandra TEESTA-III	16/1/23, 10:35:47 am	
Gulshan Rongnichu	16/1/23, 10:36:14 am	
KUMAR AMRENDRA MADANPURI	16/1/23, 10:37:28 am	

Debdas Mukherjee,WBPDCL	16/1/23, 10:38:01 am	
Mihir Rath	16/1/23, 10:38:10 am	
JAYANAGAR GRID OPTCL	16/1/23, 10:40:08 am	
GM CRITL	16/1/23, 10:41:22 am	
Power House Teesta Urja	16/1/23, 10:42:53 am	powerhouseteestaurja@teestaurja.com
Nishant Kumar Shankwar	16/1/23, 10:43:31 am	Nishant.Kumar@energy-sel.com
ramesh Rajak	16/1/23, 10:44:22 am	
optcl	16/1/23, 10:45:14 am	
Ravi ranjan	16/1/23, 10:45:47 am	
Dilip kant jha EEE CRITL	16/1/23, 10:46:41 am	
Rajiv Kumar Singh	16/1/23, 10:46:55 am	
Dilshad Alam	16/1/23, 10:49:06 am	
"prabhat kumar (TPTL) (Guest)	16/1/23, 10:49:11 am	
DGM,JAJPUR_ROAD.OPTCL	16/1/23, 10:49:39 am	
PATRALI	16/1/23, 10:51:10 am	
aditya jha	16/1/23, 10:51:16 am	
sk	16/1/23, 10:51:33 am	
gaurav	16/1/23, 10:54:51 am	
Diptikanta Panda	16/1/23, 11:00:03 am	
Deepak Kumar singh	16/1/23, 11:01:55 am	
Rajeev	16/1/23, 11:05:06 am	
Jitesh	16/1/23, 11:11:00 am	
Aarif Md DIKCHU HEP	16/1/23, 11:11:51 am	
Rengali ss (Guest)	16/1/23, 11:14:12 am	
Saibal Ghosh	16/1/23, 11:17:01 am	saibal@erldc.onmicrosoft.com
Chandan kumar	16/1/23, 11:25:34 am	chandan@erldc.onmicrosoft.com
D.PATEL OPTCL EMR MERAMUNDALI	16/1/23, 11:37:49 am	
jitesh kumar (Guest)	16/1/23, 11:46:23 am	
Gautam Manish	16/1/23, 11:50:14 am	Manish.Gautam@andritz.com
S R Mahapatra DGM EMR MRDL	16/1/23, 11:57:16 am	
Manoranjan Panigrahi	16/1/23, 11:59:10 am	MPANIGRAHI@NTPC.CO.IN
RAHUL KUMAR	16/1/23, 12:33:43 pm	
Arindam bsptcl	16/1/23, 12:37:37 pm	

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: **17-12-2022/1** दिनांक: **04-01-2023**

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

Summary of the event (घटना का सारांश):

At 10:45 hrs, B_ph CT of 220 kV Ramchandrapur-Chaibasa-1 burst at Ramchandrapur, leading to operation of Bus Bar protection and 220 kV Bus-1 tripped. At 11:23 Hrs, 220 kV Main Bus-2 was made off by tripping remaining feeders as a safety precaution and to extinguish fire caused by CT blast. Consequently, total supply failed at Ramchandrapur. 296 MW load loss reported at Adityapur, Rajkharsawan, Jadugoda and Golmuri

.

- **Date / Time of disturbance:** 17-12-2022 at 11:23 hrs
- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Ramchandrapur
- **Load and Generation loss**.
  - No generation loss was reported during the event.
  - 296 MW load loss reported during the event at Adityapur, Chandil, Jadugoda

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

- 220 kV Jamshedpur-Ramchandrapur-2 (440/220 kV ICT-2 at Jamshedpur)

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Main Bus 1 & 2 at Ramchandrapur
- 220 KV Jamshedpur-Ramchandrapur 1 & 3 (400/220 kV ICT 1 & ICT 3 at Jamshedpur)
- 220 kV Joda-Ramchandrapur
- 220 kV Chandil-Ramchandrapur
- 220 kV Chaibasa-Ramchandrapur-1
- 3*150 MVA 220/132 kV ATR 3 at Ramchandrapur

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

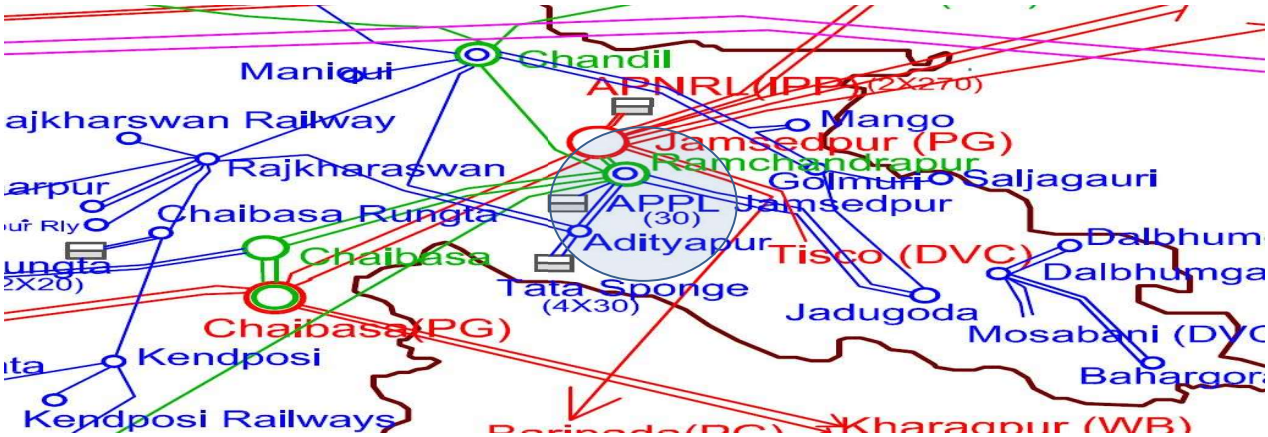


Figure 1: Network across the affected area

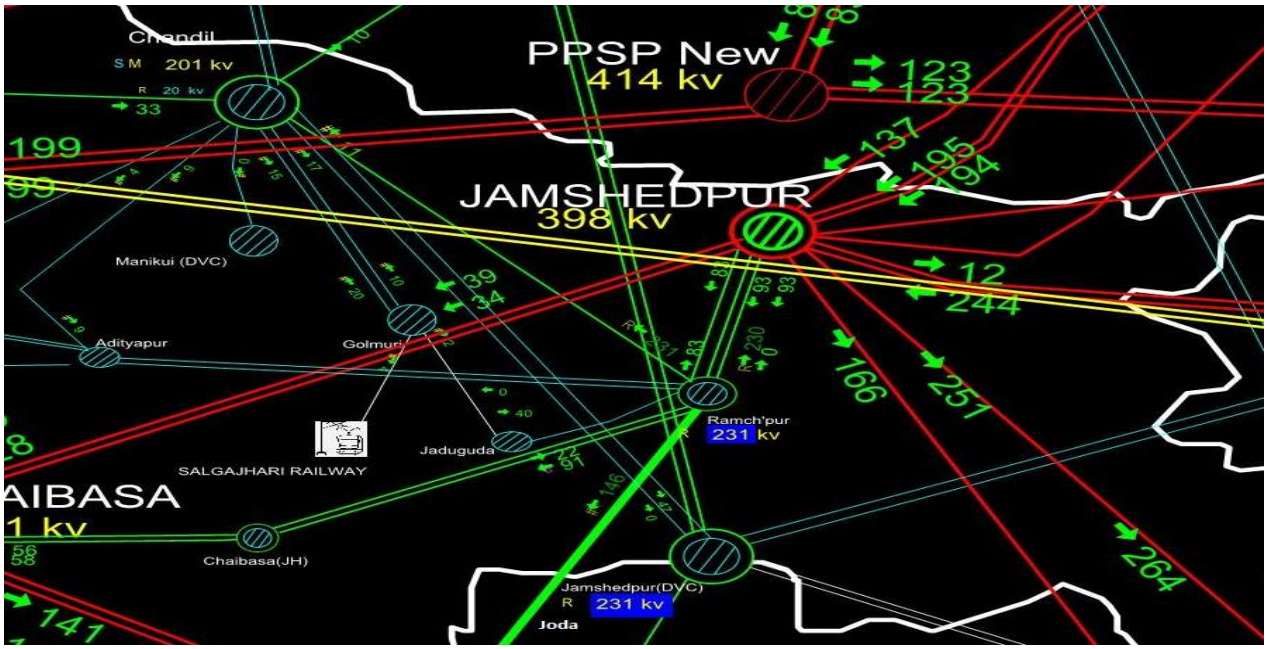


Figure 2: SCADA snapshot of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
10:45	220 kV Bus-1 at Ramchandrapur	Bus Bar protection operated	-	Around 50 kV dip in B_ph voltage at Jamshedpur. Fault clearance time: 200 msec
	220 kV Ramchandrapur-Jamshedpur 1, 3		-	
	220 kV Ramchandrapur-Chaibasa-1		Chaibasa: Didn't trip	
	220 kV Ramchandrapur-Chandil		-	
	220 kV Ramchandrapur-Joda		-	
	220/132 kV ATR-3 at Ramchandrapur		-	
11:23	220 kV Bus-2 at Ramchandrapur	Hand-tripped		-
	220 kV Ramchandrapur-Chaibasa-2			
	220/132 kV ATR-2 at Ramchandrapur			

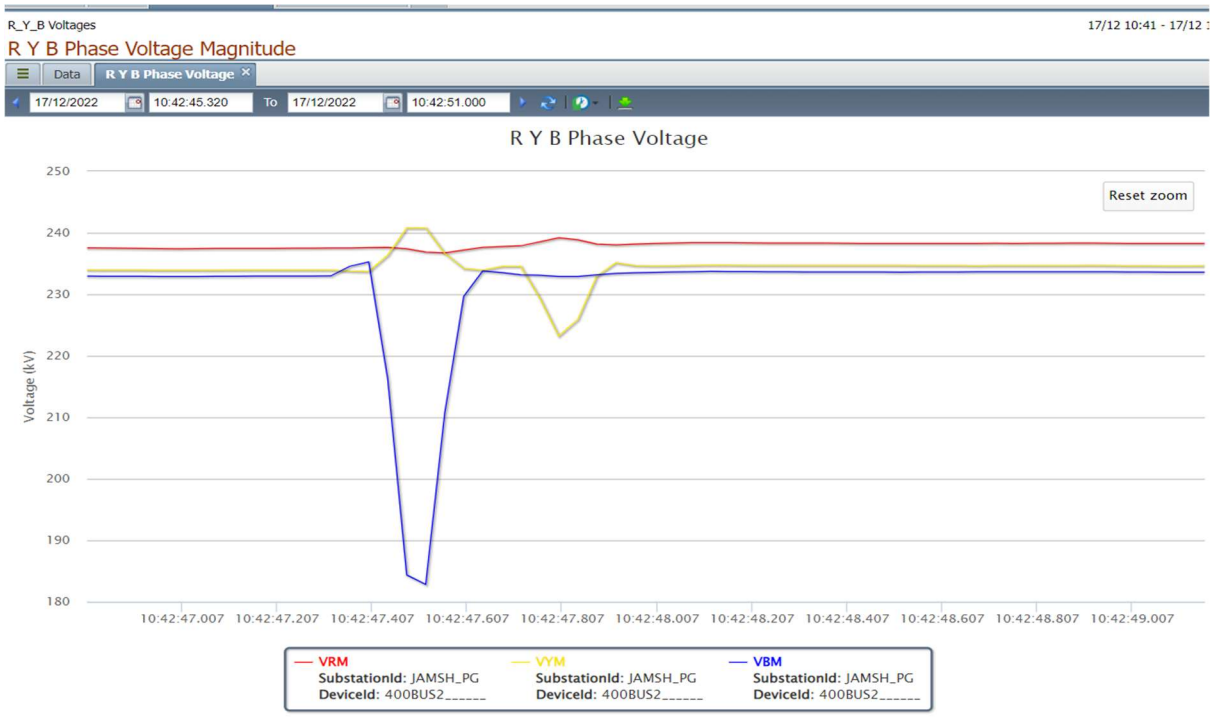


Figure 3: PMU snapshot of 400/220 kV Jamshedpur S/s

Restoration (पूर्वावस्था की प्राप्ति)

Transmission/Generation element name	Restoration time
220 kV Bus 1 at Ramchandrapur	13:09
220 kV Bus 2 at Ramchandrapur	13:12
220 kV Jamshedpur-Ramchandrapur 1	13:09
220 kV Jamshedpur-Ramchandrapur 3	13:10
220 kV Ramchandrapur-Chandil	13:12
220 kV Joda-Ramchandrapur	13:23
220 kV Ramchandrapur-Chaibasa 1	17:06 (18.12.22)
220 kV Ramchandrapur-Chaibasa 2	13:26
150 MVA 220/132 kV ICT II at Ramchandrapur	13:12
150 MVA 220/132 kV ICT III at Ramchandrapur	13:13

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

- At 10:45 Hrs, B_ph CT of 220 kV Ramchandrapur-Chaibasa-1 at Ramchandrapur burst, leading to operation of Bus Bar Protection of 220 kV Bus-1. All elements connected to Bus-1 tripped.
- As reported, 132 kV Ramchandrapur-Adityapur D/c tripped from Adityapur. Protection setting may be reviewed, and tripping details may be submitted.
- At 10:49 Hrs, 132 kV Ramchandrapur-Jadugoda was hand-tripped to avoid overloading 220/132 kV ATR-2. Load of Golmuri was fed through Jadugoda due to shutdown of ATR in Chandil.
- At 11:23 Hrs, 220 kV Bus-2 was switched off by hand-tripping remaining feeders as a precautionary measure to extinguish fire.
- Feeders should be equally distributed as far as practicable.

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 ER-I**

Status of Reporting (रिपोर्टिंग की स्थिति):

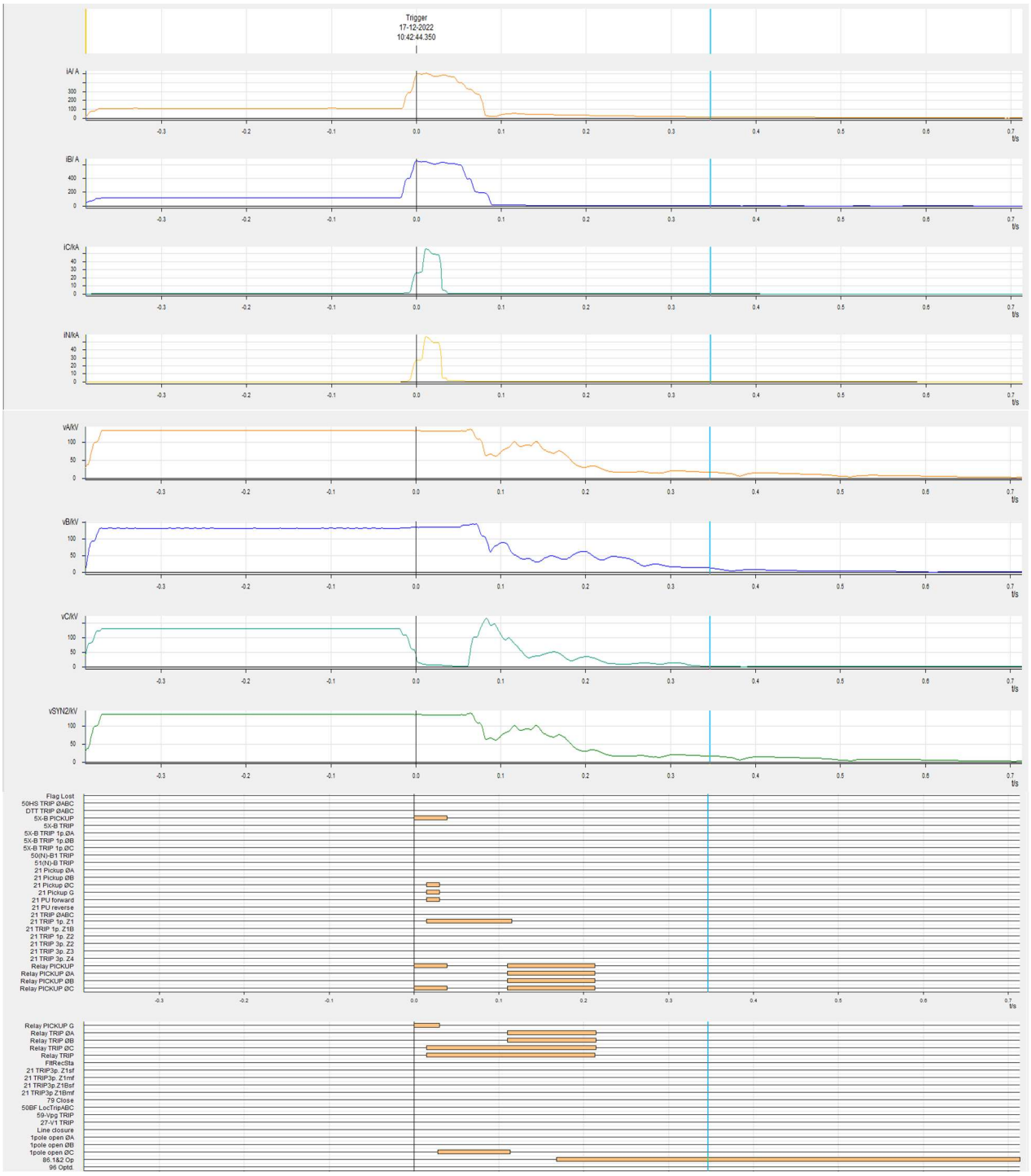
- Complete DR/EL yet to be received from JUSNL
- DR/EL yet to be received from PG ER-1

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

Sequence of event not recorded at the time of event.

Annexure 2: DR recorded

DR of 220 kV Ramchandrapur-Chaibasa I (Ramchandrapur)



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: **22-12-2022/1** दिनांक: **05-01-2023**

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

Summary of the event (घटना का सारांश):

At 07:26 hrs, 400 kV Barh-Patna-3 tripped due to _N fault. Due to persisten fault, A/r attempt failed after 1 second, however, other two phase from Barh did not open. After 11 seconds, 660 MW U#1 at Barh tripped. Other two phases of 400 kV Barh-Patna-3 also tripped at the same instant. 620 MW generation loss occurred. **Date / Time of disturbance:** 22-12-2022 at 07:26 hrs

- **Event type:** GI-2
- **Systems/ Subsystems affected:** 400 kV Barh STPS
- **Load and Generation loss**.
  - 620 MW generation loss reported during the event.
  - No load loss occurred during the event.

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

- NIL

Major elements tripped (प्रमुख ट्रिपिंग):

- 400 kV Barh-Patna-3
- 660 MW U#1 at Barh

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

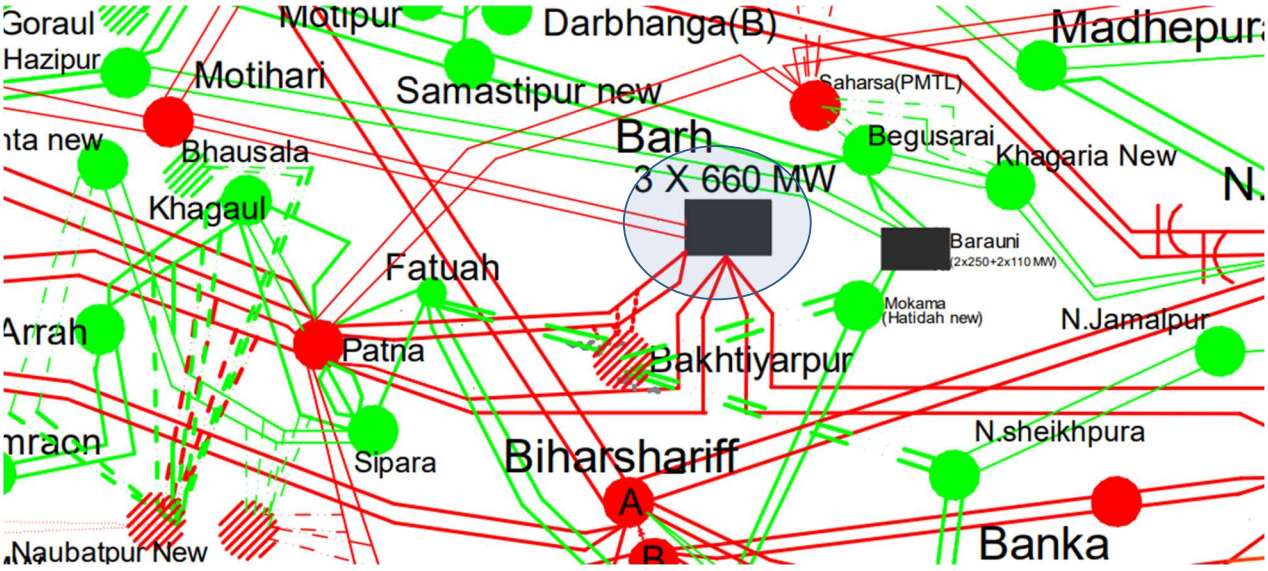


Figure 1: Network across the affected area

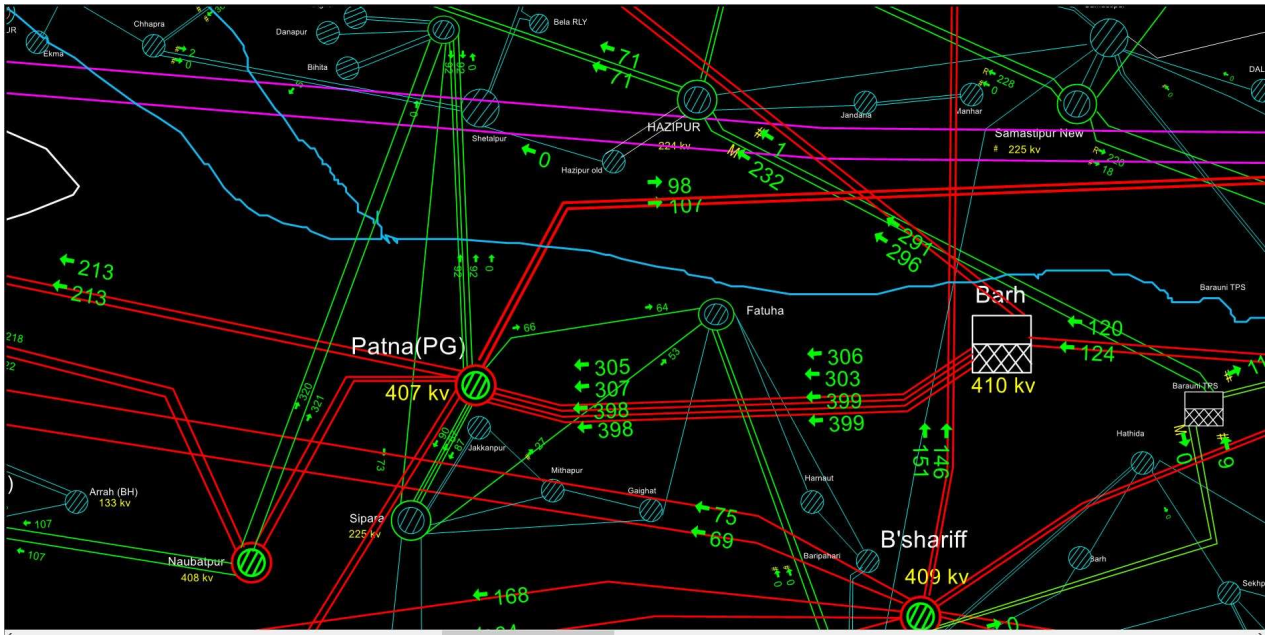


Figure 2: SCADA snapshot of the system

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
07:26	400 kV Barh-Patna-3	Barh: B_N, 18.5 km, 25.06 kA	Patna: B_N, 68.9 km, 8.6 kA	5 kA fault recorded at Patna. Fault clearance time 100 msec. Other two phase at Barh remained closed.
	660 MW U#1 at Barh	GT tripped		

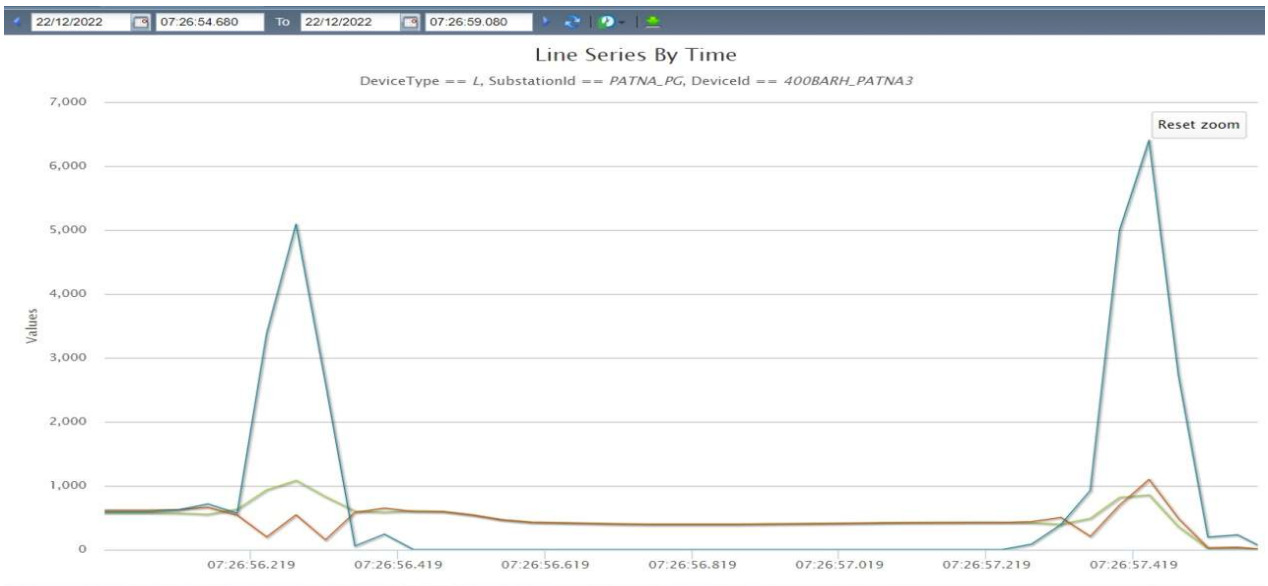


Figure 3: PMU Current snapshot of 400 kV Barh-Patna-3 at Patna S/s

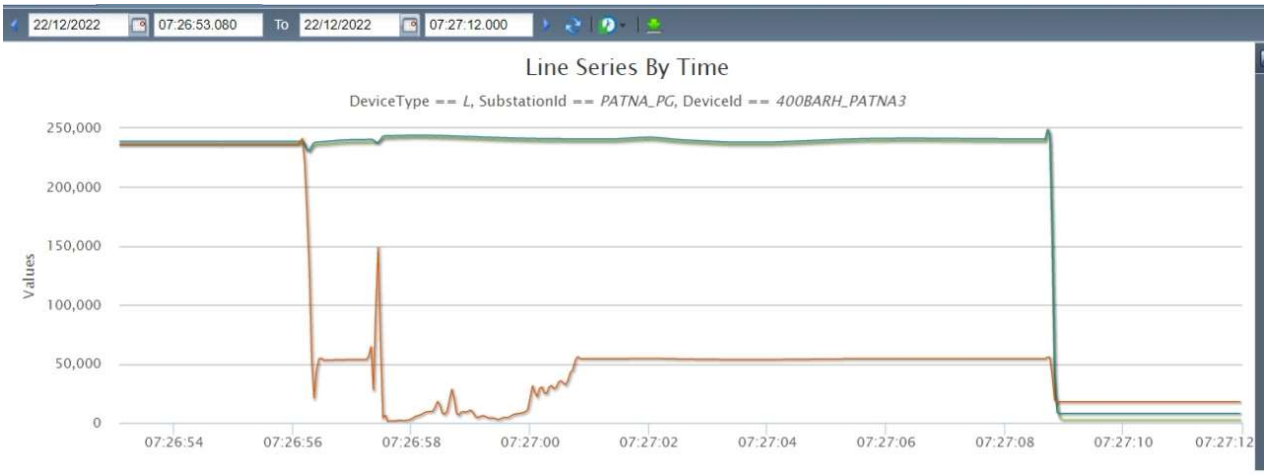


Figure 4: PMU Voltage snapshot of 400 kV Barh-Patna-3 at Patna S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
400 kV Barh-Patna-3	22:41
660 MW U#1 at Barh	16:34

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

- At 07:26 Hrs, 400 kV Barh-Patna-3 tripped due to B_N fault. A/r attempted from Patna after 1 second but failed due to persisting fault
- At Barh end
  - voltage in R_ph (healthy phase) spiked momentarily to 570 kV. Double earthing reported at Junction box and relay panel.
  - After 850 msec, other two phase of main bay at Barh opened. Reason for opening of other two phase before failed A/r attempt could not be ascertained. **Barh may explain.**
  - Other two phase of tie bay at Barh remained closed for around 12 seconds. As reported, no A/r attempt was taken as CB status was **CB not ready.** 86 relay operated after 12 seconds. This relay was found having sluggish response with a delay of 10-15 seconds. The same was replaced.
- **U#1 at Barh**
  - U#1 tripped as its GT tripped on Buchholz protection. As reported by NTPC Barh, Buchholz relay might have operated spuriously as heavy fault current might have increased transformer vibration and its Buchholz relay have mercury float switch with history of maloperation. The same has been replaced with magnetic reed switch.
- Brief analysis summary from Barh is attached at Annexure-3.

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

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

Status of Reporting (रिपोर्टिंग की स्थिति):

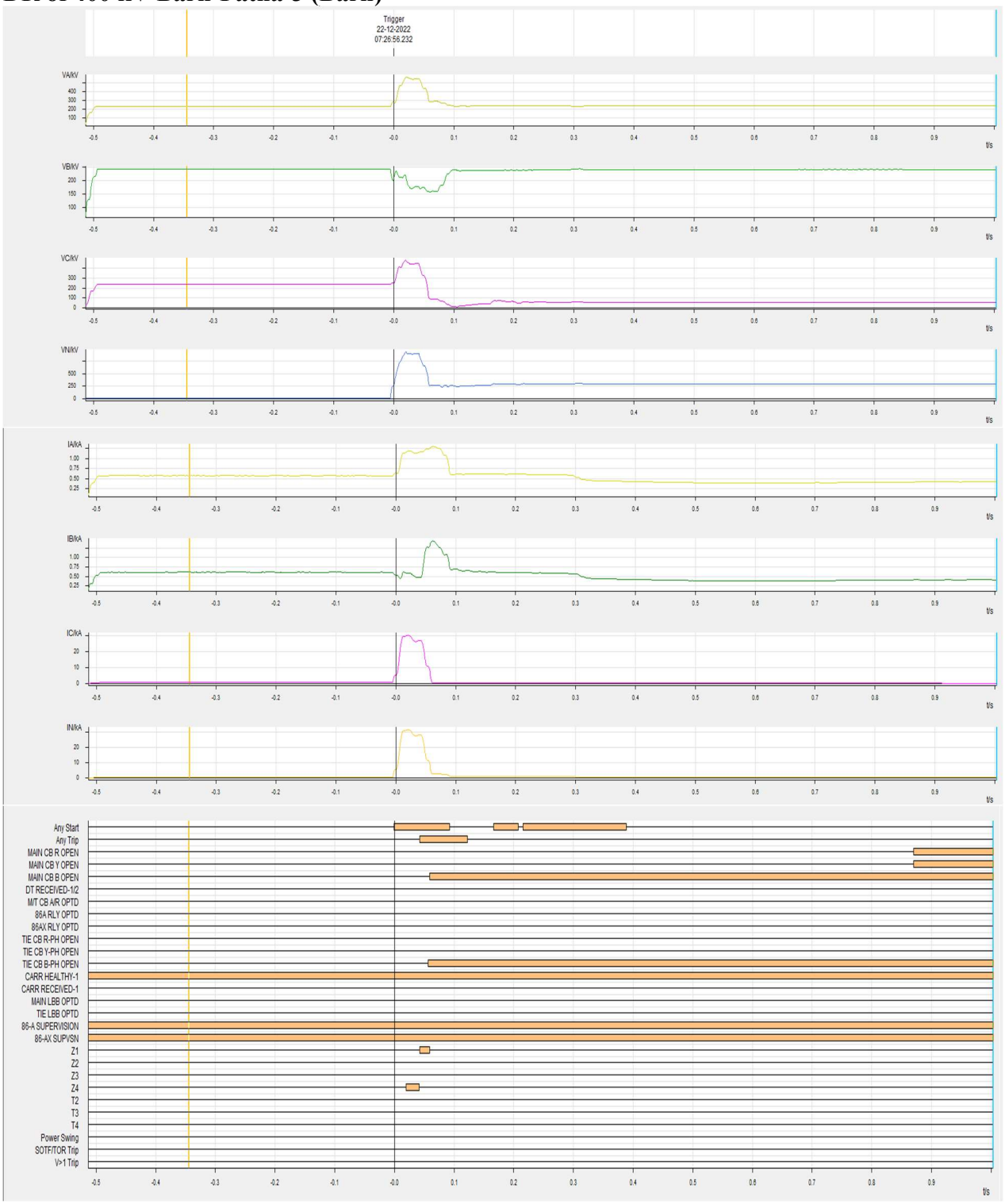
- DR/EL received from Barh
- DR/EL received from PG ER-I

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

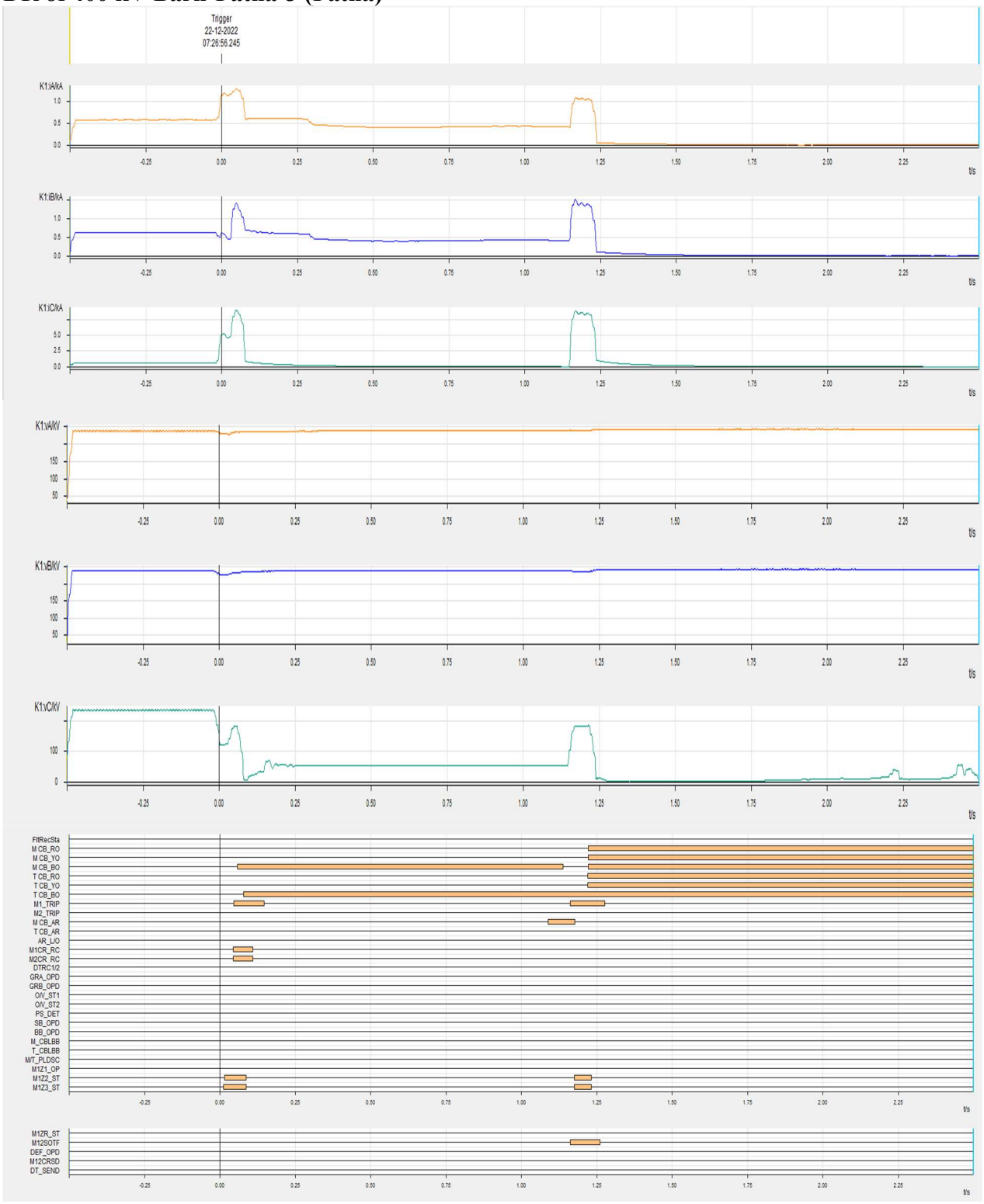
Sequence of event not recorded at time of event.

Annexure 2: DR recorded

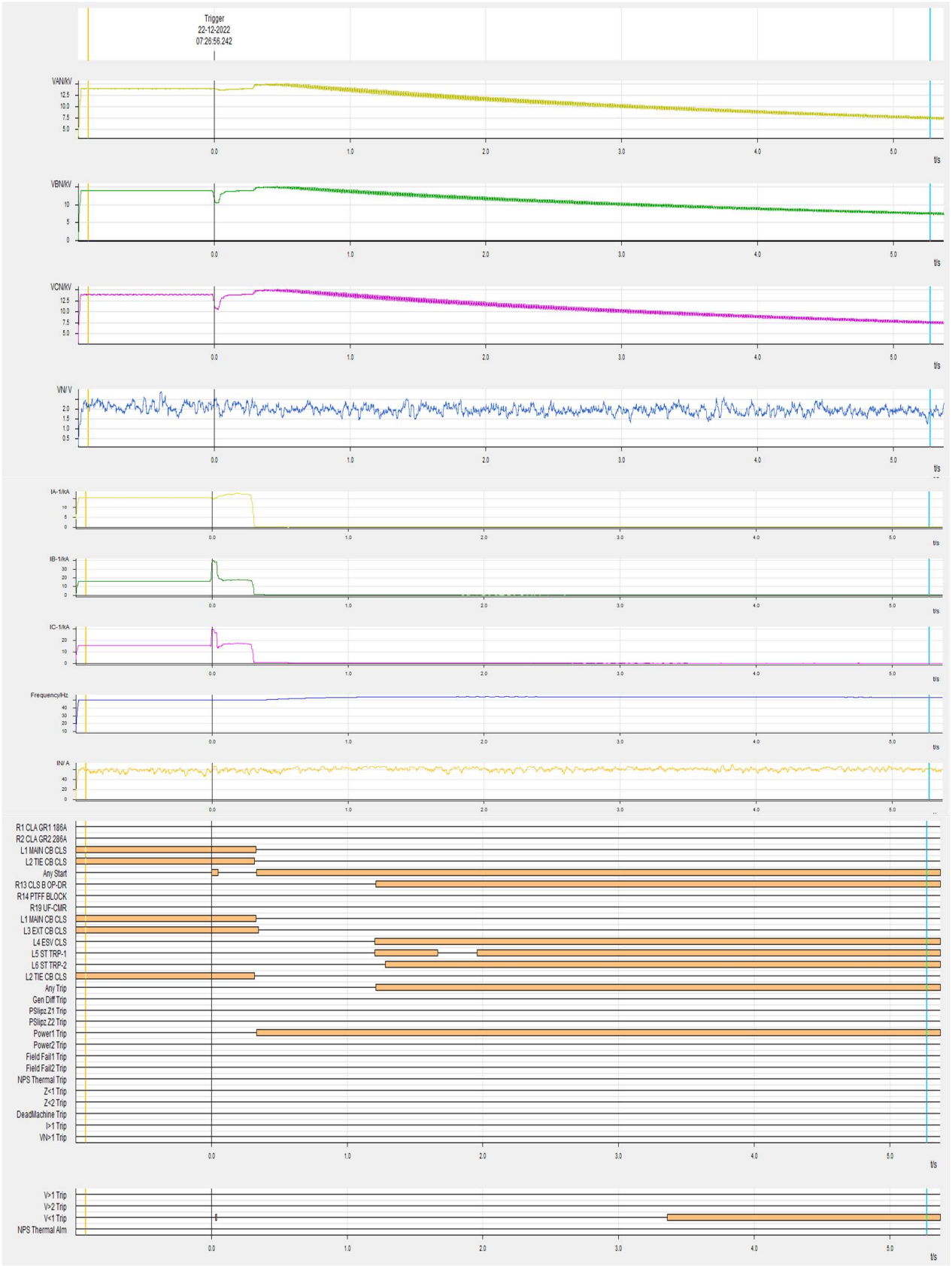
DR of 400 kV Barh-Patna-3 (Barh)



DR of 400 kV Barh-Patna-3 (Patna)



DR of U#1 Barh


Trigger
22-12-2022
07:26:56.242
VAN/kV
VBN/kV
VCN/kV
VN/V
IA-1/kA
IB-1/kA
IC-1/kA
Frequency/Hz
IN/A
R1 CLA GR1 186A
R2 CLA GR2 286A
L1 MAIN CB CLS
L2 TIE CB CLS
Any Start
R13 CLS B OP-DR
R14 PTFF BLOCK
R19 UF-CMR
L1 MAIN CB CLS
L3 EXT CB CLS
L4 ESV CLS
L5 ST TRP-1
L6 ST TRP-2
L2 TIE CB CLS
Any Trip
Gen Diff Trip
PSlipz Z1 Trip
PSlipz Z2 Trip
Power1 Trip
Power2 Trip
Field Fail1 Trip
Field Fail2 Trip
NPS Thermal Trip
Z<1 Trip
Z<2 Trip
DeadMachine Trip
I>1 Trip
VN>1 Trip
V>1 Trip
V>2 Trip
V<1 Trip
NPS Thermal Alm
t/s

Grid Incident at NTPC Barh on 22.12.2022

On 22.12.2022, at 07:26 hours following events took place at NTPC Barh

1. 400 kV Barh-Patna Line 3 tripped on zone-1 protection. Fault was recorded on B phase at 18 kms from Barh end. Fault current recorded was 30 kA.
2. Barh-Patna 3 line tripped from both ends.
3. At this very instance, Unit#1 at NTPC Barh tripped on Class-A protection. As per SCADA event log, it was observed that Generator Transformer#1B phase Buchholz relay had operated. As per event log it was also observed that Buchholz operation event reset within 40 milliseconds.
4. After inspection in GT#1B, no gas accumulation was observed in Buchholz relay. Oil sampling from transformer tank top and bottom was done and sent for DGA.
5. DGA results were normal, and all fault gases were well within limits.
6. Unit#1 was thereafter synchronized.
7. GT#1B Buchholz relay operation was suspected to be spurious in nature. The installed relays had mercury float switches which have a history of mal-operation due to various extraneous factors, significantly transformer vibration.
8. During the event of through fault (Barh-Patna 3 tripping), Generator#1 at NTPC Barh end fed the through fault and the fault current in DR was 75 kA in B phase (GT LV side). It is therefore suspected that inrush of such heavy current for a small span of time had increased the transformer vibration leading to spurious Buchholz operation.
9. As a remedial action, Buchholz relay with magnetic reed switches have been replaced in the Generator Transformer.

Post-fault analysis of 400 kV Barh-Patna 3 line

1. As per disturbance recorder, fault was cleared from both Barh and Patna end but R, Y phase showed voltage which reached zero mark after approximately 12 seconds. The same had been recorded in PMU at Barh end.
2. On further analysis it was observed that all three poles of main breaker at Barh end had opened whereas R, Y pole of tie breaker remained closed and tripped after a delay of 12 seconds.
3. On 23.12.2022, shutdown was taken for analysing the discrepancy in Barh-Patna tie breaker at Barh end.
    a. Tie breaker was initially tested for pole discrepancy. Problem was found in breaker interpole cabling of B phase. The problem was rectified, and pole discrepancy circuit was made through.
4. On 24.12.2022, Barh-Patna 3-line shutdown was taken on emergency basis for protection relay and associated trip circuit/auto reclose checking.
    a. Zone protection as per settings in relay were checked by secondary injection and found ok.
    b. Auto-reclosure operation was attempted. It was successful for main breaker of Barh-Patna 3, but unsuccessful for tie breaker.
    c. On further analysis it was observed that ‘CB not ready’ status was being read by the auto-reclosure relay (KAVR) which ultimately led to auto reclose lockout and 3-phase tripping.
    d. Secondly, 86 relay operation due to auto reclose lockout was having a sluggish response. The relay operated after approximately 10-15 seconds.
    e. The relay wiring and 86 relay was checked thoroughly. No problem in wiring was detected. For safety precaution, 86 relay was replaced.
    f. ‘CB not ready’ status which was being read by the relay was due to lack of adequate hydraulic pressure in the breaker. (3AT3 BHEL hydraulic operated breaker installed). After pressure setting modification, problem has been rectified.

Annexure B.3

ODISHA HYDRO POWER CORPORATION LIMITED

OFFICE OF THE SR. GENERAL MANAGER (ELECTRICAL)

BALIMELA HYDRO ELECTRIC PROJECT, BALIMELA, AT/PO: BALIMELA DIST: MALKANGIRI-764051,

Phones: 06861-232581 (O)/232641 (R) : FAX:06861-232541., E-mail: bhep.balimela@gmail.com

ODISHA HYDRO POWER CORPORATION LTD. (A GOVERNMENT OF ODISHA UNDERTAKING)

Regd. Office OSPH & W.C Building, Vanivihar Chhak, Janpath, Bhoinagar, Bhubaneswar-751022,

Tel: 91-0674-2542983, 2542802, 2545526, 2542826, Fax:2542102, E-Mail: ohpc.co@gmail.com / md@ohpcltd.com

WEB: www.ohpcltd.com, CIN: U40101OR1995SGC003963

ISO 9001-14001
18001 Certified

No. OHPC/BHEP/TECH/T- 100/ 143 **/** **/Dated** 09/01/23

To

The Director (Operation),
Odisha Hydro Power Corporation Limited,
O.S.P.H. &W.Corporation Building,
Vani Vihar Chowk, Janapath,
Bhubaneswar – 751 022.

Sub: Submission of System Disturbance Report of Balimela Power House occurred on dated 24.12.2022- Regarding.

Sir

With reference to the above, please find enclosed herewith the System Disturbance Report which occurred on dated 24.12.2022 at 12:06 Hrs. pertaining to BHEP, Balimela.

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

Yours faithfully,

Encl: As above.

Unit Head,
BHEP, Balimela

Memo No. 144 / Dtd. 09/01/23 /

Copy submitted to the Chief Load Despatcher, SLDC, GRIDCO, Mancheswar Railway Colony, Bhubaneswar-17 for information and necessary action.

Encl: As above.

Unit Head,
BHEP, Balimela

Memo No. 145 (2) / Dtd. 09/01/23 /

Copy forwarded to the Divisional Head, Generation Division/ P&C Division, BHEP, Balimela for information.

Unit Head,
BHEP, Balimela

SYSTEM DISTURBANCE REPORT OF BALIMELA POWER HOUSE OCCURRED AT 12:06 HRS. OF DTD. 24.12.2022.

1. STATUS OF BALIMELA POWER HOUSE BEFORE DISTURBANCE:

Running Units:-

#5/60MW Only

PH Auxiliary :- 1. PH Auxiliary for 0.4 KV 1H Sec-II & 0.4 KV 2H Sec-II were fed separately from 12T & 14T respectively through Unit #5 GT.

2. PH Auxiliary for 0.4 KV 1H Sec-I & 0.4 KV 2H Sec-I were fed separately from SAT-I & SAT-II respectively as well as 11 KV CKD & 11 KV BML feeder (All Four) were fed from 220/11 KV , 20 MVA Station Transformer.

220KV Feeder Status:-

Balimela-Jayanagar Ckt-1(L203) was under Annual Maintenance by Jayanagar Grid and Balimela-Jayanagar Ckt-2(L204) CB was in open condition from both ends ,Balimela-Jayanagar Ckt-3(L202) and Balimela- OPTCL CKT(L205) were in charged condition.

BML-Upper Sileru(L201) feeder is idle charged condition from Upper Sileru end.

220KV BUS Status:-

BUS-II was in service. Bus Coupler was in Open condition. Running Unit 5 and feeders were connected to 220KV BUS-II only.
BUS-I was in Standby condition.

BUS Voltage – 249 KV
BUS Frequency- 50.18 Hz.

2. DURING DISTURBANCE

12:06 Hrs: Balimela-Jayanagar Ckt-3(L202) and Balimela- OPTCL CKT(L205) were auto tripped due to over voltage protection.

12:10 Hrs: #5 Circuit Breaker was hand tripped and isolated from the Grid and same unit remained under voltage built up condition.

3. RESTORATION PROCESS.

12:36 Hrs.: After due consultation with SLDC and Jayanagar Grid, 220 KV Balimela-Jayanagar Ckt-2(L204) was charged from both the ends & 220KV Bus II at Balimela end was charged.

12:39 Hrs.: 220 KV Balimela-OPTCL Feeder was charged.

12:41 Hrs.: 220 KV Balimela-Jayanagar Ckt-2(L204) was auto tripped & thereby 220KV Bus II at both Balimela & Jayanagar ends was in dead condition.

12:45 Hrs.: 220 KV Balimela-OPTCL feeder was hand tripped.

12:50 Hrs.: 220 KV Balimela-Jayanagar Ckt-2(L204) was charged in consultation with Jayanagar Grid & it stood ok.

12:53 Hrs.: Unit 6 was synchronized to Grid and loaded 20 MW with due intimation to SLDC.

12:55 Hrs : 220 KV Balimela-OPTCL feeder was charged and normalized.

BUS Voltage – 241 KV

BUS Frequency- 49.99 Hz.

Thus, normalcy was restored in Balimela Power House.

Sub-Divisional officer (El.),
Balimela Generation Sub-Division-I,
Balimela.

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: **24-12-2022/1** दिनांक: **02-01-2023**

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

Summary of the event (घटना का सारांश):

At 12:05 Hrs on 24th December 2022, R_ph wave trap of 220 kV Jaynagar-Lakshmipur-1 burnt at Jaynagar end. Total power failure occurred at 220/132 kV Jaynagar, 220 kV Balimela, Upper Kolab S/s. 220 kV Bus-1 at Jeypore (PG) along with 400/220 kV ICT-1 & 3 also tripped. 40 MW load loss occurred at Jaynagar. Two running units at Upper Kolab and one unit at Balimela tripped leading to 90 MW generation loss (Upper Kolab-40 MW, Balimela-50 MW).

- **Date / Time of disturbance:** 24-12-2022 at 12:05 hrs.
- **Event type:** GD - 1
- **Systems/ Subsystems affected:** 220/132 kV Jaynagar, 220 kV Balimela HEP S/s
- **Load and Generation loss**.
  - 20 MW generation loss reported at Balimela
  - No load loss occurred during the event

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

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

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Jaynagar-Lakshmipur D/c
- 220 kV Jaynagar-Balimela-3
- 220 kV Jaynagar-Jeypore-1,4
- 220 KV Jaynagar-Upper Kolab D/c
- 2*220/132 kV ATR at Jaynagar

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

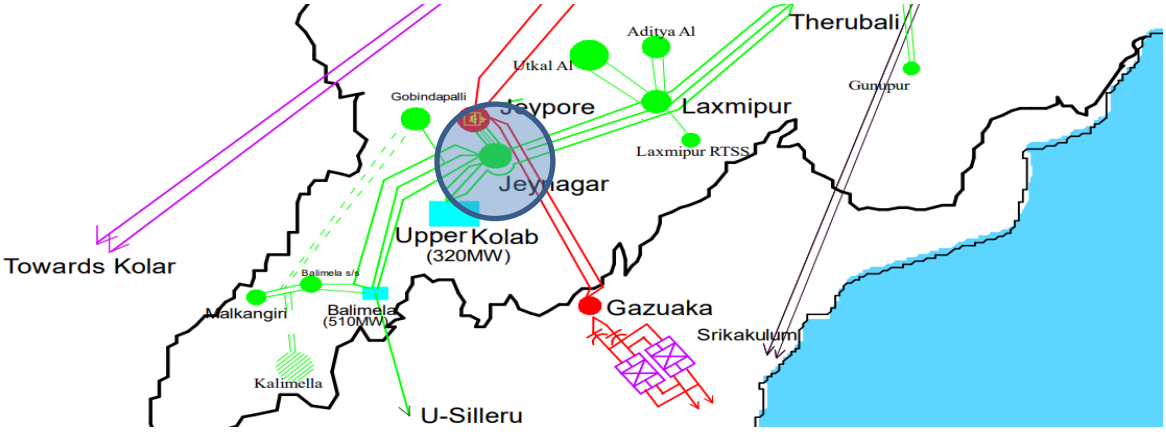


Figure 1: Network across affected area

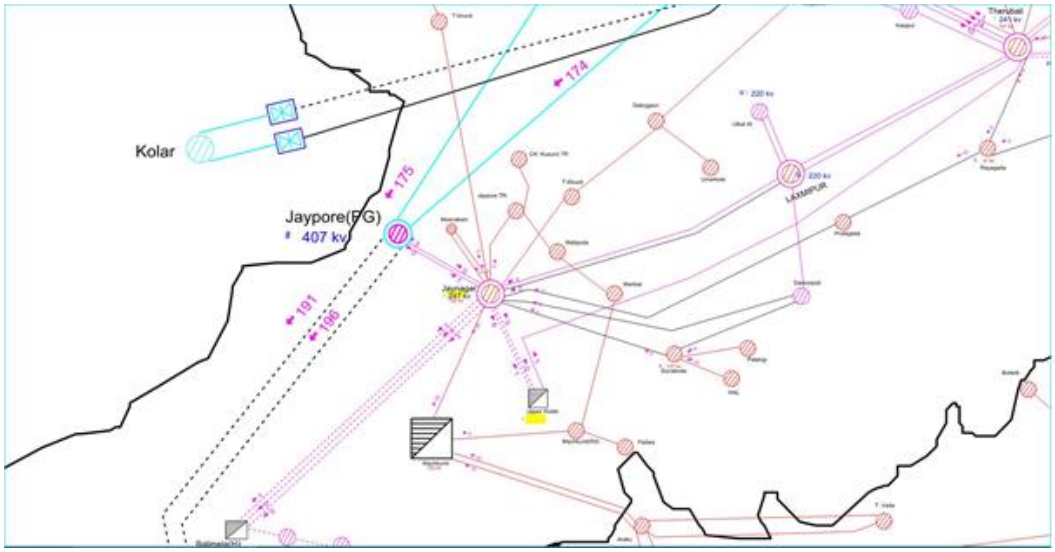


Figure 2: SCADA snapshot of the system

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

Sl.No	Feeder Name	Local End	Remote End
1	Jayanagar-Jeypur Ckt-1	NO TRIP	E/F with 300Amp current in R-E
2	Jayanagar- Jeypur Ckt-2	H/T (To regulate Voltage)	H/T (To regulate Voltage)
3	Jayanagar- Jeypur Ckt-3	H/T (To regulate Voltage)	H/T (To regulate Voltage)
4	Jayanagar- Jeypur Ckt-4	NO TRIP	E/F with 300Amp current in R-E
5	Jayanagar-Laxmipur-1	Dir. O/C & E/F, IR= 0.65KA, IB=0.02KA, IC=0.03KA	Tripped in EF, Due to communication error DR not extracted from MICOM P437 relay.
6	Jayanagar-Laxmipur-2	Z-1 WITH Distance-22KM, IB=2.7KA,	Tripped in E/F>, with IB:0.7KA and IN:0.7KA.
7	Jayanagar-Therubali-3	Under Shutdown	
8	Jayanagar - Balimela 1	H/T (To regulate Voltage)	H/T (To regulate Voltage)
9	Jayanagar - Balimela 2	(For Annual Maintenance)	LC (For Annual Maintenance)
10	Jayanagar - Balimela 3	NO TRIP	Tripped due to Over Voltage, (Setting : 250KV with 5 Sec Time delay)
11	Jayanagar - U Kolab-1	NO TRIP	NO TRIP
12	Jayanagar - U Kolab-2	NO TRIP	NO TRIP

13	160MVA Auto-1	Tripped with Over flux protection	132KV system not disturbed due to availability of source from machhkund P/H and Tentulikhunti GSS
14	160MVA Auto-2	Tripped with Over flux protection	

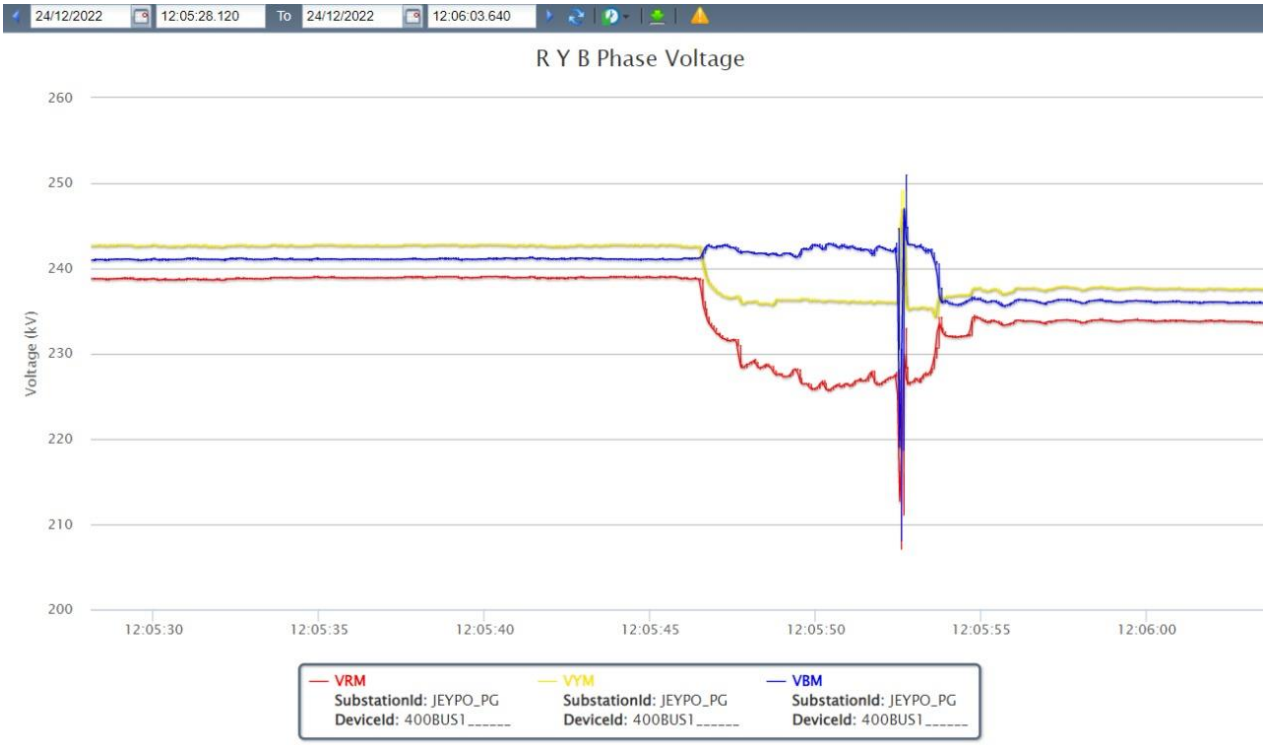
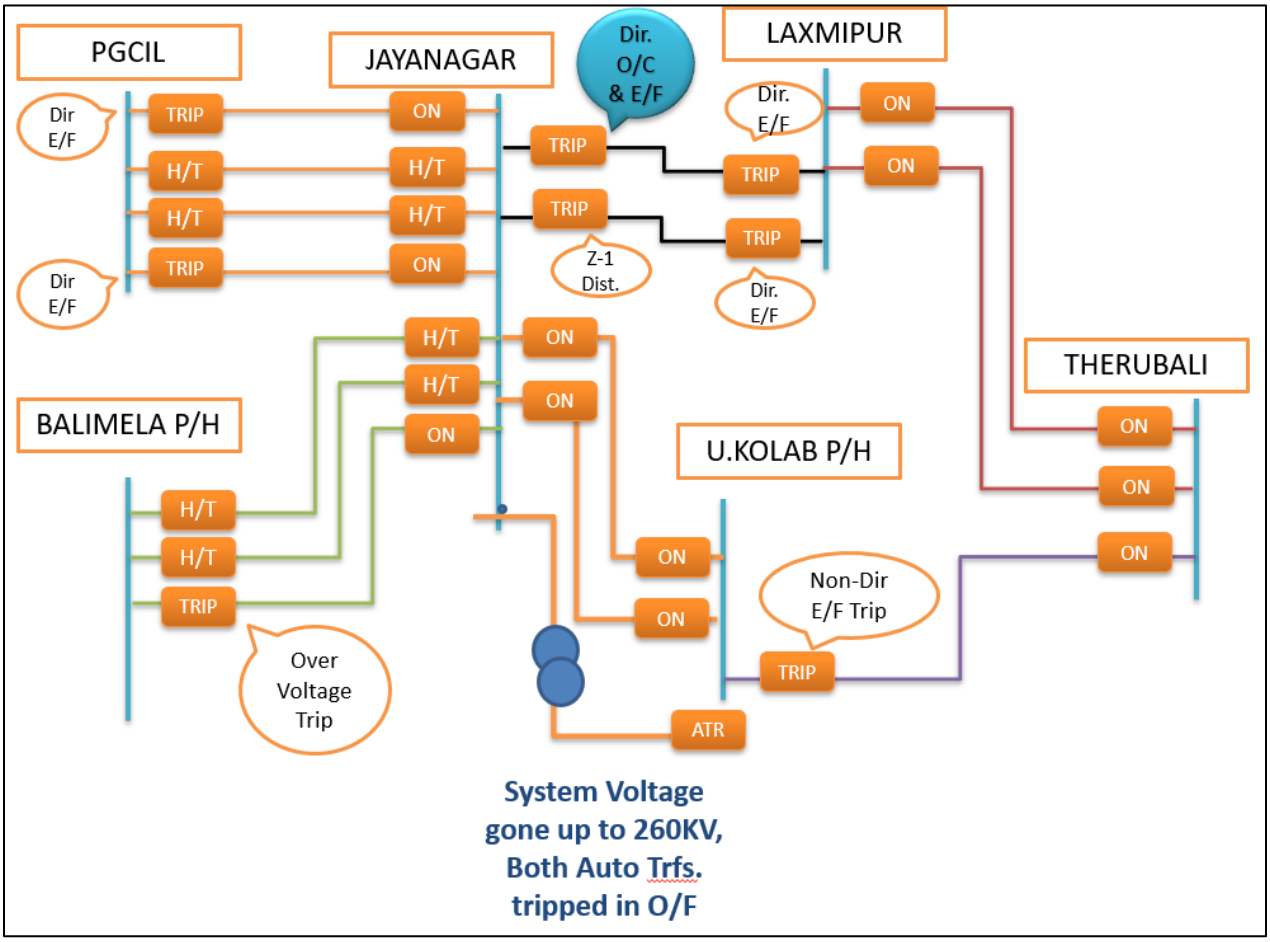


Figure 2: PMU voltage snapshot of 400/220 kV Jeypore S/s

Restoration (पूर्वावस्था की प्रप्ति):

Sl. No.	Name of the Element	Restoration Time
1	220 kV Jaynagar-Lakshmipur-D/c	-
2	220 kV Jaynagar-Balimela-3	Ckt 1: 13:13 Hrs Ckt 2: 13:14 Hrs Ckt 3:-
3	220 kV Jaynagar-Jeypore-1,4	Ckt 1: 14:35 Hrs Ckt 2: 14:00 Hrs Ckt 3: 13:09 Hrs Ckt 4: 13:39 Hrs
4	220 kV Jaynagar-Upper Kolab D/c	Ckt 1: 12:19 Hrs Ckt 2: 12:18 Hrs
6	2*220/132 kV ATR at Jaynagar	12:21 Hrs

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



- As reported, at 12:05 Hrs there was R phase fault in 220 kv Jeynagar – Laxmipur -1 (R phase wave trap burnt) the nature of fault was of high resistive nature and fault current was slowly rising as can be seen from above PMU plot .
- At the same time 220 kv Jeynagar – Laxmipur -2 developed B -phase to earth fault may be due to smoke, made a conducting path and line tripped from Jayanagar end in Zone-1 and from Laxmipur end in directional E/F after a long delay. **Distance Protection should have also sensed the fault from Laxmipur of ckt -2 as B phase fault was sudden and also as visible from DR Line voltage persisted for a long time even after opening of breaker from Jayanagar end and . OPTCL to explain.**
- **Jeypore -Jeynagar D/C tripped from Jeypore end of DEF due to the delayed fault clearance .DEF co-ordination also to be checked and co-ordinated.**
- While Ckt-1 fault was sensed by Directional e/f, from Jayanagar end, even current was more than 1Ka for more than 1.5 sec still, Trip command not issued as relay was dropping. **This needs to be checked. OPTCL to explain.**
- U.Kolab & Therubali tripped from U.kolab end due to non-direction e/f operation . This also needs to be made directional**. OPTCL to confirm.**

- With above tripping's Bus voltage of Jayanagar increased to 257 Kv and remaining ATR tripped on Over flux & single remaining line balimela-Jeynagar tripped from Balimela due to Overvoltage operation.
- This has resulted into isolation of 200 Kv Jayanagar,Balimela and U.kolab bus and it all became dead. Generation loss at U.Kolab and Balimela occurred due to loss of evacuation path.

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

Issues	Regulation Non-Compliance	Utility
Non-Submission of Preliminary Report from User, STU, CTU, SLDC to RLDC	1. IEGC 5.9.6.a 2. CEA Grid Standard 12.2 (Applicable for SLDC, ALDC only)	OPTCL
Non-Submission of Details for the tripping which is required for appropriate analysis for GD/GI	1. IEGC 5.2 (r), 5.9.6.c (VI) 2. CEA grid Standard 15.3 3. CEA (Technical standards for connectivity to the Grid) Regulation, 2007-6. 4.d	OPTCL
Fault clearance in more than 100 ms at 400 kV level and above and 160 ms at 220 kV levels	1. CEA Grid standard 2010 -3.e CEA Transmission Planning Criteria	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
DR/EL not provided within 24 Hours	1. IEGC 5.2 (r) 2. CEA grid Standard 15.3	OPTCL, PG Odisha projects

Status of Reporting (रिपोर्टिंग की स्थिति):

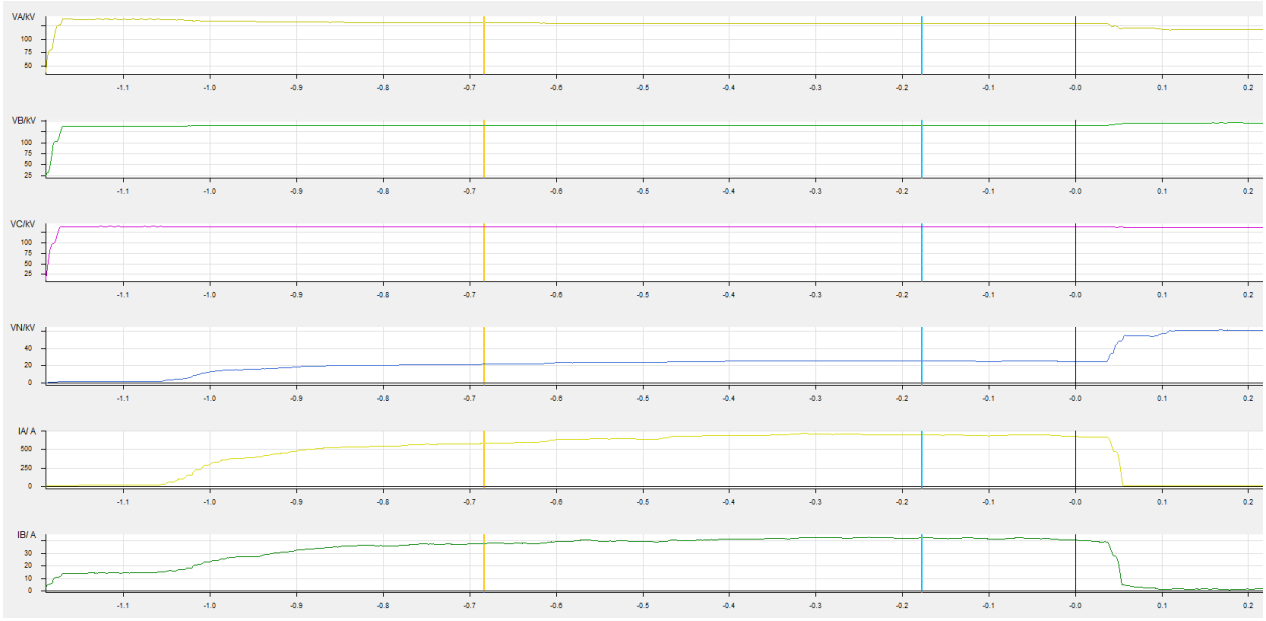
- DR/EL for Jeynagar -2 at Laxmipur end awaited .

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

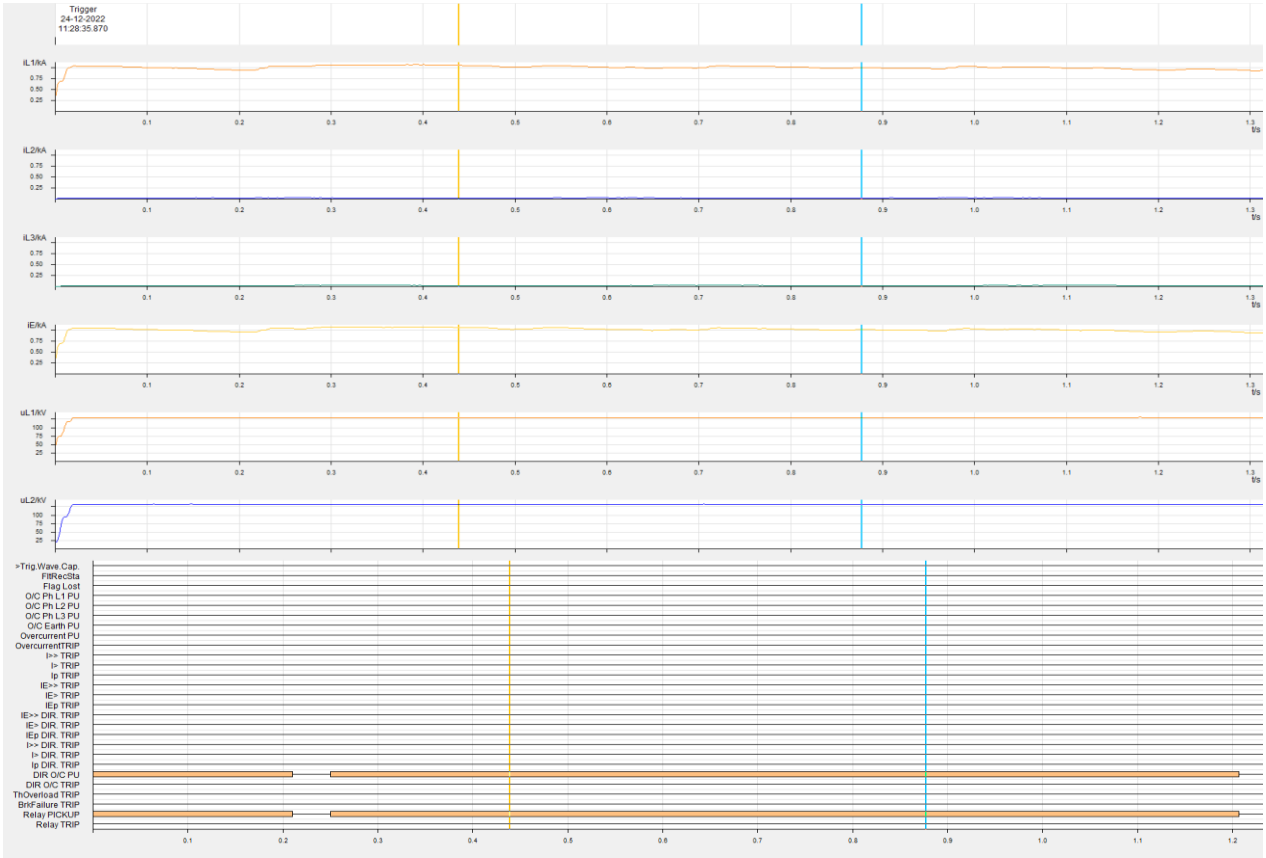
Sequence of Events not recorded during the event.

Annexure 2: DR Recorded

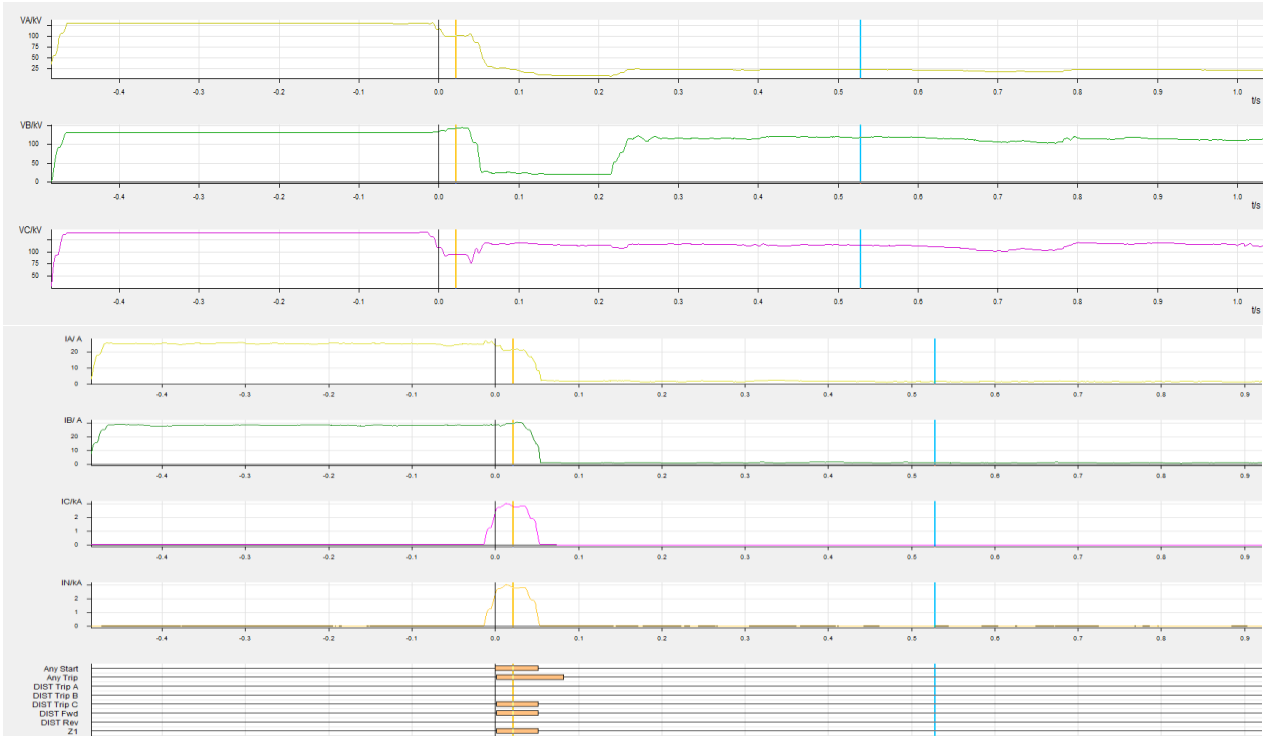
Jeynagar-Laxmipur-1 at Laxmipur end:



Jeynagar -Laxmipur-1 at Jeynagar end:



Jeynagar -Laxmipur-2 at Jeynagar end:


VA/kV
VB/kV
VC/kV
t/s
IA/ A
IB/ A
IC/kA
IN/kA
Any Start
Any Trip
DIST Trip A
DIST Trip B
DIST Trip C
DIST Fwd
DIST Rev
Z1

Annexure B.4

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

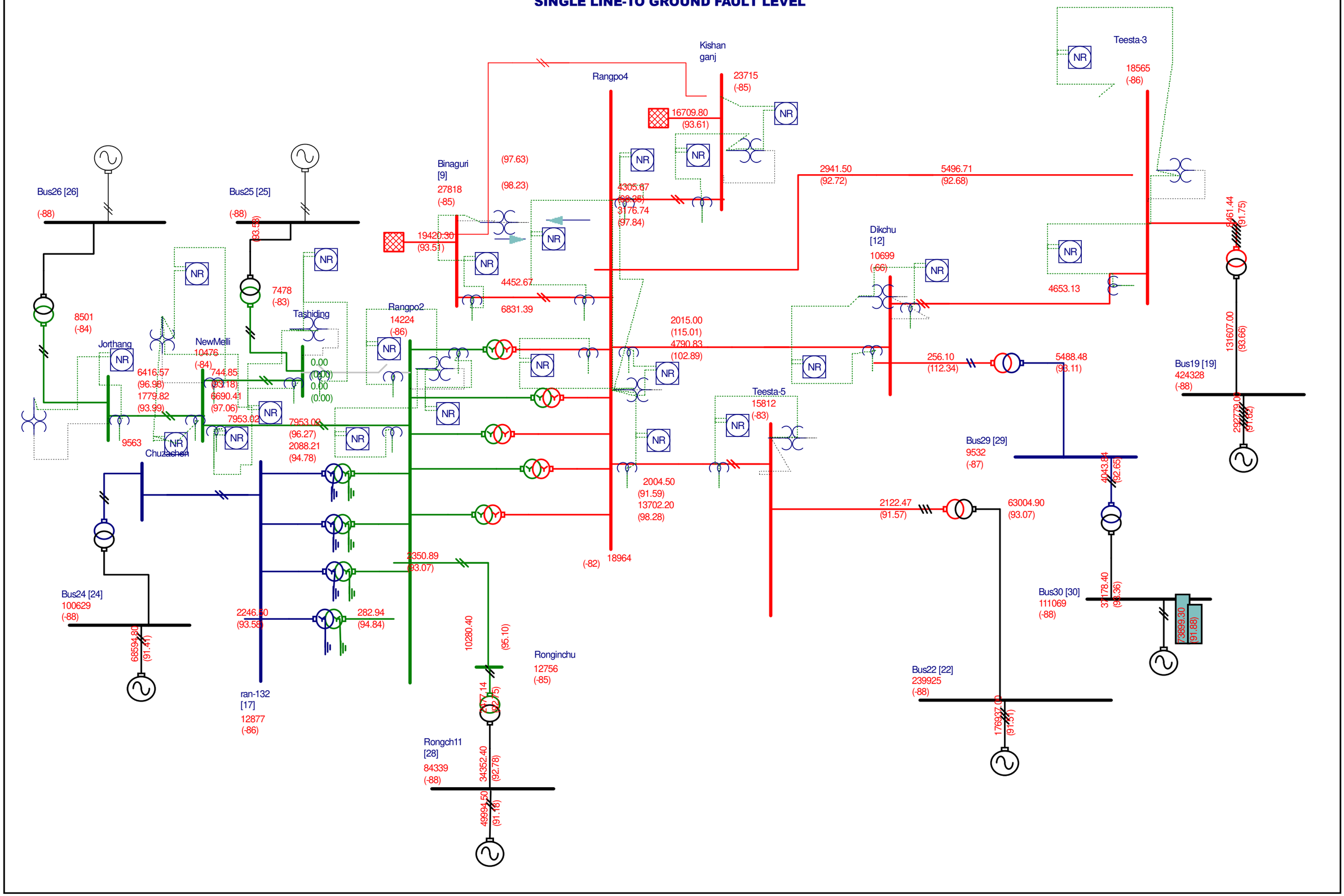
Sl. No.	LINE NAME	TRIP DATE	TRIP TIME	RESTORATION DATE	RESTORATION TIME	Relay Indication LOCAL END	Relay Indication REMOTE END	Reason	Fault Clearance time in msec	Remarks	DR Configuration Discrepancy	DR/ELRECEIVED FROM LOCAL END	DR/ELRECEIVED FROM REMOTE END	UTILITY RESPONSE
1	220 KV JODA-JSPL-1	06-12-2022	04:25	06-12-2022	05:21	Joda: Y_N, 1.12 kA		Y-Earth	350	Tripped on Directional O/c from Joda in 350 msec. Protection settings maybe reviewed		Yes	No	O/c setting to be reviewed at Joda

2	220 KV PANDIABILI-PRATAPSASAN-2	07-12-2022	17:52	07-12-2022	09:24	Pandiabili: Didn't trip	Pratapsasan: B_N, 0.157 kA	B-Earth	100	OPTCL may explain		NA	No	A/r successful. Tripped again during reclaim time
3	220 KV PANDIABILI-PRATAPSASAN-1	14-12-2022	11:38	14-12-2022	12:50	Pandiabili: B_N, 25.6 km, 3.18 kA. A/r successful	Pratapssan: B_N, 3.125 kA	B-Earth	100	A/r successful from Pandiabili only.		Yes	No	A/r blocked. PD time was set to 500 msec
4	220 KV CHANDIL-SANTALDIH-1	16-12-2022	05:55	16-12-2022	18:34	Chandil: Y_N, 80 km, 1.27 kA	Santaldih: Y_N, 22 km, 5.196 kA	Y-Earth	100	Three phase tripping for single phase fault from Chandil		Yes	No	Y_ph conductor snapped at Loc. 72 (STPS jurisdiction)
5	220 KV MUZAFFARPUR-HAZIPUR-1	16-12-2022	16:34	16-12-2022	17:51	Muzaffarpur: Didn't trip		No fault	NA	BSPTCL may explain		NA	No	PLCC card defective
6	765 KV SASARAM-FATEHPUR-1	20-12-2022	04:23	20-12-2022	18:26	Sasaram: Y_N, 268.7 km, 1.6 kA		Y-Earth	100	A/r successful from Sasaram only		Yes	NA	Line tripped from Fatehpur again during reclaim time
7	220 KV MUZAFFARPUR-HAJIPUR-1	21-12-2022	08:35	21-12-2022	09:22	Muzaffarpur: Didn't trip		No fault	NA	BSPTCL may explain		NA	No	PLCC card defective
8	220 KV RENGALI(PG)-RENGALI-1	21-12-2022	09:51	21-12-2022	10:54	Rengali (PG): Didn't trip		No fault	NA	OPTCL may explain		NA	No	Y_ph current suddenly became zero at Rengali (OPTCL) end

9	400 KV MUZAFFARPUR-GORAKHPUR-2	22-12-2022	01:03	22-12-2022	06:12	Muzaffarpur: R_N, 256.8 km, 2.19 kA	Gorakhpur: R_N, 43 km, 2.01 kA	R-Earth	100	DT received after 1 sec before A/r attempt. PG may share findings if any		Yes	NA	DT to be sent to remote end on A/r failure from Gorakhpur

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-C.5

Sl No.	Name of the incidence	PCC Recommendation	Latest status
121st PCC Meeting			
1.	Total Power failure at 220 kV Chatra(JUSNL) S/s on 18.11.2022 at 01:23 Hrs	PCC advised JUSNL to test the healthiness of bus bar relay at Chatra end for its non-operation during the incident.	*JUSNL representative informed that relay engineer is present at site for necessary testing of the relay. subsequently observation will be shared to ERPC/ERLDC after completion of the testing.*
119th PCC Meeting			
2.	Disturbance at 220 kV Tenughat (TVNL) S/S on 09.09.2022 at 12:55 Hrs	PCC advised JUSNL to rectify all clearance related issues present in 220 kV Tenughat-Govindpur D/C line so that similar type of incidents can be avoided in future. PCC advised JUSNL to share PSL logic of relay to ERPC/ERLDC. It further advised JUSNL to communicate this matter to relay manufacturer for testing and updating firmware in the relay. PCC advised TVNL to review overcurrent settings of unit #2 considering the present transmission network & fault level data at Tenughat. The coordination study may be done considering when one unit in operation & there is a line fault in one of the outgoing feeders (worst case scenario). The revised setting may be implemented at Unit end & the same may be intimated to PCC.	Regarding updating firmware in relay, JUSNL representative informed that site visit of relay engineer has been scheduled in last week of Nov-22. TVNL representative informed that they are in communication with PRDC in order to review overcurrent settings of unit #2. He further added that as per M/s BHEL has also been communicated with regard to the review of the settings in Unit #2. *Regarding updating firmware in relay, JUSNL representative informed that it will take 2-3 months more as work is planned to be executed with upgrdation of SCADA.*
118th PCC Meeting			

3.	Disturbance at 400 kV Dikchu S/s on 10.08.2022 at 11:57 Hrs	PCC advised Dikchu HEP to expedite the visit of relay engineer and resolve the issue by Sep-22. 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.	In 120th PCC meeting, Dikchu HEP representative informed that breaker will reach the site by end of Nov 2022. *Dikchu HEP representative informed that breaker had been received at site. He further added that shutdown of bus is planned from 21st Jan 2023 and restoration of main bus-2 will be completed by end of Jan 2023 in case service engineer visit is scheduled in January else work will be completed Feb-23.*

Protection audit recommendations for substations audited by protection team of ERPC

Annexure C.7

Sl No.	Name of Substation	Owner	Date of Audit	Remarks/Recommendation	Compliance Status
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.	done
				2.Provision for nameplate with bay/line name may be done in front of SPR(Kiosk) in switchyard for easy identification.	done
				1.Event logger is not available for 220 kV System. The same shall be provided.	220 KV EVENT LOGGING INTEGRATED WITH 400 KV SAS EVENT LOGGER .
				2.Time synchronising equipment is not available for 220 kV system.	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

2	400/220/132 kV Lapanga(OPTCL) S/s	OPTCL	26.04.2022	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.	SETTING FILES PREPARED .WILL BE DONE ACCORDINGLY.

				9.Autorecloser in 400 kV Lapanga-Meramundali line is having some issue. The same may be rectified.	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.	To be done.
				11.Grading in terms of time/voltage setting shall be done in Overvoltage settings of 400 kV lines.	Grading done and Implemented in relays.
				1. Time synchronising equipment in substation control room is not working. The same may be rectified & put into service.	It is presently working but synchronization with some of the Relays to be done.
				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.	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 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.	Budhipadar-Tarker-1 and 2 , Budhipadar-IBTPS-1 and 2 replaced by numerical relay.
				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.	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 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.	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.

				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.	
3	220/132 kV Budhipadar(OPTCL) S/s	OPTCL	26.04.2022	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.	To be discussed with Korba.
				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.	Zone settings are updated as per ERPC Guideline

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.	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.
9. Oil leakages was observed in 220/132 kV Auto-I. Action may be taken to address the same.	Oil leakage through Breather arrested .
10.Vegetation shall be cleared & proper PCC and 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.
General:	
1. Uniform protection philosophy shall be adopted across OPTCL 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. Voltage/time gradation to be done in overvoltage setting for S/s level.	
				4. Review of implemented protection settings need to be carried out periodically for OPTCL system..	
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.	
				8. Overvoltage setting enabled for all the lines with same voltage & time setting. Grading in terms of time/voltage setting shall be done in Overvoltage settings of 220 kV lines	
				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.	We are in process for approval of different make relay and after getting clearance same will 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	Implemented

5	400 kV OPGC S/s	OPGC	27.04.2022	3. DR time window may be increased. DR configuration may be done in line with guidelines approved in ERPC PCC meeting.	Implemented
				4. Overcurrent protection in 400 kV lines may be disabled.	Implemented
				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.	Same was confirmed and implemented
				7. Zone-2 & Zone-3 settings of all 400 kV lines need to be reviewed and set as per the ERPC Protection philosophy.	We have taken approval from M/s OPTCL and same shall be implement after internal approval
				8. Adjacent shortest and longest line length maybe verified and zone settings maybe implemented accordingly	We have taken approval from M/s OPTCL and same shall be implement after internal approval
				9. Power swing block enabled for all zones. May be reviewed	We have in discussion with OPTCL for unblocking modification in zone-1 and same will be implemented after OPTCL reply.

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.	completed.
				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.	completed.

Sl No.	Name of Substation	Owner	Date of Audit	Remarks/Recommendation	Status
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.	Time synchronization of 2 no. SIEMENS 7SA522 relay done by restarting and GPS ID updation
				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.	Reviewed and implemented as per guideline
				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.	TMS value of backup overcurrent relay made same in consulation with ERPC team
				1.Switchyard equipments are in good and healthy condition. Switchyard area as well as overall station is well maintained.	

2	400/220 kV Chaibasa S/s	Powergrid	21.07.2022	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.	
				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.	done
				8.Disturbance recorders shall be configured as per the DR standard guidelines of ERPC.	

3	220/132 kV Chandil(JUSNL) S/s	JUSNL	20.07.2022	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).	Revised
				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.	For Ramchandrapur line, Zone-3 time is coordinated with fault clearing time of ATR at Ramchndrapur. 23 time delay kept on 1 sec.
				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	done
				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.	At present PLCC channels are healthy for Ranchi line. AR setting is reviewed for 220 kV lines and set dead time- 10 sec and reclaim time- 25 s.
				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.	done
				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.	Bus 2 PT is erected at site and it will be commissioned soon.

				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.	Provision for line CVT, a preparation for requirement is in progress.
				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.	It is under progress.
				4.DR is not GPS time synchronised. The same may be rectified.	For rectification, M/S JEPDEC has been requested and he assure that it will be completed soon.
				5. DR time window may be increased. DR configuration may be done in line with guidelines approved in ERPC PCC meeting.	DR time window has been increased for all elements. (DR length-3.0 sec and pre-fault time-0.50 sec).
				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.	O/H and servicing of air conditioining system is under progress.
				7.Zone settings for chandil line shall be reviewed in line with ERPC protection philosophy.	done.

4	220 kV Ramchandrapur	JUSNL	21.07.2022	8. Zone-2 & zone-3 reach setting may be reviewed for Chaibasa fedder	done.
				9.Zone-3 setting may be reviewed for 220 kV RCP-Joda feeder.	done.
				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.	For function of LBB relay, cabling work has been completed and it will be commssioned upto 20/12/2022
				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	Power swing is blocked for Z2 and Higher Zone.
				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.	AR setting is reviewed for 220 kV lines and set dead time-1.0 sec and reclaim time- 25s.
				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.	work completed

				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.	we have requested vide this office letter no. 647 dated 21.10.2022 and memo no. 626 dated 18.10.2022 to avail shutdown for overhauling/servicing and also requested for replacement of Power transformer for smooth function of Grid substation.
				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.	
				1. Disturbance recorders are not time synchronised.	For rectification of this, estimate has been prepared an dit will be rectified soon.
				2. DR time window may be increased. DR configuration may be done in line with guidelines approved in ERPC PCC meeting.	DR time window has been increased for all elements. (DR length - 3.0 sec and pre-fault time-0.50 sec).
				3. Zone-2 reach setting & zone-3 timer setting for Ramchandrapur feeder shall be reviewed in line with ERPC protection philosophy.	done

5	220 kV Chaibasa S/s	JUSNL	21.07.2022	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 %).	done on 25.11.2022 with help of CRITL team
				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.	BCU is not in service due to some faulty cards which after rectified very soon as estimate has been prepared.
				6. Zone-3 & Zone-4 reach setting to be reviewed for 220 kV Chaibasa-Chaibasa(PG) line.	done
				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.	done.
				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.	For rectification of this, estimate has been prepared an dit will be rectified soon.
				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.	It will be rectified very soon after issuing of work order for Grid AMC.

				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.	After rectification of bus bar protection, it will be changed.
				11.DC earth leakage was observed in one of the DC sources. The same may be attended.	It will be rectified very soon after issuing of work order for Grid AMC.
				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.	Proposal for procurement of new PLCC Panel for both ends has been initiated at DVC End and is in process.
				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.	Although it is mentioned in the DR Standardization document that CB Open Status be configured in the DR Digital Channels, a CB Closed status feedback shall provide the same information and may be equally used for analysis. DVC is of the opinion that CB Status any of Close or Open should be equally applicable as far as DR channel information is concerned. DR Time Window in D60 shall be made 3sec from present 1.67sec
				3. Time synchronising equipment in substation control room is not working. The same may be rectified & put into service.	Time synchronization equipment is working properly now.

6	220 kV Jamshedpur S/s	DVC	22.07.2022	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.	Rectification has been done for both DC-I & DC-II sources.
				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.	This settings has been kept as per Clause No. 2(a) of Protection Philosophy and is as per CEA guideline. DVC requests ERPC to hold another special meeting regarding review of "Protection Philosophy of Eastern Region" where we want to discuss some of the problems being faced by DVC in implementing Sl. No. 2b (Zone 2 reach and time for 220KV and below systems)specially and also clause No. 3 (Zone 3) of the philosophy. In fact it has been about 7 years since the protection philosophy had been finalized and it has never been reviewed after that. So a review meeting shall be most welcome.
				6. Zone-2 reach setting for Bokaro line may be reviewed considering the shortest adjacent line as 220 kV BTPS-CTPS.	Same comment as above. Settings have been done as per Clause No. 2(a).
				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.	In any of DVC 220kV System, DT is not incorporated in protection schemes due to limitation in the number of spare codes available in our 220KV communication equipment. DT based tripping is implemented only in our 400kV system.