
# Minutes of 109th PCC Meeting

**Date: 04.01.2022**
**Eastern Regional Power Committee**
**14, Golf Club Road, Tollygunge**
**Kolkata: 700 033**

# EASTERN REGIONAL POWER COMMITTEE

## MINUTES OF 109th PROTECTION COORDINATION SUB-COMMITTEE MEETING HELD ON 16.12.2021 AT 10:30 HOURS

Member Secretary, ERPC chaired the meeting. The meeting was convened through Microsoft Teams online platform.

List of participants is enclosed at **Annexure-A.**

## PART – A

**ITEM NO. A.1: Confirmation of minutes of 108th Protection Coordination sub-Committee Meeting held on 16nd November 2021 through MS Teams online platform.**

The minutes of 108th Protection Coordination sub-Committee meeting held on 16.11.2021 was circulated vide letter dated 02.12.2021.

Members may confirm.

**Deliberation in the meeting**

*TPTL vide email dated 03.12.2021 had requested to include the following paragraph under the deliberation of agenda item No. B2 of 108th PCC meeting.*

*"*
*On 21st October 2021, Teesta III – Kishanganj line tripped due to landslide in the corridor which resulted in bringing the vegetation in the induction zone of the line. The landslide occurred due to extensive rainfall in the areas of Sikkim &West Bengal.*
*"*

*Members confirmed the minutes of the 108th PCC meeting with addition of above para with respect to the agenda item no. B2.*

## PART – B

**ITEM NO. B.1: Disturbance at 220 kV Budhipadar S/s on 30.11.2021 at 10:12 Hrs**

On day of incident 220 kV Bus-1 at Budhipadar S/S was under shutdown. At 10:12 Hrs, Isolator dropper of 220 kV Budhipadar-Lephripara at Budhipadar snapped and created bus fault due to which 220 kV Bus-2 at Budhipadar tripped at Budhipadar which led to total loss of power in 220 kV side of 220/132 kV Budhipadar S/s.

220 kV IB TPS S/s became dead during the above incident.

Load Loss: 82MW, Gen. Loss: 348 MW
Outage Duration: 00:23 Hrs

OPTCL may explain.

**Deliberation in the meeting**

OPTCL representative explained the disturbance as follows:

- *220 kV Bus-1 at Budhipadar S/S was under shutdown for annual maintenance work since 29.11.2021 and 220 kV Budhipadar -Lephripada feeder was charged through transfer bus coupler.*
- *On 30.11.2021 at 10:12 Hrs, during normalization of 220 kV Budhipadar-Lephripada from TBC to main bus, R phase isolator dropper snapped and created a bus fault in main bus-2.*
- *As the busbar protection is not in service, all the connected feeders got tripped from remote end in zone-2 timing to clear the fault.*
- *The disturbance led to total power failure at 220 kV Budhipadar S/s & 220 kV IB TPS station and islanding of Vedanta, Aditya Aluminium & Bhusan steel CPPs.*

*They clarified that the busbar protection was out of service due to faulty bay units of 220 kV Vedanta-1, Aditya Aluminium-1 & ATR-1 feeders. The matter is being taken up with OEM for restoration of the same.*

*On a query from PCC regarding assessment of healthiness of substation equipment and their replacement, they stated that their O& M team is assessing the healthiness of equipment of entire Budhipadar S/s and once the assessment gets completed, the cost estimate would be prepared and work order would be placed for replacement of old & defective equipment.*

*During analysis of the event, OPTCL informed that the zone-4 settings were not revised before shifting the feeders to main bus-2 which resulted in tripping of the feeders from remote end in zone-2 timing.*

*PCC opined that if bus bar protection is out of service for a particular bus, the zone 4-time settings for all feeders connected to that bus shall be revised to a reduced value (300 ms) and advised OPTCL to implement the same at Budhipadar S/s*

*PCC expressed serious concern on the matter of repeated disturbances at Budhipadar S/s and subsequent outage of 220 kV IB TPS generating units. The long delay in restoration of busbar protection at 220 kV Budhipadar is also a matter of concern which is affecting reliability & security of the grid. PCC decided to refer the matter to TCC meeting for due deliberation.*

**ITEM NO. B.2: Islanding performance assessment for Budhipadar disturbance on 30.11.2021**

**A. Vedanta Islanding Event:**

**Chronology of Event:**

- At 10:12:31 hrs, Island was formed with tripping of 220 kV Budhipadar-Vedanta D/C circuits due to 220 kV bus fault at 220/132 kV Budhipadar substation.
- Vedanta was importing 20 MW from grid, so there was excess load of 20 MW after separation from grid. Hence in order to balance load, load shedding scheme tripped 2*40 MW rectiformer which led to total 80 MW of load tripping in the Vedanta Island.
- With tripping of 80 MW load, island became generation surplus of 60 MW, hence one unit went to house load (30-35 MW), which was earlier running at 125-130 MW. So, now the total excess load was approx. 40 MW in the islanded system.
- Out of 9*135 MW units in Vedanta captive generation, one unit was under annual overhaul and one went to house load. So, now only 7 captive units were in service to provide governor action within the island. These units were already running near to full load so, adequate governor action provided by all units and load –generation was balanced in the island subsequent. Due to this, frequency was 50 Hz in the island.

- Frequency was steady at 50 Hz but it started decreasing after sustaining for 20 minutes due to reducing steam pressure, and some quantum of load picking meanwhile with manual action. This resulted in frequency to reach UFLS stg-2 which was set at 47.2 Hz for 1 second delay which caused tripping of load in the island via UFLS which could have been avoided if, some amount of load shedding could have been done in this duration.
- This load shedding led to higher frequency and caused further OFGS (Over frequency generation shedding) operation with frequency reaching 52.3 Hz for more than 500 ms that resulted in repeated phenomenon of UFLS & OFGS operation subsequently leading to collapse of islanded system.

**B. BHUSAN Islanding Event:**

- Bhusan was importing 60 MW from the grid prior to event at Budhipadar substation.
- 130 MW X 3 Units got islanded, however it did not survive as Unit 1 & 3 tripped within 2 second and Unit 2 tripped after 8 seconds. As per the islanding scheme it should survive with house load at 33 kV.
- 60 MW unit in the Bhushan steel got islanded and went to house load with 15 MW of load.

**C. Aditya Aluminium Islanding Event:**

Prior to islanding flow was almost floating, after islanding it survived.

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

Concerned CPPs may explain.

**Deliberation in the meeting**

*ERLDC representative explained the islanding events of the CPPS during the disturbance at Budhipadar S/s on 30.11.2021.*

***a) Vedanta Islanding Scheme***

- *The Island was formed after tripping of 220 kV Vedanta- Budhipadar circuits. Prior to tripping, Vedanta was importing 20 MW of power from grid so excess load was of 20 MW. In order to balance load and generation, load shedding scheme operated and tripped 2*40 MW rectiformer.*

- *After tripping of 80 MW load, island became generation surplus by 60 MW. Subsequently one unit went to house load (30-35 MW), which was running at 125-130 MW. Excess load in the island became around 40MW.*
- *Out of 9*135 MW units ,one was under annual overhaul and one went to house load, the rest seven units were in service to provide governor actions and units were already running near full capacity so full governor action was done by all units and load –generation got balanced due to which frequency was steady around 50 Hz however it started decreasing after sustaining for 20 minutes due to reducing steam pressure and due to some quantum of load picking.*
- *Meanwhile with manual action subsequently frequency reached UFLS stg-2 ,47.2 Hz@1sec which further caused OFGS (Over frequency generation shedding) ,52.3Hz@500ms, and repeated phenomenon of UFLS &OFGS ultimately caused collapse of islanding scheme.*

*The following observations were made from the analysis of the event:*

- *While the excess load was 20 MW in the island, the load shedding was done to the tune of 80 MW which as a result creates a generation surplus of 60 MW. The load shedding scheme may be reviewed.*
- *While steam pressure was reducing, some amount of load shedding in the island could have been done to avoid UFLS operation and subsequent island collapse.*
- *Sluggish response of governor had resulted in repeated phenomenon of UFLS & OFGS which was the reason behind non-survival of islanding scheme.*

*Vedanta representative submitted that the root cause for non-survival of islanding was being analyzed by them. They informed that during the incident there was voltage drop in islanded system because of which most of auxiliary got tripped in undervoltage protection subsequently compressors got tripped resulting in non-survival of island.*

*They further informed that load shedding scheme is being reviewed in consultation with OEM of the units.*

*PCC advised Vedanta to implement a revised load shedding scheme as well as to tune the governor responses of the CPP units for ensuring survival of the island.*

***b) Bhusan Islanding Scheme-***

- *Prior to incident, 2*40 MW units were under Shutdown and Bhusan was importing 60 MW from Grid.*
- *It was informed that 3*130 MW Units got islanded after the disturbance however the island did not survive as unit# 1&3 tripped within 2 second and unit 2 tripped after 8 seconds.*
- *The 60MW unit got islanded and went to house load with 15 MW of load.*

*PCC advised Bhusan CPP to submit a report regarding non-survival of their islanded system and action taken thereof.*

***c) Aditya Aluminium Islanding Scheme-***

*It was informed that Aditya Aluminium Island survived after tripping incident at Budhipadar S/S.*

**ITEM NO. B.3: Multiple tripping at 220/132 kV Jayanagar (OPTCL) Substation on 04.11.2021.**

At 10:11 Hrs on 04.11.2021, following elements tripped at 220/132 kV Jaynagar substation

| Sl.No. | Name of the feeder | Trip Time/ Date | Restoration time/Date | Local end | Remote end |
|---|---|---|---|---|---|
| 1 | 220 KV Jayanagar-Upper Kolab-1 | 10:19 Hrs, 04-11-2021 | 12:12/ 04.11.2021 | Tripped with Z-2, Dist- 5.87KM, fault current IA- 6.929 KA | Tripped on Z-1, Dist- 3.5KM, IA-2.89KA |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 220 KV Jayanagar-Jeypore(PGCIL)-3 | | 12:05/ 04.11.2021 | Tripped on 86A, 86B | Didn't trip at PGCIL end. |
| 3 | 220 KV Jayanagar-Jeypore(PGCIL)-4 | | 12:09/ 04.11.2021 | Tripped on 86A, 86B. | Didn't trip at PGCIL end |
| 4 | 132KV Jayanagar-Meenakshi | | 11:03/ 04.11.2021 | Tripped without relay indication. | Triiped on Z-III, Dist-120.6KM, B-Ph O/C |

**Event Analysis:**

- Fault was in 220 kV Jayanagar-Upper Kolab-1 which was detected in Zone-2 from Jaynagar end and Zone-1 from upper kolab end. Since PLCC is unhealthy fault was cleared in Zone-2 time from Jayanagar end.
- 220 kV Jeypore-Jayangar-3 & 4 are newly commissioned lines where due to wrong logic tripping occurred from Jayanagar end which is already rectified. Carrier was unhealthy at tripping instance at OPTCL end.
- 132KV Jayanagar-Meenakshi feeder tripped in zone -3.

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

OPTCL may explain.

**Deliberation in the meeting**

*OPTCL representative informed that the fault was in 220 kV Jayanagar-Upper Kolab-1 line near to upper Kolab end. The relay at Upper Kolab end sensed the fault in zone-1 protection and cleared the fault instantaneously whereas the line tripped from Jayanagar end in zone-2 timing. They stated that the PLCC was not in healthy condition at the time of disturbance which resulted in zone-2 tripping from Jayanagar end.*

*Regarding tripping of 220 kV Jeypore-Jayangar-3 & 4 line during the above disturbance, he explained that the lines were recently commissioned and PLCC was not working for the lines at the time of disturbance. As per the logic implemented in the relay, the master trip relay would operate when any trip with A/R block and carrier unhealthy condition gets satisfied. This resulted in tripping of both the feeders from Jaynagar end though the relay sensed the fault in reverse zone.*

*They informed that the logic had been modified to zone-1 trip instead of any trip and the same had been implemented in the relay.*

*It was further informed that 132 kV Jayanagar-Meenakshi line also sensed the fault in zone 3 and tripped from Meenakshi end. OPTCL was advised to take up the matter with Meenakshi end for necessary review of zone settings at Meenakshi end.*

*Regarding present status of PLCC for 220 kV Jayanagar-Upper Kolab-1 line and 220 kV Jeypore-Jayangar-3 & 4 lines, OPTCL submitted that carrier is healthy at Jayanagar end for all the above lines.*

**ITEM NO. B.4: Bus tripping occurred in Eastern Region during November 2021**

During November 2021 following incidents of bus bar tripping have been observed in Eastern Region.

| Element Name | Tripping Date | Reason | Utility |
|---|---|---|---|
| 400 kV Main Bus-1 at FSTPP | 04-11-2021 at 09:40 Hrs | CB of 400 kV FSTPP-Durgapur-2 stuck at FSTPP. LBB operated. | Farakka NTPC |
| 400 kV Main Bus-1 at New Purnea | 15-11-2021 at 10:20 Hrs | Due to spurious LBB signal during s/d of 400 kV New Purnea-Binaguri-1 & 2 | PG ER-1 |
| 400 kV Main Bus-2 at Jeypore | 30-11-2021 at 10:41 Hrs | Tripped due to mal-operation | PG Odisha Projects |

NTPC, Powergrid ER-1 & Powergrid Odisha may explain.

**Deliberation in the meeting**

***400 kV Bus-1 at FSTPP:***

*NTPC representative explained that there was fault in 400 kV FSTPP-Durgapur circuit-2 for which tripping command was issued by the relay at Farkka end. However, the circuit breaker for the above feeder got stuck and the breaker did not open. As a result LBB protection operated and tripped all the feeders connected to 400 kV Main Bus-1 of FSTPP.*

***400 kV Main Bus-1 at New Purnea:***

*Powergrid representative explained that the disturbance occurred while availing shutdown of 400 kV New Purnea-Binaguri- 2 line. The line was initially opened from Binaguri end and subsequently the DT signal was transmitted to New Purnea end.*

*Upon receiving of the DT signal, the LBB protection initiated at new Purnea end. However, due to faulty relay, the current signal did not get reset and remained high though there is no current in the line. As a result, LBB operated and tripped main bus-1 elements at New Purnea end.*

*They stated that the fault relay was replaced on the same day.*

***400 kV Bus-2 at Jeypore S/s:***

*Powergrid representative explained that while adjusting mechanical interlock between isolator and earthswitch of a feeder, the isolator leg moved undesirably and caused sparking at isolator. Since the earth switch was in closed condition, the event resulted into a bus fault and busbar protection operated for 400 kV bus-2 of Jeypore S/s.*

**ITEM NO. B.5: Repeated Spurious Tripping of 400 kV Barh-Patna-1**

400 kV Barh-Patna-1 had tripped on three occasions on Direct Trip (DT) receipt at Barh end whose details are as follows-

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| › | 400KV-PATNA-BARH-1 | 13/11/2021 | 08:36 | DT recieved at Barh.No trip at Patna end | | 13/11/2021 | 09:58 |
| › | 400KV-PATNA-BARH-1 | 13/11/2021 | 04:09 | Barh: DT recived, 86 relay operated Patna: Not Tripped | | 13/11/2021 | 04:45 |
| › | 400KV-PATNA-BARH-1 | 08/11/2021 | 13:57 | TRIPPED FROM ONLY BARH END | | 08/11/2021 | 14:49 |

NTPC and Powergrid may explain.

**Deliberation in the meeting**

*Powergrid representative informed that during investigation it was found that spurious DT signal was being generated from channel 1of PLCC panel at Barh end which caused tripping of 400 kV Barh-Patna-1 line.*

*They further informed that OEM engineers had visited the site however the issue could not be rectified by them. Further R&D team of OEM has been scheduled to visit the site to analyze and rectify the issue.*

*They stated that channel 1 of PLCC had been disconnected at Barh and intimation was given to ERLDC.*

**ITEM NO. B.6: Protection Audit in Eastern Region**

Protection audit is a primary activity to ensure power system protection implemented at substations and power plants are well coordinated and is as per CEA standards. Due to COVID-19, the activity could not be started since March 2020. Since then, various events have occurred where issues of protection coordination have been observed and several new substation and grid element has been connected with the grid. Therefore, it is now prime requirement to re-commence protection audit of substations and power plants in the Eastern Region. In view of this, following activities have been decided to streamline the audit process:

**PCC activities**

- Formation of Three-Four core audit teams-All utilities to nominate their members
- Nodal officer from all utilities to co-ordinate with audit activities
- Identification of S/s to be audited
- Finalization of audit format

**Pre-audit activities**

- Utilities of S/s thus identified to check and update latest protection settings in PDMS database within next 7 days
- S/s to fill up pre-requisite data as per format attached before visit of audit team

**Input to be obtained from protection database**

- SLD of the S/s
- List of elements
- Updated settings from PDMS database (PDF/excel)
- Model setting for the elements of substation being audited

**On the day of Audit at Substation/Plants**

- Verification of protection setting as per details provided.

- All testing reports
- Equipment's healthiness status, DC healthiness, Aux system healthiness etc.

Audit team observation will be shared with utilities and in PCC for action plans and compliance monitoring.

Format for protection audit checklist is attached at **Annexure B.6.**

Members may discuss.

**Deliberation in the meeting**

*ERPC Secretariat representative briefed about the third-party protection audit activities which were carried out in Eastern Region in the past and its requirement vis-à-vis the benefits. He informed that protection audit for ER substations could not be carried out since the onset of Covid Pandemic. The last comprehensive audit for all 400 kV & 220 kV substations in ER were carried out long ago and in between a number of new 400 & 200 kV substations has been commissioned.*

*In view of above it was proposed to recommence the protection audit activity in ER. The audit would cover all 400 kV & 220 kV Substations in Eastern Region including the power plant substations.*

*The audit procedure was outlined in the agenda the same was elaborated in the meeting.*

- *It was informed that 3-4 audit team will be constituted consisting members from state utility, central utility, ERLDC & ERPC secretariat. The list substations where the audit is to be carried out would be finalized beforehand in PCC meeting and the concerned utility needs to check and update the relay/protection settings available in the protection database (PDMS) before the field visit. Further the nodal officer has to coordinate with the audit teams to facilitate their visit in carrying out the substation audit.*

- *The audit team would submit their report and observation to ERPC secretariat and the same would be placed in PCC meeting for information and compliance, if any, by the auditee utility.*

*Members agreed to the proposal of requirement of periodic protection audit for the substations and expressed their full cooperation in the audit activities.*

*PCC advised utilities to submit their comments, if any, regarding the procedure and format to be followed for carrying out the protection audit.*

*PCC also advised all state utilities including state generating utility, DVC, Powergrid, NTPC & NHPC to nominate at least 2-3 members from their organization who are looking after system protection/testing related work for constitution of audit teams. Separately a nodal officer may be nominated for each utility to coordinate the audit activities for the substations in their system.*

**ITEM NO. B.7: Tripping Incidence in month of November 2021**

Tripping incidents in the month of November 2021 which needs explanation from constituents of either of the end is attached.

Concerned utilities may explain.

**Deliberation in the meeting**

*Explanation from constituents related to tripping incidents in the month of November 2021 is attached at* ***Annexure B.7.***

# PART- C::OTHER ITEMS

**ITEM NO. C.1: Requirement of additional MiP-PSCT License key with Laptop**

44thTCC advised all the utilities of ER including JUSNL to furnish their requirement, if any, for additional MiP-PSCT license to ERPC Secretariat citing proper justification.

Further in 44thERPC meeting, ERPC advised all the utilities to submit their requirement, if any, by 15th October'2021. ERPC further advised ERPC Secretariat to prepare and submit a DPR for additional MiP-PSCT licenses required for ER utilities for PSDF funding.

In 106th PCC meeting, PCC advised concerned utilitiesto submit their additional requirement of PSCT license, if any, to ERPC secretariat within fifteen (15) days.

The requirement for additional MiP-PSCT license key had been received from SLDC Odisha, JUSNL & WBSETCL.

*In 108th PCC Meeting, ERPC informed that requirement for additional MiP-PSCT license key was received from SLDC Odisha, JUSNL & WBSETCL.*

*PCC advised remaining utilities to submit their additional requirement of PSCT license, if any, to ERPC secretariat within fifteen (15) days*

Members may discuss.

**Deliberation in the meeting**

*ERPC secretariat informed that requirement for additional MiP-PSCT license key was received from SLDC Odisha, JUSNL, WBSETCL & BSPTCL.*

*It was further informed that DPR preparation w.r.t the above work had already been initiated and after finalization of DPR, the same would be submitted to PSDF nodal agency.*

**ITEM NO. C.2: List of works carried out by PRDC Pvt. Ltd. during the period of November 2020 to October, 2021.**

The Protection Database project has been implemented by PRDC and declared "Go Live" on 31st October, 2017. In continuation to above, PRDC submitted report for verification of works carried out during the period of November, 2020 to October, 2021.

PRDC may present. Members may discuss.

**Deliberation in the meeting**

*PRDC gave detailed presentation on works carried out by them during the period of November, 2020 to October, 2021 which is attached at* ***Annexure C.2****.*

*Members noted.*

**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 for decisions of previous PCC meetings is given at* ***Annexure C.3.***

**ITEM NO. C.4: Implementation of Differential protection for shorter lines**

As per the CEA standard, transmission line protection can have either have distance or differential protection scheme as main protection scheme. It has been observed that for short lines distance protection scheme tends to over reach and pose protection coordination issues with other elements from the substation. Further many a times due to this short line distance protection the longer lines from remote ends have to increase their zone-2-time delays to higher values (500-600 ms).

In view of this inherent issue the REPORT OF THE TASK FORCE ON POWER SYSTEM ANALYSIS UNDER CONTINGENCIES recommends the following:

LINE DIFFERENTIAL PROTECTION- *Many transmission lines are now having OPGW or separate optic fiber laid for the communication. Where ever such facilities are available, it is recommended to have the line differential protection as Main-I protection with distance protection as backup (built-in Main relay or standalone). Main-II protection shall continue to be distance protection. For cables and composite lines, line differential protection with built in distance back up shall be applied as Main-I protection and distance relay as Main-II protection. Auto-recloser shall be blocked for faults in the cables.*
Based on the above in the 68th PCC ER forum members agreed on:

*PCC opined that differential protection should be implemented for all short lines (<20 kM) to overcome relay coordination issues with respect to distance and over current protection.*

In view of the above, the status of implementation differential protection for shorter lines in the eastern region may be followed up at ER PCC forum level.

A list of short lines (< 20 Km) at 220 kV and above voltage level is attached at **Annexure C.4.**

Members may discuss.

**Deliberation in the meeting**

*PCC enquired about the criteria adopted by utilities for implementing line differential protection in the lines at 220 kV and above level.*

*The views of utilities are given below:*

- *WBSETCL representative informed that as per their adopted practice criteria of line length < 10 km is considered for implementing line differential protection. For line length > 10 km, distance protection scheme gives satisfactory results as such they do not require implementing line differential protection for line length of 10-20 km.*
- *DVC representative informed that they had considered the criteria of line length < 10 km for implementing line differential protection scheme in their system.*

- *ERPC secretariat opined that in general for very short lines having line length less than 10 km, limitations are imposed by R/X of the relay in accurate setting of zone-1 of distance protection so the criteria of implementing line differential protection for line length of less than 10 km may be adopted by the utilities for lines at 220 kV & above voltage level. However, in critical and important lines as recommended by PCC forum, utility shall provide line differential protection irrespective of length of line. Members agreed to the above proposal.*

*Regarding status of implementation of differential protection for existing short lines in Eastern Region, PCC advised BSPTCL, OPTCL, DVC & WBSETCL to submit the required details for the lines as listed in the annexure. Further PCC advised all the utilities to furnish the list of the lines where line differential has been proposed for implementation over and above the list of lines mentioned in the annexure.*

*JUSNL informed that line differential scheme is present in both 220 kV Chaibasa-Chaibasa (JUSNL) D/c & in 220 kV Ranchi-Hatia line.*

*Regarding 220 kV Rangpo-Rongnichu D/C line, Rongnichu informed that OPGW carrier communication is available in the line and the relays have facility for implementing differential protection. PCC advised Powergrid & Rongnichu HEP to implement line differential protection for the line.*

*Similarly, for 400 kV Rangpo-Teesta V D/C line, NHPC stated that OPGW carrier communication is present in the line. PCC advised Powergrid to implement line differential protection for 400 kV Rangpo-Teesta V line.*

*For other 400 & 220 kV lines in the Sikkim complex, line differential protection would be implemented after commissioning of OPGW communication link.*

**ITEM NO. C.5: New Element Integration**

As per information received at ERLDC, 400 kV Kahalgaon (KhSTPP)-Durgapur-2 is going to be first time charged. This circuit is a reconfiguration of 400 kV Farakka (FSTPP)-Kahalgaon (KhSTPP)-4 and 400 kV Farakka (FSTPP)-Durgapur-2 bypassing Farakka substation.

Its modified line parameter as provided below as received from the PGCIL:

| **Name** | **Conductor type** | **Length** |
|---|---|---|

| | | |
|---|---|---|
| 400 kV Kahalgaon (KhSTPP)-Durgapur-2 | ACSR Twin Moose | 242.941 km |

In view of this, Protection coordination may be required as per the following table (Based on information available at ERLDC):

| Reason | Settings to be reviewed for | Settings to be reviewed at substation | Utility | Remarks |
|---|---|---|---|---|
| FTC of 400 kV Kahalgaon (KhSTPP)-Durgapur-2 (Bypass near Farakka) | 400 kV Kahalgaon (KhSTPP)-Durgapur-2 | KhSTPP, Durgapur | NTPC KhSTPP, PG ER-2 | Protection coordination to be done for newly connected element as per ERPC guidelines. |
| | 400 kV Farakka (FSTPP)-Kahalgaon-1,2,3 | FSTPP | NTPC FSTPP | Adjacent longest line for these lines will now be 400 kV Kahalgaon-Durgapur-2 (242.941 km). Hence Zone-3 settings at respective S/s may be reviewed keeping in view it should not encroach next voltage level. Kindly check and confirm any setting revision if any change in adjacent short and long line. |
| | 400 kV Maithon A-Kahalgaon (KHSTPP) | Maithon A | PG ER-2 | |
| | 400 kV Maithon B-Kahalgaon (KHSTPP) | Maithon B | PG ER-2 | |
| | 400 kV Barh-Kahalgaon D/c | Barh | NTPC Barh | |
| | 400 kV Banka-Kahalgaon D/c | Banka | PG ER-1 | |
| | 400 kV Lakhisarai-Kahalgaon D/c | Lakhisarai | PG ER-1 | |
| | | | | |
| | 400 kV Maithon-Durgapur A D/c | Maithon | PG ER-2 | |
| | 400 kV Sagardighi-Durgapur B D/c* | Sagardighi | WBPDCL | |
| | 400 kV Bidhannagar-Durgapur B D/c* | Bidhannagar | WBSETCL | |
| | 400 kV Farakka (FSTPP)-Durgapur B (Ckt-1)* | FSTPP | NTPC FSTPP | |
| | 400 kV Jamshedpur-Durgapur B* | Jamshedpur | PG ER-1 | |
| | | | | |
| | * Setting for the scenario when bus coupler at 400/220 kV Durgapur S/s is in closed condition. At present, bus coupler is in closed condition however in future it will be opened when desired changes at Durgapur substation are in place as per bus split plan decided in previous ERPCTP MoM. | | | |

In future, when Bus coupler at Durgapur will be kept open, Then Zone-3 setting of following lines may need to be reverted back to present setting in future:

| Settings to be reviewed in | S/s to change | Utility |
|---|---|---|
| 400 kV Sagardighi-Durgapur B D/c | Sagardighi | WBPDCL |
| 400 kV Bidhannagar-Durgapur B D/c | Bidhannagar | WBSETCL |
| 400 kV Farakka (FSTPP)-Durgapur B (Ckt-1) | FSTPP | NTPC FSTPP |
| 400 kV Jamshedpur-Durgapur B | Jamshedpur | PG ER-1 |

**Following details to be shared:**

- Respective utilities may share whether revision of any existing protection setting at above mentioned S/S is required or not. In case of any revision, the revised setting may be shared with ERPC and ERLDC. All revisions may be carried out as per ERPC protection philosophy.
- Status of carrier protection and PLCC channel in the all above mentioned section to be ensure and same may be shared.
- Utilities should ensure that proper protection coordination are in place after charging of these lines/elements.

Members may update.

**Deliberation in the meeting**

*PCC advised concerned utilities to confirm their protection coordination to ERLDC/ERPC.*

ANNEXURE A

# LIST OF PARTICIPANTS IN 109TH PCC MEETING HELD ON 16TH December 2021

| Full Name | Join Time | Email |
|---|---|---|
| ERPC Kolkata | 12/16/2021, 10:10:31 AM | ERPC@KolkataMST.onmicrosoft.com |
| Amresh Mallick | 12/16/2021, 10:21:54 AM | amareshmallick@erldc.onmicrosoft.com |
| DEBDAS MUKHERJEE WBPDCL (Guest) | 12/16/2021, 10:23:28 AM | |
| SMS SAHOO,DGM,OPTCL,BHUBANESWAR (Guest) | 12/16/2021, 10:25:42 AM | |
| Satya Deep Tangudu (Dikchu H.E.P) (Guest) | 12/16/2021, 10:27:01 AM | |
| Teesta-V Power Station (Guest) | 12/16/2021, 10:27:18 AM | |
| Amresh Prusti | 12/16/2021, 10:27:36 AM | amresh.prusti@opgc.co.in |
| Mk Rath | 12/16/2021, 10:28:07 AM | |
| PGCIL ER1 | 12/16/2021, 10:29:05 AM | |
| Gulshan Singh | 12/16/2021, 10:30:17 AM | |
| Arindam Bsptcl | 12/16/2021, 10:30:45 AM | |
| U K MISHRA (Guest) | 12/16/2021, 10:30:46 AM | |
| GAUTAM NAYAK (Guest) | 12/16/2021, 10:30:48 AM | |
| SLDC-ODISHA (Guest) | 12/16/2021, 10:31:08 AM | |
| Ch Mohan Rao,PG,Odisha | 12/16/2021, 10:32:29 AM | |
| Ajay Majhi | 12/16/2021, 10:32:38 AM | ajay.majhi@opgc.co.in |
| GULSHAN SINGH  MBPCL Rongnichu HEP (Guest) | 12/16/2021, 10:33:15 AM | |
| Ankur Kumar (Guest) | 12/16/2021, 10:33:39 AM | |
| Jaganath Pani | 12/16/2021, 10:34:34 AM | |
| Mangu Srinivas | 12/16/2021, 10:34:39 AM | 211321@vedanta.co.in |
| Jaganath Pani NHPC | 12/16/2021, 10:35:07 AM | |
| Sudhakar Swain | 12/16/2021, 10:36:36 AM | |
| CRITL | 12/16/2021, 10:36:37 AM | |
| EMR MERAMUNDALI (Guest) | 12/16/2021, 10:37:55 AM | |
| Alok Pratap Singh ,ERLDC (Guest) | 12/16/2021, 10:38:16 AM | |
| Akash Modi, ERLDC (Guest) | 12/16/2021, 10:39:51 AM | |
| Akash Kumar Modi | 12/16/2021, 10:40:43 AM | akmodi@erldc.onmicrosoft.com |
| Ganesh Korada | 12/16/2021, 10:41:35 AM | ganesh.korada@opgc.co.in |
| jitesh kumar (Guest) | 12/16/2021, 10:41:36 AM | |
| D.PATEL OPTCL EMR MERAMUNDALI | 12/16/2021, 10:41:41 AM | |
| P P CHAND (ERLDC) (Guest) | 12/16/2021, 10:42:46 AM | |
| TVNL (Ashish Kr Sharma) (Guest) | 12/16/2021, 10:46:34 AM | |
| DILSHAD ALAM | 12/16/2021, 10:46:44 AM | |
| Rajdeep Bhattacharjee, RE, BSPHCL, Kolkata | 12/16/2021, 10:48:04 AM | admin@BSPHCL317.onmicrosoft.com |
| Abinash Panigrahi | 12/16/2021, 10:50:26 AM | abinash.panigrahi@adityabirla.com |

| | | |
|---|---|---|
| TEESTA-III (Guest) | 12/16/2021, 10:51:07 AM | |
| NHPC Teesta-V Power Station (Guest) | 12/16/2021, 10:51:15 AM | |
| rajendra prasad (Guest) | 12/16/2021, 10:52:03 AM | |
| Sukdev (PG) (Guest) | 12/16/2021, 10:54:17 AM | |
| Madan Prasad | 12/16/2021, 10:55:30 AM | |
| p chatterjee | 12/16/2021, 10:56:41 AM | |
| Sudipta Maiti DVC (Guest) | 12/16/2021, 10:57:18 AM | |
| A D Balde | 12/16/2021, 10:58:35 AM | |
| "prabhat k (TPTL) (Guest) | 12/16/2021, 11:01:07 AM | |
| Pallavi Kansal | 12/16/2021, 11:01:15 AM | pallavi.k@tvptl.com |
| MS ERPC, N S MONDAL (Guest) | 12/16/2021, 11:02:39 AM | |
| Sankhadeep Choudhury (Guest) | 12/16/2021, 11:04:24 AM | |
| Bauribandhu Behera | 12/16/2021, 11:07:18 AM | bauribandhu.behera@opgc.co.in |
| Kurshna samntray | 12/16/2021, 11:08:11 AM | krushna.samantray@opgc.co.in |
| RAHUL KUMAR | 12/16/2021, 11:11:27 AM | |
| shadab hasan | 12/16/2021, 11:15:54 AM | |
| PRAFULLA KUMAR Satapathy | 12/16/2021, 11:19:44 AM | |
| rajeevranjan.mit06@gmail.com | 12/16/2021, 11:20:13 AM | |
| Satyapriya Behera | 12/16/2021, 11:39:46 AM | satyapriya.behera@opgc.co.in |
| abhishek kumar BSPTCL | 12/16/2021, 11:47:33 AM | |
| Dharm Das Murmu, CRITL, JUSNL (Guest) | 12/16/2021, 11:47:58 AM | |
| GULSHAN SINGH MBPCL (Guest) | 12/16/2021, 11:53:04 AM | |
| eee critl | 12/16/2021, 12:07:40 PM | |
| Jaganath Pani NHPC | 12/16/2021, 12:37:42 PM | |
| RTAMC PATNA (Guest) | 12/16/2021, 12:45:39 PM | |
| P | 12/16/2021, 1:06:45 PM | |
| Alok ERLDc | 12/16/2021, 1:08:04 PM | |
| Ch Mohan Rao | 12/16/2021, 1:21:16 PM | |
| Amit Kumar | 12/16/2021, 1:21:32 PM | |
| Rajiv Kumar Singh  CESC | 12/16/2021, 1:47:26 PM | |

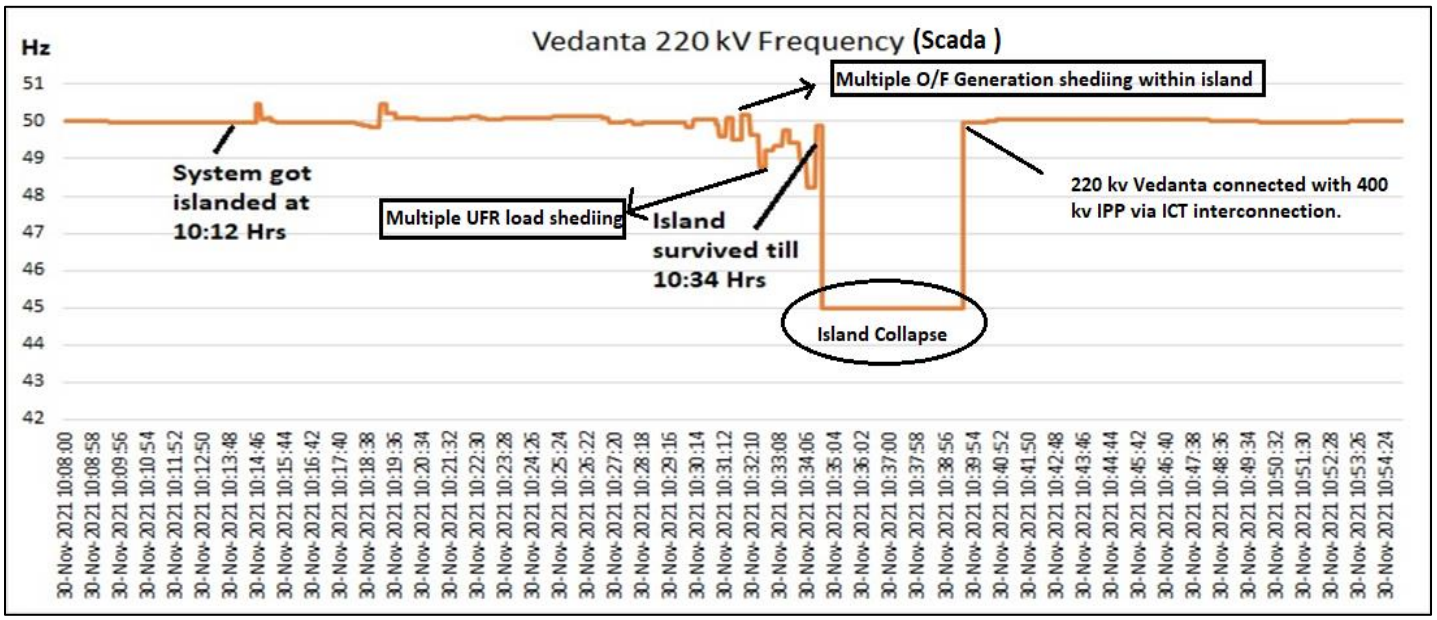
# ISLANDING PERFORMANCE ASSESSMENT FOR BUDHIPADAR DISTURBANCE

## Summary of the event:

At 10:12 Hrs, 220 kV Bus-2 at Budhipadar tripped (220 kV Bus-1 was under shutdown), leading to total power failure in 220 kV side of 220/132 kV Budhipadar S/s, 220 kV IB Thermal. There are three captive plants in vicinity-Vedanta, Bhushan Steel and Aditya Aluminium. Vedanta island survived for 22 minutes. Bhushan Steel Island didn't survive. Aditya Aluminium island survived. Total 348 MW generation loss occurred at IB TPS, and 82 MW load loss occurred (supply to Vedanta, Bhushan and Aditya Aluminium CPP).

## Vedanta Islanding Event:

**Frequency plot from Scada data for the event shown below. (See the plot from left to right)**



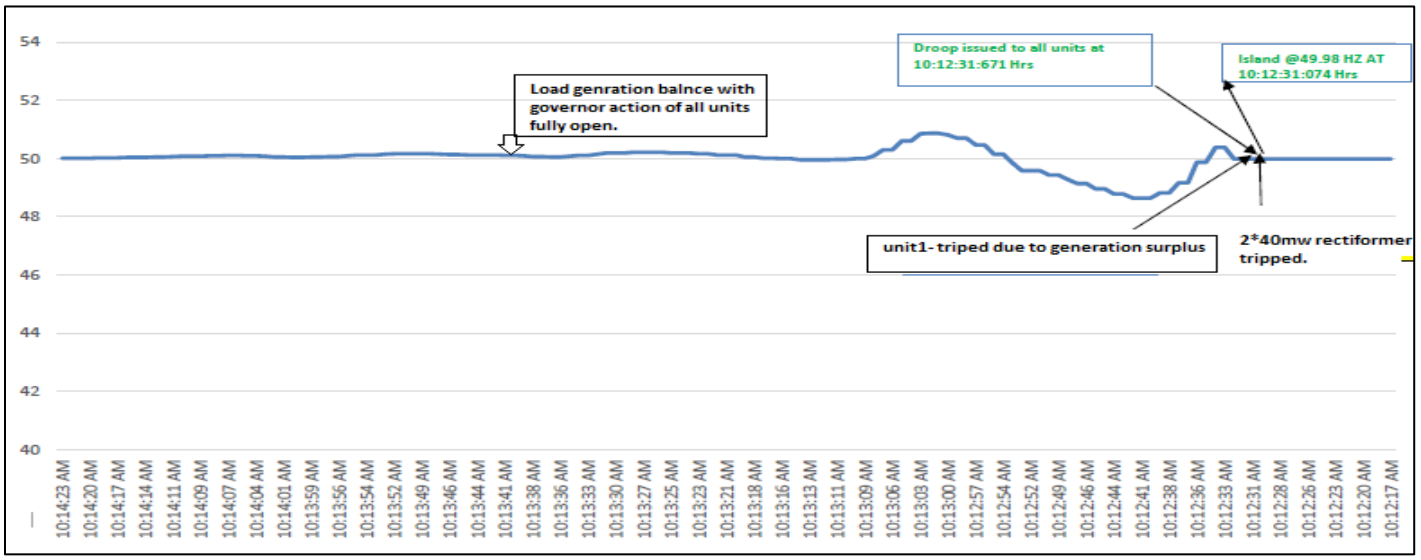

### Chronology of Event:

- At 10:12:31 Island formed with tripping of Budhipadar circuits.
- 20 Mw was import from grid, so excess load was of 20 Mw, hence to balance that ,load shedding scheme tripped 2*40 Mw rectiformer so total 80 Mw of load tripped **. (See the plots attached below).**
- With tripping of 80 Mw load, island became generation surplus of 60 Mw , hence one unit went to house load(30-35 Mw) , which was running at 125-130 Mw .So total excess load was approx 40Mw.
- Out of 9*135 Mw units one was under annual overhaul, one went to house load so only 7 units were in service to provide governor action.
- Units were already running near to full so, full governor action came by all units and load – generation was balanced and frequency was 50 Hz as shown below.
- Frequency was steady at 50 hz but it started decreasing after sustaining 20 minutes due to reducing steam pressure , and due to some quantum of load picking meanwhile with manual action .This caused frequency to reach UFLS stg-2 ,47.2 **Hz@1sec.(If during this duration some**

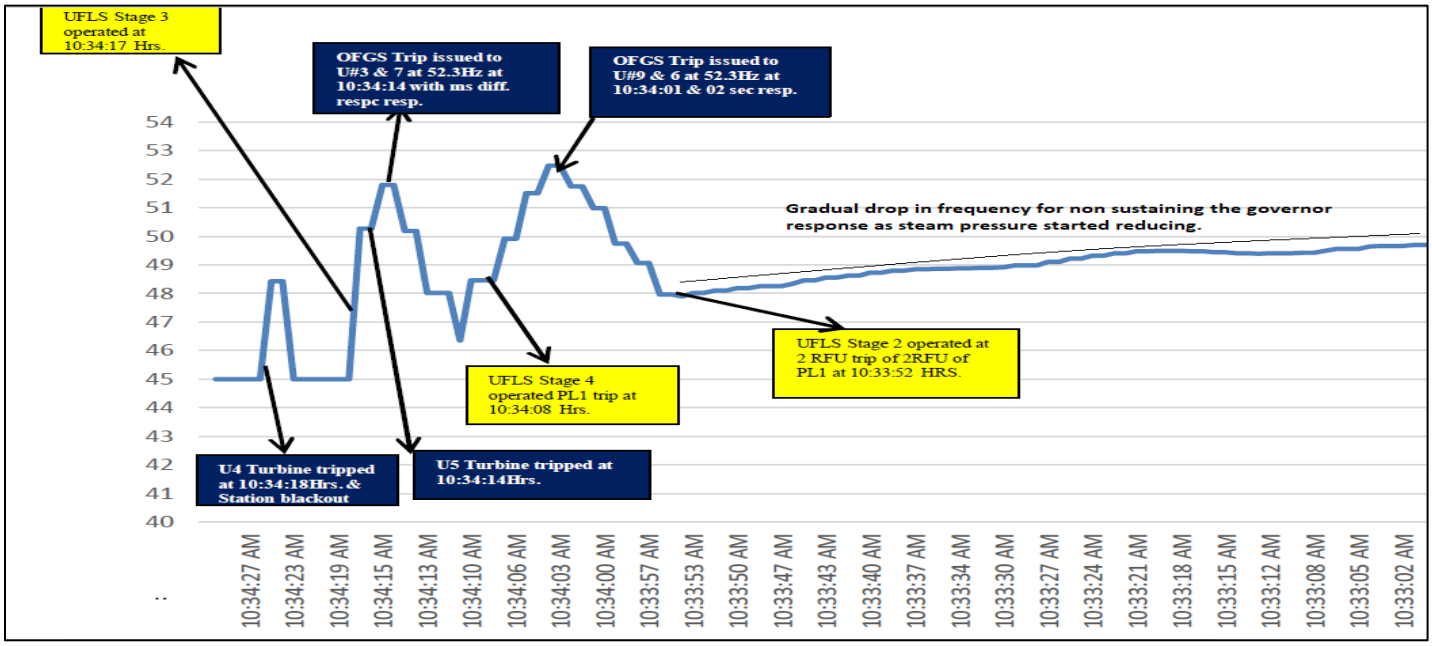
**amount of load shedding could be done this may have avoided the slow drop in frequency, some mechanism can be put to ensure the same).**

- This caused further OFGS (Over frequency generation shedding) ,52.3Hz@500ms,and same repeated phenomenon of UFLS &OFGS ultimately caused island collapse.(**This sudden UFLS AND OFGS Suspected cause for this is the sluggish response of governor which was unable to cope-up with with load –generation imbalance instantaneously**).
- **Steam valve opening is sluggish which needs to be attended and rectified for successful islanding in future events. A co-ordinated governor tuning of all units in islanded mode may be done by Vedanta in this regard to take prompt action for ensuring the successful islanding.**

**Plot of Frequency Data received from Vedanta: Starting of ISLAND & associated dynamics: (See the plot from right to left)**




**Before ISLAND collapse & associated dynamics: : (See the plot from right to left)**



## BHUSAN Islanding Event:

- Bhusan was importing 60 Mw from Grid prior to Event.
- 130 Mw*3 UNIT islanded and did not survived, Unit 1&3 tripped within 2 second and Unit 2 tripped after 8 Seconds. As per the islanding scheme it should survive with house load at 33kv.
- 60Mw unit islanded and went to house load with 15 Mw of load.
- 2*40 Mw unit were under Shutdown.
- **Detailed analysis for root cause of Non-survival is pending and remedial measures to be taken to ensure successful islanding.**

## Aditya Aluminium Islanding Event:

- Prior to islanding flow was almost floating, after islanding it survived.

# Root Cause Analysis for multiple tripping at Jeynagar

Following tripping's occurred o 04 th November .

| Sl. No. | Name of Grid S/S | Name of the feeder | Trip Time/ Date | Close time/Date | Duration | Relay Indication | |
|---|---|---|---|---|---|---|---|
| | | | | | | Local end | Remote end |
| 1 | 220/132/33KV GSS ,Jayanagar | 220 KV Jayanagar-Upper Kolab ckt-I | 10:19/ 04.11.2021 | 12:12/ 04.11.2021 | 01:53 min. | Tripped with Z-2, Dist- 5.87KM, fault current IA- 6.929 KA | Tripped on Z-1, Dist- 3.5KM, IA- 2.89KA |
| 2 | | 220 KV Jayanagar-Jeypore(PGCIL )ckt-III | 10:19/ 04.11.2021 | 12:05/ 04.11.2021 | 01:46 min. | Tripped on 86A, 86B | Didn't tripped at PGCIL end. |
| 3 | | 220 KV Jayanagar-Jeypore(PGCIL )ckt-IV | 10:19/ 04.11.2021 | 12:09/ 04.11.2021 | 01:50 min. | Tripped on 86A, 86B. | Didn't tripped at PGCIL end |
| 4 | | 132KV Jayanagar-Meenakshi feeder | 10:19/ 04.11.2021 | 11:03/ 04.11.2021 | 00:44 min. | Tripped without relay indication. | Triiped on Z-III, Dist- 120.6KM, B-Ph O/C |

## Antecedent Condition:

- 220 kv Jeypore – Jeynagar III& IV newly commissioned line.
- At the time of disturbance Carrier was unhealthy for Jeypore – Jeynagar ckt 3&4.
- 220 kv Jaynagar-Upper kolab Carrier was unhealthy.

**Event Analysis:**

- Fault was in 220 kv Jaynagar-Upper kolab –I , in Zone-2 from jaynagar and z-1 from upper kolab but as the PLCC is unhealthy it tripped after zone 2 time from jeynagar.
- 220 KV Jayanagar-Jeypore(PGCIL ) III &iv are newly commissioned where wrong logic was set for tripping which caused tripping of these two circuits . **Carrier was unhealthy for both the lines at the tripping instance.**
- **(Logic implemented should be operation of MASTER TRIP 86 A &B when zone-1 trip with A/R block and carrier unhealthy)** but instead of zone-1 trip ,**any trip was enabled in logic** , due to which for the fault of Jeyanagr –upper kolab ,zone-4 at Jeynagar end of Jeynagar –jeypore 3&4 was picked up and as per the wrong logic, any start high along with carrier unhealthy caused tripping of both circuit from Jeynagar.
- 132KV Jayanagar-Meenakshi feeder tripped on zone -3 which should not occur as fault was cleared within zone-2 time , zone-3 timing to be checked and revised at meenakshi end which has been communicated to OPTCL.

**Remedial Measure**:

- Same has been rectified and logic changed to zone-1 instead of any trip.
- Carrier healthiness to be ensured for all lines.
- OPTCL communicated to change zone-3 settings at Meenakshi end.

# PROTECTION AUDIT REPORT

## General information

| | |
|---|---|
| Substation name: | |
| SS voltage level: | |
| Fault level of all equipment (for that voltage level) | |
| Date of commissioning of the substation: | |
| Region: | |
| Audit date: | |
| Name of utility which owns the substation (e.g POWERGRID, MSETCL, ADANI POWER, etc.) | |

## Audit Team

| Name | Company name |
|---|---|
| | |
| | |

## Regional representatives:

| Name | Company name |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

## Attached documents:

1. List of the faults that was/were not eliminated by the protection;
2. Record of previous trippings for last six months and associated fault analysis.
3. Single/three pole auto-recloser events, if any in last six months;
4. Details on periodicity of relay testing and latest relay test report
5. Communiction from concerned department for the revised settings and record for implementation of the revised settings.
6. CT characteristics at all taps in case of multi-ratio CTs
7. df/dt, UFR relay details and settings if its available
8. Special Protection Schemes details if applicable. (Including test results & last operation records), implemented schematic diagram for SPS
9. Single Line Diagram

# CONCLUSIONS OF PROTECTION AUDIT REPORT

| Item no. | Issues | Remarks |
|---|---|---|
| **1** | **Recommendations of last Protection Audit** | **Status of works&reason for pending/suggestions** |
| | | |
| | | |
| | | |
| **2** | **Review of Existing Settings at Substations** | |
| | Any inadvertently enabled settings/functions observed. (Yes/No) | |
| | | |
| | | |
| | | |
| **3** | **Disturbance recorder - list of 3 tippings in last 6 months** | **Recommended action** |
| 3.a | DR as well as EL records for the trippings available (Yes/No) | |
| 3.b | Records available for Tripping analysis and corrective actions taken (Yes/no) | |
| 3.c | Time Synch Matched Between EL signals and DR signals (Yes/No) | |
| 3.d | Digital Signals of DR named properly (main CB Trip, Z1 Trip etc.) (Yes/No) | |
| | | |
| **4** | **Chronic reason of tipping, if any** | **Recommended action** |
| | | |
| | | |
| | | |

| Item no. | Issues | Remarks |
|---|---|---|
| 5 | Existing process for record of changes incorporated in the relay settings | See attached corespondence |
| | | |
| | | |
| | | |
| 6 | Overvoltage grading for parallel line (time&pick up grading, provided or not) | Recommended action |
| | | |
| | | |
| | | |
| 7 | Other deficiences/Nonconformity observed (including the major non-conformaties mentioned in the audit format. ex: Single AC source etc.) | Recommended action |
| | | |
| | | |
| | | |

## Appendix-9.4

### CHECK LIST TO ENABLE AUDIT OF PRACTICES FOLLOWED IN PROTECTION APPLICATION & CRITERIA USED FOR SETTING CALCULATIONS IN 220KV, 400KV & 765KV SUBSTATIONS

**CHECK-LIST:** Check list for different protected objects & elements in fault clearance system are as under:

**(put √ mark in the appropriate box )**

## A. Transmission Lines (OHL and Cables)

| | | |
|---|---|---|
| **1.** | Independent Main-I and Main-II protection (of different make OR different type) is provided with carrier aided scheme | ☐ YES ☐ NO |
| **2.** | Are the Main-I & Main-II relays connected to two separate DC sources (Group-A and Group-B) | ☐ YES ☐ NO |
| **3.** | Is the Distance protection (Non-switched type, suitable for 1-ph & 3-ph tripping) as Main1 and Main2 provided to ensure selectivity & reliability for all faults in the shortest possible time | ☐ YES ☐ NO |
| **4.** | Is both main-I & Main-II distance relay are numerical design having Quadrilateral or Polygon operating characteristic | ☐ YES ☐ NO |
| **5.** | In the Main-I / Main-II Distance protection, Zone-I is set cover 80% of the protected line section | ☐ YES ☐ NO |
| **6.** | In the Main-I / Main-II distance protection, Zone-2 is set cover 120% of the protected line section in case of Single circuit line and 150% in case of Double circuit line | ☐ YES ☐ NO |
| **7.** | In the Main-I / Main-II distance protection, Zone-3 is set cover 120% of the total of protected line section plus longest line at remote end as a minimum. | ☐ YES ☐ NO |
| **8.** | Resistive reach for Ground fault element set to give maximum coverage considering fault resistance, arc resistance & tower footing resistance. ( In case, It is not possible to set the ground fault and phase fault reaches separately, load point encroachment condition imposed on Phase fault resistive reach shall be applied) | ☐ YES ☐ NO |
| **9.** | Resistive reach for Phase fault element set to give maximum coverage subject to check of possibility against load point encroachment considering minimum expected voltage and maximum load. | ☐ YES ☐ NO |
| **10.** | In case of short lines, is manufacturers recommendation considered in respect of resistive setting vis a vis reactance setting to avoid overreach. | ☐ YES ☐ NO |
| **11** | Is Zone-2 time delay of Main-I / Main-II distance relay set to 0.350 seconds ?<br>In case any other value has been set for Zone-II timer, kindly specify the value and justification thereof. | ☐ YES ☐ NO |
| **12** | Is Zone-3 timer is set to provide discrimination with the operating time of relays at adjacent sections with which Zone-3 reach of relay is set to overlap. Please specify the Zone-3 time set. | ☐ YES ☐ NO |
| **13.** | Is Zone-4 reach set in reverse direction to cover expected levels of apparent bus bar fault resistance, when allowing for multiple in feeds from other circuits? | ☐ YES ☐ NO |
| **14.** | Is reverse looking Zone-4 time delay set as Zone-2 time delay? | ☐ YES ☐ NO |

| | | |
|---|---|---|
| **15.** | Is Switch on to fault (SOTF) function provided in distance relay to take care of line energisation on fault?<br>Whether SOTF initiation has been implemented using hardwire logic<br>In case of Breaker and half switching scheme, whether initiation of line SOTF from CB closing has been interlocked with the other CB | ☐ YES ☐ NO<br>☐ YES ☐ NO<br>☐ YES ☐ NO |
| **16.** | Whether VT fuse fail detection function has been correctly set to block the distance function operation on VT fuse failure | ☐ YES ☐ NO |
| **17.** | Is the sensitive IDMT directional E/F relay (either separate relay or built-in function of Main relay) for protection against high resistive earth faults? | ☐ YES ☐ NO |
| **18.** | Is additional element (Back-up distance) for remote back-up protection function provided in case of unit protection is used as Main relay for lines? | ☐ YES ☐ NO |
| **19.** | In case of Cables, is unit protection provided as Main-I & Main-II protection with distance as back-up. | ☐ YES ☐ NO |
| **20.** | Are the line parameters used for setting the relay verified by field testing | ☐ YES ☐ NO |
| **21.** | Is Two stages Over-Voltage protection provided for 765 & 400kV Lines?<br>Do you apply grading in over-voltage setting for lines at one station.<br>Please specify the setting values adopted for:<br>Stage-I : (typical value - 106 to 112 % , delay : 4-7 Sec)<br>Stage-II: (typical value - 140 to 150%, delay: 0 to 100msec.) | ☐ YES ☐ NO<br>☐ YES ☐ NO<br>…… |
| **22.** | Is 1-ph Auto –reclosing provided on 765, 400 & 220kV lines?<br>Please specify the set value:<br>Dead time: (typical 1 Sec)<br>Reclaim time: (typical 25 Sec) | ☐ YES ☐ NO<br>……<br>…… |
| **23.** | Is the Distance communication. Scheme Permissive Over Reach (POR) applied for short lines and Permissive Under Reach (PUR) applied for long lines?<br>If any other communication scheme has been applied, please provide the detail with justification thereof. | ☐ YES ☐ NO<br>…… |
| **24.** | Is the Current reversal guard logic for POR scheme provided on Double circuit lines? | ☐ YES ☐ NO |
| **25.** | In case the protected line is getting terminated at a station having very low fault level i.e. HVDC terminal, whether week end-infeed feature has been enabled in respective distance relay or not | ☐ YES ☐ NO |
| **26.** | In case of protected line is originating from nuclear power station, are the special requirement (stability of nuclear plant auxiliaries) as required by them has been met | ☐ YES ☐ NO |
| **27.** | What line current , Voltage and Load angle have been considered for Load encroachment blinder setting and what is the resultant MVA that the line can carry without load encroachment.<br>(In the absence of Load encroachment blinder function, this limit shall be applied to Zone-3 phase fault resistive reach.) | I=<br>V=<br>Angle:<br>S= |
| **28.** | a) What are the Zones blocked on Power swing block function:<br>b) Setting for Unblock timer: (typical 02 second)<br>c) Out of Step trip enabled | Z1 / Z2 / Z3 / Z4<br>Time:<br>☐ YES ☐ NO |
| **29.** | Whether the location of Out of step relay has been identified on the basis of power system simulation studies | ☐ YES ☐ NO |

| | | |
|---|---|---|
| **30.** | a) Is Disturbance recorder and Fault locator provided on all line feeder ?<br>b) Whether standalone or built in Main relay<br>c) Whether DR is having automatic fault record download facility to a central PC<br>d) Whether DR is time synchronised with the GPS based time synchronising equipment<br>e) Whether DR analog channels contain line phase & neutral current and line phase & neutral voltage.<br>f) Whether DR digital channel as a minimum contain the CB status, Main-I & II trip status, LBB trip status, Over-voltage trip status, Stub protn trip status, Permissive and direct carrier receive status, Line reactor trip status. | ☐ YES ☐ NO<br>Standalone / built-in<br>☐ YES ☐ NO<br>☐ YES ☐ NO<br>☐ YES ☐ NO<br>☐ YES ☐ NO |
| **31.** | Does the Setting document for the numerical relays (IED) contain all the settings for all functions that are used and indicates clearly the functions not used (to be Blocked / Disabled). Are all default settings validated or revised settings given in the setting document? | ☐ YES ☐ NO |

## B. Power Transformers

| | | |
|---|---|---|
| **1.** | Do you use Group A and Group B protections connected to separate DC sources for power transformers | ☐ YES ☐ NO |
| **2.** | Do you follow CBIP guideline (274 & 296) for protection setting of transformer | ☐ YES ☐ NO |
| **3.** | Do you use duplicated PRD and Bucholtz initiating contact for power transformers at 765kV and 400kV levels | ☐ YES ☐ NO |
| **4.** | Do you classify transformer protections as below in groups:<br>Group A Group B<br>• Biased differential relay Restricted earth fault (REF) relay<br>•PRD , WTI Buchholz Protection, OTI<br>• Back up Protection(HV) Back up Protection(MV)<br>• Over fluxing protection(HV) Over fluxing protection(MV) | ☐ YES ☐ NO<br>Group A or B |
| **5.** | In case of Breaker & half switching scheme, whether CT associated with Main & Tie Breakers are connected to separate bias winding of the low impedance Biased differential protection in order to avoid false operation due to dissimilar CT response. | ☐ YES ☐ NO |
| **6.** | Is Restricted earth fault (REF) protection used a high impedance type | ☐ YES ☐ NO |
| **7.** | Are Main protection relays provided for transformers are of numerical design. | ☐ YES ☐ NO |
| **8.** | a) Are directional over current & earth fault relays provided as back-up protection of Transformer are of numerical design.<br>b) Do the back-up earth fault relays have harmonic restrain feature | ☐ YES ☐ NO<br>☐ YES ☐ NO |
| **9.** | Is Fire protection system (HVW type) provided for power transformer and functioning | ☐ YES ☐ NO |
| **10.** | a) Is the Disturbance recorder provided for Transformer feeder<br>b) Whether standalone or built in Main relay<br>c) Whether DR is having automatic fault record download facility to a central PC<br>d) Whether DR is time synchronised with the GPS time synchronising equipment | ☐ YES ☐ NO<br>Standalone/built-in<br>☐ YES ☐ NO<br>☐ YES ☐ NO |

| | | |
|---|---|---|
| **11.** | Does the Setting document for the numerical relays (IED) contain all the settings for all functions that are used and indicates clearly the functions not used (to be Blocked / Disabled). Are all default settings validated or revised settings given in the setting document? | ☐ YES ☐ NO |

## C. Shunt Reactors

| | | |
|---|---|---|
| **1.** | Do you use Group A and Group B protections connected to separate DC sources for reactors | ☐ YES ☐ NO |
| **2.** | Do you follow CBIP guideline (274 and 296) for protection setting of reactors | ☐ YES ☐ NO |
| **3.** | Do you use duplicated PRD and Bucholtz initiating contact for Reactors at 765kV and 400kV levels | ☐ YES ☐ NO |
| **4.** | Do you classify Reactor protections as below in groups:<br>Group A / Group B<br>• Biased differential relay / R.E.F Protection<br>• PRD , WTI / Buchholz Protection, OTI<br>• Back up impedance protection / Direction O/C & E/F relay | ☐ YES ☐ NO<br>Group A or B |
| **5** | In case of Breaker & half switching scheme, whether CT associated with Main & Tie Breakers are connected to separate bias winding of the low impedance Biased differential protection in order to avoid false operation due to dissimilar CT response. | ☐ YES ☐ NO |
| **6** | Is Restricted earth fault (REF) protection used a high impedance type | ☐ YES ☐ NO |
| **7** | Are Main & back-up protection relays provided for Reactor are of numerical design. | ☐ YES ☐ NO |
| **8** | Is Fire protection system (HVW type) provided for Reactor and functioning | ☐ YES ☐ NO |
| **9** | a) Is the Disturbance recorder and Fault locator provided on all the Shunt Reactors used in 765 kV, 400 kV substations?<br>b) Whether standalone or built in Main relay<br>c) Whether DR is having automatic fault record download facility to a central PC | ☐ YES ☐ NO<br>Standalone/built-in<br>☐ YES ☐ NO |
| **10.** | Does the Setting document for the numerical relays (IED) contain all the settings for all functions that are used and indicates clearly the functions not used (to be Blocked / Disabled). Are all default settings validated or revised settings given in the setting document? | ☐ YES ☐ NO |

## D. Bus bars

| | | |
|---|---|---|
| **1.** | Bus Bar protection for 765, 400 & 220kV buses is provided | ☐ YES ☐ NO |
| **2.** | Duplicated Bus bar protection is provided for 765kV and 400kV buses | ☐ YES ☐ NO |
| **3.** | CBIP guideline for Protection (274 and 296) settings is followed | ☐ YES ☐ NO |
| **4** | In an existing substation if CTs are of different ratios, is biased type bus protection provided. | ☐ YES ☐ NO |
| **5** | In stations where single bus bar protection is provided, is backup provided by reverse looking elements of distance relays or by second zone elements of remote end distance relays? | ☐ YES ☐ NO |

| | | |
|---|---|---|
| **6** | In case of GIS where burn through time of SF6 is shorter than remote back up protection is the bus bar protection duplicated irrespective of voltage level? | ☐ YES ☐ NO |
| **7** | Since it is difficult to get shutdowns to allow periodic testing of bus protection, numerical bus protections with self-supervision feature is an answer. Is this followed? | ☐ YES ☐ NO |
| **8** | Does the Setting document for the numerical relays (IED) contain all the settings for all functions that are used and indicates clearly the functions not used (to be Blocked / Disabled). Are all default settings validated or revised settings given in the setting document? | ☐ YES ☐ NO |

## E. Disturbance Recorder (DR) and Event Logger (EL)

| | | |
|---|---|---|
| **1** | a) Is the Disturbance recorder and Fault locator provided on all line feeders of 765, 400 & 220kV substations?<br>b) Whether standalone or built in Main relay<br>c) Whether DR is having automatic fault record download facility to a central PC<br>d) Whether Central PC for DR , EL are powered by Inverter (fed from station DC) | ☐ YES ☐ NO<br>Standalone / built-in<br>☐ YES ☐ NO<br>☐ YES ☐ NO |
| **2.** | Whether DR is having the following main signals for lines:<br><u>Analogue signals</u>:<br>• From CT: IA, IB, IC, IN<br>• From VT: VAN, VBN, VCN<br>• From Aux. VT: V0<br><u>Digital Signals</u><br>• Main 1 Carrier receive<br>• Main 1 Trip<br>• Line O/V Stage I / Stage II<br>• Reactor Fault Trip<br>• Stub Protection Operated.<br>• Main II Trip<br>• Main II Carrier Receive<br>• Direct Trip CH I / II<br>• CB I Status (PH-R, Y & B)<br>• CB II Status (PH R, Y & B)<br>• Bus bar trip<br>• Main / Tie CB LBB Operated<br>• Main / Tie Auto-reclose operated.<br>DR for Transformer / Reactor feeder should contain analog channel like input currents & voltage. Binary signal include all protection trip input, Main & Tie CB status, LBB trip | ☐ YES ☐ NO |
| **3.** | Whether substation (765, 400 , 220kV) is having Event logger facility (standalone or built-in-SAS) | ☐ YES ☐ NO |
| **4.** | Whether GPS based time synchronizing equipment is provided at the substation for time synchronizing of Main relays / DR/ Event logger / SAS/ PMU / Line Current Differential Relays | ☐ YES ☐ NO |

## F. Circuit Breakers

| | | |
|---|---|---|
| **1.** | Is breaker fail protection ( LBB / BFR) provided for all the Circuit Breakers at 220kV , 400kV & 765kV rating | ☐ YES ☐ NO |
| **3.** | For Circuit Breaker connected to line feeder / transformer feeder, whether operation of LBB / BFR sends direct trip signal to trip remote end breaker ? | ☐ YES ☐ NO |

| | | |
|---|---|---|
| **4.** | For lines employing single phase auto reclosing, Is start signal from protection trip to LBB / BFR relay is given on single phase basis? | ☐ YES ☐ NO |
| **5.** | Is separate relay provided for each breaker and the relay has to be connected from the secondary circuit of the CTs associated with that particular breaker? | ☐ YES ☐ NO |
| **6.** | Is LBB relay provided with separate DC circuit independent from Group-A and Group-B Protections? | ☐ YES ☐ NO |
| **7.** | Is the LBB initiation provided with initiating contact independent of CB trip relay contact? | ☐ YES ☐ NO |
| **8.** | Is Separation maintained between protective relay and CB trip coil DC circuit so that short circuit or blown fuse in the CB circuit will not prevent the protective relay from energizing the LBB scheme? | ☐ YES ☐ NO |
| **9.** | Is LBB relay initiated by Bus bar protection in addition to other fault sensing relays, since failure of CB to clear a bus fault would result in the loss of entire station if BFP relay is not initiated? | ☐ YES ☐ NO |
| **10.** | Is tripping logic of the bus bar protection scheme used for LBB protection also? | ☐ YES ☐ NO |
| **11.** | Are the special considerations provided to ensure proper scheme operation by using Circuit Breaker contact logic in addition to current detectors in cases breaker-fail relaying for low energy faults like buckholz operation? | ☐ YES ☐ NO |
| **12.** | Are the Current level detectors set as sensitive as the main protection? (Generally setting of 0.2 A is commonly practiced for lines and transformers) | ☐ YES ☐ NO |
| **13.** | Is timer set considering breaker interrupting time, current detector reset time and a margin? (Generally a timer setting of 200ms has been found to be adequate) | ☐ YES ☐ NO |
| **14.** | Is the back-up fault clearance time is shorter than the operating time of the remote protections (distance relay Zone-2) ? | ☐ YES ☐ NO |
| **15.** | Is the breaker failure protection provided with two steps (First stage – retrip own CB, Second stage- Trip all associated CBs) . This mitigates unwanted operation of breaker failure protection during maintenance and fault tracing. | ☐ YES ☐ NO |
| **16.** | Is the breaker failure protection hardware provided is separate from line /transformer feeder protection? | ☐ YES ☐ NO |

## G. Communication systems

| | | |
|---|---|---|
| **1.** | a) Do you use PLCC for tele-protection of distance relays at 765, 400 & 220kV feeders<br>b) Specify type of coupling<br>c) Whether redundant PLCC channels provided for 400 & 765kV lines<br>d) Specify number of PLCC channels per circuit :<br>e) Whether dependability & security of each tele-protection channel measured & record kept ? | ☐ YES ☐ NO<br>(Ph-Ph / Ph-G/ Inter-ckt)<br>☐ YES ☐ NO<br>( One / two)<br>☐ YES ☐ NO |

| | | |
|---|---|---|
| **2.** | a) In case you use OPGW for tele-protection, are they on geographically diversified route for Main-I and Main-II relay?<br>b) Whether dedicated fibre is being used for Main-I / Main-II relay or multiplexed channel are being used. | ☐ YES ☐ NO<br><br>Dedicated / multiplexed |

## H. Station DC supply systems

| | | |
|---|---|---|
| **1.** | Do you have two separate independent DC system (220V or 110V)<br>(Source-A and Source-B) | ☐ YES ☐ NO |
| **2.** | Do you have two independent DC system (48V) for PLCC (source-A and source-B) | ☐ YES ☐ NO |
| **3.** | There is no mixing of supplies from DC source-A and DC source-B | ☐ YES ☐ NO |
| **4.** | Whether the protection relays and trip circuits are segregated into two independent system fed through fuses from two different DC source | ☐ YES ☐ NO |
| **5.** | Whether Bay wise distribution of DC supply done in the following way:<br>a) Protection<br>b) CB functions<br>c) Isolator / earth switch functions<br>d) Annunciation / Indications<br>e) Monitoring functions | ☐ YES ☐ NO |
| **6** | Whether following has been ensured in the cabling:<br>a) Separate cables are used for AC & DC circuits<br>b) Separate cables are used for DC-I & DC-II circuits<br>c) Separate cables are used for different cores of CT and CVT outputs to enhance reliability & security | ☐ YES ☐ NO |
| **7** | Is guidelines prescribed in CBIP manual 274 & 296 followed in general | ☐ YES ☐ NO |

## I. PERFORMANCE INDICES

| | | |
|---|---|---|
| **1.** | Is there a system of periodically measuring Dependability & Security of Protection system (as given in CBIP manual 296) and recorded | ☐ YES ☐ NO |
| **2.** | Is there a system of periodically measuring Dependability of switchgear associated with Protection system and recorded | ☐ YES ☐ NO |
| **3.** | Is there a process of Root cause analysis of unwanted tripping events | ☐ YES ☐ NO |
| **4.** | Are improvement action like revision of relay setting, better maintenance practices, modernising & retrofitting of switching & protection system taken based on above data. | ☐ YES ☐ NO |
| **5.** | Is attention also given to DC supply system, tele-protection signalling, healthiness of tripping cables, terminations etc. in order to improve the performance of fault clearance system | ☐ YES ☐ NO |

## J. ADDITIONAL CHECKS FOR SERIES COMPENSATED LINES

| | | |
|---|---|---|
| **1.** | What is the operating principle of Main protection employed | ☐ Distance<br>☐ Line Current diff. |

| | | |
|---|---|---|
| **2.** | Are both main-I & Main-II distance relay are numerical design | ☐ YES ☐ NO |
| **3.** | Are both main-I & Main-II distance relay suitable for Series compensated lines | ☐ YES ☐ NO |
| **4.** | Are POR tele-protection scheme employed for distance relays | ☐ YES ☐ NO |
| **5.** | Position of Line VT provided on series compensated line | ☐ Between Capacitor and line<br>☐ Between Capacitor and Bus |
| **6.** | What is the under reaching (Zone 1) setting used in teleprotection schemes (Local & Remote end) | % of line length<br>Rationale: |
| **7.** | What is the overreaching (Zone 2) setting in used teleprotection schemes | % of line length<br>Rationale: |
| **8.** | What kinds of measurement techniques are used to cope with voltage inversion? | ☐ Phase locked voltage memory<br>☐ Intentional time delay<br>Other, specify: |
| **9.** | Whether system studies carried out to check the possibility of current inversion due to series compensation | ☐ YES ☐ NO |
| **10.** | Whether any system studies conducted to find the impact of series compensation on the performance of protections installed on adjacent lines? If yes, how many lines were found to be affected. Pl. specify _____ | ☐ YES ☐ NO |
| **11** | If YES, are the affected protections on adjacent lines changed / setting revised after the introduction of series compensation? | ☐ YES ☐ NO |
| **12.** | Is dynamic simulation done to fine tune settings of distance relay installed on series compensated double circuit lines? | ☐ YES ☐ NO |
| **13.** | Whether performance of directional earth fault relay verifies by simulation studies | ☐ YES ☐ NO |
| **14.** | When is flashover of spark gaps expected? | ☐ For protected line Faults up to ohms<br>☐ For external faults an adjacent lines |
| **15.** | Whether measures taken for under/overreach problems at sub-harmonic oscillations? | ☐ YES ☐ NO |
| **16.** | Whether MOV influence considered while setting the distance relay reach | ☐ YES ☐ NO |
| **17.** | Have you experienced any security problems (Relay mal-operation) with high frequency transients caused by<br>☐ Flashover of spark gaps<br>☐ Line energisation<br>Other, specify: | ☐ YES ☐ NO |
| **18.** | If YES, how the above problem has been addressed? | |

Annexure B.7

# List of important transmission lines in ER which tripped in November-2021

| 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 | LOCAL END UTILITY | REMOTE END UTILITY | Utility Response |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 400 KV FSTPP-DURGAPUR-2 | 04-11-2021 | 09:44 | 04-11-2021 | 12:55 | FSTPP: B_N, Zone-1, 104 km, 3.5 kA | Durgapur: B_N, Zone-1, 56.94 km, 4.59 kA | B-Earth | 200 | Main bay LBB operated at Farakka. 400 kV Bus-1 tripped. Three phase autoreclosure occurred at Durgapur after 1 second. O/V st-2 appeared at Durgapur during A/r.Reason maybe sahred | NTPC FSTPP | PG ER-2 | Issue with A/r scheme at Durgapur end. Rectified. |
| 2 | 220 KV NEW PURNEA-MADHEPURA-1 | 06-11-2021 | 10:58 | 06-11-2021 | 11:16 | New Purnea: R_N, 78.54 km, 2.49 kA | | R-Earth | 350 | Carried received at New Purnea but tripped in Zone-2 time. A/r successful from Madhepura only | PG ER-1 | BSPTCL | Siemens relay at New Purnea is not receiving carrier signal. Response from OEM awaited. |
| 3 | 400 KV PPSP-BIDHANNAGAR-2 | 06-11-2021 | 12:03 | 06-11-2021 | 12:25 | PPSP: R_N, Zone-1, 144.2 km | Bidhannagar: R_N, Zone-1, 36.4 km, 6.1 kA | R-Earth | 100 | Three phase tripping at Bidhannagar | WBSETCL | WBSETCL | A/r kept out of service as per OEM advice. |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 400 KV PPSP-BIDHANNAGAR-1 | 06-11-2021 | 14:21 | 06-11-2021 | 14:42 | PPSP: R_N, Zone-1, 105.1 km | Bidhannagar: R_N, Zone-1, 85.65 km, 6.9 kA | R-Earth | 100 | Three phase tripping at Bidhannagar | WBSETCL | WBSETCL | A/r kept out of service as per OEM advice. |
| 5 | 220 KV CHANDAUTI-SONENAGAR-1 | 07-11-2021 | 23:20 | 08-11-2021 | 00:23 | Chandauti: R_N, 50.8 km, 3.2 kA | Sonenagar: R_N, 20.17 km, 2.195 kA | R-Earth | 250 | A/r successful from Chandauti only. No A/r attempt at Sonenagar | PMTL | BSPTCL | Problem in selector switch. A/r scheme also not functioning properly |
| 6 | 400 KV MERAMUNDALI-LAPANGA-2 | 08-11-2021 | 12:54 | 08-11-2021 | 13:03 | Tripped while checking VT fuse | Didn't trip | No fault | NA | No fault in line however, distance relay operated at Meramundali | OPTCL | OPTCL | fused, while rectifying that, wires of other two healthy phase got opened and tripping command initiated. On time synch issue of DR |
| 7 | 400 KV BARH-PATNA-1 | 08-11-2021 | 13:57 | 08-11-2021 | 14:49 | | Didn't trip | No fault | NA | Reason maybe shared by Barh | NTPC Barh | PG ER-1 | DT initiated locally at Barh end. Issue in channel-1, referred to OEM. |
| 8 | 400 KV RANGPO-DIKCHU-1 | 08-11-2021 | 22:24 | 08-11-2021 | 22:43 | DT received | Didn't trip | No fault | NA | DT received at Rangpo. Reason maybe shared by Dikchu | PG ER-2 | Dikchu | Isolator, earth switch status in SAS got in error state. BCU was restarted which sent DT to remote end. Dikchu was advised to intimate ERLDC if such activity is being carried out at Dikchu |
| 9 | 220 KV CHANDAUTI-SONENAGAR-2 | 11-11-2021 | 14:15 | 11-11-2021 | 15:02 | Chandauti: R_N, Zone-1, 52.6 km, 3.41 kA | Sonenagar: R_N, Zone-1, 21.6 km, 2.1 kA | R-Earth | 100 | A/r successful from Chandauti only. No A/r attempt at Sonenagar, other two phase tripped after 1 second | PMTL | BSPTCL | Problem in selector switch. A/r scheme also not functioning properly |
| 10 | 400 KV PATNA-BARH-1 | 13-11-2021 | 04:09 | 13-11-2021 | 04:45 | Didn't trip | DT received | No fault | NA | Reason maybe shared by Barh | PG ER-1 | NR | DT initiated locally at Barh end. Issue in channel-1, referred to OEM. |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 400 KV PATNA-BARH-1 | 13-11-2021 | 08:36 | 13-11-2021 | 09:58 | Didn't trip | DT received | No fault | NA | Reason maybe shared by Barh | PG ER-1 | NTPC Barh | DT initiated locally at Barh end. Issue in channel-1, referred to |
| 12 | 400 KV JEERAT-BAKRESWAR-1 | 17-11-2021 | 16:20 | 17-11-2021 | 17:49 | Didn't trip | Pole discrepancy at Bakreswar end | | | Y_ph CB at Bakreswar tripped without any fault. 1.5 seconds later other two phase tripped on PD | WBSETCL | WBSETCL | No issue found, however PD timer replaced at Bakreswar as a precautionary measure |
| 13 | 400 KV PPSP-BIDHANNAGAR-2 | 21-11-2021 | 12:39 | 21-11-2021 | 12:50 | PPSP: R_N, 141.5 km, Zone-1 | Bidhannagar: R_N, Zone-1, 47.09 km, 6.275 kA | R-Earth | 100 | Three phase tripping at Bidhannagar. A/r not in service | WBSETCL | WBSETCL | A/r kept out of service as per OEM advice. |

Annexure C.2

# Creation and maintaining a Web based Protection Database and Desktop based Protection setting calculation tool for Eastern Regional Grid

## -Update and support activities

## 01/11/2020 – 31/10/2021

# SCOPE OF WORK

| Activities |
| --- |
| New S/S Data Collection |
| New Element Addition as per OCC meetings |
| Data updation in PSCT & PDMS |
| Training on Protection study & PDMS |
| Software Enhancement |
| Server Maintenance |
| DMNS Reporting |
| Technical Analysis for Tripping Incidents |

# Technical Services

- Sikkim OC and EF coordination was done.
- Tripping analysis at Bodhgaya .
- Patna PG Islanding Study.
- Power Map update for all states in a regular span.
- Attended all PCC meetings for protection consultancy.

# OCC track update

| Sl.No | DETAILS OF ELEMENTS |
|---|---|
| 1 | 132/33 KV, 31.5 MVA Transformer 3 Kakdwip 132 KV S/S (WBSETCL) |
| 2 | 132 KV Durgapur-Panagarh GISS Ckt 1 & 2 |
| 3 | 132 kV Marsaghai – Kendrapara RTSS ckt -II |
| 4 | 160 MVA, 220/132 kV Auto Transformer - II charged at Grid S/S, Kesinga |
| 5 | 220 kV Bus -I & Bus -II charged at Grid S/S, Kesinga |
| 6 | 132 kV Bhalumaska RTSS feeder bay charged at Grid S/S Therubali |
| 7 | 132KVMokamah (BGCL) – Hathidah (BSPTCL) D/C |
| 8 | 220kv GIS Mokama-Begusarai D/C |
| 9 | 220kV GIS Mokama-Biharsharif D/C |
| 10 | 400kV Sagardighi – Gokarna-I |
| 11 | 400kV Sagardighi – Gokarna- II |
| 12 | Anti-theft charge of 765kV New RanchiMedinipur Ckt 2 with LR |
| 13 | Anti-theft charge of 765kV New RanchiMedinipur Ckt 1 with LR |
| 14 | 400kV Muzaffarpur-Dhalkebar-I |
| 15 | 400kV Muzaffarpur-Dhalkebar-II |
| 16 | 400/220 kV 315 MVA ICT 4 at Rourkela |
| 17 | 400 kV Gaya-Chandauti Ckt II |
| 18 | 400 kV Chandauti-NPGC Ckt II |
| 19 | 400 kV Gaya-Chandauti Ckt I |
| 20 | 400 kV Chandauti-NPGC Ckt I |

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# OCC track update

| | |
|---|---|
| 21 | 220 kV Arrah - Dumraon New Ckt I |
| 22 | 220 kV Arrah - Dumraon New Ckt II |
| 23 | 220 kV Nadokhar - Dumraon New Ckt I |
| 24 | 220 kV Nadokhar - Dumraon New Ckt II |
| 26 | 400 kV New Duburi TSL-1 |
| 27 | 765 kV Bus Reactor Bank-1 (3 x 110 MVAR) |
| 28 | 765 kV New Ranchi-Medinipur T/L 1 along with switchable line reactor(3 x 80 MVAR and Spare 1 x 80 MVAR) |
| 29 | 765 kV New Ranchi-Medinipur T/L 2 along with switchable line reactor(3 x 80 MVAR and Spare 1 x 80 MVAR) |
| 30 | 220 kV Subhasgram-Baruipur D/C |
| 31 | Main bays of 400 kV Subhasgram-NEW Jeerat D/C at Subhagram |
| 32 | 400 kV Main Bay of Binaguri-Bongaigaon 2 at Binaguri SS |
| 33 | 400 kV Medinipur-Chanditala TL-I |
| 34 | 400 kV Medinipur-Chanditala TL-II |
| 35 | 400 kV Medinipur-Kharagpur TL-I |
| 36 | 400 kV Medinipur-Kharagpur TL-II |
| 37 | 400 kV Main Bus 1 at Medinipur |
| 38 | 400 kV Main Bus 2 at Medinipur |
| 39 | 765/400/33 kV 1500 MVA ICT-2 at Medinipur SS |
| 40 | 765/400/33 kV 1500 MVA ICT-1 at Medinipur SS |

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# OCC track update

| | |
|---|---|
| 41 | 400 kV Bus reactor 2 at Medinipur SS |
| 42 | 400 kV Bus reactor 1 at Medinipur SS |
| 43 | 765 kV Main Bay at NEW Jeerat-1 and Tie Bay at Medinipur SS |
| 44 | 765 kV Main Bay at NEW Jeerat-2 and Tie Bay at Medinipur SS |
| 45 | 765 kV Bus Reactor Bank-2 (3 x 110 MVAR) at Medinipur SS |
| 46 | 765 kV Ranchi-Medinipur TL-2 with switable line reactor(3x80 MVAR) |
| 47 | 400 kV/220 kV 315 MVA ICT 2 at DSTPS(Andal) |
| 48 | 400 kV/220 kV 500 MVA ICT 1 at Chandauti |
| 49 | 220 kV bus coupler at Chandauti |
| 50 | 400 kV/220 kV 500 MVA ICT 3 at Chandauti |
| 51 | 400 kV/220 kV 500 MVA ICT 2 at Chandauti |
| 52 | 220 kV may bay for 500 MVA ICT 1 at Chandauti |
| 53 | 220 kV may bay for 500 MVA ICT 2 at Chandauti |
| 54 | 220 Kv Main bay at Tashiding 1 at New Melli |
| 55 | 220 Kv Main bay at Tashiding 2 at New Melli |
| 56 | 400 kV/220 kV315 MVA ICT 3 at Rourkela |
| 57 | 400KV MAIN BAY OF SAGARDIGHI-2 AT JEERAT |
| 58 | 400KV MAIN BAY OF NEW JEERAT-2 AT JEERAT |
| 59 | 400KV MAIN BAY OF NEW  JEERAT-1 AT JEERAT |
| 60 | 400KV MAIN BAY OF SUBHASGRAM-1 AT JEERAT |

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# OCC track update

| | |
|---|---|
| 61 | 125MVAR 400KV B/R-2 AT CHANDAUTI |
| 62 | 125MVAR 400KV B/R-1 AT CHANDAUTI |
| 63 | 220KV/132KV 200 MVA ICT 3 AT CHANDAUTI |
| 64 | 220KV/132KV 200 MVA ICT 1 AT CHANDAUTI |
| 65 | 400KV MAIN BAY OF GAYA-1 AT CHANDAUTI |
| 66 | 220KV MAIN BAY OF SONENAGAR-2 AT CHANDAUTI |
| 67 | 220KV MAIN BAY OF SONENAGAR-1 AT CHANDAUTI |
| 68 | 220KV MAIN BAY OF GAYA -2 AT CHANDAUTI |
| 69 | 132KV MAIN BAY OF CHANDAUTI(BSPTCL)-2 AT CHANDAUTI |
| 70 | 132KV MAIN BAY OF CHANDAUTI-1(BSPTCL) AT CHANDAUTI |
| 71 | 132KV MAIN BAY OF RAFIGANJ-1 AT CHANDAUTI |
| 72 | 132KV MAIN BAY OF SONENAGAR-1 AT CHANDAUTI |
| 73 | 132KV MAIN BAY OF 220/132KV200 MVA ICT 3 AT CHANDAUTI |
| 74 | 132KV MAIN BAY OF 220KV/132KV 200 MVA ICT 2 AT CHANDAUTI |
| 75 | 132KV MAIN BAY OF 220KV/132KV 200 MVA ICT 1 AT CHANDAUTI |
| 76 | 220KV MAIN BAY OF SONENAGAR-1 AT CHANDAUTI |
| 77 | 400 KV GORAKHPUR MOTIHARI 2 |
| 78 | 220KV-CHANDAUTI -SONENAGAR-2 |
| 79 | 400 kV PATNA KISHANGANJ D/CLINE |
| 80 | 23.5/765 KV, 3x315 MVA, GT-2,DARLIPALLI (NTPC) |

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# OCC track update

| | |
|---|---|
| 81 | 400 KV RANGPO-BINAGURI D/C |
| 82 | 400KV-ALIPURDUAR (PG) JIGMELLING-1 |
| 83 | 400KV-ALIPURDUAR (PG) JIGMELLING-2 |
| 84 | 220KV - GAYA CHANDAUTI 1 |
| 85 | 400 KV BARH MOTIHARI 1 |
| 86 | 400/22 KV 3*260 MVA GT 3 AT NPGC |
| 87 | 220KV - GAYA CHANDAUTI 2 |
| 88 | 400KV/220KV 500 MVA ICT 3 AT MALDA |
| 89 | 400 KV GORAKHPUR MOTIHARI 1 |
| 90 | 220KV BUS SECTIONALIZER BAY OF ( 220KV BUS 1A AND 220KVBUS 1B) AT RONGNICHU |
| 91 | 400KV MAIN BAY OF B/R 1 AT SITAMARHI |
| 92 | 125MVAR 400KV B/R-2 AT SITAMARHI |
| 93 | 220KV/132KV 100 MVA ICT 4 AT RANGPO |
| 94 | 400KV-SITAMARHI-MOTIHARI-2 |
| 95 | 400KV-SITAMARHI-DARBHANGA (DMTCL)-2 |
| 96 | 400KV TIE BAY OF ( 400KV-SITAMARHI--2 AND FUTURE) AT MOTIHARI |
| 97 | 400KV MAIN BAY OF SITAMARHI -2 AT MOTIHARI |
| 98 | 400KV MAIN BAY OF MOTIHARI-2 AT SITAMARHI |
| 99 | 400KV MAIN BAY OF DARBHANGA (DMTCL)-2 AT SITAMARHI |
| 100 | 400KV TIE BAY OF ( SITAMARHI--1 AND SITAMARHI--2) AT DARBHANGA (DMTCL) |

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# OCC track update

| | |
|---|---|
| 101 | 400KV MAIN BAY OF SITAMARHI -2 AT DARBHANGA (DMTCL) |
| 102 | 400KV-SITAMARHI-MOTIHARI-1 |
| 103 | 400KV MAIN BAY OF SITAMARHI -1 AT MOTIHARI |
| 104 | 400KV TIE BAY OF ( 125MVAR 400KV B/R-2 AND 400KV--MOTIHARI-1) AT SITAMARHI |
| 105 | 400KV MAIN BAY OF MOTIHARI-1 AT SITAMARHI |
| 106 | 220KV/11KV 10 MVA ST AT RONGNICHU |
| 107 | 220KV MAIN BAY OF STATION TRANSFORMER (ST) AT RONGNICHU |
| 108 | 125MVAR 400KV B/R-1 AT SITAMARHI |
| 109 | 220KV MAIN BAY OF 11/220KV GT1 AT RONGNICHU |
| 110 | 220KV MAIN BAY OF 11/220KV GT2 AT RONGNICHU |
| 111 | 220KV-DARBHANGA(DMTCL)-LAUKAHI-2 |
| 112 | 400KV TIE BAY OF ( 400KV--DARBHANGA (DMTCL)-2 AND 400KV/220KV 500 MVA ICT 2) AT SITAMARHI |
| 113 | 400KV MAIN BAY OF 400KV/220KV 500 MVA ICT 2 AT SITAMARHI |
| 114 | 400KV TIE BAY OF ( MOTIHARI-2 AND 500 MVA ICT 1) AT SITAMARHI |
| 115 | 400KV MAIN BAY OF 400KV/220KV 500 MVA ICT 1 AT SITAMARHI |
| 116 | 400KV/220KV 500 MVA ICT 2 AT SITAMARHI |
| 117 | 400KV/220KV 500 MVA ICT 1 AT SITAMARHI |
| 118 | 220KV BUS COUPLER BAY AT SITAMARHI |
| 119 | 220KV/132KV 200 MVA ICT 2 AT SITAMARHI |
| 120 | 220KV MAIN BAY OF 220KV/132KV 200 MVA ICT 2 AT SITAMARHI |

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# OCC track update

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|---|---|
| 121 | 220KV/132KV 200 MVA ICT 1 AT SITAMARHI |
| 122 | 220KV MAIN BAY OF 220KV/132KV 200 MVA ICT 1 AT SITAMARHI |
| 123 | 132KV MAIN BAY OF 220KV/132KV 200 MVA ICT 2 AT SITAMARHI |
| 124 | 220KV MAIN BAY OF MOTIPUR-2 AT SITAMARHI |
| 125 | 220KV MAIN BAY OF MOTIPUR-1 AT SITAMARHI |
| 126 | 220KV MAIN BAY OF RAXAUL -2 AT SITAMARHI |
| 127 | 220KV MAIN BAY OF RAXAUL -1 AT SITAMARHI |
| 128 | 132KV MAIN BAY OF RUNNISAIDPUR-2 AT SITAMARHI |
| 129 | 132KV MAIN BAY OF RUNNISAIDPUR-1 AT SITAMARHI |
| 130 | 132KV MAIN BAY OF PUPRI-2 AT SITAMARHI |
| 131 | 132KV MAIN BAY OF PUPRI-1 AT SITAMARHI |
| 132 | 132KV MAIN BAY OF 220KV/132KV 200 MVA ICT 1 AT SITAMARHI |
| 133 | 220KV-SITAMARHI-MOTIPUR-2 |
| 134 | 220KV-SITAMARHI-MOTIPUR-1 |
| 135 | 400KV/220KV 315 MVA ICT 3 AT JEYPORE |
| 136 | 400KV MAIN BAY OF 315 MVA ICT 3 AT MOTIHARI (DMTCL) |
| 137 | 400KV TIE BAY OF ( 400KV-SITAMARHI--1 AND 315 MVA ICT 3 ) AT MOTIHARI |
| 138 | 765KV 262 MVAR BR 1 AT DARLIPALI (DSTPS) along with Bays |
| 139 | 400KV/220KV 315 MVA ICT 1 AT DSTPS(ANDAL) |
| 140 | 33KV/0.415KV 0.630 MVA ICT 1 AT ROURKELA |
| 141 | 220KV MAIN BAY OF 400KV/220KV 315 MVA ICT 1 AT DSTPS(ANDAL) |

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# OCC track update

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|---|---|
| 142 | 400KV-SITAMARHI-MOTIHARI-2 DMTCL |
| 143 | 400KV-SITAMARHI-DARBHANGA (DMTCL)-2 |
| 144 | 400KV TIE BAY OF ( 400KV-SITAMARHI--2 AND FUTURE) AT MOTIHARI |
| 145 | 400KV MAIN BAY OF SITAMARHI -2 AT MOTIHARI |
| 146 | 400KV MAIN BAY OF MOTIHARI-2 AT SITAMARHI |
| 147 | 400KV MAIN BAY OF DARBHANGA (DMTCL)-2 AT SITAMARHI |
| 148 | 400KV TIE BAY OF ( SITAMARHI--1 AND SITAMARHI--2) AT DARBHANGA (DMTCL) |
| 149 | 400KV MAIN BAY OF SITAMARHI -2 AT DARBHANGA (DMTCL) |
| 150 | 400KV-SITAMARHI-MOTIHARI-1 |
| 151 | 400KV MAIN BAY OF SITAMARHI -1 AT MOTIHARI |
| 152 | 400KV TIE BAY OF ( 125MVAR 400KV B/R-2 AND 400KV--MOTIHARI-1) AT SITAMARHI |
| 153 | 400KV MAIN BAY OF MOTIHARI-1 AT SITAMARHI |
| 154 | 125MVAR 400KV B/R-1 AT SITAMARHI |
| 155 | 220KV-DARBHANGA(DMTCL)-LAUKAHI-2 |
| 156 | 400KV TIE BAY OF ( 400KV--DARBHANGA (DMTCL)-2 AND 400KV/220KV 500 MVA ICT 2) AT SITAMARHI |
| 157 | 400KV MAIN BAY OF 400KV/220KV 500 MVA ICT 2 AT SITAMARHI |
| 158 | 400KV TIE BAY OF ( MOTIHARI-2 AND 500 MVA ICT 1) AT SITAMARHI |
| 159 | 400KV MAIN BAY OF 400KV/220KV 500 MVA ICT 1 AT SITAMARHI |
| 160 | 400KV/220KV 500 MVA ICT 2 AT SITAMARHI |

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# OCC track update

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|---|---|
| 161 | 400KV/220KV 500 MVA ICT 1 AT SITAMARHI |
| 162 | 220KV BUS COUPLER BAY AT SITAMARHI |
| 163 | 220KV/132KV 200 MVA ICT 2 AT SITAMARHI |
| 164 | 220KV MAIN BAY OF 220KV/132KV 200 MVA ICT 2 AT SITAMARHI |
| 165 | 220KV/132KV 200 MVA ICT 1 AT SITAMARHI |
| 166 | 220KV MAIN BAY OF 220KV/132KV 200 MVA ICT 1 AT SITAMARHI |
| 167 | 132KV MAIN BAY OF 220KV/132KV 200 MVA ICT 2 AT SITAMARHI |
| 168 | 220KV MAIN BAY OF MOTIPUR-2 AT SITAMARHI |
| 169 | 220KV MAIN BAY OF MOTIPUR-1 AT SITAMARHI |
| 170 | 220KV MAIN BAY OF RAXAUL -2 AT SITAMARHI |
| 171 | 220KV MAIN BAY OF RAXAUL -1 AT SITAMARHI |
| 172 | 132KV MAIN BAY OF RUNNISAIDPUR-2 AT SITAMARHI |
| 173 | 132KV MAIN BAY OF RUNNISAIDPUR-1 AT SITAMARHI |
| 174 | 132KV MAIN BAY OF RUNNISAIDPUR-2 AT SITAMARHI |
| 175 | 132KV MAIN BAY OF RUNNISAIDPUR-1 AT SITAMARHI |
| 176 | 132KV MAIN BAY OF 220KV/132KV 200 MVA ICT 1 AT SITAMARHI |
| 177 | 220KV-SITAMARHI-MOTIPUR-2 |
| 178 | 220KV-SITAMARHI-MOTIPUR-1 |
| 179 | 400KV/220KV 315 MVA ICT 3 AT JEYPORE |
| 180 | 400KV MAIN BAY OF 315 MVA ICT 3 AT MOTIHARI (DMTCL) |

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# OCC track update

| | |
|---|---|
| 181 | 400KV TIE BAY OF ( 400KV-SITAMARHI--1 AND 315 MVA ICT 3 ) AT MOTIHARI |
| 182 | 400KV/220KV 315 MVA ICT 1 AT DSTPS(ANDAL) |
| 183 | 220KV MAIN BAY OF 400KV/220KV 315 MVA ICT 1 AT DSTPS(ANDAL) |
| 184 | 220KV-SITAMARHI-MOTIPUR-1 |
| 185 | 765KV TIE BAY OF 262MVAR BUS REACTOR-1 AND GT-1 AT DARLIPALLI |
| 186 | 400KV JEERAT-SAGARDIGHI 2 |
| 187 | 400KV JEERAT-SUBHASGRAM 2 |
| 188 | 132KV-SITAMARHI-RUNNISAIDPUR 2 |
| 189 | 132KV-SITAMARHI-RUNNISAIDPUR 1 |
| 190 | 400KV-BAHARAMPUR-BHERAMERA 3 |
| 191 | 220KV MAIN BAY OF JAYNAGAR-3AT JEYPORE |
| 192 | 220KV MAIN BAY OF JAYNAGAR-4AT JEYPORE |
| 193 | 400KV MAIN BAY OF 315 MVA ICT-III AT SUBHASGRAM(PG) |
| 194 | 400KV MAIN BAY OF 315 MVA ICT-IV AT SUBHASGRAM(PG) |
| 195 | 400KV ALIPURDUAR-JIGMELLING 1 |
| 196 | 400KV ALIPURDUAR-JIGMELLING 2 |
| 197 | 220KV JAYNAGAR-JEYPORE-3 |
| 198 | 220KV JAYNAGAR-JEYPORE-4 |
| 199 | 400KV- JEERAT-NEW JEERAT-1 |
| 200 | 400KV- JEERAT-NEW JEERAT-2 |

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# OCC track update

| | |
|---|---|
| 201 | 400KV- JEERAT-NEW JEERAT-1 |
| 202 | 400KV- JEERAT-NEW JEERAT-2 |
| 203 | 400KV BAHARAMPUR-BHERAMARA 4 |
| 204 | 132KV NAGARUNTARI-SONENAGAR 1(LILO OF 132 KV RIHAND SONENAGAR CKT 1 NAGARUNTARI) |
| 205 | 400KV DHANBAD-RANCHI1(LILO OF 400KV RANCHI-MAITHON RB D/C |
| 206 | 400KV DHANBAD-MAITHON RB-1(LILO OF 400KV RANCHI-MAITHON RB D/C) |
| 207 | 400KV DHANBAD-RANCHI2(LILO OF 400KV RANCHI-MAITHON RB D/C |
| 208 | 400KV DHANBAD-MAITHON RB-2(LILO OF 400KV RANCHI-MAITHON RB D/C) |
| 209 | 125KV BARIPADA-BANGIRPOSHI 2 |
| 210 | 220KV RANCHI-RMGARH- 1 |
| 211 | 220KV RANCHI-MTPS(DVC)- 1 |

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# Training on PDMS & PSCT

## WEBINAR on PDMS and protection study (State Wise)

| Sl no. | Date | State | Topic | Attended |
|---|---|---|---|---|
| 1 | 12.04.2021 | Bihar | PDMS | 44 |
| 2 | 13.04.2021 | Bihar | Protection Study | 44 |
| 3 | 20.04.2021 | West Bengal | PDMS | 05 |
| 4 | 21.04.2021 | West Bengal | Protection Study | 05 |
| 5 | 27.09.2021 | Jharkhand | PDMS | 55 |
| 6 | 28.09.2021 | Jharkhand | Protection Study | 55 |
| 7 | 04.10.2021 | Odisha | PDMS | 58 |
| 8 | 05.10.2021 | Odisha | Protection Study | 58 |

# New S/S Data Collection

| Collected SS LIST 2021 | | | | |
|---|---|---|---|---|
| Sl. No. | SS Name | Voltage Level | Utility | State |
| 1 | JAIPATNA | 220/132/33 kV | OPTCL | ODISHA |
| 2 | SATASANKHA | 132/33 kV | OPTCL | ODISHA |
| 3 | ASKA NEW | 220/132/33 kV | OPTCL | ODISHA |
| 4 | BETNOTI | 132/33 kV | OPTCL | ODISHA |
| 5 | KASHIPUR | 220/33 kV | OPTCL | ODISHA |
| 6 | MANCHESWAR | 132/33 kV | OPTCL | ODISHA |
| 7 | NARSINGHPUR | 220/33 kV | OPTCL | ODISHA |
| 8 | UDALA | 132/33 kV | OPTCL | ODISHA |
| 9 | IBTPS | 21/400 kV | OPGC | ODISHA |
| 10 | SUNDARGARH | 765/400 kV | PGCIL | ODISHA |
| 11 | CHANDAUTI NEW | 400/220/132 kV | PMTL | BIHAR |
| 12 | MOKAMAH | 220/132 kV | BGCL | BIHAR |
| 13 | SITAMARHI | 400/220/132 kV | PMTL | BIHAR |

# New S/S Data Collection

| Collected SS LIST 2021 | | | | |
|---|---|---|---|---|
| Sl. No. | SS Name | Voltage Level | Utility | State |
| 14 | KHAGARIA NEW | 220/132/33 kV | BSPTCL | BIHAR |
| 15 | DUMRAON NEW | 220/132/33 kV | BGCL | BIHAR |
| 16 | PANAGARH | 132/33 kV | WBSETCL | WEST BENGAL |
| 17 | MOHITNAGAR | 132/33 kV | WBSETCL | WEST BENGAL |
| 18 | MEDINIPORE | 765/400 kV | PMJTL | WEST BENGAL |
| 19 | DINAHATA | 132/33 kV | WBSETCL | WEST BENGAL |
| 20 | SALTLAKE STADIUM | 132/33 kV | WBSETCL | WEST BENGAL |
| 21 | BAGMUNDI | 132/33 kV | WBSETCL | WEST BENGAL |

# Software Update

- Multiple DR download facility on Tripping incident page
- Bug fixed for forgot password option on login page
- Working on New PDMS Dashboard
- Updation of Organization list
- New user addition
- Version Updates for PSCT
- Regular Power MAP updation of ER

# Server Maintenance

- Regular Health check up for Live Server
- UPS backup activity checking
- Regular Server Temp file/Cache clearing
- Regular Database storage backup of PDMS
- Internet Speed monitoring for Server

# DMNS

Number of Case Raised by Utilities - 7

Number of Case Closed by PRDC - 7

SLD updated for all cases

PDMS database updated for all cases

# THANK YOU

**ANNEXURE-C.3**

| Sl No. | Name of the incidence | PCC Recommendation | Latest status |
|---|---|---|---|
| **106th PCC Meeting** | | | |
| 1. | Tripping of Bus-1 at 220 kV Ramchandrapur on 20/08/2021 at 20:24 Hrs. | In 106th PCC Meeting, PCC advised JUSNL following:<br>➢ To restore the busbar protection at 220 kV Ramchandrapur S/s within a month. | ➢ In 108th PCC Meeting, Regarding Bus Bar Protection, JUSNL informed that the same could not be restored as the visit of OEM engineers get delayed. PCC advised to take up the issue with higher authority for early restoration of the busbar protection.<br>*JUSNL informed that they are in process to place fresh tender for implementation of PLCC as well as bus bar protection and it is expected that implementation of both would be completed by April 2022.* |
| 2. | Repeated Tripping of 132 kV Sultanganj- Deogarh D/C | In 106th PCC Meeting, PCC advised BSPTCL to resolve all clearance issues in the line and complete the insulator replacement work at the earliest. | *BSPTCL informed that all clearance issues in the line had been resolved and insulator replacement work had also been completed.* |
| 3. | Total Power Failure at Dumka S/s on 15/05/2021 at 12:01 Hrs | Regarding 220 kV Maithon-Dumka-1, JUSNL intimated that there was card issue in PLCC panel. The OEM (M/s ABB) had been communicated regarding the issue and the same would be resolved by September' 21.<br>In 108th PCC Meeting, JUSNL informed that work order would be placed after receiving the cost estimate from OEM. They stated that the PLCC link would be restored by December 2021. | *JUSNL informed that PLCC link would be replaced by March-2022.* |
| 4. | Grid event at 132 kV Motihari (DMTCL) S/S on 21-04-2021 at 20:19 hrs | In 106th PCC Meeting, PMTL informed that offers received from | *PMTL representative informed that they are in process of* |

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| | | OEM i.e., M/s TBEA regarding restoration of the damaged GIS section is under examination.<br><br>Regarding timeline to complete the work, PMTL informed that since all materials required for restoration work are to be imported from China, it would take 40-50 days for restoration after placing the supply order.<br><br>In 108th PCC Meeting, PMTL representative informed that an internal committee of Powergrid had visited site on 12th Nov 2021. PCC advised to submit the restoration plan of the damaged bus extension module. | *placing the work order with TBEA authorized partner i.e. M/S Path Electrical. The quotation has been received and work order would be placed by end of December 2021.* |
| **107th PCC Meeting** | | | |
| 5. | Disturbance at 220 kV Hajipur S/S on 28.09.2021 at 17:18Hrs | In 107th PCC Meeting, PCC advised BSPTCL to submit action taken report for this disturbance in coordination with BGCL. | *BSPTCL informed that they had not received any action plan form BGCL. PCC advised BSPTCL to coordinate with BGCL for getting the report regarding the disturbance. BSPTCL was further advised to communicate BGCL to attend next PCC Meeting.* |
| 6. | Islanding Performance and Observations during recent Islanding incidents in CESC system. | In 108th PCC Meeting, CESC informed that a preliminary meeting was held with ERLDC. Based on the feedback, islanding events are being analyzed and the report would be submitted after completion of the analysis. | *MOM of meeting held between ERLDC and CESC regarding Islanding Performance and Observations during recent Islanding incidents in CESC system is attached at* ***Annexure C.3.6.*** |
| 7. | Tripping of DALTONGANJ – GARWA D/C lines. | In 108th PCC Meeting, JUSNL informed that patrolling was carried out and vegetation issues were found at location no. 89, 90, 91. The same would be cleared within two weeks.<br><br>Regarding auto-recloser scheme at Garwah end, they updated that | *JUSNL informed that vegetation issue had been resolved. They further informed that auto recloser scheme had been checked and issues were rectified at Garhwa end.* |

| | | | |
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| | | scheme is being reviewed by the CRITL wing. | |
| 8. | Repeated Tripping of 220 kV Joda- Ramchandrapur | In 108th PCC Meeting, JUSNL informed that line patrolling was carried out for however no vegetation or clearance issues were found in the line.<br><br>Regarding PLCC, they updated that issue had been communicated to OEM but they were facing difficulty in getting the availability of service engineers at site. | *JUSNL informed that they are in process of placing fresh tender for implementation of PLCC as well as bus bar protection and it is expected that implementation of both would be completed by April 2022.* |
| **108th PCC Meeting** | | | |
| 9. | Total Power Failure at 220 kV Ronginchu HEP on 20.10.2021 at 12:42 Hrs | PCC advised Rongnichu HEP to review the overcurrent relay settings at their end. It was suggested to review the directional feature and definite time settings of the O/C relay. | |
| 10. | Total Power Failure at 220/132 kV Chatra(JUSNL) S/s on 09.10.2021 at 12:44 Hrs | PCC advised JUSNL to resolve the carrier related issue at Chatra end and to ensure healthiness of PLCC for 220 kV Daltonganj-Chatra line.<br><br>PCC further advised JUSNL to implement weak in-feed protection at Chatra end for 220 kV Daltonganj-Chatra lines. | *JUSNL informed that week in-feed protection had been implemented at Chatra end for 220 kV Daltonganj-Chatra lines and the carrier related issues were also resolved for the line.* |
| 11. | Tripping of 400/220 kV 500 MVA ICT-1 &2 at Darbhanga (DMTCL) S/s on 25.09.2021 | PCC advised DMTCL to revise the ICT earth fault setting at Darbhanga end in line with the guidelines at the earliest. | *DMTCL informed that they had revised the ICT earth fault setting at Darbhanga end in line with the guidelines recommended by PCC.*<br><br>*ERLDC opined that line differential protection needs to be implemented in 220 kV Darbhanga-Darbhanga (DMTCL) D/c line. PCC advised BSPTCL to submit their plan for implementing line* |

| | | | |
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| | | | *differential protection for the above line.* |

**MOM Held at ERLDC on 30.11.2021 between Officials of ERLDC & CESC regarding**
**Agenda Item No. B. 8 of 185th OCC Meeting on 23.11.2021**

**Members Present:**

| ERLDC | CESC |
|---|---|
| Mr Gopal Mitra | Mr Snehasis Samaddar |
| Mr Rajib Sutradhar | Mr Sibir Roy |
| Mr Amaresh Mallick | Mr Arunava Sen Gupta |
| Mr Shyamal Konar | Mr Susovan Narayan Choudhury |
| Mr Saugato Mondal | Mr Arghya Ghosal |
| Mr Saurav Kr. Sahay | |
| Mr Chandan Kumar | |
| Mr Raj Protim Kundu | |
| Mr Alok Pratap Singh | |
| Mr Saibal Ghosh | |

**UEL and PSS**

1. A holistic study will be carried out by CESC regarding PSS and UEL of BBGS - Will start from January, 2022 and will take 2-3 months.

2. Network for Synchronization of CESC System at 220 KV with Kasba S/S of WBSETCL is expected to be ready by March, 2022.

3. PSS and UEL performance of BBGS will be checked and tuning parameters will be validated post synchronization at Kasba 220 KV. In case of any delay in Synchronization of CESC System at 220 KV with Kasba S/S, revised timeline for field testing of PSS and UEL may be decided after discussion in appropriate forum.

**Islanding Operation**

1. PFR testing of BBGS Units will be carried out in February, 2022.

2. 'Islanded' signal will be incorporated in BBGS Unit 3 DCS for RGMO - FGMO switchover and performance will be checked. This trial will be given after PFR testing.

**ERLDC Request**

1. Study regarding PSS and UEL of BBGS needs to be done considering connectivity at 220 kV level as well 132 kV level separately in view of operating scenario during any contingency – CESC will revert.

2. Study needs to be done to ascertain whether 150 ms time delay in Islanding Scheme of CESC can be increased post Synchronisation at Kasba 220 KV, considering the Critical Clearing Time of BBGS Units – Study will be done by CESC.

3. A single combined 'Load of CESC's Islanded System' (from Substations level) to be calculated and made available to ERLDC for enabling them to display in their SCADA – Feasibility will be checked by CESC.

4. Direct access to PMU at BBGS and EMSS to be provided to ERLDC for monitoring and analysis of islanding condition – Feasibility will be checked by CESC.

# Annexure C.4

| ISTS | |
|---|---|
| **Name of the element** | **Length (km)** |
| 400 kV Durgapur-Bidhannagar D/c | 11 |
| 400 kV Rangpo-Teesta V-D/c | 11.6 |
| 400 kV Teesta-III- Dikchu | 15.1 |
| 400 kV Gaya-Chandauti D/c | 17.36 |
| 220 kV Subhashgram-Subhashgram (WB) D/c | 1 |
| 220 kV Dalkhola-Dalkhola (WB)-D/c | 1.1 |
| 220 kV Alipurduar-Alipurduar (WB) D/c | 6.34 |
| 220 kV Rajarhat-NewTown D/c | 7.5 |
| 220 kV Binaguri-NJP D/c | 9 |
| 220 kV Rourkela-Tarkera D/c | 15.3 |
| **Odisha** | |
| **Name of the element** | **Length (km)** |
| 400 kV Indravati-Indravati (Gridco) | 3.7 |
| 400 kV Meramundali GMR T/c | 8 |
| 400 kV New Duburi-TSL D/c | 8.65 |
| 220 kV Chandka-Chandka B | 1 |
| 220 kV Rengali-Rengali D/c | 1 |
| 220 kV Balimela-Balimela T | 1.38 |
| 220 kV Meramundali-BSL D/c | 2.4 |
| 220 kV Bolangir-New Bolangir D/c | 2.8 |
| 220 kV Tarkera-RSP D/c | 4.07 |
| 220 kV Sterlite-Vedanta D/c | 4.15 |
| 220 kV New Duburi-Jindal Steel D/c | 4.8 |
| 220 kV Rengali-Rengali PH D/c | 5 |
| 220 kV Mendhasal-Infocity | 5.5 |
| 220 kV Katapalli-Hindalco D/c | 5.5 |
| 220 kV Jaynagar-Upper Kolab D/c | 6 |
| 220 kV Mendhasal-Chandaka D/c | 7 |
| 220 kV Keonjhar-Keonjhar D/c | 7.48 |
| 220 kV Jeypore-Jaynagar D/c | 7.7 |
| 220 kV New Duburi-TSL D/c | 8.65 |
| 220 kV Jeypore-Jaynagar D/c | 8.8 |
| 220 kV Tarkera-RSP D/c | 10.2 |
| 220 kV Bidansi-Cuttack D/c | 10.42 |
| 220 kV Jaypatna-Indravati | 11.13 |
| 220 kV Meramundali-TTPS D/c | 11.2 |
| 220 kV Meramundali-NALCO D/c | 11.5 |
| 220 kV Joda-Jindal | 14.6 |
| 220 kV Mendhasal-Atri | 15 |
| 220 kV TSTPP-Rengali PH | 16.78 |
| **West Bengal** | |
| **Name of the element** | **Length (km)** |
| 400 kV PPSP-New PPSP D/c | 2 |
| 220 kV Kasba-Eastern Metropolitan | 1 |
| 220 kV New Haldia-IPCHL D/c | 2.7 |
| 220 kV Bidhannagar-DPL D/c | 8 |
| 220 kV Bakreswar-Sadaipur D/c | 8 |
| 220 kV Eastern Metropolitan-Princep Street | 8.2 |
| 220 kV Domjur-New Chanditala D/c | 8.32 |
| 220 kV New Cossipore-Princep Street | 8.8 |
| 220 kV NewTown-CLC Bantala | 13 |
| 220 kV Sagardighi-New Sagardighi D/c | 14.38 |
| 220 kV Subhashgram-CLC Bantala | 15 |
| 220 kV Domjur-Foundry Park D/c | 15 |
| 220 kV New Cossipore-Eastern Metropolitan | 16.2 |
| 220 kV Jeerat-Dharampur D/c | 17 |

| Bihar | |
|---|---|
| **Name of the element** | **Length (km)** |
| 220 kV Patna-Sipara-3 | 0.3 |
| 220 kV Patna-Sipara-D/c | 0.45 |
| 220 kV Purnea-New Purnea D/c | 2 |
| 220 kV Darbhanga-Darbhanga (DMTCL) D/c | 2.9 |
| 220 kV Kishanganj-Kishanganj Q/c | 4.4 |
| 220 kV Pusauli-New Sasaram (Nadokhar) D/c | 6.98 |
| 220 kV Gaya-BodhGaya D/c | 8.5 |
| 220 kV Barauni (BTPS)-Mokama D/c | 11.65 |
| 220 kV Barauni (BTPS)-Begusarai D/c | 15 |
| 220 kV Muzaffarpur-MTPS D/c | 17 |
| 220 kV Gaya-Chandauti D/c | 18 |
| **DVC** | |
| **Name of the element** | **Length (km)** |
| 220 kV Durgapur-Parulia (DVC) D/c | 1 |
| 220 kV Burnpur-IISCO D/c | 1.2 |
| 220 kV Chandrapura-Chandrapura-1 | 1.5 |
| 220 kV Chandrapura-Chandrapura-2 | 3.5 |
| 220 kV Parulia (DVC)-Tamla DSP T/c | 6 |
| 220 kV Maithon-Kalyaneshwari D/c | 7.6 |
| 220 kV Chandrapura-BSL | 9 |
| 220 kV Chandrapura-MSMDBSL D/c | 10 |
| 220 kV Waria-DSTPS D/c | 11.14 |
| 220 kV Parulia (DVC)-Muchipara D/c | 14.75 |
| 220 kV Mejia-Barjora D/c | 16.7 |
| 220 kV Waria-Bidhannagar D/c | 17.2 |
| 220 kV Parulia (DVC)-DSTPS D/c | 17.34 |
| **Jharkhand** | |
| **Name of the element** | **Length (km)** |
| 220 kV Chaibasa-Chaibasa (JUSNL) D/c | 0.7 |
| 220 kV Ranchi-Hatia | 6 |
| **IPP** | |
| **Name of the element** | **Length (km)** |
| 400 kV Adhunik (APNRL)-Jamshedpur D/c | 0.3 |
| 400 kV Sterlite-Lapanga D/c | 18.64 |
| 220 kV Rangpo-Rongnichu D/c | 7.26 |