



Agenda
for
144th PCC Meeting

Date:24.02.2025
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

AGENDA FOR 144th PROTECTION COORDINATION SUB-COMMITTEE MEETING TO BE HELD ON 24th FEB 2025 AT 10:30 HRS THROUGH MS TEAMS

PART – A

ITEM NO. A.1: Confirmation of Minutes of 143rd Protection Coordination sub-Committee Meeting held on 20th Jan 2025 through MS Teams.

The minutes of 143rd Protection Coordination sub-Committee meeting held on 20.01.2025 was circulated vide letter dated 05.02.2025.

Members may confirm the minutes of the Meeting.

PART – B

ITEM NO. B.1: Total Power Failure at 400 k V Barh (NTPC) S/s on 4th Jan 2025 at 19:23 Hrs

On 4th Jan 2025 at 19:23 Hrs, complete outage of power at 400 kV NTPC Barh occurred which led to generation loss of around 1800 MW. Subsequently a meeting was held on 8th Jan 2025 among ERPC, ERLDC and NTPC for which record notes of meeting is attached at **Annexure B.1.1**. Further, another meeting was also held on 8th Jan 2025 among ERPC, ERLDC and Powergrid to discuss Tripping of 400 kV Barh-Motihari-1 due to conductor snapping for which record notes of meeting is attached at **Annexure B.1.2**.

Few major points of discussions were as follows-

- NTPC was requested to immediately review the protection setting implemented at all generating stations and disable O/c protection setting if enabled anywhere.
- NTPC was also requested to submit protection setting of all generating stations to ERPC and ERLDC for verification.
- NTPC submitted that they wanted to keep Backup overcurrent protection with pickup above thermal limit with the AND logic of VT supervision to avoid GT failure in case of any eventuality since they experienced similar cases in past.
- Powergrid informed that conductor snapping of 400 kV Barh-Motihari-1 was in mid-span section. It was further stated that these lines were usually lightly loaded, and this was the first time that the line flow had crossed around 1100 MW.
- Powergrid emphasised that they would intensify patrolling and thermo-vision scanning of all the joints in the entire line corridor of fog prone areas and this would be completed by next 15 days.

In 143rd PCC Meeting, ERLDC representative explained the incident with help of presentation which is attached at **Annexure B.1.3**.

He informed that on 4th Jan 2025, prior to event 400 kV Barh- Kahalgaon d/c and 400 kV Barh-Patna 1 and 2 were under planned shutdown. Further 400 kV Barh- Patna -4 was also tripped on same day at 05:35 Hrs due to conductor snapping near Gantry Tower of Barh.

As 400 kV Barh- Patna - 4 and 400 kV Barh- Motihari 2 are on the same multi circuit tower, emergency shutdown of 400 kV Barh- Motihari 2 was taken for 3 hrs from 16:30 Hrs.

He said that after availing emergency shutdown of 400 kV Barh-Motihari -2, system was N-1 compliant and each of the remaining three lines being Quad Moose were capable to carry upto its thermal limit (i.e. 1750 MW). However, since Backup Overcurrent protection was enabled in 400 kV Barh-Patna-3 at Barh end with setting well below the thermal limit of line (Setting at 2040 A~1340 MW), which resulted in tripping of the line when flow crossed the set value of 2040 A. The O/c protection of the lines at Barh end was known only after the event. Further, after tripping of 400 kV Barh-Patna-3, flow in 400 kV Barh-Motihari-1 reached around 1200 MW and after six minutes, 400 kV Barh-Motihari-1 tripped on Y-Earth fault as conductor got snapped at location-393. During this period of six minutes, Barh started backing down as per the standing instruction from ERLDC and generation was backed down by 150 MW. After this, 400 kV Barh-Kahalgaon-1 was the only remaining line in service for evacuating entire generation of Barh of around 1650 MW. This line also tripped on backup overcurrent protection at Barh end (setting was kept at 1650 Amps ~1100 MW).

ERLDC representative stated that enabling Backup Overcurrent protection in 400 kV lines was violation of CEA Construction Standards,2022 and ERPC Protection philosophy. As the overcurrent pickup setting at Barh was well below the thermal capacity of the line, it resulted in complete outage of Barh power plant.

He further informed that meeting was held on 8th Jan 2025 among ERPC, ERLDC and NTPC and ERPC, ERLDC and Powergrid to discuss about the event and tripping of 400 kV Barh-Motihari-1 due to conductor snapping.

Member Secretary, ERPC opined that this issue is quite critical from both operation and protection part of network so he advised ERPC representative to convey special meeting at ERPC Kolkata (physically) among ERPC, ERLDC, NTPC and Powergrid representative or refer it to 223rd OCC Meeting for further discussion.

PCC agreed with proposal made by Member Secretary, ERPC and advised same to ERPC representative.

In 223rd OCC Meeting,

- OCC expressed serious concern on total generation loss at NTPC Barh station on 4th Jan 2025.
- OCC advised NTPC to adhere to the CEA guidelines for protection relay settings. However, to accommodate any operational concern consent of OCC/PCC forum should be obtained after due deliberation.
- OCC suggested that real time testing of loading capability of important transmission lines, especially those responsible for power evacuation from generating units, needs to be carried out on periodic basis to avert recurrence of such disturbance.
- OCC suggested that Powergrid should conduct periodic survey on all such lightly loaded lines, identify vulnerabilities and take appropriate measures to prevent such disturbance in future.
- ERLDC was advised to maintain a consolidated database on relay settings at all ER generating stations and validate the same as per protection philosophy of Eastern region. If any discrepancy is observed, the same may be flagged in OCC/PCC forums.

Members may discuss/update.

ITEM NO. B.2: Disturbance at Balimela HEP (OHPC) S/s on 6th Jan 2025 at 17:53 Hrs

On 6th Jan 2025, Unit-1,4,5 and 8 were generating around 225 MW and Balimela unit-2 & 7 were kept in standby mode at Balimela HPS. At 17:53 Hrs, during synchronization of unit-6 there was severe water leakage from the turbine which resulted in flooding of the turbine floor. Due to this, all the running units were hand tripped as a safety measure.

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

Gen. Loss :225 MW
Outage Duration: 01:58 Hrs
OHPC may explain.

ITEM NO. B.3: Disturbance at 220/132 k V Godda (JUSNL) S/s on 16th Jan 2025 at 17:17 Hrs

On 16th Jan 2025 at 17:17 Hrs, Tenughat unit-2 tripped due to turbine vibration issue. Unit-1 was already under forced outage since 14/01/2025 on Boiler tube leakage. Outage of both the units of Tenughat led to overloading of 220 kV Maithon - Dumka D/C which further resulted in SPS operation at Dumka. As Godda is radially fed from Dumka, SPS operation at Dumka S/s resulted in tripping of 220 kV Dumka-Godda D/C and 132kV-Dumka-Pakur D/C.

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

Load Loss: 120 MW
Outage Duration: 00:23 Hrs
JUSNL, TVNL may explain.

ITEM NO. B.4: Repeated Disturbance at 400 k V JSPL S/s

a) Disturbance at 400 k V JSPL S/s on 25th Jan 2025 at 05:13 Hrs

On 25th Jan 2025 ,400kV-MEERAMUNDALI-JSPL D/C tripped at 05:13 Hrs due to Y-B fault. Further, Both Bus at 400 kV JSPL became dead as it was radially connected to 400 kV Meramundali S/S. Captive power plant JSPL has 6 units of 135 MW capacity each. Unit-1 with emergency load of 90 MW was separately connected with 220 kV Bus-1 (220 kV bus-coupler remaining open). Unit-2 of JSPL was under overhauling and other 4 units (unit-3,4,5,6) connected to 220 kV Bus-2 were generating around 420 MW and rest around 25 MW was imported from grid for its captive load. As both evacuating lines tripped, the captive island didn't survive.

Load Loss: 445 MW, Gen. Loss: 420 MW
Outage Duration: 00:27 Hrs
JSPL may explain.

b) Disturbance at 400 k V JSPL S/s on 25th Jan 2025 at 06:49 Hrs

On 25th Jan 2025, 400kV-MEERAMUNDALI-JSPL-1 tripped at 06:49 Hrs due to 3 ph fault (Insulator decapping in B Phase of JSP-Meramandalli-1). Ckt-2 was under breakdown condition. Further, Both Bus at 400 kV JSPL became dead as it was radially connected to 400 kV Meramundali S/S. Captive power plant JSPL has 6 units of 135 MW capacity each. Unit-1 with emergency load of 90 MW was separately connected with 220 kV Bus-1 (220 kV bus-coupler remaining open). Unit-2 of JSPL was under overhauling and other 4 units (unit-3,4,5,6) connected to 220 kV Bus-2 were generating around 420 MW and rest around 40 MW was imported from grid for its captive load. As both evacuating lines tripped, the captive island didn't survive.

Load Loss: 460 MW, Gen. Loss: 420 MW
Outage Duration: 06:37 Hrs
JSPL may explain.

c) Disturbance at 400 k V JSPL S/s on 26th Jan 2025 at 06:06 Hrs

On 26th Jan 2025, 400kV-MEERAMUNDALI-JSPL-1 tripped at 06:06 Hrs due to R-ph Pilot insulator decapped at Loc No 97(Ckt-2 was under breakdown condition due to R-B Ph Insulator decapped at Loc No 96 from 05:31 Hrs). Further, Both Bus at 400 kV JSPL became dead as it was radially connected to 400 kV Meramundali S/S. Captive power plant JSPL has 6 units of 135 MW capacity each. Unit-1 with emergency load of 90 MW was separately connected with 220 kV Bus-1 (220 kV

bus-coupler remaining open). Unit-2 of JSPL was under overhauling and other 4 units (unit-3,4,5,6) connected to 220 kV Bus-2 were generating around 420 MW and rest around 40 MW was imported from grid for its captive load. As both evacuating lines tripped, the captive island didn't survive.

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

Load Loss: 335 MW, Gen. Loss: 320 MW

Outage Duration: 07:20 Hrs

JSPL may explain.

ITEM NO. B.5: Major grid events other than GD/GI

a) Tripping of ICTs during the month of January'2025

Sl. No	Name of the Element	Trip Date	Trip Time	Remarks	Utility
1	400KV/220KV 315 MVA ICT 2 AT MEJIA-B	20-01-2025	18:05	Tripped during charging of ICT#1 bay with cable from 220 kV GIS side.	DVC

DVC may explain.

ITEM NO. B.6: Over Current setting of lines at generator end

As per CEA Technical Standards for construction, 2022, Backup O/C protection should not be enabled for 220 kV and above lines having Main-1 and Main-2 protection. This was discussed repeatedly in several PCC meetings. In 143rd PCC meeting, it was agreed that to account for the cases when VT fuse fails and line fault occurs at that instance, O/c may be enabled with AND logic of VT fuse failure and the pickup setting should be above thermal rating of the line.

A google sheet was circulated to share the updated setting of the lines emanating from all generators, however many generating stations are yet to submit the same. Some discrepancies have also been observed with the setting shared by the generators.

Members may discuss.

ITEM NO. B.7: Submission of protection performance indices on a monthly basis by users to RPC and RLDC for 220 kV and above line

As per IEGC 2023 Clause 15(6), 15(7) all users shall submit protection performance indices of previous month by 10th of every month to ERPC and ERLDC along with reasons for performance indices less than unity of individual element wise protection system to the respective RPC and action plan for corrective measures. For the month of January'2025, PP indices had been received from PG ER-1, PG Odisha, BSPTCL, JUSNL, OPTCL, WBSETCL, NTPC Darlipalli, NTPC Barh, DMTCL, ENICL, OGPTL, PKTCL, Jorethang HEP, Tashiding HEP, and CESC which is attached as **Annexure B.7**.

Following table shows the status of PP Indices received for last five months.

Sl.no	Utility Name	September	October	November	December	January
1	PG-ER-1	Yes (26.12.2024)	Yes (26.12.2024)			Yes (13.02.2025)

2	PG-ER-2	YES (23.10.2024)	Yes (26.11.2024)	Yes (24.12.2024)	Yes (16.01.2025)	
3	PG-Odisha	Yes (21.10.2024)	Yes (01.11.2024) /-	Yes (03.12.2024)	Yes (02.01.2025)	Yes (07.02.2025)
4	WBSETCL/WBP DCL	Yes (08.10.2024) /-	Yes (05.11.2024) /-	YES (09.12.2024)	Yes (07.01.2025)	Yes (11/02/2025)
5	BSPTCL/ BGCL	Yes (15.10.2024) /-	Yes (12.11.2024) /-	Yes	Yes (13.01.2025)	Yes (10.02.2025)
6	OPTCL/ OHPC	Yes (22.10.2024)	Yes (11.11.2024)	YES	Yes (15.01.2025)	Yes (10.02.2025)
7	DVC		Yes (23.11.2024) /-	YES (21.12.2024)	Yes	
8	JUSNL	Yes (08.10.2024)	Yes (22.11.2024) /-	Yes (07.01.2025)	Yes (07.01.2025)	Yes (13.02.2025)
9	Sikkim					
10	OPGC					
11	PMTL					
12	NTPC- KHSTPP	YES	YES	Yes (13.12.2024)		
13	NTPC- FSTPP		Yes (07.11.2024)	YES (04.12.2024)		
14	NTPC-BARH	Yes (16.10.2024)		Yes (15.12.2024)	Yes (10.01.2025)	
15	NTPC- TSTPP			YES (14.12.2024)		
16	NTPC- KBUNL					
17	NPGC					
18	BRBCL					
19	NTPC- DARILAPLI			Yes (02.12.2024)	Yes (04.01.2025)	Yes (12/02/2025)
20	NTPC- NORTH KARNPUARA			Yes (10.12.2024)		

21	ATL					
22	APNRL					
23	CBPTCL					
24	DMTCL	Yes (05.10.2024)	Yes (05.11.2024)	Yes (03.12.2024)	Yes (02.01.2025)	Yes (03/02/2025)
25	ENICL			Yes (09.12.2024)	Yes (03.01.2025)	Yes (12.02.2025)
26	Chuzachen HEP					
27	Jorethang HEP	Yes (01.10.2024)	Yes (05.11.2024)	Yes	YES (02.01.2024)	Yes (01.02.2025)
28	Tashiding Hep	Yes (03.10.2024)	Yes (05.11.2024)	YES (09.12.2024)	YES (02.01.2024)	Yes (01.02.2025)
29	GMR					
30	IBEUL					
31	JITPL					
32	MPL					
33	NKTL					
34	OGPTL			YES (09.12.2024)	Yes (03.01.2025)	Yes (12.02.2025)
35	PMJTL					
36	Powerlink					
37	PKTCL			YES (09.12.2024)	Yes (03.01.2025)	Yes (12.02.2025)
38	CESC	Yes (27.11.2024)	Yes (27.11.2024)	Yes (25.12.2024)	Yes (17.02.2025)	Yes (17.02.2025)
39	Rongnichu HEP					
40	SPTL					
41	TVNL			Yes (06.12.2024)	Yes (08.01.2025)	

ITEM NO. B.8: Uniform Protection Protocol prepared by NPC

Uniform Protection Protocol has been finalized in 15th NPC Meeting held on 14th Nov 2024 at Nagpur which is attached at **Annexure B.8**.

In 142nd PCC Meeting, PCC advised all utilities to submit their observations with respect to Uniform Protection Protocol to ERPC.

In 143rd PCC Meeting, ERPC representative highlighted clause 6. vi) of Uniform Protection Protocol regarding settings of new elements to be commissioned as –

“Each Generating Company and Transmission Licensee, for voltage levels 400kV and above and interstate lines, shall submit the protection settings as per the format prescribed, along with the calculation sheets, co-ordination study reports and input data, in advance, to RPC/RLDC for every new element to be commissioned. The mentioned information shall be submitted to the RPC/RLDC two months in advance for all the elements proposed to be commissioned. RPC shall furnish the approved settings within forty days from the date of submission of the settings by the entity.”

He further highlighted clause 6. Xii) of Uniform Protection Protocol as-

“Any change in the existing protection settings, for voltage levels 400kV and above & interstate lines, shall be carried out only after prior approval from the RPC. The owner entity shall inform all the adjacent entities about the change being carried out”

PCC enquired all utilities to submit their comments regarding UPP for which OPTCL representative replied that it will require another 15 days to provide comments on uniform protection protocol. Further, no comments were received from any utility.

As no comments was received from any utility in the meeting, PCC advised all utilities to submit their observations with respect to Uniform Protection Protocol by 15 days to ERPC so that it can be discussed in 144th PCC Meeting.

Members may discuss.

ITEM NO. B.9: Protection System Analysis Group of Eastern Region

A Uniform Protection protocol has been developed by NPC in line with IEGC 2023. The protocol envisages formation of a Protection System Analysis Group (PSAG) loads in each region with members from RPC, NLDC, RLDC, PGCIL, a Protection Expert from the region along with the entity under whose jurisdiction GD/GI occurred to analyze the GD/GI for analysis of Grid Disturbances/incidents at major/critical S/s and at substations that affected critical/essential/strategic in detail by visiting the respective substation/substations physically and conducting the meetings. The progress of implementation of the PSAG shall be followed up in the monthly PCC Meeting.

In 143rd PCC Meeting, PCC advised concerned utilities to provide nominations of nodal officer to ERPC by one week for forming Protection system analysis group of eastern region.

Members may update.

ITEM NO. B.10: Support Service for Protection Database Project of ER for FY 2025-26

As per clause 14(3a) of CERC(IEGC)-2023, RPCs are required to maintain a centralized database of relay and protection settings of their concerned region.

In 51st ERPC Meeting held on 12.01.2024, the proposal for continuing support service for existing project "Creation and Maintaining a Web based Protection Database and Desktop based Protection Setting Calculation tool for Eastern Regional Grid" for an interim period of one year w.e.f. 01.04.2024 was approved which is continuing and support service will expire on 31st March 2025.

To ensure reliable and up-to -date database, continuation of support service of the project is very much necessary therefore it is proposed that support service may be extended/ renewed for period of one year for the protection database project.

It is further proposed that PDMS portal may be enhanced to include features such as sorting relay settings by type, generating summary reports for quick reference, and enabling automated checks for deviations from the standard protection philosophy. These enhancements will facilitate timely audits, ensure adherence to protection standards, and help prevent incidents caused by incorrect settings.

Utilities are required to provide their suggestions with respect to PDMS so that they can be included in scope of work while renewing support service period for FY 2025-26.

In 143rd PCC Meeting, ERPC representative informed that as per clause 14(3a) of CERC(IEGC)-2023, RPCs are required to maintain a centralized database of relay and protection settings of their concerned region. Further, existing support service for project "Creation and Maintaining a Web based Protection Database and Desktop based Protection Setting Calculation tool for Eastern Regional Grid" will expire on 31st March 2025 hence he proposed that support service may be extended/ renewed for period of one year for the protection database project.

On enquiry from ERPC representative regarding suggestions related to PDMS portal, ERLDC representative informed that portal should be enhanced to include features such as sorting relay settings by type, summary of protection settings in service at a particular S/s, Queries based data extractions, generating summary reports for quick reference, downloading protection settings of multiple S/s at once and enabling automated checks for deviations from the standard protection philosophy. These enhancements will facilitate timely audits, ensure adherence to protection standards, and help prevent incidents caused by incorrect settings.

PRDC representative informed that at present 50 relays settings can be extracted at a time for a particular substation. She requested ERLDC and other utilities to provide format and workflow in which extraction of relay settings is required along with other features related to PDMS.

She further added that for few substations relay settings are shared by utilities in pdf format instead of .csv format which further create issue in maintain and extracting settings from PDMS portal.

PCC advised PRDC representative to share relay settings of substations received in pdf format to ERPC by 27th Jan 2025 so that it can be circulated to concerned utility for getting settings in desired .csv format.

PCC advised ERPC representative to convey special meeting among ERPC, ERLDC, PRDC, Powergrid, NTPC, State utilities and other concerned utilities by first week of Feb 2025 so that all suggestions related to PDMS portal and settings calculation/ fault study by PSCT software can be discussed and further be included in scope of work while renewing support service period for FY 2025-26.

Special meeting for Utilization of PDMS and PSCT was held on 6th Feb 2025.

Concerned utilities may update.

ITEM NO. B.11: Mock testing of SPS

As per IEGC 2023 Clause 16(2), For the operational SPS, RLDC or NLDC, as the case may be, in consultation with the concerned RPC(s) shall perform regular load flow and dynamic studies and mock testing for reviewing SPS parameters & functions, at least once in a year.

Status of SPS testing/operation for SPS installed in Eastern region is as below:

Sl. No.	SPS Details	SPS implemented at	Tested/ Operated on
1	SPS for 220 kV EMSS-Shubhasgram D/C (CESC)	EMSS (CESC)	Testing done on 31.08.2024
2	SPS for 5*400/220 kV ICTs at Subhasgram	Subhasgram(PG)	Testing done on 15.04.2024
3	SPS at Rajarhat (PG) for 2x500MVA ICTs	Rajarhat (PG)	Testing done on 10.04.2024
4	SPS at 132 kV Rammam HEP	Rammam HEP (WB)	Implemented in November 2024
5	SPS at Sterlite Power (Sterlite)	Sterlite	Modified SPS is under implementation by Sterlite
6	SPS for evacuation of IBEUL generation-2 units (Through interim arrangement)	JSWEUL	SPS implemented on 22.01.2025
7	HVDC Bheramara SPS for Secure Power Transfer to Bangladesh	Baharampur(PG)	Response awaited from Bangladesh.
8	Talcher Kolar-SPS	Talcher NTPC	Successfully operated on 04/06/2024, 04/05/2024 and 03/05/2024

Utilities are requested to share mock testing details for intra state SPS for compliance of IEGC 2023 Clause 16(2).

Members may note.

ITEM NO. B.12: Single Line Tripping Incidences in month of Jan 2025

Single line tripping incidents in the month of Jan 2025 which needs explanation from constituents of either end is attached at **Annexure B.12**.

Members may discuss.

PART- C: OTHER ITEMS

ITEM NO. C.1: Internal Protection Audit Plan of Sub stations for the Year 2024-25

The Clause (5) of Regulation 15 of IEGC Regulations, 2023 envisages as below:

Quote

(1) All users shall conduct internal audit of their protection systems annually, and any shortcomings identified shall be rectified and informed to their respective RPC. The audit report along with action plan for rectification of deficiencies detected, if any, shall be shared with respective RPC for users connected at 220 kV and above (132 kV and above in NER).

(5) Annual audit plan for the next financial year shall be submitted by the users to their respective RPC by 31st October. The users shall adhere to the annual audit plan and report compliance of the same to their respective RPC."

Unquote

All utilities are requested to submit the annual audit plan for the substations 220kV and above voltage level for FY 2024-25 to ERPC by 31.10.2023. Annual audit plans for internal audit of their protection systems and third-party protection audit shall be furnished separately.

The utility wise status is given below:

Sl.no	Utility Name	Status
1	PG-ER-1 & PMTL	Received
2	PG-ER-2	Received
3	PG-Odisha	Received
4	WBSETCL	Received
5	BSPTCL	Received
6	OPTCL	Not Received
7	DVC	Received
8	JUSNL	Received
9	OPGC	Not Received
10	CESC	Received
11	NTPC	Not Received
12	NHPC	Received
13	DMTCL	Received
14	IPP	Not Received

In 140th PCC Meeting, on enquiry from PCC, OPTCL representative informed that internal protection audit plan will be shared to ERPC/ERLDC by 2-3 days.

PCC advised NTPC & IPPs to share internal protection audit plan at earliest to ERPC/ERLDC.

PCC advised concerned utilities to submit internal protection audit report for S/s where audit had been completed to ERPC/ERLDC.

OPTCL vide email dated 22nd Nov 2024 had submitted internal protection audit plan.

In 143rd PCC Meeting, PCC advised NTPC & IPPs to share internal protection audit plan by one week to ERPC/ERLDC.

PCC advised concerned utilities to submit internal protection audit report for S/s where audit had been completed to ERPC/ERLDC.

Concerned utilities may update.

ITEM NO. C.2: Third Party Protection audit of Sub stations for the Year 2024-25

As per IEGC 2023 Clause 15.2, “All users shall also conduct third party protection audit of each sub-station at 220 kV and above (132 kV and above in NER) once in five years or earlier as advised by the respective RPC.”

Further IEGC 2023 Clause 15.3 states that “After analysis of any event, each RPC shall identify a list of substations / and generating stations where third-party protection audit is required to be carried out and accordingly advise the respective users to complete third party audit within three months.”

Accordingly, a list of S/s has been identified where third-party protection audit needs to be carried out:

NTPC Kahalgaon	Tenughat	Budhipadar	Darbhanga (BH)
NTPC Farakka	Chatra	Lapanga	Biharsharif (BH)
NTPC Barh	Hatia	Rengali (OPTCL)	Purnea Old (PG)
Jorethang	Garhwa	Rengali (PH)	Kishanganj (PG)
Tashiding	Chandil	Therubali	Meramundali
Ramchandrapur	Bantala (KLC)	Balimela	

As per SOP for Third Party Protection Audit prepared by NPC, Third Party Protection Audit shall be carried out by the third party designated agencies in line with the IEGC Regulations 2023 or by the audit teams constituted by RPCs with the members from other states (at least two) who opt for the RPC coordinated third party protection audit.

In 140th PCC Meeting, ERPC representative informed that third party protection audit plan has been received from OPTCL and Powergrid ER-1. He further added that after receiving audit plan from all utilities, ERPC will communicate to concerned utilities regarding substations for which protection audit can be done through audit team of ERPC. He further told that it is planned to carry out protection audit for critical substations by last week of November 2024.

NTPC representative informed that they are planning to carry out third party protection audit by CPRI in Dec 2024 /Jan 2025 for which audit plan will be shared to ERPC/ERLDC.

PCC advised all utilities to submit third party protection audit plan by 7 days to ERPC along with their choice to carry out protection audit either through ERPC coordinated third party protection audit or by third party designated agencies.

In 141st PCC Meeting, PCC advised all utilities to submit third party protection audit plan by 7 days to ERPC along with their choice to carry out protection audit either through ERPC coordinated third party protection audit or by third party designated agencies.

In 142nd PCC Meeting, ERPC representative informed that as per communications received from Jorethang HEP and Tashiding HEP, they are planning to conduct third party protection audit for concerned S/s by Reliserve solution before 31st March 2025. He further informed that as per communication received from NTPC Barh, they are planning to carry out third party protection audit by CPRI in Jan 2025.

PCC advised concerned utilities to submit third party protection audit plan by 31st Dec 2024 to ERPC along with their choice to carry out protection audit either through ERPC coordinated third party protection audit or by third party designated agencies.

In 143rd PCC Meeting, ERPC representative informed that it is planned to carry out protection audit for few critical substations by last week of Feb 2024.

PCC advised concerned utilities to submit third party protection audit plan by one week to ERPC along with their choice to carry out protection audit either through ERPC coordinated third party protection audit or by third party designated agencies.

Members may update.

ITEM NO. C.3: Internal Protection Audit Plan of Sub stations for the Year 2025-26

The Clause (5) of Regulation 15 of IEGC Regulations, 2023 envisages as below:

Quote

(1) All users shall conduct internal audit of their protection systems annually, and any shortcomings identified shall be rectified and informed to their respective RPC. The audit report along with action plan for rectification of deficiencies detected, if any, shall be shared with respective RPC for users connected at 220 kV and above (132 kV and above in NER).

(5) Annual audit plan for the next financial year shall be submitted by the users to their respective RPC by 31st October. The users shall adhere to the annual audit plan and report compliance of the same to their respective RPC."

Unquote

All utilities are requested to submit the annual audit plan for the substations 220kV and above voltage level for FY 2025-26 to ERPC by 31.10.2024. Annual audit plans for internal audit of their protection systems and third-party protection audit shall be furnished separately.

In 143rd PCC Meeting, PCC advised all utilities to share internal protection audit plan for FY 2025-26 to ERPC at earliest.

Concerned utilities may update.

ITEM NO. C.4: Third Party Protection audit of Sub stations for the Year 2025-26

As per IEGC 2023 Clause 15.2, "All users shall also conduct third party protection audit of each sub-station at 220 kV and above (132 kV and above in NER) once in five years or earlier as advised by the respective RPC."

and as per clause 15.5," Annual audit plan for the next financial year shall be submitted by the users to their respective RPC by 31st October. The users shall adhere to the annual audit plan and report compliance of the same to their respective RPC."

In 143rd PCC Meeting, PCC advised all utilities to share third party protection audit plan for FY 2025-26 to ERPC at earliest.

Concerned utilities may update.

ITEM NO. C.5: Follow-up of Decisions of the Previous Protection Sub-Committee Meeting(s)

The decisions of previous PCC meetings are attached at **Annexure C.5.**

Members may update.

Record Notes of the online Meeting to discuss Complete outage of 400 kV Barh (NTPC) Plant

A meeting was held on 08.01.2025 with representatives from ERPC, ERLDC, NTPC through online mode (MS Teams) to discuss the occurrence of complete outage of 400 kV Barh plant which led to generation loss of around 1800 MW on 04.01.2025. List of participants is attached at Annexure-

1. Following points were discussed:

- ERLDC explained the sequence of events leading to complete outage of Barh plant. It was brought out that after availing emergency shutdown of 400 kV Barh-Motihari -2, system was N-1 compliant and each of the remaining three lines being Quad Moose were capable to carry upto its thermal limit (i.e. 1750 MW). However, since Backup Overcurrent protection was enabled in 400 kV Barh-Patna-3 at Barh end with setting well below the thermal limit of line (Setting at 2040 A~1340 MW), it resulted in tripping of the line when flow crossed the set value of 2040 A. The O/c protection of the lines at Barh end was known only after the event.
- After tripping of 400 kV Barh-Patna-3, flow in 400 kV Barh-Motihari-1 reached around 1200 MW and after six minutes, 400 kV Barh-Motihari-1 tripped on Y-Earth fault as conductor snapped at location-393. During this period of six minutes, Barh started backing down as per the standing instruction from ERLDC and generation was backed down by 150 MW.
- After this, 400 kV Barh-Kahalgaon-1 was the only remaining line in service for evacuating entire generation of Barh of around 1650 MW. This line also tripped on backup overcurrent protection at Barh end (setting was kept at 1650 Amps ~1100 MW).
- ERLDC stated that enabling Backup Overcurrent protection in 400 kV lines was violation of CEA Construction Standards,2022 and ERPC Protection philosophy. It was also mentioned that same was deliberated in 129th PCC on 08.09.2023 meeting of Eastern Region. Since the overcurrent pickup setting at Barh was well below the thermal capacity of the line, it resulted in complete outage of Barh power plant.
- NTPC acknowledged that the backup Overcurrent setting was well below the thermal limit since commissioning of these lines and these settings were not revised thereafter.
- NTPC sought to know whether considering the antecedent condition of four (4) lines out of eight (8) lines not available, the emergency shutdown of 400 kV Barh-Motihari-2 could have been avoided in evening peak hours. ERLDC mentioned that with the remaining three lines, the system was N-1 compliant. Even with single circuit of 400 kV Barh-Kahalgaon-1, entire generation could have been evacuated. Further Barh power plant was having full generation schedule throughout the day.

- NTPC stated that conductor of 400KV barh-Motihari-1 snapped while carrying around 1200MW, much below its thermal capacity and during winter season frequent de-capping of lines was also observed. ERLDC stated that the same would be taken up with Transmission licensees.
- NTPC also submitted that they wanted to keep Backup overcurrent protection with pickup above thermal limit with the AND logic of VT supervision to avoid GT failure in case of any eventuality since they experienced similar cases in past. NTPC requested to consider suitable amendment in CEA standards w.r.t. protection of transmission lines between generating stations.
- ERPC advised NTPC to place the above proposal at RPC forum to deliberate the issue and any changes if required can be done thereafter. **NTPC agreed to put up an agenda in the upcoming OCC/PCC forum.**
- ERLDC requested NTPC to immediately review the protection setting implemented at all generating stations and disable O/c protection setting if enabled anywhere. **NTPC stated that they would review the protection settings and confirm for all generating stations.**
- NTPC was also requested to submit protection setting of all generating stations to ERPC and ERLDC for verification. **NTPC agreed to the same.**
- ERPC advised utilization of PDMS database so that there is prior information of protection settings and can be verified whether it is in compliance with the CEA standards and ERPC protection philosophy.

The meeting ended with a vote of thanks.

List of Participants:

ERPC

1. Sh. Shyam Kejriwal, SE, ERPC
2. Sh. I K Mehra, SE, ERPC
3. Sh. Pratham Kumar, EE, ERPC
4. Sh. Kumar Satyam, AEE, ERPC
5. Sh. Shubhayu Das, AE, ERPC

ERLDC

1. Sh. R Sutradhar, ED, ERLDC
2. Sh. Sajan George, CGM, ERLDC
3. Sh. Bilash Achari, DGM, ERLDC
4. Sh. Manas Das, DGM, ERLDC
5. Sh. Rakesh Kumar Pradhan, CM, ERLDC
6. Sh. Alok Pratap Singh, CM, ERLDC

NTPC

1. Sh. Maranani Sreekanth, AGM (OS), CC NTPC
2. Sh. Manish Jain, AGM (Comercial) NTPC Patna RHQ
3. Sh. A P Tiwari, AGM (EMD) NTPC Barh
4. Sh. Anadi Kumar Mishra, AGM, Darlipalli
5. Sh. Deepak Kumar Mohanty, AGM, EMD, Darlipalli
6. Sh. Subash Chandra Singh, AGM (EMD), BRBCL
7. Sh. Suresh Babu Kummara, AGM (EEMG), Darlipalli
8. Sh. Rajiv Kumar Sinha, GM (O&M), North Karanpura
9. Sh. Dhanajay Kumar, DGM (OS), CC NTPC
10. Sh. Rahul Anand, DGM (OS) NTPC Patna RHQ
11. Sh. Tejinder Pal Singh, DGM, (Commercial), NTPC Patna RHQ
12. Sh. Manash Kumar Mitra, DGM (EMD), North Karanpura
13. Sh. Sushil Kumar, DGM, NTPC Barh
14. Sh. Boni Dhananjay, Sr. Manager (EMD), Darlipalli STPP
15. Sh. Premkishan Singh K, Sr. Manager (EMD), North Karanpura
16. Sh. Harinder Kumar, Sr. Engineer (EMD) NTPC Farakka
17. Sh. Kiran Kumar Konderapu, Sr. Manager (EMD), Darlipalli
18. Sh. Bipin Kumar, Sr. Manager (EMD), NPGCL
19. Sh. Amit Kumar Singh, Sr. Manager (EMD), NTPC Barh
20. Sh. Sanjib Sarkar, Sr. Engineer (EMD), North Karanpura

Record Notes of the online Meeting to discuss complete outage of NTPC Barh generating S/s and Tripping of 400 kV Barh-Motihari-1 due to conductor snapping

A meeting was held on 08.01.2025 with representatives from ERPC, ERLDC, Powergrid through online mode (MS Teams) to discuss complete outage of NTPC Barh generating station on 04.01.2025. List of participants is attached at Annexure-1.

Following points were discussed:

- ERLDC presented a brief overview of the antecedent network conditions and sequence of events. Conductor snapping of 400 kV Barh-Motihari-1 at around 65% of the thermal capacity and de-Capping of insulator string of 400 kV Barh-Patna-4 in the morning hours of 04.01.2025 was conveyed.
- Powergrid stated that both incidents were due to hardware failure.
- Powergrid informed that conductor snapping of 400 kV Barh-Motihari-1 was in mid-span section. It was further stated that these lines were usually lightly loaded, and this was the first time that the line flow had crossed around 1100 MW.
- Powergrid emphasised that they would intensify patrolling and thermo-vision scanning of all the joints in the entire line corridor of fog prone areas and this would be completed by next 15 days.
- Powergrid also stated that regular patrolling and maintenance activities were being done following best practices.

The meeting ended with a vote of thanks.

List of Participants:

ERPC

1. Sh. Pratham Kumar, EE, ERPC
2. Sh. Kumar Satyam, AEE, ERPC

ERLDC

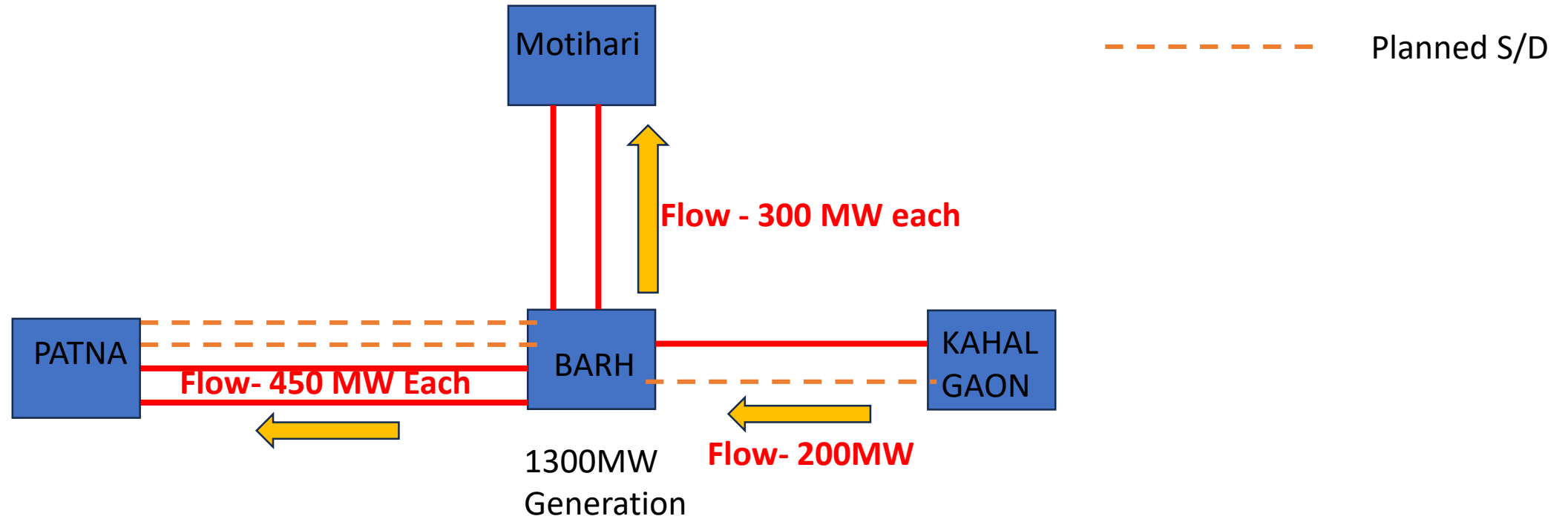
1. Sh. R Sutradhar, ED, ERLDC
2. Sh. Sajan George, CGM, ERLDC
3. Sh. Bilash Achari, DGM, ERLDC
4. Sh. Manas Das, DGM, ERLDC
5. Sh. Rakesh Kumar Pradhan, CM, ERLDC
6. Sh. Alok Pratap Singh, CM, ERLDC
7. Sh. Akash Kumar Modi, Manager, ERLDC

Powergrid

1. Sh. A Sen Sarma, ED, Powergrid ERTS-1
2. Sh, Arvind Kumar Pandey, CGM (AM), Powergrid ERTS-1
3. Sh. Achyutananda Parhi, Sr. DGM (AM), Powergrid ERTS-1
4. Sh. Sudeep Kumar, Chief Manager (AM), Powergrid ERTS-1
5. Sh. Rohit Kumar, Engineer (AM), Powergrid ERTS-1

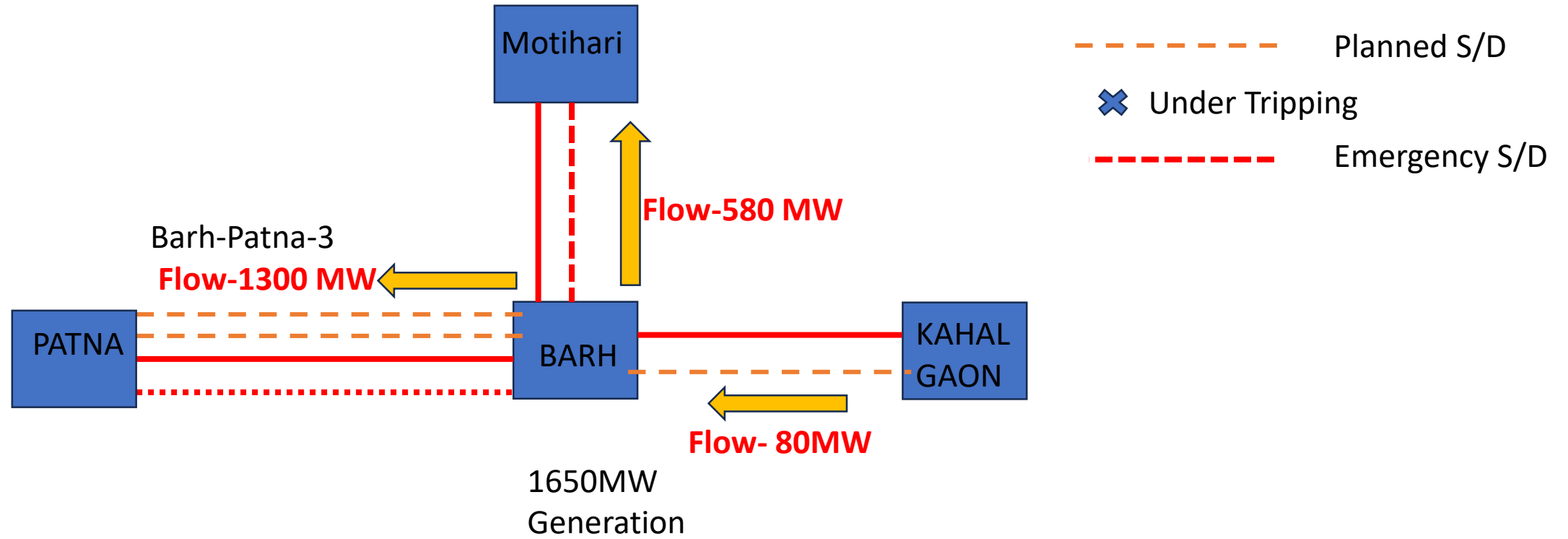
EVENT ANALYSIS OF BARH
DISTURBANCE OCCURRED ON
04TH January 19:23:52 Hrs

Pre-Event Condition Dated 04th January 00:00 Hrs.



- 400 kV Barh- Patna 1,2 are in **Planned SD** from 15-12-2024 to 06-01-2025.
Reason: Jumpering work in LILO portion at GSS Bakhtiyarpur
- 400 kV Barh - KHSTPP 2 is in **Planned SD** from 07-12-2024 to 14-02-2024.
Reason: Uprating of bay & line equipment.

After Emergency Shutdown on 04th January at 17:00 Hrs



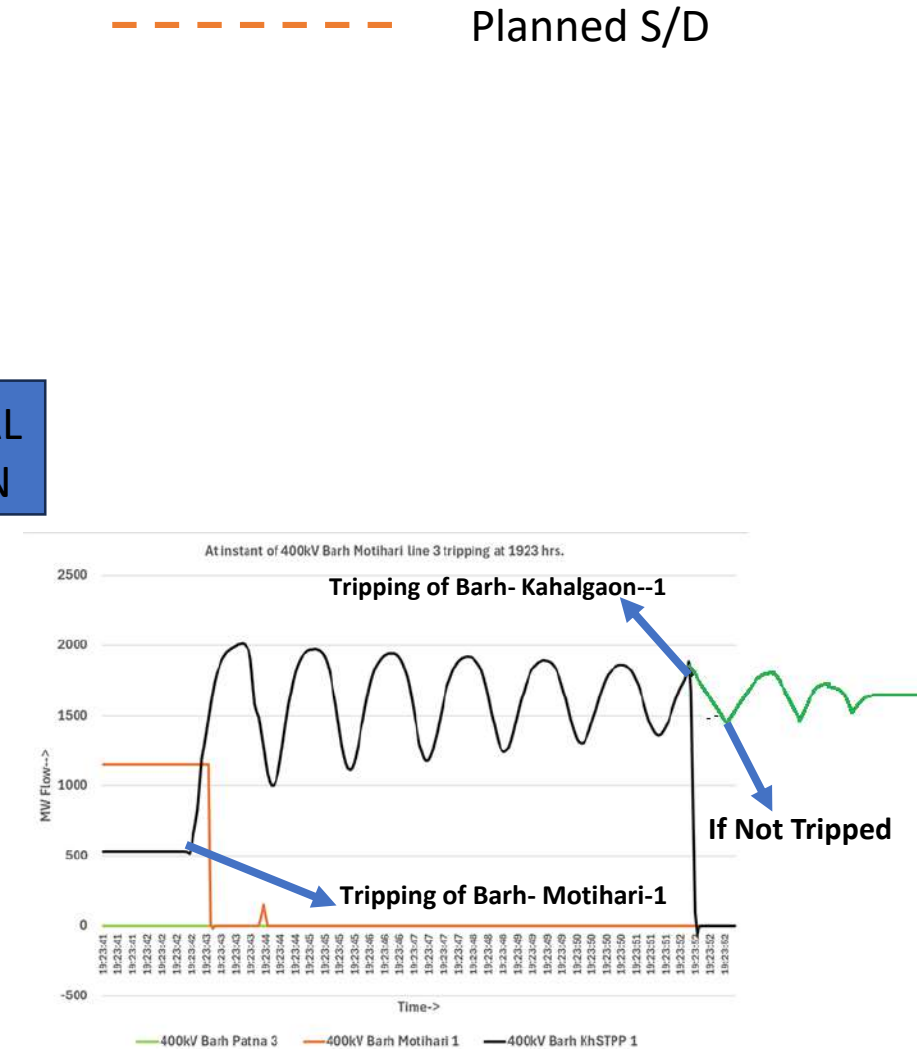
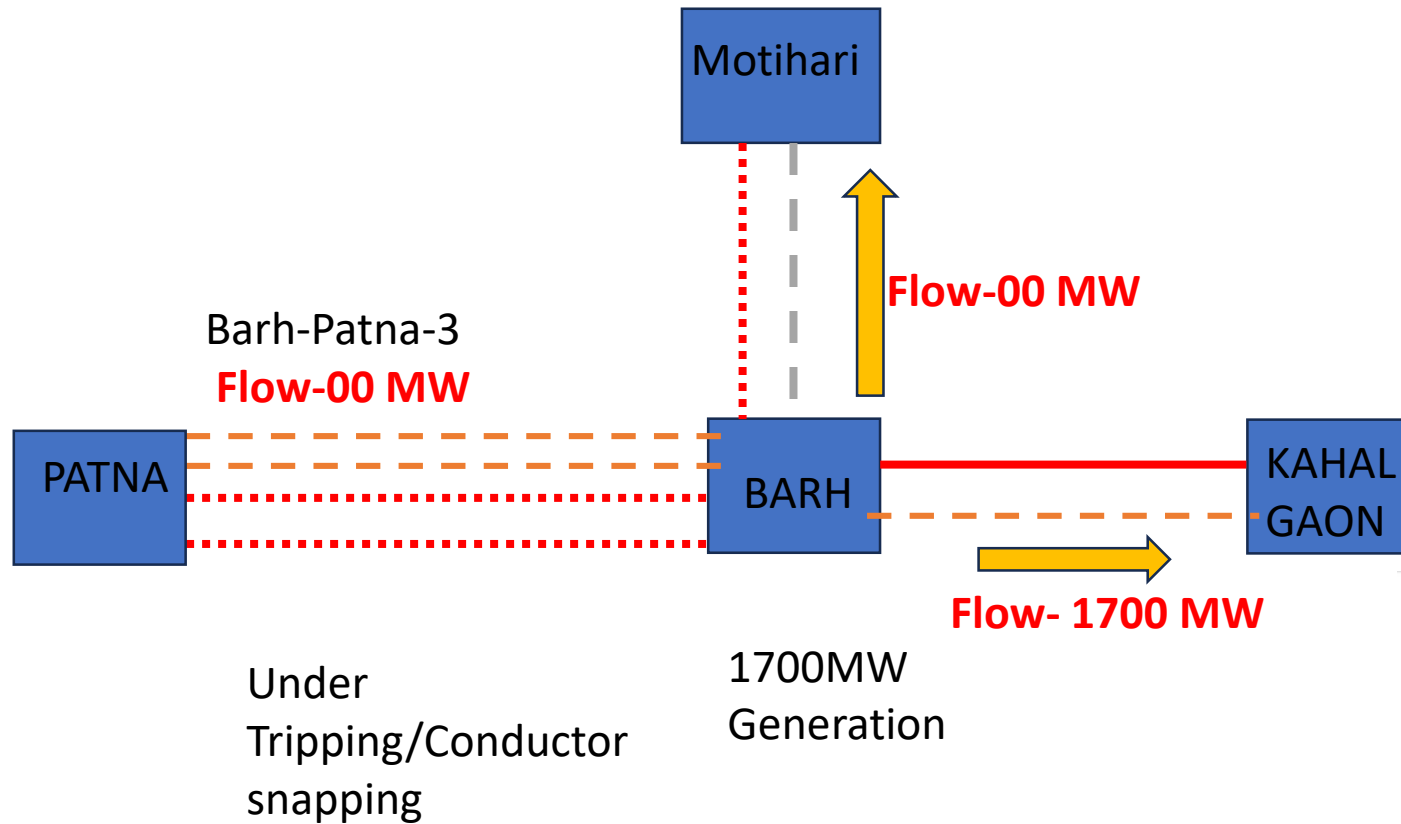
For rectification Barh Patna -4 (Insulator string snapping near gantry tower of Barh) Emergency S/D of Barh-Motihari-2 availed as they share same multi ckt tower.

Tripping of lines much Below Thermal Limit

Line Name	Thermal Limit considering margin	Tripped at Flow of	Tripping Time	Tripping Reason	O/C setting
400 Kv Barh-Patna -3	1860 MW	1370 MW	19:17:09	Tripped on Overcurrent.	1300 MW
400 Kv Barh-Motihari -1	1860 MW	1200 MW	19:23:43	Tripped on Mid Span failure	Enabled with VT Supervision
400 Kv Barh-Kahalgaon -1	1860 MW	1700 MW	19:23:51	Tripped on Overcurrent.	1100 MW

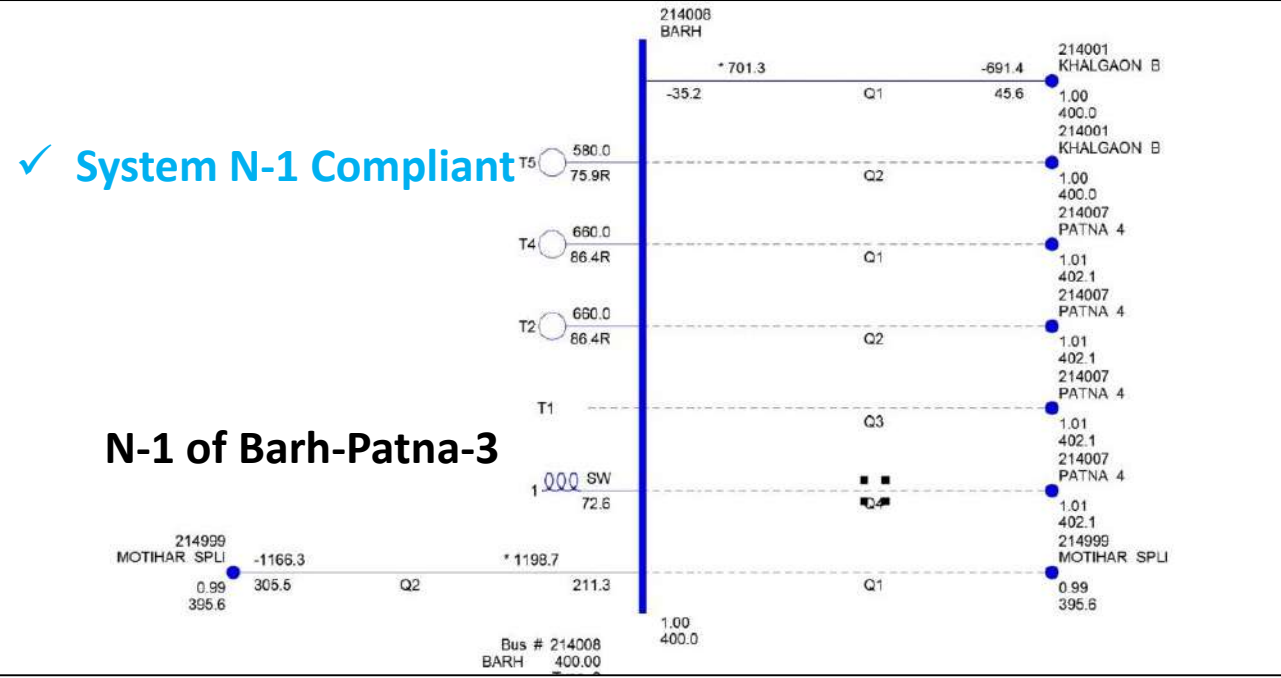
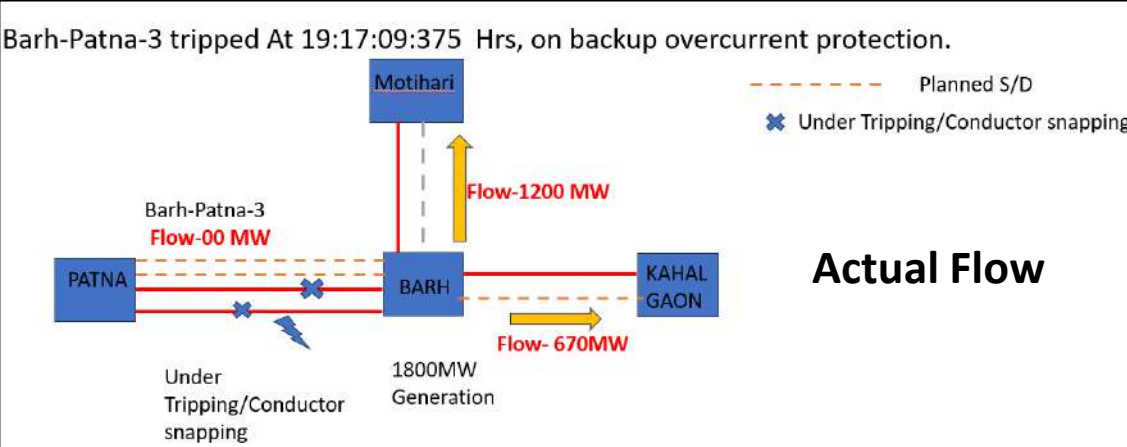
- ✓ Hidden Surprises for System /violation of standards.
- ✓ Backdown quantum is dependent on capability of lines which is being limited by O/C & Mid span failure and is unknown, so it was difficult to decide quantum of backdown.

Whether the system would have survived with single circuit?



- ✓ Yes ,provided no hidden surprise of O/C setting even One line was sufficient to cater generation.
- ✓ As per Planning criteria Overload of 110 % for 02 Hour & 120% for 1 Hour.
- ✓ With O/C set at 1100 MW in Barh-Kahalgaon Line it would have required 800 MW of Backdown.

Study results



Backdown of Barh Stg 1 & 2 Generation due to transmission constraint

ERLDC Control Room
Sat 14, 6:53 PM
NTPC Barh (ntpcbarhswy9@gmail.com); Sajan George (साजन गजगे); Barh Achari (बिहारी अचारी)

Sir/ Madam,

Currently there are three circuits available from Barh i.e.

- 400 kV Barh-Motihari-1
- 400 kV Barh-Patna-3
- 400 kV Barh-Kahalgaon-1

If any of the lines(400 kV Barh-Motihari-1 or 400 kV Barh-Patna-3) trip, you need to immediately back down 300 MW from Barh Stage 1 & 2.

साजन गजगे

with/with/Shift Charge Manager
Follow GRID-INDIA
Eastern Region Load Despatch Centre
Grid Controller of India (GRID-INDIA)
Grid-इंडिया

✓ Standing instruction given to Barh for 300MW Backdown if any one trips out of available three lines to Keep some extra margin.



THANK YOU


ग्रिड-इंडिया
GRID-INDIA

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
 (भारत सरकार का उद्यम)
GRID CONTROLLER OF INDIA LIMITED
 (A Government of India Enterprise)
 [formerly Power System Operation Corporation Limited (POSOCO)]

पूर्वी क्षेत्रीय भार प्रेषण केन्द्र / Eastern Regional Load Despatch Centre

कार्यालय : 14, गोल्फ क्लब रोड, टॉलिंगंज, कोलकाता - 700033
 Office : 14, Golf Club Road, Tollygunge, Kolkata - 700033
 CIN : U40105DL2009GOI188682, Website : www.erfdc.in, E-mail : erfdcinfo@grid-india.in, Tel. : 033 23890060/0061

पूर्वी क्षेत्र के 220 केवी बालीमेला पीएच उप-केन्द्र में ग्रिड घटना पर विस्तृत रिपोर्ट / Detailed Report of grid event at 220 kV Balimela PH Generating Station of Eastern Region
(To be submitted by RLDC/NLDC during Grid Disturbances/Grid Incidents/Near Miss Event as per IEGC section 37.2 (f))
(आई ई जी सी 37.2 (एफ) के अनुपालन में)

Date(दिनांक):13-02-2025

1. Event Summary (घटना का सारांश):

Balimela HPS Unit-1,4,5 and 8 were generating around 225 MW. At 17:53 Hrs, during synchronization of unit-6 there was severe water leakage from the turbine which resulted in flooding of the turbine floor. Due to this, all the running units were hand tripped as a safety measure. 225 MW generation loss occurred at Balimela HPS.

2. Time and Date of the Event (घटना का समय और दिनांक): 17:53 hrs of 06.01.2025

3. Event Category (ग्रिड घटना का प्रकार): Grid Incident (GI)-1

4. Location/Control Area (स्थान/नियंत्रण क्षेत्र): Odisha

5. Antecedent Conditions (पूर्ववर्ती स्थिति):

	Frequency	Regional Generation	Regional Demand	State Generation	State Demand
				Odisha	Odisha
Pre-Event (घटना पूर्व)	49.96	29012 MW	22615	3747	4857
Post Event (घटना के बाद)	49.94	28897 MW	22615	3522	4632

**Pre and post data of 1 minute before and after the event*

Important Transmission Line/Unit if under outage (महत्वपूर्ण संचरण लाइने/ विद्युत उत्पादन इकाइयां जो बंद हैं)	Balimela PH unit 3. Balimela PH Unit #2 & 7 under reserve S/D.
Weather Condition (मौसम स्थिति)	Normal.

1. Load and Generation loss (लोड और जेनरेशन हानि): Approximate Generation loss of 225 MW at Balimela PH.

Duration of interruption (रुकावट की अवधि): 17:53 Hrs to 19:51 Hrs.

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

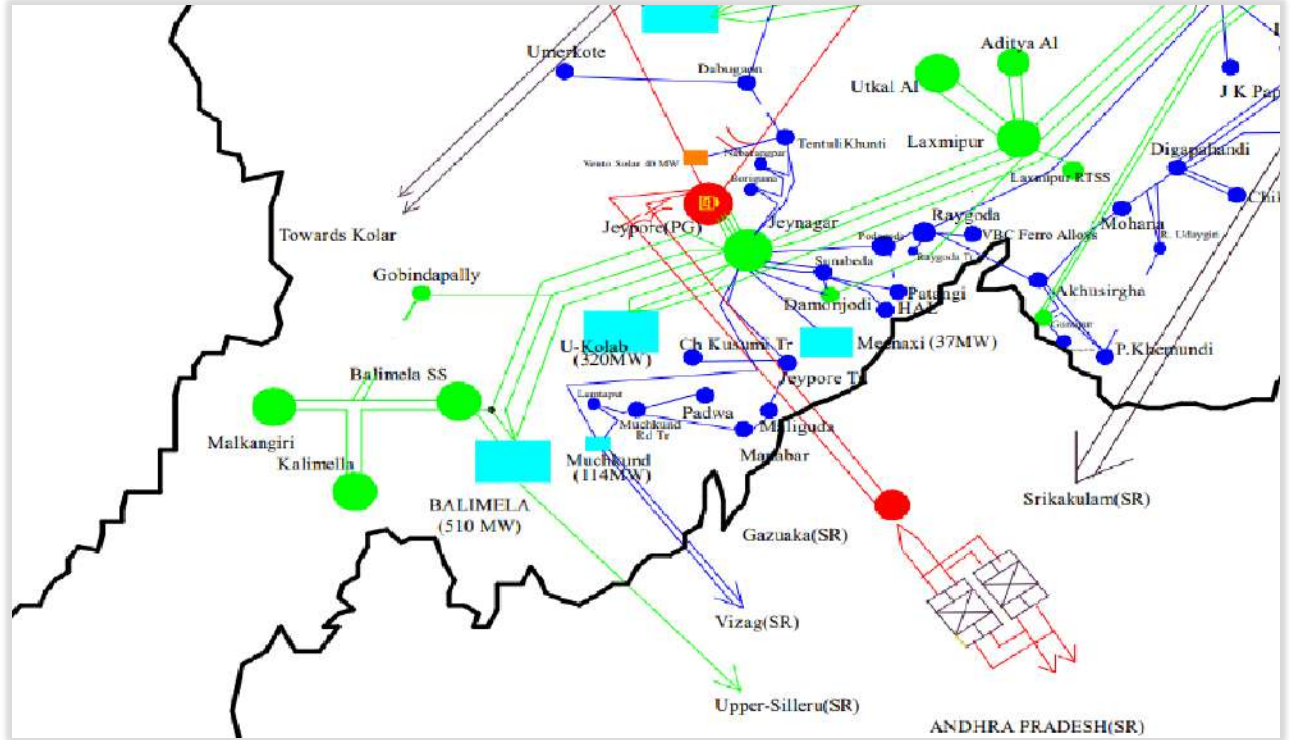


Figure 1: Network across the affected area

7. Details of Equipment Failure (if any during the event) (उपकरण विफलता का विवरण): NA

8. Major Elements Tripped (प्रमुख ट्रिपिंग):

क्र०स०	नाम	Trip time (hh:mm:ss)	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	Restoration time
1	Balimela PH - UNIT 1	17:53	Hand tripped after flooding of turbine floor		Under reserve S/D
2	Balimela PH - UNIT 4				19:51
3	Balimela PH - UNIT 5				Under reserve S/D
4	Balimela PH - UNIT 8				Under reserve S/D

9. Event Analysis (Based on PMU, SCADA & DR) (घटना का विश्लेषण):

- Balimela HPS unit# 1, 4, 5 & 8 were running with generation around 225 MW (Unit #2 & 7 under reserve S/D).
- During synchronization of Balimela unit#6 due to severe water leakage from the turbine, heavy flood reported on turbine floor.
- Immediately all running unit at Balimela hand tripped for safety purpose.
- Total generation loss of 225 MW occurred at Balimea HPS.

10. Protection/Operational issues observed (सुरक्षा/परिचालन संबंधी समस्या):

- OHPC may submit root cause analysis for the event.

11. Action Taken/Remedial Measures (सुधारात्मक उपाय): Nil

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

S.No.	Issues	Regulation Non-Compliance	Utilities
1.	DR/EL not submitted within 24 hours	1. IEGC section 37.2 (c) 2. CEA grid Standard 15.3	-

12. Key Lessons Learnt (प्रमुख अधिगम बिंदु): Nil

Annexure 1: (Sequence of Events-As per ERLDC SCADA):

SoE data not available at ERLDC.


ग्रिड-इंडिया
GRID-INDIA

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
 (भारत सरकार का उद्यम)
GRID CONTROLLER OF INDIA LIMITED
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पूर्वी क्षेत्रीय भार प्रेषण केन्द्र / Eastern Regional Load Despatch Centre

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 Office : 14, Golf Club Road, Tollygunge, Kolkata - 700033
 CIN : U40105DL2009GOI188682, Website : www.erldc.in, E-mail : erldcinfo@grid-india.in, Tel.: 033 23890060/0061

पूर्वी क्षेत्र के 220/132 केवी गोड़ड़ा उप-केन्द्र में ग्रिड घटना पर विस्तृत रिपोर्ट / Detailed Report of grid event at 220/132 Godda S/s of Eastern Region
 (To be submitted by RLDC/NLDC during Grid Disturbances/Grid Incidents/Near Miss Event as per IEGC section 37.2 (f))
 (आई ई जी सी 37.2 (एफ) के अनुपालन में)

Date(दिनांक):03-02-2025

1. Event Summary (घटना का सारांश):

At 17:17 Hrs, Tenughat unit-2 tripped due to high turbine vibration. Unit-1 was already under forced outage since 14/01/2025 due to Boiler tube leakage. Outage of both units of Tenughat led to overloading of 220 kV Maithon - Dumka D/C which further resulted in SPS operation at Dumka which tripped 132 kV-Dumka-Pakur D/C and 220 kV Dumka-Godda D/C as per the SPS scheme. As Godda and Pakur are radially fed from Dumka, total load loss of 120 MW occurred at 220 kV Godda S/s & 132 kV Pakur S/s.

Godda power restored at 17:40 Hrs by charging 220kV Dumka-Godda ckt#1.

2. Time and Date of the Event (घटना का समय और दिनांक): 17:17 hrs of 16.01.2025

3. Event Category (ग्रिड घटना का प्रकार): Grid Disturbance (GD)-1

4. Location/Control Area (स्थान/नियंत्रण क्षेत्र): Jharkhand

5. Antecedent Conditions (पूर्ववर्ती स्थिति):

	Frequency (Hz)	Regional Generation (MW)	Regional Demand (MW)	State Generation	State Demand
				Jharkhand (MW)	Jharkhand (MW)
Pre-Event (घटना पूर्व)	50.098 Hz	30073 MW	23247 MW	255 MW	1652 MW
Post Event (घटना के बाद)	50.079 Hz	29908 MW	23127 MW	90 MW	1532 MW

***Pre and post data of 1 minute before and after the event**

Important Transmission Line/Unit if under outage (महत्वपूर्ण संचरण लाइने/ विद्युत उत्पादन इकाइयां जो बंद हैं)	Tenughat Unit-1 is under Forced Outage since 14/01/2025 on Boiler tube leakage.
Weather Condition (मौसम स्थिति)	Normal

6. Load and Generation loss (लोड और जेनरेशन हानि): Total load loss of 120 MW at 220 kV Godda and 132 kV Pakur S/s.

7. Duration of interruption (रूकावट की अवधि): 17:17 Hrs to 17:40 Hrs.

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

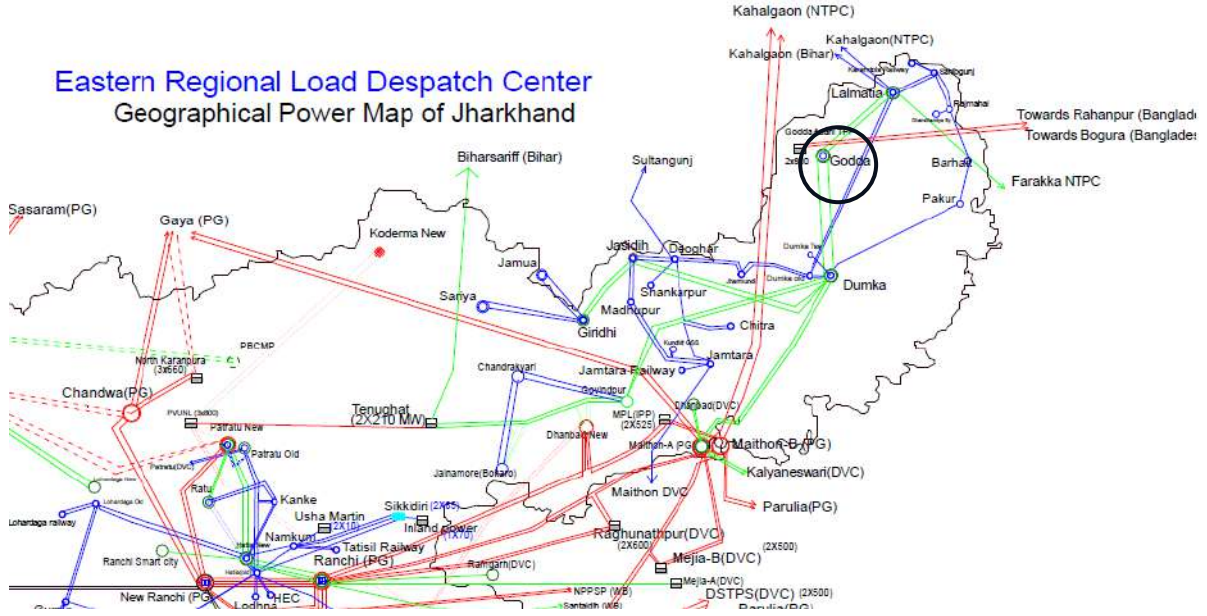


Figure 1: Network across the affected area

9. Details of Equipment Failure (if any during the event) (उपकरण विफलता का विवरण): NA

10. Major Elements Tripped (प्रमुख ट्रिपिंग):

क्र०स०	नाम	Trip time (hh:mm:ss)	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	Restoration time
1	220 kV Dumka- Godda-1	17:17		Dumka SPS operated.	17:40
2	220 kV Dumka- Godda-2	17:17			17:46
3	Tenughat Unit-2	17:17		Turbine Vibration High	18:05

11. Event Analysis (Based on PMU, SCADA & DR) (घटना का विश्लेषण):

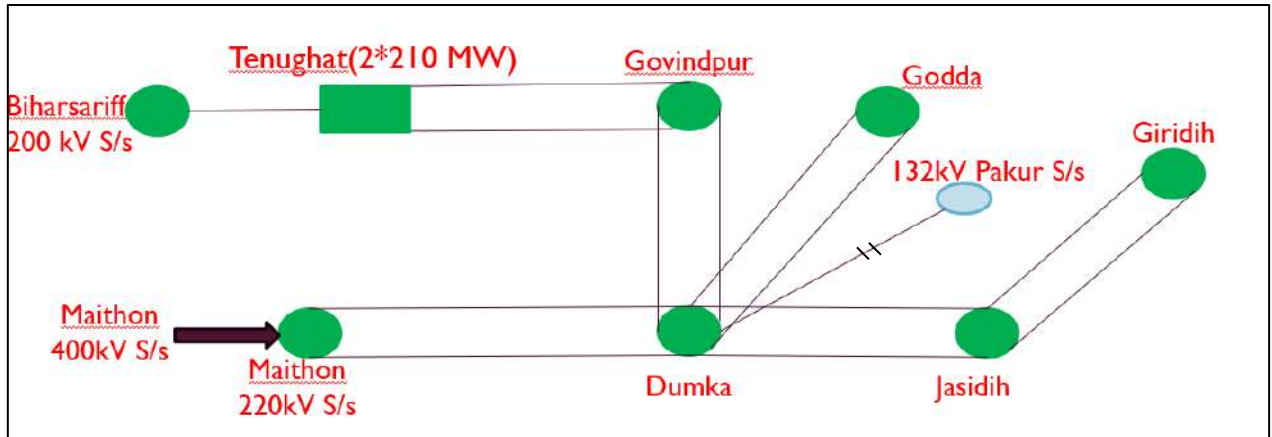


Figure 2: Network SLD across the affected area

- Prior to the event, flow of 220kV Maithon Dumka D/C was around 150 MW but after tripping of Tenughat unit#2 at 17:17 Hrs due to high turbine vibration (Unit-1 was already under forced outage since 14/01/2025 on Boiler tube leakage), flow in 220kV Maithon-Dumka D/C increased to around 220 MW (613 A).
- As per SPS scheme of 220kV-Maithon-Dumka D/C, if flow of either 220kV Maithon Dumka D/C > 600 A for **2 seconds** then 132kV-Dumka-Pakur D/C will be tripped, further if 220kV Maithon Dumka D/C flow remains >600 A for next 2 seconds then 220kV Dumka-Godda D/C will be tripped.

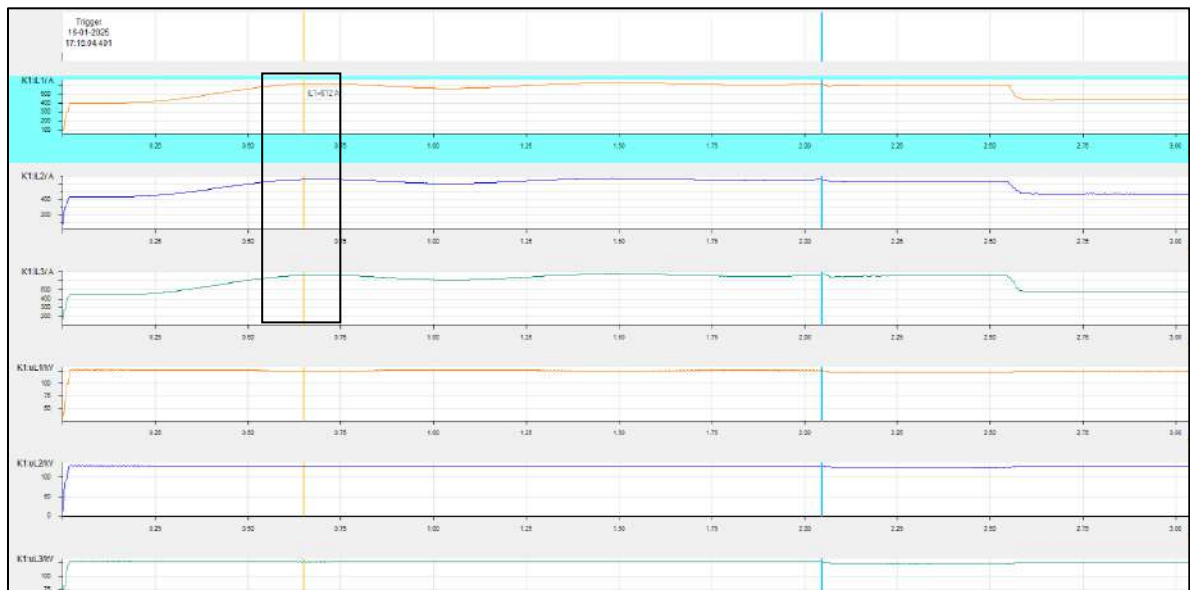


Figure 2: DR of 220kV Maithon Dumka #2

- 220kV Maithon-Dumka D/C loading exceeded set current limit of 600A (As per DR of 220kV Maithon-Dumka #2 line current touched 612 A) and SPS at Dumka triggered and tripping command sent to Pakur and Godda with time delay of 2 seconds and 4 seconds respectively.
- As Godda is radially connected to Dumka which got tripped due to SPS operation, Godda and Pakur S/s became dead and total load loss of 120 MW occurred.

12. Protection/Operational issues observed (सुरक्षा/परिचालन संबंधी समस्या): Nil

13. Action Taken/Remedial Measures (सुधारात्मक उपाय): Nil

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

S.No.	Issues	Regulation Non-Compliance	Utilities
1.	DR/EL not submitted within 24 hours	1. IEGC section 37.2 (c) 2. CEA grid Standard 15.3	-

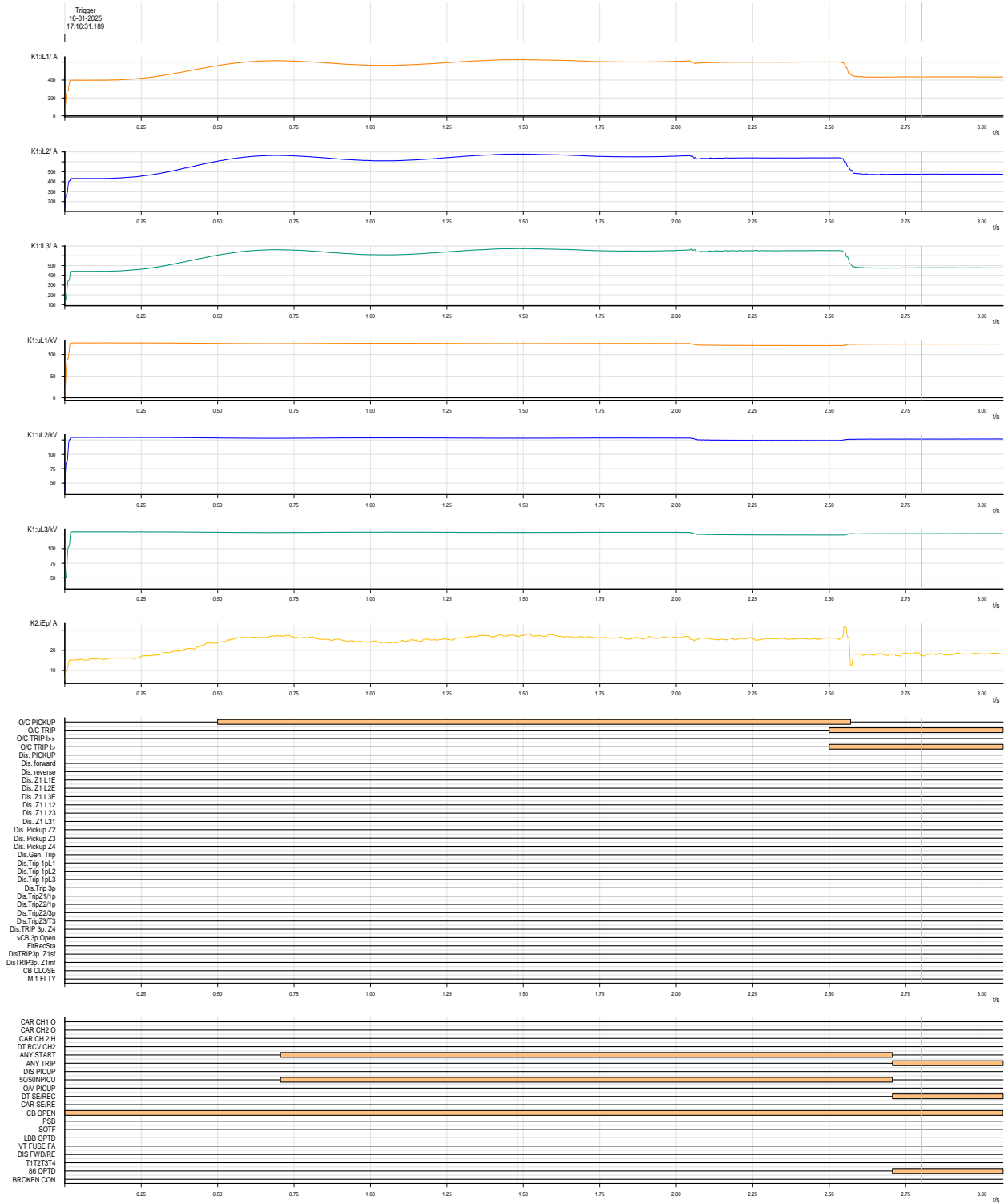
15. Key Lessons Learnt (प्रमुख अधिगम बिंदु): Nil

Annexure 1: (Sequence of Events-As per ERLDC SCADA):

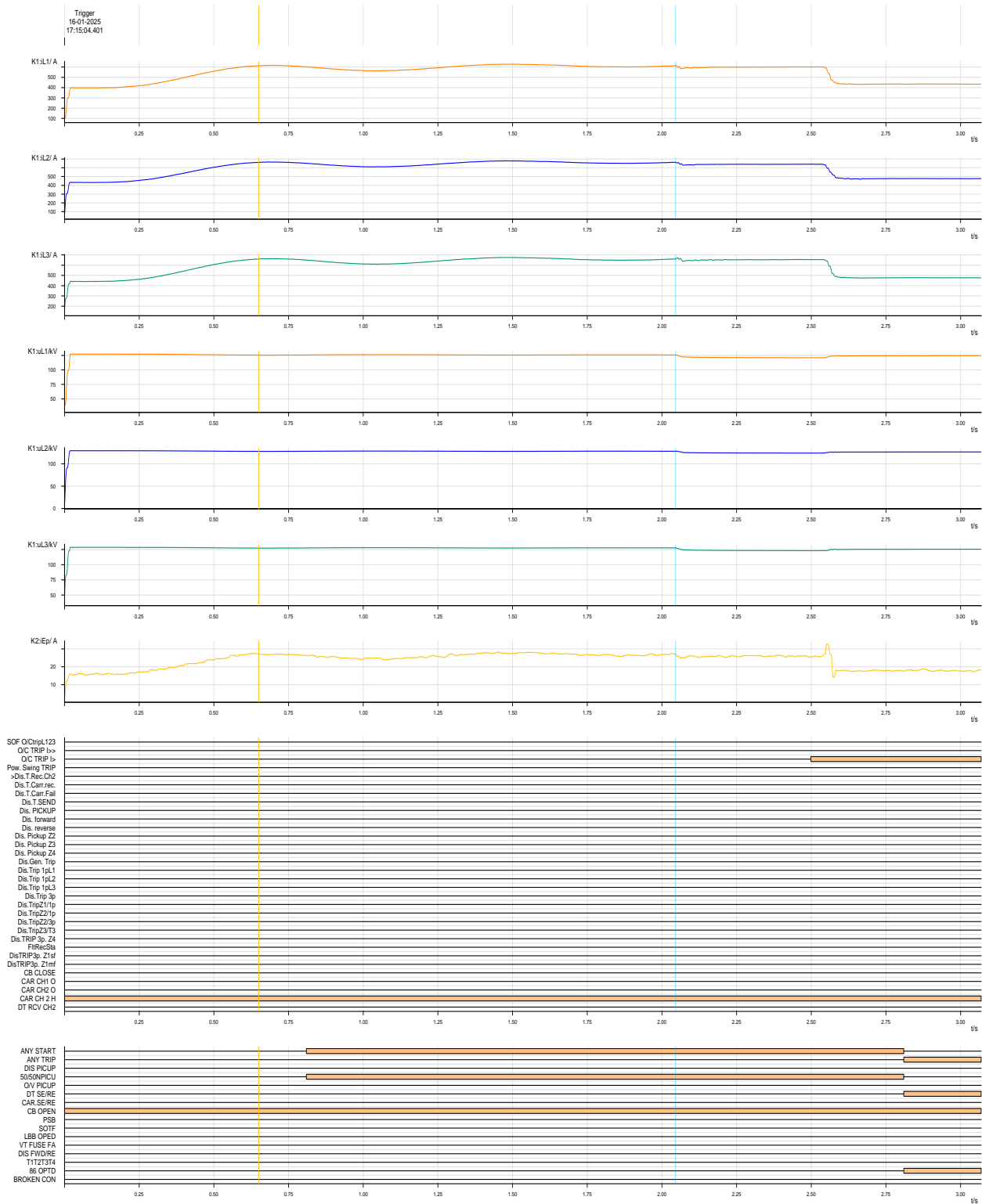
SoE data not available at ERLDC.

Annexure 2:

DR of 220kV Maithon-Dumka #1 at Dumka:



DR of 220kV Maithon-Dumka #2 at Dumka:





पूर्वी क्षेत्र के 400 केवी जेएसपीएल में ग्रिड घटना पर विस्तृत रिपोर्ट / Detailed Report of grid event at 400 kV JSPL (CPP) S/s of Eastern Region
(To be submitted by RLDC/NLDC during Grid Disturbances/Grid Incidents/Near Miss Event as per IEGC section 37.2 (f))

(आई ई जी सी 37.2 (एफ) के अनुपालन में)

Date(दिनांक):19-02-2025

1. Event Summary (घटना का सारांश):

Event#1: At 05:13 Hrs on 25/01/2025:

400KV-MEERAMUNDALI-JSPL D/C tripped at 05:13 Hrs due to Y-B fault. Both Bus at 400 kV JSPL became dead as it is radially connected to 400 kV Meramundali S/S. Captive power plant JSPL has 6 units of 135 MW capacity each. Unit-1 with emergency load of 90 MW was separately connected with 220 kV Bus-1 (220 kV bus-coupler was in opened condition). Unit-2 of JSPL was under overhauling and other 4 units (unit-3,4,5,6) connected to 220 kV Bus-2 were generating around 420 MW and rest around 25 MW was imported from grid for its captive load. As both evacuating lines tripped, the captive island didn't survive. 420 MW generation loss and 25 MW (Net load) load loss occurred at JSPL.

Event#2: At 06:49 Hrs on 25/01/2025:

400KV-MEERAMUNDALI-JSPL-1 tripped at 06:49 Hrs due to 3-phase fault (Insulator de-capping in B phase of JSPL-Meramandalli-1). Ckt-2 was under breakdown condition (Tripped since grid disturbance at 05:13 hrs on same day). Both Bus at 400 kV JSPL became dead. All units of JSPL under tripped condition (since GD at 05:13 Hrs) and JSPL was imported 40 MW from grid. Total load loss of around 40 MW occurred.

Event#3: At 06:06 Hrs on 26/01/2025:

400KV-MEERAMUNDALI-JSPL-1 tripped at 06:06 Hrs due to R phase pilot insulator de-capped at Location No 97(Ckt-2 was under breakdown condition due to R phase Insulator de-capped at Location No 96 from 05:31 Hrs). Both Bus at 400 kV JSPL became dead. Captive power plant JSPL were generating around 320 MW and rest around 15 MW was imported from grid for its captive load. As both evacuating lines tripped, the captive island didn't survive. 320 MW generation loss and 15 MW (Net Load) load loss occurred at JSPL.

2. Time and Date of the Event (घटना का समय और दिनांक):

Event#1: 05:13 Hrs on 25/01/2025

Event#2: 06:49 Hrs on 25/01/2025

Event#3: 06:06 Hrs on 26/01/2025

3. Event Category (ग्रिड घटना का प्रकार): Grid Disturbance (GD)-1

4. Location/Control Area (स्थान/नियंत्रण क्षेत्र): Odisha

5. Antecedent Conditions (पूर्ववर्ती स्थिति):

- Summary for Event#1(At 05:13 Hrs on 25/01/2025)

	Frequency	Regional Generation	Regional Demand	State Generation	State Demand
				Odisha	Odisha
Pre-Event (घटना पूर्व)	49.93 Hz	26701 MW	18065 MW	2998 MW	4363 MW
Post Event (घटना के बाद)	49.93 Hz	26701 MW	18065 MW	2998 MW	4338 MW

- Summary for Event#2(At 06:49 Hrs on 25/01/2025)

	Frequency	Regional Generation	Regional Demand	State Generation	State Demand
				Odisha	Odisha
Pre-Event (घटना पूर्व)	50.076 Hz	30173 MW	21506 MW	3318 MW	5346 MW
Post Event (घटना के बाद)	50.076 Hz	30173 MW	21506 MW	3318 MW	5306 MW

- Summary for Event#2(At 06:06 Hrs on 26/01/2025)

	Frequency	Regional Generation	Regional Demand	State Generation	State Demand
				Odisha	Odisha
Pre-Event (घटना पूर्व)	49.98 Hz	29633 MW	19228 MW	2940 MW	4588 MW
Post Event (घटना के बाद)	49.98Hz	29633 MW	19228 MW	2940 MW	4573 MW

**Pre and post data of 1 minute before and after the event*

6. Load and Generation loss (लोड और जेनरेशन हानि):

Event#1: 05:13 Hrs on 25/01/2025: 420 MW generation loss and 25 MW (Net load) load loss occurred at JSPL.

Event#2: 06:49 Hrs on 25/01/2025: Total load loss of around 40 MW occurred.

Event#3: 06:06 Hrs on 26/01/2025: 320 MW generation loss and 15 MW (Net Load) load loss occurred at JSPL.

7. Duration of interruption (रूकावट की अवधि):

Event#1: 05:13 Hrs on 25/01/2025: 05:13 Hrs to 05:40 Hrs (Around 00:27 Hrs)

Event#2: 06:49 Hrs on 25/01/2025: 06:49 Hrs to 13:26 Hrs (Around 06:37 Hrs)

Event#3: 06:06 Hrs on 26/01/2025: 06:06 Hrs to 13:26 Hrs (Around 07:20 Hrs)

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

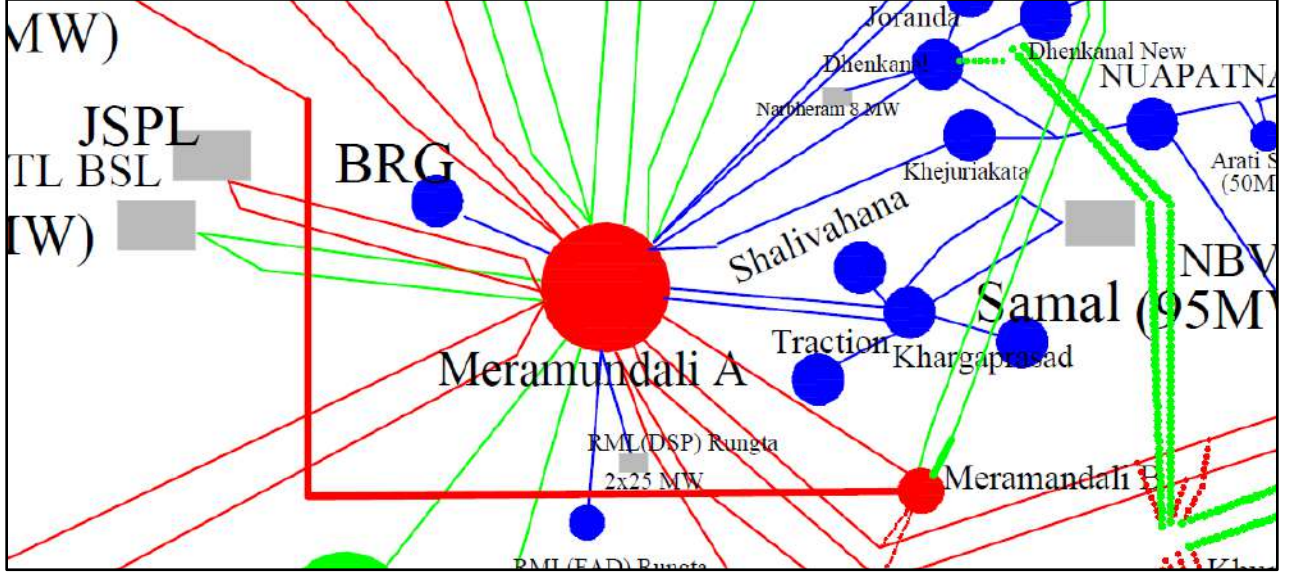


Figure 1: Network across the affected area

9. Details of Equipment Failure (if any during the event) (उपकरण विफलता का विवरण): NA

10. Major Elements Tripped (प्रमुख ट्रिपिंग):

Event#1: 05:13 Hrs on 25/01/2025

क्र०स०	नाम	Trip time (hh:mm:ss)	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	Restoration time
1	400 kV JSPL-Meeramundali-1	05:13 Hrs	Y_B_N, Iy-10.9 kA, Ib-9.7 kA	Y_B_N, Z-2, FD-40.1 Km, Iy:11.15 kA, Ib: 9.6 kA	05:40 Hrs
2	400 kV JSPL-Meeramundali-2	05:13 Hrs	Z-1, FD:13.86 Km, Y-B_N fault, Iy:13.71 kA, Ib: 4.92 kA	Y_B_N, Z-2, FD-37.2 Km, Ib=6.81 kA	13:38 Hrs

Event#2: 06:49 Hrs on 25/01/2025

क्र०स०	नाम	Trip time (hh:mm:ss)	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	Restoration time
1	400 kV JSPL-Meeramundali-1	06:49 Hrs	Z-1, FD:14.89 Km, Y_N	Z-1, DIST=31.6 Km, Y_N, FC- 10.37 kA	13:35 Hrs

Event#3: 06:06 Hrs on 26/01/2025

क्र०स०	नाम	Trip time (hh:mm:ss)	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	Restoration time
1	400 kV JSPL-Meeramundali-1	06:06 Hrs	R-N, IR=5.2 KA, FD-14.59 KM	R-N, Z-2, 31.4 km, IR=10.02 kA	14:36 Hrs

11. Event Analysis (Based on PMU, SCADA & DR) (घटना का विश्लेषण):

Event#1: At 05:13 Hrs on 25/01/2025:

- At 05:13 Hrs, B-Earth fault struck 400 kV JSPL-Meramundali-2 near JSPL. Line didn't trip from JSPL due to less current reading in the faulty phase (Due to defective CT-As reported by JSPL) and it was seen in Zone-2 from remote end. After around 400 msec, fault converted to phase-to-phase fault and line tripped in Zone-2 from Meramundali.
- 400 kV Meramundali-JSPL-1 also tripped in Zone-2 from Meramundali for the fault in the adjacent circuit.
- As both evacuating lines tripped, JSPL captive island didn't survive and 400kV JSPL S/s became dead.
- 420 MW generation loss and 25 MW (Net load) load loss occurred at JSPL.

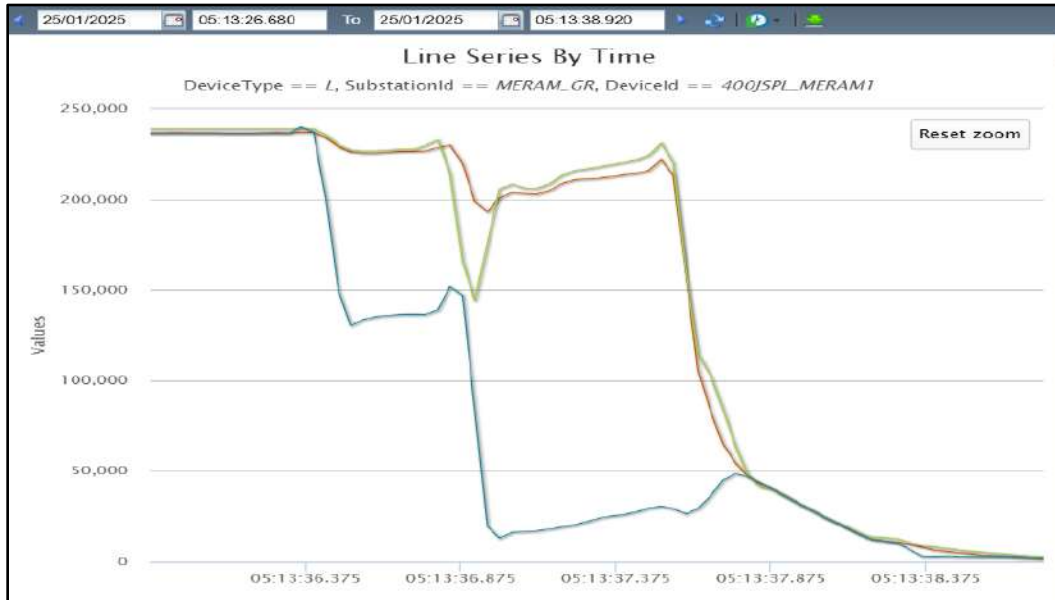


Figure-2: PMU of Meramundali-JSPL#1 voltage

Event#2: 06:49 Hrs on 25/01/2025:

- 400kV Meramundali-JSPL#2 under breakdown condition.
- At 06:49 Hrs 400kV Meramundali-JSPL #1 tripped on Y_B_N fault (After 700 msec Y phase to ground fault converted into Y_B_N) in Z-1 protection from both ends.
- All units were already under tripped condition since grid disturbance at 05:13 Hrs on same day.
- Total load loss of around 40 MW occurred at JSPL.

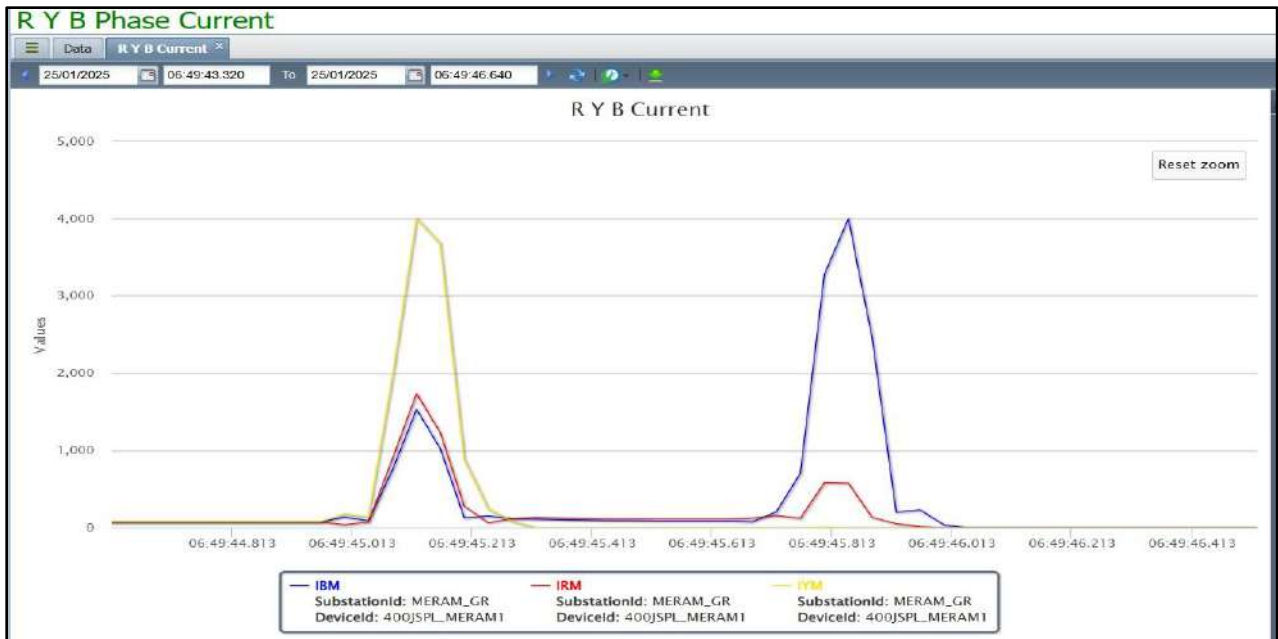


Figure-3: PMU of 400 Meramundali-JSPL#1

Event#3: 06:06 Hrs on 26/01/2025:

- 400kV-Meramundali-JSPL #2 under breakdown condition (Tripped at 05:31 on 26/01/2025 on phase to ground fault)
- At 06:06 Hrs 400kV Meramundali-JSPL #1 tripped on R_B_N fault (After 600 msec R phase to ground fault converted into R_B_N fault) in Z-1 protection from both ends.
- As evacuating lines tripped, the JSPL captive island didn't survive and 400kV JSPL S/s became dead.
- 320 MW generation loss and 15 MW (Net Load) load loss occurred at JSPL.

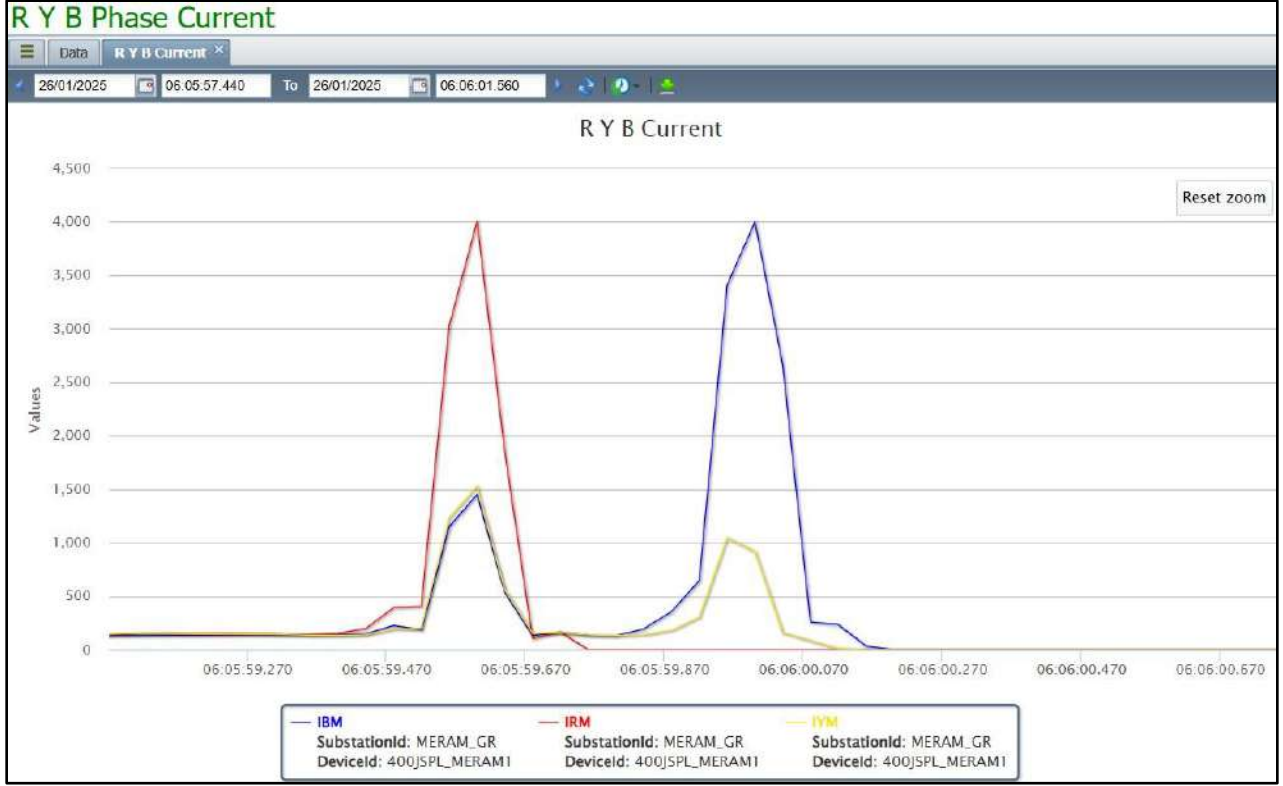


Figure-4: PMU of 400 Meramundali-JSPL#1

12. Protection/Operational issues observed (सुरक्षा/परिचालन संबंधी समस्या):

- During event #1 fault was not sensed by JSPL end due to defective CT (As confirmed by JSPL). Status of replacement of faulty CT may be shared.
- DR of JSPL end is not time synchronised.

13. Action Taken/Remedial Measures (सुधारात्मक उपाय): Islanding scheme to be reviewed.

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

S.No.	Issues	Regulation Non-Compliance	Utilities
1.	DR/EL not submitted within 24 hours	1. IEGC section 37.2 (c) 2. CEA grid Standard 15.3	OPTCL/JSPL

15. Key Lessons Learnt (प्रमुख अधिगम बिंदु): Nil

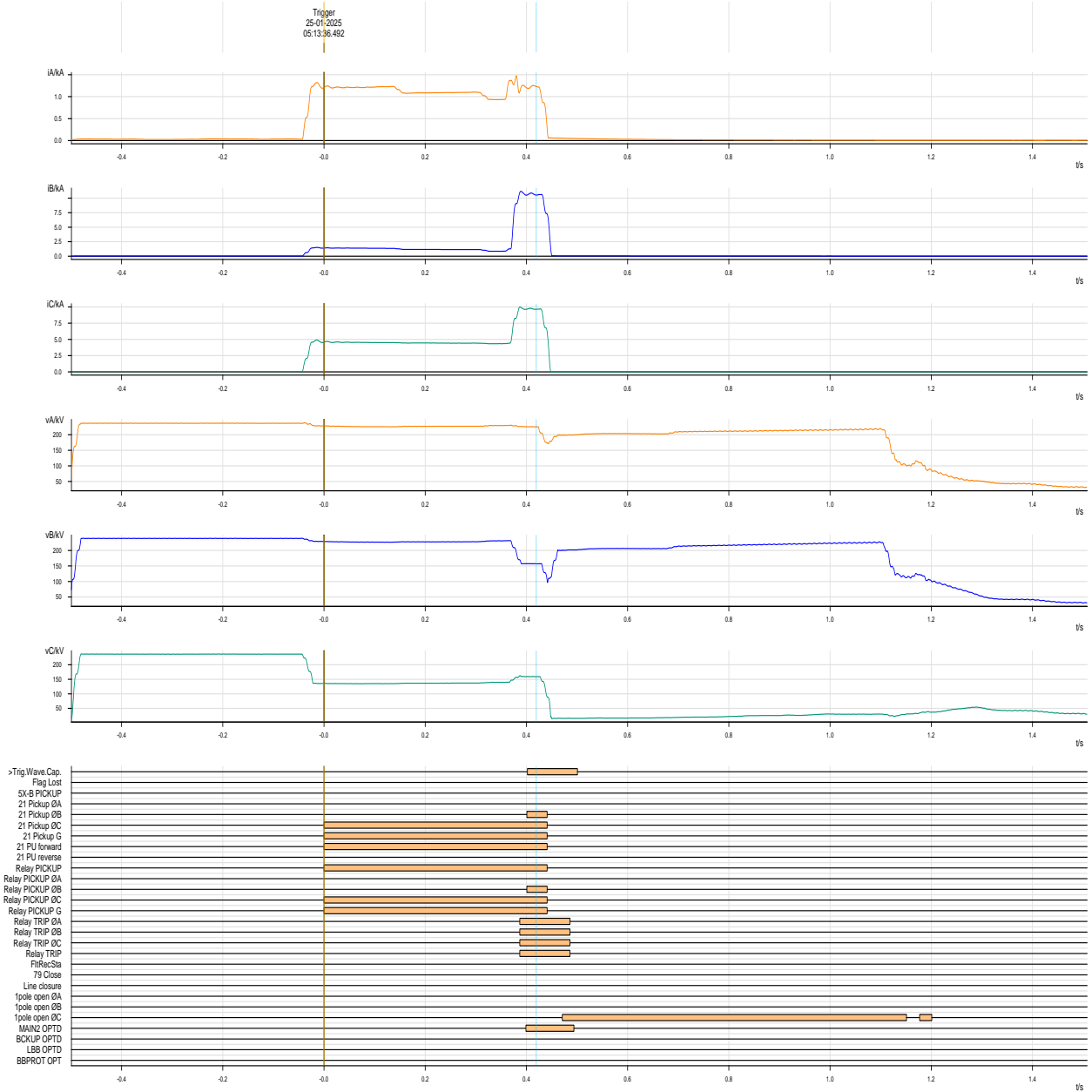
Annexure 1: (Sequence of Events-As per ERLDC SCADA):

SoE not available in ERLDC SCADA.

Annexure 2:

Event#1

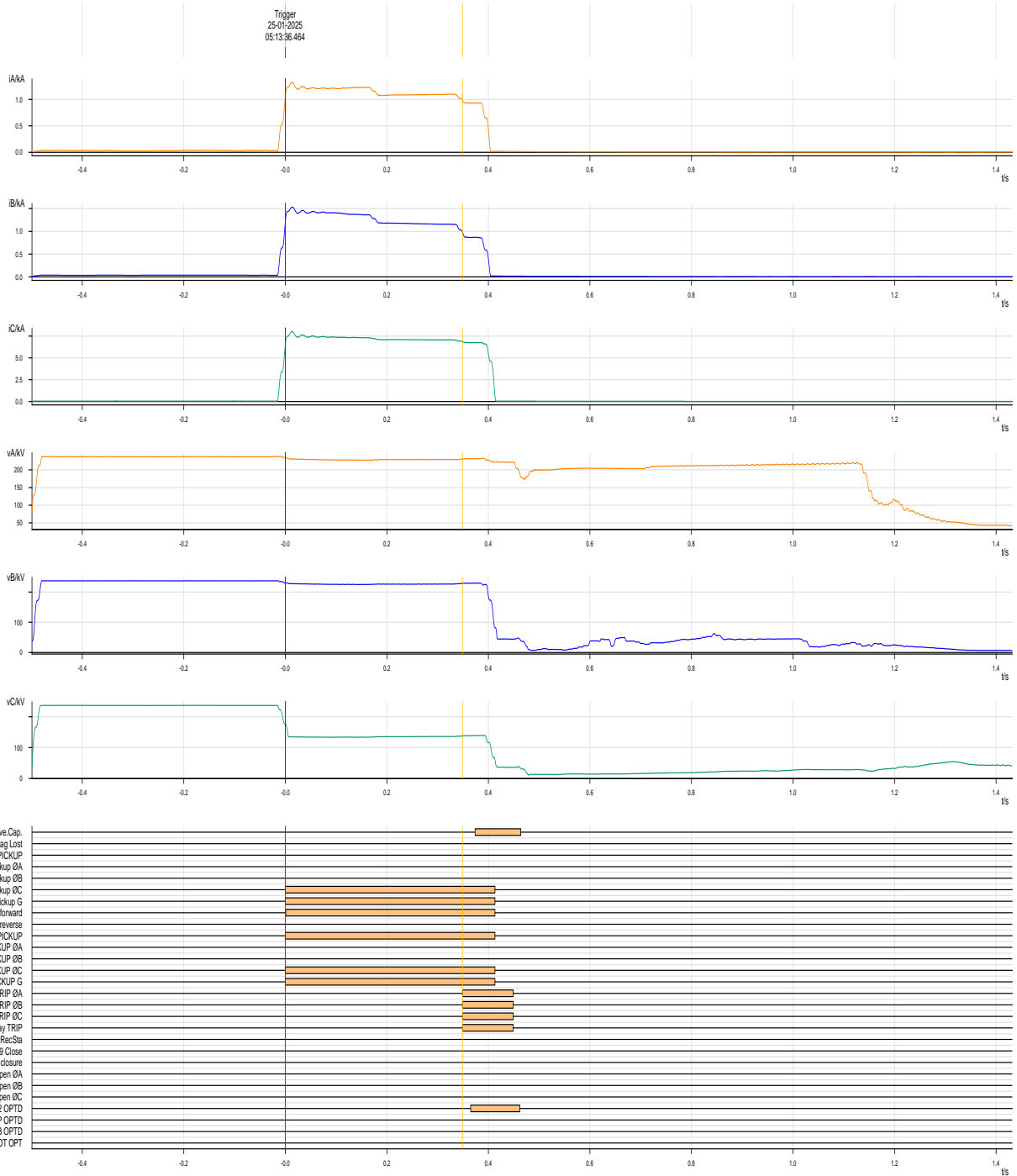
DR of 400 kV Meramundali-JSPL-1 (Meramundali):



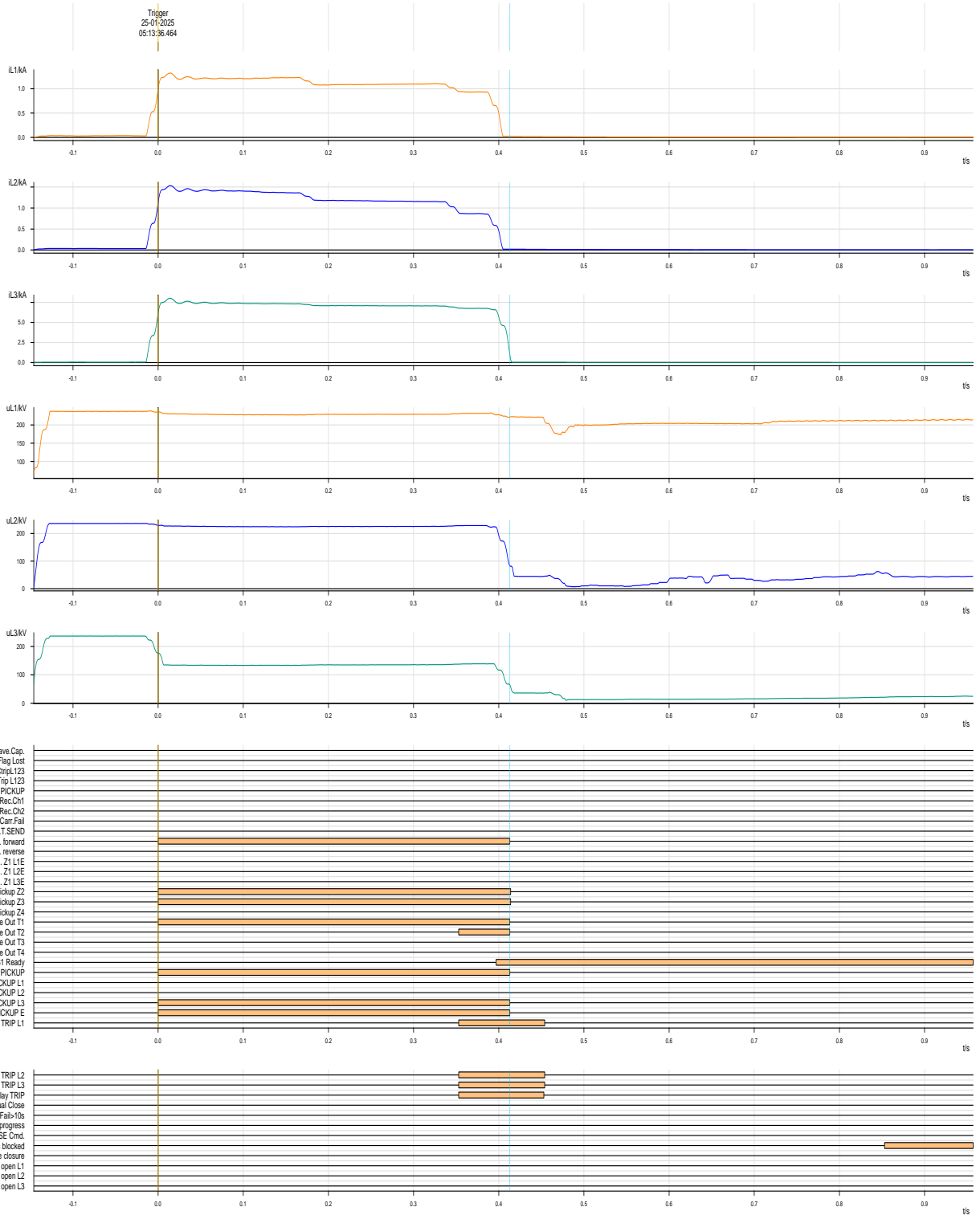
DR of 400 kV Meramundali-JSPL-1 (JSPL):



DR of 400 kV Meramundali-JSPL-2 (Meramundali):

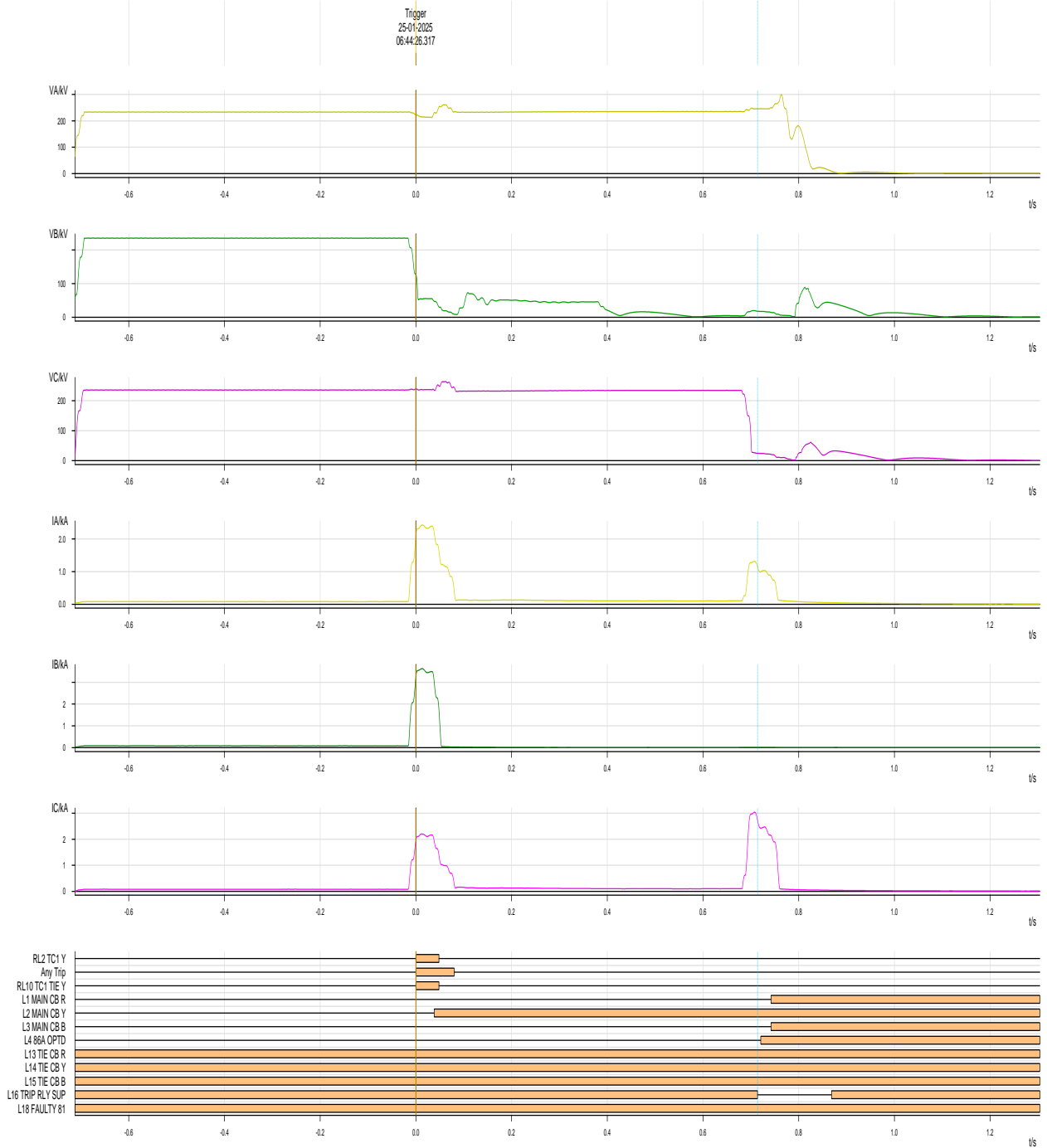


DR of 400 kV Meramundali-JSPL-2 (JSPL):

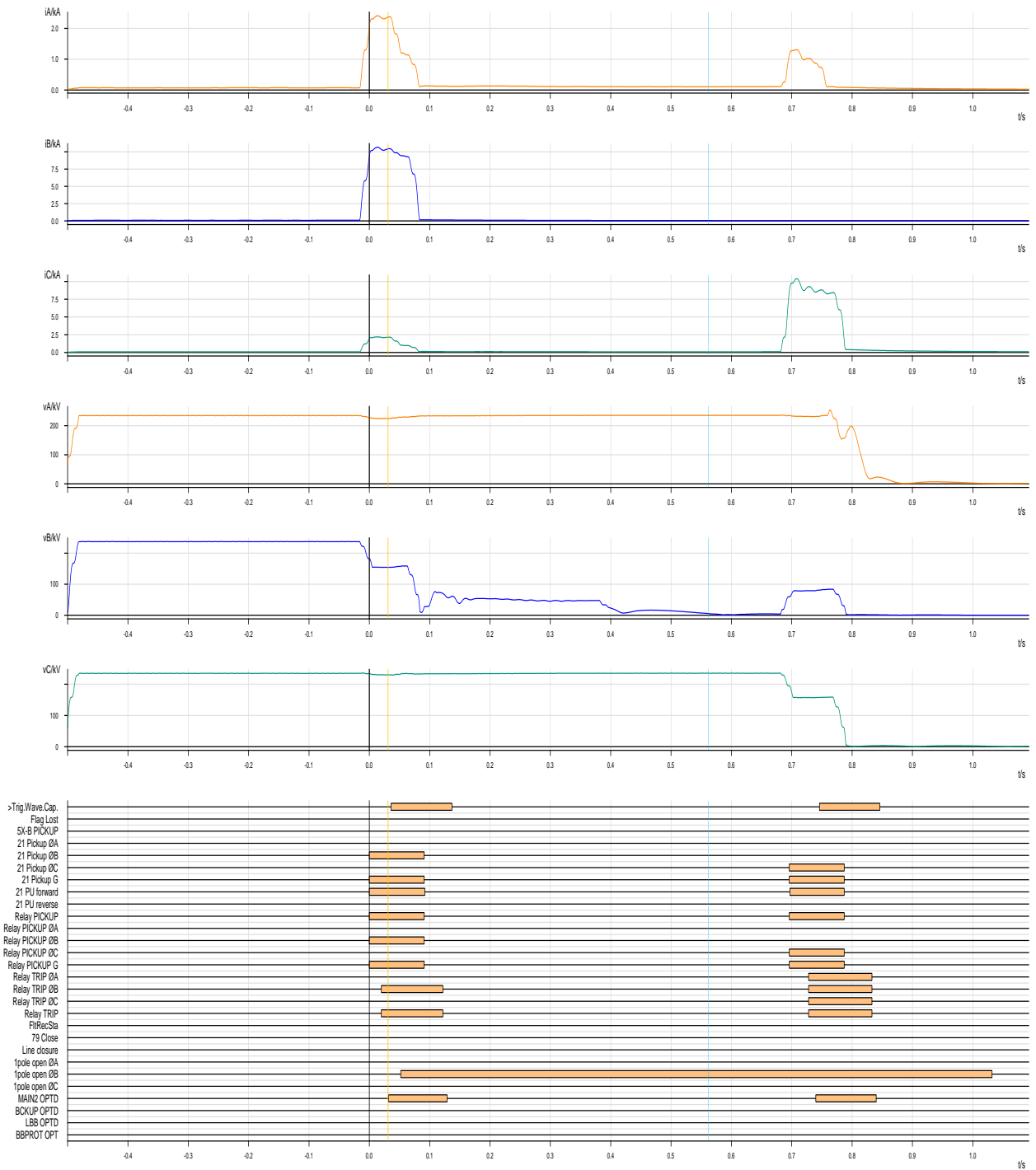


Event#2

DR of 400 kV Meramundali-JSPL-1 (JSPL):

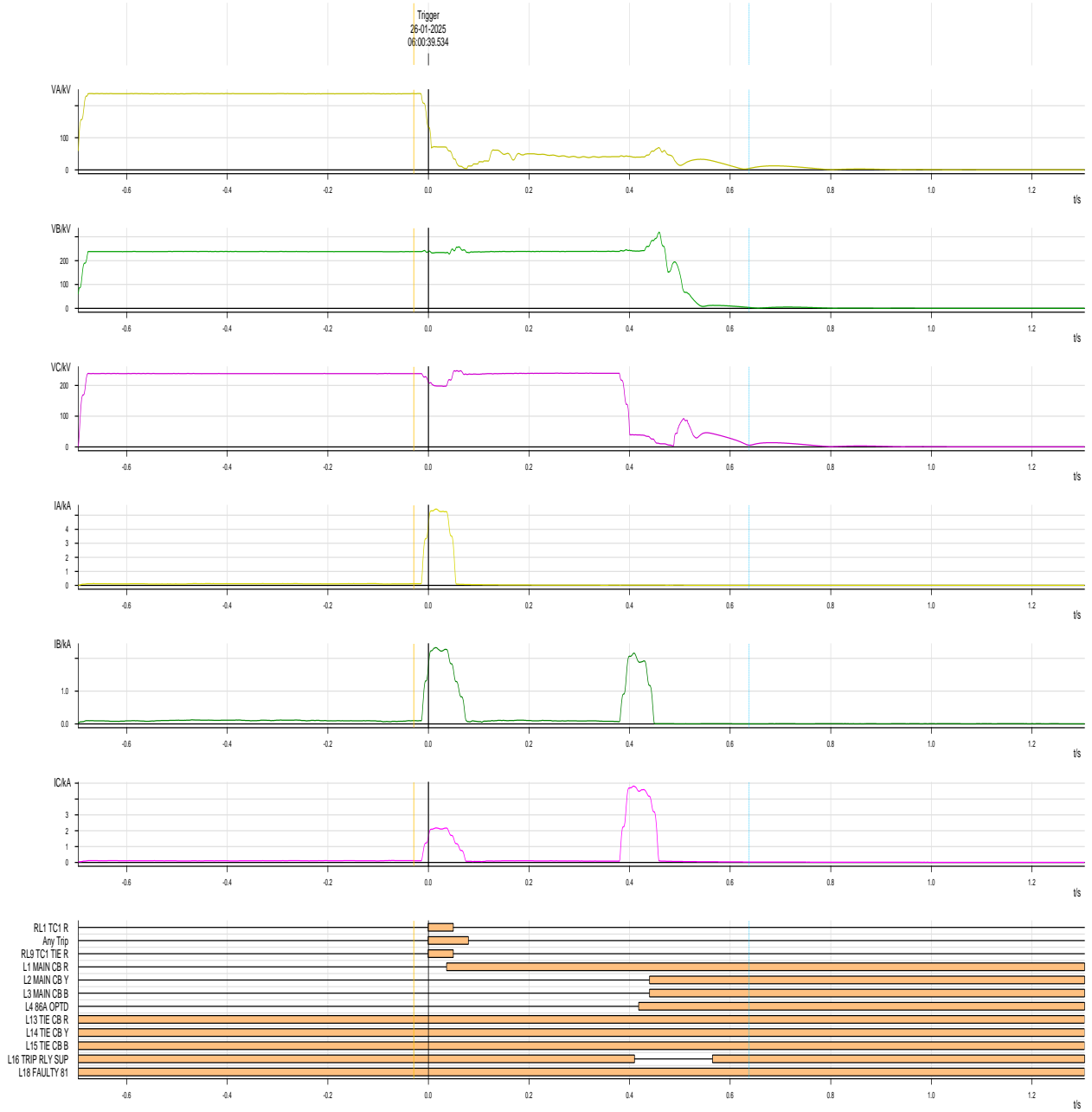


DR of 400 kV Meramundali-JSPL-1 (Meramundali):

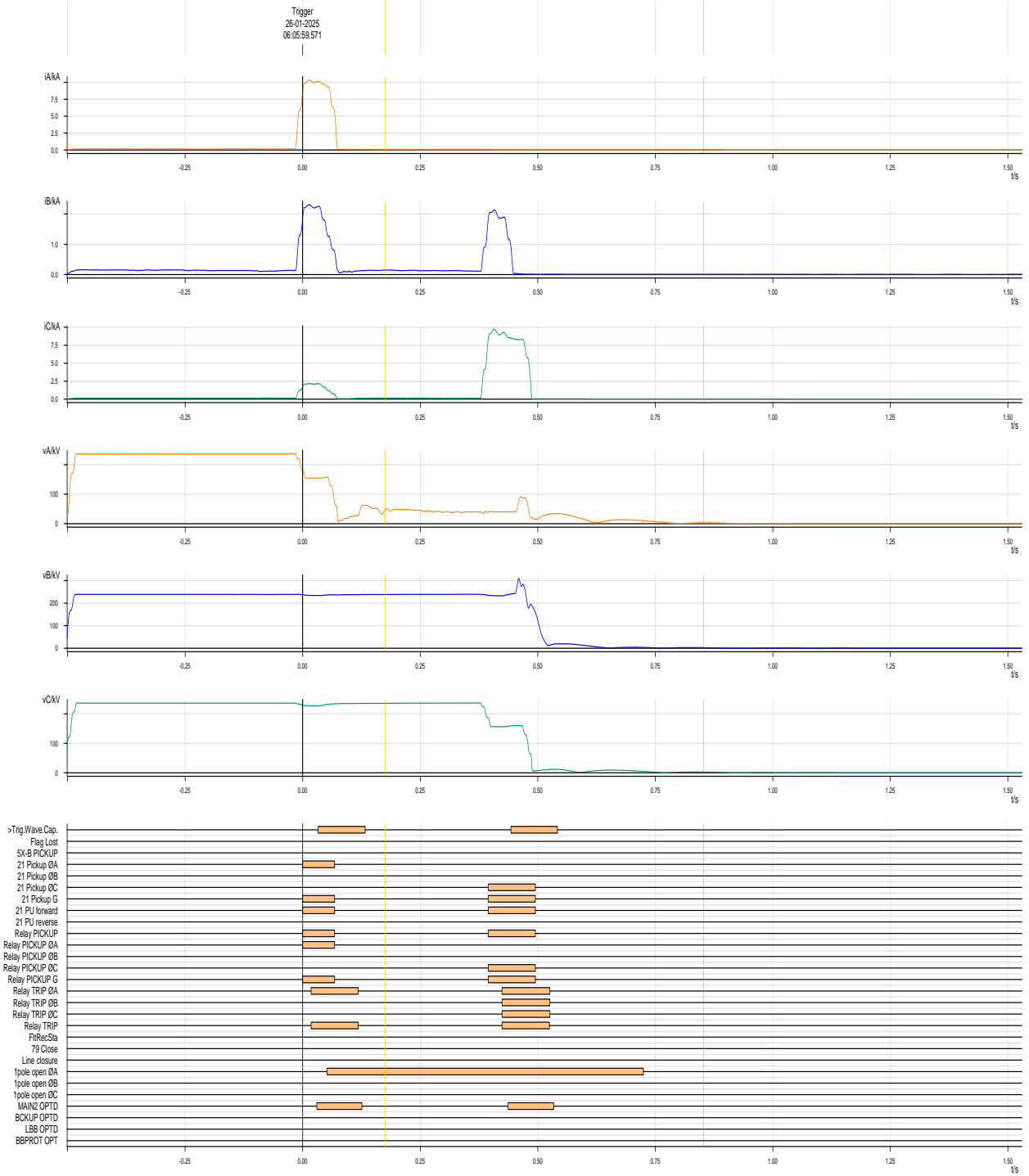


Event#3

DR of 400 kV Meramundali-JSPL-1 (JSPL):



DR of 400 kV Meramundali-JSPL-1 (Meramundali):



17	400KV NAUBATPUR BALIA CKT-2	04-01-2025	02:41:00	04-01-2025	02:41:00	A/R SUCCESSFUL FROM BOTH ENDS DUE TO B-N FAULT DUE TO DENSE FOG AROUND FAULT AREA. FAULT DETAILS-BALIA-[SITE]-M1-FD-95.7KM, FC-4.18KA, M2-FD-99KM, FC-4.14KA, NAUBATPUR[SITE]-M1-FD-46.6KM, FC-5.46KA, M2-FD-46.48KM, F = C-5.560KA. INSULATOR STRING DE-CAPPED AT LOC NO. 372	Both Other Utility	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
18	400KV NAUBATPUR BALIA CKT-2	19-01-2025	14:18:00	19-01-2025	15:48:00	TRIPPED FROM BOTH ENDS DUE TO R-Y FAULT, FAULT DETAILS(NAUBATPUR):- M1: FD-147KM, IR-3.06KA, IY-3.01KA. HANGING KITE FOUND BETWEEN LOCATION NO 657-658 DUE TO WHICH FLASH OVER MARKS OBSERVED IN CONDUCTOR AND SUSPENSION CLAMPS.	Both Other Utility	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
19	400KV SASARAM-ALLAHABAD	07-01-2025	00:32:00	08-01-2025	19:36:00	TRIPPED FROM BOTH ENDS DUE TO B-N FAULT DUE TO DENSE FOG AROUND FAULT AREA. ALLAHABAD [SITE] M1-FC-16.94KA,FD-13.55KM, M2-FC-16.56KA,FD-13.84KM FAULT IS UNDER NR3 JURISDICTION (INSULATOR DECAPPED AT LOCATION NO 530)	Other Utility	1	NA	0	NA	0	NA	1	1	1	1	1
20	765KV GAYA-BALIA	03-01-2025	05:23:00	03-01-2025	05:23:00	A/R SUCCESSFUL FROM BOTH ENDS DUE TO B-N FAULT DUE TO BIRD DEFECACTION AROUND FAULT AREA. FAULT DTAILS-GAYA[SITE]-M1-FD-150.1KM, FC-3.98KA HEAVY BIRD DROPPING FOUND AT LOC NO. 414		1	NA	0	NA	0	NA	1	1	1	1	1
21	765KV GAYA-BALIA	03-01-2025	06:47:00	03-01-2025	06:47:00	A/R SUCCESSFUL FROM BOTH ENDS DUE TO B-N FAULT DUE TO BIRD DEFECACTION AROUND FAULT AREA. FAULT DETAILS-GAYA[SITE]-M1-FD-161.2KM, FC-3.95KA HEAVY BIRD DROPPING FOUND AT LOC NO. 414		1	NA	0	NA	0	NA	1	1	1	1	1
22	765KV GAYA-BALIA	03-01-2025	06:40:00	03-01-2025	06:40:00	A/R SUCCESSFUL FROM BOTH ENDS DUE TO B-N FAULT DUE TO BIRD DEFECACTION AROUND FAULT AREA. . FAULT DTAILS-GAYA[SITE]-M1-FD-149.5KM, FC-3.97KA HEAVY BIRD DROPPING FOUND AT LOC NO. 414		1	NA	0	NA	0	NA	1	1	1	1	1
23	765KV GAYA-BALIA	03-01-2025	07:20:00	03-01-2025	07:20:00	A/R SUCCESSFUL FROM BOTH ENDS DUE TO B-N FAULT DUE TO BIRD DEFECACTION AROUND FAULT AREA. . FAULT DETAILS-GAYA[SITE]-M1-FD-158.5KM, FC-3.97KA HEAVY BIRD DROPPING FOUND AT LOC NO. 414		1	NA	0	NA	0	NA	1	1	1	1	1
24	765KV GAYA-VARANASI-1	15-01-2025	02:37:00	15-01-2025	02:37:00	A/R SUCCESSFUL FROM BOTH END B-N FAULT DUE TO DENSE FOG AROUND FAULT AREA. GAYA DETAILS: M1: FC=5.95KA, FD=84.3KM, M2: FC=5.95KA, FD=83.3KM.		1	NA	0	NA	0	NA	1	1	1	1	1
25	765KV GAYA-VARANASI-2	17-01-2025	11:05:00	17-01-2025	11:05:00	A/R SUCCESSFUL FROM BOTH ENDS DUE TO B-N FAULT DUE TO DENSE FOG AROUND FAULT AREA. GAYA[SITE]-M1-FD-59.4KM, FC-7.02KA, M2: 58.75KM FC-6.91KA		1	NA	0	NA	0	NA	1	1	1	1	1
26	HVDC BTB SASARAM	09-01-2025	12:10:00	09-01-2025	17:13:00	TRIPPED DUE TO BIRD STRIKED IN Y PH FILTER 53 IN NORTH SIDE AND SOME CAPACITORS DAMAGED/OIL LEAKED.	NA	1	NA	0	NA	0	NA	1	1	1	1	1

S. No.	Name of the element	Tripping Date	Tripping Time	Restoration Date	Restoration Time	Reason (Relay indication)		Nc		Nu		Nf		Dependability index (Nc/(Nc+Nf))	Security Index (Nc/(Nc+Nu))	Reliability Index (Nc/(Nc+Nu+Nf))	Remarks (Reason for performance indices less than 1)
						End A	End B	End A	End B	End A	End B	End A	End B				
1	220KV-MUZAFFARPUR-HAJIPUR-2	07-01-2025	08:27	07-01-2025	10:10	Muzaffarpur: R_N, 14.429 kA, 5.79 km	Hajipur :R-N, Ir-1.98 KA, 34.15 km	1	1	0	0	0	0	1	1	1	
2	220KV-GAYA-BODHGAYA-1	09-01-2025	11:34	09-01-2025	14:44	DT received at Gaya end.	-			0	1		0	0	0	0	During CB replacement work at GSS Bodhgaya DT signal send to Gaya.
3	220KV-KARAMNASHA (NEW)-SAHUPURI-1	15-01-2025	19:07	15-01-2025	22:20	Karmansha: Overcurrent Tripped	-	1		0		0	1	1	1	To prevent Jumper and conductor snapping of the Old Zebra conductor, O/C setting is enabled at 600A at Karamnasha new end.	
4	220KV-SITAMARHI-MOTIPUR-2	17-01-2025	18:09	19-01-2025	18:32	-	Motipur: B-N, FC-3.436 kA, FD-42.13 km			1		0	0	1	1	1	
5	220KV-KARAMNASHA (NEW)-SAHUPURI-1	23-01-2025	03:16	23-01-2025	15:50	Karmanasha :- Y-N, 4.93 kA, 10.6 km	-	1		0		0	1	1	1	1	Conductoir snapped.

Protection Performance Indices for the month of January' 25 (In compliance of Clause 15(6) of IEGC 2023)																	
S. No.	Name of the element	Tripping Date	Tripping Time	Restoration Date	Restoration Time	Reason (Relay indication)		Nc		Nu		Nf		Dependability index (Nc/(Nc+Nf))	Security Index (Nc/(Nc+Nu))	Reliability Index (Nc/(Nc+Nu+Nf))	Remarks (Reason for performance indices less than 1)
						End A	End B	End A	End B	End A	End B	End A	End B				
1	220 kV Dumka II (Madanpur) - Godda - I	16.01.2025	17:17			SPS operated at Dumka		1		0		0		1	1.0	1	
2	220 kV Dumka II (Madanpur) - Godda - I	16.01.2025	17:17			SPS operated at Dumka		1		0		0		1	1.0	1	
3	220 kV Chaibasa - Ramchandrapur - II	24.01.2025	03:51				BN fault, EF		1		0		0	1	1.0	1	
4	220 kV Chatra - Pakribarwadih - II	26.01.2025	07:17					1		0		0		1	1.0	1	Line was charged under antitheft

PROTECTION PERFORMANCE INDICES AS PER TRIPPING LIST OF PCC MEETING AGENDA FOR THE MONTH OF JANUARY 2025 FOR OPTCL, SLDC, ODISHA

SL.NO	NAME OF THE ELEMENT	TRIPPING DATE	TRIPPING TIME	RESTORATION DATE	RESTORATION TIME	REASON(RELAX INDICATION)		NC		NU		NF		DEPENDABILITY INDEX (NC/NC+NF)	SECURITY INDEX (NC/NC+NU)	RELIABILITY INDEX(NC/NC+NU+NF)	REMARKS
						END-A	END-B	END-A	END-B	END-A	END-B	END-A	END-B				
1	220KV PANDIAVIL-PRATAPSASAN-1	01-01-2025	21:01	01-01-2025	22:40	NOT TRIPPED	BUSBAR OPERATED	0	1	0	0	0	0	END A=0 ,END B=1	END A=0 ,END B=1	END A=0 ,END B=1	BUS-1 BUSBAR PROTECTION OPERATED DUE TO R-PHASE PT BURST AT PRATA
2	400KV NEW DUBURI-TSL-2	01-10-2025	05:30	01-10-2025	07:20	DT RECEIVED	NOT TRIPPED	1	0	1	0	1	0	END A=0.5 ,END B=0	END A=0.5 ,END B=0	END A=0.33 ,END B=0	DT RECEIVED AT NEW DUBURI END.
3	400KV NEW DUBURI-TSL-2	01-10-2025	10:01	01-10-2025	10:36	DT RECEIVED	NOT TRIPPED	1	0	1	0	1	0	END A=0.5 ,END B=0	END A=0.5 ,END B=0	END A=0.33 ,END B=0	DT RECEIVED AT NEW DUBURI END
4	220KV RENGALI PH-TSTPP-1	01-11-2025	13:10	01-11-2025	13:56	Z-2/R-N/5.022kA/21.66Km	NOT TRIPPED	1	0	1	0	1	0	END A=1 ,END B=0	END A=1 ,END B=0	END A=1 ,END B=0	LINE TRIPPED IN ZONE-2 AT RENGALI P.H. END ONLY
5	220KV BUDHIPADAR-KORBA-2	16/01/2025	21:40	17/01/2025	02:34	NOT TRIPPED	TRIPPED	0	1	0	1	0	1	END A=0 ,END B=0.5	END A=0 ,END B=0.5	END A=0 ,END B=0.33	AS PER PMU NO FAULT OBSERVED BUT LINE TRIPPED FROM KORBA END ONLY
6	400KV MERAMUNDALI-JSPL-2	26/01/2025	04:21	26/01/2025	05:07	A/R SUCCESSFUL	R-N/9.2KA/13.5KM	1	1	0	0	0	0	END A=1 ,END B=1	END A=1 ,END B=1	END A=1 ,END B=1	3-PHASE TRIPPING FOR SINGLE PHASE TO GROUND FAULT AT JSPL END ONLY
7	400KV MERAMUNDALI-JSPL-2	26/01/2025	05:31	26/01/2025	13:26	R-Y/IR=7.5kA/30.7km	R-Y-B/IR=9.85kA, IY=1.32kA,IB=3.91kA/29.49Km	1	1	0	0	0	0	END A=1 ,END B=1	END A=1 ,END B=1	END A=1 ,END B=1	LINE TRIPPED ON R-PHASE TO GROUND FAULT, AFTER 800MS ANOTHER Y-PHASE OCCURRED, WHICH TRIPPED THE LINE AT BOTH ENDS. DUE TO R&Y PHASE INSULATOR DECAPPED AT LOCATION NO-96

Protection Performance Indices for the month of JAN'25 (In compliance of Clause 15(6) of IEGC 2023)																		
Sl. No.	Name of the element	Tripping Date	Tripping Time	Restoration Date	Restoration Time	Reason (Relay indication)		Nc		Nu		Nf		Dependability index (Nc/(Nc+Nf))	Security Index (Nc/(Nc+Nu))	Reliability Index (Nc/(Nc+Nu+Nf))	Remarks (Reason for performance indices less than 1)	Analysis of the event
						End A	End B	End A	End B	End A	End B	End A	End B					
1	Arambag-KTPP #1	02.01.2025	10:17:00	02.01.2025	10:58:00	DT Receive from far End		1		0		0		1	1	1		DTsend due to DC + Earth Fault. It happens due to control cable fault . Control Cable replaced on 08.01.2025 and system is now healthy.
2	Arambag-KTPP #1	02.01.2025	11:01:00	02.01.2025	12:12:00	DT Receive from far End		1		0		0		1	1	1		DTsend due to DC + Earth Fault. It happens due to control cable fault . Control Cable replaced on 08.01.2025 and system is now healthy.
3	Durgapur-PPSP #2	22.01.2025	06:22:00	22.01.2025	09:55:00	line-1,Y-Phase,SOTF, CS , A/R		1		0		0		1	1	1		
4	Durgapur-PPSP #1	23.01.2025	04:36:00	23.01.2025	10:09:00	line-1,Y-Phase,SOTF, CS , A/R		1		0		0		1	1	1		
5	Durgapur-New Chanditala	23.01.2025	05:50:00	23.01.2025	20:59:00	line-1,Y-Phase,A/R Close, A/R	line-1,Y-Phase,A/R Close, A/R	1		0		0		1	1	1		
6	New-Town AA3--Rajarhat PG #1	24.01.2025	16:48:00	24.01.2025	17:01:00	Zone-4 Trip		0		1		0		0	#	#		Due to DC + Earth Fault , PT selection relay resetted causes PT voltage missing in the relay and relay initiate tripping.

Performance Indices of Darlipali STPP for Jan'25

Index. No.	Number of correct operations at internal power system faults(Nc)	Number of failures to operate at internal power system faults(Nf)	The Dependability Index($D=Nc/(Nc+Nf)$)
1	1	0	1

Index. No.	Number of correct operations at internal power system faults(Nc)	Number of unwanted operations (Nu)	The Security Index($S=Nc/(Nc+Nu)$)
2	1	0	1

Index. No.	Number of correct operations at internal power system faults(Nc)	Number of incorrect operations (Ni=Nf+Nu)	The Reliability Index ($R=Nc/(Nc+Ni)$)
3	1	0	1

NOTE for reference of deciding parameters:

- 1) Nc = The number of correct operation of switchyard breakers (220kV and above) on protection to be counted i.e if the breaker has operated correctly on internal protection operation**
- 2) Nf = The number of failure of switchyard breaker (220kV and above) to operate on its protection to be counted i.e if the breaker has not operated on internal protection operation (includes LBB operation etc)**
- 3) Nu = The number of unwanted operation of switchyard breaker (220kV and above) without its own protection operation to be counted i.e if the breaker has opened without operation of its protection leading to tripping of other breaker or grid connected equipments**

Month	January						
Date	Line tripping	Cause of Tripping	Tripping Analysis	Correct Operations at NTPC Barh (Nc)	Failed operations at NTPC Barh(Nf)	Number of Unwanted Operation (Nu)	Number of incorrect operations (Ni= Nf+Nu)
04.01.2025	Barh-Patna 4 at 05:35 am	Single phase-Ground fault occurred (R-N) in Zone 1.	A/R attempt failed. Over-voltage observed (ST-II, Time delayed: 100 msec) in Y phase as per DR. DT send from Barh end .	1	0	0	0
04.01.2025	Barh-Patna-3 at 06:02 am	Zone-3 picked up in Main 1, Zone 1 picked up in Main-2 relay during charging attempt of Barh-Patna#4	As per analysis, Patna#4 tripped on SOTF when charging attempt was being taken from Patna end. At the same instant, Main1 of Patna 3 at Barh end detected Zone 3 which reset within 100 msec and did not issue any trip command. Main 2 of Patna#3 detected zone-1 in Y phase along with trip start in R phase also. Main-2 issued trip command to Barh-Patna 3. Delayed tripping of R-B phase of tie CB was due to sluggish operation of PD relay. Given the nature of line fault which was later detected after the second charging attempt of Barh-Patna#4 (@ 14::34 hours) and Patna#3 being on the same multi-circuit tower as that of Patna#4, the discrepancy in the tripping was observed.	0	1	1	2
04.01.2025	Barh-Patna-3 at 14:34 pm	Zone-3 picked up in Main 1, Zone 1 picked up in Main-2 relay during charging attempt of Barh-Patna#5	Same sequence was observed as stated earlier. Auto reclosure attempt was not successful. This time tie CB R and B phase tripped on actual PD operation after a delay of 2.5 secs	1	0	1	1
19.01.2025	Barh-Motihari 1	Phase-Phase Fault	Line tripped from both eds during Ph-Ph fault recorded in Z-1 at Barh end	1	0	0	0
21.01.2025	Barh-Motihari 2	Phase-Phase Fault	Line tripped from both eds during Ph-Ph fault recorded in Z-1 at Barh end	1	0	0	0
Dependability Index $D = Nc / (Nc + Nf)$				0.8			
Security Index $S = Nc / (Nc + Nu)$				0.666666667			
Reliability Index $R = Nc / (Nc + Ni)$				0.571428571			

ENICL, OGPTL, PKTCL

Protection Performance Indices for the month of December-24 (In compliance of Clause 15(6) of IEGC 2023)																			
S. No.	Name of Utility	Name of the element	Tripping Date	Tripping Time	Restoration Date	Restoration Time	Reason (Relay indication)		Nc		Nu		Nf		Dependability index (Nc/(Nc+Nf))	Security Index (Nc/(Nc+Nu))	Reliability Index (Nc/(Nc+Nu+Nf))	Remarks (Reason for performance indices less than 1)	
							End A	End B	End A	End B	End A	End B	End A	End B					
1	EAST NORTH INTERCONNECTION LIMITED	400 kv (Quad) D/C Bongaigaon - Alipurduar line CKT- 1(BNG- ALIP #1)	20-01-2025	16:27:00	20-01-2025	18:12:00	-	-	-	-	1.00	1.00	-	-	-NA-	0	0	Line tripped due to DT send from Bongaigaon end & DT received at Alipurduar end.	
		400 kv (Quad) D/C Bongaigaon - Alipurduar line CKT- 2(BNG- ALIP #2)													-NA-	-NA-	-NA-	No events in the month of January'25	
		400 kv (Quad) D/C Alipurduar - Siliguri line CKT- 1(ALIP- SLG #1)														-NA-	-NA-	-NA-	No events in the month of January'25
		400 kv (Quad) D/C Purnia-Biharshrif Line CKT-2(NPRN- BSF# 2)														-NA-	-NA-	-NA-	No events in the month of January'25
		400 kv (Quad) D/C Purnia-Biharshrif Line CKT-1 (NPRN-BSF#1)														-NA-	-NA-	-NA-	No events in the month of January'25
		400 kv (Quad) D/C Alipurduar - Siliguri line CKT- 2(ALIP- SLG #2)														-NA-	-NA-	-NA-	No events in the month of January'25
2	ODISHA GENRATION PHASE - II LIMITED	400kV D/C LILO POINT (T. No. - 130) - Sundargarh													-NA-	-NA-	-NA-	No events in the month of January'25	
		400kV D/C OPGC-LILO POINT (T. No. - 130)													-NA-	-NA-	-NA-	No events in the month of January'25	
		400kV D/C IB-OPGC-Jharsuguda(Sundargarh) Ckt-1													-NA-	-NA-	-NA-	No events in the month of January'25	
		765kV D/C Jharsuguda(Sundargarh)-Raipur pool CKT-1													-NA-	-NA-	-NA-	No events in the month of January'25	
		765kV D/C Jharsuguda(Sundargarh)-Raipur pool CKT-2													-NA-	-NA-	-NA-	No events in the month of January'25	
3	JA KHARAGPUR TRANSMISSION COMPANY L	400 kV Chaibasa-Kharagpur D/C line CKT- 1													-NA-	-NA-	-NA-	No events in the month of January'25	
		400 kV Chaibasa-Kharagpur D/C line CKT- 2													-NA-	-NA-	-NA-	No events in the month of January'25	
		400 KV,D/C New Ranchi-New Purulia Line: CKT-1													-NA-	-NA-	-NA-	No events in the month of January'25	
		400 KV,D/C New Ranchi-New Purulia Line: CKT-2													-NA-	-NA-	-NA-	No events in the month of January'25	

Jorethang Loop Hydro Electric Project 2 X 28 MW
Protection Performance Indices for the JANUARY-2025 (In compliance of Clause 15(6) of IEGC 2023)

Sl. No.	Name of the element	Tripping Date	Tripping Time	Restoration Date	Restoration Time	Reason (Relay indication)		Nc		Nu		Nf		Dependability index (Nc/(Nc+Nf))	Security Index (Nc/(Nc+Nu))	Reliability Index (Nc/(Nc+Nu+Nf))	Remarks (Reason for performance)	Analysis of the event
						End A	End B	End A	End B	End A	End B	End A	End B					
1	220KV Jorethang-New Melli Line-1																NO TRIPPING	
2	220KV Jorethang-New Melli Line-2																NO TRIPPING	

Nc - is the number of correct operations at internal power system faults.
 Nf - is the number of failures to operate at internal power system faults.
 Nu - is the number of unwanted operations.

Tashiding HEP

Tashiding Hydro Electric Project 2 X 48.5 MW																		
Protection Performance Indices for the JANUARY -2025 (In compliance of Clause 15(6) of IEGC 2023)																		
Sl. No.	Name of the element	Tripping Date	Tripping Time	Restoration Date	Restoration Time	Reason (Relay indication)		Nc		Nu		Nf		Dependability index (Nc/(Nc+N f))	Security Index (Nc/(Nc+Nu))	Reliability Index (Nc/(Nc+Nu+Nf))	Remarks (Reason for performance indices less than 1)	Analysis of the event
						End A	End B	End A	End B	End A	End B	End A	End B					
1	220KV Tashiding-Legship Line-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NO TRIPPING	--
2	220KV Tashiding-New Melli Line-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NO TRIPPING	--
<small>Nc - is the number of correct operations at internal power system faults. Nf - is the number of failures to operate at internal power system faults. Nu - is the number of unwanted operations.</small>																		

CESC 220kV Network Protection Performance Indices for the month of January'2025

Tripping Time	Restoration Date	Restoration Time	Reason (Relay indication)		Nc		Nu		Nf		Dependability index ($Nc/(Nc+Nf)$)	Security Index ($Nc/(Nc+Nu)$)	Reliability Index ($Nc/(Nc+Nu+Nf)$)	Remarks (Reason for performance indices less than	Analysis of the event
			End A	End B	End A	End B	End A	End B	End A	End B					

Remarks : No tripping occurred in CESC 220kV network in the month of January'25

UNIFORM PROTECTION PROTOCOL

**NATIONAL POWER COMMITTEE
CENTRAL ELECTRICITY AUTHORITY**

Prepared in Compliance to

Clause 12(2) and Clause 13 of Central Electricity Regulatory
Commission Indian Electricity Grid Code Regulations, 2023

July 2024

Chapters

- 1. Background**
- 2. Applicability**
- 3. Definitions**
- 4. General Philosophy of Protection System**
- 5. Protection Schemes**
- 6. Protection Settings & Coordination**
- 7. Disturbance Monitoring, Analysis and Reporting**
- 8. Protection Audit Plan**
- 9. Performance Monitoring of the Protection Systems**
- 10. Compliance Monitoring**

UNIFORM PROTECTION PROTOCOL

1. Background

National Power Committee in its 14th meeting held at Bangalore under the chairmanship of Chairperson, CEA has decided that the protection subgroup of NPC may finalise a Uniform Protection Protocol and Uniform Protection Setting Procedure for all regions in consultation with RLDCs/GRID-India.

1.1. The Uniform Protection Protocol has been prepared in accordance with Clauses 12(2) & 13 of the Indian Electricity Grid Code, 2023 (IEGC 2023) notified by the Central Electricity Regulatory Commission.

1.1.1. The clause 12(2) of the IEGC 2023:

“There shall be a uniform protection protocol for the users of the grid:

- a) for proper co-ordination of protection system in order to protect the equipment/system from abnormal operating conditions, isolate the faulty equipment and avoid unintended operation of protection system;*
- b) to have a repository of protection system, settings and events at regional level;*
- c) specifying timelines for submission of data;*
- d) to ensure healthiness of recording equipment including triggering criteria and time synchronization; and*
- e) to provide for periodic audit of protection system.”*

1.1.2. The clause 13 of the IEGC 2023:

“13. Protection protocol

- (1) All users connected to the integrated grid shall provide and maintain effective protection system having reliability, selectivity, speed and sensitivity to isolate faulty section and protect element(s) as per the CEA Technical Standards for Construction, the CEA Technical Standards for Connectivity, the CEA (Grid Standards) Regulations, 2010, the CEA Technical Standards for Communication and any other applicable CEA Standards specified from time to time.*
- (2) Back-up protection system shall be provided to protect an element in the event of failure of the primary protection system.*
- (3) RPC shall develop the protection protocol and revise the same, after review from time to time, in consultation with the stakeholders in the concerned region, and in doing so shall be guided by the principle that minimum electrical protection functions for equipment connected with the grid shall be provided as per the CEA Technical Standards for Construction, the CEA Technical*

Standards for Connectivity, the CEA Technical Standards for Communication, the CEA (Grid Standards) Regulations, 2010, the CEA (Measures relating to Safety and Electric Supply) Regulations, 2010, and any other CEA standards specified from time to time.

- (4) *The protection protocol in a particular system may vary depending upon operational experience. Changes in protection protocol, as and when required, shall be carried out after deliberation and approval of the concerned RPC.*
- (5) *Violation of the protection protocol of the region shall be brought to the notice of concerned RPC by the concerned RLDC or SLDC, as the case may be.”*

1.2. The Uniform Protection Protocol stipulates General Protection Philosophy of Protection System, Protection Schemes for Generators & various Transmission Elements in Power System, Protection Settings & their Coordination among entities, Disturbance Monitoring, Analysis and Reporting, Time Synchronization of Protection Systems, Protection Audit Plan, Performance of Protection Systems & Compliance Monitoring.

2. Applicability

The Uniform Protection Protocol shall be applicable to all Regional entities, State/Central/Private Generating Companies/ Generating Stations, SLDCs, RLDCs, CTU, STUs, Transmission Licensees and RPCs, connected at 220 kV (132 kV for NER) and above.

3. Definitions

Words and expressions used in this Uniform Protection Protocol are defined in the Act or any other regulations specified by the Central Commission or Central Electricity Authority shall, unless the context otherwise requires, have the meanings assigned to them under the Act or other regulations specified by the Central Commission, as the case may be.

4. General Philosophy of Protection System

4.1. Protection philosophy shall be in accordance with below mentioned objectives, design criteria and other details. However, protection design in a particular system may vary depending upon judgment and operational experience in the broad contours of the protection philosophy. Consideration must also be given to the type of equipment to be protected as well as the importance of this equipment to the system. Further, protection must not be defeated by the failure of a single component.

4.1.1. Objectives:

The basic objectives of any protection schemes should be to:

- (i) Protect equipments from abnormal operating conditions.
- (ii) Automatically isolate the faulty element.
- (iii) Avoid unintended or misoperation of protection system.

- (iv) Mitigate the effect of short circuit and other abnormal conditions in minimum possible time and area.
- (v) Indicate the location and type of fault and
- (vi) Provide effective tools to analyze the fault and decide remedial measures.

4.1.2. Design Criteria:

To accomplish the above objectives, the four design criteria for protection that should be considered are:

- (i) fault clearance time/speed;
- (ii) selectivity;
- (iii) sensitivity and
- (iv) reliability (dependability and security)

4.1.2.1. **Fault clearance time/speed:** It is defined as the time required to interrupt all sources supplying a faulted piece of equipment. In order to minimize the effect on customers and maintain system stability, Fault clearance time shall be as per CEA Grid Standard Regulations 2010, as amended to date.

4.1.2.2. **Selectivity:** Selectivity is the ability of the protective relaying to trip the minimum circuits or equipment to isolate the fault .To ensure Selectivity, coordination shall be ensured with the adjacent protection schemes including breaker failure, transformer downstream relays, generator protection and station auxiliary protection.

4.1.2.3. **Sensitivity:** Sensitivity demands that the relays be capable of sensing minimum fault conditions without imposing limitations on circuit or equipment capabilities. To ensure Sensitivity, the settings must be investigated to determine that they will perform correctly for the minimum fault current envisaged in the system, yet remain stable during transients and power swings from which the system can recover.

4.1.2.4. **Reliability:** Reliability is a measure of protective relaying systems certainly to trip when required (dependability) and not to trip falsely (Security). To ensure Reliability, two independent auxiliary direct current supplies shall be provided for Main-I and Main-II relays. The Main-I and Main-II relays should be from two different makes or operating with different algorithm. The CB's shall have two independent trip coils and two independent trip circuits. Each protection device should trip at least one of them by independent auxiliary DC- supplies.

4.1.2.5. **Security:** To ensure Security, the protection shouldn't limit the maximum transmission capacity of the element. Distance protection in particular could cause spurious tripping due to specific grid conditions, in case of high load operation. Therefore, any special topologies must be known and considered for protection parameterization. For parallel Over Head Lines it is necessary to consider the rapid increase of load current in the healthy line when the faulty line trips and the protection operation must allow such conditions The

load encroachment detection function of the relays must be used, when the highest distance zone resistance reach conflicts with the maximum transmitted load on the protected element.

- 4.2. All generating units shall have standard protection system to protect the units not only from faults within the units and within the Station but also from faults in sub-stations and transmission lines.
- 4.3. The generator, generator transformer, unit auxiliary transformer shall be provided with protection systems connected to two independent channels or groups, such that one channel or group shall always be available for any type of fault in the generator and these transformers;
- 4.4. Protection relays shall be configured in such a way that analog, digital and milli ampere input points shall not pick up due to stray voltages. All protection relays should enough spare input and output contacts for taking care of future expansions.
- 4.5. Protective relays shall be used to detect electrical faults, to activate the alarms and disconnect or shut down the faulted apparatus to provide for safety of personnel, equipment and system within shortest possible time.
- 4.6. Electrical faults shall be detected by the protective relays arranged in overlapping zones of protection.
- 4.7. The protection relays for the generators, motors, transformers and the transmission lines shall generally be of numerical type.
- 4.8. All relays used shall be suitable for operation with CTs secondary rated for one ampere or five amperes as per relevant Indian Standards or International Electrotechnical Commission or Institute of Electrical and Electronics Engineers standards.
- 4.9. Relevant Indian Standards or International Electrotechnical Commission or Institute of Electrical and Electronics Engineers standards shall be applied for protection of generators, transformers and motors.

5. Protection Schemes

The electrical protection functions for equipment connected with the grid shall be provided as per the Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022 amended to date, the CEA (Technical Standards for connectivity to the Grid) Regulations 2007 amended to date, the CEA (Technical Standards for Communication System in Power System Operation) Regulations 2020 amended to date, the CEA (Grid Standards) Regulations 2010 amended to date, the CEA (Measures relating to Safety and Electric Supply) Regulations 2023 amended to date, and any other CEA standards specified from time to time.

5.1. Protection Scheme for Thermal Generating Units

The electrical protection functions for generator, generator transformer, unit auxiliary transformer and station transformer of **coal or lignite based thermal generating stations, gas turbine based thermal generating stations, internal combustion (IC) engine based**

thermal generating stations shall be provided in accordance with but not limited to the list given in **SCHEDULE-I** of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022 amended to date.

5.2. Protection Scheme for Hydro Generating Units

- 5.2.1. For the generating units with a rating of more than one hundred megawatt (100 MW), protection system shall be configured into two independent sets of protection (Group A and B) acting on two independent sets of trip coil fed from independent DC supplies, using separate sets of instrument transformers, and segregated cables of current transformers and voltage transformers.
- 5.2.2. The protection functions for Generator, Excitation Transformer, Generator, Transformer, Unit Auxiliary Transformer, and Station Auxiliary Transformer shall be provided in accordance with but not limited to the list given in SCHEDULE-IV of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022 amended to date except for variable speed units which will have specialized protection functions.

5.3. Protection Scheme for REGs/RHGS/BESS

Protection Schemes for Renewable Energy (RE) Power Plants of Solar power generation, Wind power generation, Battery Energy Storage System (BESS) and Hybrid of these connected with grid at voltage level above 650 volts shall be in accordance with the Central Electricity Authority (Technical Standards for Construction of Renewable Energy Power Plants) Regulations, 2024 from the date as & when these regulations are notified). As per Central Electricity Authority (technical Standards for Connectivity of the Distributed Generation Resources) amendment Regulations, 2019 regulation 11A-**Standards for charging station, prosumer, or a person connected or seeking connectivity to the electricity system;-**

- (1) The applicant shall provide a reliable protection system to detect various faults and abnormal conditions and provide an appropriate means to isolate the faulty equipment or system automatically.
- (2) The applicant shall ensure that fault of his equipment or system does not affect the grid adversely.
- (3) The protective relays deployed for inverter protections in RE plants shall possess protections from AC/DC over current, over and under frequency and shall comply features like LVRT/HVRT (**as per CEA Technical Standards for Connectivity**).
- (4) The protective relays deployed in RE plants shall be immune from conditions like phase jumps and sharp change in frequency during fault scenarios.
- (5) The inverters and BESS in RE plants shall responds to abnormal conditions arises due to system faults within its operating margin in holistic manner.
- (6) Protection settings of inverters/WTG shall be coordinated in such a way that it accounts for the voltage rise/drop between inverter/WTG terminal & Point of interconnection (POI). Overvoltage /under voltage trip settings should be configured accordingly.

- (7) The protection settings of elements in collector system viz. transformers, cables etc. shall such that it allows RE plants to ensure the compliance of CEA standards at POI.
- (8) Sub-cycle transients or measurement inaccuracy shall be factored while configuring the protection settings.

5.4. Substations & Transmission Line

- 5.4.1. All major protection relays for the Voltage levels 66 kV and above shall be of numerical type and communication protocol shall be as per IEC-61850.
- 5.4.2. Grouping of Protection systems for the voltage level 66 kV and above:
 - i. The protection circuits and relays shall be electrically and physically segregated into two groups each being independent and capable of providing uninterrupted protection even in the event of one of the protection group fails or taken out for maintenance.
 - ii. Interconnection between these two groups shall not generally be attempted. However, such interconnection shall be kept to the bare minimum, if found absolutely necessary.
- 5.4.3. The protections required in respect of transmission lines, transformers, reactors and bus bar protection and local breaker backup protection (breaker failure protection) but not limited to shall be in accordance with **SCHEDULE-V** of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022 amended to date.

5.5. HVDC Terminals/ Stations

5.5.1. Classical HVDC Terminals/ Stations

- i) HVDC system protection shall consist of two parts:

(A) AC side protection:

AC side protection function shall cover the zone for converter transformer, AC filters, shunt capacitors, shunt reactors, and bus bars. These protections shall generally follow the same philosophy as in a typical substation i.e. detection of fault by relay and tripping of circuit breaker.

(B) DC side protection:

DC side protection shall cover the zones consisting of the valve hall, DC switchyard including smoothing reactor and DC filters, DC line, DMR line / electrode line and ground electrode. The protection equipment shall be designed to be fail safe and shall ensure high security to avoid maloperation/ unwanted shutdown due to protection equipment failures. ii) Following a DC Line fault, the HVDC System shall have the facility to restart, one or more times, the faulted pole at a variable pre-selected DC voltage level(s), not below 80% of the nominal voltage rating. The DC transmission system shall be capable of recovery in a controlled and stable

manner without commutation failures during recovery following ac and dc system faults. The post fault power order shall be equal to the pre-fault power order unless AC/ DC systems dictate otherwise.

- ii) Protection system required in respect of Classical HVDC Terminals/ Stations but not limited to shall be in accordance with 13 (b) of Part A of SCHEDULE-VI of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022 amended to date.
- iii) HVDC Stations shall have ensure the open line test (OLT) before charging of lines after DC faults.
- iv) All HVDC stations should prioritize the protections with back up for DC line faults, Differential protections for DC yard equipment including converter valves, Filter protections, External block protections for problems like smoke detections, valve cooling etc. AC side protections and protection block for various controller maloperation issues.

5.5.2. Voltage Source Converter (VSC) based HVDC Terminals/Stations

- i) The protection equipment shall be designed to be fail-safe and shall ensure high security to avoid mal-operation/ unwanted shutdown due to protection equipment failures.
- ii) Protection system required in respect of Voltage Source Converter (VSC) based HVDC Terminals/ Stations but not limited to shall be in accordance with 8 (b) of Part B of **SCHEDULE-VI** of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022 amended to date.

5.5.3 STATCOM: All STATCOM shall be having sensitive and fast acting protection system for coupling transformer, MSC, MSR, MV bus, VSC branches and valve hall.

- i) The utility should redundancy for the protections like capacitor unbalance, Neutral displacement, cooling and temperature dependent protections all the time.

5.6. Philosophy of Transmission Line Protection

5.6.1. Transmission circuit construction can be considered in three main categories viz.: Overhead construction, Underground cable construction and Composite (overhead plus underground) construction. The requirements of overhead line and cable protection systems vary greatly, due to the exposure of transmission circuits to a wide variety of environmental hazards and are subjected to the wide variations in the format, usage and construction methodologies of transmission circuits. The type of protection signaling (tele- protection) or data communication systems required to work with the protection systems will also influence protection scheme requirements.

5.6.2. Transmission circuit Main protection is required to provide primary protection for the line and clear all type of faults on it within shortest possible time with reliability, selectivity and sensitivity. Transmission circuit back-up protection shall cater for failure of any main protection system to clear any fault that it is expected to clear. A protection function that offers back-up for most faults may also provide main protection for some fault conditions. Combinations of main and back-up protection systems should be used to address the main and application specific requirements for transmission circuits.

5.6.3. **Design Criteria:** While designing the scheme for protection of transmission lines following criteria shall be considered:

- i) The systems applied must be capable of detecting all types of faults, including maximum expected arc resistance that may occur at any location on the protected line.
- ii) The protection should be set not to trip under system transient conditions, which are not short circuits. Conversely where the short circuit current is low due to local grid conditions (weak network) or due to high resistance of the arc, this must be taken into consideration to trip the relay by using the most appropriate criterion, without jeopardizing the unwanted tripping during heavy load conditions.
- iii) The design and settings of the transmission line protection systems must be such that, with high probability, operation will not occur for faults external to the line or under non-fault conditions.
- iv) The over current protection for the transmission lines 220 kV and above voltage levels shall generally be in disabled condition.

5.6.4. **Reliability Criteria:**

- i) **For transmission line having voltages at 220kV and above:** High speed Duplicated Main Protection (Main-I and Main-II) shall be provided. Main-I protection shall be carrier aided non-switched distance protection. Main-II protection shall be carrier aided non-switched distance protection, or phase segregated line differential protection. For very short line (less than 10 km), cable or combination of overhead line and cable, line differential protection with distance protection as backup (built-in Main relay or standalone) shall be provided mandatorily as Main-I and Main-II.

In addition to above, following shall also be provided:

- a) Auto reclose relay (Standalone or as built-in function of Main-I & Main-II relay) suitable for 1 ph or 3 ph (with deadline charging and synchro- check facility) reclosure.
- b) Inverse Definite Minimum Time (IDMT) directional E/F relay (Standalone or as built-in function of Main-I & Main-II relay).

- c) Inverse Definite Minimum Time (IDMT) Directional over current for 220 kV lines if Main-II is not provided.

Main Protection shall have following features:

- a) The Main-I and Main-II protection shall be numerical relays of different makes or employ different fault detection algorithm.
- b) Each distance relay shall protect four/five independent zones (three/four forward zones and one reverse zone). It shall be provided with carrier aided tripping through PLCC or OPGW/FOTE communication.
- c) The relays should have sufficient speed so that they will provide the clearing times as defined in the CEA Grid Standards Regulations amended time to time.
- d) The Main-I and Main-II relays shall be powered by two separate DC sources.
- e) Both, Main-I and Main-II shall send initiation signal to Breaker Failure Relay / LBB Protection system.
- f) Internal Directional Earth Fault function shall be set to trip the line in case of high resistance earth faults.
- g) The Broken Conductor detection shall be used for alarm purpose only.
- h) The internal overvoltage function shall be used to protect the line against over voltages. Two stage over voltage protection for the transmission lines (Stage-I as Voltage and Time graded & Stage-II @ 140% of Nominal Voltage with time delay 100ms) shall be implemented for the transmission lines of voltage levels 400kV and above. The OVR grading, Voltage and Time graded, for the Stage-I over voltage protection shall be as recommended by RPC/RLDC. The lines emanating from same substation shall be provided with pickup as well as time grading to avoid concurrent trippings. The overvoltage relay shall have better than 98% drop-off to pick-up ratio (the ratio of the limiting values of the characteristic quantity at which the relay resets and operates). For over voltage detection, though Ph-N voltage is preferable to Ph-to-Ph voltage, to achieve required discrimination for OVR grading on account of limitation imposed by voltage resolution of the relay, Ph-to-Ph voltage to be used for Over Voltage detection.
- ii) **For transmission lines having voltages at 132kV/110kV:** There should be at least one carrier aided non-switched four/five zone distance protection scheme. Carrier aided zone protection may be optional for the radial feeders and feeders having intermittent loads In addition to this, another non switched/switched distance scheme or Inverse definite Minimum time(IDMT) directional over current and earth fault relays should be provided as back up. Main protection should be suitable for single or three phase tripping. Additionally, auto-reclose relay suitable for 1 ph or 3 ph (with dead line charging and synchro-check facility) reclosure shall be provided. In case of both line protections being Distance Protections, IDMT type Directional E/F relay (standalone or as built-in function of Main-I & Main-II relay) shall also be provided additionally.

5.6.5. Following types of protection scheme to be adopted to deal with faults on the lines:

- i) **Distance Protection Scheme:** The scheme shall be based on the measuring the impedance parameters of the lines with basic requirements as below:
 - a) Each distance relay shall protect four/five independent zones (three/four forward zones and one reverse zone). It shall be provided with carrier aided tripping through PLCC or OPGW/FOTE) communication.
 - b) Each Distance Relay:
 - i. Shall include power swing detection feature for selectively blocking, as required.
 - ii. Shall include suitable fuse-failure protection to monitor all types of fuse failure and block the protection.
 - iii. Shall include load encroachment prevention feature like Load blinder.
 - iv. Shall include Out of Step trip function.
 - v. Distance relay as Main protection should always be complemented by Directional ground protection to provide protection for high resistive line faults.
 - vi. Shall be capable to protect the series compensated lines from voltage inversion, Week end infeed and current inversion phenomenon. Special measures must be taken to guard against these phenomenon.
 - ii) **Line Differential Protection:** The scheme shall be based on the comparing the electrical quantities between input and output of the protected system. Provided that:
 - a) Due to the fact that short lines (less than 10kM) and/or cables do not have enough electrical length, the current differential relay should always be used.
 - b) For Cables, at least a differential line protection shall be used in order to guarantee fast fault clearing while maintaining security. The reason being that there are many sources of errors associated to other protection principles, especially for ground faults in cables.
 - c) The differential protection shall have following requirements:
 - i. Line differential as Main-I with inbuilt backup Distance Protection shall be installed for all the lines irrespective of length (subject to technical limitations).
 - ii. Zone-I protection feature shall get automatically enabled in case of communication failure observed by the differential relay.

- iii. The differential relays provided in 220 kV and above system must operate in less than 30 ms. RPC/RLDC may decide on differential protection on voltage level below 220 kV.
- iv. The current differential protection should be a reliable type (preferably digital). The protection should be of the segregate phase type, i.e. it should be able to detect the phase in fault and therefore for the case of single line-ground (SLG) faults to trip only the phase in fault (also to establish single phase A/R). The synchronization of the measured values is done via a communication system. The communication system for differential line protection should be based on fibre optic and any equipment should comply with the IEC 60834.

5.6.6. Auto Reclosing:

The single phase high speed auto-reclosure (HSAR) at 220 kV level and above (except for the composite feeders: overhead plus underground) shall be implemented, including on lines emanating from generating stations. If 3-phase auto reclosure is adopted in the application of the same on lines emanating from generating stations should be studied and decision taken on case to case basis. For 132 kV system, three phase auto-reclosure (TPAR) is optional. As per CEA construction standards for construction of electrical plants and lines regulation) 2022, 3 Phase A/R is optional for 132 KV system.

i) AR Function Requirements:

It shall have the following attributes:

- a) Have single phase or three phase reclosing facilities.
- b) Incorporate a facility of selecting single phase/three phase/single and three phase auto-reclose and non-auto reclosure modes.
- c) Have facilities for selecting check synchronizing or dead line charging features.
- d) Be of high speed single shot type
- e) Suitable relays for SC and DLC should be included in the overall auto reclose scheme if three phase reclosing is provided.
- f) Should allow sequential reclosing of breakers in one and half breaker or double breaker arrangement.

It may have the following attributes as well:

- (1) Have a continuously variable single phase dead time.
- (2) Have continuously variable three phase dead time for three phase reclosing.
- (3) Have continuously variable reclaim time.

ii) Scheme Special Requirements:

- a) Modern numerical relays (IEDs) have AR function as built-in feature. However, standalone AR relay or AR function of Bay control unit (BCU) for 220kV and above voltage lines may be used. For 132kV/110kV lines, AR functions built-in Main distance relay IED can be used.
- b) Fast simultaneous tripping of the breakers at both ends of a faulty line is essential for successful auto-reclosing. Therefore, availability of protection signaling equipment is a pre-requisite.
- c) Starting and Blocking of Auto-reclose Relays:

Some protections start auto-reclosing and others block. Protections which start A/R are Main-I and Main-II line protections. Protections which block A/R are:

- i. Breaker Fail Relay
- ii. Line Reactor Protections
- iii. O/V Protection
- iv. Received Direct Transfer trip signals
- v. Busbar Protection
- vi. Zone 2/3 of Distance Protection
- vii. Carrier Fail Conditions
- viii. Circuit Breaker Problems.
- ix. Phase to Phase Distance Trip
 - x. AR selection switch in OFF / Non-auto position
 - xi. Logic AR OFF in SAS
- xii. Phase Distance Start (when Auto reclosure is in progress)

When a reclosing relay receives start and block A/R impulse simultaneously, block signal dominates. Similarly, if it receives 'start' for 1-phase fault immediately followed by multi- phase fault the later one dominates over the previous one.
- xiii. Fault on reclaim time
- xiv. Fault on line charging
- xv. Pole discrepancy

iii) **Requirement for Multi breaker Arrangement:**

Following schemes shall be adhered to multi-breaker arrangements of one and half breaker or double breaker arrangement:

- a) In a multi-Circuit Breaker (C.B.) arrangement one C.B. can be taken out of operation and the line still be kept in service. After a line fault only those C.Bs which were closed before the fault shall be reclosed.
- b) In multi-C.B. arrangement it is desirable to have a priority arrangement so as to avoid closing of both the breakers in case of a permanent fault.
- c) A natural priority is that the C.B. near the busbar is reclosed first. In case of faults on two lines on both sides of a tie C.B. the tie C.B. is reclosed after the outer C.Bs. The outer C.Bs. do not need a prioritizing with respect to each other.

iv) **Setting Criteria:**

Auto reclosing requires a dead time which exceeds the de-ionizing time. The circuit voltage is the factor having the predominating influence on the de-ionizing time. Single phase dead time of 1.0 sec. is recommended for 765 kV, 400 kV, 220 kV and 132 kV system. As per CEA construction standards for construction of electrical plants and lines regulation) 2022, 3 Phase A/R is optional for 132 KV system. Therefore, 132kV system may be included based on RPC/RLDC input. For the lines emanating from generating stations single-phase dead time upto 1.5 sec may be adopted.

- a) According to IEC 62271-101, a breaker must be capable of withstanding the following operating cycle with full rated breaking current:

O - 0.3 s - CO - 3 min - CO

O- stands for Open

CO- stands for Close-Open

The rated operating cycle of the circuit breaker consisting of an opening, a holding time of 0.3 seconds, a CO cycle, a 3-minute wait, and another CO cycle.

The recommended operating cycle at 765 kV, 400 kV, 220 kV and 132 kV is as per the IEC standard. As per CEA construction standards for construction of electrical plants and lines regulation) 2022, 3 Phase A/R is optional for 132 KV system. Therefore, 132kV system may be included based on RPC/RLDC input. Therefore, reclaim time of 25 Sec. is recommended.

5.6.7. Power Swing Blocking and Out of Step (OOS) Function

Large interconnected systems are more susceptible to Power Swings in comparison to the erstwhile smaller standalone systems. Inter-area Power

Swings can be set up even due to some event in far flung locations in the system. During the tenure of such swings, outage of any system element may aggravate the situation and can lead to instability (loss of synchronism). It is hence extremely important that unwanted tripping of transmission elements need to be prevented, under these conditions. Distance protection relays demand special consideration under such a situation, being susceptible to undesirable misoperation during Power swings which may be recoverable or irrecoverable power swings. Following steps may be adopted to achieve above objective:

i) Block all Zones except Zone-I

This application applies a blocking signal to the higher impedance zones of distance relay and allows Zone 1 to trip if the swing enters its operating characteristic. Breaker application is also a consideration when tripping during a power swing. A subset of this application is to block the Zone 2 and higher impedance zones for a preset time (Unblock time delay) and allow a trip if the detection relays do not reset.

In this application, if the swing enters Zone 1, a trip is issued, assuming that the swing impedance entering the Zone-1 characteristic is indicative of loss of synchronism. However, a major disadvantage associated with this philosophy is that indiscriminate line tripping can take place, even for recoverable power swings and risk of damage to breaker.

ii) Block All Zones and Trip with Out of Step (OOS) Function

This application applies a blocking signal to all distance relay zones and order tripping if the power swing is unstable using the OOS function (function built in modern distance relays or as a standalone relay). This application is the recommended approach since a controlled separation of the power system can be achieved at preselected network locations. Tripping after the swing is well past the 180-degree position is the recommended option from CB operation point of view.

Normally relay is having Power Swing Un-block timer which unblocks on very slow power swing condition (when impedance locus stays within a zone for a long duration). Typically, the Power swing un-blocking time setting is 2sec.

However, on detection of a line fault, the relay has to be de-blocked.

Placement of OOS trip Systems

Out of step tripping protection (Standalone relay or built-in function of Main relay) shall be provided on all the selected lines. The locations where it is desired to split the system on out of step condition shall be decided based on system studies.

The selection of network locations for placement of OOS systems can best be obtained through transient stability studies covering many possible

operating conditions. Based on these system studies, either of the option above may be adopted after the approval of PCSC of RPC.

While applying Power Swing Blocking (PSB) in the distance protection relay a few other important aspects also need to be considered:

- PSB function should not block if negative sequence or zero sequence currents are present. Once blocked, the PSB should unblock if negative sequence or zero sequence currents are detected. Power Swing is a balanced three phase phenomenon and unbalance can only occur in the case of an asymmetrical fault.
- It will be desirable that during tenure of PSB, the distance protection is capable of detecting a fault and tripping. If such a feature is not available in the relay, PSB should be unblocked after a time delay, corresponding to the half cycle period of the slowest expected Swing Frequency (usually 2s corresponding to the slowest swing frequency of 0.25Hz is considered as default), to avoid the protection remaining perpetually blocked.

5.7. Transmission Relay Loadability

Transmission Relay Loadability means the loading permitted in the transmission line by the relay including a security margin. The relay Loadability is to be arrived in such a way as far as possible not to interfere with system operator actions, while allowing for short-term overloads, with sufficient margin to allow for inaccuracies in the relays and instrument transformers. Transmission relay do not prematurely trip the transmission elements out-of-service and allow the system operators from taking controlled actions consciously to alleviate the overload.

5.7.1. Protective relay settings shall

- i) Not limit transmission Loadability;
- ii) Not interfere with system operators' ability to take remedial action to protect system reliability and;
- iii) Be set to reliably detect all fault conditions and protect the electrical network from the faults.

5.7.2. The protective functions which could trip with or without time delay, on load current i.e. load responsive phase protection systems including but not limited to:

- i) Phase distance.
- ii) Out-of-step tripping.
- iii) Switch-on-to-fault.
- iv) Overcurrent relays.

- v) Communications aided protection schemes including but not limited to:
 - Permissive overreach transfer trip (POTT).
 - Permissive under-reach transfer trip (PUTT).
 - Directional comparison blocking (DCB).
 - Directional comparison unblocking (DCUB).
- vi) Phase overcurrent supervisory elements (i.e., phase fault detectors) associated with current based, communication-assisted schemes (i.e., pilot wire, phase comparison, and line current differential) where the scheme is capable of tripping for loss of communications.

5.7.3. Each Transmission Licensee and Generating Company, shall use any one of the following criteria for any specific circuit terminal to prevent its phase protective relay settings from limiting transmission system loadability while maintaining reliable protection of the Grid for all fault conditions. Relay loadability at 0.85 per unit voltage and a power factor angle of 30 degrees shall be evaluated.

i) For Distance protection relays of transmission lines, the Zone-3 shall prevent load encroachment, considering the following criteria:

a) Maximum load current (I_{max}) may be considered as 1.5 times the thermal rating of the line or 1.5 times the associated bay equipment current rating (the Minimum of the bay equipment individual rating) whichever is lower.

(The rating considered is approximately 15 minutes rating of the Transmission facility).

b) For setting angle for load blinder, a value of 30 degree may be adequate in most cases.

c) The Distance protection relays shall have provision for load blinder characteristic or load encroachment detection. ii) For Directional Overcurrent relays, wherever used in a transmission line (132/110 kV level), the following shall be adopted:

a) An overload alarm shall be set at 110% of the thermal rating of the line with sufficient delay. This alarm shall allow the operator to take corrective action.

b) The Directional Overcurrent relay shall allow the line to carry 1.2 times of the thermal rating of the associated line or bay equipment (whichever is lower) at least 10 minutes.

iii) For transformer protection relays the following shall be adopted:

- Set the definite time transformer overload relay atleast 105% of the transformer ratings with sufficient delay. It shall be wired for alarm purpose only to allow the operator to take corrective action. No tripping shall be issued from this relay.

- The back-up overcurrent relays shall use IDMT characteristics and be suitably coordinated with the upstream transmission network.
- Install supervision for the transformer using either a top oil or simulated winding hot spot temperature element. The alarm and trip settings for these relays shall be set by individual entities based on the manufacturer's recommendation.

Thermal ratings as specified in the prevailing CEA's Manual on Transmission Planning Criterion shall be used for above requirement.

6. Protection Settings & Coordination

The purpose is to ensure system protection is coordinated among the grid connected entities. The Protection systems coordination comprises the following:

- i) *Each Transmission Licensee, Load Dispatch Centre (LDC) and Generating Company shall keep themselves familiarized with the purpose and limitations of Protection System schemes applied in its area of control.*
- ii) *Each Transmission licensee shall coordinate its Protection System schemes with concerned transmission system, sub-transmission system and generators.*
- iii) *Each Generating Company shall coordinate its Protection System schemes with concerned transmission system and station auxiliaries.*
- iv) *Each Transmission Licensee and Generation Company shall be responsible for settings calculations for protection of elements under its ownership. It shall be the responsibility of the respective asset owner to obtain the inputs (adjacent line settings, infeed values etc.) from STU/Generating Company/ Transmission Licensee necessary for calculation of the settings.*
- v) *STU/Generating Company/Transmission Licensee shall provide the infeed values/latest network model to the requesting entity, within 15 days of receipt of such a request from the entity.*
- vi) *Each Generating Company and Transmission Licensee, for voltage levels 400kV and above and interstate lines, shall submit the protection settings as per the format prescribed, along with the calculation sheets, co-ordination study reports and input data, in advance, to RPC/RLDC for every new element to be commissioned. The mentioned information shall be submitted to the RPC/RLDC two months in advance for all the elements proposed to be commissioned. RPC shall furnish the approved settings within forty days from the date of submission of the settings by the entity.*
- vii) *If required Protection Setting Sub Group (PSSG) may be constituted under PCSC in the RPCs with the expert members from all States & UTs, Major Transmission Licensee in the Region, Major Generating Company in the Region, Grid-India/RLDC & RPC Secretariat for analysing/reviewing the proposed protection settings of the new elements as well as changes in the existing protection settings, as arrived by the*

proposer as per the Chapter 6 of Uniform Protection Protocol. The PSSG recommended protection settings shall be ratified by PCSC of respective RPC.

Or

Any procedure that is finalized and approved by the Protection Sub-Committee of respective RPC.

- viii) The PCSC shall review the settings to ensure that they are properly coordinated with adjacent system and comply with the existing guidelines. The onus to prove the correctness of the calculated settings shall lie with the respective Transmission licensee/Generation Company. In case, the PCSC feels that the adjacent transmission system settings need to be changed, in view of the new element, it shall inform the concerned entity for revision of the existing settings.*
- ix) The PCSC of RPC shall review and approve the settings based on the inputs /report submitted by the entities.*
- x) The approved settings shall be implemented by the entity and proper record of the implemented settings shall be kept. The modern numerical relays have several settings for various features available in the relay. It shall be ensured that only the approved features and settings are enabled in the relay. No additional protection/setting shall be enabled without the prior approval of RPC.*
- xi) Each Transmission licensee and Generating Company shall co-ordinate the protection of its station auxiliaries to ensure that the auxiliaries are not interrupted during transient voltage decay.*
- xii) Any change in the existing protection settings, for voltage levels 400kV and above & interstate lines, shall be carried out only after prior approval from the RPC. The owner entity shall inform all the adjacent entities about the change being carried out.*
- xiii) In case of failure of a protective relay or equipment failure, the Generating Company and Transmission Licensee shall inform appropriate LDC/RLDC/RPC. The Generating Company and Transmission Licensee shall take corrective action as soon as possible.*
- xiv) Each Transmission Licensee shall coordinate Protection Systems on major transmission lines and interconnections with neighbouring Generating Company, Transmission Licensee and appropriate LDC.*
- xv) RPC in consultation with the RLDC & Regional entities shall undertake review of the protection settings, assess the requirement of revisions in protection settings and revise protection settings, from time to time and at least once in a year. The necessary studies in this regard shall be carried out by the RPC & RLDC. The modifications/changes, if any, in protection settings shall be advised to the respective users and STUs.*

- xvi) *RPC shall maintain a centralized database and update the same on periodic basis in respect of their respective region containing details of relay settings for grid elements connected to 220 kV and above. RLDC also shall maintain such database. Respective Transmission licensee/Generating Company/Entities are responsible for ensuring to make available the implemented protection settings in the centralized database within fifteen days from the date of commissioning.*
- xvii) *If System Protection Schemes (SPS) is recommended to be implemented by the appropriate forum/Sub-Committee of RPC on account of operational & system constraints, the same shall be implemented by the concerned Transmission licensee/Generating Company/Entities within the specified timelines.*
- xviii) *IBR settings like phase jump, df/dt settings, over currents settings, over/under frequency, over/under voltage, LVRT/HVRT etc. for Solar, Wind & Battery Energy Storage System (BESS) etc. to be reviewed in protection subcommittee meetings.*

Note: - It was agreed in the meeting held on 28.06.2024 with members of protection Sub group of NPC that there is no need for preparation of separate uniform protection setting procedure. RPCs may develop an internal mechanism to ensure effective coordination among all grid-connected entities to achieve the required procedure. However, RPCs may refer the above Chapter 6 for the purpose of development of such internal mechanisms to review of the protection settings in consultation with the stakeholders of the respective region.

7. Disturbance Monitoring, Analysis and Reporting

The Purpose is to ensure that adequate disturbance data is available to facilitate Grid event analysis. The analysis of power system disturbances is an important function that monitors the performance of protection system, which can provide information related to correct behavior of the system, adoption of safe operating limits, isolation of incipient faults.

7.1. The Disturbance Monitoring Requirements include the following:

- i) Each Transmission Licensee and Generating Company shall provide Sequence of Event (SOE) recording capability by installing Sequence of Event recorders or as part of another device, such as a Supervisory Control and Data Acquisition (SCADA) Remote Terminal Unit (RTU), Phasor Measurement Unit (PMU), a generator plants Digital (or Distributed) Control System (DCS) or part of Fault recording equipment.

This capability shall be provided at all substations and at locations to record all the events in accordance with CEA Grid Standard Regulations, 2010 amended to date. The following shall also be monitored at each location:

- a) Transmission and Generator circuit breaker positions
- b) Protective Relay tripping for all Protection Groups that operate to trip circuit breakers identified in (a) above.

- c) Tele protection keying and receive
- ii) In either case, a separate work station PC shall be identified to function as the event logger front end. The event logger work-station PC should be connected to UPS (Uninterrupted Power Supply).

The event logger signals shall include but not limited to

- All Circuit Breaker and isolator switching Operations
 - Auxiliary supply (AC, DC and DG) supervision alarms
 - Auxiliary supply switching signals
 - Fire-fighting system operation alarms
 - Operation signals (Alarm/Trip from all the protection relays.)
 - Communication Channel Supervision Signals.
 - Intertrip signals receipt and send.
 - Global Positioning System (GPS) Clock healthiness.
 - Control Switching Device healthiness (if applicable).
 - RTU/Gateway PC healthiness
 - PMU Healthiness
 - All Circuit Breaker Supervision Signals.
 - Trip Circuit Supervision Signals.
- iii) Each Transmission Licensee/Generating Company/Users shall provide Disturbance recording capability for the following Elements at facilities:
- All transmission lines (Each line shall be provided with facility for distance to fault locator)
 - Autotransformers or phase-shifters connected to busses.
 - Shunt capacitors, shunt reactors.
 - Individual generator line interconnections.
 - Dynamic VAR Devices.
 - HVDC terminals.
 - Bus Bars
 - Inverter and PPC
 - Generators
 - Statcom
- iv) The Disturbance recording feature shall be enabled and configured in all the numerical relays installed. Disturbance recording system shall have minimum

recording time of 3 seconds (0.5 seconds for pre-fault and 2.5 seconds for post fault).

- v) Each Generating Company shall provide Disturbance recording capability for Generating Plants in accordance with Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022 amended to date, the CEA (Technical Standards for connectivity to the Grid) Regulations 2007 amended to date.
- vi) Each Transmission Licensee and Generating Company shall record for Faults, sufficient electrical quantities for each monitored Element to determine the following:
 - Three phase-to-neutral voltages. (Common bus-side/line side voltages may be used for lines.)
 - Three phase currents and neutral currents.
 - Polarizing currents and voltages, if used (As applicable).
 - Frequency (As applicable).
 - Real and reactive power (As applicable).
 - V sync(Synchronizing voltage) (For TPAR)
 - Mutual compensation current(In case of parallel line)

The Minimum parameters to be monitored in the Fault record shall be specified by the PCSC of RPCs.

- vii) Each Transmission Licensee and Generating Company shall provide Disturbance recording with the following capabilities:
 - The Disturbance recorders shall have time synchronization and a standard format for recording analogue and digital signals (DR labels to be standardized as per the Report of FOLD Working Group - 3 on DR Parameter Standardization). The data files shall be capable of being viewed, read, and analyzed with a generic COMTRADE analysis tool as per the latest revision of IEEE Standard C37.111.
 - Each Fault record duration and the trigger timing shall be settable and set for a minimum 3 second duration including 0.5 seconds for pre-fault and 2.5 seconds for post fault
 - Each Fault recorder shall have sampling frequency of 1 kHz or better.
 - Each Fault recorder shall be set to trigger for at least the following:
Internal protection trip signals, external trigger input and additional triggers may be assigned as necessary.

- viii) Each Transmission Licensee and Generating Company shall keep the recording instruments (disturbance recorder and event logger) in proper working condition

and shall establish a maintenance and testing program for Disturbance Recorder (DR) that includes

- Maintenance and testing intervals and their basis.
 - Summary of maintenance and testing procedures.
 - Monthly verification of communication channels used for accessing records remotely (if the entity relies on remote access and the channel is not monitored to a control centre staffed around the clock, 24 hours a day, 7 days a week (24/7)).
 - Monthly verification of time synchronization (if the loss of time synchronization is not monitored to a 24/7 control centre).
 - Monthly verification of active analog quantities.
 - A requirement to return failed units to service within 90 days. If a Disturbance Recorder (DR) will be out of service for greater than 90 days, the Transmission Licensee and Generating Company shall keep a record of efforts aimed at restoring the DR to service.
- ix) The time synchronization of the disturbance recorders shall be corroborated with the PMU data or SCADA event loggers by RLDCs. RLDCs shall list out for Disturbance recorders which are non-compliant for discussion in PCSC meetings of RPCs.
- x) Each Transmission Licensee and Generating Company shall submit the data files to the RLDCs conforming to the following format requirements:
- The data files shall be submitted in COMTRADE and PDF format.
 - File shall have contained the name of the Relay, name of the Bay, station name, date, time resolved to milliseconds, event point name, status.

The DR archives shall be retained for a period of three years.

- xi) A separate work-station PC, powered through UPS (Uninterrupted Power Supply) shall be identified with access to all the relays for extraction of DR. Auto Download facility shall be established for automatic extraction of the DR files to a location on the work-station PC.
- xii) **Time Synchronization Equipment**
- a) Time Synchronizing Equipment complete with antenna, all cables and processing equipment shall be provided to receive synchronizing pulse through Global Positioning System or Indian Regional Navigation Satellite System Navic compatible for synchronization of event logger, disturbance recorder, Phasor Measurement Units, and Supervisory Control and Data Acquisition System or Substation Automation System.
- b) Each substation shall have time synch equipment to synchronize all the numerical relays installed. Before any extension work, the capability of the

existing Time-sync equipment shall be reviewed to ensure the synchronization of upcoming numerical relays.

- c) The status of healthiness of the time-sync device shall be wired as “Alarm” to SCADA and as an “Event” to Event Logger.
- d) The time synch status of all the installed numerical relays and event logger shall be monitored monthly and recorded. The Monthly records for relays not in time-sync shall be reported to RLDCs and RPCs. This record shall be archived for a period of three years by each concerned agency.
- e) Remedial action shall be taken by the concerned substation/ Protection department immediately to make the relays in time synchronization with reference to external time source.
- f) All the new Grid elements/Bay extension shall have accurate and precise Time synchronization equipment.

7.2. Disturbance Analysis and Reporting

The Disturbance Analysis and Reporting shall be carried out in line with Central Electricity Authority (Grid Standards) Regulations, 2010, IEGC Grid Code Regulations 2023 and as per the revised SOP to address the Grid Disturbances (GDs)/Grid Incidents (GIs)/any other Protection Tripping’s approved in the Protection sub group of NPC which is being adopted in all region. (at **Annexure-I**)

8. Protection Audit Plan

The Protection Audit of the substations connected with ISTS system shall be carried out in line with the Central Electricity Authority (Grid Standards) Regulations, 2010, IEGC Grid Code Regulations 2023 and as per the approved SOP for Protection System Audit of the sub group of RPCs/NPC which is being adopted in all region. (at **Annexure-II**)

9. System Protection Schemes (SPS)

If System Protection Schemes (SPS) is recommended to be implemented by the appropriate forum/Sub-Committee of RPCs on account of operational & system constraints, the same shall be implemented by the concerned Transmission licensee/Generating Company/Entities within the specified timelines. The provisions related to SPS as mentioned in CEA regulations and CERC (IEGC) 2023 regulations and their amendments from time to time shall be followed.

10. Performance Monitoring of the Protection Systems

- 10.1. Users/Entities shall submit the following protection performance indices of previous month to RPCs and RLDCs on monthly basis for 220 kV (132 kV in case of NER) and above by 15th of the subsequent month and the same shall be reviewed in the ensuing PCSC meeting of RPCs.

- a) The Dependability Index defined as

$$D = \frac{N_C}{(N_C + N_F)}$$

Where, N_C is the number of correct operations at internal power system faults and N_F is the number of failures to operate at internal power system faults.

b) The Security Index defined as

$$S = \frac{N_C}{(N_C + N_U)}$$

Where, N_C is the number of correct operations at internal power system faults and N_U is the number of unwanted operations.

c) The Reliability Index defined as

$$R = \frac{N_C}{(N_C + N_I)}$$

Where, N_C is the number of correct operations at internal power system faults and N_I is the number of incorrect operations and is the sum of N_F and N_U

10.2. Users/Entities shall furnish the reasons for performance indices less than unity of individual element wise protection system to the RPC and action plan for corrective measures. The action plan will be followed up regularly in the PCSC Meetings.

11. Compliance Monitoring

11.1. The Uniform Protection Protocol shall be reviewed as and when required, in consultation with the stakeholders by Protection Sub Group of NPC after discussion in respective RPC.

11.2. Violation of the Uniform Protection Protocol shall be brought to the notice of RPCs by the RLDCs or concerned SLDC, as the case may be.

11.3. In case any User/Entity fails to comply with the Uniform Protection Protocol or fails to undertake remedial action identified by the PCSC of RPCs within the specified timelines, the RPCs would approach the Commission with all relevant details for suitable directions.

2.

Revised Final Standard Operating Procedure (SOP) to address the Grid Disturbances (GDs)/Grid Incidents (GIs)/any other Protection Trippings

1. Immediately following an event (grid disturbance/incidence as defined in the CEA (Grid Standards) Regulations 2010 and subsequent amendment in the system, the concerned user/entity or SLDC shall inform to the RLDC through voice message.
2. Written flash report shall be submitted to RLDC and SLDC by the concerned user/entity within the time line specified in **Table 8** below, as per the IEGC, 2023.
3. In compliance of IEGC, 2023, All the Users, STU/SLDC are required to furnish the following information in respect of Grid Occurrences(GD/GI) within the time line specified in **Table 8** below, to RLDC/ RPC:
 - (i) First Information Report (FIR)
 - (ii) Event Logger (EL) output
 - (iii)Disturbance Recorder (DR) output
 - (iv)Trip event analysis report-TR (with pre and post fault system conditions)
 - (v) Data Acquisition System (DAS)
4. RLDC shall report the event (grid disturbance or grid incidence) to CEA, RPC and all regional entities within twenty-four (24) hours of receipt of the flash report.
5. After a complete analysis of the event, the user/entity shall submit a detailed report in the case of grid disturbance or grid incidence within one (1) week of the occurrence of event to RLDC and RPC.
6. Based on the above detailed report submitted to RLDC by the entities, RLDC shall Categorize Grid Occurrences into grid incidents (GIs) and grid disturbance (GDs) based on criteria as per the CEA (Grid Standards) Regulations 2010 and subsequent amendment. RLDC shall also submit the Auto Reclosure (A/R) failure events, PLCC related events, any other protection related events to RPCs on monthly basis.
7. RLDCs and NLDC (for events involving more than one region) shall prepare a draft report of each grid disturbance or grid incidence including simulation results and analysis along with associated PMU plots of appropriate resolution, which shall be discussed and finalized at the Protection sub-committee/sub-group of RPC as per the timeline specified in **Table-8** below.

TABLE 8 : REPORT SUBMISSION TIMELINE

Sr. No.	Grid Event [^] (Classification)	Flash report submission deadline (users/ SLDC)	Disturbance record and station event log submission deadline (users/ SLDC)	Detailed report and data submission deadline (users/ SLDC)	Draft report submission deadline (RLDC/ NLDC)	Discussion in protection committee meeting and final report submission deadline (RPC)
1	GI-1/GI-2	8 hours	24 hours	+7 days	+7 days	+60 days
2	Near miss event	8 hours	24 hours	+7 days	+7 days	+60 days
3	GD-1	8 hours	24 hours	+7 days	+7 days	+60 days
4	GD-2/GD-3	8 hours	24 hours	+7 days	+21 days	+60 days
5	GD-4/GD-5	8 hours	24 hours	+7 days	+30 days	+60 days

[^]The classification of Grid Disturbance (GD)/Grid Incident (GI) shall be as per the CEA Grid Standards.

(The above table is as per the IEGC 2023)

8. RPCs shall circulate all the GDs, GIs, near miss events, A/R events, PLCC mal-operation events, any other protection related event etc. along with the Agenda for Protection Co-Ordination Sub-Committee (PCSC) of RPCs. PCSC meetings are to be held in every month.
9. The implementation of the recommendations of the final report shall be monitored by the protection sub-committee of the RPC. Tripping portals deployed for reporting of the GDs & GIs on RLDCs portal, shall also have compliances reporting of PCSC recommendations on this portal. NLDC shall disseminate the lessons learnt from each event to all the RPCs for necessary action in the respective regions.
10. Constituents/entities shall furnish the following details to RPCs/RLDCs in respect of all the grid occurrences for analysis:
 - a) Detailed analysis of the events
 - b) SLD or equivalent pictorial representation clearly showing:
 - i. Location of fault with distance
 - ii. Fault details with type & relay indications
 - iii. CT/PT/CVT rating details with location
 - iv. Bus-bar arrangement/ Configuration of feeders and other information related to the ratings of the information required for analysis of the disturbance.
 - v. CB positions (OPEN/ CLOSE) before and after fault
 - vi. Isolator & Earth-switch positions (OPEN/CLOSE)
 - vii. Voltage, frequency & power flows with direction at the time of fault
 - c) Output of Event logger & Disturbance recorder
 - d) Remedial Action(s) taken
 - e) Relay setting details

HVDC Station Disturbance : Any additional data such as HVDC transient fault

record, switchyard equipment and any other relevant station data required for carrying out analysis of an event by RPC, NLDC, RLDC and SLDC shall be furnished by the users including RLDC and SLDC, as the case may be, within forty- eight (48) hours of the request. All users shall also furnish high-resolution analog data from various instruments including power electronic devices like HVDC, FACTS, renewable generation (inverter level or WTG level) on the request of RPCs, NLDC, RLDCs or SLDCs.

Generating Station Disturbance: Generating Station shall furnish high-resolution analog data from various instruments including AVR response, PSS response required for analysis of disturbance.

11. The respective entities (for which the Grid occurrence is placed in the PCSC agenda) shall present the Grid Occurrence which shall cover all related aspects such as:
 - a) Antecedent conditions,
 - b) Bus-configuration,
 - c) Reasons of GD/ GI occurrence,
 - d) Relevant Diagrams showing location of the fault,
 - e) Bus bar arrangement/configuration of feeders and other connected equipment with proper CB positions (OPEN/ CLOSE) at the time of occurrence of the fault,
 - f) Type of protections operated,
 - g) Substantiation of the protections operated by relevant DRs & ELs,
 - h) Reasons for protection systems mal-operation/non-operation,
 - i) Remedial measures taken/ proposed, etc.
12. In respect of failure or Non-operation of A/R events, PLCC mal-operation events, any other protection related event as given in the PCSC agenda the concerned entities, shall furnish the reasons along with remedial action taken to RPCs/RLDCs. The same would be analyzed by the PCSC.
13. In the PCSC meetings, all the GDs, GIs, near miss events, A/R non-operation/mal-operation, PLCC mal-operations, other protection related trippings/events as circulated in the agenda shall be analyzed in detail by the PCSC forum and conclude the suitable recommendations to avoid the recurrence of such incidents in the future.
14. The action plan by the entities shall be furnished to RPC for implementation of the PCSC recommendations along with the timelines.
15. The implementation of the PCSC recommendations shall be followed up in the monthly PCSC meetings of RPC.
16. When grid disturbances or grid incidents occurred at major/critical substations and at substations that affected critical/essential/strategic loads, a Protection System Analysis Group (PSAG) shall be constituted consisting of the members from RPC, NLDC, RLDC, PGCIL, a Protection Expert from the region along with the Entity under whose jurisdiction GD/GI occurred to analyze the GD/GI in detail by visiting the respective substation/substations physically and conducting the meetings. PSAG would finalize the remedial actions and recommendations after deliberations and detailed analysis. The progress of implementation of the PSAG shall be followed up in the monthly PCSC Meetings.
17. If grid disturbance or grid incident is due to operational issue or transmission constraint/inadequacy, Grid-India shall share feedback to CTU or respective STU.

18. In case any user/entity fails to undertake remedial action identified by the RPC within the specified timelines as decided by PCSC of RPC, the concerned RPC may approach the Commission with all relevant details for suitable directions.
19. A date depository of the event as maintained by the RLDC shall be accessible to every entity and the entity shall upload all the relevant documents on the RLDC portal of trippings.

Revised Standard Operating procedure for Third Party Protection System Audit

A protection system audit is a review and evaluation of the protection systems of a substation with an objective to verify whether required protection systems have been put in place at station by the concerned utility, and to recommend suitable measures to provide for the same.

Ministry of Power, had constituted a Committee under the Chairmanship of Chairperson CEA to examine the grid disturbances on the 30th and the 31st July 2012. One of important recommendation of the committee was conducting of extensive audit of protection system. List of sub-stations where protection audit is to be undertaken on priority basis was prepared and audited across the country. This was the beginning of protection audit across the country and large number of important 400 and 220kV substations were audited.

Keeping in view the importance of Protection System Audit, Standard Operating Procedure has been prepared for the reference purpose. It will provides a step-by-step guide for RPCs to follow during the audit process.

1. All users shall conduct third party protection audit of each sub-station at 220 kV and above (132 kV and above in NER) once in five years or earlier as advised by the respective RPC.
2. After analysis of any event, each RPC shall identify a list of substations / and generating stations where third-party protection audit is required to be carried out and accordingly advise the respective users to complete third party audit within three months.
3. Third Party Protection Audit shall be carried out by the third party designated agencies in line with the IEGC Regulations 2023 or by the audit teams constituted by RPCs with the members from other states (at least two) who opt for the RPC coordinated third party protection audit.
4. The third-party protection audit report shall contain information sought in the format as per IEGC 2023 and its further amendments.
5. Annual audit plan for the next financial year shall be submitted by the users to their respective RPC by 31st October. The users shall adhere to the annual audit plan and report compliance of the same to their respective RPC.
6. **Criteria for choosing substations for third party protection audit:**

The following criteria are generally applied during choosing a substation for protection audit.

- i. Substations/ Generating (SS/ GS) stations with frequent grid incidences or frequent maloperations or any grid occurrence in any substation which affected supply to large number of substations and caused significant load loss. In this case, third-party protection audit may be carried out within three months or as decided in the Protection sub-Committee Meeting of the RPC.
- ii. Important 400kV and 765kV substations (SS) / Generating stations (GS) including newly commissioned SS/ GS. In this case, third-party protection audit may be carried out at a frequency decided in the Protection sub-Committee Meetings of respective RPCs.

7. Protection audit Procedure:

- i. After identification of stations for protection audit, the same is communicated to the owner utility seeking nomination of one nodal officer for each Station.
- ii. The nodal officer shall provide the details of substation for preparation of protection audit format (in line with IEGC and subsequent amendments).
- iii. Meanwhile nominations shall be sought from all utilities to form regional teams for audit. Regional teams comprising of engineers from various utilities /utility (other than the team of host State) of the region shall be formed based on the no. of SS to be audited. (Each team may consists of 3 or 4 engineers from utilities other than the host utility and at the maximum a team will be able to audit 3 to 4 stations in 7-9 days or so)
- iv. Once the team details and list of stations to be audited is finalised the details of nodal officers, team members , list of stations to be audited by each team is shared to all for further coordination regarding planning and conduction of audit.
- v. Based on the inputs received from nodal officer regarding the list of elements in the substation to be audited, protection audit formats shall be prepared by RPC (in line with IEGC) and circulated to nodal officer. The nodal officer along-with the substation engineers shall fill the audit format and furnish the same along-with various attachments sought as part of the audit format within a week or so. List of attachments shall be given in the covering page of audit format.
- vi. In case, other entity's bays /equipment are existing in the substation to be audited, the entity shall furnish all the details of its equipment to the Audit Team/Agency and the other entity shall be available during the Protection Audit.
- vii. The filled in audit format along-with the received annexures shall then forwarded to the audit team by the nodal officer and any further clarification regarding the format or attachments shall be taken up by the audit team with the nodal officer under intimation to RPC.
- viii. The SS/ GS shall be audited based on the data filled in audit format checking for compliance of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 & CEA (Measures relating to Safety and Electric Supply) Regulations, 2010, CERC regulations and amendments to the same, approved guidelines of RPC, best practices in industry, report of the Task Force on Power System Analysis Under Contingencies and as per the "Model Setting Calculations For Typical IEDs Line Protection Setting Guide Lines Protection System Audit Check List Recommendations For Protection Management Sub-Committee on Relay/Protection Under Task Force For Power System Analysis Under Contingencies" etc.
- ix. After conduct of audit, the shortcomings observed in the audit shall be discussed in detail with the nodal officer and substation engineers and recommendations are finalised.
- x. The filled in audit format along-with the recommendations and attachments shall be finalised and final protection audit report RPC (in line with IEGC) shall be compiled.
- xi. The audit team shall check the criteria for activation/archival of DR, as decided in the respective Protection sub-Committees of RPC.

- xii. Final protection audit report shall be discussed in Protection Coordination Committee and recommendations may be accepted/deleted/modified as per the scope of audit and compliance of various regulations/guidelines etc.
- xiii. The recommendations of all SS audited shall be inserted into audit recommendations database and update regarding recommendations shall be sought from respective utilities.
- xiv. Action plan for rectification of deficiencies detected, if any, shall be submitted to the respective RPC and RLDC and monthly progress will be submitted.
- xv. The travel expense from place of duty to Substation/Generating Station to be audited shall be borne by respective Auditor (Parent Organisation). The expense for boarding, lodging any travel of the team during the audit period shall be borne by the organisation owning the Substation/Generating Station.

List of important transmission lines in ER which tripped in January-2025

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(Local End)	DR Configuration Discrepancy(Remote End)	DR/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY
1	220KV-PANDIABIL-PRATAPSASAN-1	01-01-2025	21:01	01-01-2025	22:40	Not Tripped.	Bus Bar protection operated at 220kV Pratapsasan S/s.	No Fault	160 msec	220 kV Bus-1 Bus bar protection was operated due to burst of Bus-1 R_phase PT.			NO	NO	PG ODI SHA	OPTCL
2	400KV-KOLAGHAT-ARAMBAGH-1	02-01-2025	10:17	02-01-2025	11:00	Not Tripped.	DT Received at Arambagh.	No Fault	-	D/T received at Arambagh.WB may explain.			NO	YES	WBP DCL	WBSE TCL
3	400KV-KOLAGHAT-ARAMBAGH-1	02-01-2025	11:01	02-01-2025	12:12	Not Tripped.	DT Received at Arambagh.	No Fault	-	D/T received at Arambagh.WB may explain.			NO	YES	WBP DCL	WBSE TCL

4	400KV-BARH-PATNA-4	04-01-2025	05:35	04-01-2025	21:57	R_Y, Ir-24.04 kA, Iy-2.372 kA, FD-13.3 km	Patna: R_Y, FC-7.8 kA, FD-55.1 km	R_Y	120 msec	Line tripped on phase to phase fault. Delayed opening of Y & B phase CB at Barh end may be explain by Barh NTPC.			YES	YES	NTPC	ER-I
5	400KV-BARH-PATNA-3	04-01-2025	06:02	04-01-2025	06:06	Barh : R_Y, Ir-2.377 kA, Iy-2.351 kA, 126.8 Km	Not Tripped.	No Fault	-	Line tripped from Barh end during charging of 400kV Patna-Barh#4.As per DR Zone-3 picked up and line tripped after 100 msec.Zone-3 time delay may be check. Reason of three phase tripping of Main CB and only Y phase tripping of Tie CB(Remaing R & B Phase of Tie CB hand tripped after 40 sec) may be explain by Barh.	DR length needs to be increased		YES	NA	NTPC	ER-I
6	400KV-BARH-PATNA-3	04-01-2025	14:34	04-01-2025	15:00	Barh : Y-N, Iy = 2.21 KA, 125.9 km	Not Tripped.	Y_N	2.5 sec	DR not submitted. As per PMU line tripped on phase to ground fault. After tripping of Y phase remaing R & B phase tripped after 2.5 sec in Pole Discrepancy operation. Barh may explain.			NO	NO	NTPC	ER-I
7	400KV-NEW PURNEA-FARAKKA-1	04-01-2025	18:26	04-01-2025	18:48	New Purnea : DT received	Not Tripped.	No Fault	-	DT Received at New Purnea end. NTPC and ER-I may explain.			YES	NA	ER-I	NTPC

9	00KV-KODERMA-BIHARSARIFF(PG)	06-01-2025	14:22	06-01-2025	20:42	Koderma : Y_N, 2.91 kA, 108.6 km	Biharsariff : Y_N, 3.82 km, 14.5 kA	Y_N	100 msec	A/r failed from both end after 1 second due to persistent fault.	DR length needs to be increased		YES	NO	DVC	ER-I
10	400KV-PUSAULI(PG)-ALLAHABAD-1	07-01-2025	00:32	08-01-2025	19:36	Pusaui:-B-N, 1.401 kA, 155.2 km	B_N, Distance protection operated	B_N	100ms ec	Line tripped in reclaim time. As per DR A/r dead time at Pusaui is set at 500 msec.			YES	NO	ER-I	NORTHERN REGION
11	220KV-MUZAFFARPUR-HAJIPUR-2	07-01-2025	08:27	07-01-2025	10:10	Muzaffarpur: R_N, 14.429 kA, 5.79 km	Hajipur :R-N, Ir-1.98 KA, 34.15 km	R_N	100ms ec	DR not submitted. As per PMU line tripped in phase to ground fault in reclaim time.			NO	NO	ER-I	BSPTCL
12	220KV-GAYA-BODHGAYA-1	09-01-2025	11:34	09-01-2025	14:44	DT received at Gaya end.	Not Tripped.	No Fault	-	During CB replacement work at GSS Bodhgaya DT signal send to Gaya. BSPTCL may explain.			NO	NO	ER-I	BSPTCL
13	400KV-NEW DUBURI-TSL-2	10-01-2025	05:30	10-01-2025	07:20	New Duburi: DT Received	Not Tripped.	No Fault	-	DR not Submitted. OPTCL & TSL may explain.			NO	NO	OPTCL	TATA STEEL ltd

14	400KV-NEW DUBURI-TSL-2	10-01-2025	10:01	10-01-2025	10:36	New Duburi: DT Received	Not Tripped.	No Fault	-	DR not Submitted. OPTCL & TSL may explain.			NO	NO	OPTCL	TATA STEEL ltd
15	400KV-DHANBAD-MAITHON RB-1	10-01-2025	17:11	10-01-2025	18:28	DT Received	DC supply failure of REL650 relay at Dhanbad.	No Fault	-	Line tripped due to DC failure at Dhanbad.			NO	NO	NKTL	MPL
16	220KV-RENGALI(PH)-TSTPP-1	11-01-2025	13:10	11-01-2025	13:56	Rengali :Z-2, R_N, 5.022 KA, 21.66 Km	-	R_N	350 msec	DR not submitted. Line tripped in Z-2 protection from Rengali end .			NO	NO	OHP C	NTPC
17	400KV-FSTPP-KHSTPP-1	13-01-2025	12:15	13-01-2025	13:59	FSTPP: Y-N, 3 kA, 40 km	KHSTPP: Not Tripped.	No Fault	120 msec	DT send from FSTPP during hand tripped to FSTPP-BAHARAMPUR-2 for S/D work. NTPC may explain.			NO	NA	NTPC	NTPC
18	400KV-ALIPURDUAR (PG)-JIGMELLING	13-01-2025	16:34	13-01-2025	18:22	ALIPURDUAR :Not Tripped.	Jigmeling:-R-Y,FD-184 km	No Fault	-	As per PMU not fault observed. Line tripped from Jigmelling end.			NA	NO	ER-II	BHUTAN

19	KV-KARAMNASHA (NEW)-SAHUPU	15-01-2025	19:07	15-01-2025	22:20	Karmansha: Overcurrent Tripped	-	No Fault	-	DR not submitted. As per information received from SLDC line tripped in overcurrent. BSPTCL may explain.			NO	NO	BSP TCL	NORTHERN REGION
20	220KV-BUDHIPADAR-KORBA-2	16-01-2025	21:40	17-01-2025	02:34	Not Tripped.	Tripped from Korba end only	No Fault	-	As per PMU no fault observed. Line tripped from Korba end only.			NA	NO	OPT CL	WESTERN REGION
21	220KV-SITAMARHI-MOTIPUR-2	17-01-2025	18:09	19-01-2025	18:32	Sitahmari:B-N, FC-9.26 kA, FD-9.1 km	Motipur:B-N, FC-3.436 kA, FD-42.13 km	B_N	100 msec	A/r failed from both end after 1 second due to persistent fault.	DR length needs to be increased		NO	YES	ER-I	BSPTCL
22	400KV-NAUBATPUR(BH)-BALIA-2	19-01-2025	14:18	19-01-2025	15:47	Naubatpur: R-Y, Ir-3.06 kA, Iy-3.01 kA, 147.3 km	Balia: R-Y, Ir-10.45 kA, Iy-10.53 KA, 12.1 km	R_Y	100 msec	DR not submitted. As per pmu line tripped on phase to phase fault.			NO	NO	BGC L	NORTHERN REGION
23	400KV-BARH-MOTIHARI-1	19-01-2025	17:19	19-01-2025	18:16	Barh: R-Y, Ir: 7.601 kA, Iy: 7.28 kA, FD-69.06 km	Motihari: R-Y, Ir: 3.33 kA, Iy: 3.63 kA,FD- 158.1 km	R_Y	100 msec	Phase to Phase fault.			YES	YES	NTP C	DMTCL

24	400KV-ALIPURDUAR (PG)-BONGAIGAON-1	20-01-2025	16:26	20-01-2025	18:12	Alipurduar: DT received	-	No Fault	-	DT received at Alipurduar end.			YES	NO	ER-II	NORTHERN REGION
25	400KV-GORAKHPUR-MOTIHARI-2	21-01-2025	00:40	21-01-2025	16:08	FD- 9 Km, FC- 14 kA.	Motihari: Y_B-fault Iy=3 kA, 171 km	Y_B	100 msec	Phase to Phase fault.			NO	YES	NORTHERN REGION	DMTCL
26	400KV-MOTIHARI-BARH-2	21-01-2025	16:15	21-01-2025	20:40	Motihari: Y-B, Iy=2.89 kA, Ib=3.10 kA, 184 Km	Barh: Y-B, Iy,Ib=10.5 kA, 45.5 km	Y_B	100 msec	Phase to Phase fault.			YES	YES	DMTCL	NTPC
27	400KV-PPSP-BIDHANNAGAR-2	22-01-2025	06:22	22-01-2025	09:55	PPSP : Y-N, 136 Km	Bidhannagar: Y-N, 30.26 Km, Ib-6.96KA,	Y_N	100 msec	Three phase tripping for phase to ground fault.			NO	YES	WBS EDC L	WBSE TCL
28	220KV-KARAMNASHA (NEW)-SAHUPURI-1	23-01-2025	03:16	23-01-2025	15:50	Karmanasha :- Y-N, 4.93 kA, 10.6 km	-	Y_N	100 msec	DR not submitted. As per PMU line tripped on phase to ground fault. BSPTCL may explain.			NO	NO	BSP TCL	NORTHERN REGION

29	400KV-PPSP-BIDHANNAGAR-1	23-01-2025	04:36	23-01-2025	10:09	PPSP-Y-N, 134.4 Km	Durgapur-Y -N, 7.165 KA, 31.31 Km	Y_N	100 msec	Three phase tripping for phase to ground fault			NO	YES	WBS ETC L	WBSE DCL
30	400KV-BIDHANNAGAR-NEW CHANDITALA-1	23-01-2025	05:50	23-01-2025	20:59	Bidhannagar :Y-N, 5.80 KA, 40.3 Km	New Chanditala: Y-N, 4.458 KA	Y_N	100 msec	A/r failed from both end after 1 second due to persistent fault.			YES	YES	WBS ETC L	WBSE TCL
31	400KV-BINAGURI-TALA-2	24-01-2025	13:41	-	-	Binaguri: R-N, Ir-3.26 kA, 125.3 km	-	R_N	100 msec	A/r failed from both end after 1 second due to persistent fault.			YES	NO	ER-II	BHUTAN
32	220KV-NEW TOWN(AA-III)-RAJARHAT-1	24-01-2025	16:48	24-01-2025	17:01	R & B-Ph PT fuse failure at panel	Not Tripped.	No Fault	-	Line tripped from N Town due to R & B phase fuse failure.			NO	NO	WBS ETC L	ER-II
33	400KV-MEERAMUNDALI-JSPL-2	26-01-2025	04:21	26-01-2025	05:07	A/R successful from Meramundali end	JSPL: R-N, 9.2 kA, 13.5 Km	R_N	100 msec	Three phase tripping for phase to ground fault from JSPL end. JSPL may explain.	DR length needs to be increased		YES	NO	OPT CL	JSPL

34	400KV-MEERAMUNDALI-JSPL-2	26-01-2025	05:31	26-01-2025	13:26	Meramundali: R-Y, Ir =7.52 KA, 30.7 Km	JSPL: R-Y-B, Ir- 9.85 KA, Iy-1.32 kA, Ib-3.91 kA, 29.49 km	R_Y	100 msec	Line tripped on R phase to ground fault and after 800 msec another Y phase fault occurred, and line got tripped from both end. (R and Y phase insulator decapped at location no 96).	DR length needs to be increased		YES	NO	OPT CL	JSPL
35	220KV-RANCHI-MTPS(DVC)-1	30-01-2025	05:18	30-01-2025	13:52	A/r successful from Ranchi end.	MTPS: R-N, 28.628 KA, 1.18 Km	R_N	100 msec	A/r successful from Ranchi end .			YES	NO	ER-I	DVC

SI No.	Name of the incidence	PCC Recommendation	Latest status
143rd PCC Meeting			
1.	Disturbance at 400 k V JSPL S/s on 19 th Dec 2024 at 13:27 Hrs	<p>JSPL representative informed that communication is already being made with consultant in order to do system study and it is expected that around 4-5 months will be required for complete study.</p> <p>PCC advised JSPL representative to share islanding scheme details to ERPC/ERLDC. It further advised to share sequence of events, voltage and current data for furnace, motor load etc, drawl by furnace load and auxiliary load in minimum resolution as possible.</p> <p>PCC advised JSPL representative to do system study of JSPL as earliest as possible and submit final report to ERPC/ERLDC.</p>	
2.	Tripping of 400KV/220KV 315 MVA ICT 3 AT BIHARSARIFF on 4 th Dec 2024 at 16:19 Hrs	PCC advised Powergrid representative to share report to ERPC/ERLDC.	
3.	Tripping of 400KV/220KV 315 MVA ICT 2 AT NEW DUBURI on 21 st Dec 2024 at 03:49 Hrs	<p>PCC advised OPTCL representative to share report to ERPC/ERLDC.</p> <p>PCC advised utilities to share practice that are followed by them in case of keeping single or 2 nos of auxiliary relay TTX -2 to ERPC/ERLDC.</p>	

4.	Tripping of 400KV/220KV 315 MVA ICT 2 AT LATEHAR(JUSNL) on 25 th Dec 2024 at 06:36 Hrs and on 27 th Dec 2024 at 14:51 Hrs	<p>PCC advised JUSNL representative to share report of both incidents to ERPC/ERLDC.</p> <p>JUSNL representative informed that at present tie bay is out however communication is already shared to Powergrid. He also informed that it is expected that technician from M/s GE will visit site in later half of Jan 2025 to rectify issues associated with tie bay.</p> <p>PCC advised JUSNL representative to expedite rectification of ICT by coordinating with Powergrid.</p>	
142nd PCC Meeting			
5.	Disturbance at 220 kV Tenughat (TVNL) S/s on 21.11.2024 at 04:28 Hrs	<p>PCC advised Tenughat/JUSNL representative to share CT failure report to CEA/ERPC.</p> <p>PCC advised Tenughat representative to review settings of o/c protection of unit 2 and share revised settings to ERPC/ERLDC. It further advised Tenughat representative to share analysis report for tripping of unit 1 to ERPC/ERLDC.</p> <p>PCC advised Tenughat representative to share existing protection settings of all relays present at S/s to ERPC/ERLDC for further study.</p> <p>Tenughat representative replied that review of DEF protection at their end is in progress and</p>	<p>In 143rd PCC, Tenughat representative informed that CT failure report had been submitted.</p> <p>Regarding o/c protection settings, he informed that old relay was of electromechanical type which will be replaced by numerical relay which is already purchased and will be implemented by availing shutdown soon.</p> <p>He further told that existing protection settings of all relays present at S/s had been shared to ERPC/ERLDC for further study.</p> <p>Regarding DEF protection and DR length issue, he</p>

		<p>observation will be shared to ERPC/ERLDC.</p> <p>PCC advised TVNL representative to increase DR length at Tenughat S/s to 2.5 to 3 seconds.</p>	<p>replied that both issues will be rectified in upcoming shutdown of Govindpur circuit.</p>
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141st PCC Meeting

6.	<p>Repeated disturbance at 220 kV Balimela (OPTCL) S/s and 220 kV Balimela(PH)(OHPC) S/s</p>	<p>PCC advised OHPC representative to test backup impedance protection and share report to ERPC/ERLDC. It also advised OHPC representative to share unit-wise MW, MVar, voltage and speed data with 1 minimum 1 second resolution to ERPC/ERLDC for further study.</p> <p>PCC further advised OHPC representative to coordinate with OEM for analysing reason behind failure of governor during the event and share observation to ERPC/ERLDC.</p> <p>PCC opined that as PLCC is already available for 2 feeders, so A/r scheme can be implemented by OHPC at earliest after finalising scheme.</p> <p>PCC advised OHPC representative to expedite work for operating Balimela PH with both bus 1 and bus 2.</p> <p>PCC advised OHPC representative to rectify issue of time synchronisation of DR for identified feeders at Balimela PH at earliest.</p>	<p>In 143rd PCC Meeting, SLDC Odisha representative informed that as per communication received from OHPC, work order is already placed and it is expected that all pending issues will be resolved by Jan 2025.</p>
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7.	Repeated tripping of 220KV-RANCHI-MTPS(DVC)-1	<p>PCC advised DVC representative to share logic of implementing auto-recloser scheme to ERPC/ERLDC.</p> <p>DVC representative informed that auto-recloser scheme will be implemented after getting clearance from Ranchi end.</p>	<p>In 143rd PCC Meeting, PCC advised DVC representative to coordinate with Powergrid, ERPC and ERLDC to implement auto-recloser by one week.</p>

8.	Repeated tripping of 220KV-KHAGARIA-NEW PURNEA-1&2	PCC advised BSPTCL representative to resolve all issues associated with tripping of line along with root cause analysis of repeated tripping of line after flood ends and share analysis report to ERPC/ERLDC	In 143 rd PCC Meeting, BSPTCL representative informed that testing related to phase to phase clearance of line will be completed by Jan 2025 and report will be shared to ERPC/ERLDC.
139th PCC Meeting			
9.	Total Power failure at 220/132 kV Katapalli (OPTCL) S/s on 29.08.2024 at 06:52 Hrs	<p>OPTCL representative informed that it is planned to test relays by availing shutdown of lines as earliest as possible however at present they are facing difficulty in getting shutdown of lines due to evacuation path issue for heavy generation of Burla PH.</p> <p>PCC advised OPTCL to investigate about reason behind non-operation of protection on 29th Aug 2024 and submit observation to ERPC/ERLDC.</p> <p>PCC advised SLDC Odisha, OPTCL to communicate with Hindalco to explore possibility of setting delay time of 100-150 ms in islanding scheme of Hindalco to avoid islanding in transient faults and submit summary of discussion and decision taken to ERPC/ERLDC.</p> <p>PCC advised SLDC Odisha, OPTCL, OHPC representative to review o/c e/f settings at Lapanga, Burla, Chiplima, Katapalli, Sambalpur for all feeders and submit revised settings to ERPC/ERLDC Subsequently a meeting will be conducted among ERPC, ERLDC, OPTCL, OHPC, SLDC Odisha representative to finalize the settings.</p> <p>PCC advised OPTCL representative to share status of</p>	<p>In 143rd PCC Meeting, SLDC representative informed that meeting among concerned utilities to revise settings will be done by Jan 2025.</p> <p>PCC advised SLDC Odisha to share deliberation of scheduled meeting to ERPC/ERLDC.</p> <p>PCC advised ERPC to convey meeting among ERPC, ERLDC, OPTCL, OHPC, SLDC Odisha representative to finalize the settings after receiving revised settings from OPTCL, OHPC and SLDC Odisha.</p>

		remedial measures taken for protection/ operation issues to ERPC/ERLDC on periodic basis.	
10.	Total Power failure at 220 kV Darbhanga (BSPTCL) S/s on 01.08.2024 at 17:59 Hrs	<p>MS, ERPC advised BSPTCL representative to carry out third party inspection at Darbhanga S/s in coordination with DMTCL and submit observations to ERPC/ERLDC. PCC advised same to BSPTCL & DMTCL representative.</p> <p>PCC opined that zone 4 pickup at BSPTCL end in 220 kV Darbhanga (DMTCL)-Darbhanga 2 should not have dropped in 50 ms so it advised BSPTCL representative to check the issue and submit observation to ERPC/ERLDC.</p> <p>PCC advised BSPTCL representative to resolve issue of DR channel configuration and time synchronization at BSPTCL end at earliest and share confirmation to ERPC/ERLDC after its rectification.</p>	In 143 rd PCC Meeting, BSPTCL representative informed that testing of Musharai circuit 2 is scheduled for 20 th Jan 2025.
137th PCC Meeting			
11.	Disturbance at 220 kV Budhipadar(OPTCL) S/s and 220 kV Ib-TPS (OPGC) S/s on 05.06.2024 at 04:11 Hrs	<p>PCC advised SLDC Odisha to coordinate with CPPs and share islanding scheme details to ERPC/ERLDC.</p> <p>OPTCL representative replied that due to non availability of shutdown & testing kit, testing of auto-recloser was not done however it is expected to be completed within</p>	In 143 rd PCC Meeting, SLDC Odisha representative informed that islanding scheme details of few CPPs had been received which will be shared to ERPC/ERLDC along with complete list of CPPs islanding scheme in Odisha.

		<p>10 days and report will be shared to ERPC/ERLDC.</p> <p>PCC advised OPTCL to test relays at earliest and submit observation to ERPC/ERLDC.</p> <p>PCC advised OPTCL to conduct testing of breaker also and submit observation to ERPC/ERLDC.</p> <p>PCC advised OPTCL representative to review zone 3 time & reach settings of relay at Budhipadar end for 132 k V Budhipadar- Lapanga.</p> <p>PCC advised OPTCL representative to increase in DR length to 3 seconds.</p> <p>It further advised OPTCL representative to prepare annual maintenance plan and outage plan of each S/s and share to ERPC/ERLDC.</p>	
136th PCC Meeting			
12.	Disturbance at 220 kV Tenughat (TVNL) S/s on 29.05.2024 at 12:57 Hrs	<p>PCC advised JUSNL representative to rectify auto-reclose issue at Govindpur end by next week and intimate to ERPC/ERLDC.</p> <p>TVNL representative informed that settings at their end had been implemented by CRITL, JUSNL team and he further assured that O/C E/F settings will be revised at the earliest after consultation with CRITL, JUSNL team.</p> <p>PCC advised CRITL, JUSNL team to test auto-reclose and carrier at</p>	<p>In 143rd PCC Meeting, JUSNL representative informed that OPGW had been rectified. Further DTPC and PLCC is also healthy at their end however at Tenughat end, Power loss is getting observed. Since Bay owner is TVNL so he requested TVNL to rectify issue.</p> <p>TVNL representative requested JUSNL representative to test A/r at their end.</p>

		both Govindpur as well as Tenughat end.	PCC advised JUSNL, SLDC Jharkhand and TVNL representatives to coordinate and resolve auto-relcoser issue at Tenughat end and share report to ERPC/ERLDC.
133rd PCC Meeting			
13.	Review of SPS at Sterlite (Vedanta)	SLDC Odisha representative informed that the meeting to discuss the modalities of implementation of proposed SPS scheme will be convened within a week.	In 143 rd PCC Meeting, SLDC Odisha representative informed that as per communication received from Vedanta, SPS will be implemented by 20 th Feb 2025.