भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
पूर्वी क्षेत्रीय विद्युत समिति
Eastern Regional Power Committee
14, गोल्फ क्लब रोड, टालीगंज, कोलकाता-700033
14 Golf Club Road, Tollygunj, Kolkata-700033

सत्यमेव जयते

वसुधैव कुटुम्बकम्
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सं./NO. पू.क्षे.वि.स./PROTECTION/2023/ 1243 **दिनांक /DATE:08/12/2023**

सेवा में / To,

संलग्न सूची के अनुसार / As per list enclosed.

विषय : दिनांक – 10.11.2023 को आयोजित 130 वीं पीसीसी बैठक का कार्यवृत्त ।

Sub: Minutes of the 130th PCC meeting held on 10.11.2023

महोदय/ Sir,

10.11.2023 को आयोजित **130वीं** पीसीसी बैठक का कार्यवृत्त पू.क्षे.वि.स. की वेबसाइट (**http://www.erpc.gov.in/**) पर उपलब्ध है । कृपया देखें ।

Please find the minutes of the **130th PCC** meeting of ERPC held on **10.11.2023** available at ERPC website (**http://www.erpc.gov.in/**).

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

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

यह सदस्य सचिव, पू. क्षे. वि. स. के अनुमोदन से जारी किया जाता है ।

This issues with approval of Member Secretary, ERPC.

भवदीय / Yours faithfully,

Dena 08.12.23.

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

LIST OF ADDRESSES:

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Chief Engineer (System Operation), SLDC, BSPTCL, Patna-800021	
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General Manager(O&M) FSTPS, NTPC Ltd., P.O. Nabarun, Dist. Murshidabad, West Bengal-742236	Dy. General Manager (Engineering), WBPDCL, OS Dept. Corporate Office, 3/C, LA Block, Salt Lake-III, Kolkata-700098 (Fax-033-23350516)
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General Manager (OS), ERHQ-I, NTPC Ltd., LoknayakJaiprakashBhawan, (2nd Floor), DakBunglowChawk, Patna-800001	Manager (Electrical), Adhunik Power & Natural Resources Ltd. "Lansdowne Towers, Kolkata-700020 (Fax No. 033-2289 0285)
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Dy. General Manager (Electrical) IB Thermal Power Station, OPGCL Banhapalli, Dist. Jharsuguda-768234, Orissa	General Manager (AM), ER-I Power Grid Corporation of India Ltd., Alankar Place, Boring Road, Patna-800001
Chief Engineer (Trans.) Power Deptt., Govt. of Sikkim, Gangtok-731010	Sr. Manager (CTMC) Durgapur Projects Limited, Durgapur-713201
Executive Director, ERLDC, POSOCO, Tollygunge, Kolkata-700033	The Head Maithon Power Limited, Maithon Office, MA 5 Gogna, Dist. Dhanbad, Jhankand State, PIN-828207
General Manager (AM), ER-II Power Grid Corporation of India Ltd., J-I-15, Block-EP, Sector-V,Salt Lake,Kolkata-91	Head –Regulatory and contracts, IndiGrid Limited , 247 Embassy, Office No 107, 'B' Wing, Hindustan Co. Bus Stop, Gandhi Nagar, L.B.S. Road, Vikhroli West, Mumbai – 400 079. Ph : +91 845509 96408
General Manager (P&O), PTC Ltd., Kanchanjunga Bldg.,18, Barakhamba Road, New Delhi-110001	
Managing Director, Bhutan Power Corporation Post Box no. 580, Thimpu, Bhutan.	Managing Director, Druk Green Power Corprn. P.O. Box-1351, Thimpu, Bhutan.

Associate Director (Commercial and Regulatory) Darbhanga-Motihari Transmission Company Limited (DMTCL),503, Windsor, Off CST Road, Kalina, Santacruz(E), Mumbai-400098	The Plant Head, JITPL, Angul, Odisha (FAX:011-26139256-65)
Shri D. P. Bhagava, Chief Consultant (O&M), TeestaUrja Limited, New Delhi (FAX:011-46529744)	Director (GM Division), Central Electricity Authority Sewa Bhawan, R. K. Puram, New Delhi-110066
Director (NPC), CEA, NRPC Building, Katwaria Sarai, New Delhi- 110016	President, Dans Energy Pvt. Ltd, 5th Floor, DLF Building No. 8, Tower-C, Gurgaon - 722OO2
Director, Shiga Energy Pw. Ltd., 5th Floor, DLF Building No. 8, Tower-C, Gurgaon - 722OO2	DGM (E&I), HALDIA ENERGY LIMITED, BARIK BHAWAN, KOKATA-700072, FAX: 033-22360955
General Manager, TPTL, B2/1A Safdarjung Enclave, Africa Avenue, New Delhi -110029	

Minutes
of
130th PCC Meeting

Date: 08/12/2023
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 130th PROTECTION COORDINATION SUB-COMMITTEE MEETING HELD ON 10th NOVEMBER 2023 AT 11:00 HRS AT ERPC, KOLKATA

Member Secretary Chaired the Meeting. List of Participants is attached at **Annexure A.** ERLDC representative highlighted the protection performance of the ER utilities for the month of Sep 2023 and Oct 2023 which is enclosed at **Annexure A.1.**

PART – A

ITEM NO. A.1: Confirmation of Minutes of 129th Protection Coordination sub-Committee Meeting held on 8th Sep 2023 through MS Teams online platform.

The minutes of 129th Protection Coordination sub-Committee meeting held on 08.09.2023 was circulated vide letter dated 22.09.2023.

Members may confirm.

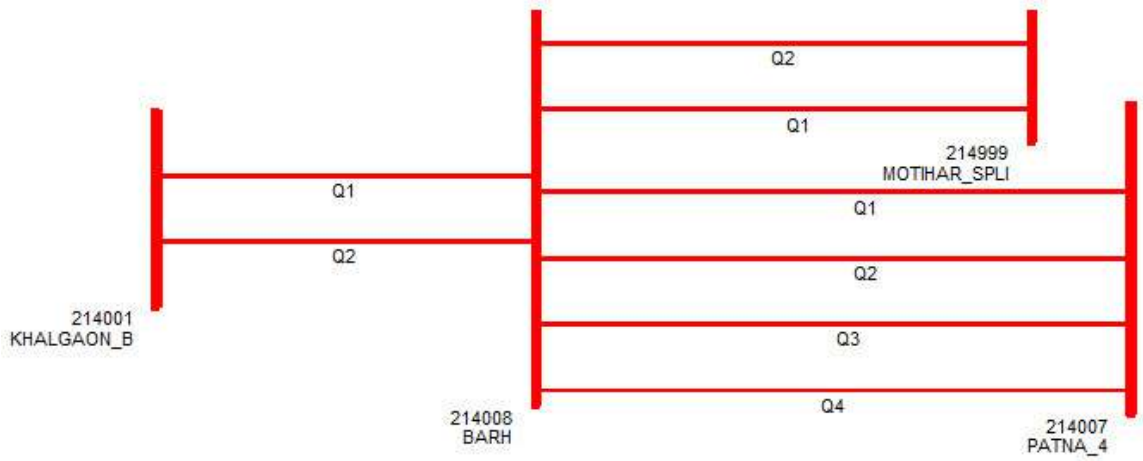
Deliberation in the meeting

Members confirmed the minutes of 129th PCC Meeting.

PART – B

ITEM NO. B.1: Disturbance at 400 kV Barh (NTPC) S/s on 27.10.2023 at 10:15 Hrs

On 27.10.2023 at 10:15 Hrs, autorecloser attempt was observed for 400 kV Barh-Motihari-2 which was successful from both ends. However, teed protection got operated in its tie bay at Barh end and the dia element 400 kV Kahalgaon-Barh-2 got tripped. It is observed that at the same time, 660 MW Unit 2 at Barh also got tripped on GT differential protection.



Gen. Loss: 570 MW
Outage Duration: 08:14 Hrs

NTPC may explain.

Deliberation in the meeting

ERLDC representative explained the event with help of report which is attached at ***Annexure B.1.***

Y phase fault was developed in 400 kV Barh-Motihari-2 line. Subsequently autorecloser attempt was made in the line which was successful from both end.

At the same time, teed protection operated in the tie bay of 400 kV Barh-Motihari-2 at Barh end and the other dia element i.e. 400 kV Kahalgaon-Barh-2 got tripped in TEED protection from local end and on DT receipt it got tripped from remote end.

On enquiry from PCC regarding reason behind maloperation of TEED protection, ERLDC representative mentioned that as per information received from NTPC, tie bay CT cable at relay panel end for TEED Differential protection was in loose condition which led to maloperation of the relay during the fault in the line. A small amount of differential current greater than threshold current value was observed leading to operation of TEED protection.

During this incident, 660 MW U#2 at Barh also tripped due to operation of GT differential protection and around 570 MW generation loss occurred. It was reported CT cable emanating from LV turret CT(Unit#2 GT-B phase) was damaged midway resulting in less current contribution and subsequently tripping the unit on transformer differential.

PCC suggested NTPC for periodical checking of the relay wiring, connections during the time of schedule maintenance so that this type of unwanted tripping can be avoided.

ITEM NO. B.2: Total Power Failure at 400 kV Teesta V(NHPC), 400 kV Teesta III(SUL) and 400 kV Dikchu S/s on 04.10.2023 at 02:55 Hrs

On 04.10.2023 at 00:50 hrs, due to continuous high silt and rise in inflow in the upstream area of the reservoir, all units at Teesta-III (6*200 MW) (On bar gen 1300 MW) were taken out of bar. 400 kV Teesta III – Dikchu & 400 kV Teesta-III -Rangpo lines were hand tripped from Teesta III HEP end at 01:08 hrs and consequently Teesta-III substation became dead.

Further, at 01:49 hrs, both units at Dikchu (2*48 MW) were taken out of bar due to flash flood and all units of Teesta V (3*170 MW, generating around 504 MW) were taken out of service at 02:37 hrs due to high silt.

At 02:55 hrs, 400 kV-Rangpo-Teesta-V- D/C tower get collapsed at loc. No. 1 and Teesta-V substation became dead. Further at 06:15 Hrs, 400 kV Dikchu-Rangpo line breaker was opened from Dikchu HEP consequently Dikchu substation became dead.

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

Load Loss: 0 MW, Gen. Loss: 0 MW

Teesta V(NHPC), Teesta III(SUL) & Dikchu HEP may explain.

Deliberation in the meeting

The above events were occurred due to Glacial Lake Outburst Flood at South Lohnak lake in North Sikkim which led to high rise in inflow and silt in Teesta River.

- *At 00:50 Hrs: 6*200 MW units at Teesta-3 was desynchronized one by one due to high silt content and t 01:08 Hrs: 400 kV Teesta 3-Rangpo and 400 kV Teesta 3-Dikchu were hand-tripped from Teesta-3 as a precautionary measure due to which 400 kV Teesta-3 S/s became dead.*

- *At 01:49 Hrs, 2*48 MW units at Dikchu got desynchronized due to flash flood and at 02:37 Hrs, 3*170 MW units at Teesta-5 got desynchronized due to high silt content.*
- *At 02:55 Hrs, 400 kV Teesta V-Rangpo D/c tower collapsed at loc. 1 just outside Teesta-5 switchyard subsequently at 02:55:12 hrs, 400 kV Rangpo-Teesta V-2 got tripped due to Y phase fault and after, 800 msec, fault appeared in B phase of of the line and three phases tripping occurred. At the same time, 400 kV Rangpo-Teesta V-1 got tripped due to phase-to-phase fault leading to total power failure at 400 kV Teesta V S/s and at 06:15 Hrs: 400 kV Rangpo-Dikchu was hand-tripped from Dikchu end as a precautionary measure following which 400 kV Dikchu S/s became dead.*

PCC observed that there was no protection discrepancy during the above events.

Dikchu HEP representative explained the damage at the plant site and their restoration plan with help of a presentation which is enclosed at Annexure. He informed that full restoration of Dikchu HEP would be completed by March-2024.

For Teesta-V HEP, NHPC representative intimated that the damage was mainly at dam end and the restoration would take around one year of time.

ITEM NO. B.3: Total Power Failure at 220 kV Rongnichu S/s on 09.10.2023 at 11:13 Hrs

On 09.10.2023 at 11:13 Hrs, 220 kV Rangpo-Rongnichu-2 got tripped on Y_B fault, leading to loss of evacuation path for two running units at Rongnichu as 220 kV Rangpo-Rongnichu-1 was already under emergency shutdown. Consequently, total power failed occurred at Rongnichu S/s.
Detailed report from ERLDC is attached at **Annexure B.3.**

Gen. Loss: 103 MW
Outage Duration: 07:04 Hrs

Rongnichu HEP may explain.

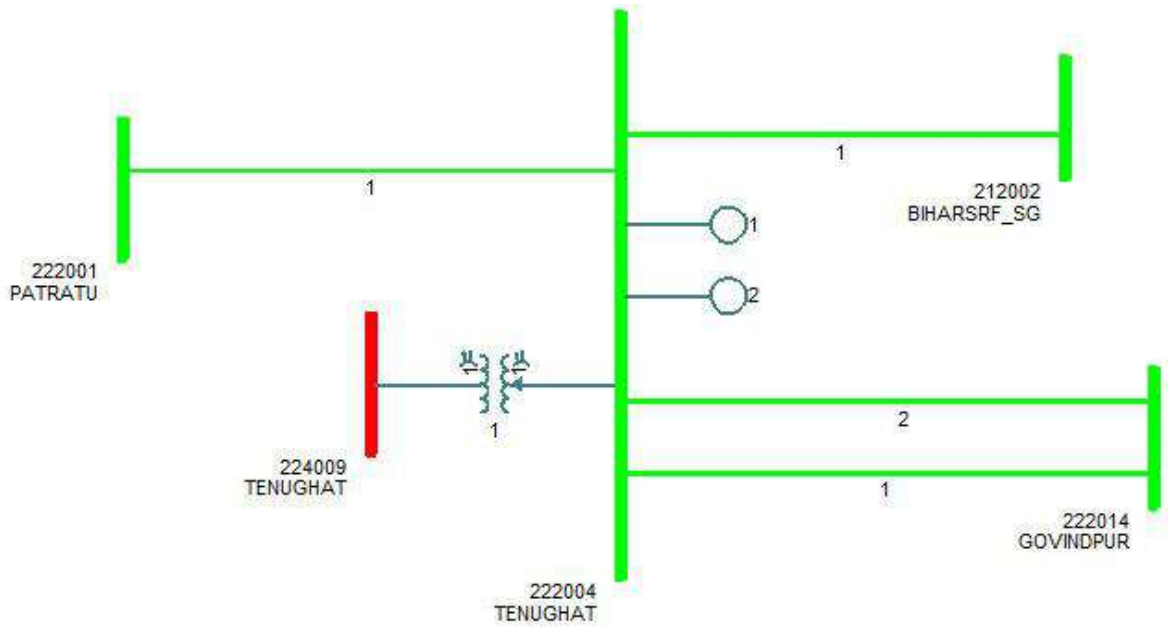
<u>Deliberation in the meeting</u>

220 kV Rangpo-Rongnichu-1 was already under emergency shutdown prior to the event. Based on DR analysis, it was informed by ERLDC that Y-B fault developed in 220 kV Rangpo-Rongnichu-2 line which led to tripping of the only available line and subsequent loss of evacuation path for two running units at Rongnichu. No discrepancy was found in protection system during the event.

ITEM NO. B.4: Disturbance at 220 kV Tenughat (JUSNL) S/s on 08.09.2023 at 20:33 Hrs

On 08.09.2023 at 20:30 Hrs, 220 kV Maithon-Dumka-1 got tripped due to R phase fault leading to increase in loading of 220 kV Maithon-Dumka-2, which got tripped at 20:33 Hrs due to R phase fault. After 12 seconds, 220 kV Tenughat-Biharsharif also got tripped from Biharsharif end which led to islanding of entire Tenughat, Govindpur, Dumka, Godda, Deoghar complex with one unit of Tenughat. As generation of one unit of Tenughat was 140 MW and 410 MW load was present at time of islanding hence island didn't survive due to Load – Generation mismatch subsequently the island collapsed immediately.

A Meeting was conducted among ERPC, ERLDC and concerned utilities on 16th Oct 2023. The action points finalised in the meeting is attached at **Annexure B.4.1.**



Detailed report from ERLDC is attached at **Annexure B.4.2.**

Load Loss: 437 MW, Gen. Loss: 140 MW
Outage Duration: 00:34 Hrs

JUSNL & BSPTCL may update.

<u>Deliberation in the meeting</u>

Based on the DR analysis, ERLDC representative informed that R phase fault was developed in 220 kV Maithon-Dumka-1 line subsequently the line got tripped. This led to increase in loading of 220 kV Maithon-Dumka-2, resulting in tripping of this line too at 20:33 Hrs on R-phase fault.

He further added that after 12 seconds, 220 kV Tenughat-Biharsharif also got tripped from Biharsharif end which led to islanding of entire Tenughat, Govindpur, Dumka, Godda, Deoghar complex with one unit of Tenughat. As generation of one unit of Tenughat was 140 MW and 410 MW load was present at time of the islanding system did not service due to Load – Generation mismatch subsequently the island collapsed immediately.

It was informed that a special meeting was held on 16th Oct 2023 in which this disturbance was discussed thoroughly and few remedial actions were recommended to JUSNL, PG and BSPTCL.

On enquiry from PCC regarding status of the corrective actions suggested in special meeting, the followings were updated:

- *Regarding defective DTPC at Dumka end for 220 kV Maithon-Dumka-1, JUSNL representative informed thatdue to faulty card, DTPC was not working and already they are in contact with agency (M/s Schnider) to replace card at earliest for which quotation had been already asked to OEM.*
- *Regarding defective DTPC at Powergrid end for 220 kV Maithon-Dumka-2, the issue could not be resolved due to varying opinion by JUSNL & Powergrid regarding responsibility of maintaining the DTPC.*

  MS, ERPC expressed serious concern on this matter and opined that as ownership of DTPC belongs to JUSNL, JUSNL shall take necessary action to rectify the problem. He

advised JUSNL to look into the matter and resolve the DTPC issue for both circuits of 220 kV Maithon-Dumka line at the earliest. It was also decided that in case the issue remains unresolved, it would be taken up in forthcoming TCC meeting.

- *Regarding earthfault setting of 220 kV Maithon-Dumka-2 at Dumka end, JUSNL representative replied that settings had been revised.*
- *Regarding change in setting of Overcurrent relay at Biharsharif end for 220 kV Biharsharif-Tenughat, BSPTCL representative replied that o/c settings had been increased at Biharsharif end as per recommendation.*
- *Regarding SPS Scheme it was opined that after reconductoring of 220 kV Tenughat-Biharsharif line the loading limit has been increased which is sufficient to cater the load during contingency and therefore there is no need of any SPS at present.*

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

A. Disturbance at Angul S/s on 12.10.2023 at 17:49 Hrs

On 12th October 2023, at 17:49 hrs, multiple number of trippings occurred at Angul S/s. During the incident, 765kV Bus 1&2, 765kV Angul-Srikakulam D/C, 765kV Angul-Jharsuguda Ckt-3&4, 765/400kV ICT-3 &4, 400kV Bus-1, 400kV Angul-GMR Ckt 2 and 400kV Angul-JITPL Ckt1 got tripped at 765/400 kV Angul S/s. It was reported that both 765 kV Bus & 400 kV Bus 1 got tripped due to operation of bus bar differential protection.

Report from ERLDC is attached at **Annexure B.5.A.**

Powergrid Odisha may explain.

<u>Deliberation in the meeting</u>

*The presentation made by Powergrid is attached at **Annexure B.5. A.1.***

He informed that on 12th October 2023 bad weather and lightening was reported near Angul. At 17:49 Hrs, multiple tripping occurred at Angul S/s during which following elements got tripped.

- *765kV Bus 1&2,*
- *765kV Angul-Srikakulam D/C,*
- *765kV Angul-Jharsuguda Ckt-3&4,*
- *765/400kV ICT-3 &4,*
- *400kV Bus-1,*
- *400kV Angul-GMR Circuit-2 and*
- *400kV Angul-JITPL Circuit-1*

He further described the event in details as follows-

- *At 17:49:13.545 hrs due to flashover in main bay CT of 765 kV Angul-Jharsuguda-3, 765 kV Bus-2 bus bar differential operated which resulted in tripping of all main bays connected to Bus 2. Further, after 200 msec,330 MVAr Bus reactor-1 connected to Bus-2 got tripped due to operation of LBB protection. He further informed that at the same instant at which bus bar differential operated at Angul Bus 2, B-phase Tie CB of Angul- Srikakulam-1&2 and 765 kV Angul- Jharsuguda-3&4 also opened on indication of zone – 1 protection however*

all the aforesaid 765 kV lines successfully auto reclosed from Angul end after 1 second and no tripping was observed at remote ends.

- *At 17:49:13.545 hrs, distance protection relay at Angul end for 400 kV GMR- Angul 2 pickup fault in zone 1 however all three phases of 400 kV GMR- Angul 2 got tripped from Angul end only due to operation of O/V Stage 2 protection. He further added that at the same time, 400 kV Meramundali-Angul-1 which was antitheft charged from Angul end also tripped in overvoltage stage 2 protection.*
- *At 17:49:34.167 hrs, flashover of Main bay of 765/400 kV ICT 3 CT connected to 400kV Bus 1 occurred resulting in development of bus fault in Bus 1 subsequently differential relay of 400 kV Angul Bus-1operated resulting in tripping of all connected elements. At the same instant, 400 kV Angul-JITPL-1 also tripped as its dia element 400 kV GMR- Angul 2 had already tripped.*
- *At 17:49:38.106 hrs, failure of 765 kV Angul Jharsuguda-4 tie bay-of half dia CT occurred subsequently bus fault got developed at 765 kV Angul Bus-1 therefore differential relay of 765 kV Angul Bus-1 operated resulting in tripping of all main bays associated to Bus-1. Therefore, 765kV Angul-Srikakulam D/C, 765kV Angul-Jharsuguda Ckt-3&4 and 765/400kV ICT – 4 got tripped however 765 kV Angul-Jharsuguda-1 & 765/400 kV ICT-1 in same dia; 765 kV Angul-Jharsuguda-2 & 765/400 kV ICT-2 remained charged through tie bay on 765 kV side.*
- *At 17:50:18.148 Hrs, B phase fault got appeared in765 kV Angul-Jharsuguda -3 following which 765 kV Angul-Jharsuguda-3&4 got tripped from Jharsuguda end. However, it was observed as per DR that Overvoltage protection stage 2 had appeared at open end in healthy phases in both lines during the fault and DT was sent to Jharsuguda end.*

He informed that during the incident, sparking and flashover was observed near secondary side JB boxes of CTs so it was suspected that there might be issue in earthing system of S/s. Regarding remedial measure, he informed that earthing audit is already in progress by external agency (M/s Manav Energy) at Angul S/s for last 15 days and report will be shared to ERPC/ERLDC after its completion. Further, detailed analysis of substation Direct stroke lightning protection (DSLP) plan needs to be studied for possible effect of lightning on substation equipment.

PCC observed that during tripping of 765 kV Bus-2 at Angul S/s, B-phase tie CB of 765 Angul-Srikakulam-1&2 and 765 kV Angul- Jharsuguda-3&4 also opened on zone-1 protection though the fault was in reverse direction. Powergrid replied that on investigation it was found that relay(all are M/s Siemens make) had mal-operated due to shift of neutral voltage on account of double point earthing of CVT done by OEM during firmware upgradation work of relay. The same has been rectified.

Regarding delayed tripping of Bus reactor connected to 765 kV Bus-2 in LBB protection instead of instant tripping on bus bar differential protection operation, PG representative replied that main breaker of bus reactor had already opened after operation of bus bar differential protection however due to fault CT, current was seen by LBB relay and initiation was send to tie breaker.

Regarding failure of NGR at Jharsuguda end for 765 kV Angul-Jharsuguda-4, PG representative replied that NGR failure analysis is under progress and report will be shared to ERPC/ERLDC after its completion.

On enquiry from PCC regarding non opening of breakers of all elements connected to bus even after operation of bus bar differential protection and later tripping through LBB, Powergrid representative replied that all CBs had tripped on busbar or other protection which are as per scheme however LBB had operated in some relays due to failed CTs sensing current even though their respective CBs were opened.

Replies of Powergrid of different queries raised by PCC forum was also shared with ERPC/ERLDC via mail dated 16th Nov 2023 which is attached at ***Annexure B.5. A.2.***

B. Bus tripping occurred in Eastern Region during September and October 2023

Element Name	Tripping Date	Reason	Utility
400 kV Main Bus-1 at Keonjhar	01.09.23 at 10:18 Hrs	LBB relay operated	PG Odisha
220 kV Main Bus-1 at Ramchandrapur	01.10.23 at 04:38 Hrs	Bus PT failed	JUSNL
220 kV Main Bus-2 at Budhipadar	06.10.23 at 16:14 Hrs	-	OPTCL
220 kV Main Bus-1 at Ramchandrapur	20.10.23 at 00:11 Hrs	Bus Bar differential operated	JUSNL

Concerned utilities may explain.

Deliberation in the meeting

- **Tripping of 400 kV Main Bus-1 at Keonjhar on 01.09.2023 at 10:18 Hrs**

Powergrid representative was not available in the meeting.

- **Tripping of 220 kV Main Bus-1 at Ramchandrapur on 01.10.2023 at 04:38 Hrs**

JUSNL representative informed that Y phase PT blast was occurred for 220 kV Bus 1 due to insulation failure of PT which resulted in bus fault and leading to tripping of 220 kV Bus 1. Subsequently all connected elements got tripped.

He added that the blasted PT is of M/s SCT make and it had been observed that due to manufacturing defect, various number of CT and PTs of same make had blasted recently.

PCC advised to take up the matter with the equipment manufacturer for further analysis of the failure of the elements and if necessary, replace all the PT/CT of similar make /lot to avoid these kind of trippings in future.

PCC also advised JUSNL to share failure report of any power system elements including CT & PTs to CEA for their root cause analysis.

- **Tripping of 220 kV Main Bus-2 at Budhipadar on 06.10.23 at 16:14 Hrs**

*OPTCL representative was not available in the meeting. However, the disturbance report was received from them which is attached at **Annexure B.5.B.***

Based on the report the incident as explained as follows:

- *Prior to incident 220kV Budhipadar- Lapanga -1 was on TBC and 220 kV Budhipadar-Kuanrmunda was under shutdown.*
- *Bus bar bay unit of 220kV Budhipadar -Bamra (charged from 220kV Bus-2) got defective on 05.10.23 therefore it was kept out of service for the said bay in the central unit but the bus bar protection was kept enabled for 220kV Bus-2.*

- *On 06.10.23 at 16.14hrs, transient B phase to ground fault got developed in in 220kV Bamra – Tarkera line and distance relay at Budhipadar end for 220kV Budhipadar-Bamra line sensed B phase fault in Zone-3.*
- *Further, as the BU of 220kV Budhipadar-Bamra line at Budhipadar GSS was defective and a fault current of 220kV Bamra-Tarkera line was sensed by the Bus bar relay, the incoming current and outgoing current of 220kV Bus-2 got mismatched leading to a flow of differential current and thereby resulted in Bus-bar relay operation for 220kV Bus-2. Therefore, all the elements connected to Bus-2 got tripped and Bus-2 became dead.*

Regarding remedial actions, they intimated that the bus bar protection for 220kV Bus-2 has been made disabled and it would be in disabled condition till replacement of the defective Bay Unit of Bus bar protection relay for 220kV Budhipadar -Bamra line.

PCC advised to replace the defective bay unit at the earliest and restore the busbar protection for bus-2 thereafter.

- **Tripping of 220 kV Main Bus-1 at Ramchandrapur on 20.10.23 at 00:11 Hrs**

JUSNL representative informed that bus bar differential relay of 220 kV Bus-1 at Ramchandrapur operated due to maloperation of LBB relay resulting in tripping of 220 kV Bus 1 subsequently all connected elements got tripped.

On enquiry from PCC, JUSNL representative replied that there was no fault in line, so it is expected that due to some issue in logic of LBB protection, bus tripping had occurred. He further informed that matter had been communicated to CRITL team of JUSNL.

PCC advised CRITL, JUSNL to so investigation for maloperation of LBB protection and submit report to ERPC/ERLDC.

ITEM NO. B.6: Repeated tripping of 220 kV Darbhanga (DMTCL)-Laukahi D/c

It has been observed that 220 kV Darbhanga (DMTCL)-Laukahi D/c had tripped quite frequently (18 times) in last three months. Details is attached at **Annexure B.6.**

BSPTCL may explain.

<u>Deliberation in the meeting</u>

BSPTCL representative informed that 220 kV Darbhanga (DMTCL)-Laukahi D/C line passes through low lying land which remain waterlogged most of the times. Also, the line passes through forest area. Due to above reason, the vegetation issues could not be attended periodically which led to tripping of the line.

He added that patrolling was done on 29th Oct and 30th Oct in which various locations had been identified where bamboo tree cutting and clearance of vegetation is required. He also informed that it is further planned to conduct tower top patrolling after Chath Puja so that towers having damaged insulators can be identified.

ERLDC representative informed that in all of tripping incidents, it is observed that line was charged after 15-20 minutes which means fault was transient in nature.

PCC advised BSPTCL representative to rectify all vegetation issues and replace the damaged insulators at earliest so that further tripping of line is not observed.

ITEM NO. B.7: Repeated Tripping of Transmission Lines in the month of September and October'23

S.No.	Name of the Element	No. of times Tripped	Remarks	Utility
1	220 kV Ranchi-Mejia-1	6	R_N fault in 4 instances.	DVC
2	220 kV Rengali(PG)-Rengali(OPTCL)-1	6	No fault in line. Tripped from OTPCL end only	OPTCL
3	400 kV PPSP-Bidhannagar-2	6	Line charged within 30 minutes in 4 cases. 5 out of 6 faults in B_ph	WBSETCL
4	400 kV Lapanga-Sterlite-2	4	R_N fault in all cases. Fault around 3 km from Sterlite in 3 instances.	OPTCL

Concerned utilities may explain.

Deliberation in the meeting

- ***Repeated Tripping of 220 kV Ranchi-Mejia-1***

DVC representative informed that the fault wasobserved at 45- 46 km stretch from Mejia end due to clearance issues on account of crossing of LV lines. The same have been attended and no such tripping has been observed henceforth.

- ***Repeated Tripping of 220 kV Rengali(PG)-Rengali(OPTCL)-1***

OPTCL representative was not available in the meeting.

- ***Repeated Tripping of 400 kV PPSP-Bidhannagar-2***

WBSETCL representative informed that in 3 number of tripping incidents, permanent fault was present. For remaining 3 incidents, fault was transient in nature, but due to non-operation of auto-recloser, the line got tripped. He added that auto-recloser scheme was not enabled for the line due to technical reasons at PPSP end(as per the advice of OEM of PPSP units).

- ***Repeated Tripping of 400 kV Lapanga-Sterlite-2***

OPTCL representative was not available in the meeting.

ITEM NO. B.8: Tripping Incidence in month of Sep 2023 and Oct 2023

Single line tripping incidents in the month of Sep 2023 and Oct 2023 which needs explanation from constituents of either end is attached.

Members may discuss.

Deliberation in the meeting

*Explanation from constituents for Single line tripping incidents in the month of Sep 2023 and Oct 2023 is attached at **Annexure B.8.***

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.

Members may discuss.

Deliberation in the meeting

ERPC representative informed that as per IEGC Regulations 2023, all utilities in Eastern Region shall conduct internal audit of their protection systems annually for all substations of 220 kV and above (132 kV and above S/s in case of Sikkim). In this regard, an annual audit plan for the next financial year shall be submitted by the users to ERPC by 31st October therefore all utilities are requested to submit the annual audit plan for FY 2024-25 to ERPC at the earliest.

PCC advised all utilities to submit internal protection audit plan for FY 2024-25 to ERPC at the earliest.

ITEM NO. C.2: Submission of protection settings for newly charged elements/change in network configuration

In 123rd PCC Meeting, PCC advised all the utilities to intimate any changes in network configuration in their intra state network regularly and review the settings accordingly & upload the relay settings in PDMS by using DMNS portal or by sending the settings file in desired format to erpc-protection@gov.in.

The updated status of protection settings for new elements charged in ER Grid from Nov 22 to Oct 2023 is given at **Annexure C.2.**

Members may update.

Deliberation in the meeting

PRDC representative informed that few numbers of protection settings are pending from BSPTCL and NTPC.

PCC advised concerned utilities to share protection settings to PRDC so that it can be updated in protection database.

ITEM NO. C.3: Follow-up of Decisions of the Previous Protection Sub-Committee Meeting(s)

The decisions of previous PCC meetings are attached.

Members may update the latest status.

Deliberation in the meeting

Updated status of decisions of previous PCC meetings are attached at ***Annexure C.3.***

******

Annexure A

Participants in 130th Protection Coordination Sub- Committee Meeting

Venue: ERPC Conference Hall, Kolkata | Time: 11:00 hrs | Date: 10.11.2023(Friday)

Sl No	Name	Designation/ Organization	Contact Number	Email	Signature
1	**Shri N.S. Mondal**	**Member Secretary, ERPC**	**9958389967**	**mserpc-power@gov.in**	
2	**Shri R. Sutradhar**	**Executive Director, ERLDC**			
3	P. P. Jena	EE, ERPC	9776198991	ppjenaerpc@gov.in	
4	Kumar satya	AEE ERPC	7355225072	Satyam.2436@gov.in	
5	P. K. DE	SE, ERPC	9433125844	secomml.erpc@gov.in	
6	RAHUL RAJ	AEE, BSPTCL	7979973202	RAHULRAJ.RNR@GMAIL.COM	
7	DEEPAK KUMAR	EEE/CRITL/BSPTCL	7763817776	DEEPAK.KUMAR76@BSPTCL.BIHAR.GOV.IN	
8	Suraj Kr Gupta	AEE/CRITL/BSPTCL	9262991470	Surajkumargupta.1542@rediffmail.com	
9	S.K. CHOUDHARY	Sr. Manager, TD, Dumka	7367866685	eeetransdivdumka@gmail.com	
10	PRABHAT KUMAR	MANAGER/CRITL/JUSNL	9608115449	ceCRITL.JUSNL@rediffmail	
11	Nirmal Mondal	Addl. CE, WBSETCL	9433408877	ceckdwbsetcl@gmail.com	10/11/23
12	Sanjib Kumar Das	DE, WBSETCL	9903236334	sanjib.das@wbsetcl.in	
13	Rajiv Kumar Singh	Addl. Mgr, CESC Ltd	9831869165	rajiv.singh1@rpsg.in	
14	Rajat Kumar Koley	Sr. Mgr(OS), WBPDCL	9474860642	rajatkumarkoley@gmail.com	
15	Debdas Mukherjee	Sr. Mgr. (OS), WBPDCL	9830052830	d.mukherjee@wbpdcl.co.in	

"Coming together is a beginning, staying together is progress, and working together is success." –Henry Ford

Participants in 130th Protection Coordination Sub- Committee Meeting

Venue: ERPC Conference Hall, Kolkata | Time: 11:00 hrs | Date: 10.11.2023(Friday)

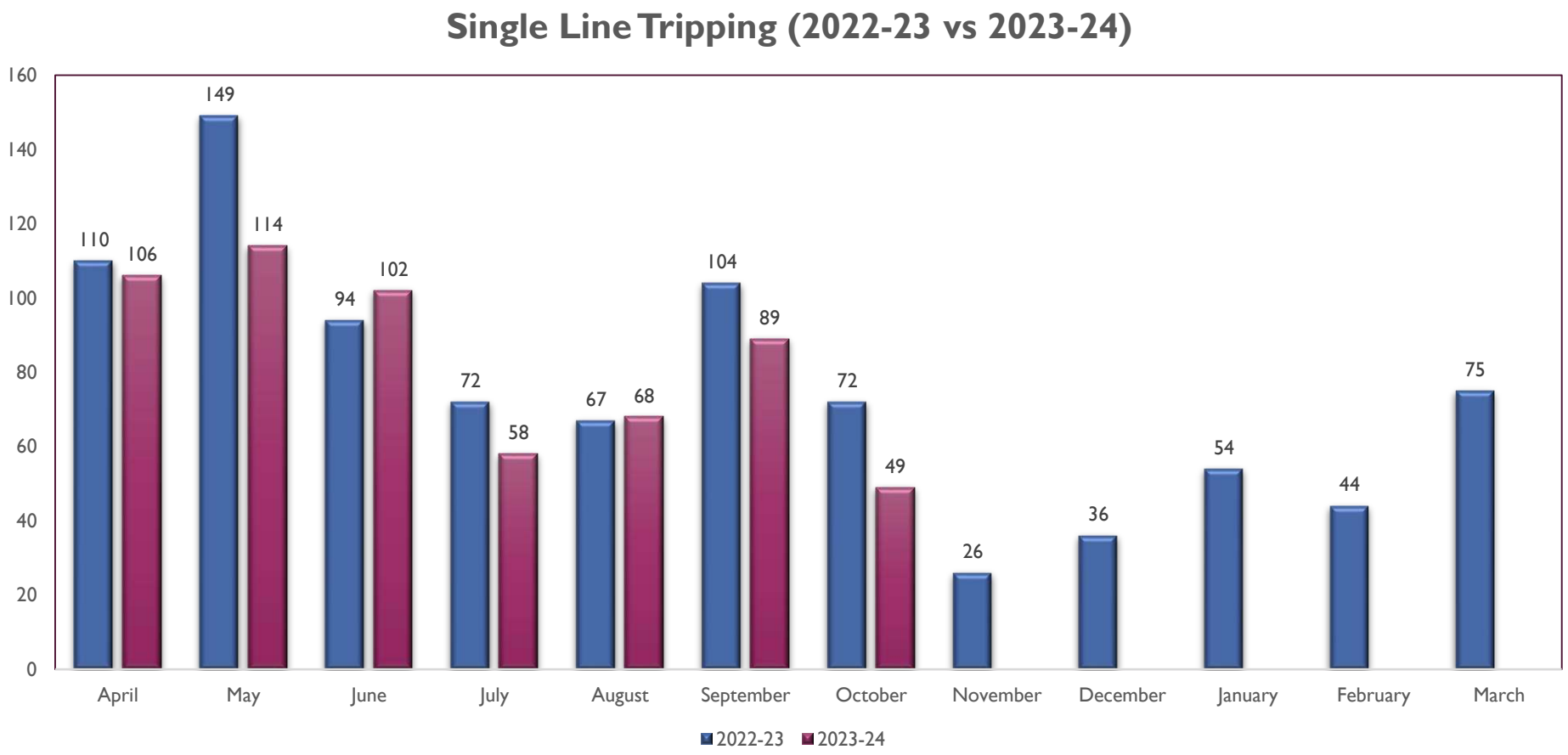
Sl No	Name	Designation/ Organization	Contact Number	Email	Signature
16	Alok Pr. Singh	Manager / ERLDC	9007285390	apsingh@grid-india.in	Alok
17	Md. Arif	Sr. Manager / DIKCHU HEP	9933370011	arif.md@greenkoenergyprojects.com	
18	Kumar Manish	Dy. Mgr / ATL	9334689726	kumar.manish@adani.com	
19	Niraj Kumar	Lead Engg / Maithon Power Ltd.	9006138188	nirajkumar@tatapower.com	
20	Jaganath Pani	Sr. Manager, NHPC Ltd	8800021271	jaganathpani@nhpc.nic.in	
21	S. MAITI	Sr. Manager, DVC	8986824841	sudiptamiti@gmail.com	S. Maiti
22	Sanjai Kr. Singh	Manager / PG ER-1	8709107611	sanjai.singh@powergrid.in	Sanjai
23	Mithun Gayen	Manager / PG ER-II	9007691056	mithun.gayen@powergrid.in	
24	Bilash Achari	DGM / ERLDC (GRID-INDIA)	7003472016	bilash.achari@grid-india.in	
25	S. Konar	GM, ERLDC	9436335370	konar_s@grid-india.in	Konar
26	Agniva Chatterjee	AEE, ERPC	8100307502	agniva.cea@gov.in	Chatterjee
27	Patrali Mondal	PRDC, Engineer	8240963527	Patrali.mondal@prdcinfotech.com	P. Mondal
28	Arindam Sanyal	PRDC / Team Lead.	7003065986	arindam.sanyal@prdcinfotech.com	
29	RANJAN DAS	MANAGER / JUSNL	7482000516	aeeetsdrop@gmail.com	
30	D.K. Khandrio	Assistant Director	7683889161	dilip.khandrio@gov.in	

"Coming together is a beginning, staying together is progress, and working together is success." –Henry Ford

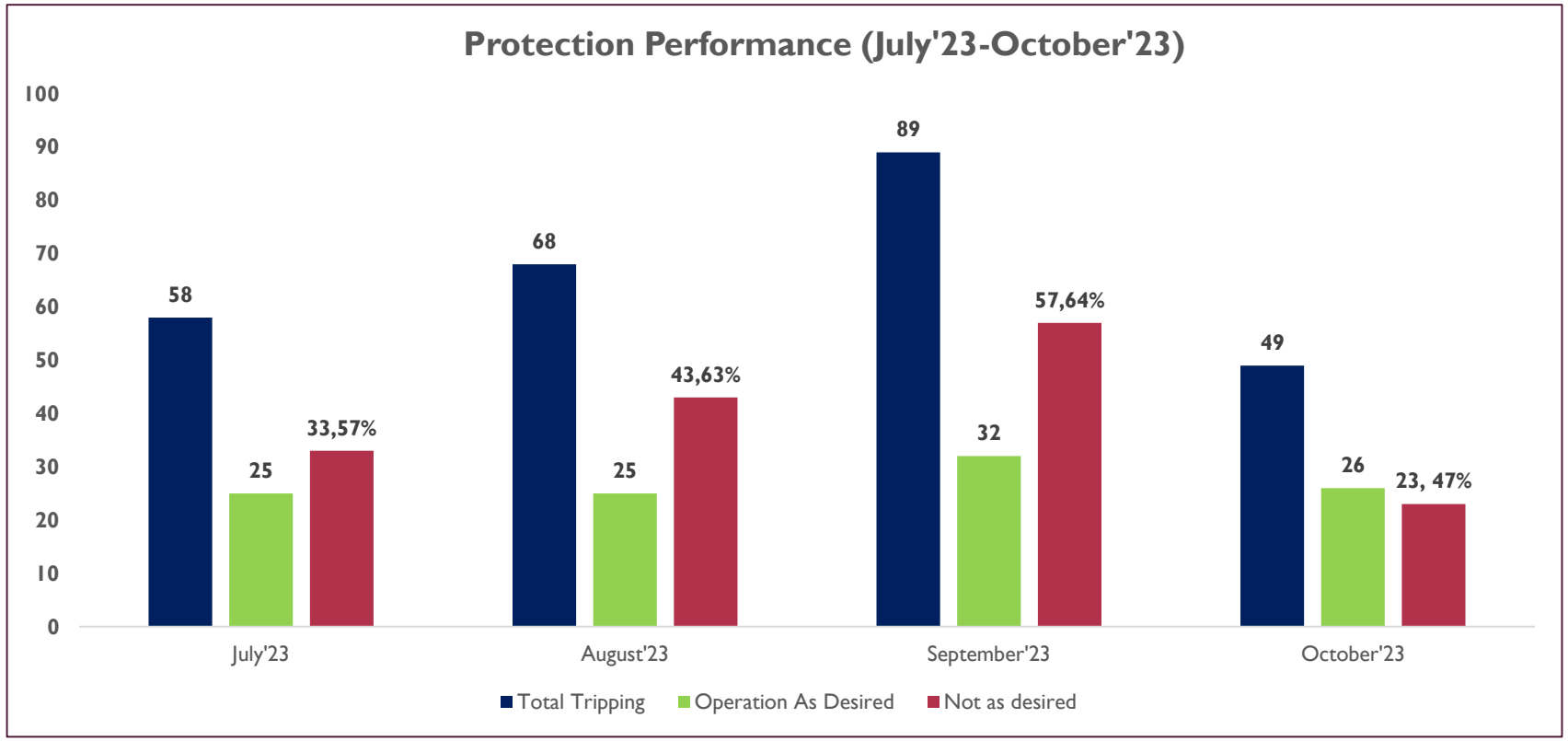
Annexure A.1

ER PROTECTION STATISTICS FOR THE MONTH OF SEPTEMBER & OCTOBER’23

SINGLE LINE TRIPPING



PROTECTION PERFORMANCE



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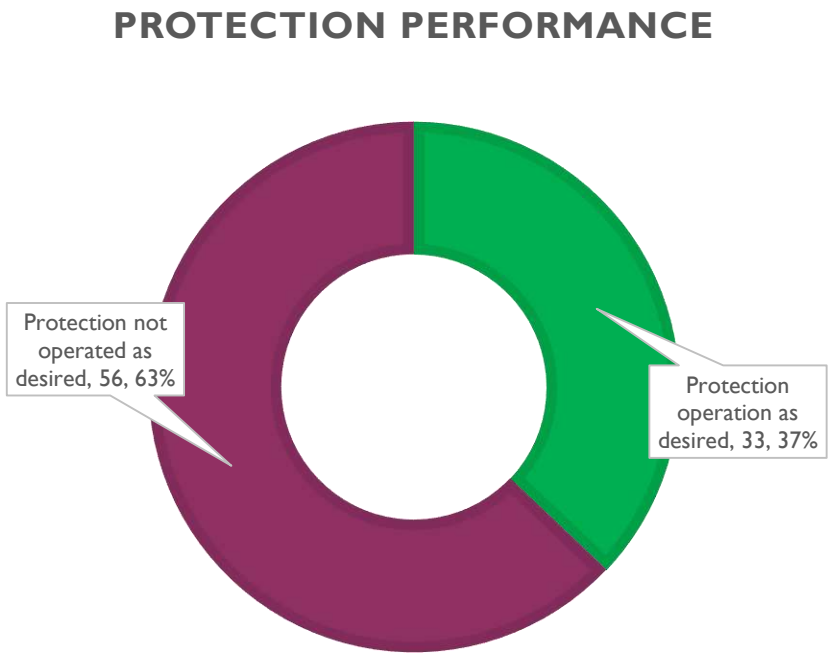
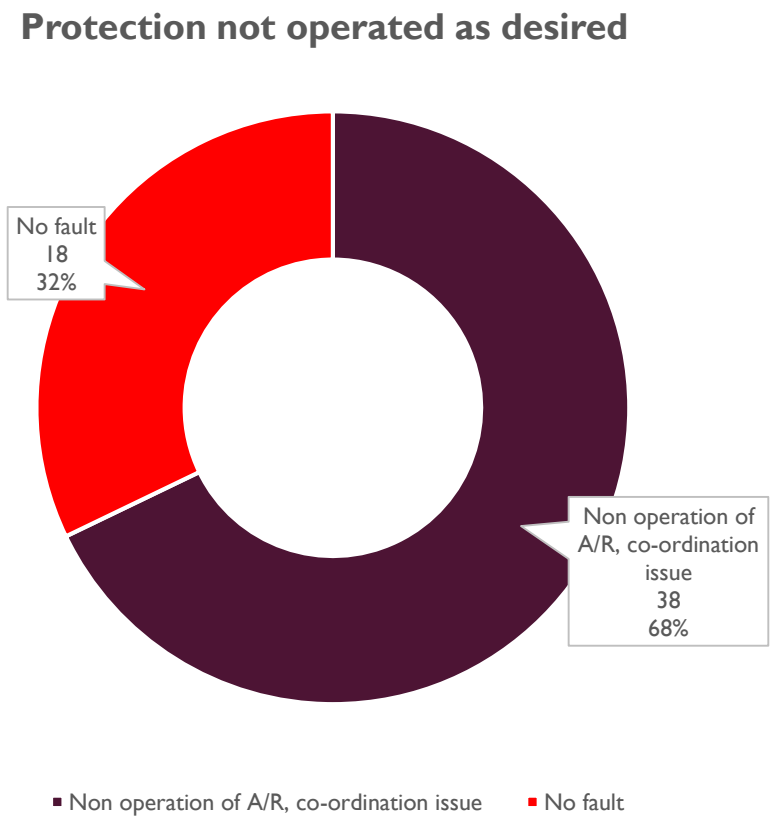
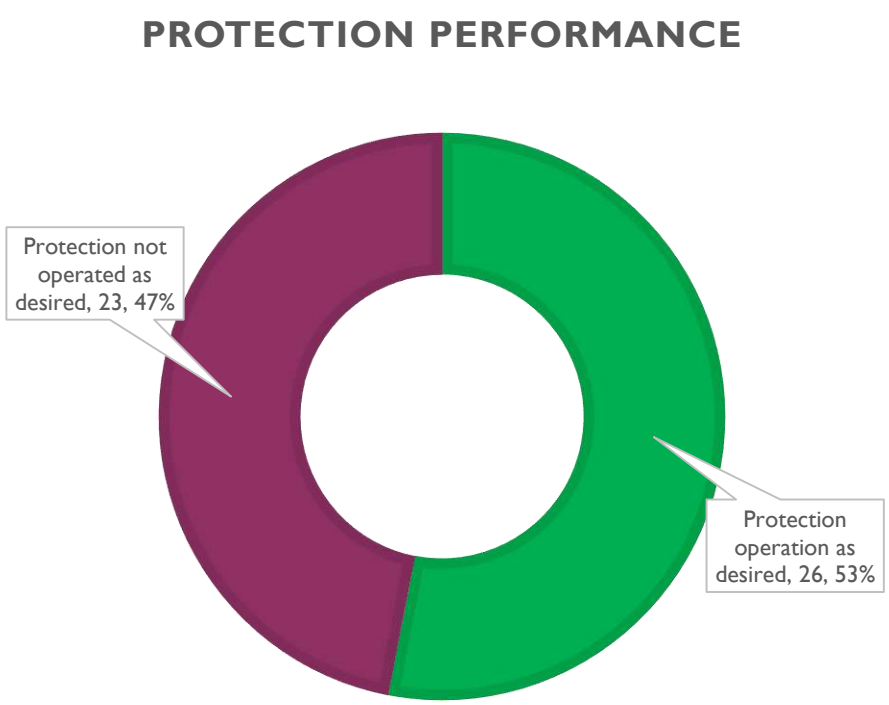
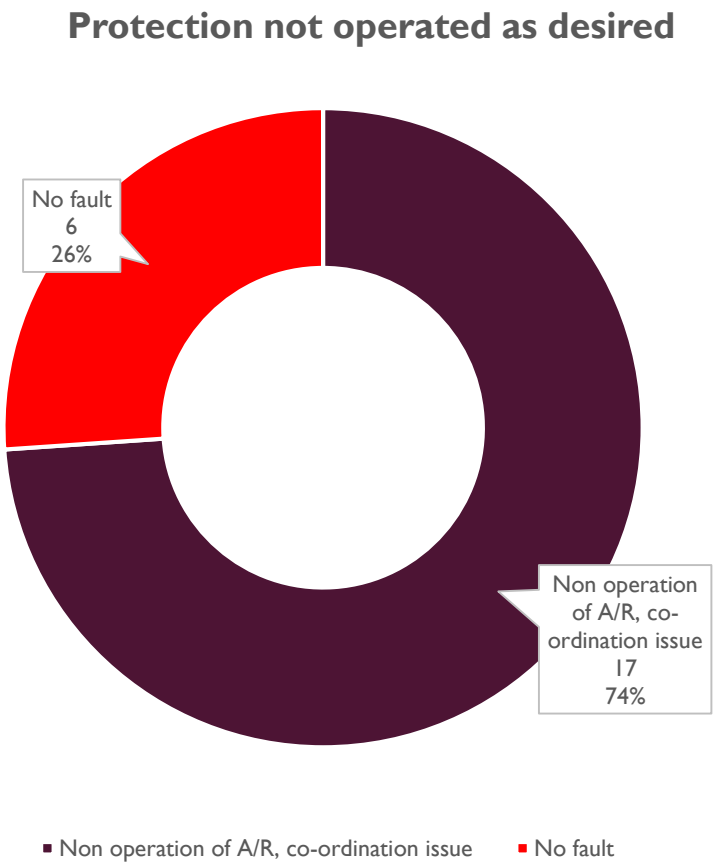


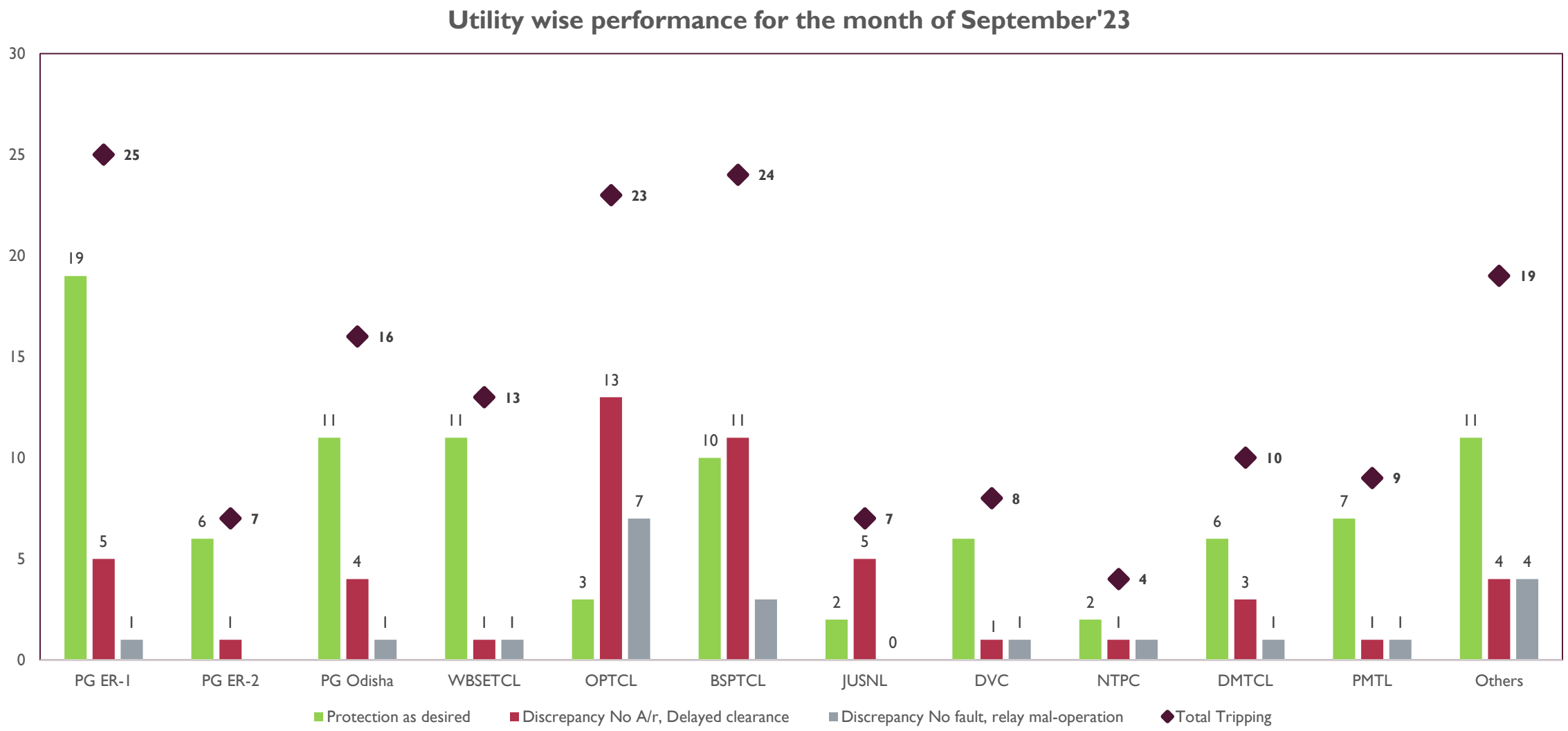


PROTECTION PERFORMANCE (OCTOBER'23)

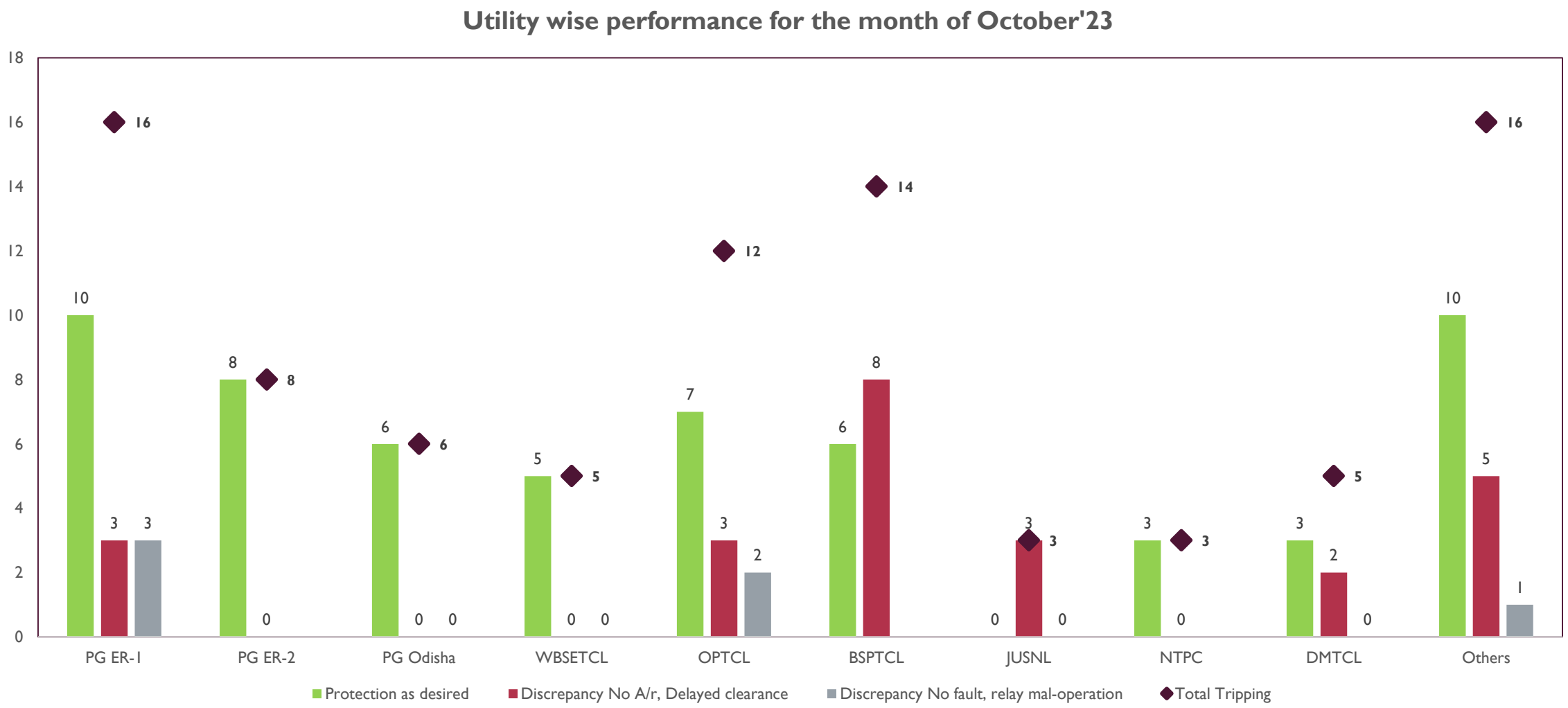




UTILITY WISE PERFORMANCE



UTILITY WISE PERFORMANCE



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, टालिगंज, कोलकाता - 700033
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 400 केवी बाढ़ एसटीपीएस उप-केन्द्र में ग्रिड घटना पर विस्तृत रिपोर्ट / Detailed Report of grid event in 400 kV Barh STPS 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):03-11-2023

1. **Event Summary (घटना का सारांश):**

At 10:15 Hrs on 27.10.2023, A/r observed in 400 kV Barh-Motihari-2 which was successful from both ends, however, teed protection operated in its tie bay at Barh, and the Dia element 400 kV Kahalgaon-Barh-2 tripped. At the same time, 660 MW U#2 at Barh also tripped on GT differential protection and 570 MW generation loss occurred.

2. **Time and Date of the Event (घटना का समय और दिनांक):** 10:15 hrs of 27.10.2023
3. **Event Category (ग्रिड घटना का प्रकार): Grid Incident (GI)-2**
4. **Location/Control Area (स्थान/नियंत्रण क्षेत्र):** Barh (Bihar)
5. **Antecedent Conditions (पूर्ववर्ती स्थिति):**

	Frequency	Regional Generation	Regional Demand
Pre-Event (घटना पूर्व)	50.006	27932	19703
Post Event (घटना के बाद)	49.976	27463	19612

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

Important Transmission Line/Unit if under outage (महत्वपूर्ण संचरण लाइने/ विधुत उत्पादन इकाइयां जो बंद है)	Nil
Weather Condition (मौसम स्थिति)	Normal weather

6. **Load and Generation loss (लोड और जेनरेशन हानि)**: Generation loss: Around 570 MW; Load loss: NIL.

7. **Duration of interruption (रुकावट की अवधि):** 08:14 Hrs

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

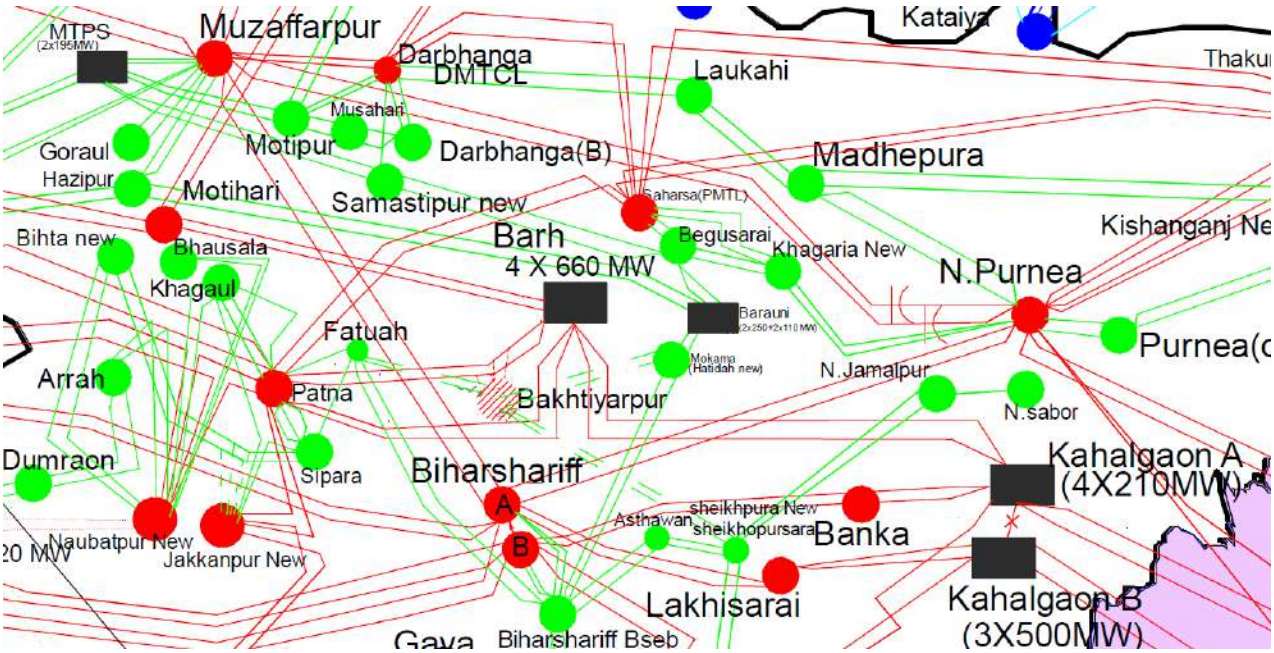


Figure 1: Network across the affected area

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

10. Major Elements Tripped (प्रमुख ट्रिपिंग)

क्रoसo	नाम	Trip time (hh:mm:ss)	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	Restoration time
1	400 kV Barh-Kahalgaon-2	10:15	Barh: Teed Protection Operated	Kahalgaon: DT received	18:29
2	660 MW U#2 at Barh	10:15	GT Differential operated		20:42

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

- Y-Earth fault struck 400 kV Barh-Motihari-2. After 1 second, A/r was successful from both ends.
- However, at the time of the fault, TEED protection operated in tie bay of this line at Barh end and its dia element, 400 kV Barh-Kahalgaon-2 tripped. DT sent to Kahalgaon and line tripped from remote end also. As reported, tie bay 22CT-B cable at relay panel end for TEE-Differential protection-2 was in loose condition. Thus, current contribution for tie bay CT was less.
- At the same time, 660 MW U#2 at Barh also tripped due to operation of GT differential protection and around 570 MW generation loss occurred. As reported, LV turret CT (Unit#2 GT-B phase) was contributing less current. Physical investigation showed that CT cable

emanating from LV turret CT of GT was damaged midway resulting in less current contribution and subsequently tripping the unit on transformer differential.

PMU Snapshot:

Figure 2: PMU Voltage snapshot of 400 kV Rangpo S/S

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

- Operation of TEED protection in tie bay during fault in one of dia element has occurred in Barh earlier also. On 22.12.20 at 06:09 Hrs, 400 kV Barh-Kahalgaon-1 tripped during fault in its dia element, 400 kV Barh-Patna-1. On 09.07.20, 400 kV Kahalgaon-1 tripped due to operation of TEED protection during a fault in 400 kV Patna-NPGC line. TB connection of all bays may be checked for loose connection. **NTPC Barh may update.**
- Due to damaged CT cable, one running unit at Barh tripped during a through fault. Provision of some alarm may be explored in case of differential beyond a threshold but less than pickup value so that any discrepancy can be detected during normal operation also. **NTPC Barh may update.**
- DR not time synchronized at Barh. Complete DR/EL yet to be received.

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

- TB tightening done for tie bay CT inputs to relay panel of 400 kV Barh-Kahalgaon-2
- Damaged CT cable of Current transformer of GT replaced.

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

S.No.	Issues	Regulation Non-Compliance	Utilities
2.	**Whether DR/EL provided within 24 Hours?**	1. IEGC section 37.2 (c) 2. CEA grid Standard 15.3	**NTPC Barh, NTPC Kahalgaon**

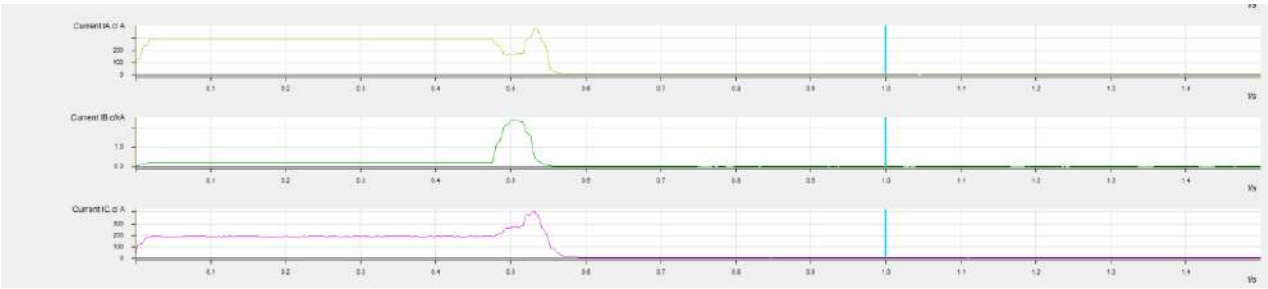
15. Key Lessons Learnt (प्रमुख अधिगम बिंदु): Nil

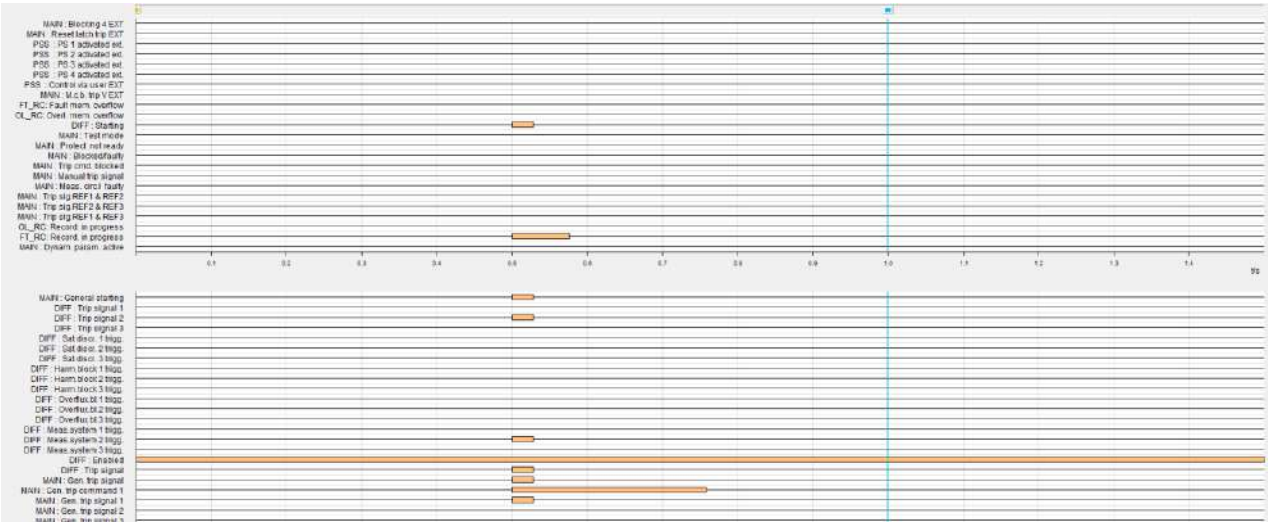
Annexure 1: (Sequence of Events-As per ERLDC SCADA)

SoE not recorded in ERLDC SCADA.

Annexure 2:

DR of 400 kV Barh-Kahalgaon-2 (Barh)





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, टालिगंज, कोलकाता - 700033
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 400 केवी तीस्ता-III, दिक्चू, तीस्ता-V उप-केन्द्र में ग्रिड घटना पर विस्तृत रिपोर्ट / Detailed Report of grid event in 400 kV Teesta-III, Dikchu, Teesta-V 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):12-10-2023

1. **Event Summary (घटना का सारांश):**

At 00:50 hrs on 04-10-2023, due to continuous high silt and rise in inflow in the upstream area of the reservoir, all units at Teesta-III (6*200 MW) (On bar gen 1300 MW) taken out of bar. 400 kV Teesta III – Dikchu & 400 kV Teesta-III -Rangpo lines were hand tripped from Teesta III HEP at 01:08 hrs and consequently Teesta-III substation became dead. Both units at Dikchu (2*48 MW) taken out of bar at 01:49 hrs due to flash flood. All units of Teesta V (3*170 MW, generating around 504 MW) were taken out of service at 02:37 hrs due to high silt. 400 kV-RANGPO-TEESTA-V-D/C tower collapsed at loc. No. 1 at 02:55 hrs and Teesta-V substation became dead. 400 kV Dikchu- Rangpo line breaker opened from Dikchu HEP at 06:15 hrs and Dikchu substation became dead.

2. **Time and Date of the Event (घटना का समय और दिनांक):** 02:55 hrs of 04.10.2023
3. **Event Category (ग्रिड घटना का प्रकार): Grid Disturbance (GD)-1**
4. **Location/Control Area (स्थान/नियंत्रण क्षेत्र):** Sikkim
5. **Antecedent Conditions (पूर्ववर्ती स्थिति):**

	Frequency	Regional Generation	Regional Demand
Pre-Event (घटना पूर्व)	49.984	27350	20289
Post Event (घटना के बाद)	49.984	27350	20289

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

Important Transmission Line/Unit if under outage (महत्वपूर्ण संचरण लाइने/ विधुत उत्पादन इकाइयां जो बंद है)	Nil
Weather Condition (मौसम स्थिति)	Incessant Rainfall in North Sikkim. GLOF event in South Lohnak lake

6. **Load and Generation loss (लोड और जेनरेशन हानि)**: Considering Teesta III, Teesta V and Dikchu, together, a total generation of approx. 1919 MW was lost during 00:50 hrs to 02:37 Hrs.

7. **Duration of interruption (रुकावट की अवधि):** Not restored yet.

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

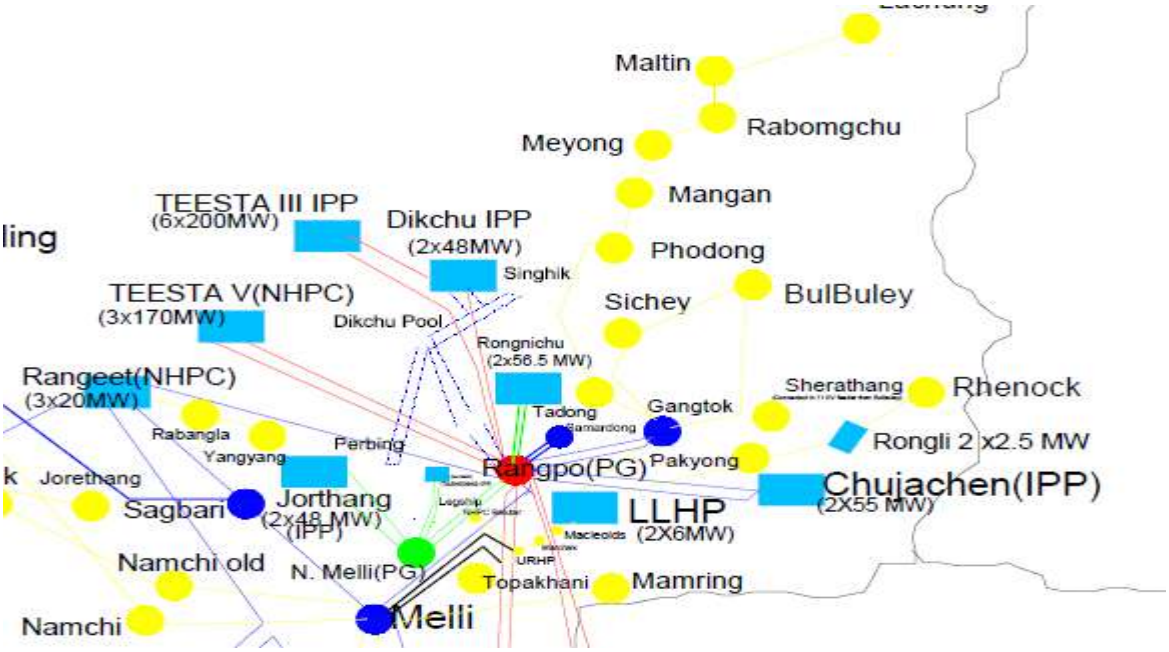


Figure 1: Network across the affected area

9. **Details of Equipment Failure (if any during the event) (उपकरण विफलता का विवरण):** Tower of 400 kV Rangpo-Teesta-V D/c collapsed at loc. No.1

10. Major Elements Tripped (प्रमुख ट्रिपिंग)

क्र०सं०	नाम	Trip time (hh:mm:ss)	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	Restoration time
1	400 kV Rangpo-Teesta V-1	02:55:13	Rangpo: R-B-Ph,11.507km,11.6kA	-	Not restored yet
2	400 kV Rangpo-Teesta V-2	02:55:12	Rangpo: Y-N,12.135km,9.21kA	-	

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

A GLOF (Glacial Lake Outburst Flood) event occurred at South Lohnak lake in North Sikkim led to high rise in inflow and silt in Teesta River. 400 kV Teesta-III, Dikchu and Teesta-V desynchronized their units one by one and around 1900 MW generation loss occurred.

Sequence of Events:

- At 00:50 Hrs: 6*200 MW units at Teesta-3 was desynchronized one by one due to high silt content.
- At 01:08 Hrs: 400 kV Teesta 3-Rangpo and 400 kV Teesta 3-Dikchu hand-tripped from Teesta-3 as a precautionary measure. 400 kV Teesta-3 S/s became dead.
- At 01:49 Hrs: 2*48 MW units at Dikchu desynchronized due to flash flood.
- At 02:37 Hrs: 3*170 MW units at Teesta-5 desynchronized due to high silt content.
- At 02:55 Hrs: 400 kV Teesta V-Rangpo D/c tower collapsed at loc. 1 just outside Teesta-5 switchyard. At 02:55:12 Hrs 400 kV Rangpo-Teesta V-2 tripped due to Y_N fault. After, 800 msec, fault appeared in B_ph of the line and three phase tripped. At the same time, 400 kV Rangpo-Teesta V-1 tripped due to phase-to-phase fault. 400 kV Teesta V S/s became dead.
- At 06:15 Hrs: 400 kV Rangpo-Dikchu hand-tripped from Dikchu end as a precautionary measure. 400 kV Dikchu S/s became dead.

PMU Snapshot:

Figure 2: PMU snapshot of 400 kV Rangpo S/S during the tower collapse of 400 kV Rangpo-Teesta-V D/c at 02:55 hrs of 04.10.23

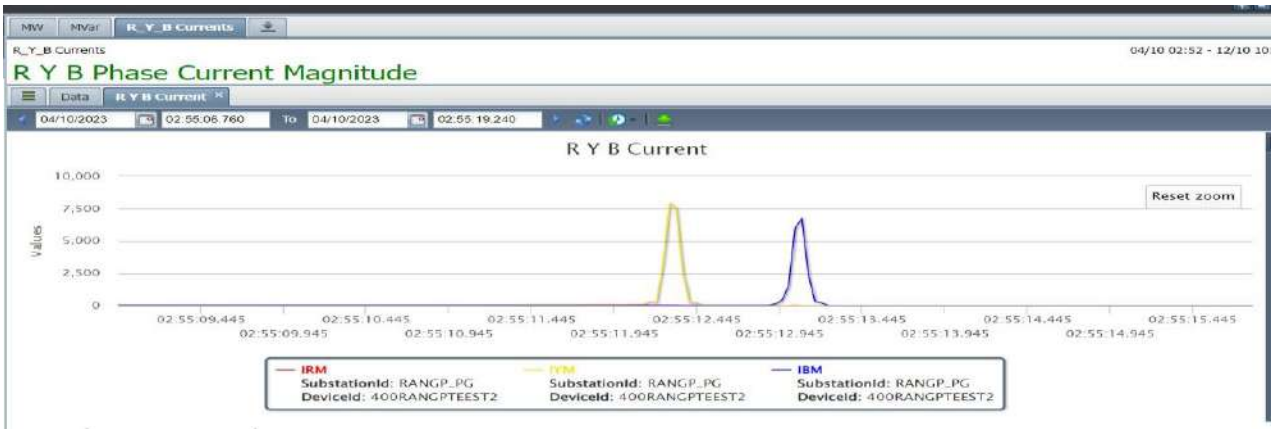


Figure 3: PMU snapshot of current of 400 kV Rangpo-Teesta V-2 @ Rangpo

SCADA Snapshot:

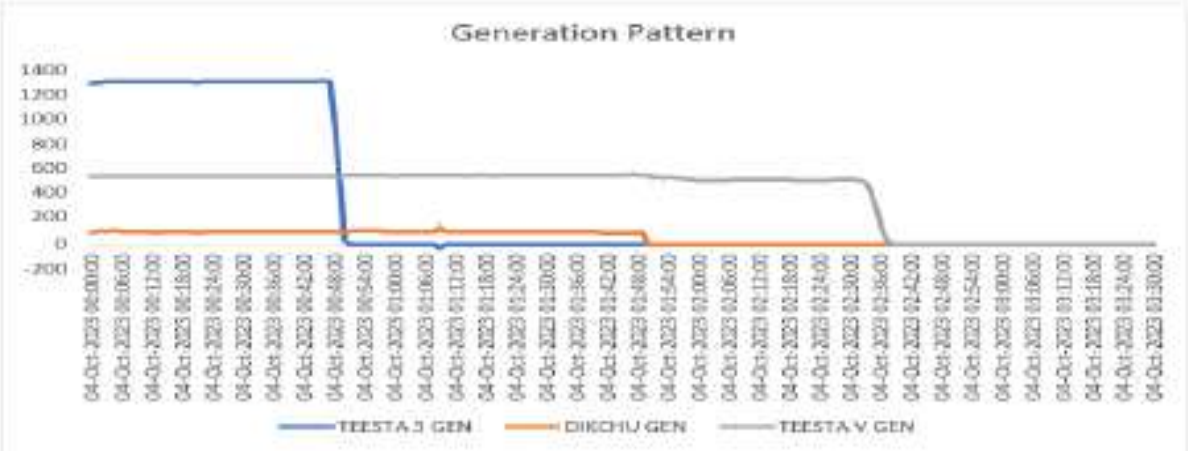


Figure 4: Generation outage sequence during the event

- In case of extreme weather event, when generation has already been desynchronized and information received about intensity of the problem, S/s may be completely isolated by hand-tripping the lines as a safety measure

12. **Protection/Operational issues observed (सुरक्षा/परिचालन संबंधी समस्या):** From PMU and SCADA data**,** no discrepancies observed in protection operation.

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

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

S.No.	Issues	Regulation Non-Compliance	Utilities
2.	**Whether DR/EL provided within 24 Hours?**	1. IEGC section 37.2 (c) 2. CEA grid Standard 15.3	**PG ER-2, Teesta V**

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

Annexure 1

SOE_PG

Date/Time	Station Name	Point Name	Value	Time Quality	Scan Quality
04/10/23 03:36:00:878	BHVDC_PG	220_ACFBank2_Capacitor5_CB	Open	Good	Good
04/10/23 03:36:00:852	BHVDC_PG	220_ACFBank2_Capacitor5_CB	Travel	Good	Good
04/10/23 03:14:00:561	PURNW_PG	220_KHAGR_BH_2_CB	Closed	Good	Good
04/10/23 03:00:51:667	CHEP__PG	132_RANGP_2_PG_Main_CB	Open	Good	Good
04/10/23 02:55:13:097	RANGP_PG	400_TEEST_PG_2_CB	Open	Good	Good
04/10/23 02:55:13:015	RANGP_PG	400_TEEST_PG_1_CB	Open	Good	Good
04/10/23 02:55:12:344	RANGP_PG	400_TEEST_PG_2_CB	Travel	Good	Good
04/10/23 02:46:33:437	BHVDC_PG	220_ACFBank2_Reactor3_CB	Closed	Good	Good
04/10/23 02:46:33:409	BHVDC_PG	220_ACFBank2_Reactor3_CB	Travel	Good	Good
04/10/23 02:41:06:633	TEEST_PG	400_RANGP_PG_2_CB	Open	Good	Good
04/10/23 02:40:57:431	TEEST_PG	400_RANGP_PG_1_CB	Open	Good	Good
04/10/23 02:37:44:261	TEEST_PG	400_Unit1_CB	Open	Good	Good
04/10/23 02:37:04:784	TEEST_PG	400_Unit3_CB	Open	Good	Good
04/10/23 02:36:10:360	TEEST_PG	400_Unit2_CB	Open	Good	Good
04/10/23 02:04:37:930	DKCHU_PG	400_ICT_1_Pri_Main_CB	Open	Good	Good
04/10/23 02:04:37:930	DKCHU_PG	400_FUTURE_1_Main_CB	Open	Good	Good
04/10/23 01:25:35:685	DKCHU_PG	400_TEES3_PG_Main_CB	Open	Good	Good
04/10/23 01:25:35:683	DKCHU_PG	400_TEES3_PG_RANGP_PG...	Open	Good	Good
04/10/23 01:25:35:664	DKCHU_PG	400_TEES3_PG_MP1	Operated	Good	Good
04/10/23 01:25:35:662	DKCHU_PG	400_TEES3_PG_MP2	Operated	Good	Good
04/10/23 00:43:20:024	PURNW_PG	400_MALDA_PG_1_Main_Bu...	Closed	Good	Good
04/10/23 00:39:39:932	PURNW_PG	400_MALDA_PG_1_Main_CB	Closed	Good	Good
04/10/23 00:38:49:760	TEES3_PG	400_DKCHU_PG_CB	Open	Good	Good
04/10/23 00:38:47:740	TEES3_PG	400_DKCHU_PG_CB	Travel	Good	Good
04/10/23 00:19:55:160	TEES3_PG	400_UNIT6_H_CB	Open	Good	Good
04/10/23 00:19:52:480	TEES3_PG	400_UNIT6_H_CB	Travel	Good	Good
04/10/23 00:19:48:700	TEES3_PG	400_UNIT3_H_CB	Open	Good	Good
04/10/23 00:19:47:620	TEES3_PG	400_UNIT5_H_CB	Open	Good	Good
04/10/23 00:19:45:740	TEES3_PG	400_UNIT3_H_CB	Travel	Good	Good

Annexure 2

DR/EL not submitted by PG ER-2, Teesta V.

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, टालिगंज, कोलकाता - 700033
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 केवी रोंगनिचू उप-केन्द्र में ग्रिड घटना पर विस्तृत रिपोर्ट / Detailed Report of grid event in 220 kV Rongnichu HEP 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):17-10-2023

1. **Event Summary (घटना का सारांश):**

At 11:13 Hrs, 220 kV Rangpo-Rongnichu-2 tripped on Y_B fault, leading to loss of evacuation path for two running units at Rongnichu as 220 kV Rangpo-Rongnichu-1 was already under emergency shutdown. Consequently, total power failed at Rongnichu S/s and around 103 MW generation loss occurred.

2. **Time and Date of the Event (घटना का समय और दिनांक):** 11:13 hrs of 09.10.2023
3. **Event Category (ग्रिड घटना का प्रकार): Grid Disturbance (GD)-1**
4. **Location/Control Area (स्थान/नियंत्रण क्षेत्र):** Sikkim
5. **Antecedent Conditions (पूर्ववर्ती स्थिति):**

	Frequency	Regional Generation	Regional Demand
Pre-Event (घटना पूर्व)	49.98	26407	22285
Post Event (घटना के बाद)	49.98	26304	22285

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

Important Transmission Line/Unit if under outage (महत्वपूर्ण संचरण लाइने/ विधुत उत्पादन इकाइयां जो बंद है)	220KV-Rongnichu-Rangpo-1 was under emergency shutdown.
Weather Condition (मौसम स्थिति)	Normal weather

6. **Load and Generation loss (लोड और जेनरेशन हानि):** Generation loss: Around 103 MW; Load loss: NIL.

7. **Duration of interruption (रुकावट की अवधि):** 06:53 Hrs

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

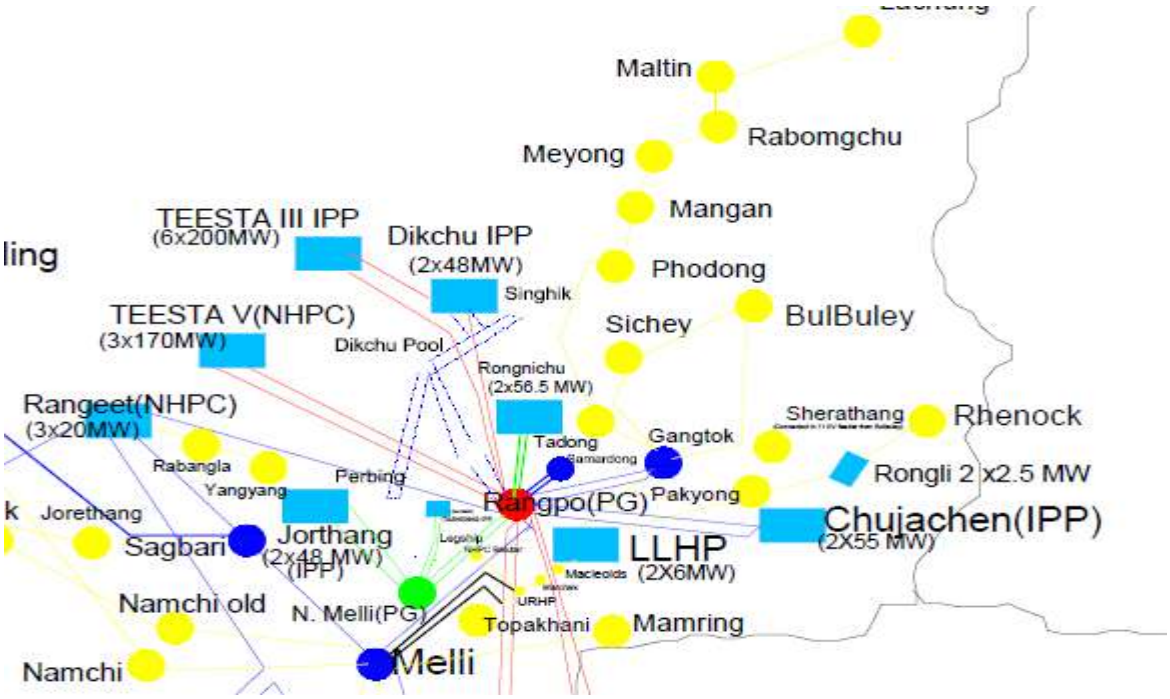


Figure 1: Network across the affected area

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

10. Major Elements Tripped (प्रमुख ट्रिपिंग)

क्र०सं०	नाम	Trip time (hh:mm:ss)	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	Restoration time
1	220 kV Rangpo-Rongnichu-2	11:13:08	Rangpo: Y_B, 1.27 km, Iy=Ib=13.18 kA	-	18:17

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

- A phase-to-phase fault struck 220 kV Rangpo-Rongnichu-2 and line tripped. Both running units at Rongnichu tripped due to loss of evacuation path as 220 kV Rangpo-Rongnichu-1 was already under emergency shutdown.
- 220 kV Rangpo-Rongnichu-1 charged at 18:04 Hrs and power supply was restored.
- DR not time synchronized at Rangpo end.

PMU Snapshot:

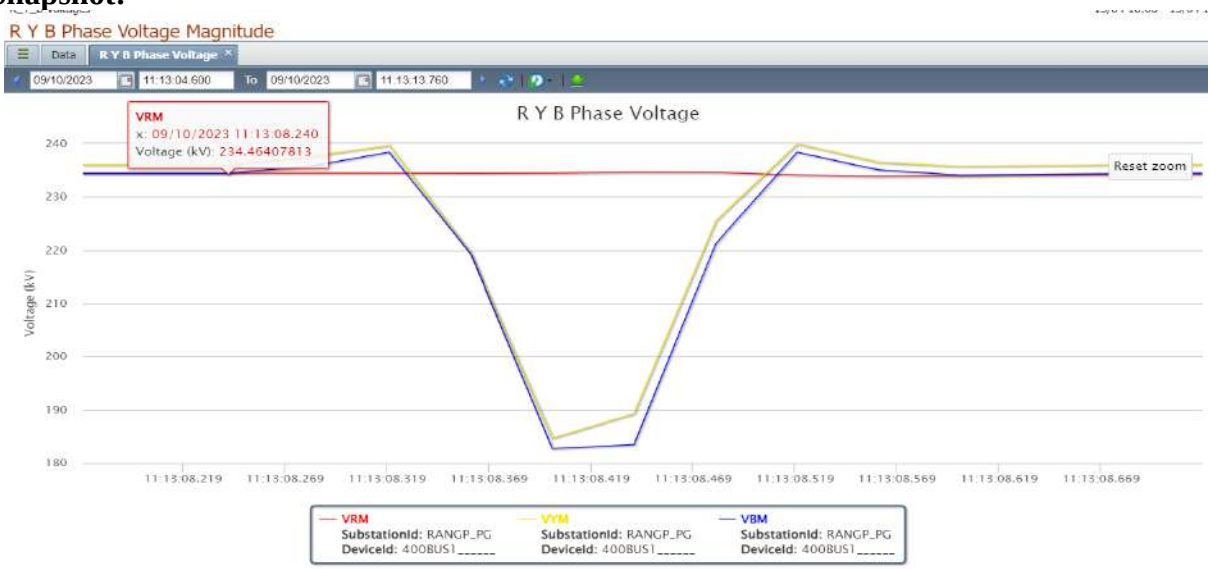


Figure 2: PMU Voltage snapshot of 400 kV Rangpo S/S

12. **Protection/Operational issues observed (सुरक्षा/परिचालन संबंधी समस्या):** No discrepancies observed in protection operation.

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

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

S.No.	Issues	Regulation Non-Compliance	Utilities
2.	**Whether DR/EL provided within 24 Hours?**	1. IEGC section 37.2 (c) 2. CEA grid Standard 15.3	**PG ER-2**

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

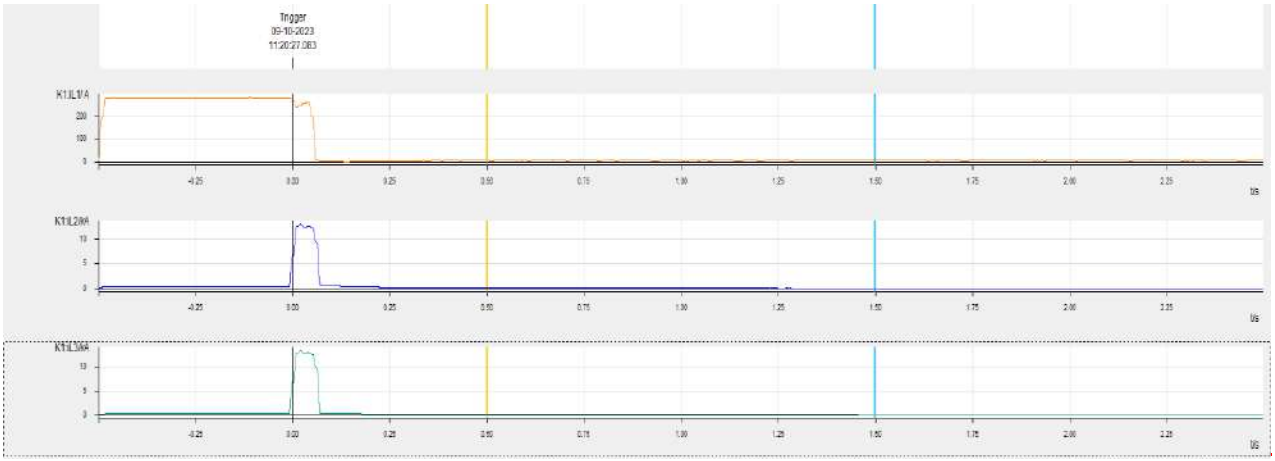
Annexure 1: (Sequence of Events-As per ERLDC SCADA)

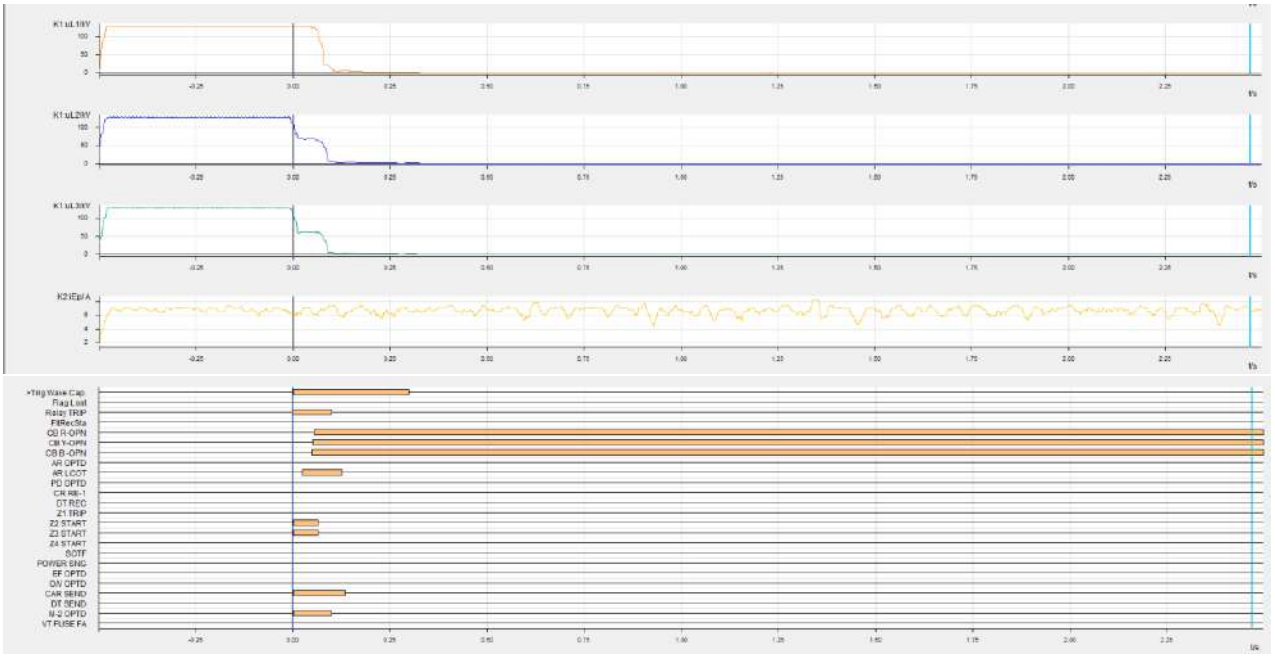
All

Date/Time	Station Name	Point Name	Value	Time Quality	Scan Quality
09/10/23 11:13:08:441	RANGP_PG	220_RONGN_PG_2_CB	Open	Good	Good
09/10/23 11:13:13:046	RONGN_PG	220_stn_trf_CB	Open	Good	Good
09/10/23 11:13:13:013	RONGN_PG	220_stn_trf_CB	Travel	Good	Good
09/10/23 11:13:09:367	RONGN_PG	220_UNIT_H_2_CB	Open	Good	Good
09/10/23 11:13:09:345	RONGN_PG	220_UNIT_H_1_CB	Open	Good	Good
09/10/23 11:13:09:344	RONGN_PG	220_UNIT_H_2_CB	Travel	Good	Good
09/10/23 11:13:09:334	RONGN_PG	220_UNIT_H_1_CB	Travel	Good	Good
09/10/23 11:13:07:982	RONGN_PG	220_RANGP_PG_2_CB	Open	Good	Good
09/10/23 11:13:07:953	RONGN_PG	220_RANGP_PG_2_CB	Travel	Good	Good

Annexure 2:

DR of 220 kV Rangpo-Rongnichu-2 (Rangpo)

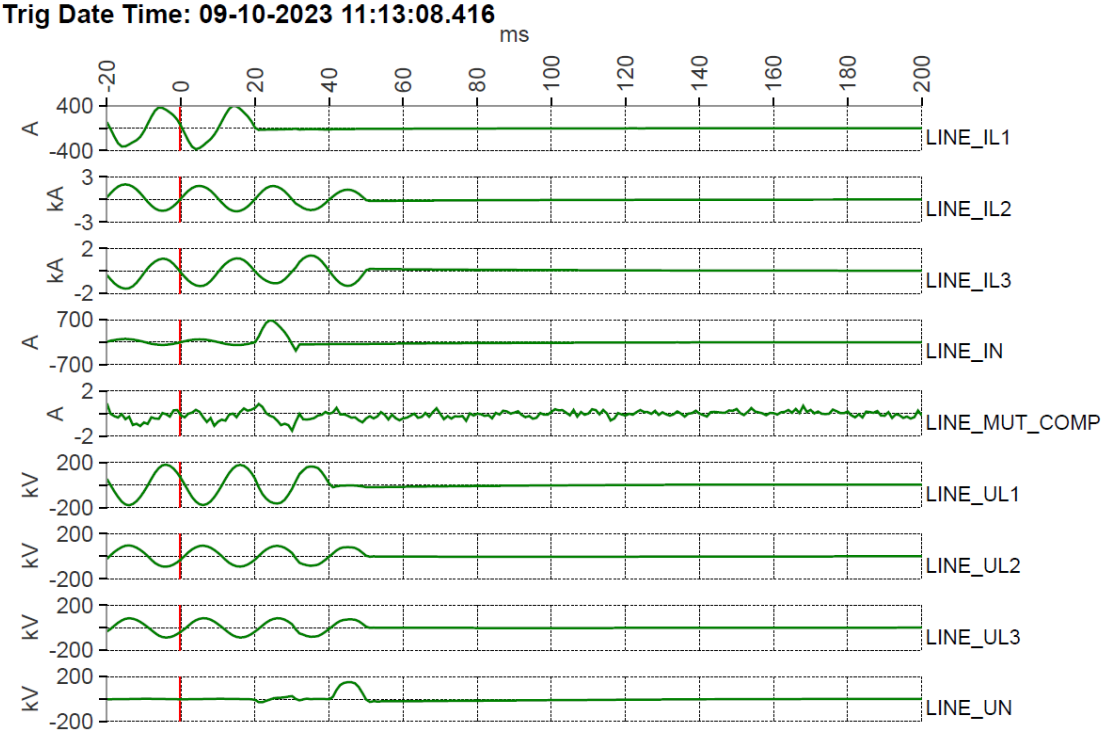




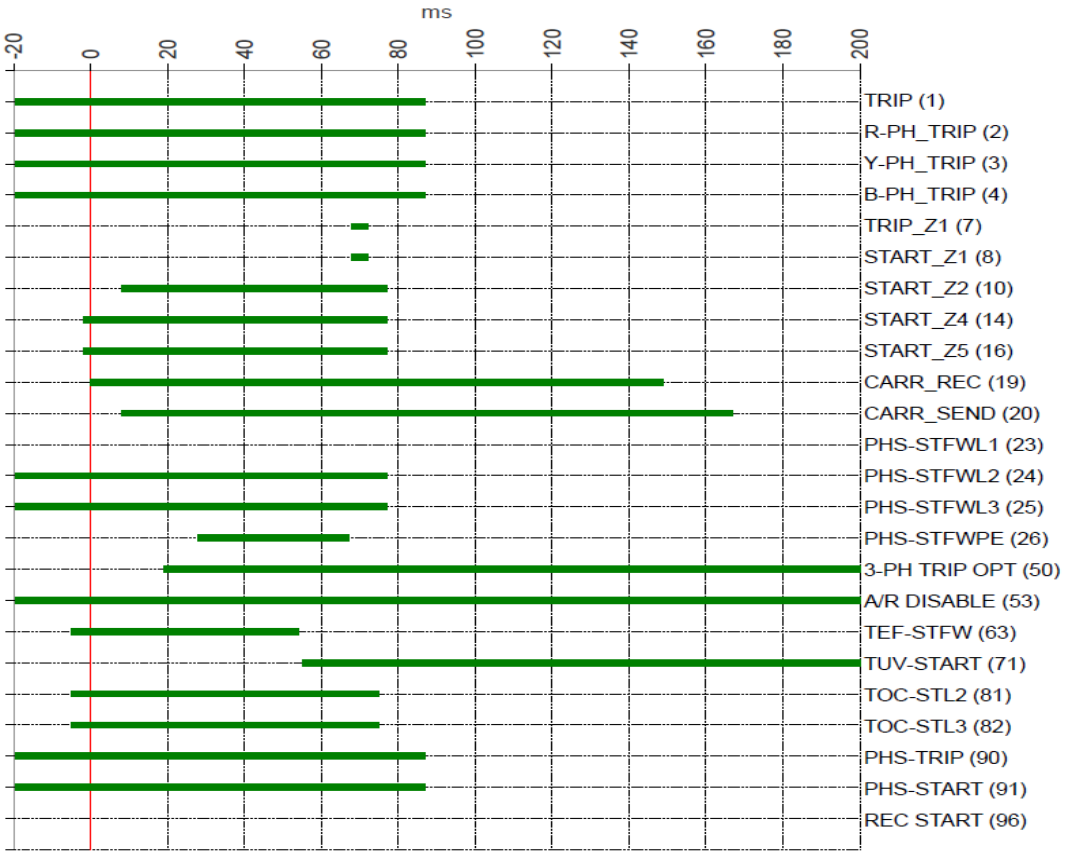
DR of 220 kV Rangpo-Rongnichu-2(Rongnichu)

Analog Time Diagram

Trig Date Time: 09-10-2023 11:13:08.416



Trig Date Time: 09-10-2023 11:13:08.416



Action Points for various utilities

An online meeting was held on 16.10.23 to discuss the Grid Disturbance that occurred at Tenughat, Govindpur, Dumka, Godda, Deoghar area on 08.09.2023 at 20:33 Hrs. Meeting was attended by participants from ERPC, ELRDC, Powergrid ER-2, JUSNL, BSPTCL, SLDC Patna.

Following action points were agreed upon which is to be undertaken by various utilities:

S. No.	Action Point	Utility
1	Replacement of defective Digital Protection coupler of 220 kV Maithon-Dumka-1. A/r may be enabled for Zone-1 without DTPC till replacement.	JUSNL
2	Rectification of DTPC issues for 220 kV Maithon-Dumka-2 at Maithon end	JUSNL, PG ER-2
3	Periodic patrolling and preventive maintenance of the line to prevent repeated tripping of 220 kV Maithon-Dumka D/c	JUSNL
4	E/f setting of 220 kV Maithon-Dumka-2 at Dumka end (May intimate the revised setting)	JUSNL
5	Increasing O/c setting value at Biharsharif end for 220 kV Biharsharif-Tenughat. O/c setting for other lines at Biharsharif also may be reviewed once.	BSPTCL
6	SPS for 220 kV Maithon-Dumka D/c (To be discussed in next OCC meeting)	JUSNL

Concerned utilities may update after making abovementioned changes.

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

घटना संख्या: **08-09-2023/1** दिनांक: **05-10-2023**

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

Summary of the event (घटना का सारांश):

At 20:30 Hrs, 220 kV Maithon-Dumka-1 tripped due to R_N fault leading to increased loading of 220 kV maithon-Dumka-2, which tripped at 20:33 Hrs due to R_N fault. After 12 seconds, 220 kV Tenughat-Biharsharif also tripped from Biharsharif. This led to islanding of entire Tenughat, Govindpur, Dumka, Godda, Deoghar complex with only one unit of Tenughat (140 MW generation) and 410 MW load, which did not survive, and the island collapsed immediately.

- **Date / Time of disturbance:** 08-09-2023 at 20:33 hrs
- **Event type:** GD-1
- **Systems/ Subsystems affected:** 220/132 kV Tenughat, Dumka, Govindpur, Godda, Jaisidh, Giridih S/s
- **Load and Generation loss**.
  - 140 MW generation loss reported during the event.
  - Around 410 MW load loss reported during the event at Dumka, Govindpur, Godda, Jaisidih, Giridih, Deoghar, Pakur, Rajmahal (Including Railway) by Jharkhand SLDC.

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

- 220 kV Godda-Lalmatia D/c

Major elements tripped (प्रमुख ट्रिपिंग):

- 220 kV Maithon-Dumka D/c
- 220 kV Biharsharif-Tenughat
- 210 MW U#2 at Tenughat

Network across the affected area (प्रभावित क्षेत्र का नक्शा)

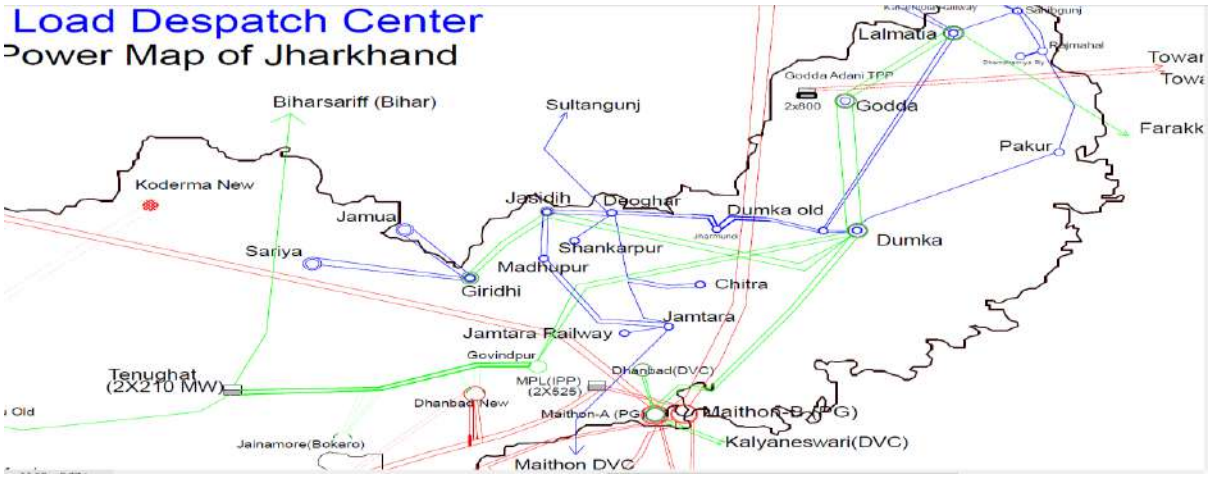


Figure 1: Network across the affected area

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

समय	नाम	उप केंद्र 1 रिले संकेत	उप केंद्र 2 रिले संकेत	पीएमयू पर्यवेक्षण
20:30	220 kV Maithon-Dumka-1	Maithon: R_N, 12.1 km, 8.6 kA	Dumka: R_N, 50.94 km, 1.33 kA	Around 55 kV dip in R_ph voltage at Maithon. Fault clearance time:100 msec
20:33	220 kV Maithon-Dumka-2	Maithon: R_N, 13.4 km, 9.07 kA	Dumka: R_N	Around 50 kV dip in R_ph voltage at Maithon. Fault clearance time:100 msec
20:33	220 kV Biharsharif-Tenughat	Biharsharif: O/c St.1 (Y_ph)	Tenughat: Did not trip	No fault observed from PMU
20:33	210 MW U#2 at Tenughat	Under-frequency after islanding		

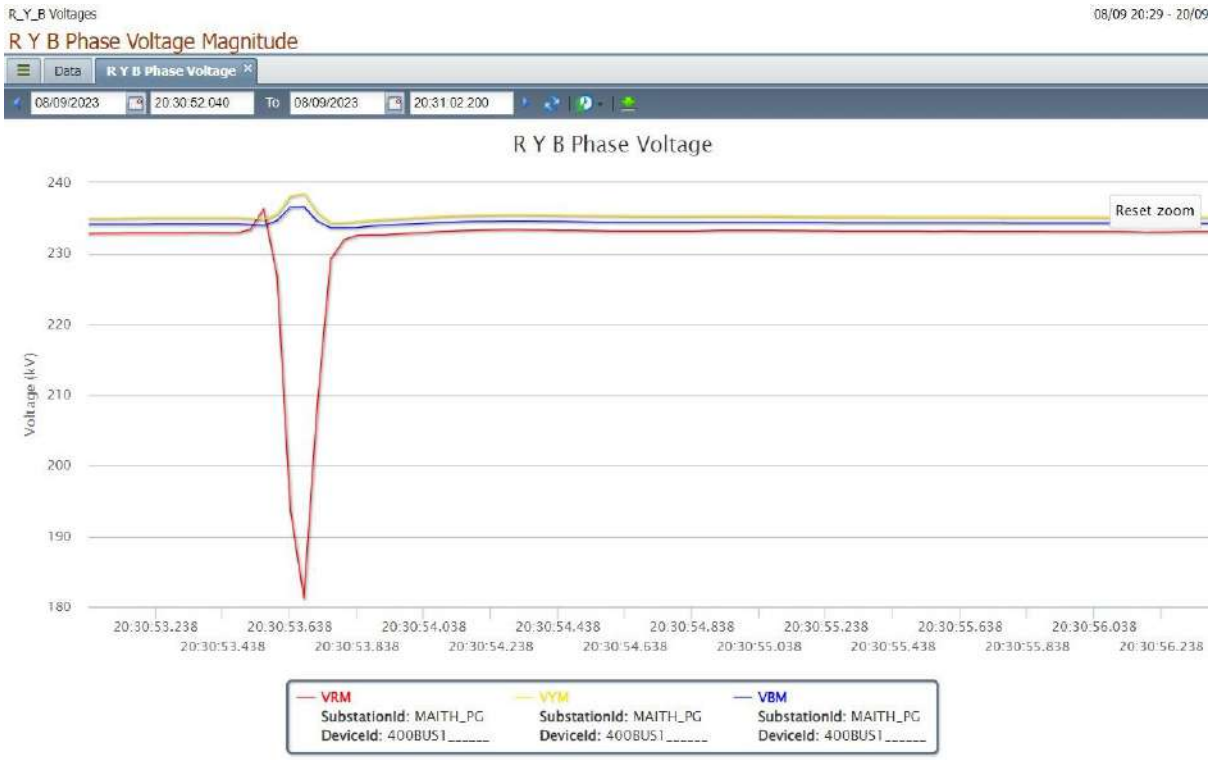


Figure 2: PMU snapshot of 400/220 kV Maithon S/s (220 kV Maithon-Dumka-1 @ 20:30)

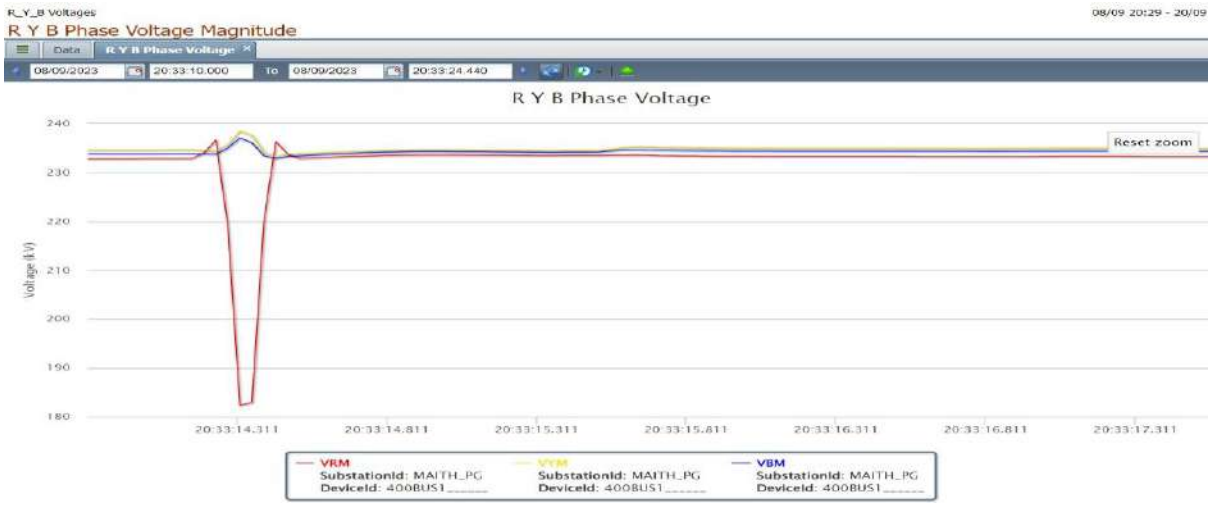


Figure 3: PMU snapshot of 400/220 kV Maithon S/s (220 kV Maithon-Dumka-2 @ 20:33)

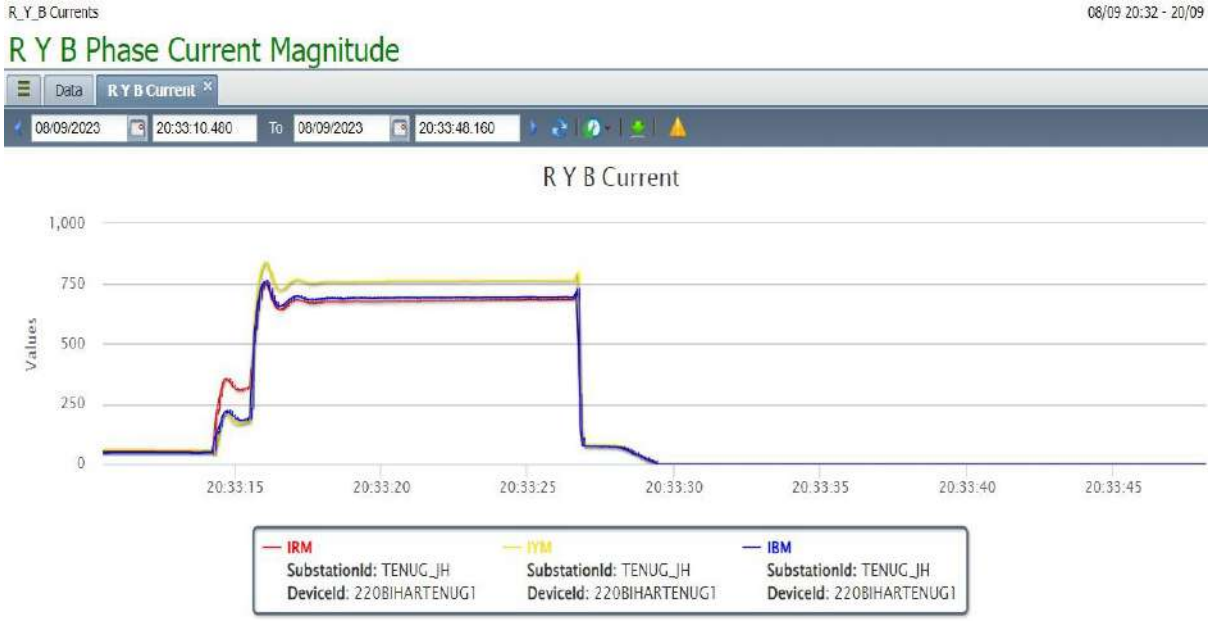


Figure 4: PMU snapshot of 220 kV Tenughat-Biharsharif @ Tenughat

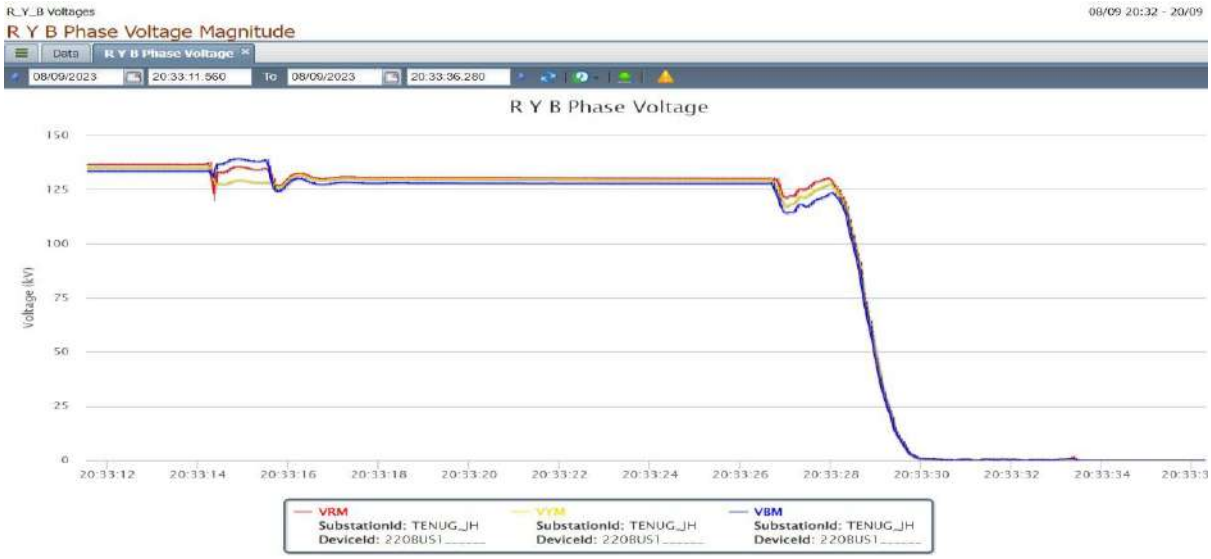


Figure 5: PMU snapshot of 220 kV Tenughat S/s

Restoration (पूर्वावस्था की प्रप्ति)

Transmission/Generation element name	Restoration time
220 kV Maithon-Dumka-1	20:57
220 kV Maithon-Dumka-2	21:08
220 kV Biharsharif-Tenughat	20:57
210 MW U#2 at Tenughat	04:55 (09.09.23)

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

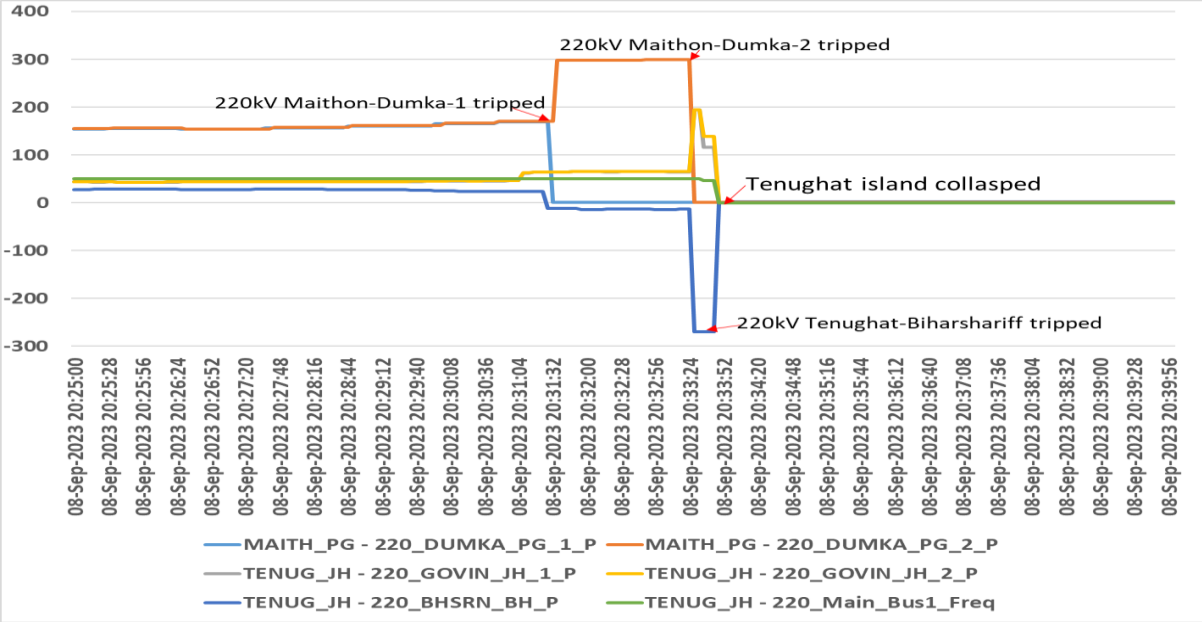


Figure 6: SCADA line flow of various lines during the event

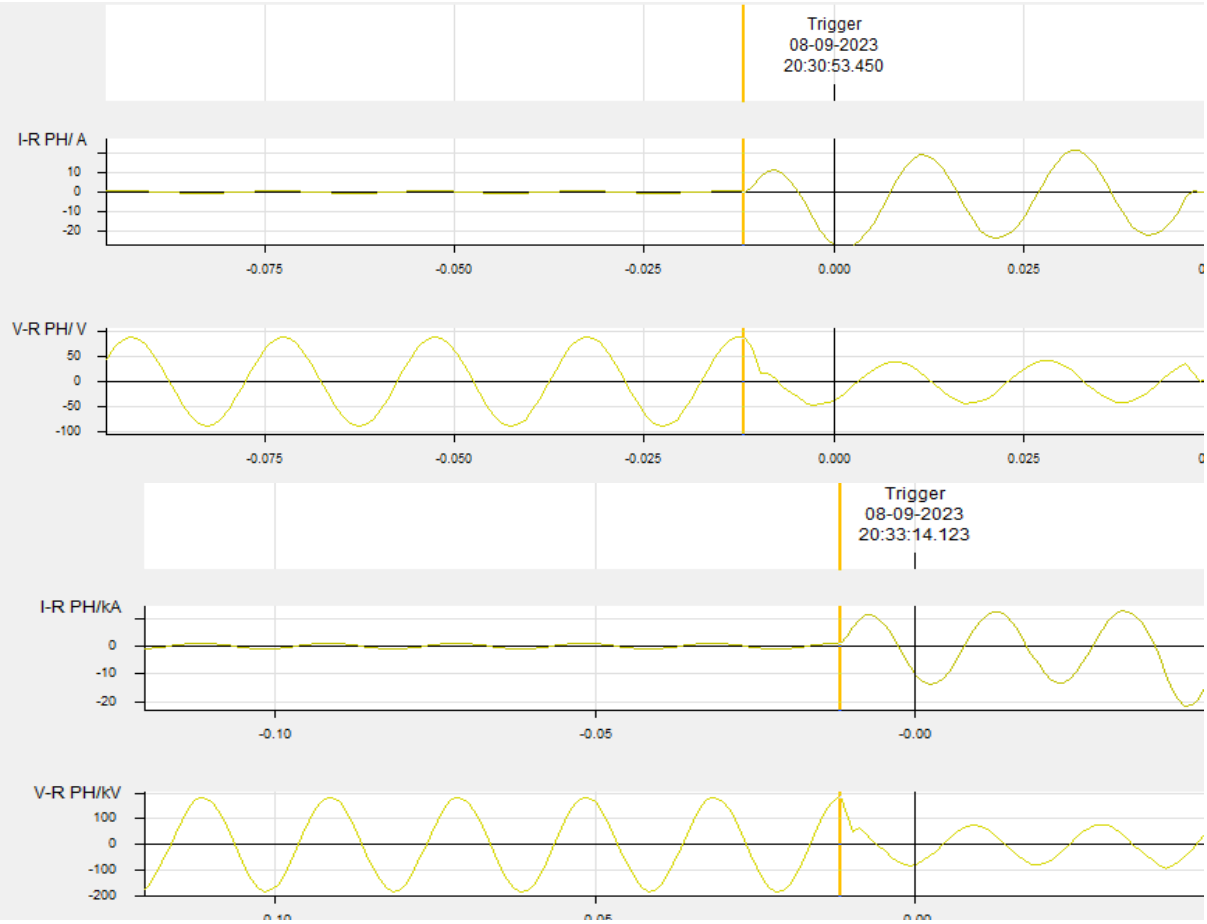
Sequence of Events & Issues observed:

- At 20:30:53 Hrs: R_N fault struck 220 kV Maithon-Dumka-1 line. As reported, A/r was successful from Maithon end only. Nonoperation of A/r at Dumka end has been flagged many times. JUSNL may update.

- At 20:33:14 Hrs: R_N fault struck 220 kV Maithon-Dumka-2 line. A/r was successful from Dumka end. However, SOTF also initiated and three phase tripped and DT sent to Maithon end. A/r lockout immediately appeared at Maithon end after first tripping instance. **PG ER-2 may explain.** Why SOTF initiated after A/r at Dumka as current was very low? **JUSNL may explain.**

- A/R scheme at both ends may be tested completely and resolved to avoid such disturbances again , If A/R would have operated properly there would not have been such disturbance and load loss.

- Both lines tripped with same phase and same fault location and fault was of transient nature , it is suspected to be some clearance /vegetation issue's . proper ROW clearance clearance and tree trimming to be done. **JUSNL may update**.
- Below DR attached shows that at both instances fault started at voltage peak indicating vegetation fault.



- At 20:33:27 Hrs: 220 kV Tenughat-Biharsharif tripped from Biharsharif end only on O/c Stage-1 and Tenughat with Dumka, Govindpur and other loads got islanded. O/c setting at Biharsharif **end (set at 750 A) may be disabled**. **Reason for keeping such low O/C setting may also be explained as the line has been reconductored to HTLS**. **BSPTCL may update.**

- At 20:33:28 Hrs: Tenughat island with 140 MW generation and around 450 MW load collapsed.

- DRs at Dumka end are not time synchronized, digital channels are also not configured properly. **JUSNL may update.**

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

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

Status of Reporting (रिपोर्टिंग की स्थिति):

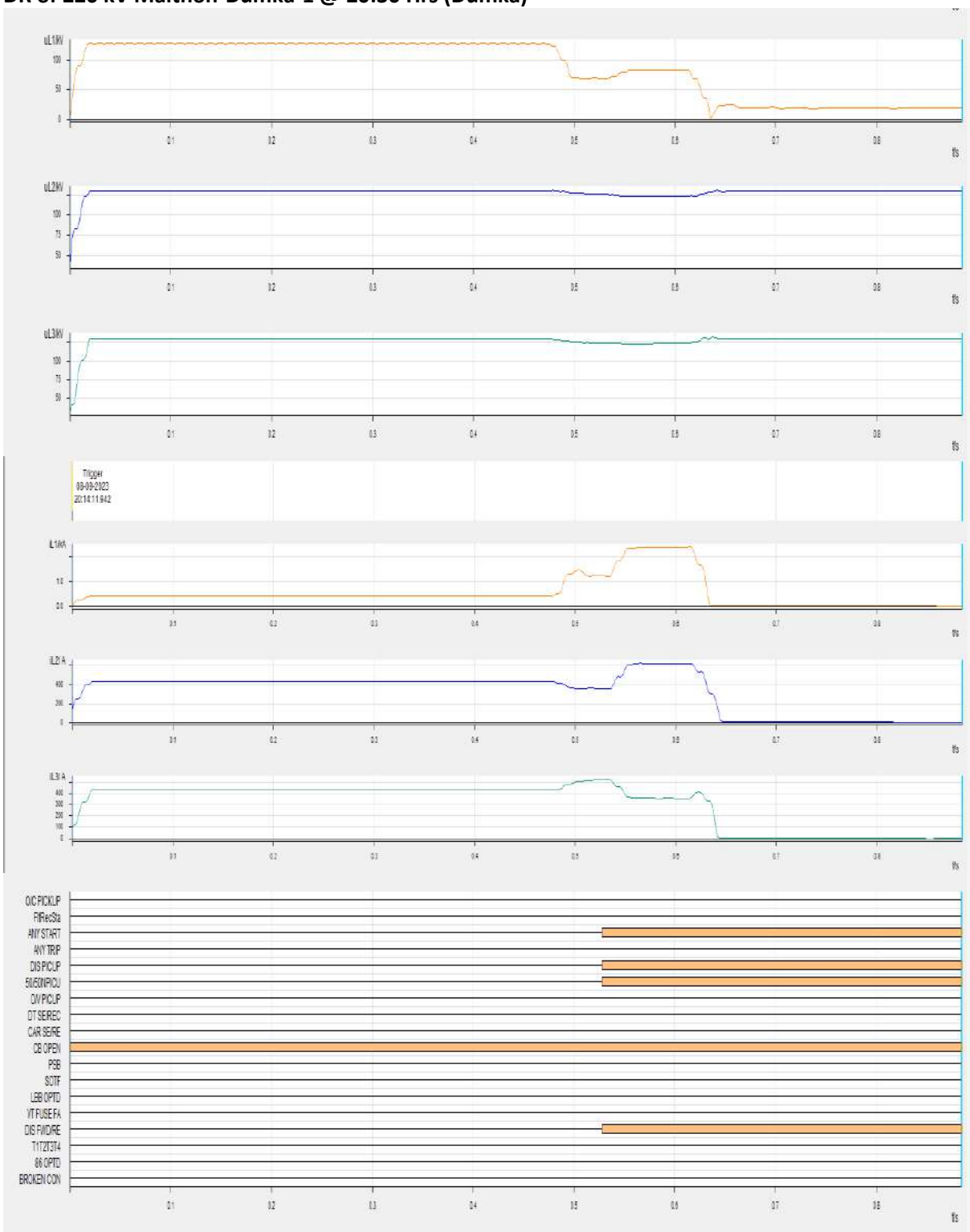
- DR/EL received from JUSNL, PG ER-2, BSPTCL.

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

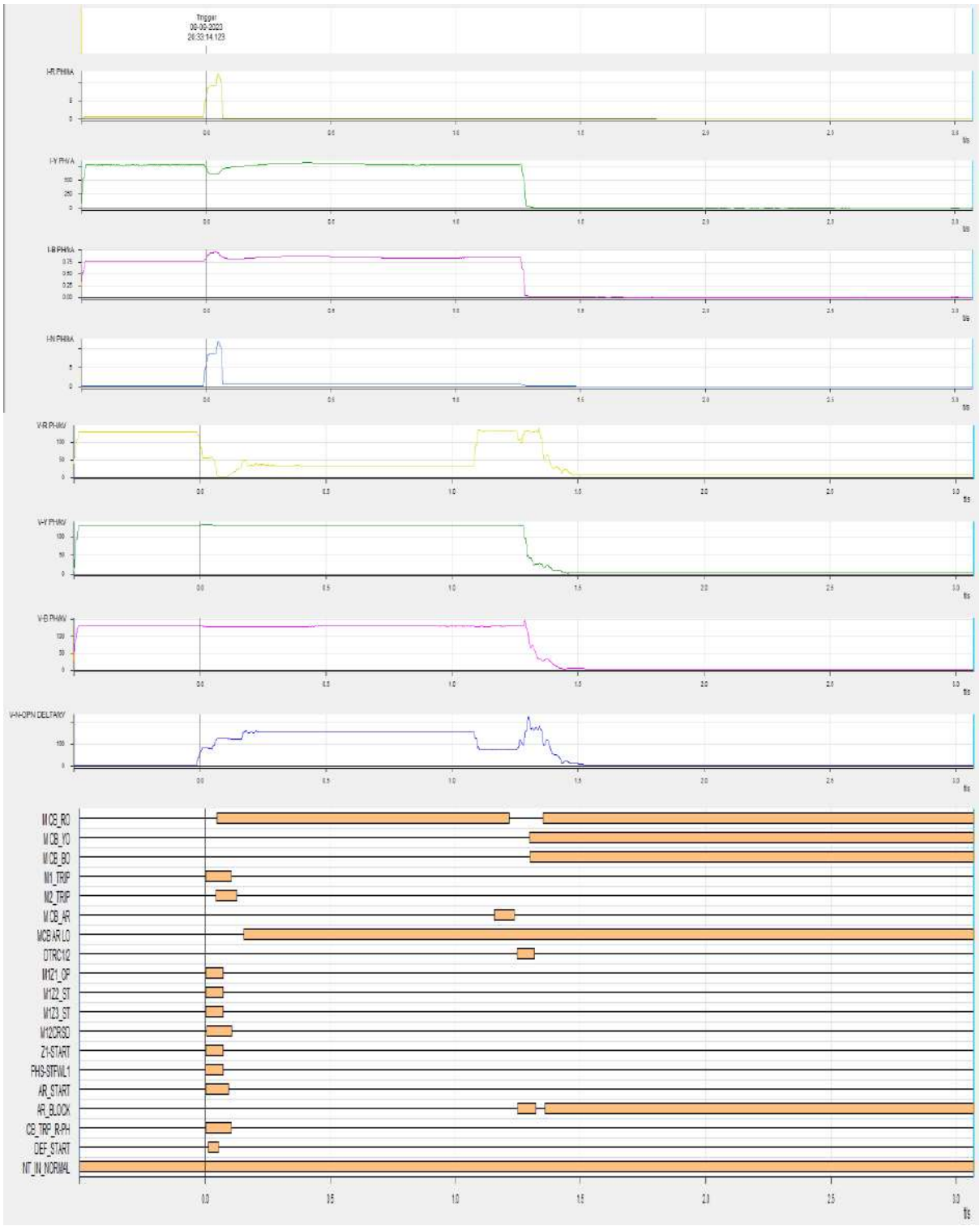
Sequence of Events not recorded at the time of event.

Annexure 2: DR recorded

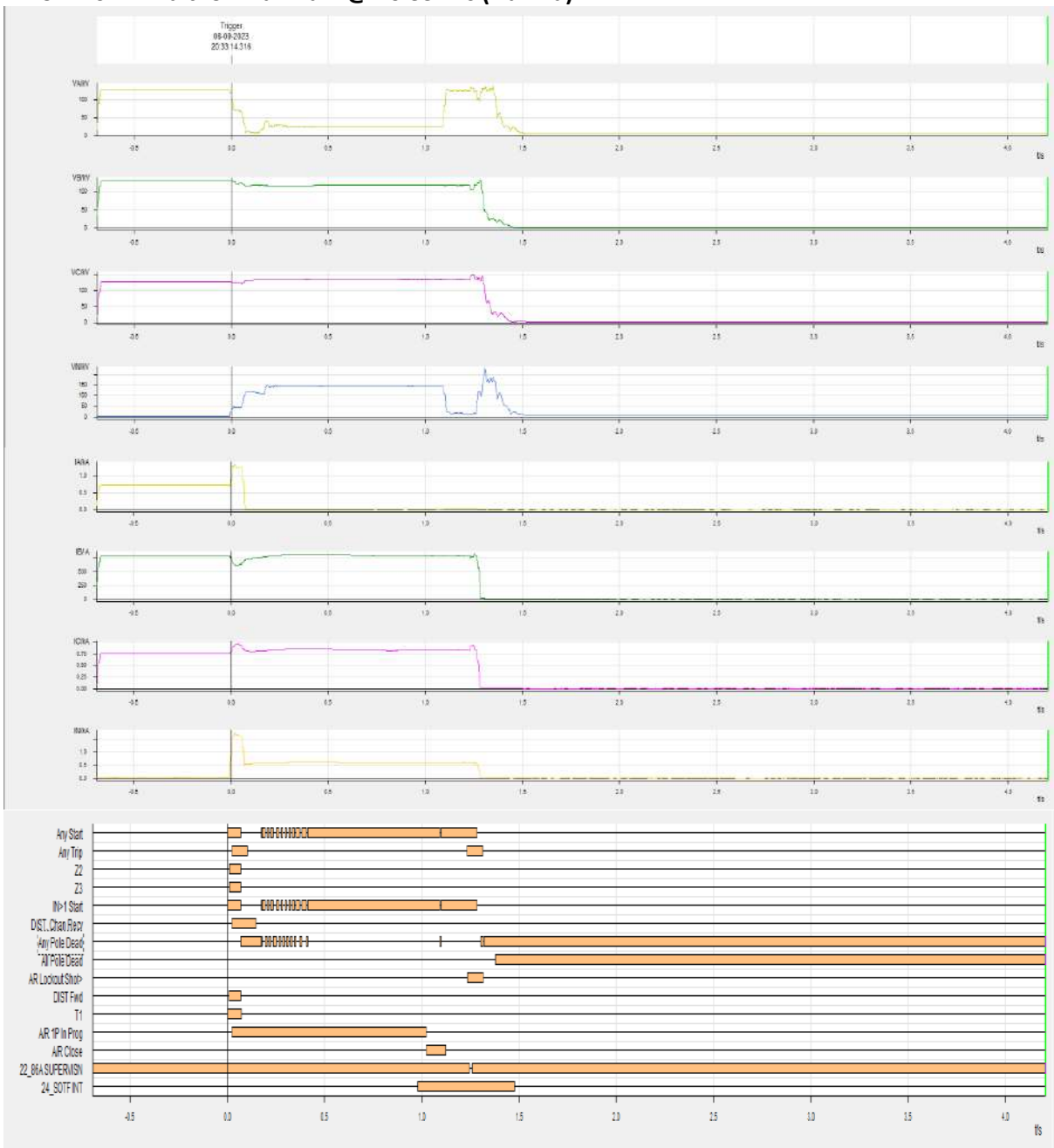
DR of 220 kV Maithon-Dumka-1 @ 20:30 Hrs (Dumka)



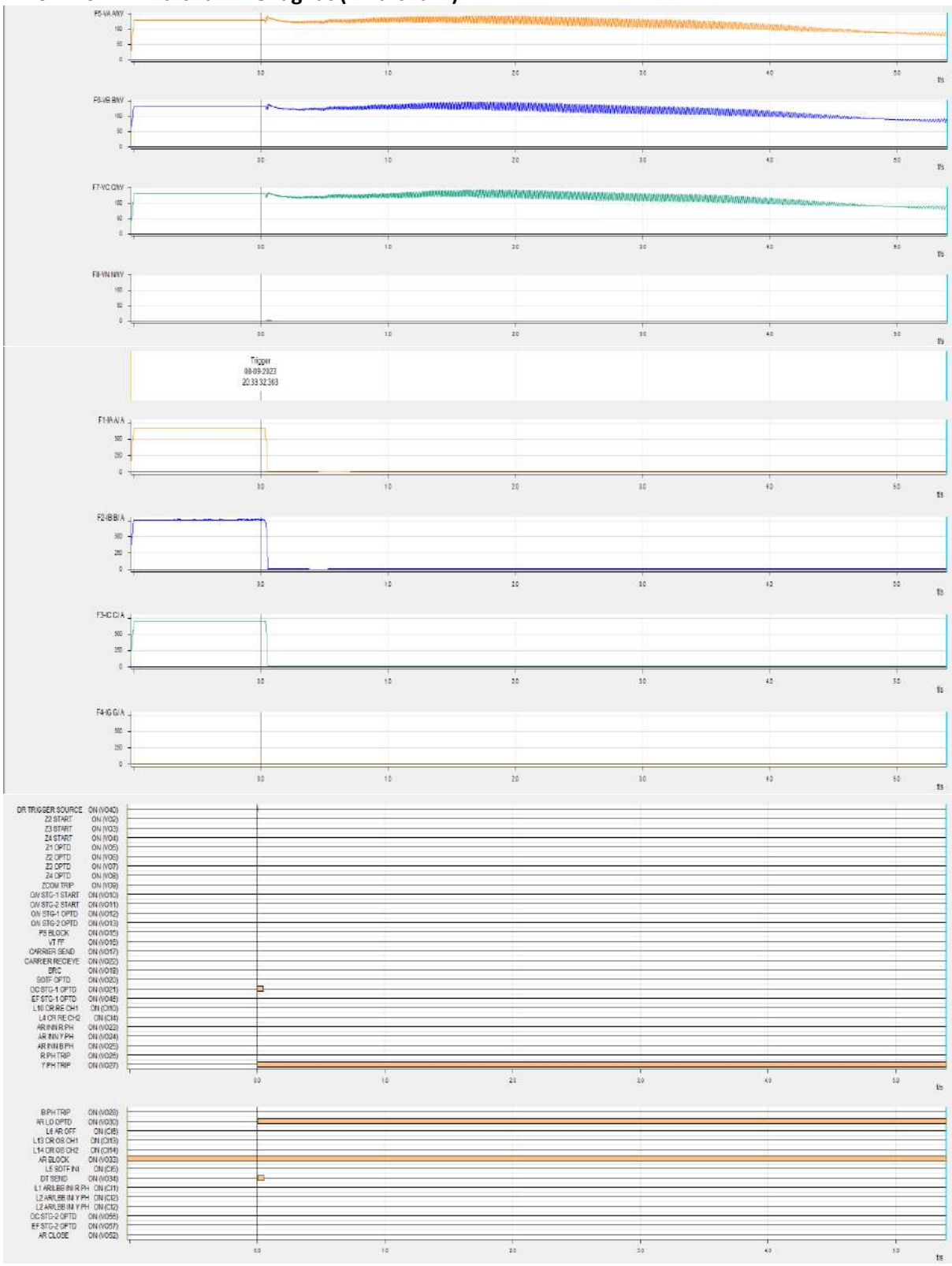
DR of 220 kV Maithon-Dumka-2 @ 20:33 Hrs (Maithon)



DR of 220 kV Maithon-Dumka-2 @ 20:33 Hrs (Dumka)



DR of 220 kV Biharsharif-Tenughat (Biharsharif)



Preliminary Report of grid event in Angul Station of Eastern Region

(To be submitted by 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): 12-Oct-2023

1. **Event Summary (घटना का सारांश):**

   On 12th October 23, at 17:49 hrs multiple trippings occurred at Angul Station. During the incident at 765/400 kV Angul S/s, 765kV Bus 1&2, 765kV Angul-Srikakulam D/C, 765kV Angul-Jharsuguda Ckt-3&4, 765/400kV ICT-3 &4, 400kV Bus-1, 400kV Angul-GMR Ckt 2 and 400kV Angul-JITPL Ckt#1 tripped. It was reported that both 765 kV Bus & 400 kV Bus I tripped due to operation of bus bar differential protection.

2. **Time and Date of the Event (घटना का समय और दिनांक):** 17:50 hrs of 12th Oct 2023

3. **Event Category (ग्रिड घटना का प्रकार):** Grid Event (Event not under GD/GI)

4. **Location/Control Area (स्थान/नियंत्रण क्षेत्र):** Eastern & Southern Region

5. **Antecedent Conditions (पूर्ववर्ती स्थिति):**

	Frequency	Regional Generation	Regional Demand
Pre-Event (घटना पूर्व)	49.84 Hz	29566 MW	24959 MW
Post Event (घटना के बाद)	49.86 Hz	29571 MW	25071 MW

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

Important Transmission Line/Unit if under outage)महत्वपूर्ण संचरण लाइने/ विधुत उत्पादन इकाइयां जो बंद है(	None
Weather Condition (मौसम स्थिति)	Inclement weather reported at Angul

6. **Load and Generation loss (लोड और जेनरेशन हानि):** No load loss happened during the event. SPS operated at JITPL to reduce generation from 1080MW to 755MW (17:48 to 18:31Hrs) to restrict overloading of single surviving 400kV Angul-JITPL line for JITPL power evacuation.

7. **Duration of interruption (रुकावट की अवधि):** 17:50Hrs to 18:50Hrs

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

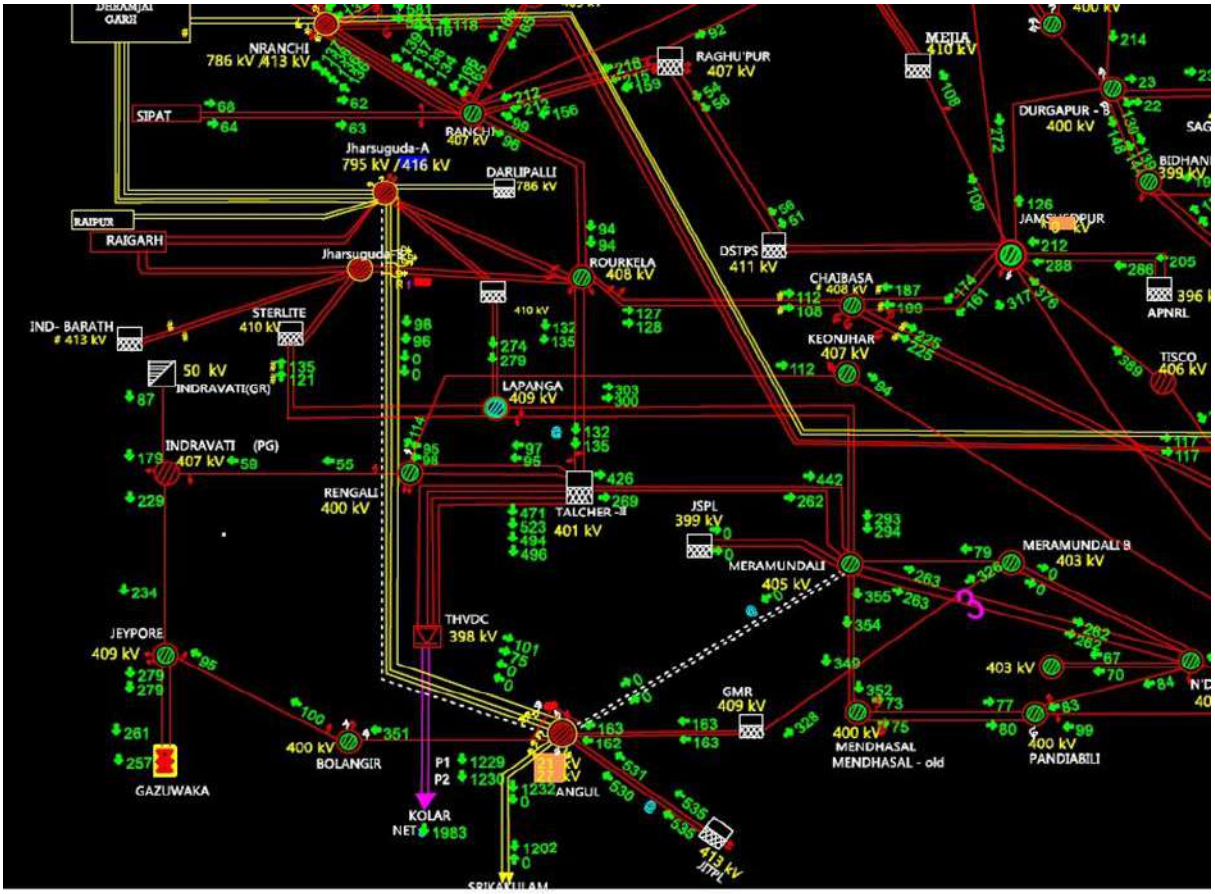


Figure 2: Network across the affected area

9. Sequence of events:

Time	Elements tripped	Remarks
17:49:13.545	765 kV Bus-2 at Angul tripped	Bus bar differential operated. Flashover in main bay of 765 kV Angul-Jharsuguda-3
17:49:13.660	400 kV GMR- Angul 2 tripped (From Angul Only)	O/V Stage 2 protection operated
17:49:13.768	330 MVAr Bus reactor-1 (Connected to Bus-2) tripped	LBB protection operated (after almost 200 ms)
17:49:14.800	765 kV Angul-Srikakulam-1&2 A/R operated	A/R successfully operated through on tie bay only. B-Ph Tie CB opened at same instant of bus bar differential operation at Angul Bus 2.
17:49:14.800	765 kV Angul-Jharsuguda-3&4 A/R operated	A/R successfully operated through tie bay only. B-Ph Tie CB opened at same instant of bus bar differential operation at Angul Bus 2.
17:49:18.140	400 kV Angul-Meramundali-1 tripped (Idle charged)	O/V Stage 2 protection operated

17:49:34.167	400 kV Bus-1 at Angul tripped.	Bus bar differential operated. 400 kV Angul-JITPL-1 tripped as its dia element (400kV GMR-2) was already tripped.
17:49:34.935	400 kV Main bay of 765/400 kV ICT-3	LBB operated
17:49:38.106	765 kV Main Bus-1 at Angul tripped	Bus bar differential operated. Bay 719 (Jharsuguda-4 tie bay-of half dia) CT failed. 765kV Angul-Srikakulam D/C, 765kV Angul-Jharsuguda Ckt-3&4, 765/400kV ICT- 4 at Angul tripped. All four lines tripped from Angul only. (765 kV Angul-Jharsuguda-1 & 765/400 kV ICT-1 in same dia; 765 kV Angul- Jharsuguda-2 & 765/400 kV ICT-2 in same dia - These four elements remained charged through tie bay on 765 kV side and power flow remained intact).
17:49:43.240 & 17:49:44.240	Tripping of 765 kV Angul- Srikakulam-1&2 from Srikakulam end	After 5 & 6 seconds of tripping of 765kV Angul-Srikakulam from angul end line tripped from Srikakulam end also due to overvoltage operation.
17:50:18.148	Tripping of 765 kV Angul-Jharsuguda-3 from Jharuguda	765 kV Jharsuguda-Angul-3 tripped from Jharsuguda end due to B_N fault. O/V appeared at the same time at open end. Voltage reached 1.53 times nominal value and O/V St.2 operated. DT sent to Jharsuguda and three phase tripped.
17:50:18:148	Tripping of 765 kV Angul- Jharsuguda-4 from Jharsuguda end	During fault in line-3 at the same instance, O/V St.2 operated in this line too from open end and DT sent to remote end. It is suspected that at this instance NGR at Jharsuguda failed.

10. Event Analysis (घटना का विश्लेषण):

- **Event-1: at 17:49:13.545 hrs**

At 17:49:13.545 hrs due to flashover in main bay CT of 765 kV Angul-Jharsuguda-3, 765 KV Bus-2 bus bar differential operated which resulted in tripping of all main bays connected to Bus 2. It is reported that bus bar protection operated due to Bay 723 (Jharsuguda-3 main bay) CT flashover and failure and possible core short circuit. The snapshot of DR of Angul Bus 2 is given below. At 17:49:13.768 hrs,330 MVAr Bus reactor-1 (Connected to Bus-2) tripped due to operation of LBB protection (after 200 msec)

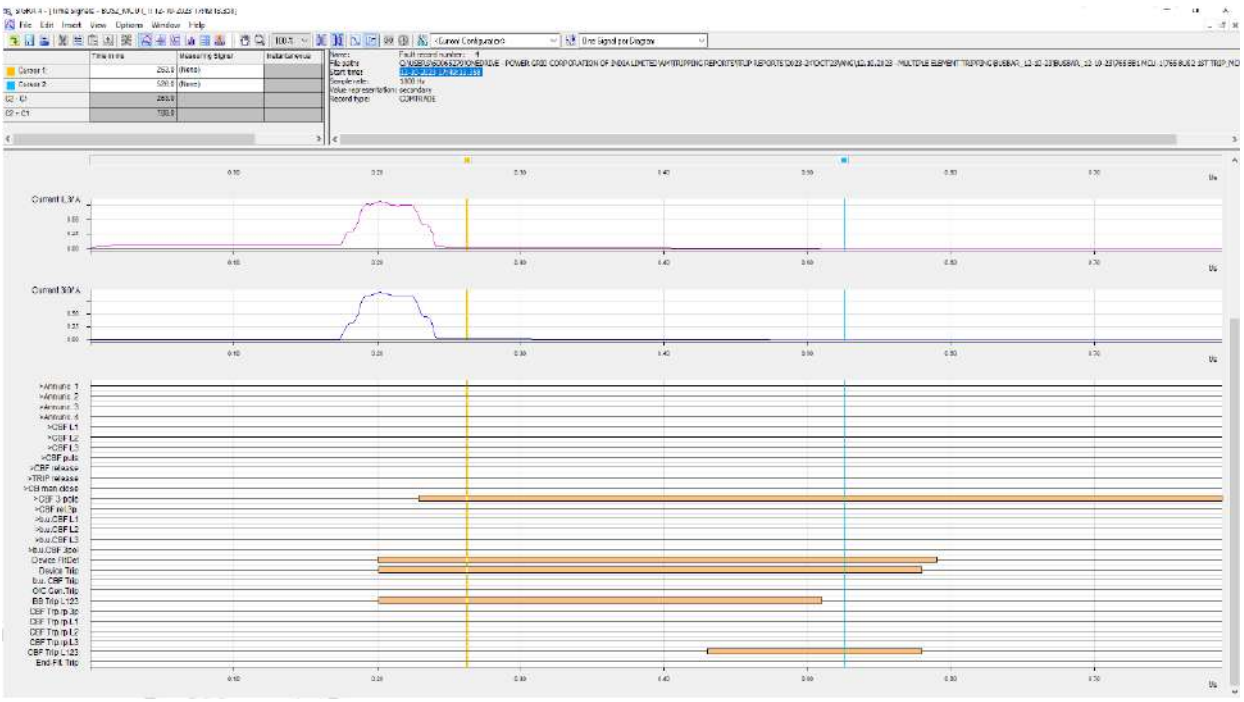


Figure 1: DR of Angul Bus 2

At the same instant at which bus bar differential operated at Angul Bus 2, B-phase Tie CB of 765 kV Angul- Srikakulam-1&2 and 765 kV Angul- Jharsuguda-3&4 also opened on indication of zone – 1 protection. All the aforesaid 765 kV lines successfully auto reclosed from Angul end after 1 second. There was no tripping at remote ends. The snapshot of DR from Angul end is given below:

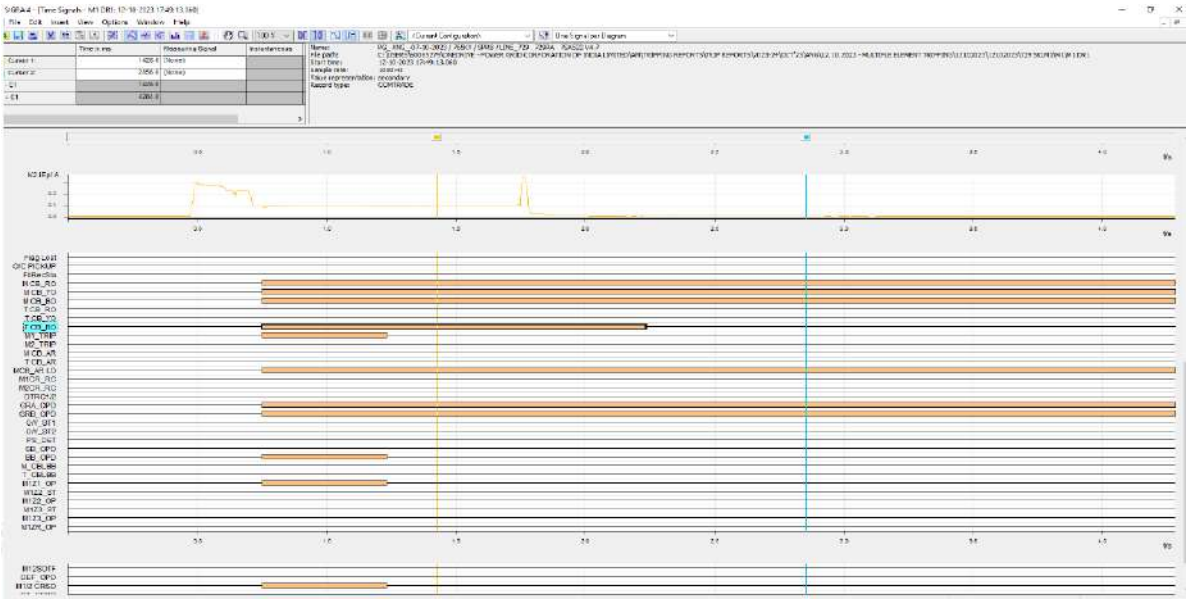


Figure 2: DR of 765Kv Angul-Srikakulam-1 A/R

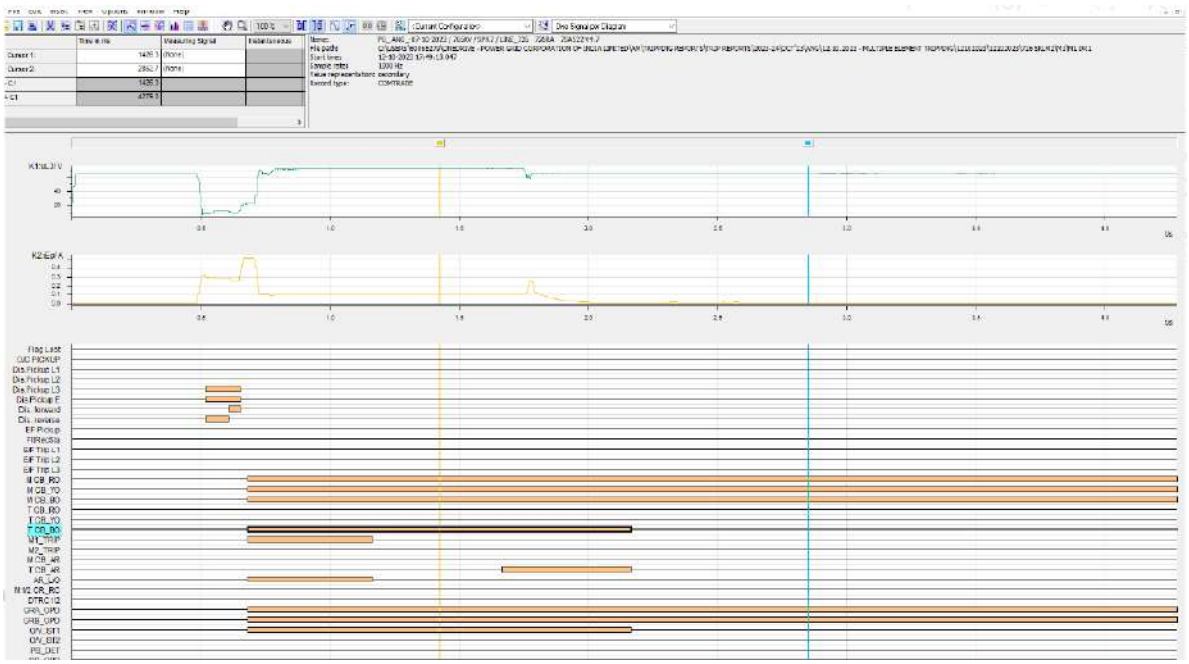


Figure 3: DR of 765Kv Angul-Srikakulam-2 A/R

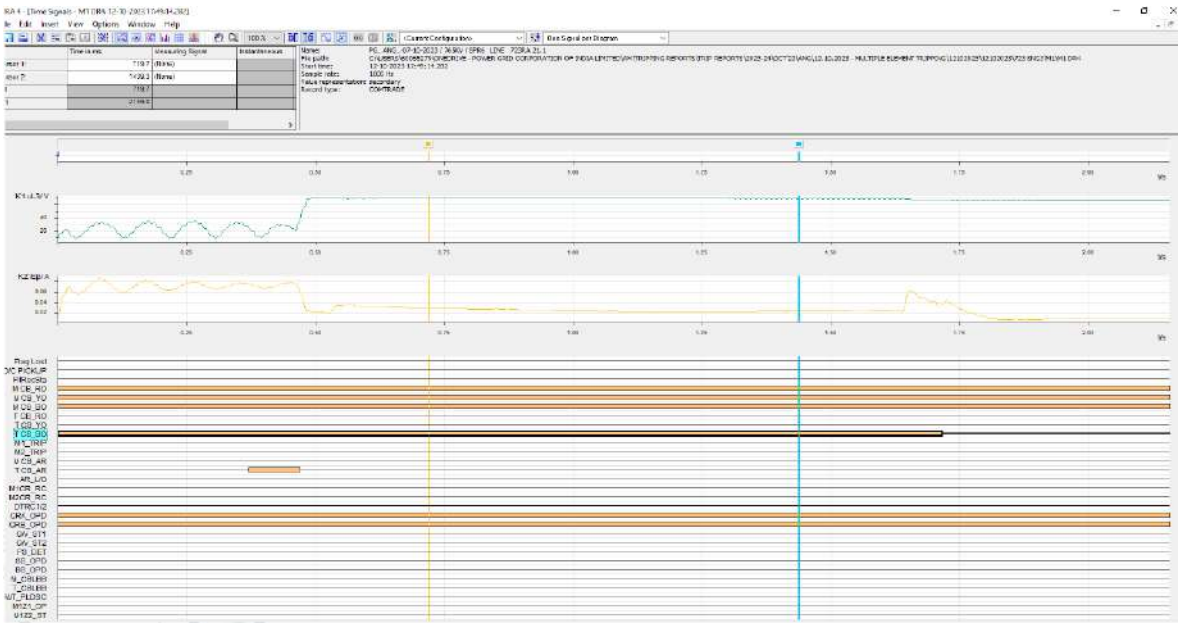


Figure 4: 765Kv Angul-Jharsuguda-3 A/R

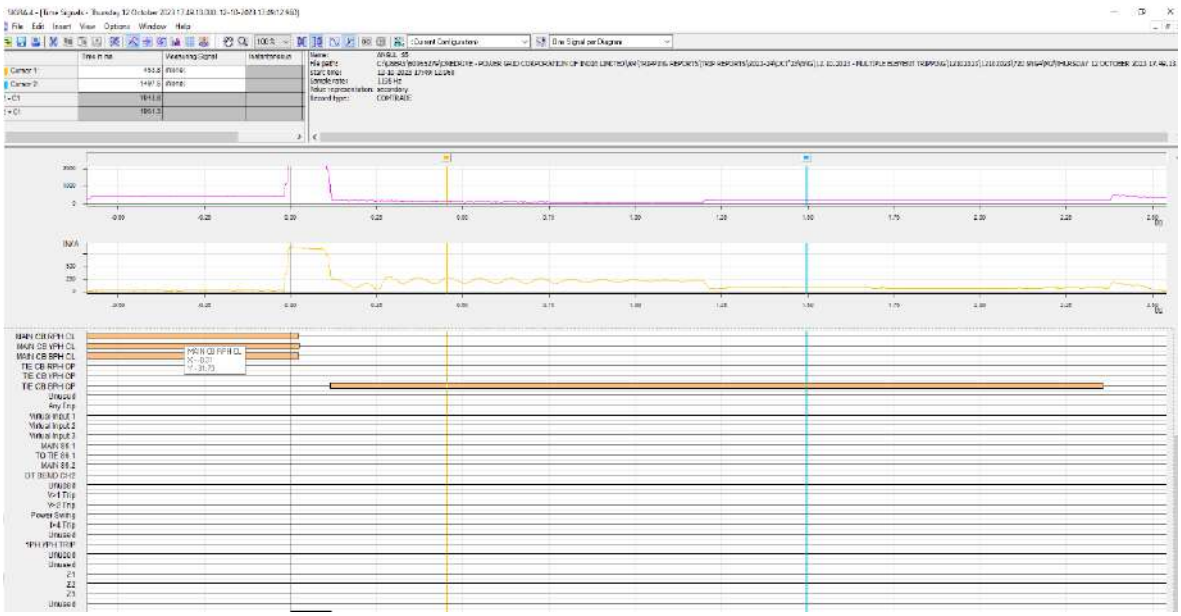


Figure 5: 765Kv Angul-Jharsuguda-4 A/R

- **Event-2: at 17:49:13.660 hrs**

  At 17:49:13.545 hrs, 400 kV GMR- Angul 2 tripped from Angul end only due to operation of O/V Stage 2 protection . Distance protection also operated at Angul (Zone-1), however, O/V St.2 operated and three phase tripped at Angul. Voltage reached 1.7 times of nominal value in Y phase as attached below.

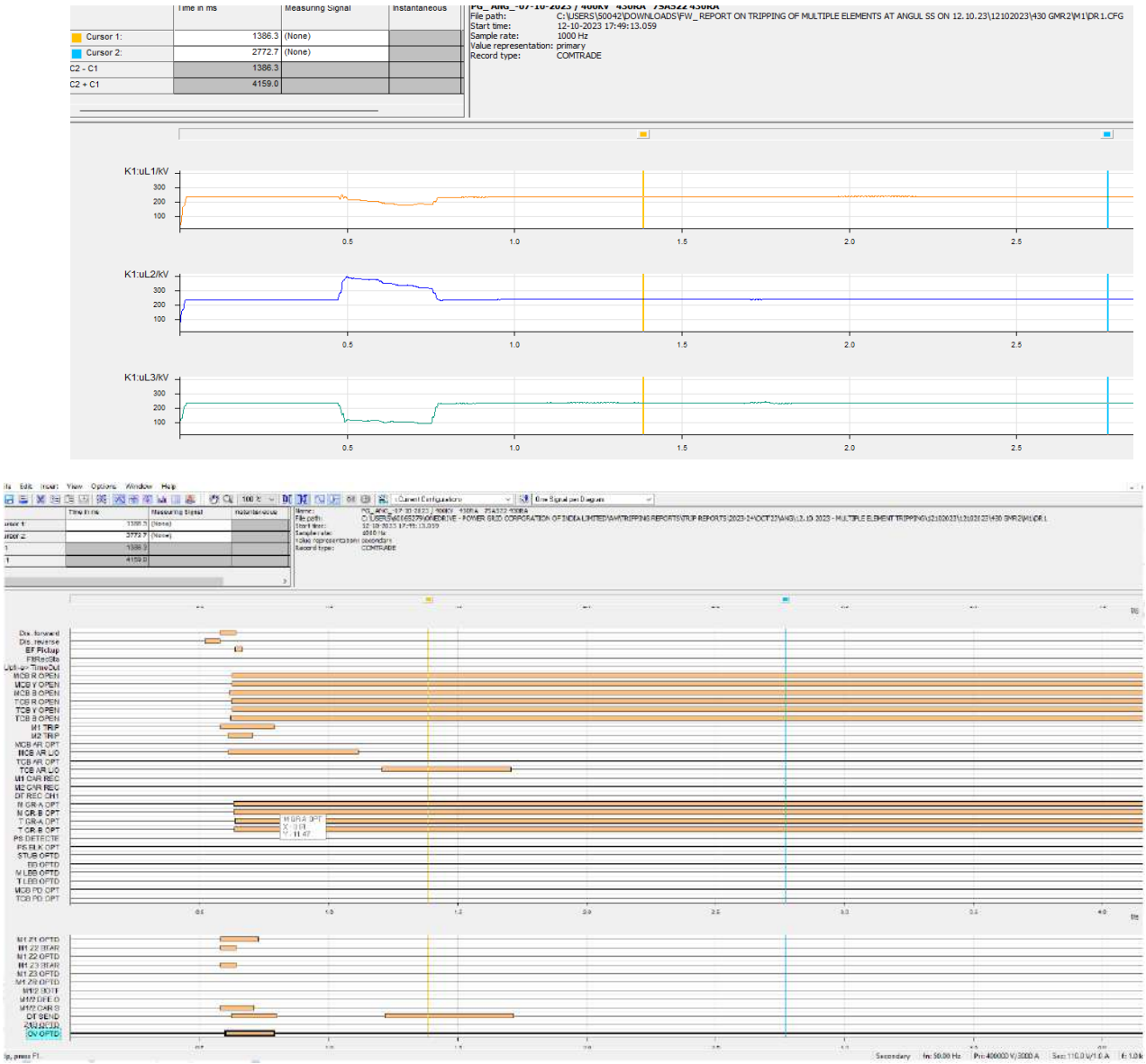


Figure 6: DR of 400 kV GMR- Angul 2 from Angul end

- **Event-3: at 17:49:34.167 hrs**

  At 17:49:34.167 hrs, differential relay of 400 kV Angul Bus-1operated resulting in tripping of all main bays connected to Bus-1. It is reported that the bus bar operated due to 413 (Main bay of 765/400 kV ICT 3 CT flashover/ failure). At the same instant, 400 kV Angul-JITPL ckt 1 also tripped as its dia element (GMR-2) already tripped at 17:49:13.660 hrs. The snapshot of DR is given below:

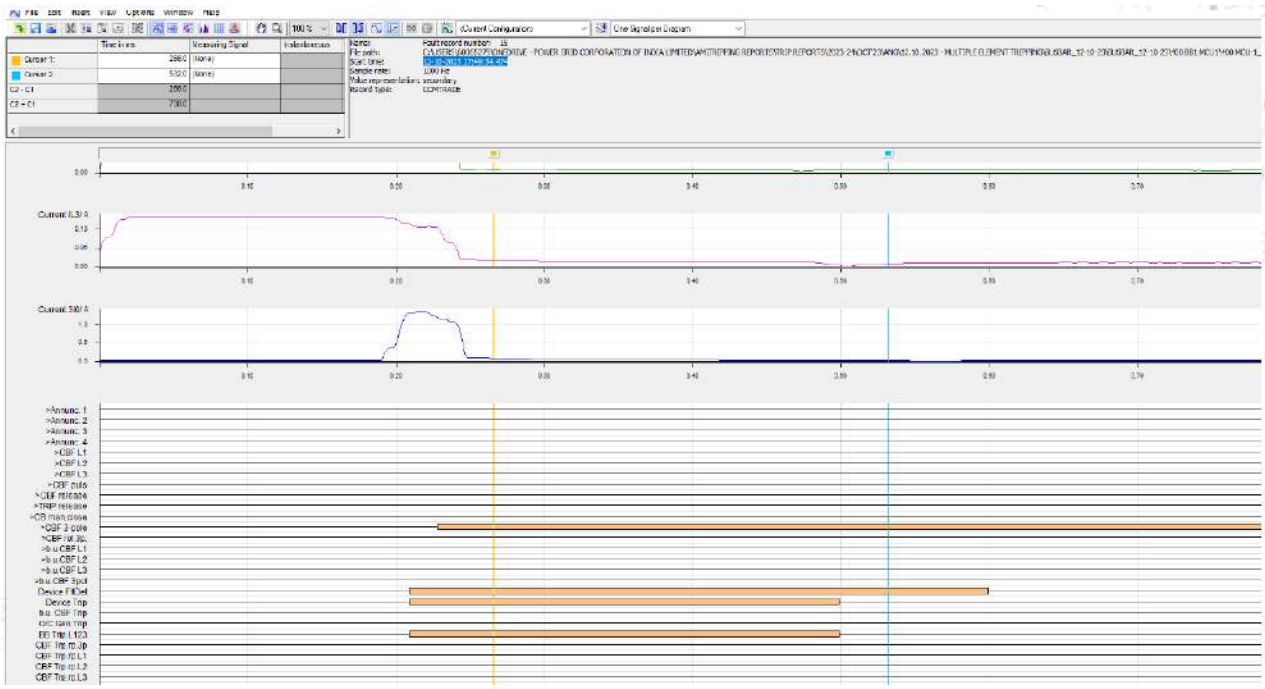


Figure 7: DR of 400 kV Angul Bus 1

- **Event-4: at 17:49:38.106 hrs**

At 17:49:38.106 hrs, differential relay of 765 kV Angul Bus-1 operated resulting in tripping of all main bays associated to Bus-1. It is reported that Bus Bar protection operated due to Bay 719 (Jharsuguda-4 tie bay-of half dia) CT failed.
765kV Angul-Srikakulam D/C, 765kV Angul-Jharsuguda Ckt-3&4 and 765/400kV ICT - 4 tripped. 765 kV Angul-Jharsuguda-1 & 765/400 kV ICT-1 in same dia; 765 kV Angul-Jharsuguda-2 & 765/400 kV ICT-2 were in same dia. These elements remained charged through tie bay on 765 kV side and power flow remained intact). The DR of 765 kV Angul Bus-1 is given below:

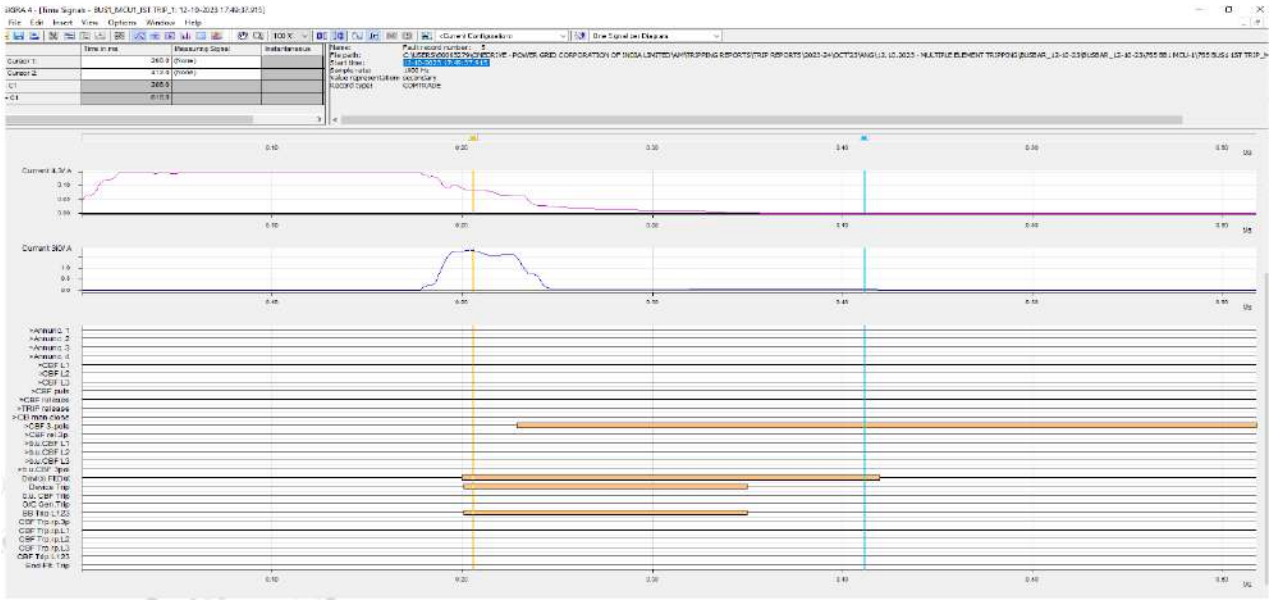


Figure 8: DR of 765 kV Angul Bus 1

- **Event-5: at 17:50:18.148 hrs**

At 17:50:18.148 Hrs, 765 kV Angul-Jharsuguda-3&4 tripped from Jharsuguda end. B_N fault appeared in Ckt-3. However, O/V St.2 appeared at open end in healthy phases in both lines during the fault and DT sent to Jharsuguda.

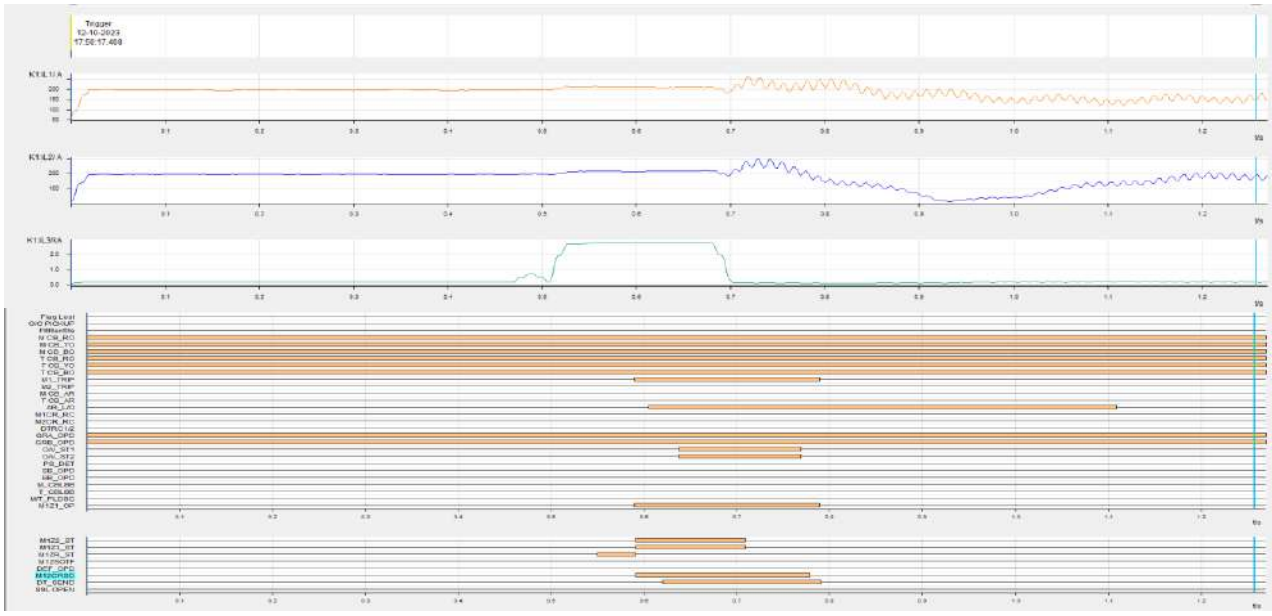


Figure 9: DR of 765 kV Angul-Jharsuguda-3

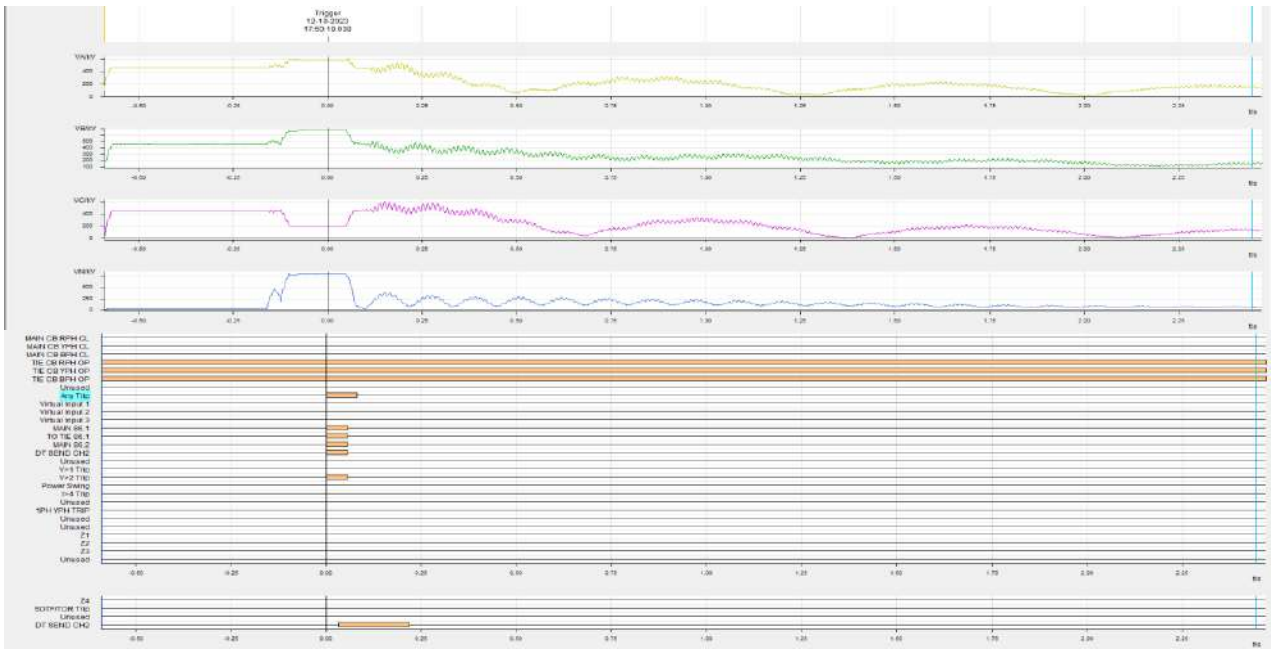
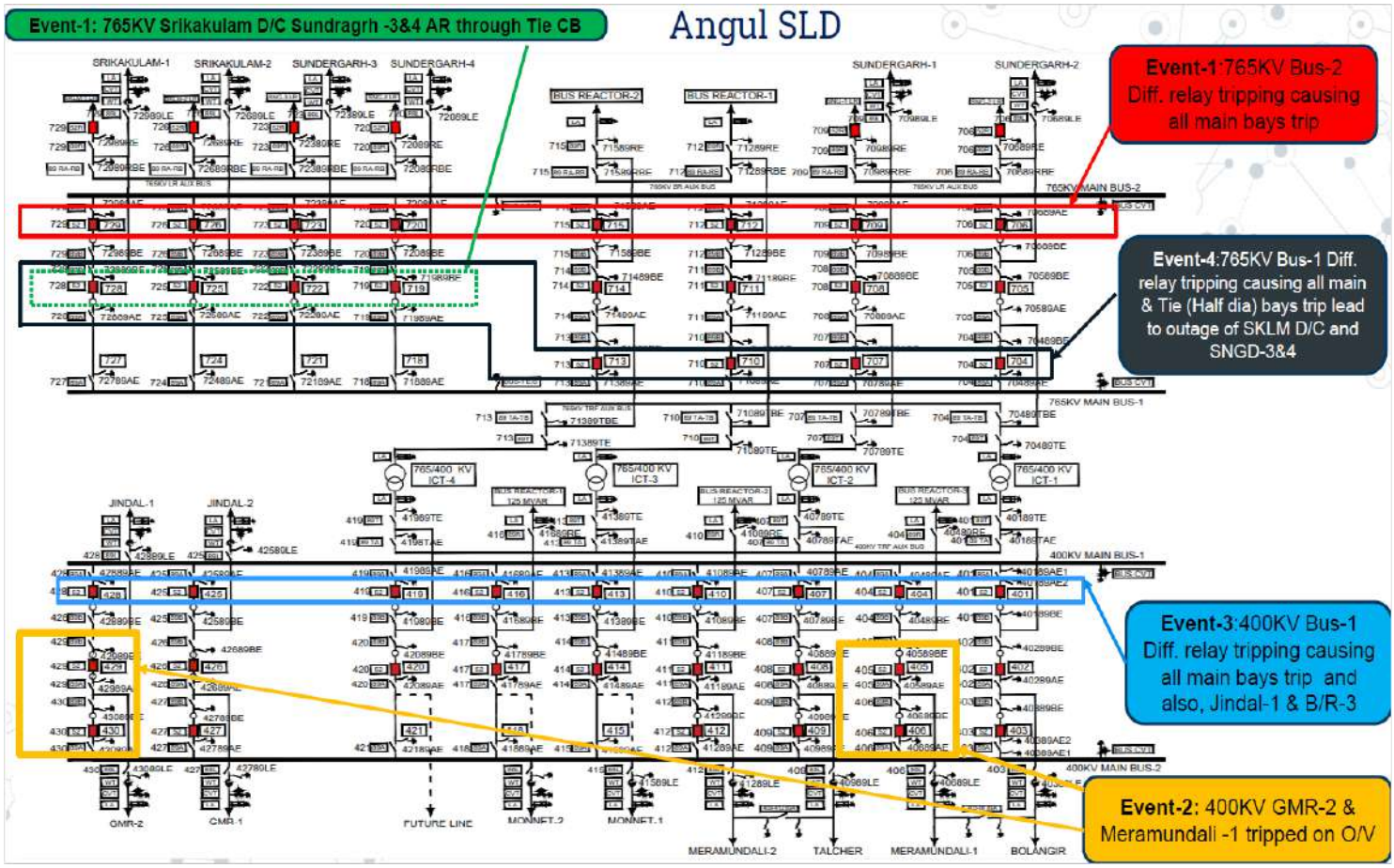


Figure 10: DR of 765 kV Angul-Jharsuguda-4

The graphical representation* of all the above four events on SLD of Angul station is given below:



*(*Submitted by Powergrid)*

PMU Plots

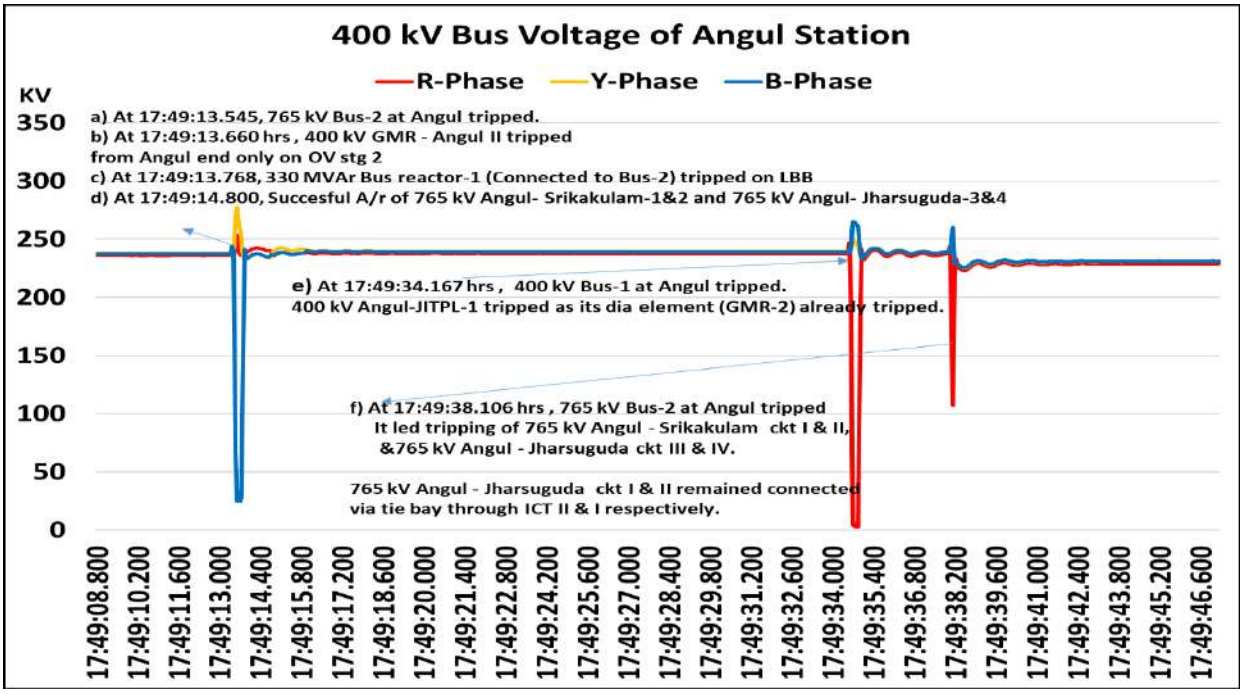


Figure 9: 3 Phase 400 kV Bus Voltage of Angul Station

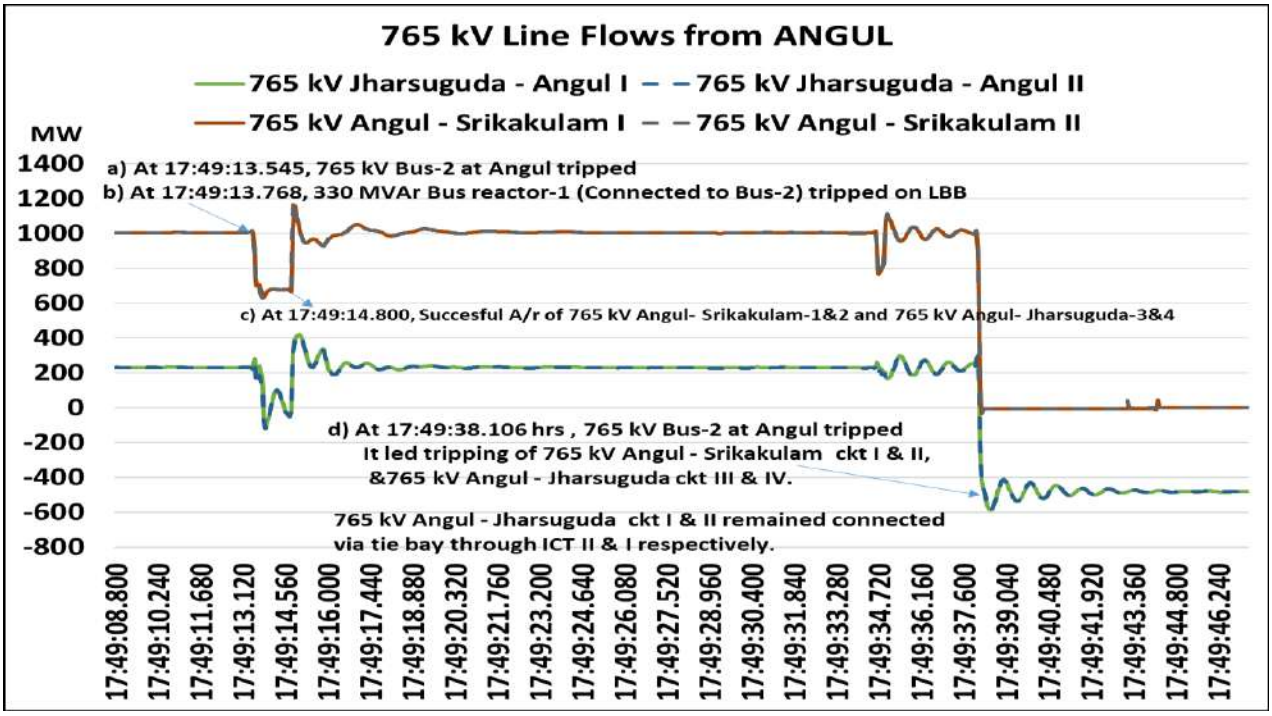


Figure 10:765 kV Line Flows from Angul Station

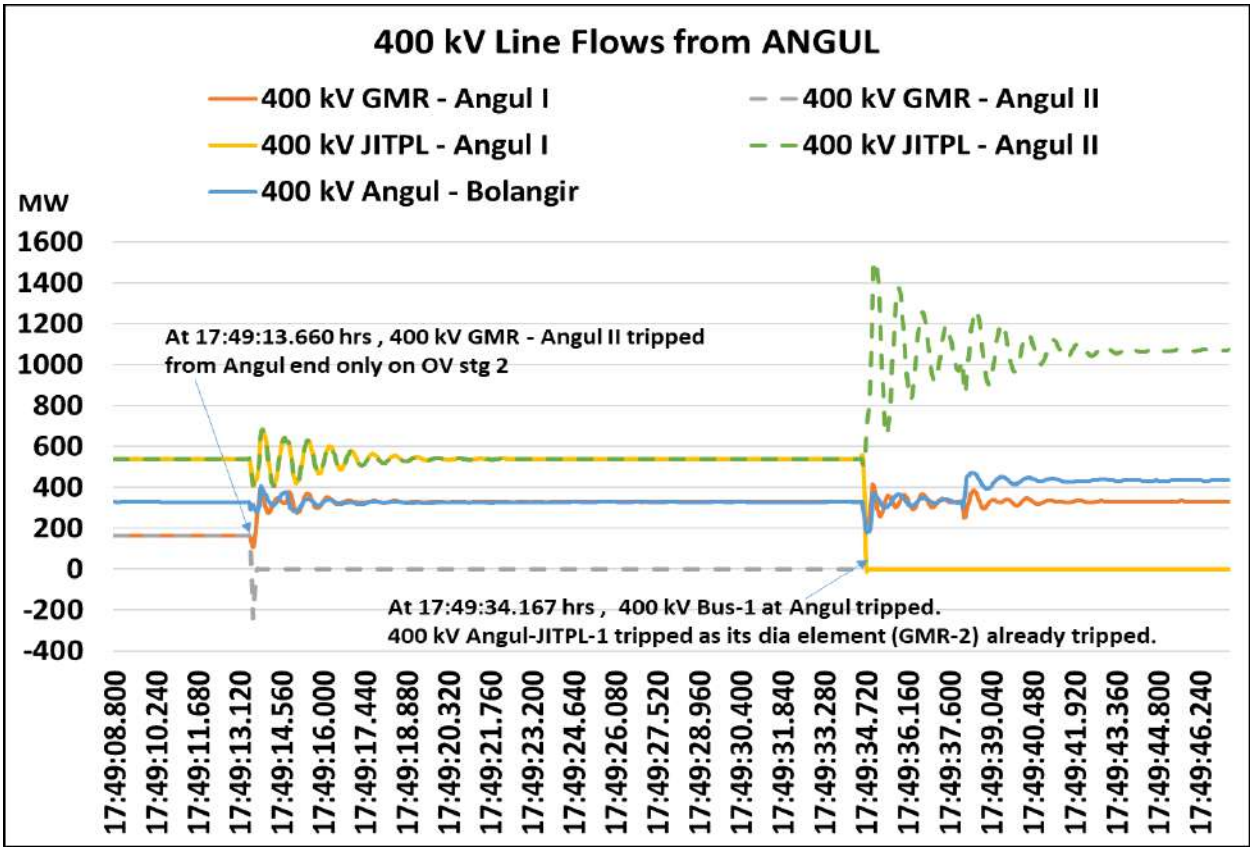


Figure 11: 400 kV Line Flows from Angul Station

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

- CT failure of Bay 723 (Jharsuguda-3 main bay), Bay 719 (Jharsuguda-4 tie bay-of half dia) & 413 (Main bay of 765/400 kV ICT 3) resulted in tripping of 765 kV Angul Bus 2, 765 kV Angul Bus 1 & 400 kV Angul Bus 1 respectively. Here, three contingencies occurred within 25 seconds.

- At the same instant at which bus bar differential operated at Angul 765 kV Bus 2, B-phase Tie CB of 765 kV Angul- Srikakulam-1&2 and 765 kV Angul- Jharsuguda-3&4 also opened on indication of zone – 1 protection. All the aforesaid 765 kV lines successfully auto reclosed after 1.5 seconds. It is very rare that all the Tie CBs opened exactly at the same instant at which main bay CBs of 765 kV Bus 2 tripped. Protection logic need to be checked here.

- Root cause analysis of simultaneous tripping of all four lines may be done. Further, all four lines tripped in Zone-1 from Angul only, there was no tripping from remote ends despite carrier send from Angul. Whether remote ends detected the fault in Zone-2 or not. **The same may be confirmed**.

- At 17:49:13.545 hrs, 400 kV GMR- Angul 2 tripped from Angul end only due to operation of O/V Stage 2 protection. Distance protection also operated at Angul (Zone-

1) whether zone-2 picked up at GMR or not ? DT was sent from Angul but line didn't trip from GMR. Whether GMR received DT? **GMRKEL may confirm.**

- Reason for such high voltage during fault, whether due to lightning fault back flashover resulted in such high voltage or some earthing issues to **be checked by PG-Odisha** .
- At 17:49:13.768 hrs,330 MVAr Bus reactor-1 (Connected to Bus-2) tripped due to operation of LBB protection (after almost 200 ms). Main bay CB need to be checked.
- At 17:49:34.167 hrs, differential relay of 400 kV Angul Bus-1 operated resulting in tripping of all main bays connected to Bus-1. It is reported that the bus bar protection operated due to 413 bay CT flashover (Main bay of 765/400 kV ICT 3).
- 400 kV Angul-JITPL-1 also tripped from JITPL end. DT sent from Angul end during bus bar tripping. Why DT sent from Angul? **PG Odisha may explain. DR of this tripping may be submitted by JITPL.**
- At 17:49:38.106 hrs, differential relay of 765 kV Angul Bus-1 operated resulting in tripping of all main bays associated with Bus-1. It is reported that bus bar protection operated due to Bay 719 (Jharsuguda-4 tie bay-of half dia) CT failed. At this instant 765kV Angul-Srikakulam D/C, 765kV Angul-Jharsuguda Ckt-3&4 and 765/400kV ICT - 4 tripped. The elements survived on 765 kV side of Angul station are 765 kV Angul-Jharsuguda-1,2 and 765/400 kV ICT-1,2 tripped in 765 kV side.
- At 17:50:18.148, 765 kV Angul-Jharsuguda-3 tripped from Jharsuguda end due to DT receipt from Angul. Zone-1 appeared at Angul end also with fault current around 2.8 kA, but as both main and tie CB were open at Angul, how this current was seen at Angul. Angul also sent carrier signal but fault was cleared after 200 msec after DT received. Why there was delayed clearance from Jharsuguda. **PG Odisha may explain.**
- At 17:50:18.148, 765 kV Angul-Jharsuguda-4 tripped from Jharsuguda end on DT receipt from Angul. NGR at Jharsuguda end failed. Reason of failure of NGR may be ascertained. NGR rating may also be intimated. Phenomena of resonance O/v may also be checked and whether existing NGR is capable to suppress such O/V. **PG Odisha may explain.**
- It is observed that, after operation of differential protection in all three instances, few breakers didn't open and later LBB operated for those bays. The reason for non-opening of breakers in the first instance may be analyzed. **PG Odisha may explain.**

12. Restoration of Elements

- **12.10.23**
  i. 400 kV GMR-Angul-2 charged at 18:25 Hrs.
  ii. 400 kV Angul-JITPL-1 charged at 18:32 Hrs.
  iii. 765 kV Bus-2 charged at 18:45 Hrs but tripped again while charging 765 kV Angul-Jharsuguda-3 from Angul end on Bus bar differential.
  iv. 765 kV Bus-2 charged again at 19:22 Hrs.

v. 330 MVAr Bus Reactor-2 charged at 19:31 Hrs.
vi. 765 kV Angul-Srikakulam-1 charged at 19:38 Hrs.
vii. Line reactor of 765 kV Angul-Jharsuguda-4 at Angul charged at bus reactor at 20:25 Hrs.
viii. 765 kV Angul-Srikakulam-2 charged at 20:37 Hrs.
ix. 400 kV Bus-1 at Angul charged at 23:11 Hrs.

13.10.23

x. 765 kV Bus-1 charged at 12:06 Hrs.
xi. 765 kV Angul-Jharsuguda-3 charged at 13:18 Hrs.
xii. 765/400 kV ICT-3 charged at 13:22 Hrs.
xiii. 330 MVAr Bus Reactor-1 charged at 15:44 hrs.

15.10.23

xiv. 765 kV Angul-Jharsuguda-4 charged at 10:39 hrs.

13. 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	**PG Odisha*, JITPL**

**DR of Jharsuguda end pending*

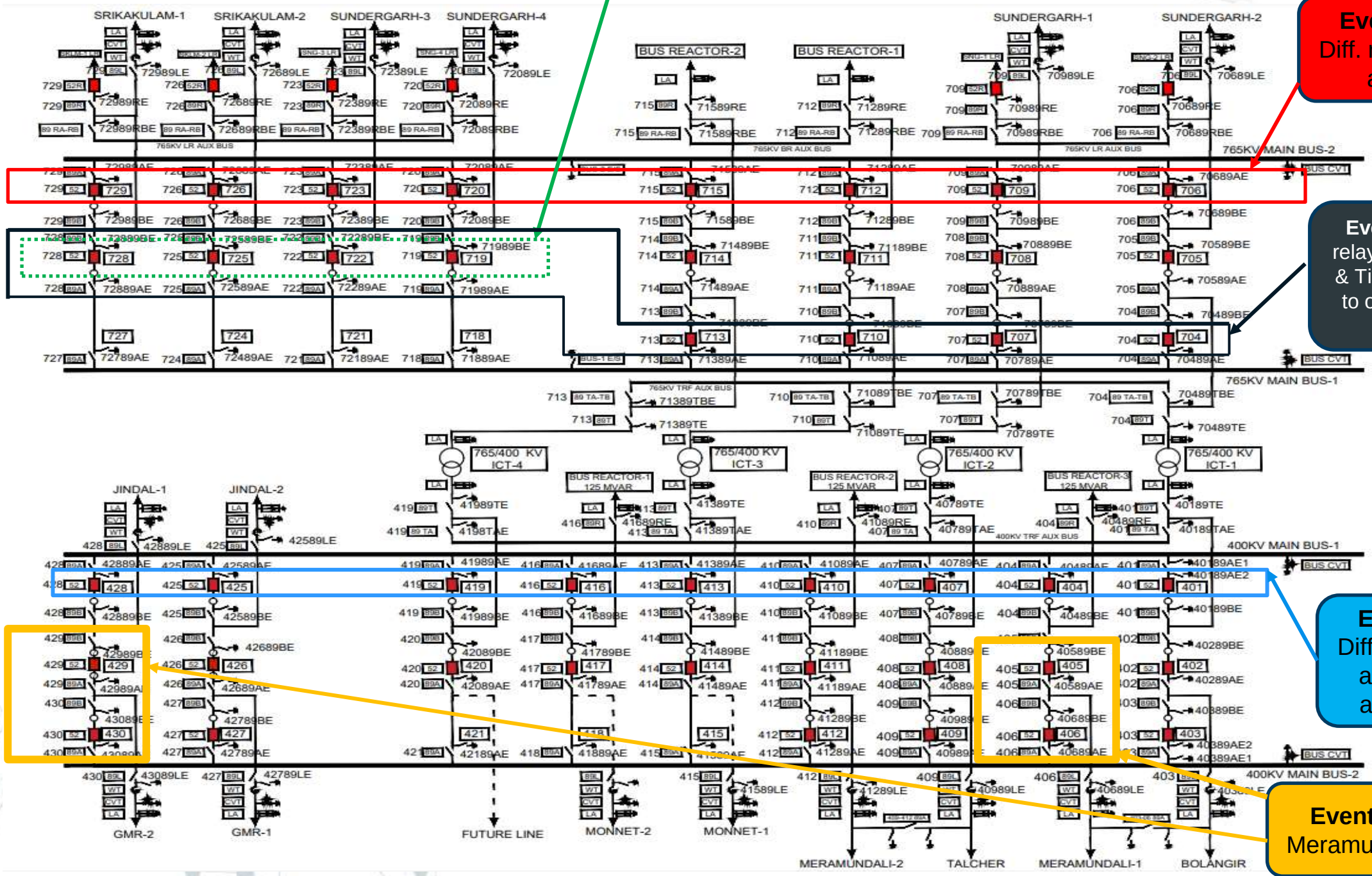
Report on Multiple element trippings at Angul on 12.10.23

Preliminary report on Multiple element trippings at Angul on 12.10.23

STATION:	765/400KV Angul S/s
Tripping event Date & Time	12/10/2023 17:49:13 hrs
Details	765KV Bus-1 & 2 and 400KV Bus-1 Tripped along with other elements during Heavy Lightning strikes in switchyard
Elements tripped	765KV Bus-2- Tripped on Diff. Protection at 17:49:13:545 Hrs 400KV GMR-2:Tripped on Over voltage 400KV Bus-1 Tripped on Diff. Protection at 17:49:34:667 Hrs 400KV Jindal-1 & B/R-3: Tripped due to Complete dia outage caused by Bus-1 & GMR-1 Trip. 765KV Bus-1- Tripped on Diff. Protection at 17:49:38:106 Hrs 765KV Srikakulam-1 & 2 (Connected in Half DIA) 765KV Sundargarh -3 & 4 (Connected in Half DIA) 765KV/400KV ICT-3: Tripped due to inter trip received from 765KV B/R LBB Operation as per scheme.

Event-3: 765KV Srikakulam D/C Sundragrh -3&4 AR through Tie CB

Angul SLD



Event-1:765KV Bus-2 Diff. relay tripping causing all main bays trip

Event-5:765KV Bus-1 Diff. relay tripping causing all main & Tie (Half dia) bays trip lead to outage of SKLM D/C and SNGD-3&4

Event-4:400KV Bus-1 Diff. relay tripping causing all main bays trip and also, Jindal-1 & B/R-3

Event-2: 400KV GMR-2 & Meramundali -1 tripped on O/V

Sequence of Events

TIME	PROTECTION OPTD	BAY OPEN	ELEMENT OUT	REMARKS
17:49:13:545	765 BUS-2 DIFFERENTIAL OPTD	706	706 765 KV BUS BAR-2	709,712,715,720,723,726 & 729
17:49:13:768	712 LBB	711(TIE)	765 KV BR-1	
17:49:13:660	OV STG-2 OF GMR-2	430 & 429	GMR-2	
17:49:18:140	OV STG-2 OF MNDLI-1	406 & 405	MNDLI-1	
17:49:15:863	SNG-3 & 4 AR OPTD			MAIN BAYS (720,723) REMAIN OPENED BECAUSE OF BB OPTD
17:49:15:213/29	3SKLM-1 & 2 AR OPTD			MAIN BAYS (726, 729) REMAIN OPENED BECAUSE OF BB OPTD
				TIE BAYS CLOSED IN SUCCESSFUL AR OPERATION
17:49:38:106	765 BUS-1 DIFFERENTIAL OPTD	704	704 765 KV BUS BAR-1	BECAUSE OF LINE OPEN AT ANGUL END AND REMAIN HOLD AT REMOTE END OV STG-1 OPERATED AFTER 5 SEC AND DT SEND TO REMOTE END.
		707	SKLM-1	
		710	SKLM-2	
		713	SNG-3	
		719	SNG-4	
		722,725 & 728	SKLM-1 & SSKLM-2	

17:49:34:167	400 BUS-1 DIFFERENTIAL OPTD	401	401 400 KV BUS BAR-1	
		404	404 400 KV BR-3	AS 405 ALREADY OPENED.
		407		
		410		
		413		
		416		
		419		
		425		
		428	JINDAL-1	AS 429 ALREADY OPENED.
17:49:34:935		ICT-3 IV MAIN_413	ICT-3	BAY 413 LBB OPERATED THROUGH BAY UNIT-1 HENCE ICT IV TIE BAY AND HV MAIN AND TIE BAY OPENED AS PER SCHEME.
17:49:35:004		ICT-3 IV TIE_414		
17:49:35:004		ICT-3 HV MAIN_710		
17:49:14:288		ICT-3 HV TIE_711		
17:49:34:710		ICT-4 IV MAIN_419		OPERATION IS NORMAL
NOT OPENED		ICT-4 IV TIE_420		
17:49:38:147		ICT-4 HV MAIN_713		
NOT OPENED		ICT-4 HV TIE_714		

HMI: Sequence of Events of Angul S/S

EVENTS

SICAM PAS CC V7 Event list

	Date	Time	Message Group	Message Text	Value	Cause	Additional ca
353	12/10/2023	17.48.41,243	PES2	Port_08_LinkDown	CLEARED	spontaneous	no error
354	12/10/2023	17.49.13,534	712_87R TEE_7UT613	87 Blocked by ext. fault C	RAISED	spontaneous	no error
355	12/10/2023	17.49.13,536	723RA 21.2	Overvoltage PROTECTION START STAGE1	RAISED	spontaneous	no error
356	12/10/2023	17.49.13,536	712_87R.1_7UT613	87 Blocked by ext. fault C	RAISED	spontaneous	no error
357	12/10/2023	17.49.13,537	430 REL 670	VT FUSE FAIL	RAISED single indi	spontaneous	no error
358	12/10/2023	17.49.13,537	712_87R TEE_7UT613	87 Blocked by ext. fault B	RAISED	spontaneous	no error
359	12/10/2023	17.49.13,537	712_87R TEE_7UT613	87 Blocked by ext. fault A	RAISED	spontaneous	no error
360	12/10/2023	17.49.13,538	712_87R.1_7UT613	87 Blocked by ext. fault B	RAISED	spontaneous	no error
361	12/10/2023	17.49.13,538	712_87R.1_7UT613	87 Blocked by ext. fault A	RAISED	spontaneous	no error
362	12/10/2023	17.49.13,541	720RA 21.2	Overvoltage PROTECTION START STAGE2	RAISED	spontaneous	no error
363	12/10/2023	17.49.13,545	765 KV BB MCU1	Trip command for BUS2 (group alarm)	RAISED	spontaneous	no error
364	12/10/2023	17.49.13,545	765 KV BB MCU1	GEN TRIP.phsC	RAISED	spontaneous	no error
365	12/10/2023	17.49.13,545	765 KV BB MCU1	GEN. TRIP	RAISED	spontaneous	no error
366	12/10/2023	17.49.13,545	765 KV BB MCU1	Protection/DIFF.TRIP	RAISED	spontaneous	no error
367	12/10/2023	17.49.13,545	765 KV BB MCU1	Disturb Rec/Recording.Grid fault num	4	spontaneous	no error
368	12/10/2023	17.49.13,546	430 REL 670	DISTANCE BLOCK	RAISED single indi	spontaneous	no error
369	12/10/2023	17.49.13,546	726RA_7SA522	Total.Pickup.phsB	RAISED	spontaneous	no error
370	12/10/2023	17.49.13,546	726RA_7SA522	Total.Pickup.phsA	RAISED	spontaneous	no error
371	12/10/2023	17.49.13,546	726RA_7SA522	Total.Pickup	RAISED	spontaneous	no error
372	12/10/2023	17.49.13,546	726RA_7SA522	Relay PICKUP Phase L1	RAISED	spontaneous	no error
373	12/10/2023	17.49.13,546	726RA_7SA522	Relay PICKUP	RAISED	spontaneous	no error
374	12/10/2023	17.49.13,546	726RRA_7SA522 V4.7	Uph-e> Pickup	RAISED	spontaneous	no error
375	12/10/2023	17.49.13,546	726RA_7SA522	Relay PICKUP Phase L2	RAISED	spontaneous	no error
376	12/10/2023	17.49.13,547	427 REL 670	BROKEN CONDUCTOR START	RAISED single indi	spontaneous	no error
377	12/10/2023	17.49.13,547	765 KV BB MCU2	Trip command for BUS2 (group alarm)	RAISED	spontaneous	no error
378	12/10/2023	17.49.13,547	765 KV BB MCU2	Protection/DIFF.TRIP	RAISED	spontaneous	no error
379	12/10/2023	17.49.13,547	765 KV BB MCU2	Disturb Rec/Recording.Grid fault num	46	spontaneous	no error
380	12/10/2023	17.49.13,548	707_67.1IV V4.6	67 General Pickup	RAISED	spontaneous	no error
381	12/10/2023	17.49.13,549	706 REL	O/V START	RAISED	spontaneous	no error
382	12/10/2023	17.49.13,549	720RRA 21.R	21 GENERAL PICKUP	RAISED	spontaneous	no error
383	12/10/2023	17.49.13,549	723RRA- 21.R	Total Pickup	RAISED	spontaneous	no error
384	12/10/2023	17.49.13,549	726RRA_7SA522	Total.Pickup	RAISED	spontaneous	no error
385	12/10/2023	17.49.13,549	729RA_7SA522	Total.Pickup	RAISED	spontaneous	no error
386	12/10/2023	17.49.13,550	406 REL 670	VT FUSE FAIL	RAISED single indi	spontaneous	no error
387	12/10/2023	17.49.13,550	715_87R.1_7UT613	87 Blocked by ext. fault C	RAISED	spontaneous	no error
388	12/10/2023	17.49.13,555	706 REL	DISTANCE START L3	RAISED	spontaneous	no error
389	12/10/2023	17.49.13,555	765 KV BB MCU1	Disturb Rec/Recording.Made	CLEARED	spontaneous	no error
390	12/10/2023	17.49.13,556	765 KV BB MCU2	Disturb Rec/Recording.Made	CLEARED	spontaneous	no error
391	12/10/2023	17.49.13,557	709RRB 64R.2 7SJ804	709LR BODY PROT THRES. REACHED	RAISED single indi	spontaneous	no error
392	12/10/2023	17.49.13,558	709RRB 64R.2 7SJ804	709LR BODY PROT THRES. REACHED	CLEARED single ir	spontaneous	no error
393	12/10/2023	17.49.13,558	710_67.1IV_7SJ804	67 General Pickup	RAISED	spontaneous	no error
394	12/10/2023	17.49.13,559	704_67.1IV V4.6	67 General Pickup	RAISED	spontaneous	no error
395	12/10/2023	17.49.13,559	712_67.1IV_7SJ804	67 General Pickup	RAISED	spontaneous	no error

Sequence of Events of Angul S/S - Multi-Element tripping dt.12.10.2023

EVENTS

SICAM PAS CC V7 Event list

	Date	Time	Message Group	Message Text	Value	Cause	Additiona
393	12/10/2023	17.49.13,558	710_67.1IV_7SJ804	67 General Pickup	RAISED	spontaneous	no error
394	12/10/2023	17.49.13,559	704_67.1IV V4.6	67 General Pickup	RAISED	spontaneous	no error
395	12/10/2023	17.49.13,559	713_67.1IV_7SJ804	67 General Pickup	RAISED	spontaneous	no error
396	12/10/2023	17.49.13,560	729RA_7SA522	Total.Pickup.phsB	RAISED	spontaneous	no error
397	12/10/2023	17.49.13,560	729RA_7SA522	Total.Pickup.phsA	RAISED	spontaneous	no error
398	12/10/2023	17.49.13,560	729RA_7SA522	Total.Pickup	RAISED	spontaneous	no error
399	12/10/2023	17.49.13,560	729RA_7SA522	ov stage-1 pickup	RAISED	spontaneous	no error
400	12/10/2023	17.49.13,560	729RA_7SA522	Relay PICKUP Phase L2	RAISED	spontaneous	no error
401	12/10/2023	17.49.13,560	729RA_7SA522	Relay PICKUP Phase L1	RAISED	spontaneous	no error
402	12/10/2023	17.49.13,560	729RA_7SA522	Relay PICKUP	RAISED	spontaneous	no error
403	12/10/2023	17.49.13,560	720 7SA522	RELAY GENERAL PICKUP	RAISED	spontaneous	no error
404	12/10/2023	17.49.13,560	720 7SA522	OVERVOLTAGE STAGE1 PICKUP	RAISED	spontaneous	no error
405	12/10/2023	17.49.13,560	720 7SA522	RELAY GENERAL PICKUP	RAISED	spontaneous	no error
406	12/10/2023	17.49.13,560	723 7SA522	RELAY GENERAL PICKUP	RAISED	spontaneous	no error
407	12/10/2023	17.49.13,560	723 7SA522	OVERVOLTAGE STAGE1 PICKUP	RAISED	spontaneous	no error
408	12/10/2023	17.49.13,562	406 REL 670	DISTANCE BLOCK	RAISED single indi	spontaneous	no error
409	12/10/2023	17.49.13,566	726RA_7SA522	Total.Pickup.phsC	RAISED	spontaneous	no error
410	12/10/2023	17.49.13,566	726RA_7SA522	Relay PICKUP Earth	RAISED	spontaneous	no error
411	12/10/2023	17.49.13,566	726RA_7SA522	Relay PICKUP Phase L3	RAISED	spontaneous	no error
412	12/10/2023	17.49.13,566	726RA_7SA522	Dist general.Pickup.phsC	RAISED	spontaneous	no error
413	12/10/2023	17.49.13,566	726RA_7SA522	Dist general.Pickup	RAISED	spontaneous	no error
414	12/10/2023	17.49.13,567	430 REL 670	VT FUSE FAIL	CLEARED single ir	spontaneous	no error
415	12/10/2023	17.49.13,567	726RRA_7SA522 V4.7	Distance Pickup Z5	RAISED	spontaneous	no error
416	12/10/2023	17.49.13,569	706_6MD663 V4.8	Auto recloser is NOT ready	RAISED	spontaneous	no error
417	12/10/2023	17.49.13,569	706RB LINE BCU 6MD663	Control/CBYGGIO1.52_Y_PHASE	bad state	spontaneous	no error
418	12/10/2023	17.49.13,569	706RB LINE BCU 6MD663	Control/CBRGGIO1.52_R_PHASE	bad state	spontaneous	no error
419	12/10/2023	17.49.13,569	723 BCU	86.1 Reset	RAISED	spontaneous	no error
420	12/10/2023	17.49.13,569	723 BCU	86.2 Reset	RAISED	spontaneous	no error
421	12/10/2023	17.49.13,569	720 BCU	720 CB RPH POSITION	interm. state	spontaneous	no error
422	12/10/2023	17.49.13,570	709RB LINE BCU 6MD663	CB-52 Y-PH STATUS	bad state	spontaneous	no error
423	12/10/2023	17.49.13,570	723 BCU	86.1 Optd	RAISED	spontaneous	no error
424	12/10/2023	17.49.13,570	723 BCU	86.2 TRIP RELAY Optd	RAISED	spontaneous	no error
425	12/10/2023	17.49.13,570	720 BCU	86.2 Optd	RAISED	spontaneous	no error
426	12/10/2023	17.49.13,570	720 BCU	86.1 Optd	RAISED	spontaneous	no error
427	12/10/2023	17.49.13,570	720 BCU	720 CB BPH POSITION	interm. state	spontaneous	no error
428	12/10/2023	17.49.13,571	715_BCU-1_6MD663	CB Y-PHASE	bad state	spontaneous	no error
429	12/10/2023	17.49.13,571	709RB LINE BCU 6MD663	CB-52 R-PH STATUS	bad state	spontaneous	no error
430	12/10/2023	17.49.13,571	712_BCU-1_6MD663	CB Y-PHASE STATUS	bad state	spontaneous	no error
431	12/10/2023	17.49.13,571	720 BCU	720 CB YPH POSITION	interm. state	spontaneous	no error
432	12/10/2023	17.49.13,572	715_BCU-1_6MD663	Control/CBRGGIO1.CB R-PHASE	bad state	spontaneous	no error
433	12/10/2023	17.49.13,572	706RB LINE BCU 6MD663	Control/CBBGGIO1.52_B_PHASE	bad state	spontaneous	no error
434	12/10/2023	17.49.13,572	709RB LINE BCU 6MD663	CB-52 B-PH STATUS	bad state	spontaneous	no error
435	12/10/2023	17.49.13,572	712_BCU-1_6MD663	CB B-PHASE STATUS	bad state	spontaneous	no error

To acknowledge: 3104 List: 100

Sequence of Events of Angul S/S - Multi-Element tripping dt.12.10.2023

EVENTS

SICAM PAS CC V7 Event list

	Date	Time	Message Group	Message Text	Value	Cause	Additional ca
432	12/10/2023	17.49.13,572	715_BCU-1_6MD663	Control/CBRGGIO1.CB R-PHASE	bad state	spontaneous	no error
433	12/10/2023	17.49.13,572	706RB LINE BCU 6MD663	Control/CBBGGIO1.52_B_PHASE	bad state	spontaneous	no error
434	12/10/2023	17.49.13,572	709RB LINE BCU 6MD663	CB-52 B-PH STATUS	bad state	spontaneous	no error
435	12/10/2023	17.49.13,572	712_BCU-1_6MD663	CB R-PHASE STATUS	bad state	spontaneous	no error
436	12/10/2023	17.49.13,572	723 BCU	AR BLOCK	RAISED	spontaneous	no error
437	12/10/2023	17.49.13,572	720 BCU	720 CB CMD	interm. state	spontaneous	no error
438	12/10/2023	17.49.13,572	720RB BCU	CB STATUS	interm. state	spontaneous	no error
439	12/10/2023	17.49.13,572	720 BCU	A/R BLOCK	RAISED	spontaneous	no error
440	12/10/2023	17.49.13,572	430 7SA522	MAIN-1 Distance to fault	10	spontaneous	no error
441	12/10/2023	17.49.13,573	706RB LINE BCU 6MD663	86.2 TRIP RELAY OPTD	RAISED single indi	spontaneous	no error
442	12/10/2023	17.49.13,573	729RB_BCU	86.2 TRIP RELAY Optd	RAISED	spontaneous	no error
443	12/10/2023	17.49.13,573	729RB_BCU	86.1TRIP RELAY Optd	RAISED	spontaneous	no error
444	12/10/2023	17.49.13,573	709RRB 64R.2 7SJ804	709LR BODY PROT THRES. REACHED	RAISED single indi	spontaneous	no error
445	12/10/2023	17.49.13,573	720RA21.2	MAIN CB RPH CLOSE	CLEARED	spontaneous	no error
446	12/10/2023	17.49.13,573	720RA21.2	MAIN CB BPH CLOSE	CLEARED	spontaneous	no error
447	12/10/2023	17.49.13,574	715_BCU-1_6MD663	CB B-PHASE	bad state double ir	spontaneous	no error
448	12/10/2023	17.49.13,574	715_BCU-1_6MD663	86.2 OPTD	RAISED single indi	spontaneous	no error
449	12/10/2023	17.49.13,574	715_BCU-1_6MD663	86.1 OPTD	RAISED single indi	spontaneous	no error
450	12/10/2023	17.49.13,574	706RB LINE BCU 6MD663	86.1 TRIP RELAY OPTD	RAISED single indi	spontaneous	no error
451	12/10/2023	17.49.13,574	709RB LINE BCU 6MD663	86.1 TRIP RELAY OPTD	RAISED single indi	spontaneous	no error
452	12/10/2023	17.49.13,574	729RB_BCU	CB Y _1.Position	bad state	spontaneous	no error
453	12/10/2023	17.49.13,574	729RB_BCU	CB R_1.Position	bad state	spontaneous	no error
454	12/10/2023	17.49.13,574	726RB_BCU	CB Y-PH OC_1.Position	bad state	spontaneous	no error
455	12/10/2023	17.49.13,574	726RB_BCU	AR BLOCK	RAISED	spontaneous	no error
456	12/10/2023	17.49.13,574	726RB_BCU	86.1 OPERATED	RAISED	spontaneous	no error
457	12/10/2023	17.49.13,574	726RB_BCU	CB Auto recloser is NOT ready	RAISED	spontaneous	no error
458	12/10/2023	17.49.13,574	712_BCU-1_6MD663	86.1 OPTD	RAISED single indi	spontaneous	no error
459	12/10/2023	17.49.13,575	709RB LINE BCU 6MD663	86.2 TRIP RELAY OPTD	RAISED single indi	spontaneous	no error
460	12/10/2023	17.49.13,575	729RB_BCU	CB B_1.Position	bad state	spontaneous	no error
461	12/10/2023	17.49.13,575	726RB_BCU	CB52OC_1.Position	bad state	feed back	no error
462	12/10/2023	17.49.13,575	726RB_BCU	86.2 OPERATED	RAISED	spontaneous	no error
463	12/10/2023	17.49.13,575	720RA21.2	MAIN CB YPH CLOSE	CLEARED	spontaneous	no error
464	12/10/2023	17.49.13,575	712_BCU-1_6MD663	86.2 OPTD	RAISED single indi	spontaneous	no error
465	12/10/2023	17.49.13,575	712_BCU-1_6MD663	CB B-PHASE STATUS	bad state	spontaneous	no error
466	12/10/2023	17.49.13,575	723RA21.1	Relay PICKUP Phase L3	RAISED	spontaneous	no error
467	12/10/2023	17.49.13,575	720 7SA522	Zone Z5 START	RAISED	spontaneous	no error
468	12/10/2023	17.49.13,575	720 7SA522	Zone Z4 START	RAISED	spontaneous	no error
469	12/10/2023	17.49.13,575	723RA21.1	Relay PICKUP Phase L3	RAISED	spontaneous	no error
470	12/10/2023	17.49.13,576	430 REL 670	DISTANCE BLOCK	CLEARED single ir	spontaneous	no error
471	12/10/2023	17.49.13,576	723 7SA522	Zone Z5 START	RAISED	spontaneous	no error
472	12/10/2023	17.49.13,577	726RB_BCU	CB R-PH OC_1.Position	bad state	spontaneous	no error
473	12/10/2023	17.49.13,578	729RB_BCU	CB52 _1.Position	bad state	feed back	no error
474	12/10/2023	17.49.13,578	729RB_BCU	AR BLOCK	RAISED	spontaneous	no error

To acknowledge: 3104 List: 1000

Sequence of Events of Angul S/S - Multi-Element tripping dt.12.10.2023

Alarms | Alarms_GI | Events | Trends | Reports | DASHBOARD | LEGEND | HOTSPOT

SICAM PAS CC V7 Event list

EVENTS

	Date	Time	Message Group	Message Text	Value	Cause	Additional cause
471	12/10/2023	17.49.13,576	723 7SA522	Zone Z5 START	RAISED	spontaneous	no error
472	12/10/2023	17.49.13,577	726RB_BCU	CB R-PH OC_1.Position	bad state	spontaneous	no error
473	12/10/2023	17.49.13,578	729RB_BCU	CB52 _1.Position	bad state	feed back	no error
474	12/10/2023	17.49.13,578	729RB_BCU	AR BLOCK	RAISED	spontaneous	no error
475	12/10/2023	17.49.13,578	729RB_BCU	Auto recloser is NOT ready	RAISED	spontaneous	no error
476	12/10/2023	17.49.13,578	720 BCU	720 CB YPH POSITION	ON	spontaneous	no error
477	12/10/2023	17.49.13,579	427 7SA522	Protection/Dist general.Pickup.phsC.backward	RAISED	spontaneous	no error
478	12/10/2023	17.49.13,579	427 7SA522	Protection/Dist general.Pickup.phsC.unknown	CLEARED	spontaneous	no error
479	12/10/2023	17.49.13,579	427 7SA522	Protection/Dist general.Pickup.phsC	RAISED	spontaneous	no error
480	12/10/2023	17.49.13,579	427 7SA522	Protection/Dist general.Pickup.neut	RAISED	spontaneous	no error
481	12/10/2023	17.49.13,579	427 7SA522	Protection/Dist general.Pickup.backward	RAISED	spontaneous	no error
482	12/10/2023	17.49.13,579	427 7SA522	Protection/Dist general.Pickup.unknown	CLEARED	spontaneous	no error
483	12/10/2023	17.49.13,579	427 7SA522	Dist general.Pickup	RAISED	spontaneous	no error
484	12/10/2023	17.49.13,579	709RRB 64R 2 7SJ804	709LR BODY PROT THRES. REACHED	CLEARED single i	spontaneous	no error
485	12/10/2023	17.49.13,579	720 BCU	720 CB BPH POSITION	ON	spontaneous	no error
486	12/10/2023	17.49.13,580	4037SA522	Zone Z5.Pickup	RAISED	spontaneous	no error
487	12/10/2023	17.49.13,580	720 BCU	720 CB RPH POSITION	ON	spontaneous	no error
488	12/10/2023	17.49.13,581	726RB_BCU	CB B-PH OC_1.Position	bad state	spontaneous	no error
489	12/10/2023	17.49.13,582	720 BCU	720 CB CMD	ON	spontaneous	no error
490	12/10/2023	17.49.13,582	720RB BCU	CB STATUS	ON	spontaneous	no error
491	12/10/2023	17.49.13,583	723RA 21.1	AR BLOCK	RAISED	spontaneous	no error
492	12/10/2023	17.49.13,584	709RRA_7SA522 V4.7	21 Picked up FORWARD	RAISED	spontaneous	no error
493	12/10/2023	17.49.13,584	720RA 21.1	AR BLOCK	RAISED	spontaneous	no error
494	12/10/2023	17.49.13,584	720 BCU	720 CB BPH POSITION	interm. state	spontaneous	no error
495	12/10/2023	17.49.13,584	720 BCU	720 CB YPH POSITION	interm. state	spontaneous	no error
496	12/10/2023	17.49.13,584	720 BCU	720 CB RPH POSITION	interm. state	spontaneous	no error
497	12/10/2023	17.49.13,585	715_BCU-1_6MD663	CB Y-PHASE	OFF	spontaneous	no error
498	12/10/2023	17.49.13,586	706RB LINE BCU 6MD663	Control/CBYGGIO1.52_Y_PHASE	OFF	spontaneous	no error
499	12/10/2023	17.49.13,586	706RB LINE BCU 6MD663	Control/CBBGGIO1.52_B_PHASE	OFF	spontaneous	no error
500	12/10/2023	17.49.13,586	723 BCU	Circuit break Position	interm. state	spontaneous	no error
501	12/10/2023	17.49.13,586	723 BCU	723 CB CMD	interm. state	spontaneous	no error
502	12/10/2023	17.49.13,586	720 BCU	720 CB CMD	interm. state	spontaneous	no error
503	12/10/2023	17.49.13,586	720RB BCU	CB STATUS	interm. state	spontaneous	no error
504	12/10/2023	17.49.13,587	706RB LINE BCU 6MD663	Control/CBRGGIO1.52_R_PHASE	OFF	spontaneous	no error
505	12/10/2023	17.49.13,587	706RA 21.1 7SA522	MAIN CB Y-PHASE OPEN	RAISED single indi	spontaneous	no error
506	12/10/2023	17.49.13,587	706RA 21.1 7SA522	MAIN CB B-PHASE OPEN	RAISED single indi	spontaneous	no error
507	12/10/2023	17.49.13,587	715_BCU-1_6MD663	CB B-PHASE	OFF double indicat	spontaneous	no error
508	12/10/2023	17.49.13,587	712_BCU-1_6MD663	CB R-PHASE STATUS	OFF	spontaneous	no error
509	12/10/2023	17.49.13,588	709RB LINE BCU 6MD663	CB-52 Y-PH STATUS	OFF	spontaneous	no error
510	12/10/2023	17.49.13,588	709RB LINE BCU 6MD663	CB-52 R-PH STATUS	OFF	spontaneous	no error
511	12/10/2023	17.49.13,588	729RB_BCU	CB B_1.Position	OFF	spontaneous	no error
512	12/10/2023	17.49.13,588	729RB_BCU	MAIN_CB_B_OPEN	RAISED	spontaneous	no error
513	12/10/2023	17.49.13,588	706RA 21.1 7SA522	MAIN CB R-PHASE OPEN	RAISED single indi	spontaneous	no error

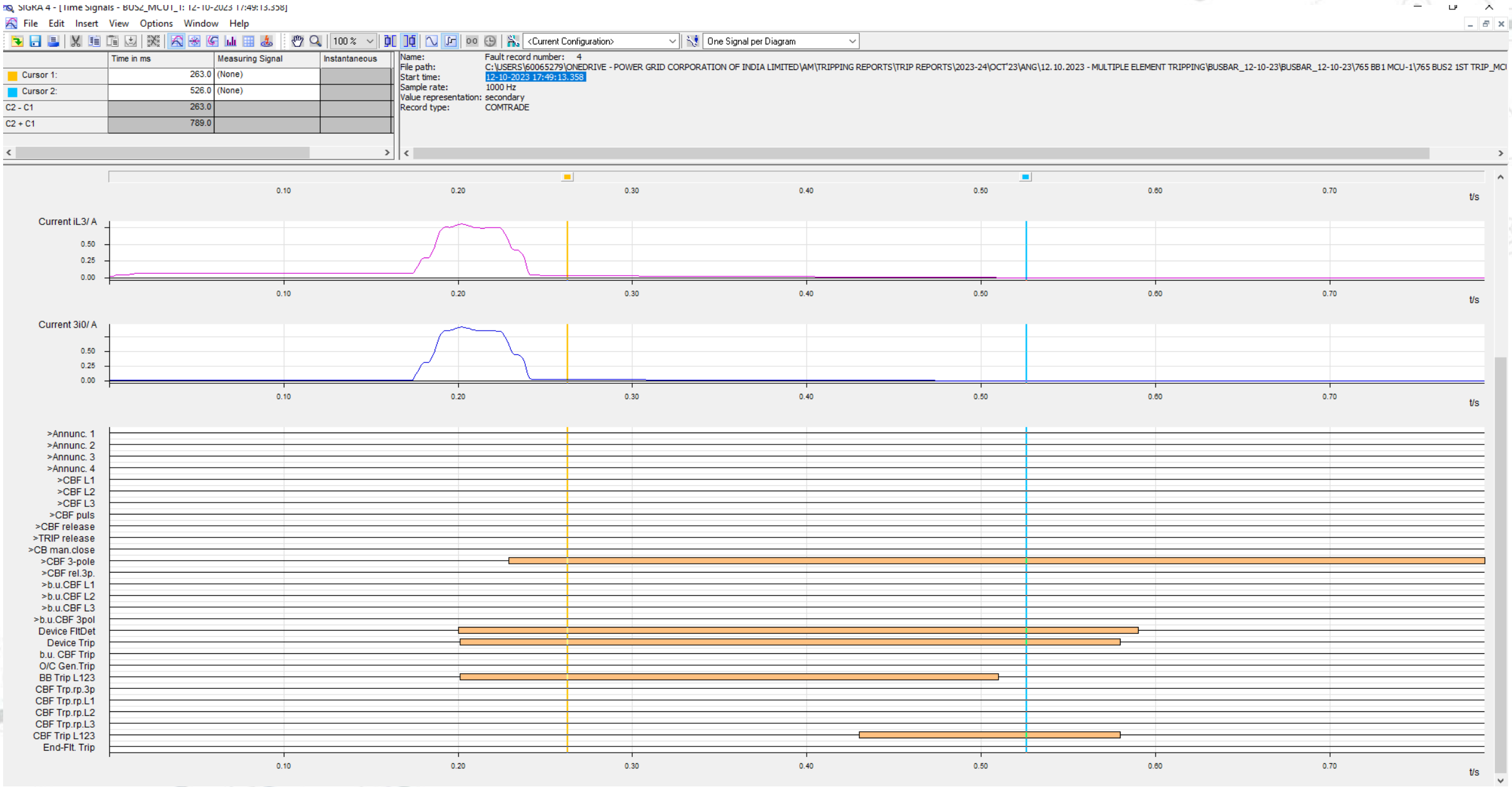
Sequence of Events of Angul S/S - Multi-Element tripping dt.12.10.2023

EVENTS

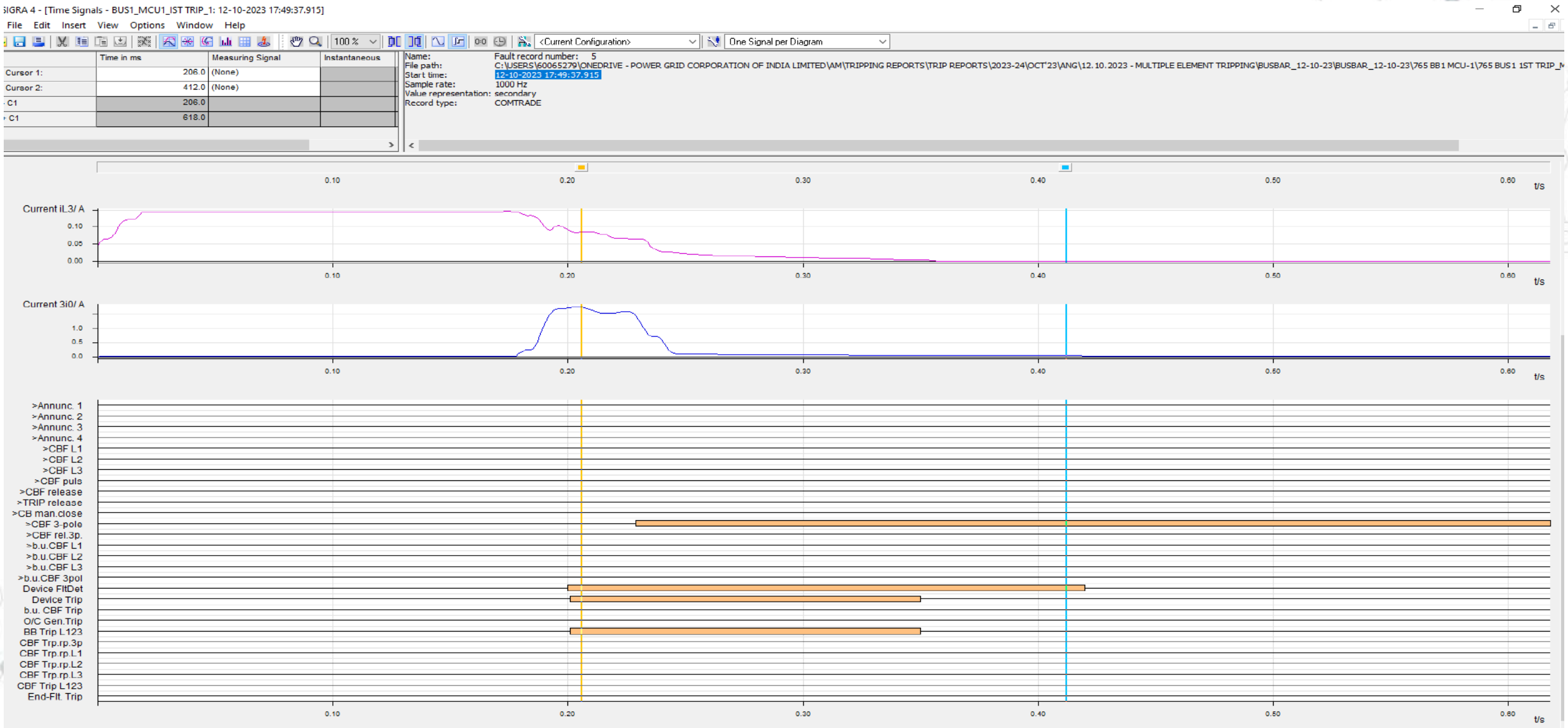
SICAM PAS CC V7 Event list

	Date	Time	Message Group	Message Text	Value	Cause	Additional cau
509	12/10/2023	17.49.13,588	709RB LINE BCU 6MD663	CB-52 Y-PH STATUS	OFF	spontaneous	no error
510	12/10/2023	17.49.13,588	709RB LINE BCU 6MD663	CB-52 R-PH STATUS	OFF	spontaneous	no error
511	12/10/2023	17.49.13,588	729RB_BCU	CB B_1.Position	OFF	spontaneous	no error
512	12/10/2023	17.49.13,588	729RB_BCU	MAIN_CB_B_OPEN	RAISED	spontaneous	no error
513	12/10/2023	17.49.13,588	706RA21.1 7SA522	MAIN CB R-PHASE OPEN	RAISED single indi	spontaneous	no error
514	12/10/2023	17.49.13,588	709RA21.1 7SA522	MAIN CB R-PHASE OPEN	RAISED single indi	spontaneous	no error
515	12/10/2023	17.49.13,588	709RA21.1 7SA522	MAIN CB Y-PHASE OPEN	RAISED single indi	spontaneous	no error
516	12/10/2023	17.49.13,588	712_BCU-1_6MD663	CB Y-PHASE STATUS	OFF	spontaneous	no error
517	12/10/2023	17.49.13,588	723 BCU	Circuit break Position	ON	spontaneous	no error
518	12/10/2023	17.49.13,589	709RB LINE BCU 6MD663	CB-52 B-PH STATUS	OFF	spontaneous	no error
519	12/10/2023	17.49.13,589	709RA21.1 7SA522	MAIN CB B-PHASE OPEN	RAISED single indi	spontaneous	no error
520	12/10/2023	17.49.13,589	715_BCU-1_6MD663	Control/CBRGGIO1.CB R-PHASE	OFF	spontaneous	no error
521	12/10/2023	17.49.13,589	723 BCU	723 CB CMD	ON	spontaneous	no error
522	12/10/2023	17.49.13,590	729RA_7SA522	M1 YPHOPEN	RAISED	spontaneous	no error
523	12/10/2023	17.49.13,590	729RB_BCU	CB R_1.Position	OFF	spontaneous	no error
524	12/10/2023	17.49.13,590	729RB_BCU	MAIN _CB_R_OPEN	RAISED	spontaneous	no error
525	12/10/2023	17.49.13,590	723RA21.1	M1 RPH OPEN	RAISED	spontaneous	no error
526	12/10/2023	17.49.13,590	712_BCU-1_6MD663	CB B-PHASE STATUS	OFF	spontaneous	no error
527	12/10/2023	17.49.13,591	729RA_7SA522	M1 BPHOPEN	RAISED	spontaneous	no error
528	12/10/2023	17.49.13,591	729RB_BCU	CB Y _1.Position	OFF	spontaneous	no error
529	12/10/2023	17.49.13,591	729RB_BCU	MAIN _CB_Y_OPEN	RAISED	spontaneous	no error
530	12/10/2023	17.49.13,591	720 BCU	720 CB BPH POSITION	OFF	spontaneous	no error
531	12/10/2023	17.49.13,592	723 BCU	Circuit break Position	OFF	spontaneous	no error
532	12/10/2023	17.49.13,592	723 BCU	723 CB CMD	OFF	spontaneous	no error
533	12/10/2023	17.49.13,592	720 BCU	720 CB RPH POSITION	OFF	spontaneous	no error
534	12/10/2023	17.49.13,593	729RA_7SA522	NO VOLT IN LINE	RAISED	spontaneous	no error
535	12/10/2023	17.49.13,593	729RA_7SA522	M1 RPHOPEN	RAISED	spontaneous	no error
536	12/10/2023	17.49.13,593	723RA21.1	M1 YPH OPEN	RAISED	spontaneous	no error
537	12/10/2023	17.49.13,593	723RA21.1	M1 BPH OPEN	RAISED	spontaneous	no error
538	12/10/2023	17.49.13,593	729RA_7SA522	NO VOLT IN LINE	CLEARED	spontaneous	no error
539	12/10/2023	17.49.13,593	726RB_BCU	CB Y-PH OC_1.Position	OFF	spontaneous	no error
540	12/10/2023	17.49.13,593	726RB_BCU	MAIN CB Y OPEN	RAISED	spontaneous	no error
541	12/10/2023	17.49.13,593	709RRB 64R 2 7SJ804	709LR BODY PROT THRES. REACHED	RAISED single indi	spontaneous	no error
542	12/10/2023	17.49.13,593	723 BCU	INTERLOCK 89B Open	RAISED	spontaneous	no error
543	12/10/2023	17.49.13,593	723 BCU	INTERLOCK 89A CLOSE	RAISED	spontaneous	no error
544	12/10/2023	17.49.13,593	723 BCU	INTERLOCK 89B CLOSE	RAISED	spontaneous	no error
545	12/10/2023	17.49.13,593	723 BCU	INTERLOCK 89A OPEN	RAISED	spontaneous	no error
546	12/10/2023	17.49.13,595	726RB_BCU	CB R-PH OC_1.Position	OFF	spontaneous	no error
547	12/10/2023	17.49.13,595	726RB_BCU	MAIN CB R OPEN	RAISED	spontaneous	no error
548	12/10/2023	17.49.13,596	726RB_BCU	CB B-PH OC_1.Position	OFF	spontaneous	no error
549	12/10/2023	17.49.13,596	726RB_BCU	MAIN CB B OPEN	RAISED	spontaneous	no error
550	12/10/2023	17.49.13,596	726RA_7SA522	MAIN-1B PH OPEN	RAISED	spontaneous	no error

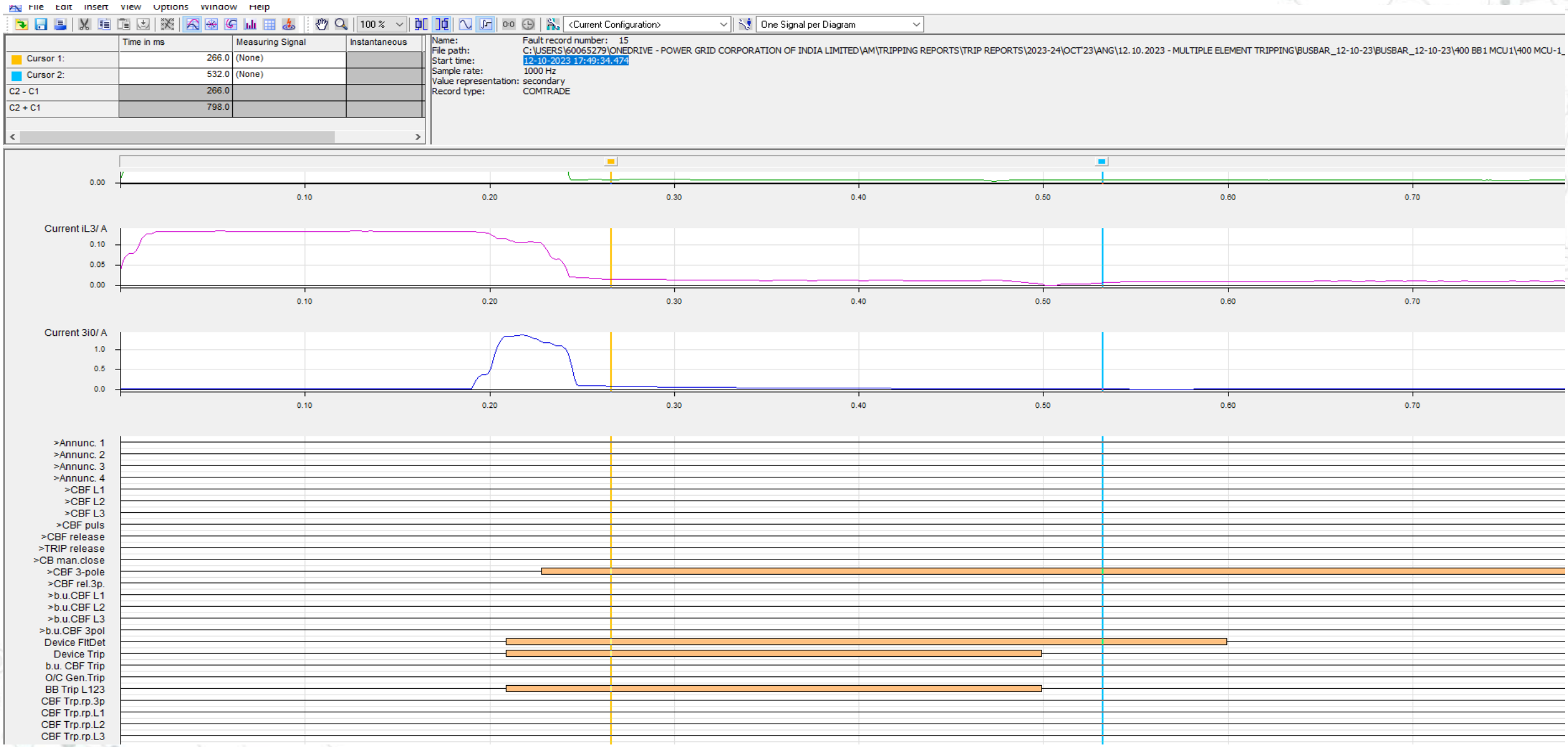
765KV Bus-2 DR



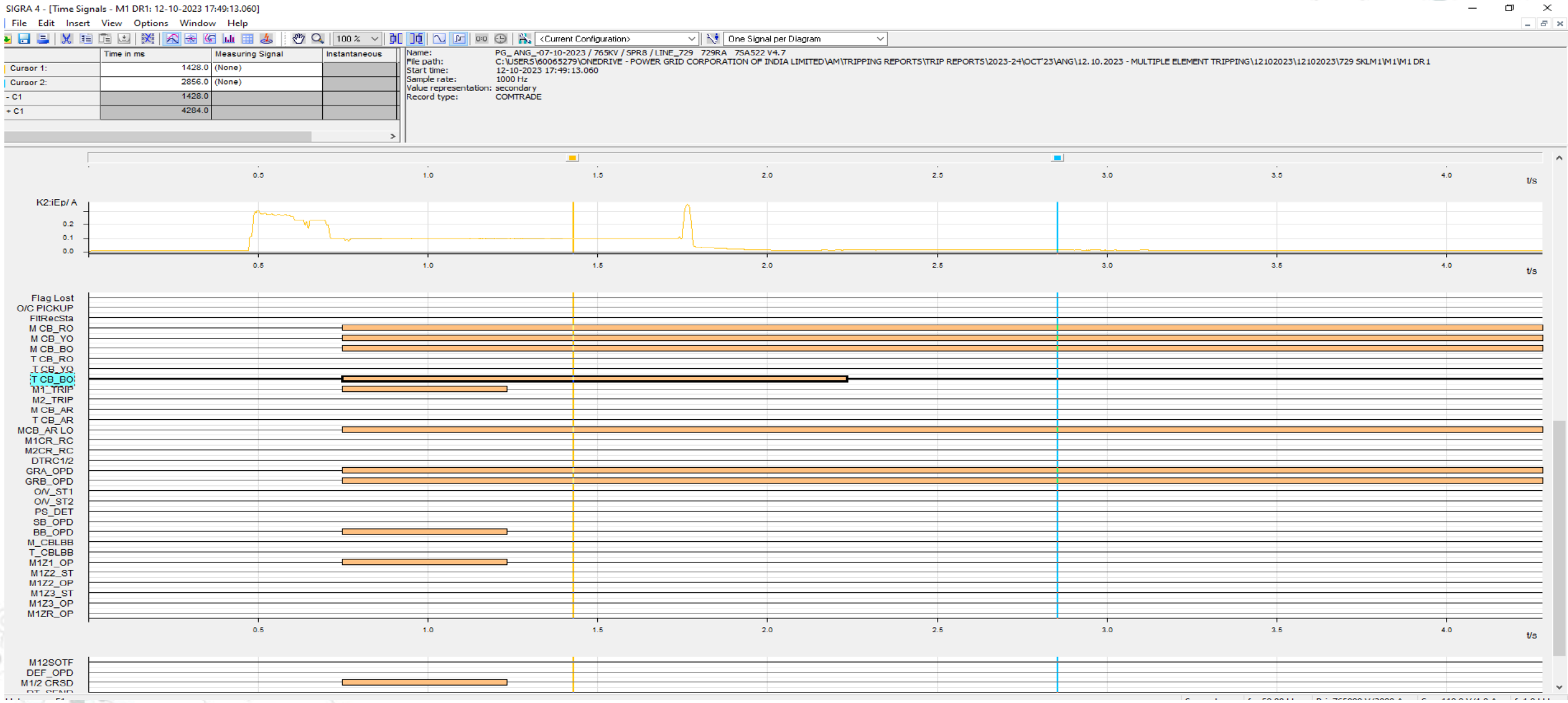
765KV Bus-1 DR



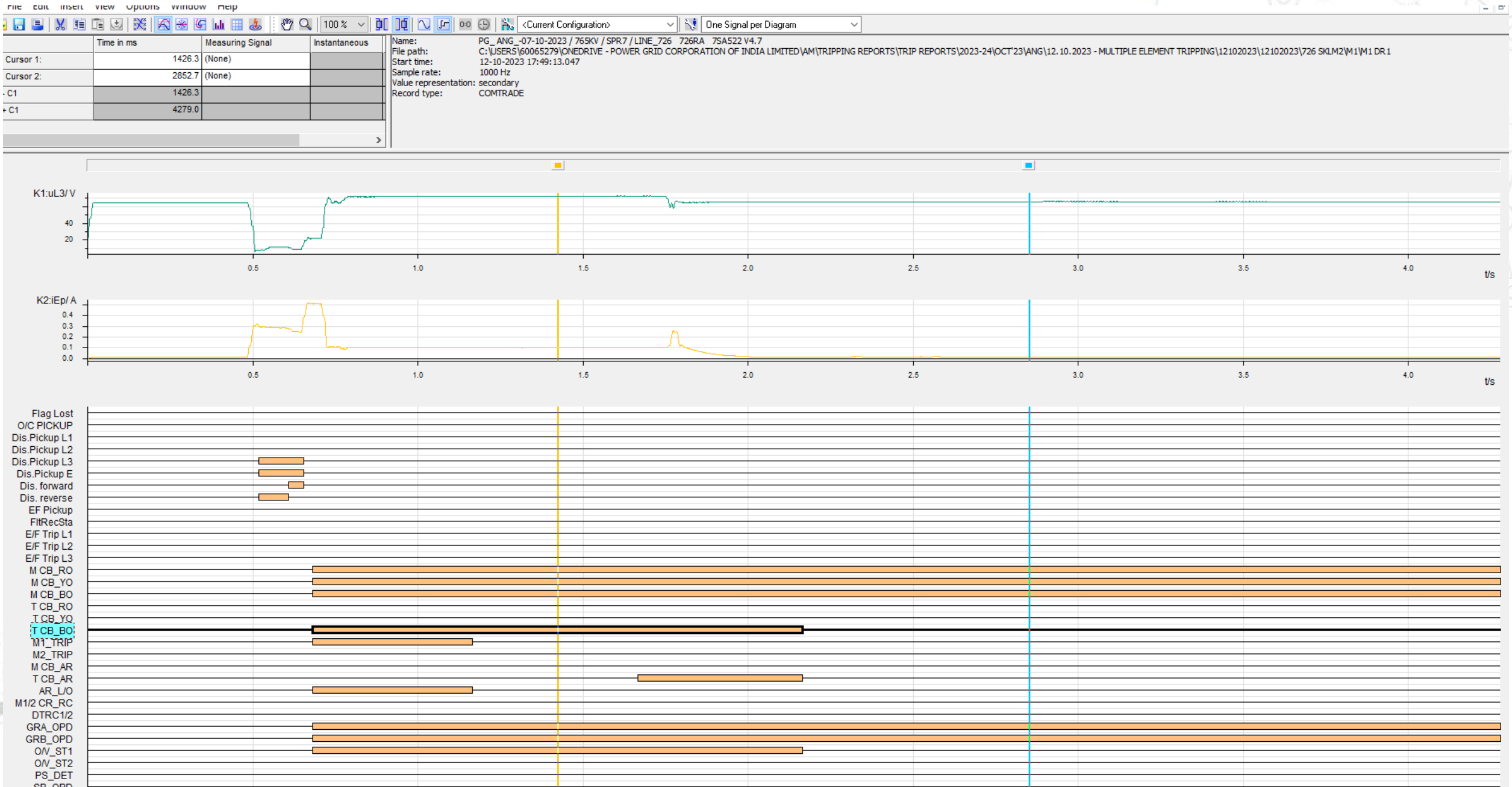
400KV Bus-1 DR



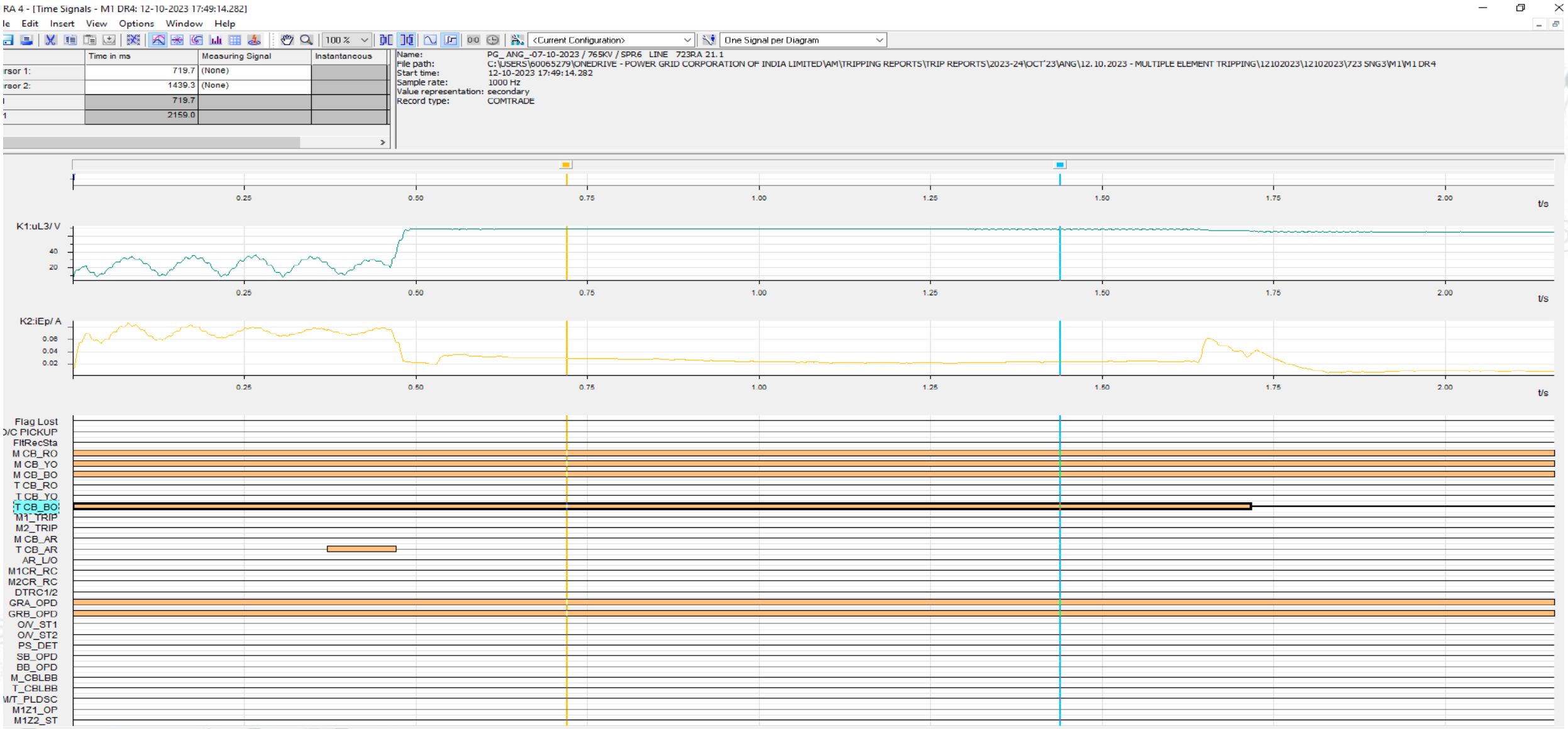
765Kv Angul-Srikakulam-1 A/R



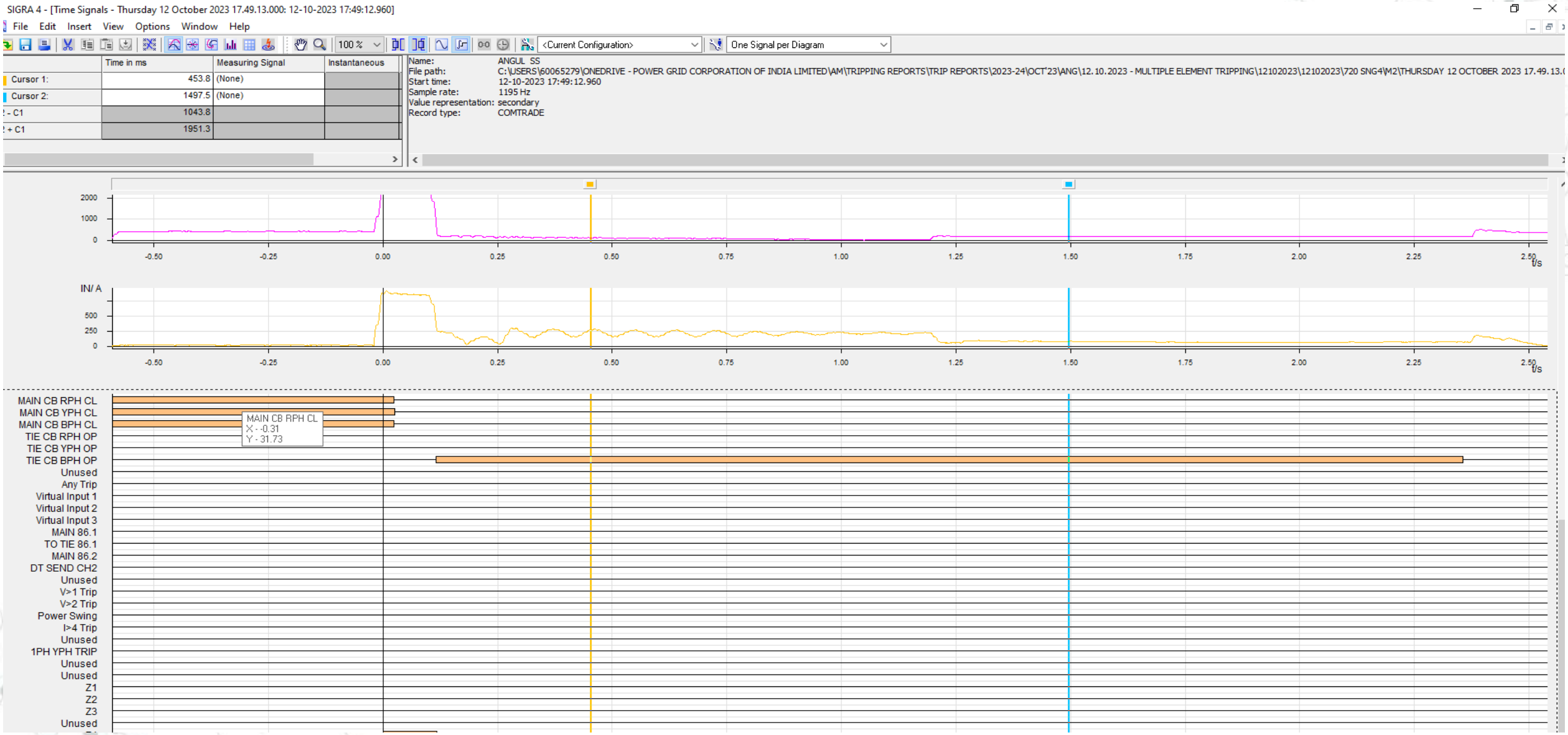
765Kv Angul-Srikakulam-2 A/R



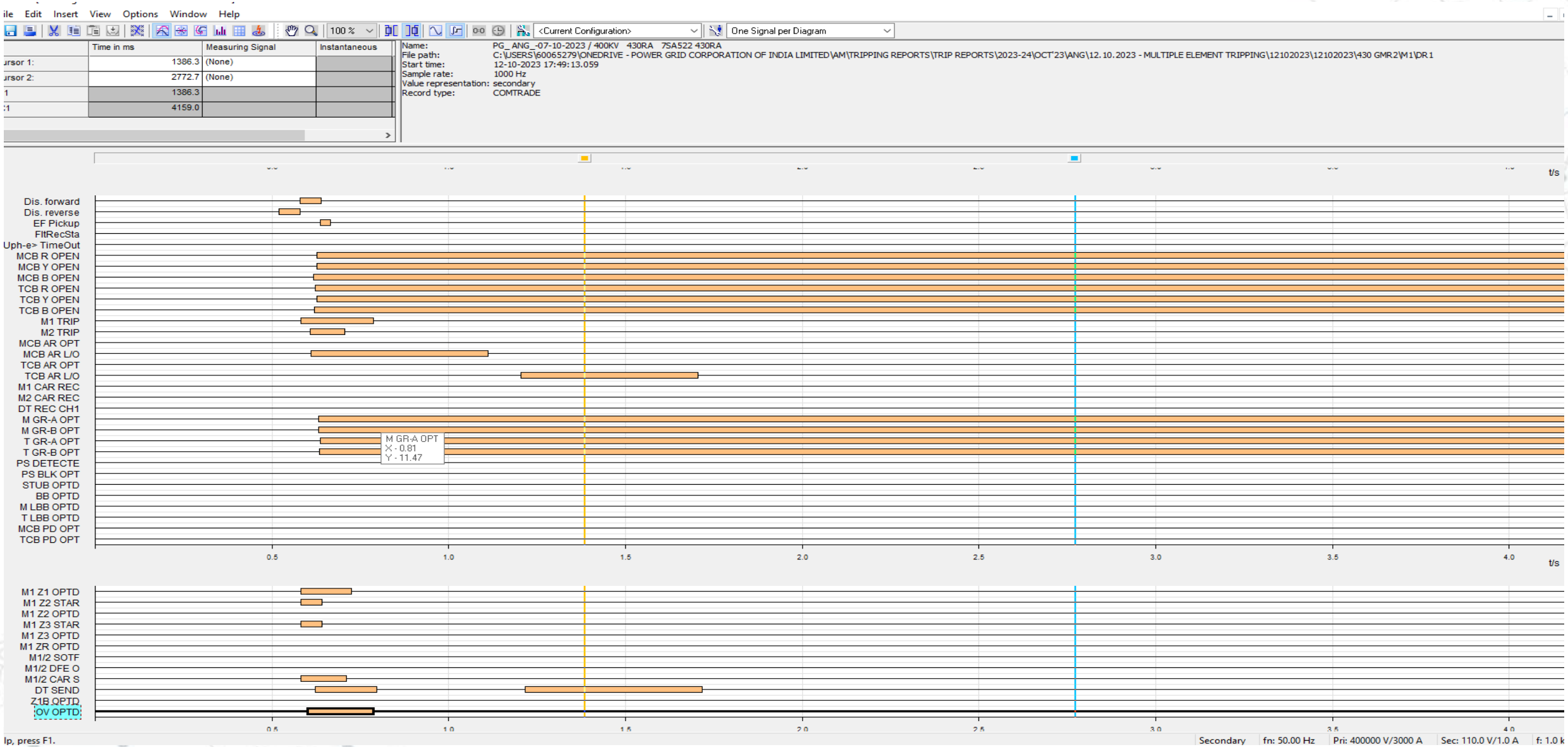
765Kv Angul-Sundargarh-3 A/R



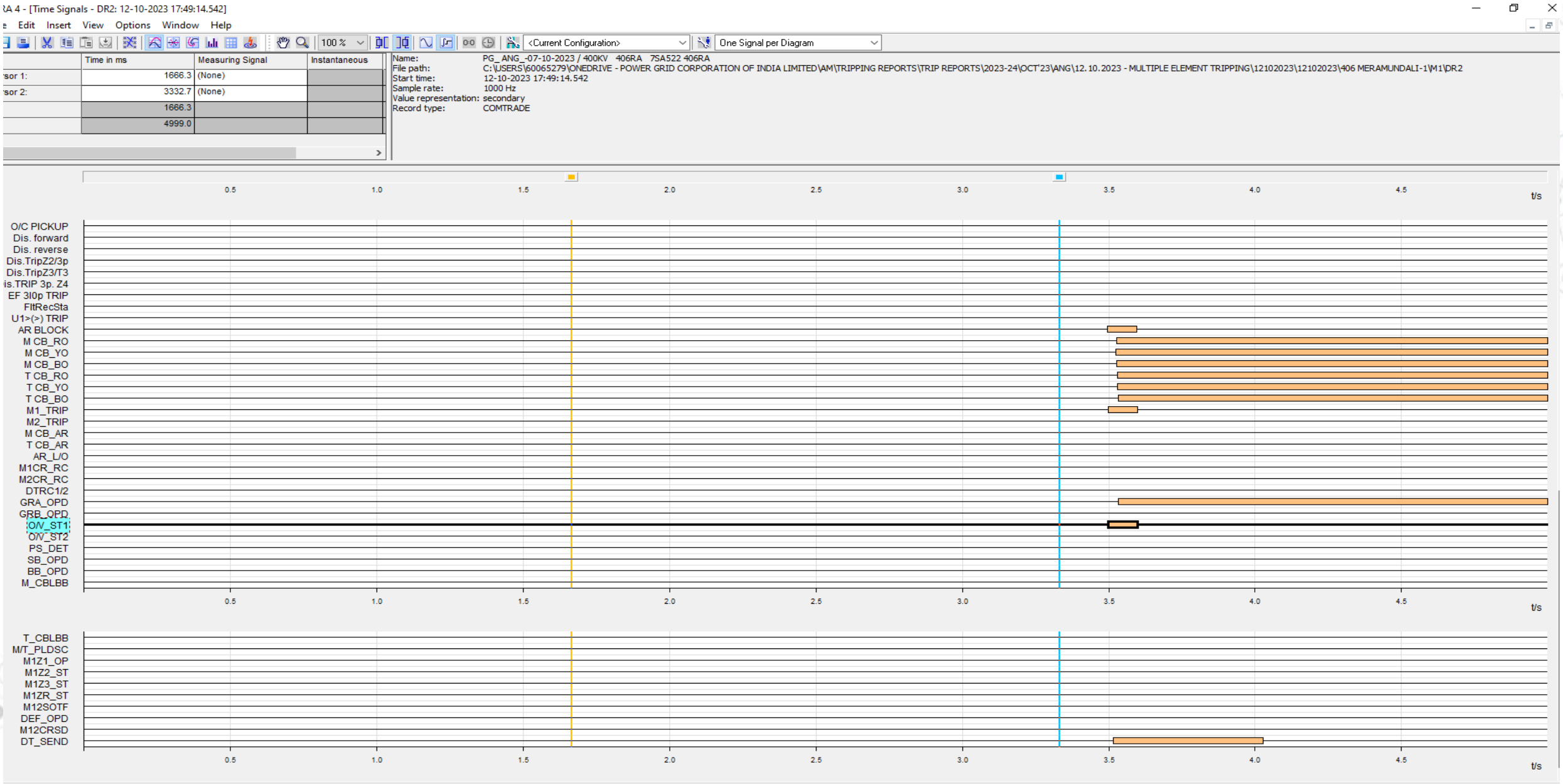
765Kv Angul-Sundargarh-4 A/R



400KV Angul-GMR-2 OV Optd.



400KV Angul-Meramundali-1 OV Optd.



Sequence of Restoration:

S. No.	TIME (hrs)	NAME OF Elements/Lines
01	18:25	400 KV ANGUL-GMR-2 LINE
02	18:32	400 KV angul-JITPL-1– IVT S/C LINE
03	18:45	765 kV BUS-II
04	19:11	765 kV Angul-Sundergarh-4 charged but did not hold again tripped due to o/V stg-1 and 765 kV BUS-2 also tripped
05	19:22	765kV BUS-II Charged
06	19:38	765 kV Angul-Srikakulam-1
07	20:25	240MVAR L/R of Angul-Sundergarg-4 charged as a bus reactor
08	20:37	Angul-Srikakulam-2
09	21:50	765kV BUS-1 charged but tripped again
10	23:11	400kV BUS-1
11	23:25	400kV 125 MVAR B/R-3
12	23:33	400kV Angul-Meramundali-1
765Kv BUS-1 is out of service		
765 kV Angul-Sundergarh-3 is out of service		
765 kV Angul-Sundergarh-4 is out of service		
ICT-3 is out of service, 765KV B/R-1 out of service		

Flash over in secondary JB boxes of CT & Other equipment during severe lightning.

Preliminary Analysis:

- Flash over marks in secondary junction boxes observed in three CTs (723,413 &719) which are associated with bus trippings. Detailed testing of CTs is under way and bays are out of service now for the detailed checking.
- Further, detailed analysis of substation Direct stroke lightning protection (DSLP) plan needs to be studied for possible effect of lightning on substation equipment.
- Detailed report with further findings will be shared shortly.

Clarification for item no: B.5. A. (Disturbance at Angul S/s on 12.10.2023 at 17:49 Hrs) of 130th PCC agenda

1. CT failure of Bay 723 (Jharsuguda-3 main bay), Bay 719 (Jharsuguda-4 tie bay-of half dia) & 413 (Main bay of 765/400 kV ICT 3) resulted in tripping of 765 kV Angul Bus 2, 765 kV Angul Bus 1 & 400 kV Angul Bus 1 respectively. Here, three contingencies occurred within 25 seconds.

Comment: During the incident , Heavy Lighting were persisting at site. This has resultant failure of CTs. Earthing system of substation is being reviewed. Findings of the review will be shared shortly.

2. At the same instant at which bus bar differential operated at Angul 765 kV Bus 2, B-phase Tie CB of 765 kV Angul- Srikakulam-1&2 and 765 kV Angul- Jharsuguda-3&4 also opened on indication of zone – 1 protection. All the aforesaid 765 kV lines successfully auto reclosed after 1.5 seconds. It is very rare that all the Tie CBs opened exactly at the same instant at which main bay CBs of 765 kV Bus 2 tripped. Protection logic need to be checked here.

Comment: Only Main-1 relay protection (siemens) has seens the faults in forwarded & hence ARs were happened. This is due to CVT earthing issue & same was rectified. Tripping and AR through tie CB (Main CBs already tripped on BB protection)is as per scheme and no discrepancies observed.

3. Root cause analysis of simultaneous tripping of all four lines may be done. Further, all four lines tripped in Zone-1 from Angul only, there was no tripping from remote ends despite carrier send from Angul. Whether remote ends detected the fault in Zone-2 or not. The same may be confirmed.

Comment: All Four lines sensed the fault in Zone-1 even thou fault is in reverse This is due to CVT earthing issue & same was rectified. From remote end also, AR happened during first incident when angul end relays send carrier on forward Z1 pick up. Later all lines tripped on O/V after complete tripping of both buses.

4. At 17:49:13.545 hrs, 400 kV GMR- Angul 2 tripped from Angul end only due to operation of O/V Stage 2 protection. Distance protection also operated at Angul (Zone- 1) whether zone-2 picked up at GMR or not ? DT was sent from Angul but line didn't trip from GMR. Whether GMR received DT? GMRKEL may confirm.

5. Reason for such high voltage during fault, whether due to lightning fault back flashover resulted in such high voltage or some earthing issues to be checked by PG-Odisha .

Comment: Earthing system integrity is being under study and review. Findings will be shred later.

6. At 17:49:13.768 hrs,330 MVAr Bus reactor-1 (Connected to Bus-2) tripped due to operation of LBB protection (after almost 200 ms). Main bay CB need to be checked.

Comment: Even though main CB got opened, LBB got picked up due to faulty CT.

7. At 17:49:34.167 hrs, differential relay of 400 kV Angul Bus-1 operated resulting in tripping of all main bays connected to Bus-1. It is reported that the bus bar protection operated due to 413 bay CT flashover (Main bay of 765/400 kV ICT 3).

Comment: 413 Ct failure resulted in operation of BB protection.

8. 400 kV Angul-JITPL-1 also tripped from JITPL end. DT sent from Angul end during bus bar tripping. Why DT sent from Angul? PG Odisha may explain. DR of this tripping may be submitted by JITPL.

Comment: DT was sent from Angul.

9. At 17:49:38.106 hrs, differential relay of 765 kV Angul Bus-1 operated resulting in tripping of all main bays associated with Bus-1. It is reported that bus bar protection operated due to Bay 719 (Jharsuguda-4 tie bay-of half dia) CT failed. At this instant 765kV Angul-Srikakulam D/C, 765kV Angul-Jharsuguda Ckt-3&4 and 765/400kV ICT - 4 tripped. The elements survived on 765 kV side of Angul station are 765 kV AngulJharsuguda-1,2 and 765/400 kV ICT-1,2 tripped in 765 kV side.

Comment: Explained through presentation in PCC. Presentation is attached.

10. At 17:50:18.148, 765 kV Angul-Jharsuguda-3 tripped from Jharsuguda end due to DT receipt from Angul. Zone-1 appeared at Angul end also with fault current around 2.8 kA, but as both main and tie CB were open at Angul, how this current was seen at Angul. Angul also sent carrier signal but fault was cleared after 200 msec after DT received. Why there was delayed clearance from Jharsuguda. PG Odisha may explain.

Comment: Current at Angul sensed due to faulty 723 CT .

11. At 17:50:18.148, 765 kV Angul-Jharsuguda-4 tripped from Jharsuguda end on DT receipt from Angul. NGR at Jharsuguda end failed. Reason of failure of NGR may be ascertained. NGR rating may also be intimated. Phenomena of resonance O/v may also be checked and whether existing NGR is capable to suppress such O/V. PG Odisha may explain.

Comment: NGR failure analysis is under way.

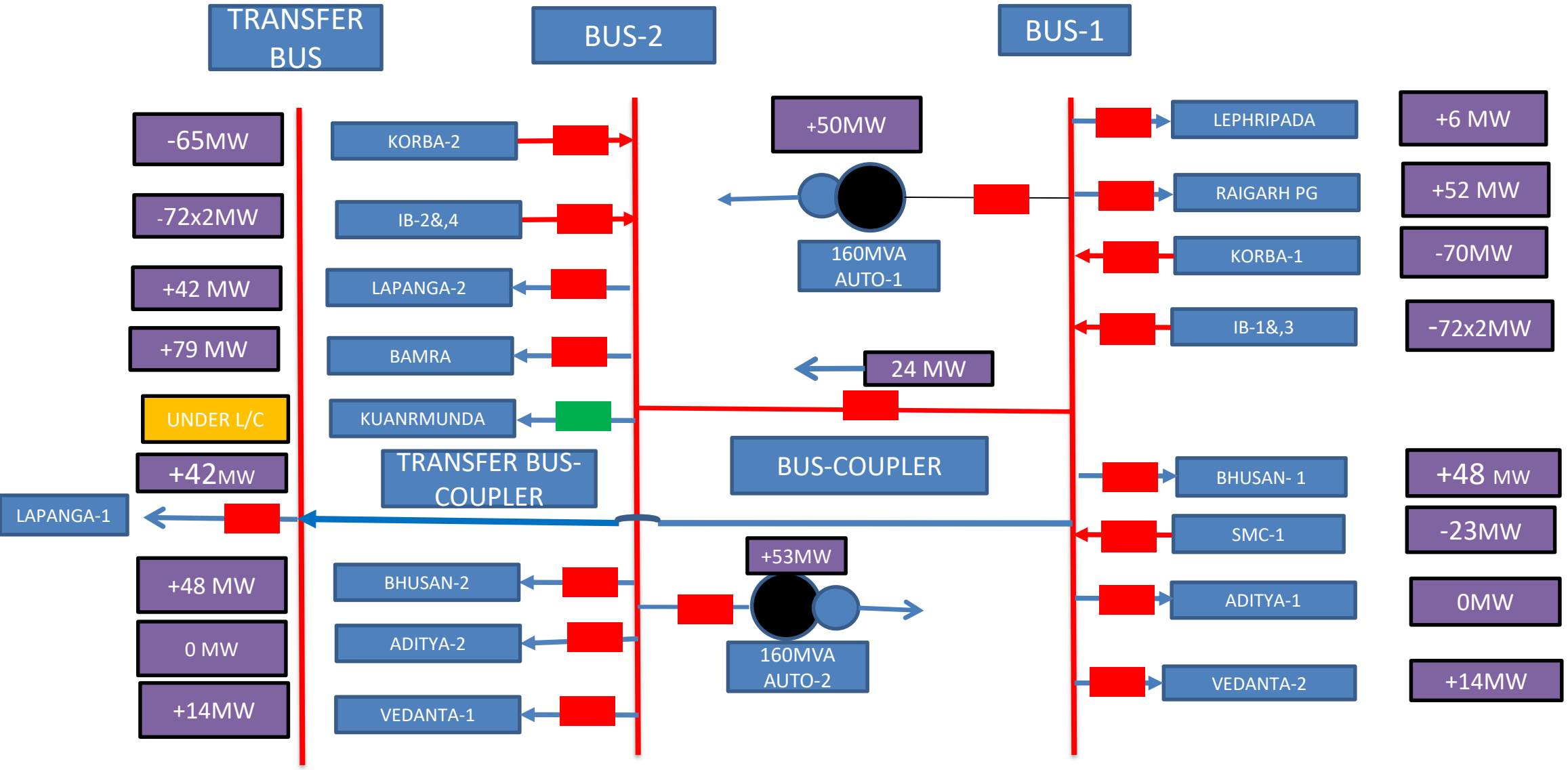
12. It is observed that, after operation of differential protection in all three instances, few breakers didn't open and later LBB operated for those bays. The reason for non-opening of breakers in the first instance may be analysed. PG Odisha may explain.

Comment: All CBs tripped on BB or other protection which are as per scheme. LBB operated in some relays due to failed CTs sensing current even though their respective CBs were opened.

Outage of 220KV Bus-2 system at Budhipadar Grid S/s on dt 06.10.2023.

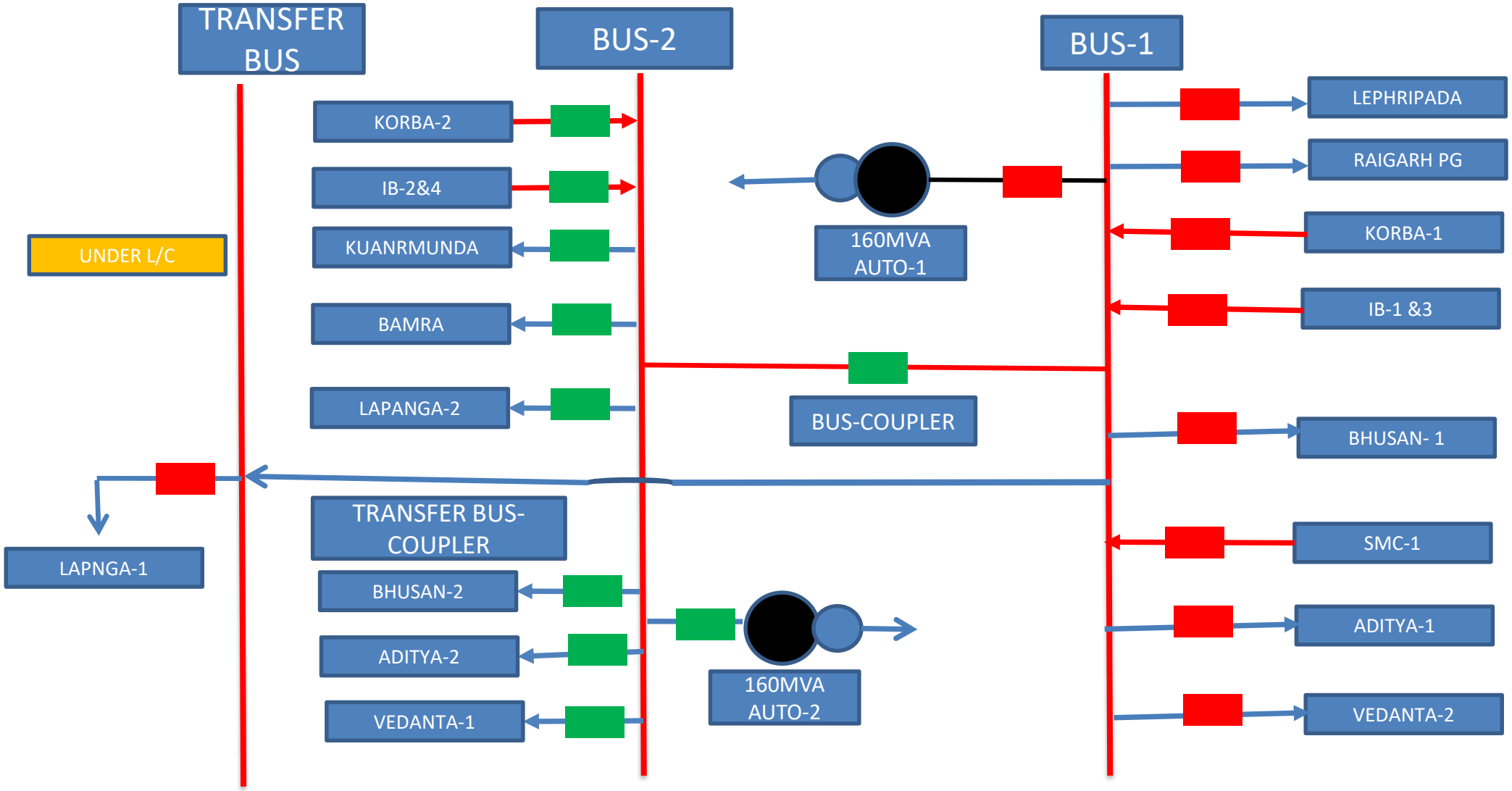
- **Date 06.10.2023 ,Time- 16:14 Hrs.**
- **Station : Budhipadar 220/132/33kV GSS**
- **Weather : Sunny.**
- **220KV Lapanga Ckt-1 feeder was on TBC as the own C.B was in breakdown condition.**
- **220KV Kuanrmunda feeder was on L/C for maintenance work at remote end.**
- **Outage of 220KV Bus-2 occurred due to operation of Bus bar protection and all feeders connected to Bus-2 tripped.**

PRE-FAULT CONDITION



POST-FAULT CONDITION

(ALL FEEDERS & AT-2 IN BUS-2 TRIPPED)



Date & Time of Occurrence:06.10.23, 16.14 Hrs

Sl.No.	Name of feeder	Relay Indication	
		B.Padar End	Remote End
1	220 KV Bamra	DP2-SIEMENS-7SA522 Zone-3, L3-E, FD= 104.3Km IL3= 1.73KA	No Trip
2	220 kV Bus-2 AT-2, korba-2,IB-2&4, Lapanga-2, B/C,Bhusan-2, AAL-2,VAL-1)	BB-SIEMENS-7SS522 Trip BB2- L3	NA

Analysis:-

1. **The Bus bar bay unit (Make-Siemens, Type-7SS522) of 220KV Bamra feeder (Charged from Bus-2) was defective on dt 05.10.23. It was kept out of service for the said bay in the central unit but the B/B protection switch for Bus-2 was in ON condition.**
2. **On dt. 06.10.23 at 16.14hrs. the 220KV Budhipadar-Bamra feeder DP-2(Siemens, 7SA522) relay sensed a fault in Zone-3,Bph-E & fault current in Bph was 1.73KA.**
3. **While checking the DR of Bamra feeder, it is found that the DP relay was picked up in Zone-3 .**
4. **On enquiry it was known that, there was a Transient fault in 220KV Bamra – Tarkera line in B Ph-E fault.**
5. **As the BU of 220KV Bamra feeder at Budhipadar GSS was defective and a fault current of 220KV Bamra-Tarkera line was sensed by the Bus bar relay, the incoming current and outgoing current of Bus-2 mismatched leading to a differential current and thereby resulted to Bus-bar relay operation for Bus-2. Therefore, all the feeders and ATR connected to Bus-2 got tripped and Bus-2 became dead.**

REMEDIAL MEASURES:

1. **Till replacement of the defective Bay Unit of Bus bar protection relay for 220KV Bamra feeder, the Bus bar protection for Bus-2 has been kept OFF to avoid such unwanted outage of the Bus.**

S.No.	Element Name	Tripping Date	Tripping Time	Reason	Revival Date	Revival Time
1	220KV-DARBHANGA(DMTCL)-LAUKAHI-2	26-10-2023	01:30	DARBHANGA: B-N, 71KM, 0.7KA, LAUKAHI: B-N, 18.74Km,0.23KA	26-10-2023	02:23
2		10-10-2023	12:46	Tripped from Laukahi end LAUKAHI: Y_B, Iy=0.94 KA, Ib=0.95 KA	10-10-2023	14:31
3		06-10-2023	19:10	Dharbhanga: A/R successful, R ph, 4.47 kA, 27.3 km Laukahi: Z-1, R-N, 2kA, 50km	06-10-2023	19:46
4		27-09-2023	12:09	Drabhanga: B-Ph, 20 km, 9.6kA, Z-I, A/R Successful Laukhai: zone -1 distance 60.32Km,IA-57.36A,IB-62.38A,IC-1.009KA.	27-09-2023	12:35
5		13-09-2023	22:30	Tripped from DMTCL end	14-09-2023	01:24
6		06-09-2023	19:11	Tripped only from Laukhi end.	06-09-2023	20:23
7		02-09-2023	21:07	LAUKAHI: zone -1, distance- 50.28Km, R_E, fault current R-phase 2.076 KA	02-09-2023	22:10
8		21-08-2023	21:01	Darbhanga:Y-N fault,Zone-1,FD-54.79kM; Laukahi: Y-N, 3.34kA, 31.57km	21-08-2023	23:18
9		16-08-2023	19:53	Darbhanga - R_N , FD - 28 km , FC - 4.751 KA laukai - R_N , FD - 57 km , FC - 2.079 KA A/R successful	16-08-2023	21:45

10		14-08-2023	03:52	Darbhanga: A/R succesfull Laukahi: Distance 26.19km , Ir=4.026 KA, R-N fault	14-08-2023	20:08
11		13-08-2023	18:19	DARBHANGA: R_N, FC-2.20 KA, FD-66 KM, Z-1, A/R SUCCESSFUL LAUKAHI: zone -1 distance 19.78Km, fault current in R-phase 4485A.	13-08-2023	19:07
12		13-08-2023	02:27	Darbhanga: A/R successful, Z-I, Y-Ph, 66.28km,2.463kA laukhai: zone -1 distance 22.95 Km , over current fault current Y-phase 4.256kA	13-08-2023	03:01
13		12-08-2023	03:50	Laukahi : Z-1, R-ph, 30 km, 3.283 kA Darbhanga : A/R Successful, Z-1, R-ph, 2.65 kA, 7.5 km	12-08-2023	04:30
14		09-08-2023	19:33	Darbhanga: A/R succesful, R-N, Z-1, Fd= 27.2 km, Ir = 4.57 KA Laukahi: R-N Fault, Z-1, Fd= 49.45km, fc= 2.183 KA	09-08-2023	20:22
15		08-08-2023	00:40	DMTCL: B-N, 2.75kA, 52.1km, A/R successful	08-08-2023	01:34
16	220KV-DARBHANGA(DMTCL)-LAUKAHI-1	10-10-2023	12:46	Tripped from Laukahi end LAUKAHI: Y_B, Iy=0.93 KA, Ib=0.96 KA	10-10-2023	14:31
17		10-10-2023	12:46	Tripped from Laukahi end LAUKAHI: Y_B, Iy=0.93 KA, Ib=0.96 KA	10-10-2023	14:31

18		18-09-2023	11:50	Darbhanga - Y_B Fault , FD - 9.7 km , FC - IY - 10.94 KA , IB - 10.84 KA Laukahi - FD- 76.09Km FC - Y-B-phase, Ib-1.694 KA, Iy-1.570kA	18-09-2023	12:50

List of Single line tripping incidents for Sep 2023 and Oct 2023 for PG ER-1

Annexure B.8

Sl. No.	LINE NAME	TRIP DATE	TRIP TIME	RESTORATION DATE	RESTORATION TIME	Fault Clearance time in msec	Remarks	Comments from Utilty	PMU Location	DR Configuration Discrepancy	DR/ELRECEIVED FROM LOCAL END	DR/ELRECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	As desired/not	
1	220KV NEW PURNEA-MADHEPURA-1	01-09-2023	11:07	02-09-2023	20:10	100	Phase to phase fault		New Purnea	CB digital signal not configured in new Purnea end DR	Yes	No	PG ER-1	BSPTCL	1	
2	220KV PATNA-KHAGAUL-1	02-09-2023	17:07	02-09-2023	17:33	100	A/r successful from Khagaul only. Other two phase at Patna tripped on PD after 2.25 seconds	A/R did not sent close command , relay faulty , A/R to be implemneted BCU	Patna	CB status channel not mapped properly at Patna. DR length less and not time synchronized at Khagaul	Yes	Yes	PG ER-1	BSPTCL	0	
3	220KV RANCHI-MTPS(DVC)-1	03-09-2023	12:56	03-09-2023	14:23	100	A/r successful from Ranchi. A/r kept disabled at Mejia		Ranchi	Mejia end Dr having insufficient length	Yes	Yes	PG ER-1	DVC	1	
4	220KV RANCHI-MTPS(DVC)-1	08-09-2023	21:00	08-09-2023	22:36	100	A/r successful from Ranchi. A/r kept disabled at Mejia		Ranchi		Yes	Yes	PG ER-1	DVC	1	
5	765KV GAYA-VARANASI-2	15-09-2023	20:00	15-09-2023	23:27	100	No A/r attempt from Gaya. Other two phase tripped after 2.5 seconds on PD	A/R OFF	Gaya		Yes	NA	PG ER-1	NR	0	
6	220KV MUZAFFARPUR(PG)-AMNOUR-2	17-09-2023	18:42	17-09-2023	19:43	100	Three phase tripping for single phase fault.	Maintained by BSPTCL ,DTPC Issue	Muzaffarpur		Yes	No	PG ER-1	BSPTCL	0	
7	400KV KISHANGANJ(PG)-SAHARSA-2	18-09-2023	16:28	18-09-2023	16:44	100	A/r failed after 1 second		Kishanganj		Yes	Yes	PG ER-1	PMTL	1	
8	220KV RANCHI-MTPS(DVC)-1	20-09-2023	16:41	20-09-2023	17:37	100	A/r successful from Ranchi. A/r kept disabled at Mejia		Ranchi		Yes	No	PG ER-1	DVC	1	
9	400KV CHANDWA-NORTH KARANPURA-2	21-09-2023	05:05	21-09-2023	06:56	NA	North Karnpura sensed fault in Zone-3 yet line tripped immediately. U#1 at north Karnpura also tripped at the same time on generator diffenretial. NKSTPP may explain.		Gaya		Yes	Yes	PG ER-1	NTPC	1	

10	400KV GAYA-CHANDWA-1	21-09-2023	05:05	21-09-2023	06:12	100	Chandwa end sensed single phase fault in Y_ph and A/r was successful. Gaya sensed phase to phase fault and three phase tripped.		Gaya		Yes	Yes	PG ER-1	PG ER-1	1	
11	400KV GAYA-CHANDWA-2	21-09-2023	05:05	21-09-2023	06:11	100	Chandwa end sensed single phase fault in B_ph and A/r was successful. Gaya sensed phase to phase fault and three phase tripped.		Gaya		Yes	Yes	PG ER-1	PG ER-1	1	
12	220KV RANCHI-RAMGARH-1	21-09-2023	08:28	21-09-2023	14:02	100	Three phase fault. DVC may share findings.		Ranchi		No	No	PG ER-1	DVC	1	
13	400KV NEW RANCHI-PATRATU-2	21-09-2023	17:27	21-09-2023	18:20	400	Tripped in Zone-2 from New Ranchi. No carrier received.	PLCC ERROR, WILL BE RECTIFIED IN A WEEK	New Ranchi		Yes	Yes	PG ER-1	JUSNL	1	
14	400KV JAMSHEDPUR-ANDAL-2	22-09-2023	22:27	23-09-2023	00:11	100	A/r successful from Jamshedpur only. DVC may explain.		Jamshedpur		Yes	No	PG ER-1	DVC	1	
15	765KV GAYA-VARANASI-1	24-09-2023	08:56	24-09-2023	10:53	NA	O/V St.1 operated at Gaya. As per PMU, voltage reached around 801 kV. O/v setting may be reviewed.		Gaya		Yes	NA	PG ER-1	NR	1	
16	220KV RANCHI-MTPS(DVC)-1	25-09-2023	19:42	25-09-2023	21:38	100	A/r successful from Ranchi. A/r kept disabled at Mejia		Ranchi		No	No	PG ER-1	DVC	1	
17	220KV RANCHI-MTPS(DVC)-1	27-09-2023	23:20	28-09-2023	00:31	100	A/r successful from Ranchi. A/r kept disabled at Mejia		Ranchi		Yes	No	PG ER-1	DVC	1	
18	220KV NEW PURNEA-MADHEPURA-1	28-09-2023	10:30	28-09-2023	11:16	100	Phase to phase fault		New Purnea		No	No	PG ER-1	BSPTCL	1	
19	220 KV RANCHI-CHANDIL-1	29-09-2023	22:43	29-09-2023	22:55	400	Tripped in Zone-2 from Ranchi. No carrier received.		Ranchi		Yes	No	PG ER-1	JUSNL	1	
20	220KV MUZAFFARPUR-HAZIPUR-2	30-09-2023	13:05	30-09-2023	17:04	100	No A/r observed from PMU data.		Muzaffarpur	DR channels not configured properly at Muzaffarpur end	Yes	No	PG ER-1	BSPTCL	0	
21	220KV DEHRI-GAYA-2	01-09-2023	12:18	01-09-2023	12:44	100	A/r successful but tripped again within reclaim time		Gaya	Dehri end DR not time synchronized	Yes	Yes	BSPTCL	PG ER-1	1	
22	220KV KARAMNASHA (NEW)-PUSAULI-1	04-09-2023	04:16	13-09-2023	22:55	100	A/r failed after 1 second from Pusauli. Other two phase at karamnasha tripped on PD after 2.5 seconds		Sasaram		No	Yes	BSPTCL	PG ER-1	1	

23	400KV NEW PPSP-NEW RANCHI-2	07-09-2023	15:32	07-09-2023	19:30	NA	No fault observed from PMU. DC Earth fault reported at New Ranchi. PG ER-1 may explain.	DC EARTH FAULT	New Ranchi		Yes	No	WBSETCL	PG ER-1	0	
24	220KV CHANDIL-RANCHI-1	14-09-2023	20:46	14-09-2023	21:01	100	A/r successful from Ranchi only		Ranchi	DR length less at Chandil	Yes	Yes	JUSNL	PG ER-1	1	
25	220KV HAZIPUR-MUZAFFARPUR-1	18-09-2023	14:00	18-09-2023	14:45	100	Three phase tripping for single phase fault.		Muzaffarpur	DR channels not configured properly at Muzaffarpur end	No	Yes	BSPTCL	PG ER-1	0	19
26	220KV MUZAFFARPUR(PG)-HAZIPUR-2	01-10-2023	09:55	01-10-2023	11:03	100	A/r not ascertained from PMU data		Muzaffarpur		No	No	PG ER-1	BSPTCL	0	
27	400KV BIHARSARIFF(PG)-VARANASI-1	02-10-2023	19:38	02-10-2023	20:21	100	A/r failed after 1 second		Biharsharif		Yes	NA	PG ER-1	NR	1	
28	220KV NEW PURNEA-MADHEPURA-1	08-10-2023	09:56	08-10-2023	11:23	100	A/r not ascertained from PMU data		New Purnea	DR length less at New Purnea	Yes	No	PG ER-1	BSPTCL	0	
29	765KV NEW RANCHI-DHARAMJAIGARH-2	12-10-2023	14:56	12-10-2023	19:55	100	A/r failed after 1 second		New Ranchi		No	No	PG ER-1	WR	1	
30	400KV NEW PURNEA-BIHARSARIFF(PG)-2	22-10-2023	23:49	23-10-2023	00:42	NA	No fault observed from PMU. PG ER-1 may explain.		New Purnea		No	No	PG ER-1	PG ER-1	0	
31	220KV NEW PURNEA-MADHEPURA-1	24-10-2023	10:04	24-10-2023	10:50	650	Resistive fault. A/r not ascertained from PMU data		New Purnea		No	No	PG ER-1	BSPTCL	0	
32	400KV MUZAFFARPUR(PG)-DHALKEBAR-1	30-10-2023	02:57	30-10-2023	03:58	100	A/r failed after 1 second		Muzaffarpur		No	NA	PG ER-1	Nepal	1	
33	220KV RANCHI-MTPS(DVC)-1	31-10-2023	04:38	31-10-2023	06:15	100	A/r disabled at Mejia.		Ranchi		No	No	PG ER-1	DVC	1	
34	220KV KHAGARIA-NEW PURNEA-2	04-10-2023	20:23			100	Phase to phase fault		New Purnea		No	No	BSPTCL	PG ER-1	1	
35	220KV KARAMNASHA (NEW)-PUSAULI-1	07-10-2023	13:57	07-10-2023	15:20	100	A/r failed after 1 second		Sasaram		No	Yes	BSPTCL	PG ER-1	1	
36	220KV KARAMNASHA (NEW)-PUSAULI-1	12-10-2023	12:32	12-10-2023	13:54	100	A/r successful from Sasaram only. Other two phase tripped after 1.7 seconds from Karamnasha		Sasaram		No	Yes	BSPTCL	PG ER-1	1	
37	400KV BINAGURI-NEW PURNEA-1	14-10-2023	12:21	14-10-2023	13:12	100	A/r failed after 1 second from both ends. However, tie bay at New Purnea attempted A/r after failure of main bay A/r and this time A/r was successful.	A/R attempted due to block timer set at 200 ms.	New Purnea		Yes	Yes	PG ER-2	PG ER-1	1	
38	220KV KHAGARIA-NEW PURNEA-1	25-10-2023	13:35	25-10-2023	14:20	100	Initially fault in B_ph. After 300 msec, fault struck Y_ph and all three phase tripped.		New Purnea		Yes	No	BSPTCL	PG ER-1	1	
39	765KV FATEHPUR-PUSAULI-1	28-10-2023	23:53	29-10-2023	02:47	100	A/r failed after 1 second		Sasaram		No	No	NR	PG ER-1	1	

40	400KV NEW PPSP-NEW RANCHI-1	30-10-2023	10:29	30-10-2023	11:09	NA	PG/WBSETCL may explain.		New Ranchi		No	No	WBSETCL	PG ER-1	0	
41	400KV NEW PPSP-NEW RANCHI-2	30-10-2023	10:38	30-10-2023	11:14	NA	PG/WBSETCL may explain.		New Ranchi		No	No	WBSETCL	PG ER-1	0	
															10	

List of Single line tripping incidents for Sep 2023 and Oct 2023 for PG ER-2

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	Comments from Utilty	PMU Location	DR Configuration Discrepancy	DR/ELRECEIVED FROM LOCAL END	DR/ELRECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	As desired/not
1	400KV ALIPURDUAR (PG)-PUNASANGCHUN-JIGMELING-2	06-09-2023	17:12	06-09-2023	18:56	Alipurduar: B_E, Zone-2, 212.3 km, 2 kA	Jigmelling: B_E, Zone-1, 105.3 km, 1.6 kA	B-Earth	1100	Resistive fault. Tripped in Zone-2 from Alipurduar. No carrier received		Alipurduar		Yes	NA	PG ER-2	Bhutan	1
3	220KV ALIPURDUAR (PG)-SALAKATI-2	15-09-2023	11:06	15-09-2023	12:13	Alipurdaur: R_N, 36.2 km, 1.9 kA	Salakati:R_N, 93 km,1.9 kA	R-Earth	100	A/r not attempted at Alipurduar and other two phase tripped after 1.5 seconds. A/r successful from Salakati, however tripped again within reclaim time.	CB Unhealthy , CB SF6 alarm low is going for unhealthy which is rectified .	Alipurduar		Yes	NA	PG ER-2	NER	0
5	220KV NEW TOWN(AA-III)-RAJARHAT-2	01-09-2023	11:35	01-09-2023	13:27	New town: B_E, 5.45 km, 13 kA	Rajarhat:B_E, 1.44 km, 16.54 kA	B-Earth	100	A/r failed after 1 second		Rajarhat		No	Yes	WBSETCL	PG ER-2	1
6	220KV CHUKHA-BIRPARA-1	01-09-2023	14:50	02-09-2023	15:59		Birpara: Y_B, 52.6 km, Iy= 3.033 kA, Ib= 3.053 kA	Y-B	100	Phase to phase fault		Birpara		No	Yes	Bhutan	PG ER-2	1
7	220KV PARULIA-PARULIA(PG)-2	12-09-2023	15:45	12-09-2023	16:32		Parulia (PG): Didn't trip	No fault	NA	No fault observed from PMU. DVC may explain.		Durgapur		Yes	NA	DVC	PG ER-2	1
8	400KV ALIPURDUAR (PG)-PUNASANGCHUN-JIGMELING-2	03-10-2023	02:43	03-10-2023	04:02	Alipurdaur: R_N, 25.67 km, 8.9 kA, A/r successful	Bhutan : R_N, 174 km, 1.32 kA	R-Earth	100	A/r successful from Alipurduar only. Three phase tripping at Jigmelling		Alipurduar		Yes	NA	PG ER-2	BHUTAN	1
9	400KV BAHARAMPUR-BHERAMARA-4	05-10-2023	00:01	05-10-2023	18:57	Baharampur: Y_E, Zone-1, 63 km, 4.8 kA		Y-Earth	100	A/r failed after 1 second		Baharampur		Yes	NA	PG ER-2	BANGLADESH	1
11	220KV BINAGURI-BIRPARA-2	17-10-2023	17:25	18-10-2023	01:39	Binaguri: Y_B, Zone-1, 46.13 km, Iy= 3.8 kA, Ib= 4.2 kA	Birpara: Y_B, Zone-1, 27.74 km, Iy= 3.6 kA, Ib= 6.06 kA	Y-B-Earth	100	Phase to phase fault. TOP(B) Ph Conductor Broken and snapped in the span Tower no-85-86 near tower no-86		Binaguri		Yes	Yes	PG ER-2	PG ER-2	1
12	220KV BIRPARA-MALBASE-1	18-10-2023	15:50	18-10-2023	16:38		220 kV Bus tripped at Malbase	No fault	NA	No fault observed from PMU.		Birpara		No	NA	PG ER-2	BHUTAN	1
13	220KV BINAGURI-BIRPARA-2	30-10-2023	17:50	31-10-2023	03:04	Binaguri: Y_B_N, 36.08 km, Iy= 4.09 kA, Ib= 6.873 kA	Birpara: Y_B_N, Iy= 2.183 kA, Ib= 13.861 kA	Y-Earth	100	After 500 msec, phase to phase fault struck remaining two phases. After 1 second of first fault, A/r attempted and three phase tripped due to persisiting fault in all three phases. Conductor snapped between tower loc. no. 128 & 129		Binaguri		No	No	PG ER-2	PG ER-2	1
14	400KV NEW JEERAT-SUBHASGRAM(PG)-2	03-10-2023	11:48	03-10-2023	20:58	New Jeerat: B_N, Zone-1, 45.80 km, 5.43 kA	Subhasgram: B_N, Zone-1, 62.4 km, 4.9 kA	B-Earth	100	A/r failed after 1 second		Subhashgram		Yes	Yes	PMJTL	PG ER-2	1
15	220KV RONGNICHU-RANGPO-2	09-10-2023	11:13	09-10-2023	18:17		Rangpo: Y_B, 13.183 km, 1.27 kA	Y-B	100	Phase to phase fault		Rangpo		Yes	Yes	Rongnichu	PG ER-2	1

List of Single line tripping incidents for Sep 2023 and Oct 2023 for PG Odisha

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	PMU Location	DR Configuration Discrepancy	DR/ELRECEIVED FROM LOCAL END	DR/ELRECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE	
1	220KV KATAPALLI-BOLANGIR(PG)-1	02-09-2023	11:32	02-09-2023	11:56	Katapalli: R_N, Zone-2, 1.7 kA	Bolangir: Didn't trip	R-Earth	650	Tripped in Zone-2 from Katapalli. Whether A/r operated at Bolangir? PG Odisha may explain.	Bolangir		Yes	No	PG Odisha	OPTCL	0	
2	220KV BOLANGIR(PG)-BOLANGIR(GRIDCO)-2	02-09-2023	11:34	02-09-2023	12:08	Bolangir: R_N, 6.16 kA	Bolangir: E/F	R-Earth	300	As per DR, fault cleared from PG end after 300 msec in Zone-1. A/r signal got high at PG end but no A/r attempted. PG Odisha may explain.	Bolangir	Main 2 DR not time synchronized in Bolangir(PG)	Yes	No	PG Odisha	OPTCL	0	
3	400KV JEYPORE-GAJUWAKA-2	02-09-2023	16:57	03-09-2023	11:14	Jeypore: B_N, 111.2 km, 1.18 kA	Gajuwaka: B_N, 57.3 km, 1.39 kA	B-Earth	100	A/r failed after 1 second	Jeypore		Yes	No	PG Odisha	SR	1	
4	400KV JHARSUGUDA-ROURKELA-3	07-09-2023	18:13	07-09-2023	18:50	Jharsuguda: DT received		No fault	NA	No fault observed from PMU. PG Odisha may explain.	Rourkela		Yes	No	PG Odisha	PG Odisha	0	
12	400KV INDRAVATI(PG)-INDRAVATI(GR)-1	26-09-2023	11:01	26-09-2023	11:32	Indravati:B_N, 2.15 kA	Indravati(GR): Didn't trip	B-Earth	400	As per PMU, line tripped in Zone-2 time from PG end.	Indravati		No	No	PG Odisha	OHPC	0	
14	220KV BARIPADA-BALASORE-1	29-09-2023	20:30	29-09-2023	21:15	Baripada: R_N, 25.25 km, 4.893 kA	Balasore: R_N, A/r successful	R-Earth	100	A/r successful from Balasore end only. No A/r attempt from Baripada end. PG Odisha may explain.	Baripada		No	No	PG Odisha	OPTCL	0	
16	400KV GMR-ANGUL-1	10-09-2023	12:19	10-09-2023	15:50		Angul: B_N,Zone-1, 15 km, 11.4 kA	B-Earth	100	A/r failed after 1 second	Angul		No	Yes	GMRKEL	PG Odisha	1	11
17	400KV ROURKELA-JHARSUGUDA-4	02-10-2023	15:26	02-10-2023	16:55	Rourkela: R_B, Zone-1, 65.38 km, Ir= 7.25 kA, Ib= 7.35 kA	Jharsuguda: R_B, 63.2 km, Ir= 7.8 kA, Ib= 7.72 kA	R-B-Earth	100	Phase to phase fault	Rourkela		Yes	Yes	PG Odisha	PG Odisha	1	
19	220KV ROURKELA-TARKERA-2	07-10-2023	15:27	07-10-2023	19:52		Tarkera: B_N, 16.9 kA	B-Earth	100	A/r failed after 1 second. Jumper snapped at loc.2	Rourkela		No	Yes	PG Odisha	OPTCL	1	
22	400KV GMR-ANGUL-2	01-10-2023	11:28	01-10-2023	12:33	GMR: B_N, Zone-1, 19.54 km, 10 kA, A/r unsuccessful	Angul: B_N, 25.7 km, 10.41 kA	B-Earth	100	A/r failed after 1 second	Angul		No	Yes	GMRKEL	PG Odisha	1	

List of Single line tripping incidents for Sep 2023 and Oct 2023 for PMTL

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	Comments from Utilty	PMU Location	DR Configuration Discrepancy	DR/ELRECEIVED FROM LOCAL END	DR/ELRECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE
1	400KV SAHARSA-DARBHANGA (DMTCL)-1	01-09-2023	12:18	01-09-2023	12:59	Saharsa: R_E, Zone-1, 8.2 km, 10.2 kA	Darbhanga: R_E, Zone-2, 4 kA	R-Earth	100	A/r failed after 1 second		Muzaffarpur	Saharsha end main 2 DR not time synchronized	Yes	No	PMTL	DMTCL	1
2	400KV SAHARSA-DARBHANGA (DMTCL)-2	04-09-2023	13:09	04-09-2023	16:13	Saharsa: DT received	Darbhanga: Didn't trip	No fault	NA	No fault in line. PMTL/DMTCL may explain		Muzaffarpur		No	No	PMTL	DMTCL	0
3	220KV CHANDAUTI (PMTL)-SONENAGAR-2	17-09-2023	12:19	17-09-2023	12:54	Chandauti:B_N, 55.57 km, 2.12 kA	Sonenagar:B_N, Zone-1, 40.47 km, 1.251 kA	B-Earth	1580	Resistive fault. Tripped after fault was sensed by distance relay. A/r failed after 1 second		Gaya		Yes	No	PMTL	BSPTCL	1
4	220KV SAHARSA(PMTL)-BEGUSARAI-1	27-09-2023	06:02	27-09-2023	09:54	Saharsa: Didn't trip	Begusarai: tripped	No fault	NA	Fault in downstream in 220 kV Begusarai. Samastipur-2. Both lines tripped from Begusarai in Zone-4		Muzaffarpur		No	Yes	PMTL	BSPTCL	1
5	220KV SAHARSA(PMTL)-BEGUSARAI-2	27-09-2023	06:02	27-09-2023	09:54	Saharsa: Didn't trip	Begusarai: tripped	No fault	NA			Muzaffarpur		No	Yes	PMTL	BSPTCL	1
6	220KV SITAMARHI-RAXAUL-2	29-09-2023	12:07	29-09-2023	13:16	Sitamarhi: B_N, 10.16 km, 9.49 kA	Raxaul: B_N, 52 km, 2.6 kA	B-Earth	100	Three phase tripping for single phase fault. No A/r observed from either end.	Reclaim time tripping , carrier out of serive not healthy yet.	Kishanganj		Yes	Yes	PMTL	BSPTCL	0
7	220KV SITAMARHI-MOTIPUR-1	30-09-2023	12:22	30-09-2023	13:59	Sitamarhi: Y_B, 52.1 km, 1.54 kA		Y_B	800	Tripped in Zone-3 from Sitamarhi, suggestive of downstream fault which was not cleared. No tripping at		Kishanganj		Yes	Yes	PMTL	BSPTCL	1
8	220KV SITAMARHI-MOTIPUR-2	30-09-2023	12:22	30-09-2023	14:23	Sitamarhi: Y_B, 52.1 km, 3.53 kA		Y_B	800			Kishanganj		Yes	Yes	PMTL	BSPTCL	1
9	400KV KISHANGANJ(PG)-SAHARSA-2	18-09-2023	16:28	18-09-2023	16:44	Kishanganj: B_N, 97 km, 4.19 kA	Saharsa:B_N, 92 km, 3.6 kA	B-Earth	100	A/r failed after 1 second		Kishanganj		Yes	Yes	PG ER-1	PMTL	1
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List of Single line tripping incidents for Sep 2023 and Oct 2023 for BSPTCL

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	Comments from Utilty	PMU Location	DR Configuration Discrepancy	DR/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE	
1	220KV DEHRI-GAYA-2	01-09-2023	12:18	01-09-2023	12:44	Dehri: B_E, 69.07 km, 0.644 kA	Gaya: B_E, 44.05 km, 8.87 kA	B-Earth	100	A/r successful but tripped again within reclaim time		Gaya	Dehri end DR not time synchronized	Yes	Yes	BSPTCL	PG ER-1	1	
2	220KV KARAMNASHA (NEW)-PUSAULI-1	04-09-2023	04:16	13-09-2023	22:55	Sasaram:Y_E, 4.53 km 13.8 kA		Y-Earth	100	A/r failed after 1 second from Pusauli. Other two phase at karamnasha tripped on PD after 2.5 seconds	Breaker stuck so tripped in PD.	Sasaram		No	Yes	BSPTCL	PG ER-1	0	
3	220KV HAZIPUR-MUZAFFARPUR-1	18-09-2023	14:00	18-09-2023	14:45	Hazipur:B_N, Zone-1, 4.37 kA	Muzaffarpur:B_N, Zone-1, 34.6 km, 4.28 kA	B-Earth	100	Three phase tripping for single phase fault.		Muzaffarpur	DR channels not configured properly at Muzaffarpur end	No	Yes	BSPTCL	PG ER-1	0	
4	220KV KARAMNASHA (NEW)-SAHUPURI-1	27-09-2023	14:02	27-09-2023	15:31	Karamnasha: O/c operated		No fault	NA	As per PMU, no fault in line. Why O/c setting kept at Karamnasha end. BSPTCL may explain.	A/R successful from Bihar end , UP end Dog conductor so O/C kept at 600 amps.	Sasaram		No	No	BSPTCL	NR	0	
5	220KV NEW PURNEA-MADHEPURA-1	01-09-2023	11:07	02-09-2023	20:10	New Purnea: Y_ph CT burst		Y-B	100	Phase to phase fault		New Purnea	CB digital signal not configured in new Purnea end DR	Yes	No	PG ER-1	BSPTCL	1	
6	220KV PATNA-KHAGAUL-1	02-09-2023	17:07	02-09-2023	17:33	Patna: R_N, 4.236 km, 18.288 kA	Khagaul: Didn't trip	R-Earth	100	A/r successful from Khagaul only. Other two phase at Patna tripped on PD after 2.25 seconds		Patna	CB status channel not mapped properly at Patna. DR length less and not time synchronized at Khagaul	Yes	Yes	PG ER-1	BSPTCL	1	
7	220KV DARBHANGA(DMTCL)-LAUKAHI-2	02-09-2023	21:07	02-09-2023	22:10		Laukahi: R_E, Zone-1, 50.28 km, 2.076 kA	R-Earth	800	A/r successful from Darbhanga. Three phase tripping at Laukahi		Muzaffarpur	CB digital channels not seen in laukahi end DR	No	Yes	DMTCL	BSPTCL	0	
8	220KV DARBHANGA(DMTCL)-LAUKAHI-2	06-09-2023	19:11	06-09-2023	20:23		Laukahi:R_N, 3.74 kA	R-Earth	100	A/r successful at Darbhanga. Three phase tripping at Laukahi		Muzaffarpur	CB digital signals not mapped in DR of laukahi	No	Yes	DMTCL	BSPTCL	0	
9	220KV DARBHANGA (DMTCL)-MOTIPUR-1	12-09-2023	04:21	12-09-2023	04:44	DMTCL:R_E, Zone-1, 43 km, 3.33 kA		R-Earth	100	A/r successful from Motipur only.		Muzaffarpur		No	Yes	DMTCL	BSPTCL	1	
10	220KV DARBHANGA (DMTCL)-MOTIPUR-1	12-09-2023	13:54	12-09-2023	19:50	Darbhanga: Y_N , 55 km, 2.2 kA		Y-Earth	100	A/r couldn't be ascertained from PMU. BSPTCL/DMTCL may confirm		Muzaffarpur		No	Yes	DMTCL	BSPTCL	0	
11	220KV DARBHANGA (DMTCL)-MOTIPUR-2	12-09-2023	13:54	12-09-2023	14:18	Darbhanga:R_N, 78 km, 0.8 kA		R-Earth	100	A/r couldn't be ascertained from PMU. BSPTCL/DMTCL may confirm		Muzaffarpur		No	Yes	DMTCL	BSPTCL	0	

12	220KV DARBHANGA(DMTCL)-LAUKAHI-2	13-09-2023	22:30	14-09-2023	01:24	DMTCL: Tripped		No fault	NA	DMTCL may explain		Muzaffarpur		No	No	DMTCL	BSPTCL	1	
13	220KV CHANDAUTI (PMTL)-SONENAGAR-2	17-09-2023	12:19	17-09-2023	12:54	Chandauti:B_N, 55.57 km, 2.12 kA	Sonenagar:B_N, Zone-1, 40.47 km, 1.251 kA	B-Earth	1580	Resistive fault. Tripped after fault was sensed by distance relay. A/r failed after 1 second		Gaya		Yes	No	PMTL	BSPTCL	1	
14	220KV MUZAFFARPUR(PG)-AMNOUR-2	17-09-2023	18:42	17-09-2023	19:43	Muzaffarpur: R_N, 7.78 km, 12.57 kA	Amnour:R_N, 42.4 km, 1.45 kA	R-Earth	100	Three phase tripping for single phase fault.		Muzaffarpur		Yes	No	PG ER-1	BSPTCL	0	
15	220KV DARBHANGA(DMTCL)-LAUKAHI-1	18-09-2023	11:50	18-09-2023	12:50	Darbhanga: Y_B, 9.7 km, Iy=10.954 kA, Ib=10.84 kA	Laukahi:Y_B, Ib=1.694 kA, Iy=1.570 kA	Y-B	100	Phase to phase fault		Muzaffarpur		No	Yes	DMTCL	BSPTCL	1	
16	220KV SAHARSA(PMTL)-BEGUSARAI-1	27-09-2023	06:02	27-09-2023	09:54	Saharsa: Didn't trip	Begusarai: tripped	No fault	NA	Fault in downstream in 220 kV Begusarai.		Muzaffarpur		No	Yes	PMTL	BSPTCL	0	
17	220KV SAHARSA(PMTL)-BEGUSARAI-2	27-09-2023	06:02	27-09-2023	09:54	Saharsa: Didn't trip	Begusarai: tripped	No fault	NA	Samastipur-2. Both lines tripped from		Muzaffarpur		No	Yes	PMTL	BSPTCL	0	
18	220KV DARBHANGA(DMTCL)-LAUKAHI-2	27-09-2023	12:09	27-09-2023	12:35	Darbhanga:B_N, Zone-1, 20 km, 9.6 kA	Laukhai: B_N, Zone-1, 60.32 km, 1.009 kA	B-Earth	100	A/r successful from Darbhanga after 650 msec. Three phase tripping at Laukahi.		Muzaffarpur		No	Yes	DMTCL	BSPTCL	0	
19	220KV TENUGHAT-BIHARSARIFF-1	27-09-2023	12:24	27-09-2023	19:22	Tenughat:Y_N, Zone-1, 34.5 km	Biharsariff: Y_N, Zone-1, 126 km, 1.114 kA	Y-Earth	100	Three phase tripping for single phase fault.		Tenughat		No	No	TVNL	BSPTCL	0	
20	220KV NEW PURNEA-MADHEPURA-1	28-09-2023	10:30	28-09-2023	11:16	New purena: Y_B, 45 km, Iy= 4.44 kA, Ib= 4.35 kA	Madhepura: Y_B, 49 km, Iy= 3.11 kA, Ib= 3.2 kA	Y-B	100	Phase to phase fault		New Purnea		No	No	PG ER-1	BSPTCL	1	
21	220KV SITAMARHI-RAXAUL-2	29-09-2023	12:07	29-09-2023	13:16	Sitamarhi: B_N, 10.16 km, 9.49 kA	Raxaul: B_N, 52 km, 2.6 kA	B-Earth	100	Three phase tripping for single phase fault. No A/r observed from either end.		Kishanganj		Yes	Yes	PMTL	BSPTCL	0	
22	220KV SITAMARHI-MOTIPUR-1	30-09-2023	12:22	30-09-2023	13:59	Sitamarhi: Y_B, 52.1 km, 1.54 kA		Y_B	800	Tripped in Zone-3 from Sitamarhi, suggestive of downstream fault		Kishanganj		Yes	Yes	PMTL	BSPTCL	1	
23	220KV SITAMARHI-MOTIPUR-2	30-09-2023	12:22	30-09-2023	14:23	Sitamarhi: Y_B, 52.1 km, 3.53 kA		Y_B	800			Kishanganj		Yes	Yes	PMTL	BSPTCL	1	
24	220KV MUZAFFARPUR-HAZIPUR-2	30-09-2023	13:05	30-09-2023	17:04	Muzaffarpur: B_N, 24 km, 5.76 kA	Hazipur: B_N, 34 km, 2.9 kA	B-Earth	100	No A/r observed from PMU data.		Muzaffarpur	DR channels not configured properly at Muzaffarpur end	Yes	No	PG ER-1	BSPTCL	0	
25	220KV KHAGARIA-NEW PURNEA-2	04-10-2023	20:23				New Purnea: Y_B, 19 km, Iy= 8.08 kA, Ib= 8 kA	Y-B	100	Phase to phase fault		New Purnea		No	No	BSPTCL	PG ER-1	1	
26	220KV KARAMNASHA (NEW)-PUSAULI-1	07-10-2023	13:57	07-10-2023	15:20	Karamnasa: B_N, 7.45 km, 1.27 kA	Pusauli: B_N, 16.7 km, 6.5 kA	B-Earth	100	A/r failed after 1 second		Sasaram		No	Yes	BSPTCL	PG ER-1	1	
27	220KV KARAMNASHA (NEW)-PUSAULI-1	12-10-2023	12:32	12-10-2023	13:54	Karmnasha: B_N, 15.17 km, 2.304 kA	Pusauli: B_N, 8.22 km, 9.588 kA, A/r successful	B-Earth	100	A/r successful from Sasaram only. Other two phase tripped after 1.7 seconds from Karamnasha		Sasaram		No	Yes	BSPTCL	PG ER-1	0	
28	220KV KARAMNASHA (NEW)-SAHUPURI-1	21-10-2023	09:58	21-10-2023	12:10		Sahupuri: Y_N, Zone-1, 35.2 km, 1.48 kA	Y-Earth	100	A/r not ascertained from PMU data		Sasaram		No	NA	BSPTCL	NR	0	
29	220KV KHAGARIA-NEW PURNEA-1	25-10-2023	13:35	25-10-2023	14:20	Khagaria: Y_N, Zone-1, 76.86 km, 1.644 kA	Purnea: Y_N, 13.8 km, 3.5 kA	Y-Earth	100	Initially fault in B_ph. After 300 msec, fault struck Y_ph and all three phase tripped.		New Purnea		Yes	No	BSPTCL	PG ER-1	1	
30	220KV MUZAFFARPUR(PG)-HAZIPUR-2	01-10-2023	09:55	01-10-2023	11:03	Muzaffarpur: B_E, Zone-1, 39.96 km, 3.6 kA	Hazipur: B_N, Zone-1, 13.7 km	B-Earth	100	A/r not ascertained from PMU data		Muzaffarpur		No	No	PG ER-1	BSPTCL	0	
31	220KV DARBHANGA(DMTCL)-LAUKAHI-2	06-10-2023	19:10	06-10-2023	19:46	Darbhanga: R_N, 27.3 km, 4.47 kA, A/r successful	Laukahi: R_N, Zone-1, 50 km, 2 kA	R-Earth	100	A/r successful from Darbhanga only		Muzaffarpur		No	Yes	DMTCL	BSPTCL	0	
32	220KV NEW PURNEA-MADHEPURA-1	08-10-2023	09:56	08-10-2023	11:23	New purnea: B_N, 65 km, 2.52 kA	Madhepura: B_N, Zone-1, 35.7 km, 2.25 kA	B-Earth	100	A/r not ascertained from PMU data		New Purnea	DR length less at New Purnea	Yes	No	PG ER-1	BSPTCL	0	
33	220KV DARBHANGA(DMTCL)-LAUKAHI-1	10-10-2023	12:46	10-10-2023	14:31		Laukahi: Y_B, Iy = 0.93 kA, Ib= 0.96 kA	Y-B	100	Phase to phase fault		Muzaffarpur		No	Yes	DMTCL	BSPTCL	1	
34	220KV DARBHANGA(DMTCL)-LAUKAHI-2	10-10-2023	12:46	10-10-2023	14:31		Laukahi: Y_B, Iy = 0.94 kA, Ib= 0.95 kA	Y-B	100	Phase to phase fault		Muzaffarpur		No	Yes	DMTCL	BSPTCL	1	

35	220KV TENUGHAT-BIHARSARIFF-1	13-10-2023	08:58	13-10-2023	09:45	Tenughat: R_N, Zone-2, 55.37 km	Biharshariff: R_N, Zone-1, 1.15 kA	R-Earth	100	Three phase tripping for single phase fault		Tenughat		No	No	TVNL	BSPTCL	0	
36	220KV DARBHANGA (DMTCL)-MOTIPUR-1	15-10-2023	04:58	15-10-2023	05:26	Darbhanga: B_N, Zone-1, 25.1 km, 4.83 kA	Motipur: B_N, Zone-1, A/r successful	B-Earth	100	A/r successful from Motipur only. Three phase tripping at Darbhanga		Muzaffarpur		No	Yes	DMTCL	BSPTCL	1	
37	220KV NEW PURNEA-MADHEPURA-1	24-10-2023	10:04	24-10-2023	10:50	New Purnea: B_N, 21.87 km, 4.72 kA	Madhepura: B_N, Zone-1, 74.2 km, 1.96 kA	B-Earth	650	Resistive fault. A/r not ascertained from PMU data		New Purnea		No	No	PG ER-1	BSPTCL	0	
38	220KV DARBHANGA(DMTCL)-LAUKAHI-2	26-10-2023	01:30	26-10-2023	02:23	Darbhanga: B_N, 71 km, 0.7 kA	Laukahi: B_N, 18.74 km, 0.23 kA	B-Earth	100	A/r not ascertained from PMU data		Muzaffarpur		No	No	DMTCL	BSPTCL	0	
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List of Single line tripping incidents for Sep 2023 and Oct 2023 for DMTCL

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	PMU Location	DR Configuration Discrepancy	DR/ELRECEIVED FROM LOCAL END	DR/ELRECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE
1	220KV DARBHANGA(DMTCL)-LAUKAHI-2	02-09-2023	21:07	02-09-2023	22:10		Laukahi: R_E, Zone-1, 50.28 km, 2.076 kA	R-Earth	800	A/r successful from Darbhanga. Three phase tripping at Laukahi	Muzaffarpur	CB digital channels not seen in laukahi end DR	No	Yes	DMTCL	BSPTCL	1
2	220KV DARBHANGA(DMTCL)-LAUKAHI-2	06-09-2023	19:11	06-09-2023	20:23		Laukahi:R_N, 3.74 kA	R-Earth	100	A/r successful at Darbhanga. Three phase tripping at Laukahi	Muzaffarpur	CB digital signals not mapped in DR of laukahi	No	Yes	DMTCL	BSPTCL	1
3	220KV DARBHANGA (DMTCL)-MOTIPUR-1	12-09-2023	04:21	12-09-2023	04:44	DMTCL:R_E, Zone-1, 43 km, 3.33 kA		R-Earth	100	A/r successful from Motipur only.	Muzaffarpur		No	Yes	DMTCL	BSPTCL	0
4	220KV DARBHANGA (DMTCL)-MOTIPUR-1	12-09-2023	13:54	12-09-2023	19:50	Darbhanga: Y_N , 55 km, 2.2 kA		Y-Earth	100	A/r couldn't be ascertained from PMU. BSPTCL/DMTCL may confirm	Muzaffarpur		No	Yes	DMTCL	BSPTCL	0
5	220KV DARBHANGA (DMTCL)-MOTIPUR-2	12-09-2023	13:54	12-09-2023	14:18	Darbhanga:R_N, 78 km, 0.8 kA		R-Earth	100	A/r couldn't be ascertained from PMU. BSPTCL/DMTCL may confirm	Muzaffarpur		No	Yes	DMTCL	BSPTCL	0
6	220KV DARBHANGA(DMTCL)-LAUKAHI-2	13-09-2023	22:30	14-09-2023	01:24	DMTCL: Tripped		No fault	NA	DMTCL may explain	Muzaffarpur		No	No	DMTCL	BSPTCL	0
7	220KV DARBHANGA(DMTCL)-LAUKAHI-1	18-09-2023	11:50	18-09-2023	12:50	Darbhanga: Y_B, 9.7 km, Iy=10.954 kA, Ib=10.84 kA	Laukahi:Y_B, Ib=1.694 kA, Iy=1.570 kA	Y-B	100	Phase to phase fault	Muzaffarpur		No	Yes	DMTCL	BSPTCL	1
8	220KV DARBHANGA(DMTCL)-LAUKAHI-2	27-09-2023	12:09	27-09-2023	12:35	Darbhanga:B_N, Zone-1, 20 km, 9.6 kA	Laukhai: B_N, Zone-1, 60.32 km, 1.009 kA	B-Earth	100	A/r successful from Darbhanga after 650 msec. Three phase tripping at Laukahi.	Muzaffarpur		No	Yes	DMTCL	BSPTCL	1
9	400KV SAHARSA-DARBHANGA (DMTCL)-1	01-09-2023	12:18	01-09-2023	12:59	Saharsa: R_E, Zone-1, 8.2 km, 10.2 kA	Darbhanga: R_E, Zone-2, 4 kA	R-Earth	100	A/r failed after 1 second	Muzaffarpur	Saharsha end main 2 DR not time synchronized	Yes	No	PMTL	DMTCL	1
10	400KV SAHARSA-DARBHANGA (DMTCL)-2	04-09-2023	13:09	04-09-2023	16:13	Saharsa: DT received	Darbhanga: Didn't trip	No fault	NA	No fault in line. PMTL/DMTCL may explain	Muzaffarpur		No	No	PMTL	DMTCL	1
	220KV DARBHANGA(DMTCL)-LAUKAHI-2	06-10-2023	19:10	06-10-2023	19:46	Darbhanga: R_N, 27.3 km, 4.47 kA, A/r successful	Laukahi: R_N, Zone-1, 50 km, 2 kA	R-Earth	100	A/r successful from Darbhanga only	Muzaffarpur		No	Yes	DMTCL	BSPTCL	1
	220KV DARBHANGA(DMTCL)-LAUKAHI-1	10-10-2023	12:46	10-10-2023	14:31		Laukahi: Y_B, Iy = 0.93 kA, Ib= 0.96 kA	Y-B	100	Phase to phase fault	Muzaffarpur		No	Yes	DMTCL	BSPTCL	1
	220KV DARBHANGA(DMTCL)-LAUKAHI-2	10-10-2023	12:46	10-10-2023	14:31		Laukahi: Y_B, Iy = 0.94 kA, Ib= 0.95 kA	Y-B	100	Phase to phase fault	Muzaffarpur		No	Yes	DMTCL	BSPTCL	1
	220KV DARBHANGA (DMTCL)-MOTIPUR-1	15-10-2023	04:58	15-10-2023	05:26	Darbhanga: B_N, Zone-1, 25.1 km, 4.83 kA	Motipur: B_N, Zone-1, A/r successful	B-Earth	100	A/r successful from Motipur only. Three phase tripping at Darbhanga	Muzaffarpur		No	Yes	DMTCL	BSPTCL	0
	220KV DARBHANGA(DMTCL)-LAUKAHI-2	26-10-2023	01:30	26-10-2023	02:23	Darbhanga: B_N, 71 km, 0.7 kA	Laukahi: B_N, 18.74 km, 0.23 kA	B-Earth	100	A/r not ascertained from PMU data	Muzaffarpur		No	No	DMTCL	BSPTCL	0

List of Single line tripping incidents for Sep 2023 and Oct 2023 for DVC

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	PMU Location	DR Configuration Discrepancy	DR/ELRECEIVED FROM LOCAL END	DR/ELRECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE
1	220KV PARULIA-PARULIA(PG)-2	12-09-2023	15:45	12-09-2023	16:32		Parulia (PG): Didn't trip	No fault	NA	No fault observed from PMU. DVC may explain.	Durgapur		Yes	NA	DVC	PG ER-2	0
2	220KV RANCHI-MTPS(DVC)-1	03-09-2023	12:56	03-09-2023	14:23	Ranchi:R_N, 187 km, 0.971 kA	Mejia: R_N, Zone-1, 53.52 km, 3.077 kA	R-Earth	100	A/r successful from Ranchi. A/r kept disabled at Mejia	Ranchi	Mejia end Dr having insufficient length	Yes	Yes	PG ER-1	DVC	1
	220KV RANCHI-MTPS(DVC)-1	08-09-2023	21:00	08-09-2023	22:36	Ranchi:R_N, Zone-1, 66.54 km, 2.45 kA, A/r successful	Mejia:R_N, Zone-1, 145.5 km, 1.14 kA	R-Earth	100	A/r successful from Ranchi. A/r kept disabled at Mejia	Ranchi		Yes	Yes	PG ER-1	DVC	1
	220KV RANCHI-MTPS(DVC)-1	20-09-2023	16:41	20-09-2023	17:37	Ranchi:Y_N, 184.62 km, 1.13 kA	Mejia: Y_N, Zone-1, 58.33 km, 2.88 kA	Y-Earth	100	A/r successful from Ranchi. A/r kept disabled at Mejia	Ranchi		Yes	No	PG ER-1	DVC	1
	220KV RANCHI-RAMGARH-1	21-09-2023	08:28	21-09-2023	14:02	Ranchi: R_Y_B, 94.5 km, Ir=3.1 kA, Iy= 3.7 kA, Ib= 2.5 kA	Ramgarh:R_Y_B, 11.7 km, Ir= 3.3 kA, Iy= 3.5 kA, Ib= 2.1 kA	R-Y-B-Earth	100	Three phase fault. DVC may share findings.	Ranchi		No	No	PG ER-1	DVC	1
	400KV JAMSHEDPUR-ANDAL-2	22-09-2023	22:27	23-09-2023	00:11	Jamshedpur: Y_N, 133 km, 2.48 kA		Y-Earth	100	A/r successful from Jamshedpur only. DVC may explain.	Jamshedpur		Yes	No	PG ER-1	DVC	0
	220KV RANCHI-MTPS(DVC)-1	25-09-2023	19:42	25-09-2023	21:38	Ranchi:R_N, Zone-1, 57.7 km, 2.8 kA	MTPS: R_N, Zone-1, 161.7 km, 1.21 kA	R-Earth	100	A/r successful from Ranchi. A/r kept disabled at Mejia	Ranchi		No	No	PG ER-1	DVC	1
	220KV RANCHI-MTPS(DVC)-1	27-09-2023	23:20	28-09-2023	00:31	Ranchi: R_N, 1.53 km, 1.086 kA	Mejia: R_N, Zone-1, 46.29 km, 3.52 kA	R-Earth	100	A/r successful from Ranchi. A/r kept disabled at Mejia	Ranchi		Yes	No	PG ER-1	DVC	1
	220KV RANCHI-MTPS(DVC)-1	31-10-2023	04:38	31-10-2023	06:15	Ranchi: R_N, Zone-1, 185 km, 1.14 kA, A/r successful	MTPS: R_N, Zone-1, 55.3 km	R-Earth	100	A/r disabled at Mejia.	Ranchi		No	No	PG ER-1	DVC	6

List of Single line tripping incidents for Sep 2023 and Oct 2023 for JUSNL

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	PMU Location	DR Configuration Discrepancy	DR/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE
1	220KV CHANDIL-RANCHI-1	14-09-2023	20:46	14-09-2023	21:01	Chandil:R_N, 50 km,2.29 kA	Ranchi:R_N, 30 km,4.8 kA	R-Earth	100	A/r successful from Ranchi only	Ranchi	DR length less at Chandil	Yes	Yes	JUSNL	PG ER-1	0
2	220KV JODA-RAMCHANDRAPUR-1	03-09-2023	03:50	03-09-2023	04:36	Joda:Y_E, Zone-2, 116.6 km, 1.32 kA	Ramchandarpur: Y_E, Zone-1, 10.2 km, 9.45 kA	Y-Earth	400	Tripped in Zone-2 from Joda, carrier not received. Three phase tripping at Ramchandrapur	Jamshedpur		Yes	Yes	OPTCL	JUSNL	0
3	220KV MAITHON-DUMKA-2	13-09-2023	14:08	13-09-2023	14:50	Maithon:R_N, 31 km, 6.06 kA		R-Earth	100	A/r successful from Maithon only	Maithon	individual CB digital signal not configured in Dumka end DR	Yes	Yes	PG ER-2	JUSNL	0
4	400KV NEW RANCHI-PATRATU-2	21-09-2023	17:27	21-09-2023	18:20	New Ranchi: R_N,Zone-2, 48.99 km,. 5.06 kA	Patratu: R_N, Zone-1, A/r successful	R-Earth	400	Tripped in Zone-2 from New Ranchi. No carrier received.	New Ranchi		Yes	Yes	PG ER-1	JUSNL	0
5	220KV JODA-RAMCHANDRAPUR-1	23-09-2023	11:06	23-09-2023	12:04	Joda:B_N, Zone-1, 3.5 km, 4.3 kA	Ramchandarpur: B_N, Zone-2, 126 km, 1.69 kA	B-Earth	450	Tripped in Zone-2 time from Ramchandrapur. A/r attempt failed from Joda after 1 second. No carrier received at Ramchandrapur.	Jamshedpur		Yes	Yes	OPTCL	JUSNL	1
6	220KV JODA-RAMCHANDRAPUR-1	24-09-2023	06:30	24-09-2023	16:31	Joda:Y_N, Zone-1, 2.28 km, 6.12 kA	Ramchandarpur: Y_B, 140.1 km	Y-B-Earth	350	Tripped in Zone-2 from Ramchandrapur. No carrier received at Ramchandrapur	Jamshedpur		No	Yes	OPTCL	JUSNL	1
7	220 KV RANCHI-CHANDIL-1	29-09-2023	22:43	29-09-2023	22:55	Ranchi: R_N, 14.8 km, 4.32 kA		R-Earth	400	Tripped in Zone-2 from Ranchi. No carrier received.	Ranchi		Yes	No	PG ER-1	JUSNL	0
1	220KV JODA-RAMCHANDRAPUR-1	01-10-2023	04:38	01-10-2023	12:30		220 kV Main Bus-1 PT burst at Ramchandrapur	R-Y-B-Earth	300	Initially fault in B_ph only which was sensed in reverse direction at Ramchandrapur. Later three phase fault in forward direction and all three phase tripped.	Jamshedpur		No	Yes	OPTCL	JUSNL	0
2	220KV JODA-RAMCHANDRAPUR-1	07-10-2023	07:58	07-10-2023	08:41	Joda: Y_N, 3.4 km, 5.7 kA, A/r successful	Ramchandarpur: Y_N, 123.1 km, 1.74 kA	Y-Earth	400	Tripped in Zone-2 from Ramchandrapur	Jamshedpur		Yes	Yes	OPTCL	JUSNL	0
3	220KV JODA-RAMCHANDRAPUR-1	07-10-2023	12:12	07-10-2023	13:20	Joda: Y_N, Zone-1, 92 km, 1.32 kA	Ramchandarpur: Y_N, Zone-1, 39.9 km, 2.76 kA	Y-Earth	100	Three phase tripping at Ramchandrapur. A/r failed after 1 second from Joda.	Jamshedpur	DR not time synchronized and digital channels not configured properly at Joda end.	Yes	Yes	OPTCL	JUSNL	0

List of Single line tripping incidents for Sep 2023 and Oct 2023 for NTPC

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	PMU Location	DR Configuration Discrepancy	DR/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE	
1	220KV RENGALI(PH)-TSTPP-1	08-09-2023	14:39	08-09-2023	20:42	Rengali: B_N, Zone-1, 11.2 km,7 kA	TSTPP:B_N, Zone-1, 15.5 km, 6.16 kA	B-Earth	100	A/r couldn't be ascertained from PMU. OHPC/NTPC may confirm	Talcher	Unable to open TSTPP end	No	Yes	OHPC	NTPC	0	
2	220KV RENGALI(PH)-TSTPP-1	13-09-2023	20:17	14-09-2023	19:19	Rengali:B_N, Zone-1, 19.06 km,5.73 kA	Talcher: B_N,Zone-2, 20 km,5.73	B-Earth	500	Tripped in Zone-2 time from TSTPP	Rengali		No	Yes	OHPC	NTPC	1	
3	400KV CHANDWA-NORTH KARANPURA-2	21-09-2023	05:05	21-09-2023	06:56	Chandwa:Didn't trip	North Karanpura: B_Y, Zone-3	No fault	NA	North Karnpura sensed fault in Zone-3 yet line tripped immediately. U#1 at north Karnpura also tripped at the same	Gaya		Yes	Yes	PGER-1	NTPC	0	
4	400KV MEERAMUNDALI-TSTPP-2	21-09-2023	18:30	21-09-2023	19:35	Meeramundali: R_N, 24.4 km, 9.19 kA	TSTPP: R_N, Zone-1, 39.7 km, 7.37 kA	R-Earth	800	A/r successful from Talcher. At meramundali, distance protection not operated, tripped on DEF. OPTCL may explain.	TSTPP	DR of another instance uploaded by NTPC. DR length less at Meramundali	Yes	No	OPTCL	NTPC	1	

5	220KV TTPS-TSTPP-1	01-10-2023	18:58	01-10-2023	20:15	TTPS:Y_B, Zone-1, 22.17 km, Iy=5.54 kA, Ib= 5.54 kA	TSTPP: Y_B, Zone-1, 12.1 km, Iy= 1.39 kA, Ib= 1.39 kA	Y-B	100	Phase to phase fault	Talcher	Unable to open TSTPP DR file	No	Yes	OPTCL	NTPC		1
6	400KV MEERAMUNDALI-TSTPP-2	09-10-2023	13:48	09-10-2023	14:52	Meramundali: B_N, Zone-1, 30.5 km, 6.9 kA	TSTPP: B_N, Zone-1, 37.18 km, 8.61 kA, A/r unsuccessful	B-Earth	100	A/r failed after 1 second	Talcher		Yes	Yes	OPTCL	NTPC		1
7	400KV MEERAMUNDALI-TSTPP-2	11-10-2023	12:46	11-10-2023	21:45	Meeramundali: B_E, Zone-1, 28.1 km, 6.51 kA, A/r unsuccessful	TSTPP:B_E, 142.08 km, 7.142 kA	B-Earth	100	A/r successful after 1 second. Tripped again within reclaim time	Talcher		Yes	Yes	OPTCL	NTPC		1

List of Single line tripping incidents for Sep 2023 and Oct 2023 for OPTCL

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	Comments from Utilty	PMU Location	DR Configuration Discrepancy	DR/ELRECEIVED FROM LOCAL END	DR/ELRECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY		
1	400KV MENDHASAL-PANDIABILI-2	02-09-2023	16:51	02-09-2023	16:19	Mendhasal: Y_N, Zone-1, 6.78 kA	Pandiabili: Didn't trip	Y-Earth	100	A/r successful from Pandiabilli. No A/r attempt at Mendhasal, other two phase tripped after 1 sec. OPTCL may explain.		Pandiabili		No	Yes	OPTCL	PG Odisha	0	
2	400KV LAPANGA-STERLITE-2	02-09-2023	19:29	02-09-2023	20:43	Lapanga: R_N, Zone-1, 10.76 km, 11.34 kA	Sterlite: R_N, 13.07 km, 2.722 kA	R-Earth	100	A/r successful from Sterlite only. No A/r attempt at Lapanga, other two phase		Lapanga		Yes	No	OPTCL	CPP	0	
3	220KV JODA-RAMCHANDRAPUR-1	03-09-2023	03:50	03-09-2023	04:36	Joda:Y_E, Zone-2, 116.6 km, 1.32 kA	Ramchandarpur: Y_E, Zone-1, 10.2 km, 9.45 kA	Y-Earth	400	Tripped in Zone-2 from Joda, carrier not received. Three phase tripping at Ramchandrapur		Jamshedpur		Yes	Yes	OPTCL	JUSNL	1	
4	400KV LAPANGA-STERLITE-2	03-09-2023	14:26	03-09-2023	17:14	Lapanga: R_N, Zone-1, 10.67 km, 11.02 kA	Sterlite: R_N, 2.95 km, 3.5 kA	R-Earth	100	A/r successful from Sterlite only. Other two phase at Lapanga tripped on PD		Lapanga		Yes	No	OPTCL	CPP	0	
5	220KV BUDHIPADAR-RAIGARH-1	03-09-2023	15:08	03-09-2023	16:38	Budhipadar: Didn't trip	Raigarh: R_E, 9.5 km, 11.67 kA	R-Earth	100	Three phase A/r enabled at Budhipadar.		Budhipadar	DR length less at Budhipadar	Yes	No	OPTCL	WR	0	
6	400KV LAPANGA-STERLITE-2	04-09-2023	14:19	06-09-2023	16:22		Sterlite: R_N, Zone-1, 2.95 km, 32 kA	R-Earth	100	A/r successful from Sterlite only. Other two phase at Lapanga tripped on PD		Lapanga		Yes	No	OPTCL	CPP	0	
7	400KV LAPANGA-STERLITE-2	19-09-2023	13:12	19-09-2023	19:42	Lapanga: R_N, Zone-1, 4.3 km, 28 kA	Sterlite: R_N, Zone-1, 14 km, 9.64 kA	R-Earth	100	A/r failed after 1 second		Meramundali		Yes	No	OPTCL	IPP	1	
8	400KV MEERAMUNDALI-TSTPP-2	21-09-2023	18:30	21-09-2023	19:35	Meeramundali: R_N, 24.4 km, 9.19 kA	TSTPP: R_N, Zone-1, 39.7 km, 7.37 kA	R-Earth	800	A/r successful from Talcher. At meramundali, distance protection not operated, tripped on DEF. OPTCL may explain.		TSTPP	DR of another instance uploaded by NTPC. DR length less at Meramundali	Yes	No	OPTCL	NTPC	0	
9	220KV JODA-RAMCHANDRAPUR-1	23-09-2023	11:06	23-09-2023	12:04	Joda:B_N, Zone-1, 3.5 km, 4.3 kA	Ramchandarpur: B_N, Zone-2, 126 km, 1.69 kA	B-Earth	450	Tripped in Zone-2 time from Ramchandrapur. A/r attempt failed from Joda after 1 second. No carrier received at Ramchandrapur.		Jamshedpur		Yes	Yes	OPTCL	JUSNL	0	
10	220KV JODA-RAMCHANDRAPUR-1	24-09-2023	06:30	24-09-2023	16:31	Joda:Y_N, Zone-1, 2.28 km, 6.12 kA	Ramchandarpur: Y_B, 140.1 km	Y-B-Earth	350	Tripped in Zone-2 from Ramchandrapur. No carrier received at Ramchandrapur		Jamshedpur		No	Yes	OPTCL	JUSNL	0	
11	220KV BUDHIPADAR-RAIGARH-1	25-09-2023	13:34	25-09-2023	20:20	Budhipadar:R_N, Zone-2, 25 km, 9.6 kA		R-Earth	400	Tripped in Zone-2 from Budhipadar		Budhipadar		No	No	OPTCL	WR	0	
12	220KV BUDHIPADAR-RAIGARH-1	30-09-2023	19:43	01-10-2023	10:51	Budhipadar: R_N, 68 km, 2.4 kA	Raigarh: R_N, 10 km, 10.14 kA	R-Earth	400	Tripped in Zone-2 from Budhipadar		Budhipadar		No	NA	OPTCL	WR	0	
13	220KV KATAPALLI-BOLANGIR(PG)-1	02-09-2023	11:32	02-09-2023	11:56	Katapalli: R_N, Zone-2, 1.7 kA	Bolangir: Didn't trip	R-Earth	650	Tripped in Zone-2 from Katapalli. Whether A/r operated at Bolangir? PG Odisha may explain.		Bolangir		Yes	No	PG Odisha	OPTCL	0	
14	220KV BOLANGIR(PG)-BOLANGIR(GRIDCO)-2	02-09-2023	11:34	02-09-2023	12:08	Bolangir: R_N, 6.16 kA	Bolangir: E/F	R-Earth	300	As per DR, fault cleared from PG end after 300 msec in Zone-1. A/r signal got high at PG end but no A/r attempted. PG Odisha may explain.		Bolangir	Main 2 DR not time synchronized in Bolangir(PG)	Yes	No	PG Odisha	OPTCL	0	

15	220KV RENGALI(PG)-RENGALI-1	17-09-2023	08:06	17-09-2023	09:39	Rengali(PG): Didn't trip	Rengali: R_N, 0.456 kA	No fault	NA	OPTCL may explain.		Rengali		NA	No	PG Odisha	OPTCL	0
16	220KV RENGALI(PG)-RENGALI(GRIDCO)-1	19-09-2023	02:27	19-09-2023	07:47	Rengali: Didn't trip	Rengali: O/c E/f operated	No fault	NA	No fault in line. OPTCL may explain		Rengali		No	Yes	PG Odisha	OPTCL	0
17	220KV RENGALI(PG)-RENGALI(GRIDCO)-1	22-09-2023	10:05	22-09-2023	13:30	Rengali: Didn't trip	Rengali: O/c E/f operated	No fault	NA	No fault in line. OPTCL may explain		Rengali		NA	No	PG Odisha	OPTCL	0
18	220KV BARIPADA-BALASORE-2	23-09-2023	10:50	23-09-2023	12:26	Baripada: Didn't trip	Balasore: CB lockout due to low SF6 gas in R_Ph. LBB operated	No fault	NA	OPTCL may explain.		Baripada		NA	No	PG Odisha	OPTCL	0
19	220KV RENGALI(PG)-RENGALI(GRIDCO)-1	25-09-2023	07:12	25-09-2023	08:14	Rengali (PG): Didn't trip	Rengali: O/c E/f operated	No fault	NA	No fault in line. OPTCL may explain	DEF operating current of one circuit is reducing and other is increasing by same amount so DEF operating ,Needs to be checked for root cause.	Rengali		No	No	PG Odisha	OPTCL	0
20	20KV-RENGALI(PG)-RENGALI(GRIDCO)-1	25-09-2023	13:22	25-09-2023	14:09	Rengali (PG): Didn't trip	Rengali: O/c E/f operated	No fault	NA	No fault in line. OPTCL may explain	DEF operating current of one circuit is reducing and other is increasing by same amount so DEF operating ,Needs to be checked for root cause.	Rengali		No	No	PG Odisha	OPTCL	0
21	220KV BOLANGIR(PG)-BOLANGIR(GRIDCO)-2	25-09-2023	17:34	25-09-2023	18:36	Bolangir (PG): Didn't trip	Bolangir:R_N, 0.847 kA, Backup overcurrent relay	R-Earth	800	Tripped after 800 msec. As per PMU, it seems line tripped for fault in some another line. O/c setting at OPTCL end may be reviewed.		Bolangir		No	No	PG Odisha	OPTCL	0
22	220KV RENGALI(PG)-RENGALI(GRIDCO)-1	29-09-2023	08:16	29-09-2023	09:13	Rengali(PG): Didn't trip	Rengali: O/c E/f operated	No fault	NA	No fault in line. OPTCL may explain	DEF operating current of one circuit is reducing and other is increasing by same amount so DEF operating ,Needs to be checked for root cause.	Rengali		NA	No	PG Odisha	OPTCL	0
23	220KV BARIPADA-BALASORE-1	29-09-2023	20:30	29-09-2023	21:15	Baripada: R_N, 25.25 km, 4.893 kA	Balasore: R_N, A/r successful	R-Earth	100	A/r successful from Balasore end only. No A/r attempt from Baripada end. PG Odisha may explain.		Baripada		No	No	PG Odisha	OPTCL	1
24	220KV JODA-RAMCHANDRAPUR-1	01-10-2023	04:38	01-10-2023	12:30		220 kV Main Bus-1 PT burst at Ramchandrapur	R-Y-B-Earth	300	Initially fault in B_ph only which was sensed in reverse direction at Ramchandrapur. Later three phase fault in forward direction and all three phase tripped.		Jamshedpur		No	Yes	OPTCL	JUSNL	1
25	220KV TTPS-TSTPP-1	01-10-2023	18:58	01-10-2023	20:15	TTPS:Y_B, Zone-1, 22.17 km, Iy=5.54 kA, Ib= 5.54 kA	TSTPP: Y_B, Zone-1, 12.1 km, Iy= 1.39 kA, Ib= 1.39 kA	Y-B	100	Phase to phase fault		Talcher	Unable to open TSTPP DR file	No	Yes	OPTCL	NTPC	1
26	220KV BUDHIPADAR-RAIGARH-1	02-10-2023	18:34	03-10-2023	23:55	Budhipadar: R_N, 60.8 km, 2.39 kA		R-Earth	400	Tripped in Zone-2 from Budhipadar		Budhipadar		Yes	NA	OPTCL	WR	0
27	220KV BUDHIPADAR-KORBA-2	06-10-2023	16:14	06-10-2023	20:09	Budhipadar: 220 kV Bus-2 tripped		B-Earth	100	OPTCL may explain.		Budhipadar	DR not time synchronized	Yes	NA	OPTCL	WR	0
28	220KV JODA-RAMCHANDRAPUR-1	07-10-2023	07:58	07-10-2023	08:41	Joda: Y_N, 3.4 km, 5.7 kA, A/r successful	Ramchandarpur: Y_N, 123.1 km, 1.74 kA	Y-Earth	400	Tripped in Zone-2 from Ramchandrapur		Jamshedpur		Yes	Yes	OPTCL	JUSNL	1
29	220KV JODA-RAMCHANDRAPUR-1	07-10-2023	12:12	07-10-2023	13:20	Joda: Y_N, Zone-1, 92 km, 1.32 kA	Ramchandarpur: Y_N, Zone-1, 39.9 km, 2.76 kA	Y-Earth	100	Three phase tripping at Ramchandrapur. A/r failed after 1 second from Joda.		Jamshedpur	DR not time synchronized and digital channels not configured properly at Joda end.	Yes	Yes	OPTCL	JUSNL	1
30	400KV MEERAMUNDALI-TSTPP-2	09-10-2023	13:48	09-10-2023	14:52	Meramundali: B_N, Zone-1, 30.5 km, 6.9 kA	TSTPP: B_N, Zone-1, 37.18 km, 8.61 kA, A/r unsuccessful	B-Earth	100	A/r failed after 1 second		Talcher		Yes	Yes	OPTCL	NTPC	1

31	220KV BUDHIPADAR-RAIGARH-1	11-10-2023	12:13	11-10-2023	13:15	Budhipadar: B_E, 54.5 km, 2.74 kA, A/r successful	Raigarh: B_E, 27.072 km, 4.478 kA	B-Earth	100	Three phase A/r at Budhipadar.		Budhipadar		Yes	No	OPTCL	WR	0	
32	400KV MEERAMUNDALI-TSTPP-2	11-10-2023	12:46	11-10-2023	21:45	Meeramundali: B_E, Zone-1, 28.1 km, 6.51 kA, A/r unsuccessful	TSTPP:B_E, 142.08 km, 7.142 kA	B-Earth	100	A/r successful after 1 second. Tripped again within reclaim time		Talcher		Yes	Yes	OPTCL	NTPC	1	
33	220KV PANDIABILI-PRATAPSASAN-2	06-10-2023	09:28	06-10-2023	10:30	Pandiabili: R_N, 29 km, 4.2 kA, A/r successful	Pratapsasan: R_N, 14 km, 3 kA	R-Earth	100	A/r successful from Pandiabili only. OPTCL may explain.		Pandiabili		No	No	PG Odisha	OPTCL	0	
34	220KV ROURKELA-TARKERA-2	07-10-2023	15:27	07-10-2023	19:52		Tarkera: B_N, 16.9 kA	B-Earth	100	A/r failed after 1 second. Jumper snapped at loc.2		Rourkela		No	Yes	PG Odisha	OPTCL	1	
35	220KV RENGALI(PG)-RENGALI(GRIDCO)-1	07-10-2023	18:43	07-10-2023	19:25		Rengali(Gridco): Tripped	No fault	NA	No fault observed from PMU. OPTCL may explain	DEF operating current of one circuit is reducing and other is increasing by same amount so DEF operating ,Needs to be checked for root cause.	Rengali		No	No	PG Odisha	OPTCL	0	
36	220KV BARIPADA-BALASORE-1	19-10-2023	10:35	19-10-2023	11:11	Baripada: DT received	Balasore: Didn't trip	No fault	NA	No fault observed from PMU. OPTCL may explain		Baripada		No	No	PG Odisha	OPTCL	0	
																			7

List of Single line tripping incidents for Sep 2023 and Oct 2023 for WBSETCL

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	PMU Location	DR Configuration Discrepancy	DR/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE
1	220KV NEW TOWN(AA-III)-RAJARHAT-2	01-09-2023	11:35	01-09-2023	13:27	New town: B_E, 5.45 km, 13 kA	Rajarhat:B_E, 1.44 km, 16.54 kA	B-Earth	100	A/r failed after 1 second	Rajarhat		No	Yes	WBSETCL	PG ER-2	1
2	400KV BIDHANNAGAR-NEW CHANDITALA-1	04-09-2023	14:59	04-09-2023	15:48	Bidhannagar: B_N, Zone-1, 97.8 km	New Chandi: B_N, Zone-1, 36.31 km, 7.92 kA	B-Earth	100	Three phase tripping for single phase fault	Bakreshwar		Yes	No	WBSETCL	WBPDCL	0
3	400KV JEERAT-BAKRESWAR-1	05-09-2023	15:33	06-09-2023	06:59	Jeerat: R_N, Zone-2, 156.6 km, 2.72 kA	Bakreswar: R_N,Zone-1, 15.52 km, 6.96 kA	R-Earth	100	A/r failed after 1 second	Durgapur		Yes	Yes	WBSETCL	WBSETCL	1
5	400KV GOKARNA-SAGARDIGHI-1	29-09-2023	17:28	29-09-2023	18:27	Gokarna: B_N, 17.28 km, 10.06 kA	Sagardighi: B_N, 24.5 km, 2.459 kA	B-Earth	100	A/r successful. Tripped again within reclaim time	Farakka		No	Yes	WBSETCL	WBPDCL	1
6	400KV GOKARANA-SAGARDIGHI-2	29-09-2023	17:28	29-09-2023	18:28	Gokarna: B_N, 16.14 km, 10.05 kA	Sagardighi: B_N, 31.61 km, 11.14 kA	B-Earth	100	A/r failed after 1 second. DT received at Sagardighi during failed A/r attempt	Farakka		No	Yes	WBSETCL	WBPDCL	1
7	400KV PPSP-BIDHANNAGAR-2	07-09-2023	21:28	08-09-2023	21:53		Bidhannagar: Y_E, Zone-1, 31.21 km, 7.37 kA	Y-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	Yes	WBSEDCL	WBSETCL	1
8	400KV PPSP-BIDHANNAGAR-1	13-09-2023	15:31	13-09-2023	16:08	PPSP:R_N, Zone-1, 155.7 km	Durgapur:R_N, Zone-1, 44.05 km, 5.231 kA	R-Earth	100	A/r kept disabled as per OEM advise	Durgapur	CB digital channels missing in Bidhannagar DR	No	Yes	WBSEDCL	WBSETCL	1
9	220KV SUBHASGRAM(PG)-SUBHASGRAM(WB)-1	26-09-2023	03:41	26-09-2023	04:08	Subhashgram(PG): Didn' t trip	Subhashgram(WB): Master trip relay operated while shifting to TBC	No fault	NA	WBSETCL may explain.	Subhashgram		NA	No	PG ER-2	WBSETCL	0
10	400KV PPSP-BIDHANNAGAR-2	28-09-2023	14:20	28-09-2023	14:35	PPSP: B_N, Zone-1, 60.3 km	Bidhanagar: B_N, Zone-1, 125.4 km, 1.25 kA	B-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	1
11	400KV PPSP-BIDHANNAGAR-1	28-09-2023	14:44	28-09-2023	15:37	PPSP: R_N, Zone-1, 57.7 km, 3.18 kA	Bidhannagr:R_N, Zone-1, 127.4 km, 1.25 kA	R-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	1
12	400KV PPSP-BIDHANNAGAR-2	28-09-2023	15:50	28-09-2023	23:00	PPSP:B_N, Zone-1, 158.9 km	Bidhanagar: B_N, Zone-1, 22.9 km, 8.4 kA	B-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	1
13	400KV PPSP-BIDHANNAGAR-1	30-09-2023	13:08	30-09-2023	13:31	PPSP: B_N, 69.8 km, 2.14 kA	Bidhannagar: B_N, 127.32 km, 2.658 kA	B-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	1
	400KV NEW PPSP-NEW RANCHI-1	30-10-2023	10:29	30-10-2023	11:09	New PPSP: DT received		No fault	NA	PG/WBSETCL may explain.	New Ranchi		No	No	WBSETCL	PG ER-1	1
	400KV NEW PPSP-NEW RANCHI-2	30-10-2023	10:38	30-10-2023	11:14	New PPSP: DT received		No fault	NA	PG/WBSETCL may explain.	New Ranchi		No	No	WBSETCL	PG ER-1	1
	400KV PPSP-BIDHANNAGAR-2	20-10-2023	11:24	20-10-2023	11:58	PPSP: B_N, Zone-1, 170.3 km	Bidhanagar: B_N, Zone-1, 20.2 km, 4.54 kA	B-Earth	100	A/r disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	1
	400KV PPSP-BIDHANNAGAR-2	24-10-2023	12:54	25-10-2023	02:47	PPSP: B_N, 123.9 km	Bidhanagar: B_N, 49.7 km, 5.137 kA	B-Earth	100	A/r disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	1
	400KV PPSP-BIDHANNAGAR-2	28-10-2023	11:59	28-10-2023	12:16	PPSP: B_N, Zone-1, 173 km	Bidhannagar: B_N, Zone-1, 17 km, 8.67 kA	B-Earth	100	A/r disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	1

List of Single line tripping incidents for Sep 2023 and Oct 2023 for WBSEDCL

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	PMU Location	DR Configuration Discrepancy	DR/ELRECEIVED FROM LOCAL END	DR/ELRECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE
1	400KV PPSP-BIDHANNAGAR-2	07-09-2023	21:28	08-09-2023	21:53		Bidhannagar: Y_E, Zone-1, 31.21 km, 7.37 kA	Y-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	Yes	WBSEDCL	WBSETCL	1
	400KV PPSP-BIDHANNAGAR-1	13-09-2023	15:31	13-09-2023	16:08	PPSP:R_N, Zone-1, 155.7 km	Durgapur:R_N, Zone-1, 44.05 km, 5.231 kA	R-Earth	100	A/r kept disabled as per OEM advise	Durgapur	CB digital channels missing in Bidhannagar DR	No	Yes	WBSEDCL	WBSETCL	
	400KV PPSP-BIDHANNAGAR-2	28-09-2023	14:20	28-09-2023	14:35	PPSP: B_N, Zone-1, 60.3 km	Bidhanagar: B_N, Zone-1, 125.4 km, 1.25 kA	B-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	
	400KV PPSP-BIDHANNAGAR-1	28-09-2023	14:44	28-09-2023	15:37	PPSP: R_N, Zone-1, 57.7 km, 3.18 kA	Bidhannagr:R_N, Zone-1, 127.4 km, 1.25 kA	R-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	
	400KV PPSP-BIDHANNAGAR-2	28-09-2023	15:50	28-09-2023	23:00	PPSP:B_N, Zone-1, 158.9 km	Bidhanagar: B_N, Zone-1, 22.9 km, 8.4 kA	B-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	
	400KV PPSP-BIDHANNAGAR-1	30-09-2023	13:08	30-09-2023	13:31	PPSP: B_N, 69.8 km, 2.14 kA	Bidhannagar: B_N, 127.32 km, 2.658 kA	B-Earth	100	A/r kept disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	
	400KV PPSP-BIDHANNAGAR-2	20-10-2023	11:24	20-10-2023	11:58	PPSP: B_N, Zone-1, 170.3 km	Bidhanagar: B_N, Zone-1, 20.2 km, 4.54 kA	B-Earth	100	A/r disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	
	400KV PPSP-BIDHANNAGAR-2	24-10-2023	12:54	25-10-2023	02:47	PPSP: B_N, 123.9 km	Bidhanagar: B_N, 49.7 km, 5.137 kA	B-Earth	100	A/r disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	
	400KV PPSP-BIDHANNAGAR-2	28-10-2023	11:59	28-10-2023	12:16	PPSP: B_N, Zone-1, 173 km	Bidhannagar: B_N, Zone-1, 17 km, 8.67 kA	B-Earth	100	A/r disabled as per OEM advise	Durgapur		No	No	WBSEDCL	WBSETCL	

List of Single line tripping incidents for Sep 2023 and Oct 2023 for Others utilties

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	PMU Location	DR Configuration Discrepancy	DR/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	LOCAL END UTILITY	REMOTE END UTILITY	UTILITY RESPONSE
1	220KV CHUKHA-BIRPARA-1	01-09-2023	14:50	02-09-2023	15:59		Birpara: Y_B, 52.6 km, Iy= 3.033 kA, Ib= 3.053 kA	Y-B	100	Phase to phase fault	Birpara		No	Yes	Bhutan	PG ER-2	1
2	220KV RENGALI(PH)-TSTPP-1	08-09-2023	14:39	08-09-2023	20:42	Rengali: B_N, Zone-1, 11.2 km,7 kA	TSTPP:B_N, Zone-1, 15.5 km, 6.16 kA	B-Earth	100	A/r couldn't be ascertained from PMU. OHPC/NTPC may confirm	Talcher	Unable to open TSTPP end DR	No	Yes	OHPC	NTPC	1
3	400KV GMR-ANGUL-1	10-09-2023	12:19	10-09-2023	15:50		Angul: B_N,Zone-1, 15 km, 11.4 kA	B-Earth	100	A/r failed after 1 second	Angul		No	Yes	GMRKEL	PG Odisha	0
4	220KV RENGALI(PH)-TSTPP-1	13-09-2023	20:17	14-09-2023	19:19	Rengali:B_N, Zone-1, 19.06 km,5.73 kA	Talcher:B_N,Zone-2, 20 km,5.73 kA	B-Earth	500	Tripped in Zone-2 time from TSTPP	Rengali		No	Yes	OHPC	NTPC	1
5	220KV TENUGHAT-BIHARSARIFF-1	27-09-2023	12:24	27-09-2023	19:22	Tenughat:Y_N, Zone-1, 34.5 km	Biharsariff: Y_N, Zone-1, 126 km, 1.114 kA	Y-Earth	100	Three phase tripping for single phase fault.	Tenughat		No	No	TVNL	BSPTCL	1
6	400KV JEYPORE-GAJUWAKA-2	02-09-2023	16:57	03-09-2023	11:14	Jeypore: B_N, 111.2 km, 1.18 kA	Gajuwaka: B_N, 57.3 km, 1.39 kA	B-Earth	100	A/r failed after 1 second	Jeypore		Yes	No	PG Odisha	SR	0
7	400KV LAPANGA-STERLITE-2	02-09-2023	19:29	02-09-2023	20:43	Lapanga: R_N, Zone-1, 10.76 km, 11.34 kA	Sterlite: R_N, 13.07 km, 2.722 kA	R-Earth	100	A/r successful from Sterlite only. No A/r attempt at Lapanga, other two phase tripped later on PD.	Lapanga		Yes	No	OPTCL	CPP	1
8	400KV LAPANGA-STERLITE-2	03-09-2023	14:26	03-09-2023	17:14	Lapanga: R_N, Zone-1, 10.67 km, 11.02 kA	Sterlite: R_N, 2.95 km, 3.5 kA	R-Earth	100	A/r successful from Sterlite only. Other two phase at Lapanga tripped on PD	Lapanga		Yes	No	OPTCL	CPP	1
9	220KV BUDHIPADAR-RAIGARH-1	03-09-2023	15:08	03-09-2023	16:38	Budhipadar: Didn't trip	Raigarh: R_E, 9.5 km, 11.67 kA	R-Earth	100	Three phase A/r enabled at Budhipadar.	Budhipadar	DR length less at Budhipadar	Yes	No	OPTCL	WR	1
10	400KV LAPANGA-STERLITE-2	04-09-2023	14:19	06-09-2023	16:22		Sterlite: R_N, Zone-1, 2.95 km, 32 kA	R-Earth	100	A/r successful from Sterlite only. Other two phase at Lapanga tripped on PD	Lapanga		Yes	No	OPTCL	CPP	1
11	400KV BIDHANNAGAR-NEW CHANDITALA-1	04-09-2023	14:59	04-09-2023	15:48	Bidhannagar: B_N, Zone-1, 97.8 km	New Chandi: B_N, Zone-1, 36.31 km, 7.92 kA	B-Earth	100	Three phase tripping for single phase fault	Bakreshwar		Yes	No	WBSETCL	WBPDCL	1
12	400KV JEERAT-BAKRESWAR-1	05-09-2023	15:33	06-09-2023	06:59	Jeerat: R_N, Zone-2, 156.6 km, 2.72 kA	Bakreswar: R_N,Zone-1, 15.52 km, 6.96 kA	R-Earth	100	A/r failed after 1 second	Durgapur		Yes	Yes	WBSETCL	WBPDCL	0
13	400KV ALIPURDUAR (PG)-PUNASANGCHUN-JIGMELING-2	06-09-2023	17:12	06-09-2023	18:56	Alipurduar: B_E, Zone-2, 212.3 km, 2 kA	Jigmelling: B_E, Zone-1, 105.3 km, 1.6 kA	B-Earth	1100	Resistive fault. Tripped in Zone-2 from Alipurduar. No carrier received	Alipurduar		Yes	NA	PG ER-2	Bhutan	0
14	220KV ALIPURDUAR (PG)-SALAKATI-2	15-09-2023	11:06	15-09-2023	12:13	Alipurdaur: R_N, 36.2 km, 1.9 kA	Salakati:R_N, 93 km,1.9 kA	R-Earth	100	A/r not attempted at Alipurduar and other two phase tripped after 1.5 seconds. A/r successful from Salakati, however tripped again within reclaim time.	Alipurduar		Yes	NA	PG ER-2	NER	0
15	765KV GAYA-VARANASI-2	15-09-2023	20:00	15-09-2023	23:27	Gaya: Y_N, Zone-1, 175.19 km, 3.51 kA	Varanasi: Y_N, 79 km, 6.7 kA	Y-Earth	100	No A/r attempt from Gaya. Other two phase tripped after 2.5 seconds on PD	Gaya		Yes	NA	PG ER-1	NR	0
16	400KV LAPANGA-STERLITE-2	19-09-2023	13:12	19-09-2023	19:42	Lapanga: R_N, Zone-1, 4.3 km, 28 kA	Sterlite: R_N, Zone-1, 14 km, 9.64 kA	R-Earth	100	A/r failed after 1 second	Meramundali		Yes	No	OPTCL	IPP	0
17	765KV GAYA-VARANASI-1	24-09-2023	08:56	24-09-2023	10:53	Gaya: O/V St.1		O/V	NA	O/V St.1 operated at Gaya. As per PMU, voltage reached around 801 kV. O/v setting may be reviewed.	Gaya		Yes	NA	PG ER-1	NR	0
18	220KV BUDHIPADAR-RAIGARH-1	25-09-2023	13:34	25-09-2023	20:20	Budhipadar:R_N, Zone-2, 25 km, 9.6 kA		R-Earth	400	Tripped in Zone-2 from Budhipadar	Budhipadar		No	No	OPTCL	WR	1

19	400KV INDRAVATI(PG)-INDRAVATI(GR)-1	26-09-2023	11:01	26-09-2023	11:32	Indravati:B_N, 2.15 kA	Indravati(GR): Didn't trip	B-Earth	400	As per PMU, line tripped in Zone-2 time from PG end. Whether fault was in this line or adjacent one. PG Odisha may explain.	Indravati		No	No	PG Odisha	OHPC	0
20	220KV KARAMNASHA (NEW)-SAHUPURI-1	27-09-2023	14:02	27-09-2023	15:31	Karamnasha: O/c operated		No fault	NA	As per PMU, no fault in line. Why O/c setting kept at Karamnasha end. BSPTCL may explain.	Sasaram		No	No	BSPTCL	NR	1
21	400KV GOKARNA-SAGARDIGHI-1	29-09-2023	17:28	29-09-2023	18:27	Gokarna: B_N, 17.28 km, 10.06 kA	Sagardighi: B_N, 24.5 km, 2.459 kA	B-Earth	100	A/r successful. Tripped again within reclaim time	Farakka		No	Yes	WBSETCL	WBPDCL	1
22	400KV GOKARANA-SAGARDIGHI-2	29-09-2023	17:28	29-09-2023	18:28	Gokarna: B_N, 16.14 km, 10.05 kA	Sagardighi: B_N, 31.61 km, 11.14 kA	B-Earth	100	A/r failed after 1 second. DT received at Sagardighi during failed A/r attempt	Farakka		No	Yes	WBSETCL	WBPDCL	1
23	220KV BUDHIPADAR-RAIGARH-1	30-09-2023	19:43	01-10-2023	10:51	Budhipadar: R_N, 68 km, 2.4 kA	Raigarh: R_N, 10 km, 10.14 kA	R-Earth	400	Tripped in Zone-2 from Budhipadar	Budhipadar		No	NA	OPTCL	WR	0
24	400KV GMR-ANGUL-2	01-10-2023	11:28	01-10-2023	12:33	GMR: B_N, Zone-1, 19.54 km, 10 kA, A/r unsuccessful	Angul: B_N, 25.7 km, 10.41 kA	B-Earth	100	A/r failed after 1 second	Angul		No	Yes	GMRKEL	PG Odisha	1
25	400KV NEW JEERAT-SUBHASGRAM(PG)-2	03-10-2023	11:48	03-10-2023	20:58	New Jeerat: B_N, Zone-1, 45.80 km, 5.43 kA	Subhasgram: B_N, Zone-1, 62.4 km, 4.9 kA	B-Earth	100	A/r failed after 1 second	Subhashgram		Yes	Yes	PMJTL	PG ER-2	1
26	220KV RONGNICHU-RANGPO-2	09-10-2023	11:13	09-10-2023	18:17		Rangpo: Y_B, 13.183 km, 1.27 kA	Y-B	100	Phase to phase fault	Rangpo		Yes	Yes	Rongnichu	PG ER-2	1
27	220KV TENUGHAT-BIHARSARIFF-1	13-10-2023	08:58	13-10-2023	09:45	Tenughat: R_N, Zone-2, 55.37 km	Biharshariff: R_N, Zone-1, 1.15 kA	R-Earth	100	Three phase tripping for single phase fault	Tenughat		No	No	TVNL	BSPTCL	0
28	400KV TENUGHAT-PVUNL-1	24-10-2023	09:25	24-10-2023	10:27	Tenughat: R_N, 73.4 km, 1.36 kA		R-Earth	100	A/r couldn't be ascertained from PMU data	Tenughat		No	No	TVNL	PVUNL	0
29	765KV FATEHPUR-PUSAULI-1	28-10-2023	23:53	29-10-2023	02:47		Sasaram: M1: 328 km, 1.4 kA, M2: 337.6 km, 1.388 kA	R-Earth	100	A/r failed after 1 second	Sasaram		No	No	NR	PG ER-1	1
30	220KV BUDHIPADAR-RAIGARH-1	02-10-2023	18:34	03-10-2023	23:55	Budhipadar: R_N, 60.8 km, 2.39 kA		R-Earth	400	Tripped in Zone-2 from Budhipadar	Budhipadar		Yes	NA	OPTCL	WR	0
31	400KV BIHARSARIFF(PG)-VARANASI-1	02-10-2023	19:38	02-10-2023	20:21	Biharshariff: Y_N, 101.629 km, 3.70 kA		Y-Earth	100	A/r failed after 1 second	Biharsharif		Yes	NA	PG ER-1	NR	1
32	400KV ALIPURDUAR (PG)-PUNASANGCHUN-JIGMELING-2	03-10-2023	02:43	03-10-2023	04:02	Alipurdaur: R_N, 25.67 km, 8.9 kA, A/r successful	Bhutan : R_N, 174 km, 1.32 kA	R-Earth	100	A/r successful from Alipurduar only. Three phase tripping at Jigmelling	Alipurduar		Yes	NA	PG ER-2	BHUTAN	1
33	400KV BAHARAMPUR-BHERAMARA-4	05-10-2023	00:01	05-10-2023	18:57	Baharampur: Y_E, Zone-1, 63 km, 4.8 kA		Y-Earth	100	A/r failed after 1 second	Baharampur		Yes	NA	PG ER-2	BANGLADESH	1
34	220KV BUDHIPADAR-KORBA-2	06-10-2023	16:14	06-10-2023	20:09	Budhipadar: 220 kV Bus-2 tripped		B-Earth	100	OPTCL may explain.	Budhipadar	DR not time synchronized	Yes	NA	OPTCL	WR	1
35	220KV BUDHIPADAR-RAIGARH-1	11-10-2023	12:13	11-10-2023	13:15	Budhipadar: B_E, 54.5 km, 2.74 kA, A/r successful	Raigarh: B_E, 27.072 km, 4.478 kA	B-Earth	100	Three phase A/r at Budhipadar.	Budhipadar		Yes	No	OPTCL	WR	0
36	765KV NEW RANCHI-DHARAMJAIGARH-2	12-10-2023	14:56	12-10-2023	19:55	New Ranchi: B_N, 342.27 km, 2.73 kA	Dharamjaigarh: B_N, 59.654 km, 8.158 kA	B-Earth	100	A/r failed after 1 second	New Ranchi		No	No	PG ER-1	WR	1
37	220KV BIRPARA-MALBASE-1	18-10-2023	15:50	18-10-2023	16:38		220 kV Bus tripped at Malbase	No fault	NA	No fault observed from PMU.	Birpara		No	NA	PG ER-2	BHUTAN	0
38	220KV KARAMNASHA (NEW)-SAHUPURI-1	21-10-2023	09:58	21-10-2023	12:10		Sahupuri: Y_N, Zone-1, 35.2 km, 1.48 kA	Y-Earth	100	A/r not ascertained from PMU data	Sasaram		No	NA	BSPTCL	NR	0
39	400KV MUZAFFARPUR(PG)-DHALKEBAR-1	30-10-2023	02:57	30-10-2023	03:58	Muzaffarpur: R_N,Zone-1, 91.81 km, 3.43 kA		R-Earth	100	A/r failed after 1 second	Muzaffarpur		No	NA	PG ER-1	Nepal	1
																	10

Annexure C.2

SL NO	MONTH	UTILITY	ELEMENT	DETAILS OF ELEMENT	REMARKS
1	OCC_JAN_2023	OPTCL	B/R	400 kV 125 MVAr Bus Reactor at Mendhasal GSS	PDMS AND PSCT DONE
2	OCC_JAN_2023	OPTCL	T/L	125kva bus reactorat Mendhasal	PDMS AND PSCT DONE
3	OCC_JAN_2023	OPTCL	ICT	132/33kV 20MVA Power TRF-1 AT Lapanga	PDMS AND PSCT DONE
4	OCC_JAN_2023	OPTCL	ICT	132/33kV 20MVA Power TRF-II ATGIS Hinjili	PDMS AND PSCT DONE
5	OCC_JAN_2023	OPTCL	T/L	RE-GENERATION 132kV BALASORE ALLOY PLANT 220/132/33kV BALASORE	Data required
6	OCC_JAN_2023	OPTCL	ICT	RE-ENERGIZATION 1*25MW TURBO GENARATOR AT M/S MSP METALICS LTD JHARSUGUDA OPTCL SYSTEM AT 132kV MSP FEEDER FROM 220/132/33kV GSS,BUDHIPADAR	Data required
7	OCC_JAN_2023	OPTCL	ICT	RE-ENERGIZATION OF 220/132kV 100MVA AUTO TRF-III AT MERAMUNDALI	Data required
8	OCC_FEB_2023	OPTCL	T/L	132/33kV 20MVA Power TRF-1 AT ASKA NEW	PDMS AND PSCT DONE
9	OCC_FEB_2023	OPTCL	T/L	132kV Barbil-Kamanda line	PDMS AND PSCT DONE
10	OCC_FEB_2023	OPTCL	T/L	132kV Switching station kutra 132Kv along with LILO of kuchinda rajgangpur s/c line to kutra	PDMS AND PSCT DONE
11	OCC_FEB_2023	OPTCL	T/L	132kV Kutra m/s shiva cement s/c line	Data required
12	OCC_FEB_2023	OPTCL	T/L	132/33kV 20MVA Power TRF-1 AT 132/33 kV,GSS,CHANDIPUR	PDMS AND PSCT DONE
13	OCC_FEB_2023	OPTCL	T/L	132kV Switching station near M/s Ultrateh Cement ltd at Khamarnuagaon,Khuntuni,132kV LILO arrangement from Arati steel -TS alloys line	Data required
14	OCC_FEB_2023	OPTCL	T/L	12.5 MW Solar power plant at 33kV Level in 132/33kV witchyard M/S ARBEL having connectivity at 132kV With LILO switching station SAINTALA	Data required
15	OCC_FEB_2023	OPTCL	T/L	220kV Switchyard at 220/132/33kV GSS,BAMRA having LILO connectivity 220kV Budhipadar-Tarkera ckt-II& CKT-I	Data required
16	OCC_FEB_2023	OPTCL	T/L	220/132kV160MVA Power Auto TRF-1 AT 220/132/33 kV,GSS,BAMRA	PDMS AND PSCT DONE
17	OCC_FEB_2023	OPTCL	T/L	220/132kV160MVA Power Auto TRF-2 AT 220/132/33 kV,GSS,KURAMUNDA	PDMS AND PSCT DONE
18	OCC_FEB_2023	OPTCL	T/L	220/132kV 40MVA Power Auto TRF-1 AT 220/132/33 kV,GSS,KURAMUNDA	PDMS AND PSCT DONE
19	OCC_FEB_2023	OPTCL	T/L	Synchronization(re-energization 19.5MW TG-1 OF CGP of m/s ninl Duburi with OPTCL network,220/132/33kV GSS 220kV DUBURI OLD-NINL FEEDER	Data required
20	OCC_MAR_2023	OPTCL	T/L	400 kV GMR - Meramundali-B S/C Line after LILO work of 400 kV GMR - Meramundali-A Line at Meramundali-B SS	PDMS AND PSCT DONE
21	OCC_MAR_2023	OPTCL	T/L	132kV 2 PH S/C LINE,132kV GSS,KAMAKHYANAGAR FOR EXTENTION OF P/S TO RTSS KAMAKHYANAGAR	Data required
22	OCC_MAR_2023	OPTCL	T/L	400kV GMR-MERAMUNDALI-B SC LINE & MERAMUNDALI-B TO MERAMUNDALI-A LINE AFTER LILO OF GMR-MERAMUNDALI-A SC LINE MERAMUNDALI-B GIS	PDMS AND PSCT DONE
23	OCC_MAR_2023	OPTCL	ICT	132/33kV 20MVA POWER TR NO-2 AND 1 132kV FEEDER BAY GSS BIRMAHARAJPUR	Data required
24	OCC_APR_2023	OPTCL	ICT	400KV MAIN BAY OF 400KV/220kV 315 MVA ICT-3 AT KALINGANAGAR	DATA REQUIRED
25	OCC_APR_2023	OPTCL	T/L	132kV 2 PH S/C LINE,DC TOWER FROM M/S JABAMAYEE FERO ALLOY STATION-TO SUKINDA LINE	DATA REQUIRED
26	OCC_APR_2023	OPTCL	T/L	1*25MW TG#2 OF 132kV RUNGTA MINE LTD DHENKANAL STEEL PLANT WITH OPTCL SYSTEM THROUGH MERAMUNDALI-RML DSP LINE FEEDER	DATA REQUIRED
27	OCC_APR_2023	OPTCL			DATA REQUIRED
28	OCC_APR_2023	OPTCL	ICT	400/220kV ICT-III AT BRPS TATA STEEL KALINGANAGAR	DATA REQUIRED
29	OCC_APR_2023	OPTCL	T/L	132kV BHATLI-BARGARH BAY AT 220/132/33kV	DATA REQUIRED
30	OCC_APR_2023	OPTCL	T/L	33kV GEDCOL-BOLANGIR NEWBAY AT 220/132/33kV AT BOLANGIR	DATA REQUIRED
31	OCC_APR_2023	OPTCL	ICT	400/220kV 315MVA ICT-1 AT INDRAVATI	DATA REQUIRED
32	OCC_MAY_2023	OPTCL	T/L	SYNCHRONIZATION OF 2MW GEDCOL SOLAR PV PLANT HAVING 33kV CONNECTIVITY AT 220/132/33kV,GSS BOLANGIR NEW FOR 2MW SOLAR PV PLANT	DATA REQUIRED
33	OCC_MAY_2023	OPTCL	T/L	220kV LILO LINE LOC NO 227 OF EXITING 220kV NEW DUBURI-BALASORE LINE UPTO GANTRY OF 220/132/33kV GRID S/S DHARMA	DATA REQUIRED
34	OCC_MAY_2023	OPTCL	T/L	SYNCHRONIZATION OF 3.64MW SOLAR PV PLANT HAVING 11kV LEVEL CONNECTIVITY AT 132/33kV,SWITCHYARD OF M/S SHREE CEMENT LTD CONNECTED WITH KHUNTUNI-SHREE	DATA REQUIRED
35	OCC_MAY_2023	OPTCL	ICT	220/33kV GSS,KANTABADA LILO CONNECTIVITY FROM LOC NO 453 AND 455 OF 220kV CHANDAKA-MENDASHAL CKT-III ALONG WITH 02 NOS OF 220/33 Kv 63mva power trf	DATA REQUIRED
36	OCC_MAY_2023	OPTCL	T/L	SYNCHRONIZATION OF 30MW THERMAL UNIT OF M/S JAGANNATH STEEL AND POWER KEONJHAR WITH OPTCL SYSTEM	DATA REQUIRED
37	OCC_MAY_2023	OPTCL	T/L	33kV SOLAR BAY EXTENSION AT 132/33kV AT BARIPADA	DATA REQUIRED
38	OCC_MAY_2023	OPTCL	T/L	132/33kV GSS,BORIGUMA LILO CONNECTIVITY OF 132kV JAYANAGAR-TENTULKHANTI CKT-2(132kV JAYANAGAR-NABARANGPUR LINE	DATA REQUIRED
39	OCC_MAY_2023	OPTCL	T/L	132/33kV 40MVA POWER TRANSFORMER -2 AT ROURKELA	DATA REQUIRED
40	OCC_MAY_2023	OPTCL	T/L	132kV BRAJARAJNAGAR-LAKHANPUR DC LINE& 132kV LAKHANPUR GSS(5NOS 132kV,132KV TRANSFORMER1&2 20MVA	DATA REQUIRED
41	OCC_JULY_2023	OPTCL	T/L	220/132/33kV 132kV GUNUPUR-RTSS LINE	DATA REQUIRED
42	OCC_JULY_2023	OPTCL	ICT	220/132/33kV GSS,40MVA TR-II AT DHARMA	DATA REQUIRED
43	OCC_JULY_2023	OPTCL	T/L	132kV BHAWANIPATNA-RTSS LINE-II	DATA REQUIRED
44	OCC_JULY_2023	OPTCL	T/L	132/33kV BUDHIPADAR-LAKHANPUR LINE AND BRAJRAJNAGAR-JORABAGA MCL AT LILO ARRANGMENT BUDHIPADAR-JORABAGA MCLCKT-II AND LAKHANPUR-BRAJRAJNAGAR	DATA REQUIRED

SL NO	MONTH	UTILITY	ELEMENT	DETAILS OF ELEMENT	REMARKS
1	OCC_JAN_2023	BSPTCL	T/L	220 kV Patna (PG) - Sipara (BSPTCL) D/C Line after reconducting	PDMS AND PSCT DONE
2	OCC_JAN_2023	BSPTCL	T/L	132kV Ganwara-Pandaul line(reconducting)	PDMS AND PSCT DONE AT GANGWARA END
3	OCC_JAN_2023	BSPTCL	T/L	132kV Darbhanga-samastipur line(reconducting)	PDMS AND PSCT DONE AT DARBHANGA END
4	OCC_JAN_2023	BSPTCL	T/L	132kV Dumraon-Bikramganj line(reconducting)	In 132kV Dumraon Bikramganj line reconductoring h
5	OCC_JAN_2024	BSPTCL	T/L	220kV SamastipuR(New ujiyarpur)-DMTCL(Darbhanga)	PDMS AND PSCT DONE
6	OCC_MAR_2023	BSPTCL	T/L	220kV BIHARSARIFF-TTPS S/C(RECONDUCTING)	Data required
7	OCC_MAR_2023	BSPTCL	T/L	132kV SONENAGAR(OLD)-NAGARUNTARI TSS,SCTL(RECONDUCTING)	Data required
8	OCC_MAR_2023	BSPTCL	T/L	132kV RAJGIR ASTHAWAN CKT1&2	Data required
9	OCC_APR_2023	BSPTCL	T/L	220 kV Sitamarhi (PMTL) - Raxaul Line 1 along with associated bays at Raxaul end	DATA REQUIRED
10	OCC_APR_2023	BSPTCL	T/L	220 kV Sitamarhi (PMTL) - Raxaul Line 2 along with associated bays at Raxaul end	DATA REQUIRED
11	OCC_APR_2023	BSPTCL	T/L	220kV BEGUSRAI-BARAUNI BTPS LINE 1&2	DATA REQUIRED
12	OCC_APR_2023	BSPTCL	T/L	132KV BARIPAHARI-HARNAUT LINE	DATA REQUIRED
13	OCC_APR_2023	BSPTCL	T/L	132KV CHHAPRA-EKMA LINE 1&2	DATA REQUIRED
14	OCC_APR_2023	BSPTCL	ICT	100MVA ICT-2 AT BHUSAULA GSS 220/33kV	DATA REQUIRED
15	OCC_APR_2023	BSPTCL	T/L	132kV MADHUPURA-SAPAUL LINE	DATA REQUIRED
16	OCC_MAY_2023	BSPTCL	T/L	220 kV Muzzafarpur(PG) - Amnour(BSPTCL)LINE2	DATA REQUIRED
17	OCC_MAY_2023	BSPTCL	T/L	132kV BARUIPUR-SERAKOL LINE AT SERAKOL	Data required
18	OCC_JUNE_2023	BSPTCL	T/L	400/220kV 500MVA ICT 3 at Ranchi SS	Data required
19	OCC_JUNE_2023	BSPTCL	T/L	132 kV Kataiya (BSPTCL) -Kushaha (Nepal) circuit 3 along with associated bay number 113 at Kataiya end	Data required
20	OCC_JUNE_2023	BSPTCL	T/L	220kV RAXUAL-GOPALGANJ LINE1&2	Data required
21	OCC_AUG_2023	BSPTCL	T/L	132kV D/C LINE 132/33kV GSS BRAJARAJNAGA-BELPAHAR RTSS CKT-1&	Data required
22	OCC_SEP_2023	BSPTCL	T/L	132kV RAXAUL-PARWANIPUR 1&2	Data required
23	OCC_SEP_2023	BSPTCL	ICT	132/33kV 50MVA ICT-2 AT PHULPARAS	Data required
24	OCC_SEP_2023	BSPTCL	ICT	132/33kV 50MVA ICT-3 AT HULSAGANJ	Data required
25	OCC_SEP_2023	BSPTCL	T/L	132kV BIRAPARA-KAMAKHYAGURI LINE	Data required
26	OCC_SEP_2023	BSPTCL	T/L	132kV ULUBERIA-BAGNAN LINE	Data required
27	OCC_SEP_2023	BSPTCL	T/L	132kV KAKDWEEP-RAMGANGA LINE 1&2 ,B/C	Data required
					Data required

SL NO	MONTH	UTILITY	ELEMENT	DETAILS OF ELEMENT	REMARKS
1	OCC_DEC_2022	BGCL	ICT	400KV MAIN BAY OF 400KV/220KV/132kV/33kv 500 MVA ICT 2 AT JAKKANPUR JIS	PDMS AND PSCT DONE
2	OCC_JAN_2023	BGCL	T/L	220kV JAKKANPUR NEW(BGCL)-KHAGAUL(BSPTCL)	PDMS AND PSCT DONE AT JAKKANPUR END AND DATA REQUIRED KHAGAUL END
3	OCC_JAN_2023	BGCL	T/L	220kV JAKKANPUR NEW(BGCL)-SIPARA(BSPTCL)	PDMS AND PSCT DONE AT JAKKANPUR END AND DATA REQUIRED KHAGAUL END
4	OCC_MAR_2023	BGCL	ICT-1	400/220/33kV ICT 1 500MVA at Naubatpur SS	Data required
5	OCC_MAR_2023	BGCL	ICT	500MVA ICT-1 400/220/132/33kV ,NAUBATPUR	Data required
6	OCC_MAR_2023	BGCL	T/L	132kV KHAGAUL-BIHITA NEW(BGCL) S/L	PDMS AND PSCT DONE
7	OCC_MAR_2023	BGCL	T/L	132kVBIHITA NEW(BGCL)-DIGHA(BSPTCL)	PDMS AND PSCT DONE
8	OCC_JUNE_2023	BGCL	T/L	220kV MUJAFFARPUR-AMNOUR1&2	Data required
9	OCC_JUNE_2023	BGCL	T/L	220kVDIGHA-AMNOUR1&2	Data required

SL NO	MONTH	UTILITY	ELEMEN	DETAILS OF ELEMENT	REMARKS
1	OCC_NOV_2022	JUSNL	T/L	400KV MAIN BAY OF LATEHAR(JUSNL)-1 AT CHANDWA(PG)	PDMS AND PSCT DONE AT CHANDWA END AND DATA REQUIRED AT LATEHAR END
2	OCC_NOV_2022	JUSNL	T/L	400KV MAIN BAY OF LATEHAR(JUSNL)-2 AT CHANDWA(PG)	PDMS AND PSCT DONE AT CHANDWA END AND DATA REQUIRED AT LATEHAR END
3	OCC_JAN_2023	JUSNL	T/L	400 kV Chandwa (PG) - Latehar (JUSNL) D/C Line	PDMS AND PSCT DONE AT CHANDWA END AND LATEHAR END DATA REQUIRED
4	OCC_AUG_2023	JUSNL	T/L	400 kV Tenughat – Patratu S/C Line anti-theft charging from Tenughat end [upto 64 kms] (upto Patratu gantry)	DATA REQUIRED

SL NO	MONTH	UTILITY	ELEMEN	DETAILS OF ELEMENT	REMARKS
1	OCC_NOV_2022	NTPC (North Karanpura)		660MW New Generating Unit charged a Tandwa,Jharkhand	DATA REQUIRED
2	OCC_NOV_2022	NTPC (North Karanpura)	ICT	400KV MAIN BAY OF 400KV/11.50KV 315 MVA ST-3 AT NORTH KARANPURA	PDMS AND PSCT DONE
3	OCC_NOV_2022	NTPC (North Karanpura)	GT-1	400KV MAIN BAY OF 400KV/21KV 265 MVA GT-1 AT NORTH KARANPURA	PDMS AND PSCT DONE
4	OCC_NOV_2022	NKTL	T/L	400 kV North Karanpura(NTPC)- Chandwa(PG) Transmission Line -1	PDMS AND PSCT DONE AT NORTH KARANPURA END AND DATA REQUIRED CHANDWA END
5	OCC_NOV_2022	NKTL	T/L	400 kV North Karanpura(NTPC)- Chandwa(PG) Transmission Line 2	PDMS AND PSCT DONE AT NORTH KARANPURA END AND DATA REQUIRED CHANDWA END
6	OCC_JAN_2023	NTPC	T/L	Main Bays of 400 kV Gaya D/C Line at NTPC sitchyard	NOT CHARGED
7	OCC_MAR_2023	NTPC		NTPC Barh Stage Unit #2, 24 kV, 660 MW is yet to be synchronized	Data required
8	OCC_MAR_2023	NTPC	GT(3*26	400kV GT#2 of NTPC Barh	Data required
9	OCC_APR_2023	NTPC	GT	NTPC Barh Stage 1 Unit #2 660MW	DATA REQUIRED
10	OCC_AUG_2023	NTPC	T/L	33 kV Darlipalli (NTPC) - Dulanga CMP Line 2	PDMS AND PSCT DONE

SL NO	MONTH	UTILITY	ELEMEN	DETAILS OF ELEMENT	REMARKS
1	OCC_DEC_2022	PGCIL	ICT	400KV MAIN BAY OF 400KV/220KV/33kV 315 MVA ICT 2 AT DURGAPUR SS	PDMS AND PSCT DONE
2	OCC_JAN_2023	PGCIL	T/L	PG-Patna-Gaurichak TL CKT-2(reconducting)	DATA REQUIRED
3	OCC_JAN_2023	PGCIL	T/L	PG-Patna-Gaurichak TL CKT-1(reconducting)	DATA REQUIRED
4	OCC_FEB_2023	PGCIL	T/L	220 kV Pusauli (PG) - Durgauti (IR) D/C Line	Data required in both end
5	OCC_APR_2023	POWERG	T/L	132 kV Ranpo (PG) - Samardong (EPD, Sikkim) Line 1	PDMS AND PSCT DONE AT RANGPO END
6	OCC_APR_2023	POWERG	T/L	133 kV Ranpo (PG) - Samardong (EPD, Sikkim) Line 2	PDMS AND PSCT DONE AT RANGPO END
7	OCC_APR_2023	POWERG	T/L	220 kV Pusauli (PG) - Durgauti (IR) D/C Line2	DATA REQUIRED
8	OCC_MAY_2023	POWERG	T/L	220 kV Pusauli (PG) -Durgauti Line 2	DATA REQUIRED
9	OCC_AUG_2023	PGCIL	T/L	400 kV Sitamarhi (PGCIL) -Dhalkebar (Nepal) Line 1 &2	DATA REQUIRED
10	OCC_AUG_2023	PGCIL	T/L	400 kV Maithon (PGCIL) -Maithon RB (MPL) Line 1&2	DATA REQUIRED

SL NO	MONTH	UTILITY	ELEMEN	DETAILS OF ELEMENT	REMARKS
1	OCC_JUNE_2023	WBSETC	B/R	400 kV 125 MVAR BusReactor at Gokarna SS	PDMS AND PSCT DONE
2	OCC_SEP_2023	WBSETC	ICT	400/220/33 315MVA ICT-3 AT GOKARNA S/S	PDMS AND PSCT DONE

ANNEXURE-C.3

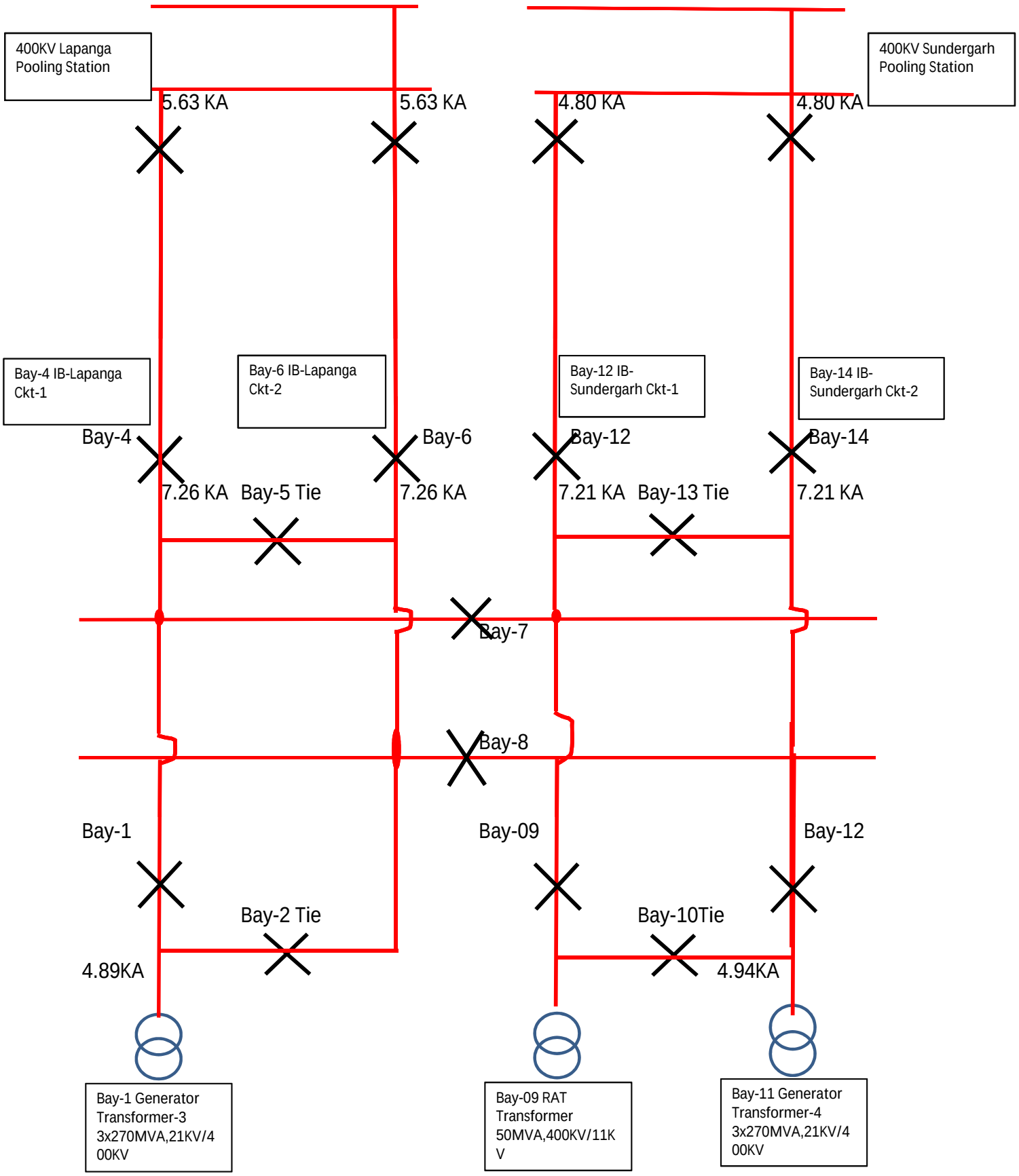
Sl No.	Name of the incidence	PCC Recommendation	Latest status
129th PCC Meeting			
1.	Disturbance at 220/132 kV Motipur (BSPTCL) S/s on 15.08.2023 at 14:31 Hrs	ERLDC representative suggested that modification in the busbar protection logic to be explored to avoid such instances so that when there is floating Isolator status or when it is showing connection with both buses, last known status of the isolator or current measurements may be used to ascertain the actual status of the isolator. PCC advised BSPTCL to explore the scheme modification as suggested by ERLDC.	*PCC advised BSPTCL that to prevent maloperation of busbar relay, physical checking of isolator status flag in busbar relay may done whenever there is a isolator operation in the switchyard. In addition to it, periodical checking of all stsus flags of busbar relay may be followed. In this regard an SOP may be prepared and followed across all the substations.*
2.	Disturbance at 400 kV APNRL S/s on 17.08.2023 at 12:18 Hrs	PCC advised APNRL following: 1. to disable overcurrent protection in 400 kV APNRL-Jamshedpur lines 2. to implement DEF protection for 400 kV APNRL-Jamshedpur D/C at APNRL end with differential protection being the primary protection and the same may be coordinated with Jamshedpur end. 3. to revise earth fault protection settings of GT at APNRL end in coordination with DEF settings of outgoing feeders at APNRL.	*ERLDC representative informed that as per communication received from APNRL, all of mentioned recommendations had been implemented.*
3.	Disturbance at 220 kV Budhipadar(OPTCL) S/s and 220 kV Ib-TPS(OPGC) S/s on 29.07.2023 at 19:13 Hrs	PCC advised OPTCL to rectify autorecloser issues of the connected lines to Budhipadar and take necessary action for ensuring the system healthy all the time.	*OPTCL representative was not available in the meeting.*

128th PCC Meeting			
4.	Disturbance at 400 kV Lapanga (OPTCL) S/s and 400 kV OPGC S/s on 10.06.2023 at 17:27 Hrs	PCC advised OPTCL following: ➢ to test auto-reclose and CB at Lapanga end for 400 kV Meramundali- Lapanga-1 the earliest. ➢ to test both main-1 & main-2 relay at Lapanga end for Meramundali line. ➢ the carried aided tripping scheme of 400 kV Meramundali-Lapanga -2 at Lapanga end may be checked. ➢ to review O/C and DEF protection settings of ICTs at Lapanga end. PCC advised OPGC to review DEF settings and it need to be coordinated with Jharsuguda (Powergrid) as well as Lapanga end. OPGC was also to review SEF settings at unit 4. OPGC vide email dated 12th Aug 2023 had shared proposed settings for neutral earth fault protection which is attached at **Annexure C.3.4.**	*OPTCL representative informed that auto-reclose and CB had been checked for 400 kV Meramundali-Lapanga-1 and 2 during which BCU of main breaker is found to be faulty therefore BCU contact with main breaker had been disabled and it has been kept direct with relay at present.* *He also informed that PLCC and carrier had been checked and found healthy.* *Regarding review of O/C and DEF protection setting of ICTs, OPTCL representative replied that settings was checked and found to be in order. PCC advised to carry out CT saturation testing.* *PCC informed that proposed settings from OPGC is in order for neutral earth fault protection and the same may be implemented after getting necessary feedback from Powergrid.* *In 130th PCC, OPTCL representative was not available in the meeting.*
5.	Disturbance at 400 kV Teesta III S/s and 400 kV Dikchu S/s on 28.06.2023 at 02:28 Hrs	After detailed deliberation, the following was decided;	*<u>129th PCC:</u>*

		➢ Dikchu HEP to coordinate relay time settings of 400/132 kV ICT with IDMT time settings of line in consultation with ERPC/ERLDC so that in case of any fault in line, ICT and units should not trip before line. ➢ SUL to disable overcurrent protection in outgoing lines at Teesta-III end. ➢ PRDC to review settings for DEF relay in Sikkim complex with reduced pick-up settings of 300 A or any suitable value and the report need to be submitted before next PCC meeting	*PRDC representative informed that they had kept pickup of 10 % settings for lines that are acting as evacution path for units however for other lines not acting as evacution path to units, settings had been kept at pickup of 20 % only. She enquired views of Powergrid regarding same for which Powergrid representative replied that pickup settings of 10% can be kept for DEF protection.* *PCC advised PRDC that reduced DEF settings at 10% might be kept for other feeders also and revised study may be shared to ERPC/ERLDC.* *PCC advised PRDC to submit revised report of DEF protection settings in Sikkim complex at earliest.*
125th PCC Meeting			
6.	Repeated Line tripping of 220 kV Ramchandrapur - Joda in April 2023	Regarding status of commissioning of DTPC in the line, PCC advised the matter may be taken with their telecom wing for early commissioning of the same.	*JUSNL representative informed that work order for commissioning of DTPC in the line will be issued shortly and it is expected that work will be completed by July 2023.* *In 129th PCC meeting, JUSNL representative informed that there is no further update to this however they are planning to implement DTPC at earliest.* *JUSNL representative informed that there is no*

			progress in the status due to delay in getting internal approval for the work. *As the issue is a long pending one, PCC decided to highlight the issue in forthcoming TCC Meeting.*

Short circuit study for Single line to earth fault



Neutral Earth fault setting of Line feeder based on fault contribution to remote end SLG fault case

1 OPGC Lapanga Feeder
Maximum fault current contribution by OPGC feeder is 5.63 KA for SLG fault at Lapanga Bus
TMS of Neutral earth fault setting should be selected such that operating time will be more then Zone-3 time + 100ms
PMS =0.1
Operating time 1.1 sec
Operating Charactersitic -SI
Fault current = 5.63 KA
Calculated TMS =0.5424

2 OPGC Sundergarh Feeder
Maximum fault current contribution by OPGC feeder is 4.8 KA for SLG fault at Sundergarh PGCIL Bus
TMS of Neutral earth fault setting should be selected such that operating time will be more then Zone-3 time + 100ms
PMS =0.1
Operating time 1.1 sec
Operating Charactersitic -SI
Fault current = 4.80 KA
Calculated TMS = 0.5157

3 Lapanga OPGC Feeder
Maximum fault current contribution by Lapanga feeder is 7.26 KA for SLG fault at OPGC Bus
TMS of Neutral earth fault setting should be selected such that operating time will be more then Zone-3 time + 100ms
PMS =0.1
Operating time 1.1 sec
Operating Charactersitic -SI
Fault current = 7.26 KA
Calculated TMS = 0.5854

4 Sundergarh PGCIL OPGC Feeder
Maximum fault current contribution by OPGC feeder is 7.21 KA for SLG fault at OPGC Bus
TMS of Neutral earth fault setting should be selected such that operating time will be more then Zone-3 time + 100ms
PMS =0.1
Operating time 1.1 sec
Operating Charactersitic -SI
Fault current = 7.21 KA
Calculated TMS = 0.5841

Present Setting	**PMS**	**TMS**	**Curve**	**CTR**
OPGC Lapanga feeder	0.2	0.25	SI	2000/1
OPGC PGCIL feeder	0.2	0.25	SI	2000/1
PGCIL End	0.1	0.51	SI	2000/1
Lapanga End	0.2	0.38	SI	2000/1
GT Standby EF	0.1	7	Def	1250/1
Proposed Setting	**PMS**	**TMS**	**Curve**	**CTR**
OPGC Lapanga feeder	0.1	0.54	SI	2000/1
OPGC PGCIL feeder	0.1	0.51	SI	2000/1
PGCIL End	0.1	0.58	SI	2000/1
Lapanga End	0.1	0.58	SI	2000/1
GT Standby EF	0.16	1	SI	1250/1