Minutes
of
101st PCC Meeting

Date: 27.04.2021
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 101ST PROTECTION SUB-COMMITTEE MEETING HELD ON 13.04.2021 AT 10:30 HOURS

Member Secretary, ERPC chaired the 101st PCC Meeting. The meeting was conducted through Microsoft Teams online platform.

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

PART – A

ITEM NO. A.1: Confirmation of minutes of 100th Protection sub-Committee Meeting held on 12th March 2021 through MS Teams.

The minutes of 100th Protection Sub-Committee meeting held on 12.03.2021 circulated vide letter dated 09.04.2021.

Deliberation in the Meeting

Members confirmed the minutes of 100th PCC meeting.

PART – B

ITEM NO. B.1: Total Power failure at 220 kV Lalmatia and Godda S/S on 22.03.2021 at 11:05 hrs

220 kV Godda-Dumka D/C were not in service. On 22-03-2021 at 11:05 hrs 220 kV Farakka-Lalmatia S/C and 132 kV KhSTPP -Lalmatia S/C tripped resulting in total power failure at Lalmatia and Godda S/S.

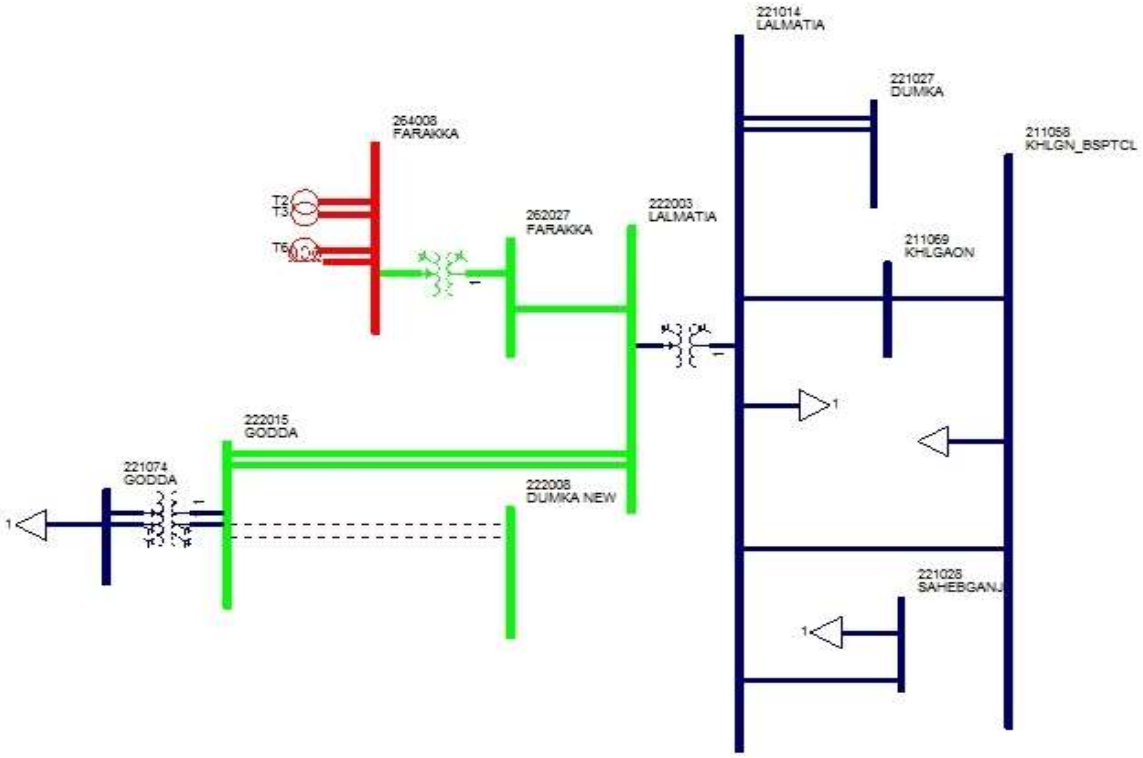
From relay indications it was observed that there was no fault in 132kV KHSTPP-Lalmatia line. 132kV KHSTPP-Lalmatia tripped on Z3 from KHSTPP end due to non-tripping of breaker of 220kV FSTPP-Lalmatia at Lalmatia end.

Relay Indications :

Time	Name	End 1	End 2	PMU Observation
11:05 hrs	220 FSTPP-LAMATIA	FSTPP-Z-1,Y-B fault , IY2.66KA, IB-2.6KA	Not tripped	Delayed clearance of 1sec observed in PMU.
11:05 hrs	132 KHSTPP-LALMATIA	KHSTPP: Z3, Y-B, IY-1.68KA, IB-1.5KA, 89KM	Not tripped	

Load Loss : 45 MW

Outage Duration: 01:32 Hrs



JUSNL & NTPC may explain.

Deliberation in the Meeting

NTPC informed that the fault was in 220 kV Farakka-Lalmatia line and NTPC Farakka end cleared the fault in zone-1 timing of distance protection. At 220 kV Lalmatia end, there was no tripping.

They added that relay at 132 kV KhTPP-Lalmatia circuit tripped in zone-3 of distance protection to clear the fault.

JUSNL informed that the only 220/132 kV ICT at Lalmatia S/s also got tripped from both HV and LV side on overcurrent protection.

PCC observed that as no protection system operated at 220 kV Lalmatia end, the fault should have been cleared by the 220/132 kV ICT at Lalmatia S/s. The tripping of 132 kV KhSTPP-Lalmatia line is not in order. PCC observed that there is a coordination issue between the 220 /132 kV ICT and zone-3 settings of 132 kV KhSTPP-Lalmatia line at KhSTPP end and advised JUSNL & NTPC to properly coordinate the relay settings at their respective end.

Regarding non-operation of any protection system of 220 kV Farakka-Lalmatia line at 220 kV Lalmatia end, NTPC informed that main distance relay at Lalmatia end was faulty and out of service since one year. They further informed that as installation of new relay involves capital expenditure, the issue was already communicated to ECL i.e. the owner of the 220 kV Farakka-Lalmatia transmission system. However, no response from ECL has received till date.

PCC advised NTPC to resolve the issue of protection system at 220 kV Lalmatia end in coordination with ECL.

PCC also advised JUSNL to enable directional high-set in backup overcurrent relay at LV side of 220/132 kV ICT at Lalmatia for faster fault clearance in case of non-clearance of fault in 220 kV Farakka-Lalmatia line at 220 kV Lalmatia end.

ITEM NO. B.2: Total power failure at JSPL on 09.03.2021 at 08:02 hrs

At 07:50 hrs, 400 kV JSPL – Meramundali - 2 got tripped after unsuccessful auto-reclose attempt due to persistent Y phase to earth fault.

At 08:02 hrs, 400 kV JSPL – Meramundali-1 got tripped after unsuccessful auto-reclose attempt due to persistent Y phase to earth fault resulting in total power failure at JSPL plant. During line patrolling, it was observed that "Y" Phase Insulators of both the circuits were damaged and conductors were lying on top of Blue Phase cross arms at tower location at 111.

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

Load Loss : 333 MW , Gen. Loss: 373 MW

Outage Duration: 05:06 Hrs

JSPL & OPTCL may explain.

Deliberation in the Meeting

JSPL informed that the fault was due to insulator decapping on account of fog in the 400 kV JSPL-Meramundali line at 32 kM from JSPL which resulted in tripping of the lines.

ERLDC stated that the following two discrepancies were observed during the tripping of 400 kV Meramundali-JSPL-2 at 07:50 hrs and Meramundali-JSPL-1 at 08:02 hrs.

- ***Low Dead time of Auto Recloser*:**

ERLDC informed that there was Y-phase to earth fault in the line and Y-phase breaker got opened within 100 ms but again after 350 ms Y-phase breaker got closed and fed the fault for next 300 ms and then all 3 poles got opened.

They added that from DR as well as PMU it appeared that A/R dead time is kept only 350 ms.

JSPL informed that the deadtime settings of 350 msec was due to limitation in the relay at their end. They added that procurement of new relay has already been initiated and the revised dead time settings would be implemented in the new relay which is expected to be commissioned within two months.

- ***Delayed breaker opening at the instance of reclose:***

ERLDC informed that after reclosing of Y-pole breaker at Meramundali end, the Y-pole again got opened after 400 ms even though the fault was persisting. They opined that SOTF/TOR feature may be enabled in the distance relay to avoid the delayed opening of breaker during the autorecloser instance.

JSPL informed that SOTF had been enabled at their end.

PCC advised OPTCL to enable the Trip on reclose (TOR)/SOTF function in the distance relay at Meramundali end.

ITEM NO. B.3: Tripping of 400 kV Rangpo-Kishangunj S/C and 400 kV Teesta III - Kishangunj S/C on 10.03.2021 at 19:35 hrs

At 19:35 Hrs, both the 400 kV circuits tripped due to R and B phase to earth fault at 117-121 km from Kishangunj end resulted in islanding operation of 1560 MW generation at Sikkim hydro complex with 54 MW load at Gangtok. Consequently all the generators tripped and total power failure occurred.

Fault was sensed in Zone -1 by both ends of the circuits and cleared within 100 ms.

Relay Indications :

Time	Name	End 1	End 2	PMU Observation
19:35 Hrs	400 kV Rangpo – Kishangunj S/C	R-B-N, Zone – 1, F/C 3.2kA, 82.657Km from Rangpo	R-B, Zone – 1, 117 km from Kishangunj, F/C 5.2kA	Around 75 kV dip has been observed in R and B phase voltage at Rangpo PMU data. The fault clearing time was less than 100 ms. After the fault; power swing has been captured at three phase voltage at Rangpo S/S followed by voltage collapse within 90 seconds. Rest of the grid frequency dropped from 50.01 Hz to 49.87 Hz. Later it stabilized to 49.95 Hz.
19:35 Hrs	400 kV Teesta III – Kishangunj S/C	R-B, Zone – 1, 102 km from Teesta III, IR-2.2 kA, IB-1.1kA	R-B, Zone – 1, 121 km from Kishangunj, F/C 4.9kA	

Report by ERLDC is enclosed at **Annexure B.3**

Load Loss : 54 MW , Gen. Loss: 1560 MW

Outage Duration: 00:21 Hrs

Powergrid & TPTL may explain.

Deliberation in the Meeting

It was informed that SPS signal was initiated during the disturbance however, due to tripping of both 400 k V Rangpo- Kishangunj and 400 kV Teesta III -Kishanganj –circuits, there was no evacuation path for the generators and as a result all the generators got tripped and total power failure occurred in Sikkim complex.

TPTL informed that on the day of incident, weather was stormy and fault occurred in both circuits due to heavy thunderstorm. They further added that patrolling was done however no issue of clearance was found in the line

ITEM NO. B.4: Repeated grid events at 132/66 kV Melli S/s in March' 2021

Repeated grid events at 132/66 kV Melli S/S have been reported in March 2021 which had resulted in power failure at Melli and Kalimpong areas. A summary of the grid events in March 2021 is given in the following table:

Sr No	Date	Time (Hrs.)	Brief Description	Relay Indication of Rangpo Melli S/C	Relay Indication of Siliguri Melli S/C	Power loss
1	11-03-2021	16:17	132 kVSiliguri-Melli S/C was out of service. Kalimpong was radially fed from Melli through 66 KV Kalimpong-Melli D/C. 132 kV Rangpo – Melli S/C tripped ON R-Y phase fault leading to power failure at Melli.	R-Y, I_R=1.2 kA, I_Y=1.1 kA, 2.1 km from Rangpo	--	Melli: 15 MW Kalimpong: 5 MW
2	24-03-2021	18:41	Both 132 kV Rangpo-Melli S/C and 132 KV Siliguri-Melli S/C tripped due to R & Y phase-to-earth fault resulting in total power failure at Melli and Kalimpong. Kalimpong was radially fed from Melli through 66 KVKalimpong-Melli D/C.	R-Y, I_R=1.6 kA, I_Y=1.5 kA, 2.1 km from Rangpo	R-Y, I_R=1.4 kA, I_Y=1.3 kA, 104 km from Siliguri;	Melli: 12 MW Kalimpong: 6 MW
3	28-03-2021	16:42	132 kV Rangpo-Melli S/C and 132 KVSiliguri-Melli S/C tripped due to R & Y phase-to-earth fault resulting in total power failure at Melli and Kalimpong. Kalimpong was radially fed from Melli through 66 KVKalimpong-Melli D/C.	R-Y, I_R=1.4 kA, I_Y=1.4 kA, 2 km from Rangpo	R-Y, I_R=1.4 kA, I_Y=1.3 kA, 105 km from Siliguri	Melli: 15 MW Kalimpong: 5 MW

Based on preliminary observation, the fault is more likely located on the 132 kV Rangpo-Melli section. In all events, the fault was not cleared from Melli's end. To clear the fault ,132 kV Siliguri – Melli S/C got tripped from Siliguri end in the zone -2 time.

The following may be shared by Sikkim:

- Reason for repeated occurrence of the same type of faults and root cause analysis (Similar issue of the repetitive tripping has been observed in 132 kVRanlpo-Chujachen 1 which also falls under Sikkim jurisdiction)
- Status of patrolling activity after each event may also be shared
- Reason for non-clearing of fault from Melli's end which is resulting in additional line tripping.

Sikkim may explain.

Deliberation in the Meeting

Powergrid informed that the mentioned fault location of 2.1 km from Rangpo in all of the above incidents falls under Sikkim judrisiction.

Sikkim representative was not available in the meeting.

PCC decided to refer the issue to next OCC meeting for discussion.

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

ITEM NO. B.5.1: Disturbance at 132 kV Purnea (BSPTCL) S/S on 01-03-2021 at 20:08hrs

On 01-03-2021 at 20:08hrs, 220/132 kV 160 MVA ICT 1, 2 & 3 at 220/132 kV Purnea (PG) S/S tripped on back up impedance protection due to Y phase PT burst of 132 kV Purnea (PG)-Purnea (BSPTCL) T/C at BSPTCL end. Later these 132 kV feeders were hand tripped at BSPTCL end.

Around 177 MW load loss occurred at Katihar, Manihari, Dhamdaha, Banmankhi, Nuagachhia, Barsoi and Purnea.

Flash report received from Bihar SLDC is attached in **Annexure B.5.1**

Powergrid and BSPTCL may explain.

Deliberation in the Meeting

BSPTCL informed that the disturbance occurred due to bursting of bus PT at 132 kV Purnea (BSPTCL) S/s.

The following elements got tripped to clear the fault.

I. *220/132 kV 160 MVA ICT 1, 2 & 3 at Purnea (PG) S/S on backup impedance protection*

II. *132 kV Purnea -Triveniganj in zone-4 of distance protection from Purnea end.*

Powergrid informed that 132 kV Purnea (PG)- Purnea (BSPTCL) circuits are very short line and hence line differential protection is present as main protection for these lines.

They informed that backup overcurrent E/F relay for 132 kV Purnea (PG)- Purnea (BSPTCL) lines got picked up during the disturbance however ICTs got tripped in backup impedance protection in 200 msec before tripping of these lines.

BSPTCL informed that other 132 k V feeders were radially fed and subsequently hand tripped at Purnea end.

ITEM NO. B.5.2 : Disturbance at Maithon Hydel on 18-03-2021 at 16:15hrs

On 18-03-2021 at 16:15 hrs, 132 KV Maithon Hydel-Kalyaneshwari D/C tripped leading to loss of power supply at Maithon Hydel.

Consequently, 132 KV Maithon Hydel, Panchet, Ramkanali, Kumardhubi, Jamtara substations became dead. At same time 132 KV Jamuria S/s became dead after tripping of 132 KV Jamuria-Waria S/c on O/C protection.

132 KV Dhanbad- Patherdih D/C tripped on O/C protection resulting in loss of power supply to Patherdih S/S.

DVC may explain.

Deliberation in the Meeting

DVC informed that following lines were out due to operational and maintenance purpose before this incidence:
a) 132 k V Putki- Patherdih double circuits
b) 132 k V CTPS – Ramakali single circuit
c) 132 k V Maithon Hydel - Kalyaneshwari line 2

They informed that on that day GE engineers were checking LBB protection for bus coupler bay of 132 kV Kalyansweri S/s. During the testing, they inadvertently uploaded wrong settings to the relay as a result the LBB protection operated and resulted in tripping of 132 k V Maithon Hydel – Kalyaneshwari line.

After tripping of this line from Kalyansweri, 132 kV DTPS- Jamuria D/C and 220/132 kV ICT at Dhanbad got overloaded.

Subsequently 132 kV DTPS- Jamuria D/C got tripped from DTPS end in overcurrent protection and further 220/132 kV ICT at Dhanbad S/s tripped on LV overcurrent protection.

Due to tripping of all these elements, total power failure occurred at 132 KV Maithon Hydel, Panchet, Ramkanali, Kumardhubi, Jamtara substations.

PCC observed that similar type of disturbances during testing of the relays by OEM engineers have been observed in recent months and advised DVC to take utmost precautions and measures before such type of testing of the relays to avoid mal-tripping incidences in future.

ITEM NO. B.5.3: Disturbance at 400/220 kV Malda on 22-03-2021 at 16:29hrs

On 22-03-2021 at 16:29hrs, bus bar protection operated at 220 kV bus 1 and 2 at Malda during final checkup for restoration of 400/220KV 315MVA ICT 3 at Malda.

As a result, 220 kV Malda- Gazole D/C and all 160 MVA 220/132 kV ICTs tripped resulting total power failure at 220 kV voltage level at Malda and around 57 MW load loss at Malda.

In PMU data, no fault has been observed.

POWERGRID may explain.

Deliberation in the Meeting

Powergrid explained following:

- *On the day of disturbance, cable replacing work was going on for busbar panel in the substation. During the removal of the old cable, the LBB initiation to busbar relay point in terminal board got inadvertently touched and as a result busbar trip got initiated.*

- *As the restoration work of ICT-3 was going on, the isolator status for the ICT-3 bay was not ready for selection of the bus as a result the busbar relay operated for both bus-I & bus-2 and gave trip command to all other feeders connected to both the buses.*

They further informed that total load loss of 57 MW occurred in this incidence and restoration was done in 30 minutes.

PCC took serious note of the above negligence and advised Powergrid to take proper measures during such type of work to avoid any kind of maloperation during the commissioning and testing of other elements.

ITEM NO. B.5.4: Bus tripping occurred in Eastern Region during March 2021

B.5.4.1: Tripping of 400 kV bus 1at 400 kV Koderma generating station on 08-03-2021 at 13:35hrs

On 08-03-2021 at 13:35 hrs, R phase string insulator of swing bus at 400 kV Koderma generating station connected to 400 kV Koderma- Bokaro 1 got burst. As a result, 400 kV bus 1 tripped on operation of bus bar differential protection.

DVC may explain.

Deliberation in the Meeting

DVC informed that R-phase insulator of swing bus of 400 kV Koderma-Bokara-I circuit got burst resulting in bus fault of Bus-I at koderma S/s. As a result all the feeders connected to 400 kV Bus-I got tripped on operation of busbar differential protection.

They added that there was no power interruption in the substation as all the tie-breakers are in service.

B.5.4.2 : Tripping of 220 kV Bus 1 at 400/220 kV Rengali S/S on 16-03-2021 at 16:02hrs

On 16-03-2021 at 16:02hrs, Y-phase clamp from the CB towards the bus isolator side broke and fell on the ground creating y phase to earth fault at 220 kV Bus 1 at 400/220 kV Rengali S/S. Both main 1 and main 2 bus bar protection at 220 kV bus 1 at Rengali operated.

Report shared by Powergrid is attached in **Annexure B.5.4.2.**

POWERGRID may explain.

Deliberation in the Meeting

Powergrid explained that Y-phase clamp of the CB towards the bus isolator side got broken and fell on the ground which resulted in Y-phase to earth fault at 220 kV Bus-1 at 400/220 kV Rengali S/S. Both main 1 and main 2 bus bar protection of 220 kV bus-1 at Rengali S/s operated and tripped all the connected elements.

PCC observed that the above trippings are in order and advised Powergrid to check connectors of such old substations during maintenance to avoid such type of tripping incidences in future.

ITEM NO. B.6: Repeated delayed clearance of faults at 220 kV Chandil STPS S/C

In March 2021, 220 kV Chandil STPS S/C tripped repeatedly due to various short circuit faults at 6-12 km from STPS.

During all instants, fault was at zone-1 from STPS and Zone – 2 from Chandil. No auto-reclose attempt was observed at STPS end. Due to non-receipt of carrier, Chandil end had cleared the faults in zone – 2 timing.

Detailed observation is attached in **Annexure B.6.**

- WBSETCL may share reason for repeated short circuit faults at almost same location and remedial action taken to reduce the no of tripping.
- WBPDCL may share reason for non-auto reclose attempt at STPS end.
- WBSETCL/JUSNL/WBPDCL may share the status of carrier aided protection at both ends of the lines**.**

WBSETCL, WBPDCL and JUSNL may explain.

Deliberation in the Meeting

ERLDC informed that there are two major issues observed related to the tripping of 220 kV Chandil-STPS lines.

I. *Non-operation of auto- recloser at STPS end*
II. *Delayed tripping at Chandil end*

Regarding the issue of auto-recloser at STPS end, WBPDCL informed that due to PLCC issue at Chandil end, the auto-recloser is not being initiated at their end. They further informed that PLCC issue at Chandil end persists since May,2020.

PCC observed that auto-recloser at Santaldih is not being operated as both the channels of PLCC are unhealthy and the delayed tripping at Chandil end is also due to non-availability of carrier protection on account of PLCC issues.

JUSNL informed that the PLCC issue at Chandil was being taken up with their telecom wing.

PCC advised JUSNL to expedite the process and resolve the PLCC issue at Chandil end at the earliest.

Further, PCC decided that WBPDCL and JUSNL engineers would conduct a joint exercise for checking the carrier communication to both the substations after the rectification of PLCC issues at Chandil end by JUSNL.

WBSETCL informed that they had carried out the line patrolling and it was found that snapping of earth wire at one location. The same had been rectified.

After detail deliberation, PCC further advised WBPDCL to communicate the tripping/ fault details of the 220 kV STPS-Chandil line to Purulia area office of WBSETCL in addition to SLDC, West Bengal for early identification and resolution of the issues.

ITEM NO. B.7: Repeated Tripping of 220 kV Biharshariff- Tenughat line.

During March-2021, 220 kV Tenughat - Biharshariff S/C tripped repeatedly due to various short circuit fault in the line and downstream network.

The fault location (39 – 43 km from Tenughat) and fault type (R phase to earth fault) is same for the most of the tripping incidents.

Summary of details received at ERLDC for tripping incidents of 220 kV Tenughat-Biharshariff S/C during March 2021

Element Name	Tripping Date	Tripping Time	Reason	Revival Date	Revival Time
220KV-TENUGHAT-BIHARSARIFF-S/C	22-03-2021	09:44 Hrs	R-N F/C 2.370 kA,40.91 km from Tenughat	22-03-2021	10:41 Hrs
220KV-TENUGHAT-BIHARSARIFF-S/C	21-03-2021	11:46 Hrs	R-N, Zone - 1, F/C 1.18 kA, 125 km from Biharshariff; R-N, Zone - 1, F/C 2.5 kA 39.75 km from Tenughat	21-03-2021	18:02 Hrs
220KV-TENUGHAT-BIHARSARIFF-S/C	21-03-2021	11:06 Hrs	R-N, Zone - 1, F/C 1.146 kA, 127 km from Biharshariff; R-N, Zone - 1, F/C 2.267 kA 43.81 km from Tenughat	21-03-2021	11:44 Hrs
220KV-TENUGHAT-BIHARSARIFF-S/C	17-03-2021	14:10 Hrs	Y-N, Zone - 1, F/C1.368 kA, 112.9 km from Tenughat	17-03-2021	14:46 Hrs

220KV-TENUGHAT-BIHARSARIFF-S/C	10-03-2021	19:05 Hrs	Tripped from Biharshariff end due to LA burst at Baripahari S/S.	10-03-2021	19:50 Hrs

BSPTCL and JUSNL may explain.

Deliberation in the Meeting

TVNL informed that during joint patrolling of the line, certain clearance issues were found which might had resulted in multiple trippings.

JUSNL informed that the clearance issues of the line have already been taken up and resolved.

PCC advised JUSNL and TVNL to do patrolling on regular basis especially in forest areas of 220 kV Tenughat – Biharshariff S/C line so that multiple tripping of line can be avoided.

ITEM NO. B.8: Repeated tripping of 220 k V Daltonganj- Garwa circuits with similar Nature of Fault

Element Name	Tripping Date	Tripping Time	Reason	Revival Date	Revival Time
220KV-DALTONGUNJ-GARWAH (NEW)-1	31/03/2021	9:49	DALTONGUNJ: B_N, Z-1, FD-47.8KM, FC-2.1KA	31/03/2021	19:07
220KV-DALTONGUNJ-GARWAH (NEW)-2	30/03/2021	11:47	DALTONGUNJ: Y-B, 61KM, 2.36KA	31/03/2021	18:22
220KV-DALTONGUNJ-GARWAH (NEW)-1	30/03/2021	9:35	Y-B Fault, Y: 1.7 KA B: 1.65 KA, Zone 2, 80.607 km from Daltongunj Garwah: Iy 0.495 KA Ib: 0.541 KA z1 23 km	30/03/2021	18:17
220KV-DALTONGUNJ-GARWAH (NEW)-2	30/03/2021	11:26	DALTONGUNJ: B-N, 18KM, 3.46KA,	30/03/2021	11:46
220KV-DALTONGUNJ-GARWAH (NEW)-1	15/03/2021	14:45	DT RECEIVED	15/03/2021	16:47

Repetitive tripping of 220 kV Daltonganj-Garwa D/C has been observed in the month of March 2021. ERLDC performed some analysis with the available data and observations are as follows.

- Most of the faults are of Y-B fault (Phase to phase). There is no involvement of ground in these faults which shows that at some phase to phase shorting is occurring slowing with arcing kind of phenomenon.
- Initially, the B phase fault is getting converted to a Y-B phase fault at the charging instance. After this, some arcing is been observed from the charging instance. Before tripping, it is observed that the line is already having a Y-B fault whose magnitude is slowly increasing and getting detected by the relay and initiating tripping command. This is indicative of a phase-to-phase clearance issue and thorough patrolling is advised to confirm and rectify the same if found.

- During the First time charging of this line, this same sequence of tripping was observed on multiple occasions.

Detailed analysis is attached in **Annexure B.8**.

JUSNL may explain.

Deliberation in the Meeting

ERLDC informed that as per the disturbance recorder analysis for the tripping of 220 kV Daltonganj-Garwa-2 line on 30.03.2021, it was found that

- *Initially there was a B-phase to ground fault in the line which got converted to a Y-B phase fault at the charging instance during auto-reclosing operation. The fault current in both the phases were slowly increasing and subsequently detected by the relay and initiated tripping command which indicates phase-to-phase clearance issue in the line.*
- *During the First time charging of this line, this same sequence of tripping was also observed.*

ERLDC further informed that most of the faults are of Y-B (phase to phase) fault and there is no involvement of ground in these faults.

JUSNL stated that patrolling was done for these lines after the trippings in which various bamboo trees were found in burnt condition near conductors. They added that at one location sag issue was also found.

Regarding remedial measures, they informed that tree cuttings have been completed at the places where clearance issues were found. Further to resolve the sag issue, the same was already taken up with a third party agency for necessary rectification work.

On enquiry from ERLDC regarding frequency of conducting line patrolling by them, JUSNL informed that last patrolling was done in August 2020 and the patrolling were being carried out after the incidence of trippings.

PCC opined that periodic patrolling should be done as a measure of preventive maintenance so that such tripping incidences can be avoided and advised JUSNL to carry out periodic line patrolling for all the lines as a preventive maintenance plan.

PCC also advised JUSNL to resolve the sag issue in the line at the earliest and submit a report in this regard to ERPC secretariat and ERLDC.

ITEM NO. B.9: Disturbance at 220 kV Budhipadar S/s at 14:07 Hrs on 08.04.2021.

At 14:07 Hrs, pipe bus of 220 KV Budhipadar-Tarkera-2 started melting due to high loading and 220 kV Budhipadar-Tarkera-1 tripped on overload. At the same time, 220 KV Budhipadar-Korba 2 and 3 and Budhipdar-Raigarh tripped on over load/power swing.

Power flow in all four circuits of 220 KV Budhipadar-IB TPS and 220 KV Budhipadar-Vedanta D/C become zero due to generation tripping on load generation imbalance.
Total power failure occurred at 220 KV Budhipadar, IB TPS and Vedanta S/s..

Generation Loss:

- **Vedanta: 1120 MW (Injection to grid: 260 MW , Captive Load loss: 860 MW)**
- **IB TPS: 250 MW**
- **Bhusan:50 MW**

Load Loss: 100 MW

OPTCL may explain.

Deliberation in the Meeting

*OPTCL explained the event with help of presentation which is attached at **Annexure B.9.***
The sequence of events as explained by OPTCL is as follows-

- *The 220KV Budhipadar-Lapanga Ckt-1 &2 tripped on distance protection with Y-B phase fault. The load flow of Lapanga-1 & 2 during that period was around 320MW and total power flow at Budhipadar bus was 682MW.*
- *After tripping of the 220KV Lapanga-1 & 2, the power flow started to Lapanga through 132KV Budhipadar-Lapanga circuit via 160MVA ATR-1 and the loading of ATR reached to 190 MW. To prevent the overload of ATR, the 132KV Budhipadar-Lapanga and Budhipadar- Jharsuguda ckt-2 were hand tripped.*
- *The 220KV Budhipadar- Raigarh PG tripped on O/C & E/F protection due to unbalance power flow and 220KV Budhipadar-Korba-3 tripped on power swing protection.*
- *Further to evacuate the power from 220 kV Budhipadar station, power flow increased in 220 kV Budhipadar- Trakera-1 & 2 line and the lines got overloaded. Subsequently, 220 kV Tarkera-1 tripped in zone-1 of distance protection.*
- *After tripping of Tarkera-1, loading in 220 kV Budhipadar-Tarkera-2 further increased and R-ph pipe bus from isolator to breaker got snapped & resulted a bus fault at Budhipadar S/s.*
- *Therefore, all feeders/Auto TRF connected to Bus-1 tripped on Bus-bar protection and Bus-1 became dead.*
- *After tripping of bus-1, there was no path for evacuation of power which resulted in tripping of IB TPS units on over frequency protection and islanding of CPPs at Vedanta, Aditya Aluminium & Bhusan.*
- *The Aditya Aluminium and Bhusan CPP got successfully islanded however in Vedanta, the units got tripped after islanding from the grid.*

*ERLDC explained the event with help of report**.** They informed that this incident was clear case of cascaded trippings due to overloading.*

Vedanta explained that the at the time of islanding they were exporting power to the tune of 260 MW and after islanding the frequency overshoots and the units got tripped. They added that if proper signal was communicated earlier to them at the start of event then they might have islanded successfully by adjusting their generation.

PCC observed that 220 kV Budhipadar S/s is an important substation of OPTCL which evacuates power from IBTPS, export power of several CPPs and connected to inter-regional grid Being a important S/s, occurance of such type of disturbances and total power failure at substation was not desirable.
PCC opined that a suitable Special protection scheme(SPS) or scheme may be planned by OPTCL so that in case of trippings of one or multiple feeders, suitable loads can be disconnected or generation injection from CPPs can be decreased so that such cascade trippings and total power failure can be avoided. Further, it can also be explored for extension of suitable signal to CPPs for islanding to ensure successful islanding operation of CPPs.

PCC advised OPTCL to carry out a study in this regard and submit detailed plan before next PCC Meeting.

ITEM NO. B.10: Total Power Failure at 220 kV Tashiding HEP at 19:56 Hrs on 17.02.2021

On 17-02-2021 at 19:56 hrs, 220 kV THEP – New Melli S/C and 220 kV THEP – Rangpo S/C tripped on R and B phase fault resulting in total generation loss and blackout at 220kV THEP.

Successful auto reclose operation on R phase to earth fault has been observed from DR rerecorded at New Melli end.

Relay Indications :

Name	End 1	End 2	PMU Observation
220 kV THEP – New Melli S/C	Zone – 4, DT sent, 8 km (reverse direction)	R-B, F/C 4.5 kA, 18 km from New Melli.	Around 60 kV dip has been observed in R and B phase voltage at Rangpo PMU data. The fault clearing time was less than 100 ms
220 kV THEP-Rangpo S/C	B-N, Zone – 1, 33 km IR = 2.25 kA, IB = 2.7 kA	R-B, Zone – 2, F/C 4.3 kA,75 km from Rangpo	

In 100th PCC Meeting, PCC advised Tashiding HEP followings:

- For line patrolling in both 220 kV Tashiding-Rangpo and Tashiding-N.Melli section to find out any clearance/sag issues.
- To submit the PSL settings file of both the lines for further analysis.
- As the Sequence of events for Tashiding HEP have not been recorded/received at ERLDC end, PCC also advised Tashiding HEP to rectify the issue at the earliest.

PCC also advised Powergrid to check the reason for operation of autorecloser relay at New Melli end for a phase to phase fault.

Tashiding HEP & Powergrid may update.

Deliberation in the Meeting

Tashiding informed that following actions were taken as per deliberations of 100th PCC Meeting.

- *Generator transformer earth fault settings had been revised as recommended by PCC forum.*
- *PSL settings file of both the lines had already been shared with ERPC.*
- *The line patrolling of both 220 kV Tashiding-Rangpo and Tashiding-N.Melli section is in progress and they would share the report after completion of the same.*
- *The issue of SOE has also been rectified at their end.*

ITEM NO. B.11: Tripping of 220 kV Bus-2 at 220/132 kV Budipadar S/S on 27-02-2021 at 17:27 hrs

On 27-02-2021 at 17:27 hrs 220 kV Bus-2 at 220/132 kV Budipadar S/s got tripped due to mal-operation of LBB relay resulting in tripping of following elements connected with the 220 kV bus-2:

- 220 kV bus coupler at Budipadar

- 220 kV Budipadar IBTPS – 2 & 4
- 220 kV BudipadarBasundharaCkt 2
- 220 kV Budipadar VAL 2
- 220 kV Budipadar AAL 2
- 220 kV BudipadarTarkera 1
- 220 kV BudipadarBhusan 1

Bus bar tripping has earlier been occurred at Budipadar S/S on 16th July 2020, 13th March 2020, 08th October 2019 also.

In 100th PCC Meeting, after detailed deliberation PCC advised OPTCL following:

I. To disable the busbar protection until the faulty bay unit is replaced/restored.

II. To reduce the zone-4 time settings in line with the earlier PCC guidelines till the bus-bar is not in operation.

III. To maintain the enough spare bay units of busbar protection relay in view of the importance of 220 kV Budhipadar S/s.

IV. To take up the issue with OEM for root cause analysis of the failure of bay units of busbar protection.

OPTCL may update.

Deliberation in the Meeting

OPTCL updated status as follows –

i. Busbar protection was disabled at Budhipadar S/s.

ii. zone 4 time settings of all lines were reduced to 300 milisecond from 500 milisecond.

iii. Regarding maintaining enough spare by units, they informed that necessary action has been initiated.

iv. Regarding root cause analysis of failure of bay units, they informed that M/S Siemens was already communicated for necessary root cause analysis and they would share the report to ERPC and ERLDC once the same is received from Siemens

PCC advised OPTCL to restore original protection scheme once new bus bar relay is operational after the replacement of bay unit by M/S Siemens.

ITEM NO. B.12: Total Power Failure at 400 kV Motihari Substation on 21.01.2021 at 11:20 hrs

400 kV Motihari-Gorakhpur D/C and 400 kV Motihari Barh-1 were out of service due to tower collapse. Motihari was connected to rest of the grid through 400 kV Barh Motihari - 2.
On 21-01-2021 at 11:20 hrs, a transient Y-phase to earth fault occurred at 400 kV Barh-Motihari - 2. Successful auto reclose operation was occurred at Motihari end.

In 99th PCC, NTPC informed that there was a transient Y-phase to earth fault in 400 kV Barh-Motihari line. The auto reclosure was successful for tie bay at Barh end. However, B-pole breaker of main bay did not reclose during the autorecloser operation. They informed that after opening of

After detailed deliberation, PCC observed that the as the line reactor is switchable, the protection of line rector should not trip the master trip relay of the line. PCC advised NTPC to check and review the scheme/relay configuration for the line reactor of 400 kV Barh-Motihari-2 line.

In 100th PCC meeting, NTPC informed that the scheme/relay configuration for the line reactor of 400 kV Barh-Motihari-2 line is being reviewed by their engineering wing. The same would be shared with ERPC/ERLDC on receipt of the views of their Engineering wing.

NTPC may update.

Deliberation in the Meeting

NTPC informed that they had not received report from their engineering wing related to modification of scheme/relay configuration for the line reactor of 400 kV Barh-Motihari-2 line till date. They added that during recent shutdown of 400 kV Barh-Motihari-2 line , they had checked and simulated the scheme and the issue was not found at that time.

ITEM NO. B.13: Repeated tripping of Circuits from NTPC Barh and Associated protection Issues

In January 2021, repeated tripping has been observed for the lines emanating from 400 kV NTPC Barh generating station. During the analysis of the tripping incidents, discrepancies in Auto – reclose operation, protection system operation and extension of the direct trip signal have been observed and the same has been shown in the next table.

NTPC vide mail dated 26th Feb 2021 updated as follows:

1. M/s Powergrid, Patna has been informed for resolution of carrier signal delay.
2. CVT secondary earthing has been checked at protection panel of Barh -Patna lines. For further detailed checking, shutdown is planned on 02 March 2021. The tripping after auto-reclose is due to TOR(Trip on Re-close) as in DR channel it is configured as SOTF/TOR trip.
3. The AR of both the main and tie breakers will be checked thoroughly during line shutdown.
4. The protection settings and schemes of transmission lines at Barh have been sent to our Engineering team for review and is under process.

In 100th PCC meeting, NTPC Barh informed that the CVT secondary earthing was checked and found healthy.

Regarding A/R & protection scheme, NTPC informed that the scheme has been sent to their engineering wing for review of the same.

Regarding carrier issue for 400 kV Barh –Patna line, Powergrid informed that the same would be checked during shutdown of the line planned in the month of April'2021.

NTPC & Powergrid may update.

Deliberation in the Meeting

Powergrid informed that carrier issue for 400 kV Barh-Patna line would be checked during shutdown of the line planned in the month of April'2021.

ITEM NO. B.14: Disturbance at 220 kV Hatia Substation on 29.01.2021 at 10:44 hrs

220 kV Ranchi - Hatia - 3 was being shifted from 220 kV bus-1 to 220 kV bus-2 at Hatia. During changeover, sparking was observed in 220 kV bus-2 isolator at Hatia of Ranchi-3 feeder. Bus bar

protection was not in service at Hatia at 220 kV voltage level. All 220 kV feeders tripped from remote ends.

In 99th PCC Meeting, after detailed deliberation PCC advised followings to JUSNL:

- To review the backup overcurrent settings of 220/132 kV ICTs at 132 kV Hatia-II S/s immediately.
- To review and submit the line backup overcurrent protection settings for 132 kV Hatia 1-132 kV Hatia II circuits.
- To review the zone settings at 132 kV Kanke end as the line should not have tripped in zone-3 from Kanke end.
- To check healthiness of the relay at PTPS end for 132 kV Hatia-I-PTPS line.
- To configure the disturbance recorders as per the standard finalized in 79th PCC Meeting.

In 100th PCC Meeting, JUSNL informed that review of settings for ICTs at Hatia-II end and checking of healthiness of the relay at PTPS end could not be completed due to non-availability of shutdown. They added that same would be done within March-2021.

Regarding DR configuration, they informed that the concerned team had already been communicated to configure the disturbance recorders as per the standard finalized in 79th PCC Meeting and would be completed by two weeks.

JUSNL may update.

Deliberation in the Meeting

JUSNL informed that review of settings for ICTs at Hatia-II end and checking of healthiness of the relay at PTPS end would be done during the shutdown scheduled on 24th and 25th April 2021

ITEM NO. B.15: Grid event at 220/132 kV Lalmatia S/s on 11-01-2021 at 11:57 hrs.

On 11-01-2021 at 11:57 hrs,132 KV KhSTPP - Lalmatia S/C, 132 KV Kahalgaon (Bihar)-Lalmatia S/C, 132 KV Lalmatia – Sahebgunj S/C tripped on R phase to earth fault. As a result, 40 MW load loss occurred. Power was supplied to Sahebgunj and Rajmahal areas through transfer bus at Lalmatia via 132 kV Kahalgaon – Lalmatia – Sahebgunj link. There was no power failure at 220 kV voltage level at Lalmatia.

PCC advised BSPTCL to set the relay settings at Kahalgaon(BSPTCL) end considering the line length of 132 kV Kahalgaon – Lalmatia section only.

Regarding frequent tripping of the 132 kV Kahalgaon (Bihar)-Lalmatia line and 132 kV KHSTPP-Lalmatia line, PCC advised JUSNL and BSPTCL to do a joint patrolling of the line and submit a report to PCC.

In 100th PCC Meeting, JUSNL informed that joint patrolling was conducted on 10th March 2021 and clearance issue was observed in the section under jurisdiction of Bihar.

PCC advised BSPTCL to submit corrective action plan based on the findings in joint patrolling report within one week.

JUSNL and BSPTCL may update.

Deliberation in the Meeting

BSPTCL informed that corrective actions related to clearance issue are already being taken up and regarding earth wire issue they informed that and there was a delay due to non-availability of shutdown from SLDC Jharkhand.

JUSNL informed that shutdown would be facilitated after second week of April'21.

ITEM NO. B.16: Backup Overcurrent Relay coordination of Sikkim Complex

In 97th PCC following deliberations were made,

It was informed that IDMT characteristics were implemented at Jorethang and Tashiding.

In 99th PCC, PCC advised PRDC to re-send the revised settings to all concerned utilities. It further advised all concerned utilities to go through revised settings and provide their observations within one week.

In 100th PCC, PRDC informed that comment from ERLDC was received and accordingly, revised study had been carried out and further the revised setting was sent to ERLDC for comments, if any.

ERLDC informed that observation would be submitted at the earliest.

Members may update.

Deliberation in the Meeting

On a query from ERLDC regarding consideration of HTLS parameters for 400 kV Rangpo-Binaguri line in the study carried out by PRDC, PRDC informed that the same has not been taken into account.

PCC advised PRDC to carry out revised study considering HTLS parameters for 400 kV Rangpo-Binaguri D/C line and share the study report to all concerned utilities.

ITEM NO. B.17: Protection setting related agenda-ERLDC

A. The primary requirement for the stage 1 setting should be to detect earth faults at the local bus bar, where the transformer winding is connected. Therefore, a fault calculation should be made as per figure 1. This calculation provides the current fed to the protection i.e. $3I_{0fault1}$. To assure that step 1 calculation to have selectivity for other earth-fault protection in the network, a short delay may be selected. Normally, a delay in the range of 0.3 – 0.4 s is appropriate under such conditions.

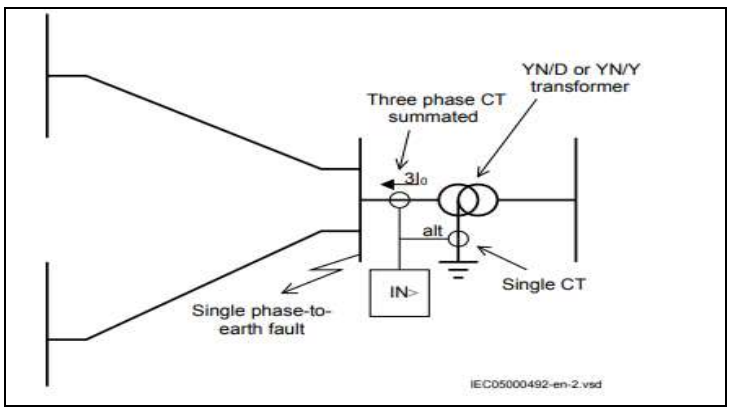


Figure 1: Step 1 fault calculation 1

Further to ensure selectivity to delayed line faults clearance at the local bus (typically distance protection operation in zone 2 in 0.5 sec), the current setting must be set high enough so that these faults do not result in unwanted step 1 trip of transformer on earth fault stage 1 setting.

Therefore, a fault calculation as shown in figure 2 is also required to be done. If the fault is located at the borderline between the instantaneous and delayed operation of the line protection (such as Distance protection or line residual overcurrent protection), the above calculation gives the current fed to the protection i.e. $3I_{0fault2}$ the setting of step 1 can be chosen within the interval shown relation given below for the above calculations.

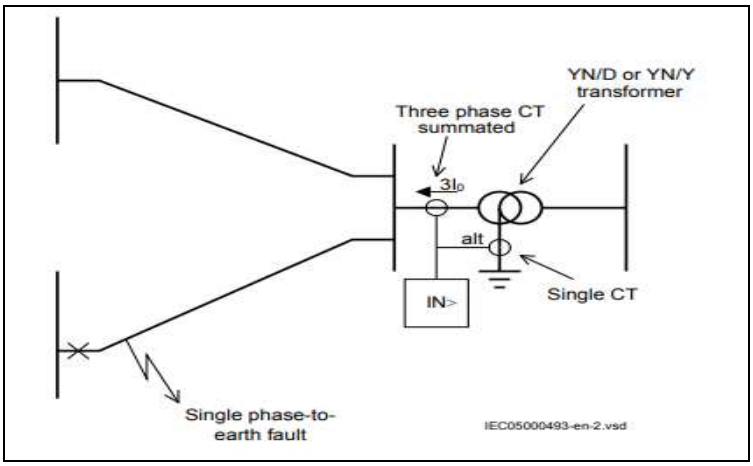


Figure 2: Step 1 fault calculation 1

$$3I_{0fault2} \cdot \text{lowmar} < I_{step1} < 3I_{0fault1} \cdot \text{highmar}$$

Where **lowmar** is a margin to assure selectivity (typical 1.2) and **highmar** is a margin to assure fast fault clearance of busbar fault (typical 1.2)

Earth fault overcurrent Stage 2 setting:

The setting of the sensitive step-2 is dependent on the chosen time delay therefore often a relatively long definite time delay or inverse time delay is selected. For this, a very low current setting (Minimum setting possible) can be selected as it is required to detect earth faults in the transformer winding, close to the neutral point. However, zero-sequence currents that can occur during normal operation of the power system are also required to be considered while selecting this current value for pickup.

In 100th PCC meeting,

ERLDC informed that the earth-fault overcurrent relay settings of the ICTs need to coordinated with that of the transmission lines.

PCC advised all the utilities to share their existing practice of setting the E/F overcurrent relays in transformers and also submit their comments regarding the proposed guidelines as above.

Members may update.

Deliberation in the Meeting

Powergrid informed that they are following the guidelines of Ramkrishna Committee for setting of the E/F overcurrent relays in transformers for 220 & 400 kV level. The setting was calculated by considering fault in remote end substation and the level of fault feeding by the connecting lines to that substation from the ICT.

CESC informed that setting of E/F overcurrent relay in transformer would depend on zero sequence current flowing through ICTs during the fault in a connected line and further value of zero sequence current would dependent on no. of ICTs connected to the bus.

DVC informed that at their substations time setting of E/F overcurrent relay in transformer is coordinated with zone 3 settings of line.

PCC advised all the utilities to share their existing practice of setting the E/F overcurrent relays in transformers through email and also submit their comments regarding the proposed guidelines as above.

B. Double-ended fault calculation using IEEE C37.114 guideline for lines with multiple owners

In today's complex power system with multiple asset owners, it is extremely important to determine fault location with high accuracy to avoid any difference in opinion among utilities at the remote ends of the line. In view of this, it is proposed that for lines where multiple owners are involved in those cases "double-ended fault location" may be adopted. IEEE standard "IEEE Std C37.114™-2014 "in this regard may be referred for better understanding and adopting the best international practice.

Recently such calculation has been done for 400 kV Motihari-Barh 2 circuit and results were found to be quite useful to avoid any difference in views of remote end utilities.

In 100th PCC Meeting, ERLDC informed that double ended fault calculation method is being used for finding the accurate fault location of the line and this method is extremely beneficial for lines where multiple utilities are involved.

They further informed that one calculation was done for an incident in 400 kV Motihari-Barh-2 line and the result was satisfactory.

The analysis & report done by ERLDC is attached at Annexure-B17.

PCC advised all the utilities to go through the above methodology and send their comments in this regard.

Members may update.

Deliberation in the Meeting

ERLDC explained that this method is useful in calculating exact fault location whenever there is a mismatch in calculated fault location from studies done at either end of the line.

Powergrid informed that double ended fault calculation gives comparatively better accuracy than single end fault calculation.

After detailed deliberation, PCC opined that utilities may adopt the double ended fault calculation method to find the fault location whenever both end DRs are available to them.

ITEM NO. B.18: Additional Agenda

1. Disturbance at 400/220/132 kV Rangpo S/s on 08.04.2021 at 15:53 hrs.

At 15:53 Hrs, all four 400/220 kV 315 MVA running ICTs(ICT- 1,3,4,5) at Rangpo S/s tripped from HV side on backup impedance protection with inter trip to LV side. At that time 28 MW generation at Tashiding and 37 MW load at Gangtok was lost on load generation imbalance. Above events led to total voltage loss in 220 KV Rangpo, Rongnichu, Tashiding, Jorethang, New Melli and 132 KV Gangtok and 132 KV Chuzachen.

Generation Loss: 28 MW
Load Loss: 37 MW

Outage Duration: 01:00 Hr

Deliberation in the Meeting

Powergrid informed that there was a fault in downstream side of the ICTs and all four running 400/220 kV ICTs got tripped on backup impedance protection. There was no tripping in the 220 kV lines at Rangpo end.

They added that as there was minimal generation at 220 kV level, the fault was entirely feed by the ICTs at Rangpo S/s and ICT got tripped from HV side after 800 msec.

They further informed that exact fault location has not yet been identified however they are suspecting there might have issues in recently commissioned new bays at 220 kV side.

They stated that OEM has already been communicated for detailed checking in this regard and a detail report would be shared once the fault location is identified.

2. LC Resonance observed in 400KV BNG-ALPD D/C—Powergrid

Powergrid intimated that problem of ferro-resonance have been observed during Single phase tripping of 400KV Binaguri-Alipurduar Ckt.- I&II due to over compensation. Initially those lines are as 400KV Binaguri-Bongaigaon D/C having distance of 217KM with line reactors of 50MVAR in each circuits at Binaguri end; later both the lines are LILOed at 400KV/220KV Alipurduar substation having new distance of 123.7KM from Binaguri end.

Due to ferro-resonance problem, the voltage in healthy phases shoot up to 291 KV (Ph-N) i.e. approx. 1.26 times of normal voltage and the neutral voltage up to 366KV. This would create stress in healthy equipment like- CT, CVT, WT, LA etc and may deteriorate the life of costly equipment.

The report submitted by Powergrid in this regard is attached at Annexure-B18.2.

They proposed following remedial action:

Both the 50MVAR Line Reactors are switchable in nature and hence Reactor circuit breaker to be given 3-ph trip command in case any single phase operation of Line Protection, so that Line Reactor will be out of service to avoid resonance problem. This type of scheme modification has been carried out in other regions to eliminate the ferro-resonance issues. Therefore, the same is proposed to consider the opening of Line Reactor due to single phase tripping of Line and it should not be booked in equipment outage. However, if Reactors tripped due to its own protection relays / body protection etc same will be consider as Outage. It can be summarized as follows:

Case-I: Line Reactors tripped due to system constrain as mentioned above, a mail will be forwarded to ERLDC / POSOCO for closing of the Line Reactor mentioning tripping due to system constrained. - It should not be booked in outage,

Case-II: Line Reactors tripped due to its own protection like – protection relay operation, body protection etc. - it will booked for outage.

Deliberation in the Meeting

ERLDC informed that the proposed scheme of tripping the line reactors during single phase tripping of the line may be implemented in view of equipment healthiness of the utility.

PCC advised Powergrid to implement the proposed scheme for 400 kV Binaguri-Alipurduar D/C Line at Binaguri end and recommended that the outage of the line reactors due to single phase tripping of line may be considered under system constraints.

PART- C:: OTHER ITEMS

ITEM NO. C.1: Collection of substation data by PRDC

PRDC is collecting the substation data and maintaining the database for the Eastern Region. The data for following new substations are to be collected:

Sl No	SS Name	Data Collection	Owner	State
1	Bagmundi		WBSETCL	West Bengal
2	Dinahata		WBSETCL	West Bengal
3	Goghat		WBSETCL	West Bengal
4	Saltlake Stadium		WBSETCL	West Bengal
5	Mathabhanga		WBSETCL	West Bengal
6	Kashipur		OPTCL	Odisha
7	Betanati		OPTCL	Odisha
8	Aska New		OPTCL	Odisha
9	Udala		OPTCL	Odisha
10	Narashinghpur		OPTCL	Odisha
11	IBTPS		OPGC	Odisha
12	Mancheswar		OPTCL	Odisha
13	North Karanpura		NTPC	Jharkhand
14	TingTing		….	Sikkim
15	Lethang		….	Sikkim
16	Rongichu		……	Sikkim

In 100th PCC Meeting, PRDC informed that they had visited new substations in West Bengal and collected relevant data. They further informed that they data collection for Odisha substations would be completed by March 2021.

PCC advised all concerned utilities to facilitate the visit by PRDC personnel for collection of substation/relay data.

Members may update.

Deliberation in the Meeting

PRDC informed that they had visited all new substations except few in Sikkim.

ITEM NO. C.2: Submission of protection settings in PDMS

Relay settings of many transmission elements are not available in the protection database. The list has been prepared and forwarded to all the concerned utilities.

Relay settings had been received from CESC, Haldia Energy Limited and for few Substations from Powergrid ER-1. OPTCL, WBSETCL, JUSNL, BSPTCL, WBPDCL,Powergrid ER-II ,NTPC and other constituents are required to submit relay settings at earliest.

In 100th PCC Meeting, it was informed by ERPC secretariat that an audit by PSDF audit team was carried out for protection Database project on 19.02.2021 and it was noted that around 7 percent of protection settings was not available in PDMS.

PCC advised all concerned utilities to upload the pending relay settings in PDMS or send the

relay settings to erpcprotection@gmail.com.

Members may update.

Deliberation in the Meeting

PCC advised ERPC to share updated list of pending relay settings to all the concerned utilities. It further advised all concerned utilities to upload the pending relay settings in PDMS or send the relay settings to erpcprotection@gmail.com.

ITEM NO. C.3: Protection coordination of the New Transmission elements to be charged in Eastern Region

C.3.1 : Restoration of LILO of 400 kV Barh Gorakhpur - 1 at Motihari

As per information received at ERLDC,LILO of 400 kV Barh Gorakhpur - 1 at Motihari will be restored soon. Details of the modified line after LILO (as per information available at ERLDC)are as follows:

Name	Conductor type	Length
400 kV BarhMotihari - 1	Quad ACSR Moose	237km
400 kV Gorakhpur Motihari - 1	Quad ACSR Moose	190 km

As per information available at ERLDC, protection coordination may be required as per the following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
Restoration of LILO of 400 kV Barh Gorakhpur - 1 at Motihari	Motihari	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	DMTCL	Protection coordination has been done as per ERPC's guideline
	Barh	Protection coordination to be done for 400 kV BarhMotihari– 1 (earlier it was 400 kV Barh Gorakhpur S/C) as per ERPC's guidelines	NTPC Barh	**Yet to be received**
	S/S connected to Barh: Kahalgaon and Patna	Longest line connected to NTPC Barh may change from 400 kV Barh – Gorakhpur S/C to 400 kV Barh – Motihari - 1	NTPC Kahalgaon and POWERGRID ER-1	**Yet to be received**

Following Details to be shared:

- Confirmation of end to end carrier protection between Barh and Motihari&Motihari and Gorakhpur may be shared.
- In case of change in any existing protection setting, same may be shared with ERLDC and ERPC for update in ERPC protection database.
- Protective relay setting of all newly charged (or to be charged) elements may be shared as per the following table.

Element Name	S/S Name	Utility to respond	Received for S/S
400 kV Barh – Motihari - 1	Barh STPP &Motihari	NTPC Barh and DMTCL	
400 kV Gorakhpur – Motihari - 1	Gorakhpur &Motihari	POWERGRID & DMTCL	

NTPC and Powergrid may update.

Deliberation in the Meeting

PCC advised powergrid to share revised protection settings of Gorakhpur to ERPC and ERLDC.

C.3.2 : First time charging of 400/220/132 kV Sitamari s/s and other transmission elements connected to this S/S

As per information received at ERLDC, following transmission elements will be charged:

Name	Conductor type/Capacity	Length
400 kV bus 1 and 2 at Sitamari	Quad AAC Bull, 4kA continuous, 63kA/1 sec	--
400 kV Bus Extension- I & 400 kV Bus Extension- 2 at Motihari S/S	GIS busbar extension module,4kA continuous, 50kA/1 sec	--
400 kV Sitamari – Motihari D/C	Triple ACSR Snowbird	85.693 km
400/220 kV 500 MVA ICT 1 and 2 at Sitamari	500 MVA	--
400 kV 125 MVA bus reactor 1 & 2 at Sitamari	125 MVAr	--
400 kV Darbhanga Sitamari D/C	Triple ACSR Snowbird	80 km
220/132 kV 200 MVA ICT 1 & 2 at Sitamari	200 MVA	--

Protection coordination may be required as per the following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
Charging of 400 kV Sitamari – Motihari D/C	Motihari	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	DMTCL	**Yet to be received**
	Sitamari	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	PMTL	**Received**
	S/S connected to Motihari: Barh and Gorakhpur	Shortest line connected to Motihari will be 400 kV Sitamari – Motihari D/C. Zone – 2 time setting may need to be coordinated.	NTPC Barh and POWERGRID	**Yet to be received**
Charging of 400 kV Darbhanga Sitamari D/C	Darbhanga	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	DMTCL	**Yet to be received**
	Sitamari	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	PMTL	**received**
	S/S connected to Darbhanga: Muzaffarpur and Kishangunj	Longest and Shortest lines connected to Darbhanga may be checked.	POWERGRID ER -1	**Yet to be received**

Following Details to be shared:

- Confirmation of end to end carrier protection between Sitamari and Motihari & Sitamari and Darbhanga may be shared.

- Confirmation of bus extension portion would be protected by bus bar protection at Motihari
- In case of change in any existing protection setting, same may be shared with ERLDC and ERPC for update in ERPC protection database.
- Protective relay setting of all newly charged (or to be charged) elements may be shared as per the following table.

Element Name	S/S Name	Utility to respond	Received for S/S
400 kV Sitamari – Motihari D/C	Sitamari&Motihari	PMTL & DMTCL	**Sitamari**
400 kV Darbhanga Sitamari D/C	Sitamari&Darbhanga	PMTL & DMTCL	**Sitamari**
400 kV bus 1 and 2 at Sitamari	Sitamari	PMTL	**Sitamari**
400/220 kV ICT – 1 & 2 at Sitamari	Sitamari	PMTL	**Sitamari**
220 kV bus 1 and 2 at Sitamari	Sitamari	PMTL	**Sitamari**
220/132 kV ICT – 1 & 2 at Sitamari	Sitamari	PMTL	**Sitamari**
132 kV bus 1 at Sitamari	Sitamari	PMTL	**Sitamari**
400 kV bus reactor 1 & 2 at Sitamari	Sitamari	PMTL	**Sitamari**

Concerned utility may update.

Deliberation in the Meeting

PCC advised DMTCL, Powergrid and NTPC to share protection settings to ERPC and ERLDC at earliest.

C.3.3: First time charging of 220 kV Sitamarhi-Motipur D/C and other transmission elements connected to this S/S

As per information received at ERLDC,220 kV Sitamarhi-Motipur D/C will be charged.**Details of the line (as received at ERLDC)**

Name	Conductor type	Length
220 kV Sitamarhi-Motipur D/C	ACSR Twin Moose	52.1 km

Protection coordination may be required as per the following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
Charging of 220 kV Sitamarhi -Motipur D/C	Sitamarhi	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	PMTL	Protection coordination has been done as per ERPC's guideline
	Motipur	Protection coordination to be done for all newly connected elements as per ERPC's guidelines. Shortest line connected to Motipur S/S may be checked and protection coordination may be done for feeders connected to Motipur S/S in case of change in shortest line connected to Motipur S/S. 220 KvSitamrhi-	BSPTCL	**Yet to be received**

		Motipur(52.1Km) is Twin moose conductor so impedance wise it may be the shortest line, Kindly check and confirm any setting revision.		
	S/S connected to Motipur: Kanti, Musari, Darbhanga(DMTCL),	Shortest line connected to Motipur S/S (Earlier it was 220 kV Motipur-Kanti D/C as per details available at ERLDC) may get changed. 220 k V Sitamrhi-Motipur (52.1Km) is Twin moose conductor so impedance wise it may be the shortest line, Kindly check and confirm any setting revision.	BSPTCL /DMTCL/NTPC	**Yet to be received**

Following Details to be shared:

- PMTL& BSPTCL 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.
- The protection setting at Sitamarhi&Motipur may be shared with ERPC and ERLDC.
- Status of carrier protection and PLCC channel in 220 kV Sitamarhi ,Motipur section may be shared.

Concerned utilities may update.

Deliberation in the Meeting

It was informed that the revised settings had already been received.

C.3.4 : Restoration of 400 kV Patna Kishangunj D/C

As per information received at ERLDC, 400 kV Patna Kishangunj D/C (Line conductor: Quad Moose ACSR; Line length 196 km) will be restored soon.

Hence necessary protection coordination (if required) may be done for S/S connected to Patna S/S which are Balia, Barh and NPGC.

Necessary protection coordination may also be done for S/S connected to Kishangunj S/S which are New Purnea, Darbhanga, Binaguri, Rangpo and Teesta III.

Members may discuss.

Deliberation in the Meeting

PCC advised Powergrid & ATL to confirm necessary protection coordination to ERPC secretariat and ERLDC at the earliest.

C.3.5: First time charging of 400/132 kV 315 MVA ICT 3 at Motihari substation and other transmission elements connected to this S/S

Powergrid has intimated that they are in process of commissioning 400/132 kV 315 MVA ICT-3 at Motihari substation. In view of the above, the net impedance of ICTs at Motihari will further reduce (Existing is 2 X 200 MVA 400/132 kV ICT 1 and 2).

It is advised to kindly confirm the required protection coordination at NTPC barh and 400/220 kV Gorakhpur (PGCIL) S/s for this.

If there is any change, the new setting may also kindly be shared with ERLDC/ERPC and later after charging the same may also be uploaded.

NTPC & Powergrid may update.

Deliberation in the Meeting

PCC advised all concerned utilities to confirm protection coordination to ERPC secretariat and ERLDC.

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