Minutes of 94th PCC Meeting

Date: 28.09.2020
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 94TH PROTECTION SUB-COMMITTEE MEETING HELD ON 28.09.2020 AT 10:30 HOURS

The meeting was conducted through MS Teams online platform. List of participants is enclosed at **Annexure-A**.

PART – A

ITEM NO. A.1: Confirmation of minutes of 93rd Protection sub-Committee Meeting held on 17th Aug 2020 at ERPC, Kolkata.

The minutes of 93rd Protection Sub-Committee meeting held on 17.08.2020 circulated vide letter dated 09.09.2020.

Members may confirm the minutes of 93rd PCC meeting.

Deliberation in the meeting

Members confirmed the minutes of 93rd PCC Meeting.

PART – B

ITEM NO. B.1: Disturbance at 400/132 kV Motihari Substation on 12.08.2020 at 23:45 hrs

400/132 kV Motihari substation is connected to the rest of the grid via 400 kV Barh – Motihari – 2 (Other 400 kV lines are under breakdown due to tower-collapse in DMTCL Motihari section). It is feeding the radial loads of 132 KV Bettiah, and 132 KV Raxaul through 400/132 kV ICT – 1 at Motihari.

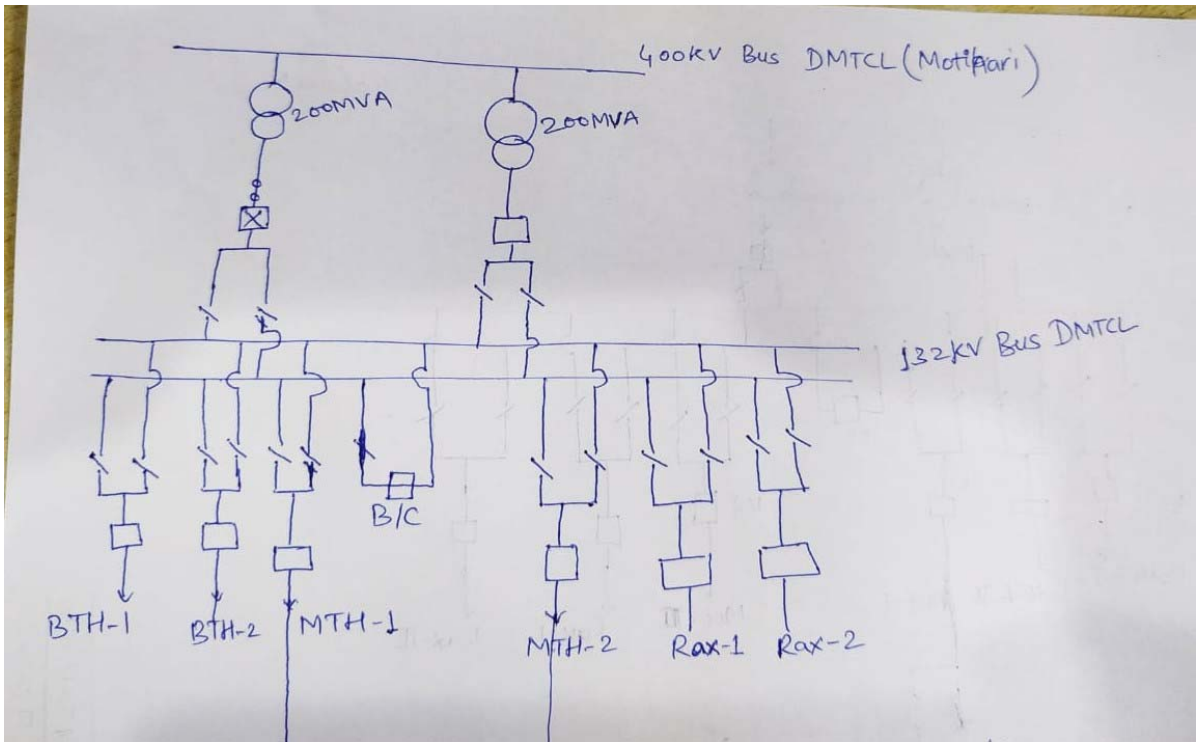
132 kV Motihari (BSPTCL) is presently not being supplied from Motihari DMTCL due to the non-availability of 400/132 kV ICT 2 due to the bushing issue and is being fed through 220 kV Motipur via 400/132 kV Darbhanga (DMTCL) substation. On an interim basis, 132 kV Dhaka substation load was being fed through 400/132 Motihari substation through 132 kV Motihari-Motihari (BSPTCL) 1 circuit via 132 kV transfer bus bay at Motihari (BSPTCL) and connecting 132 kV Motihari(BSPTCL)-Dhaka(BSPTCL) ckt. Loading limit restriction was imposed on this interim connection as 40 MW and based on which directional overcurrent setting was implemented at 132 kV Motihari (DMTCL) to avoid any overloading of 400/132 kV ICT 1.

At 02:19 hrs 400/132 kV ICT - 1 at Motihari got tripped due to operation of LBB Protection from 132 kV side. Being the single source of supply, the tripping of 400/132 kV ICT 1 has led to the loss of supply to 132 kV Bettiah and Raxaul and connected rest of the 132 kV radial system.

Relay Indications :

Element Name	End1 Relay Indication	End 2 Relay Indication	PMU Observation
400/132 kV ICT - 1	Did not trip	LBB Protection	No short circuit fault has been observed in PMU voltage recorded at Barh.
132 kV Motihari-Bettiah 1	LBB Protection	-	

132 kV Motihari-Bettiah 2	LBB Protection	-	
132 kV Motihari-Raxaul 1	LBB Protection	-	
132 kV Motihari-Raxaul 2	LBB Protection	-	
132 kV Motihari-Motihari 1 (Feeding Dhaka 132 kV via transfer bus at 132 kV Motihari BSPTCL)	Direction O/C operated as load increased beyond 40 MW based current setting , Breaker not tripped, LBB operated.	-	



Load Loss : 180 MW

BSPTCL and DMTCL may explain.

Deliberation in the meeting

BSPTCL and DMTCL informed that there was no fault in the transmission system. BSPTCL and DMTCL explained that as an interim basis, 132 kV Dhaka substation load was being fed through 400/132 Motihari substation through 132 kV Motihari-Motihari (BSPTCL) 1 circuit via 132 kV transfer bus bay at Motihari (BSPTCL). Loading limit restriction was imposed on this interim connection as 40 MW and based on which directional overcurrent setting was implemented at 132 kV Motihari (DMTCL) to avoid any overloading of 400/132 kV ICT 1.

DMTCL informed that one phase current of 132 kV Motihari-Motihari (BSPTCL) 1 at 132 kV Motihari (DMTCL) was increased higher than the pickup value due to unbalance as a result, the relay issued trip commanded to the respective breaker, but the breaker did not open. Thereafter, LBB protection operated and tripped all the elements connected to 132kV bus.

DMTCL informed that after investigation, it was found that the cabling between the relay and the

circuit breaker was not connected. DMTCL explained that since backup directional overcurrent protection was not being used in Motihari S/s, it was overlooked by them.

DMTCL added that after the disturbance, the respective cables have been connected and tripping of the CB verified by giving trip command from the relay.

PCC advised DMTCL to check the protection system by initiating a trip command from the relay and ensure respective CB operation to avoid such incidences. The line shutdown may be taken, if required.

PCC advised all the transmission utilities to follow the above procedure to ensure the healthiness of the protection system during any modification and alteration in the protection system.

ERLDC informed that they are not getting the load loss and time duration of the load loss from the SLDCs.

PCC advised all the SLDCs to provide MU data, quantum of load and load shifting details to ERLDC along with the disturbance report.

ERLDC informed that load shedding scheme should be implemented at Motihari S/s to avoid overloading of other 400/132kV ICT in case of tripping of one ICT.

It was informed that third 400/132kV ICT would be commissioned by December 2020.

PCC advised BSPTCL to interact with DMTCL and implement a SPS scheme at Motihari S/s till the commissioning of 3rd ICT.

ITEM NO. B.2: Disturbance at 400 kV Motihari Substation on 22.08.2020 at 16:46 hrs

At 16:46 hrs 400 kV Barh – Motihari – 2 tripped due to Y to B phase short circuit fault. Other 400kV lines connected to Motihari(DMTCL) are under breakdown since August 2019. The tripping led to loss of supply to 400kV Motihari (DMTCL), Betiah/Raxaul/Motihari (Bihar), being the only source of supply.

No SOE has been recorded in ERLDC SCADA data at the time of the event. NTPC Barh, BSPTCL and DMTCL are requested to check this issue.

Relay Indications :

Element Name	Barh End	Motihari End	PMU observation
400 kV Barh Motihari - 2	Y-B, Zone – 1, F/C: 17.89 kA, 10.5 km, from Barh	DT received	Around 80 kV dip has been observed in Y and B phase voltage at the time of the event. Fault clearing time was less than 100 ms.

Load Loss : 117 MW

NTPC Barh, BSPTCL and DMTCL may explain.

Deliberation in the meeting

DMTCL informed that at 16:46 hrs there was a Y to B phase short circuit fault occurred in 400kV Barh-Motihari line-2 at 18 km from Barh end and DT was received at Motihari end due to which 400 kV Barh – Motihari – 2 tripped.

Powergrid informed that line patrolling was done and a big kite was found at the fault location causing Y to B phase fault. Powergrid further informed that the line was charged after taking the necessary corrective action.
ERLDC informed that Motihari end should pick up the fault in the line and placed the following observations related to protection settings at 400kV Motihari (DMTCL) S/S:

- *Weak infeed protection may be enabled till the restoration of remaining lines for better detection of the faults in the transmission lines.*
- *The resistive reach settings of the distance protection are to be reviewed for reliable detection of high resistance faults in the transmission system.*
- *400/132 kV ICT backup overcurrent E/F protection settings is at 100 ms which needs to be reviewed.*

PCC advised DMTCL to review the above protection settings incoordination with ERLDC.

ERLDC informed that three times line to ground faults were appeared in this line during past one month.

PCC advised DMTCL and Powergrid to take necessary action to maintain healthiness of the line to maintain reliable power supply to Motihari.

ITEM NO. B.3: Total power failure at 400 kV Muzaffarpur and 220 kV Darbhanga Substation on 20.07.2020 at 07:06 hrs

At 07:06 hrs. B phase to earth fault occurred at 400 kV Muzaffarpur-Gorakhpur – 2. B pole of tie breaker at Muzaffarpur end got did not open. Due to delay in LBB operation, fault was getting fed and to clear the fault, 400 kV Muzaffarpur-Gorakhpur – 1, 400 kV Muzaffarpur-New Purnea-2, 400 kV Muzaffarpur-Biharshariff D/C and 220 kV Muzaffarpur – Hajipur D/C tripped. Fault clearing time was around 500 ms. Tripping of 220 kV Muzaffarpur – Hajipur D/C resulted total power failure at Hajipur and chapra.

At 07:08 hrs, 220 kV Darbhanga (DMTCL) – Darbhanga D/C, 220 kV Darbhanga (DMTCL) – Motipur D/C, 220 kV Darbhanga (DMTCL) – Laukahi - 1, 220 kV Darbhanga (DMTCL) – Samastipur S/C tripped due to overvoltage problem resulting total power failure at Darbhanga and its nearby areas.

In 93rd PCC, it was observed that distance protection at Dharbanga(DMTCL) of 400 kV Muzaffarpur-Dharbanga(DMTCL) line has not seen the fault either in zone 3 or zone 2. PCC advised DMTCL to review the zone settings at Dharbanga (DMTCL).

DMTCL may update.

Deliberation in the meeting

ERLDC informed that parameters of longest line were not considered for calculation of zone settings at Darbhanga (DMTCL) and resistive reach settings are also to be reviewed.

DMTCL informed that they had reviewed the zone 3 settings as per the ERPC protection settings guidelines.

PCC advised DMTCL to review the resistive reach settings in coordination with ERLDC.

ITEM NO. B.4: Disturbance at 220 kV Darbhanga Substation on 22.07.2020 at 12:15 hrs

220 kV Darbhanga (BSPTCL) to Mushahari – 2 was idle charged from Mushahari end. At 12:15 hrs 220 kV Darbhanga (DMTCL) – Darbhanga (BSPTCL) D/C tripped from DMTCL end only. At same time 220 kV Darbhanga (BSPTCL) to Mushahari – 1 also tripped. Later it was reported that Y – Phase Bushing to Gantry tower conductor of 220 kV Darbhanga (DMTCL) – Darbhanga (BSPTCL) – 2 was melted and fault occurred.

Detail report for any event occurred at Bihar STU network is yet to be received from Bihar SLDC in spite of repeated reminders.

Relay Indications:

Element Name	End 1	End 2	PMU observation
220 kV Darbhanga (DMTCL)-Darbhanga (Bihar)-2	Yet to be received	Did not trip	Around 15 kV dip has been observed in B and Y phase voltage at Muzaffarpur PMU. Initially there was a B phase to earth fault. Around 1000 ms later, another Y phase to earth fault occurred. Fault clearing time was 1300 ms for B phase to earth fault and 300 ms for Y phase to earth fault.
220 kV Darbhanga (DMTCL)-Darbhanga (Bihar)-1	Yet to be received	Did not trip	
220 kV Darbhanga (Bihar) – Mushahari - 1	Yet to be received	Yet to be received	

Load Loss : 250 MW

In 93rd PCC, BSPTCL explained that there was a transient fault in 220 kV Darbhanga (BSPTCL)-Mushahari – 1. Due to problem in trip circuit of Circuit Breaker at Darbhanga (BSPTCL) end, the line did not trip from Darbhanga (BSPTCL) end. Thereafter, 220 kV Darbhanga (DMTCL) – Darbhanga (BSPTCL) D/C tripped from DMTCL end on zone 3.

ERLDC informed that as per the DR plot of Darbhanga (DMTCL) of 220 kV Darbhanga (DMTCL) – Darbhanga (BSPTCL) line-I, the fault was Y-N fault whereas DRs of other lines were showing B-N fault. ERLDC added that BSPTCL is not submitting the DRs in time.

PCC advised BSPTCL to take following actions:

- Check the phase sequence of 220 kV Darbhanga (DMTCL) – Darbhanga (BSPTCL) D/C lines.
- Check the Circuit breaker of 220 kV Darbhanga (BSPTCL) - Mushahari – 1 at 220 kV Darbhanga (BSPTCL) and identify the root cause of non-operation of the CB.
- Submit the DRs and tripping report within stipulated time.

BSPTCL may update.

Deliberation in the meeting

BSPTCL informed that the phase sequence issue of 220 kV Darbhanga (DMTCL) – Darbhanga (BSPTCL) D/C lines were resolved after charging the bays as per the original plan. BSPTCL added that breaker timing test was done at GSS Darbhanga for all the line bays. It was found that R-ph pole circuit breaker of 220 kV Darbhanga (BSPTCL) - Mushahari – 1, auxiliary contact was melted and the same has been rectified.

ITEM NO. B.5: Disturbance at 220 k V Darbhanga S/S on 10.06.2020 at 10:54 hrs.

On 10th June 2020, at 10:54 Hrs, 220 kV Darbhanga (DMTCL)-Darbhanga (BSPTCL) D/C tripped from BSPTCL end. At the same time 220 kV Darbhanga (BSPTCL) – Mushahari – 1 and 220 kV Darbhanga (DMTCL) – Motipur – 1 also tripped resulting in load loss at Darbhanga, Madhubani and Pandaul.

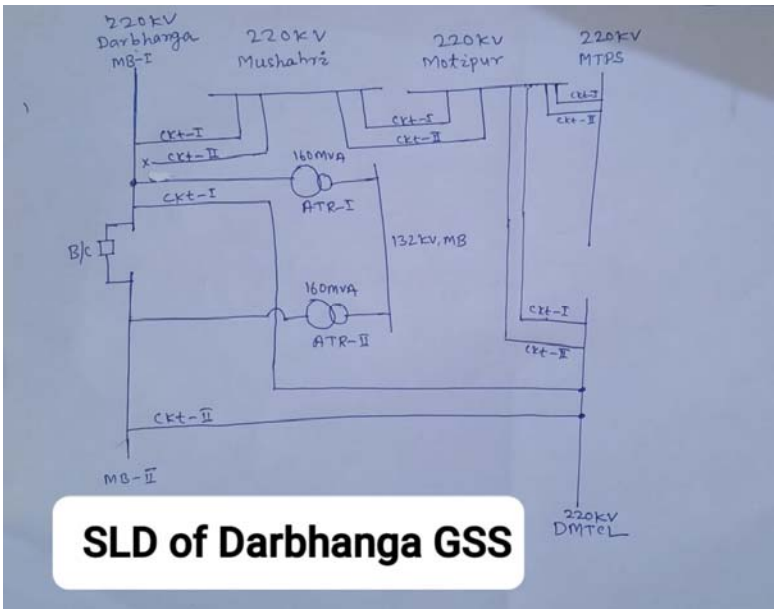
Load Loss: 135 MW

In 92nd PCC, BSPTCL explained that fault was in 220 k V Darbhanga(DMTCL) – Motipur -1 line, the line got tripped in zone 1 and the auto-reclose was successful at Motipur end.

DMTCL informed that auto-reclose was unsuccessful at Darbhanga(DMTCL) end.

BSPTCL informed that 220 kV Darbhanga (DMTCL)-Darbhanga (BSPTCL) circuit 2 got tripped from BSPTCL end on directional earth fault. Thereafter LBB protection at Darbhanga (BSPTCL) was operated due to loose connection and tripped 160 MVA ATR-2 which was connected to Bus II. As a result, 160 MVA ATR-I and 220 kV Darbhanga (BSPTCL) – Mushahari – 1 also got tripped due to overload.

ERLDC pointed out that when system remains on both buses (MB-1 & MB-2) through bus coupler then the current values are unsymmetrical resulting in abnormal neutral current. But when the system is put on the single bus the currents are in symmetrical.



After detailed deliberation, PCC advised DMTCL to check the reason for non-operation of auto-reclose of 220 kV Darbhanga(DMTCL) – Motipur -1 line from DMTCL end.

In 93rd PCC, BSPTCL updated the status of corrective actions as follows:

- Test the breakers at 220/132 kV GSS Darbhanga (BSPTCL) –-Testing would be done within a week
- Test the healthiness of LBB protection at Darbhanga (BSPTCL) ---Tested and found loose connection with the auxiliary relay. The same has been rectified.
- Find out the reason for occurrence of unsymmetrical current at Darbhanga (BSPTCL) and resolve the issue. ---Not yet resolved. BSPTCL agreed to resolve at the earliest.

ERLDC informed that unsymmetrical current may be due to wave trap.

PCC advised BSPTCL to interact with ERLDC for any guidance on this issue.

BSPTCL may update.

Deliberation in the meeting

BSPTCL informed that breaker timing test was done at GSS Darbhanga for all the line bays and the issues were resolved as discussed in Item B4.

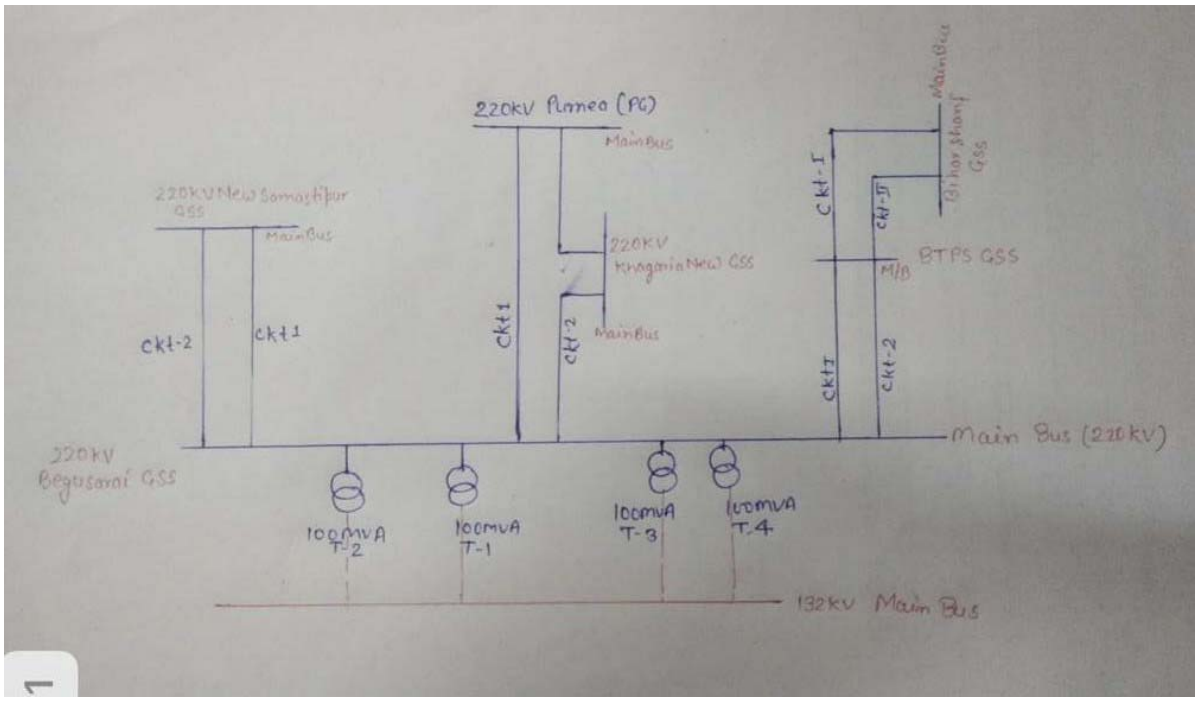
BSPTCL informed that unsymmetrical current was observed due to unsymmetrical arrangement of wave trap on either side of the line and the same has been corrected.

After detailed deliberation, PCC advised BSPTCL and DMTCL to implement the following:

- *As the line length is 2.98 km, Differential protection for 220 kV Darbhanga (DMTCL)-Darbhanga (BSPTCL) D/C line may be implemented to improve the reliability.*
- *Implement POTT inter trip scheme along with current reversal guard in the distance protection to improve the reliability.*
- *Directional overcurrent E/F protection is to be coordinated with distance protection and adjacent line back up protection*

ITEM NO. B.6: Disturbance at 220 kV Begusarai , 220 kV Khagaria and 220 kV Barauni Substation on 03.08.2020 at 11:05 hrs

On 03-08-20 at 10:15 Hrs 220 kV New Purnea-Begusarai-1 tripped on B phase to earth fault. Consequently 220 KV MTPS-Samastipur D/C kept open to reduce overloading of 220 KV Muzaffarpur(PG)-MTPS D/C. 220kV Samatipur-DMTCL Darbhanga line was out due to flood.



At 11:01 hrs 220 kV Biharshariff-Barauni D/C tripped from Biharshariff end on B-Phase to earth fault with delayed fault clearance observed in PMU. At the same time 220 KV Barauni-Begusari-1 tripped in zone-2 from Barauni end.

At 11:05hrs, 220 KV Begusarai-Khagaria and New Purnea –Khagaria ckt 2 tripped on B phase to earth fault. For 220 KV Begusarai-Khagaria line fault distance was 48.26 km from Begusarai.

At 11:05 hrs. Running unit of Barauni (unit no. 8) generating 180 MW get islanded with Begusarai load and Samastipur load. Due to LGBR unbalance unit-8 of Barauni tripped on under frequency and complete blackout in 220 k V Barauni, 220 KV Begusarai & 220 KV Khagaria took place. Load loss of 232 MW in Rosra, Kucheswar, Dalsingsarai, Manjhaul, Samastipur, Khagaria areas took place.

Load Loss : 232 MW , Gen . Loss :180 MW

BSPTCL may explain.

Deliberation in the meeting

BSPTCL informed that there were multiple faults in the network due to bad weather.

BSPTCL explained that at 10:15 Hrs 220 kV New Purnea-Begusarai-1 tripped from New Purnea end on zone 2 and Begusarai end on zone 2 because of B phase to earth fault in the line.

At 11:01 hrs there was another fault in 220 KV Barauni-Begusari line-1, the line was tripped on zone-2 from Barauni end and zone 1 from Begusari end. But at the same time, 220 kV Biharshariff-Barauni D/C tripped from Biharshariff end on B-Phase to earth fault within 400 msec and 220kV BTPS-Hazipur D/C lines also tripped from Hazipur end.

At 11:05 hrs, 220 KV Begusarai-Khagaria line also tripped from both ends on zone 1 because of another fault in the line.

Thereafter, Running unit of Barauni (unit no. 8) generating 180 MW got islanded with Begusarai load and Samastipur load and the unit got tripped due to unbalance between the load and generation.

BSPTCL informed that they are having high set setting in 220 kV Biharshariff-Barauni D/C line at Biharshariff to avoid tripping of ICTs at Biharshariff. BSPTCL added that the time setting of the high set has been revised from 400 ms to 450 ms after the disturbance to have better coordination with 220 KV Barauni-Begusari D/C line protection.

After detailed deliberation, PCC advised BSPTCL to take following corrective actions:

- *Proper line patrolling is to be done to avoid faults in the transmission system.*
- *Tripping of 220kV BTPS-Hazipur D/C line from Hazipur to be verified. BSPTCL advised to check the relay settings of main and backup protection.*
- *PLCC system, inter tripping and auto recloser should be in service to minimise the fault clearing time.*

ITEM NO. B.7: Disturbance at 220 kV Begusarai , 220 kV Khagaria and 220 k V Barauni Substation on 09.08.2020 at 07:41 hrs

At 7:41 hrs R ph CT blast at Begusarai end of 220 KV BTPS Begusarai ckt 2. Subsequently, all connected 220 KV ckts and 220/132 KV ICTs at Begusarai tripped either on busbar/LBB protection or from remote ends on zone 2.

At the same time, running unit 8 at 220 KV Barauni TPS with 220 MW generation tripped on overcurrent. 220 kV BTPS –Hajipur 1 was under breakdown due to tower collapse and 220 KV BTPS Hajipur ckt 2 also tripped at the same time on possibly overreach.

As a result ,there was total voltage loss at 220 KV Begusarai s/s and load loss 175 MW took place in Dalsinghsarai , BTPS(132Kv),Manjhaul, Ballia, Khagaria andBegusarai area.220 KV BTPS remained connected with 220 KV Biharshariff via 220 KV double ckts.

Load Loss : 175 MW , Gen Loss :220 MW

BSPTCL may explain.

Deliberation in the meeting

BSPTCL explained that R ph CT blast at Begusarai end of 220 KV BTPS Begusarai ckt 2 which resulted in bus fault at 220kV Begusarai S/s. BSPTCL informed that Busbar protection at 220kV Begusarai was not in service. 220 KV BTPS-Begusarai ckt 2 tripped from Begusarai end on zone 1, 220 KV BTPS-Begusarai ckt I was not tripped from Begusarai and remote end details are not available with them. 220kV Khagaria-Begusarai D/C line tripped from Khagaria end and 220kV

BTPS-Hazipur line 2 also tripped from Hazipur.

After detailed deliberation, PCC concluded that the fault was cleared from 220kV BTPS end as there was no tripping from 220kV Biharshariff end and there was no other source is connected at 132kV side of Begusarai.

PCC advised BSPTCL to take the following corrective actions:

- *SLDC, Bihar should collect the tripping details from BTPS and submit to ERPC and ERLDC.*
- *Tripping of 220kV BTPS-Hazipur line 2 from Hazipur to be verified. The line was also tripped on previous disturbance discussed in Item B6.*
- *BSPTCL should bring the busbar protection at 220kV Begusari S/s at the earliest*

ITEM NO. B.8: Disturbance at 220 kV Hajipur Substation on 04.08.2020 at 19:33 hrs

220 KV Barauni-Hajipur-1 was under breakdown and ckt-2 was not in service prior to the event. At 19:33 hrs, while taking charging attempt of 220 KV Barauni-Hajipur 2, 220 KV Muzaffarpur-Hajipur D/C tripped leading to a load loss of 313 MW in Hajipur, Chhapra, Amnour.Initially the 220 kV Barauni-Hazipur 1 which was under outage and was being charged from Hazipur end at 19:33 Hrs.

From DR of 400 kV Muzaffarpur-Hazipur circuits, it is observed that the circuit developed a fault in B phase which persisted for more than 700 ms. After this, the fault got isolated as per the DR file as well as PMU data. The DR for this circuit has not been shared by BSPTCL.

Immediately after 300 ms of this fault, Y-B phase fault appeared in 220 kV Muzaffarpur-Hazipur D/C which was picked in zone 1 and lines got tripped immediately. The exact fault location and whether it was related to 220 kV Barauni-Hazipur 1 tripping is not known as no details from BSPTCL.

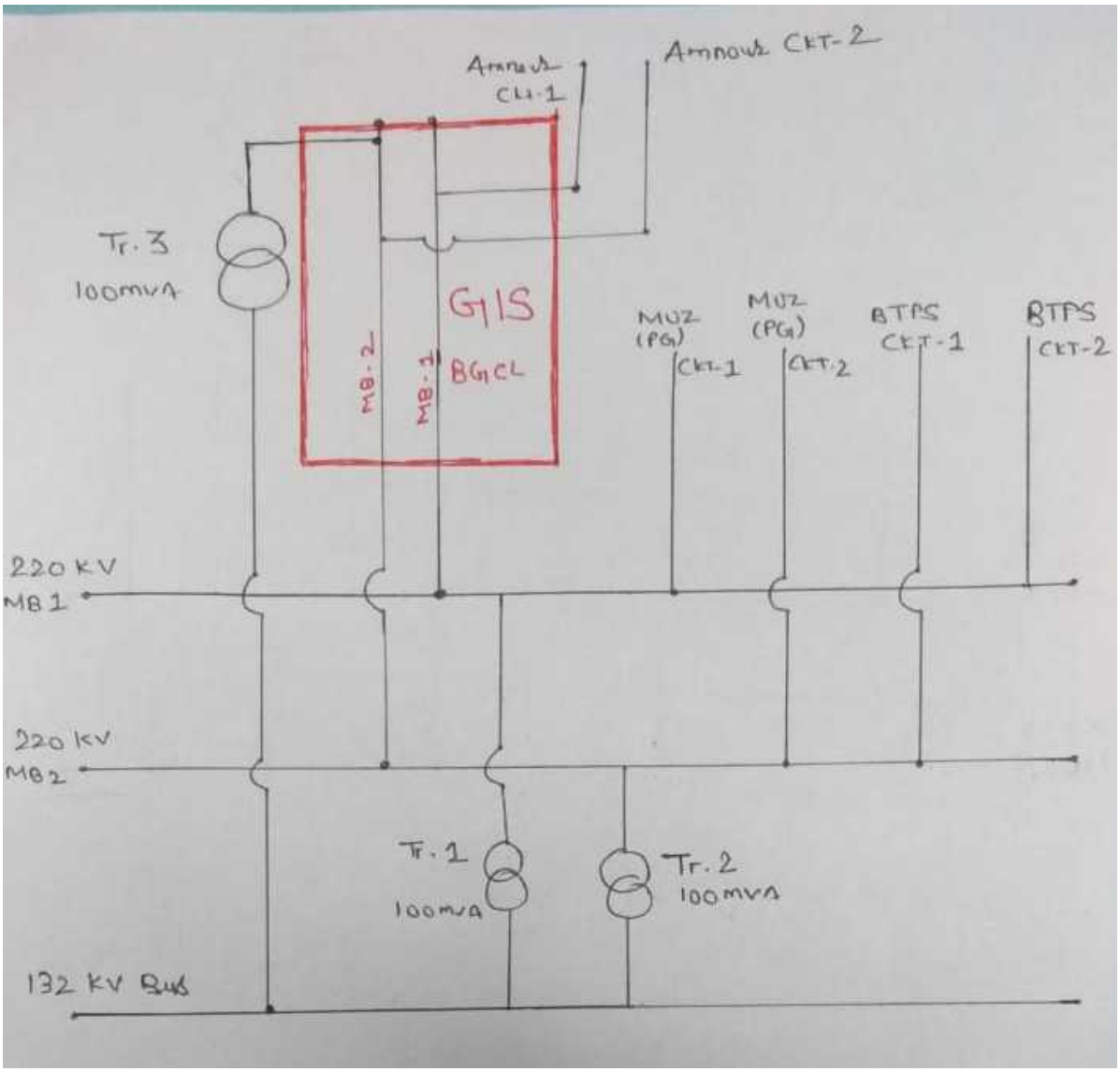
As 220 kV Mujaffarpur-Hazipur D/C were the only supply source for 220/132 kV Hazipur, Chapra and Amnour substations, the radial system got blacked out causing loss of 313 MW of load.

- The sequence of events for tripping at Hajipur end has not been recorded at ERLDC SCADA data.
- The reason for tripping from Muzaffarpur end may be shared by POWERGRID ERTS-1.
- It has been observed Auto-reclose attempt was not taken at Hajipur end for a single phase to earth zone 1 fault. Carrier protection was unhealthy prior to the tripping. BSPTCL may explain.
- The reason for the tripping of both 220 kV Muzaffarpur Hajipur D/C may be shared by BSPTCL.

Relay Indications:

Element Name	**End 1**	**End 2**	**PMU observation**
220 kV Hazipur-Barauni 1	No Details	No Details	Around 15 kV dip has been observed in B phase voltage at Muzaffarpur. The fault clearing time was around 300 ms. Around 200 ms after the clearing of this fault, another Y and B phase fault has been captured. The voltage dip was around 10 kV in both Y and B phases. The fault clearing time was less than 100 ms indicating zone 1 tripping time.
220 KV Muzaffarpur-Hajipur – D/C	Yet to be received	B-N, Zone – 1, F/C 2.3 kA, 3 phase trip, Auto-reclose attempt was not taken (circuit ID is not mentioned)	

Load Loss: 313 MW



BSPTCL and Powergrid may explain.

Deliberation in the meeting

After detailed deliberation, it was observed that there were multiple faults in both the circuits of 220 KV Muzaffarpur-Hajipur – D/C line which caused the tripping of both the lines.

PCC observed that Autorecloser was not operated in this incidence. PCC advised BSPTCL to check the healthiness of PLCC and put the Autorecloser in service.

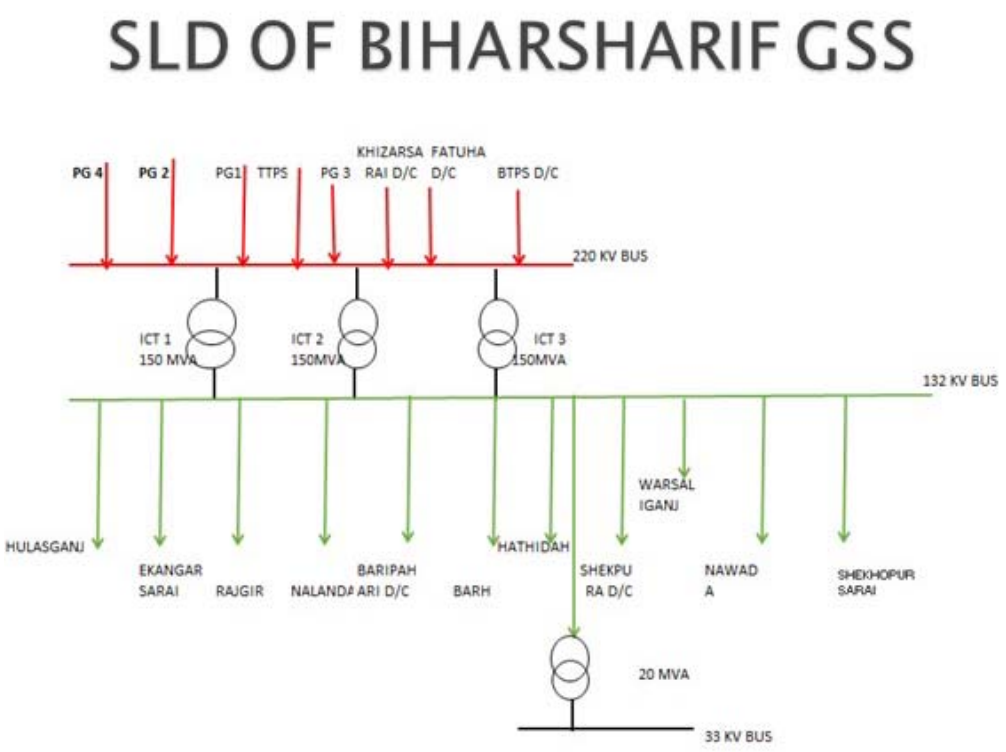
ITEM NO. B.9: Disturbance at 220 k V Biharsharif Substation on 14.08.2020 at 20:23 hrs

At 20:23 hrs 220 kV Tenughat Bihar Sharif S/C tripped due to Y phase to earth fault. At same time, 400/220 kV ICT 2 and 3 at Bihar Sharif, 220/132 kV ICT 1, 2 and 3 at Bihar Sharif, 132 KV Bihar sharif –Sheikhupura S/C also tripped. During line patrolling, it was found that Y phase Conductor of 220 kV Bihar sharif – TTPS S/C snapped at location No. 496-497 and fell on 132 kV Bihar sharif – Sheikhupura D/C at tower loc no. 10 from Bihar Sharif.

Status of PLCC on 220 kV Bihar Sharif-Tenughat line on both ends as the Tenughat is clearing the fault in zone 2 due to this which exceeds the CEA Standard 2010 for 220 kV lines.

BSPTCL may share on which protection, 220 kV Bihar sharif – TTPS S/C tripped at Bihar Sharif end.

BSPTCL may share the reason for the tripping of 400/220 and 220/132 kV ICTs at Bihar Sharif. Lack of protection coordination has been observed during the event at 400/220 kV Bihar Sharif (PGCIl) and 220/132 kV Bihar Sharif (BSPTCL) during this event. The status of the entire protection system at 220/132 kV Bihar Sharif substation may kindly be shared by BSPTCL as non-operation of 132 kv line protection is of serious concern.



Relay Indications:

Time	Element Name	End 1	End 2	PMU Observation
20:23 hrs	220 kV Bihar Sharif Tenughat S/C	Y-N, O/C & E/F picked up, no distance protection picked up at Bihar Sharif DR. IY-27 kA VYN-62 kV	Y-N, Zone – 2, F/C 1 kA, 182 km from TTPS	Around 70 kV dip in Y phase voltage has been observed at the time of fault at 220 kV Bihar Sharif S/C. During the fault of 132 KV Bihar sharif – Sheikhupura D/C within 100 ms, voltage started to decrease in R and B phase also. When the fault of 220 kV Tenughat Bihar
20:23 hrs	400/220 kV ICT 2 & 3 at Bihar Sharif	ICT – 3 did not trip at HV side. ICT – 2 tripped form HV SIDE due to inter trip receipt from LV side.	Master trip relay operated at LV side (BSPTCL end)	
20:23 hrs	132 KV Bihar sharif – Sheikhupura 1	B-N, Zone – 1, Fault distance 2.12 km, IR 9.5	Radial Feed	

		kA, IY – 8.9 kA, IB-9.7 kA		Sharif S/C got cleared from Bihar Sharif end within 100 ms, the voltage dip in Y phase became equal to R and B phase dip (around 10 kV) due to the 3 phase fault at 132 KV Bihar sharif – Sheikhupura D/C. The total fault clearing time was around 400 ms.
20:23 hrs	132 KV Bihar sharif – Sheikhupura 2	R-Y-B-N, Zone – 1, IR 8.9 kA, IY 10.1 kA, IB 10.4 kA	Radial Feed	
20:23 hrs	220/132 kV ICT 1, 2 & 3 at Bihar Sharif	ICT 1 and 2 tripped from both sides due to master trip operation. ICT 3 tripped from LV side due to Directional overcurrent and earth fault relay. IR-1.1 kA, IY-1.14 kA, IB-1.14 kA		

Load Loss : 332 MW

BSPTCL may explain.

Deliberation in the meeting

BSPTCL informed that Y phase Conductor of 220 kV Biharsharif – TTPS S/C snapped at location No. 496-497 and fell on 132 kV Bihar sharif – Sheikhupura D/C at tower loc no. 10 from Bihar Sharif. BSPTCL explained that 220 kV Bihar sharif – TTPS S/C line was tripped from Bihar sharif end on backup overcurrent E/F protection as distance relay did not pickup the fault and TTPS end tripped on zone 2. 400/220 kV ICT 2 & 3 at Bihar Sharif were tripped from LV side and 220/132 kV ICT 1, 2 & 3 were tripped on OSR protection. 132 KV Bihar sharif –Sheikhupura D/C lines tripped from Bihar sharif end on zone 1 and there was no tripping from Sheikhupura end as the line was radially connected with Biharshariff.

PCC opined that distance protection at Biharshariff might not pickup the fault in 220 kV Bihar sharif – TTPS S/C due to close in fault and the line was tripped from Biharsharif on backup protection.

PCC observed the following and advised BSPTCL to take the corrective action:

- *BSPTCL should carry out proper maintenance of the transmission system to avoid snapping of conductors.*
- *400/220 kV ICT 2 & 3 at Biharsharif should not trip from backup overcurrent protection of LV side as the fault got cleared within 400 ms. BSPTCL review the relay settings in coordination with Powergrid.*
- *Healthiness of the transformers 220/132 kV ICT 1, 2 & 3 should be checked as the transformers tripped on Oil Surge Relay protection.*

ITEM NO. B.10: Total Power failure at 220/132 kV Chaibasa Substation on 06.05.2020 at 01:19 hrs.

In 92nd PCC, JUSNL was advised to take the following corrective actions:

- CB of Chaibasa(JUSNL) end of 220 kV Chaibasa – Ramchandrapur circuit 1 to be tested
- Protection system of 220/132 kV ATRs to be tested along with healthiness of DC and the respective CT, PT connections to be checked

In 94th PCC, JUSNL informed that they had taken shutdown twice to test CB of Chaibasa (JUSNL) end of 220 KV Chaibasa- Ramchandrapur circuit 1, however due to poor weather conditions they were not able to test the CB. JUSNL added that circuit breaker is in service.

JUSNL further added that DC and respective CT, PT connections were checked and were found in order.

PCC advised JUSNL to carry out the preliminary testing of the circuit breaker operation by issuing trip command immediately. Then detailed testing of CB could be done after taking shutdown. PCC also advised JUSNL to test the backup protection of 220/132 kV ATRs and send a detailed report to ERPC and ERLDC.

JUSNL may update.

Deliberation in the meeting

JUSNL informed that CB of Chaibasa (JUSNL) end of 220 KV Chaibasa- Ramchandrapur circuit 1 has been tested and found okay.

PCC advised JUSNL to carry out the preliminary testing of the circuit breaker operation by issuing trip command from the relay to ensure the healthiness of protection system of the line. PCC also advised JUSNL to test the backup protection of 220/132 kV ATRs and send a detailed report to ERPC and ERLDC.

ITEM NO. B.11: Total Power failure at 220/132 kV Hatia Substation on 14.05.2020 at 15:33 hrs

In 92nd PCC, JUSNL explained that backup overcurrent protection settings of 220 kV Hatia(II) – Ranchi (PG) circuit 3 was kept at non-directional with definite time setting of 250 ms. JUSNL informed that the same was corrected to directional with the time setting of 1.25 sec definite time.

JUSNL further informed that overvoltage setting of 220 kV Hatia(II) – Ranchi (PG) circuit 1 and 220 kV Patratu-Hatia D/C at Hatia was 110 % and pickup to drop off ratio was changed from 0.98 to 0.9.

ERLDC advised JUSNL to increase pickup to drop off ratio to 0.99.

PCC opined that over voltage may appear due to improper earthing of the substation. PCC advised JUSNL to take the following actions and submit a report to ERPC and ERLDC

- Verify the reason for non-operation of autorecloser and carrier inter tripping of 220 kV Hatia(II) – Ranchi (PG) circuit 2 from Hatia end
- Checking of earthing at 220kV Hatia II and Patratu S/s.
- Backup overcurrent protection time settings must be IDMT instead of definite time. It has to be rectified with proper time setting in consultation with ERPC and PRDC.

In 94th PCC, JUSNL informed that pickup to drop off ratio was changed to 0.99 and earthing at 220 kV Hatia II and Patratu S/s was checked and found in order. JUSNL added that the autorecloser relay is healthy and it is in service.

PCC advised JUSNL to send the results of test done for earthing at 220 kV Hatia II and Patratu S/S to ERPC and ERLDC. PCC advised JUSNL to test PLCC as the auto-recloser would not work if carrier is not healthy.

JUSNL had sent the result of test done for earthing at 220 kV Hatia II and Patratu S/S to ERPC and ERLDC which is attached at **Annexure B11**.

JUSNL may update.

Deliberation in the meeting

PCC advised JUSNL to check the healthiness of PLCC and auto-recloser and send a report to ERPC and ERLDC within one week.

ITEM NO. B.12: Disturbance at 400 kV Arambag S/S on 10.07.2020 at 08:45 hrs.

At 08:45 hrs, 400 kV Arambag – New Chanditala S/C, 400 kV Arambag – Bakreswar S/C, 400 kV Arambag Kolaghat S/C and 400/220 kV ICT – 1, 2, 3 and 4 at Arambag tripped. At same time, all 220 KV lines connected to Arambag s/s and some 132 kV lines also tripped during this event. Flash over was reported at B phase pole of 220 kV side breaker of 315 MVA 400/220 kV ICT – 4 at Arambag.

Flash over at B phase pole of 220 kV side breaker of 315 MVA 400/220 kV ICT – 4 at Arambag resulted B phase to earth fault at 220 kV bus at Arambag. Fault was sensed by Directional E/F protection from 400 kV ICT – 4. Remote ends of 220 kV feeders sensed the fault in Zone – 2. Due to delay in clearance of fault, 220 kV Arambag – Midnapore D/C, 220 kV Arambag – New Bishnupur D/C, 220 kV Arambag – Domjur – 1 and 220 kV Arambag Howrah S/C tripped from remote end in Zone -2. 220 kV Arambag – Rishra S/C tripped from Arambag end Zone -2. Reason for tripping of 220 kV Arambag – Rishra S/C from Arambag end may be investigated by WEBSETCL as fault was in reverse direction. Remote ends of 400 kV Arambag – New Chanditala S/C, 400 kV Arambag – Bakreswar S/C, 400 kV Arambag Kolaghat S/C sensed the fault and tripped in zone – 3 after non-clearance of fault in zone -3 timing. For 400 kV Arambag – New Chanditala S/C and 400 kV Arambag Kolaghat S/C, direct trip signal was received at Arambag end and Arambag end breakers got opened. Criteria for sending DT signal to remote ends may be reviewed by WBPDCL and WBSETCL. 132 kV Arambag Tarakeswar D/C, 132 kV Arambag – Raina D/C, 132 kV Arambag – Brisingha 2 tripped from remote end in back up E/F protection. • 400/220 kV ICT 1, 2, 3 and 4 at Arambag tripped in directional E/F from 400 kV side (ICT - 4 tripped from 220 kV side also). Fault clearing time was around 1100 ms.
Delayed fault clearance has been observed. Due to fault clearing time of around 1100 ms, 400, 220 and 132 kV feeders tripped from remote ends in Zone -2, Zone -3, back up E/F protection. WBSETCL may investigate and share the reason for delayed clearance of this fault. It has been learnt 220 kV bus bar protection was not in service at Arambag end. Reason for tripping of 220 kV Arambag – Rishara S/C from Arambag end may be shared by WBSETCL.

Relay Indications:

Element Name	End 1	End 2	PMU observation
400 kV Arambag – New Chanditala S/C	DT received	B-N, Zone – 3, 133 km, F/C 3.2 kA	Around 140 kV dip has been observed in B phase at Arambag PMU. Current in 400 kV Arambag – New PPSP – 1 and Arambag – Bakreswar S/C increased to 1.4 kA during the event. As per PMU data, fault clearing time was around 1100 ms.
400 kV Arambag – Bakreswar S/C	Did not trip	B-N, Zone – 3, 300 km	
400 kV Arambag Kolaghat S/C	DT received	B-N, Zone – 3, 180 km, F/C 2 kA	
400/220 kV ICT – 1, 2, 3 and 4 at Arambag	ICT 1, 2, 3: Directional E/F from HV side ICT 4: Directional E/F from HV and LV side		
220 kV Arambag – Midnapore D/C	Did not trip	Zone – 2 protection	
220 kV Arambag – New Bishnupur D/C,	Did not trip	Zone – 2 protection	
220 kV Arambag – Domjur – 1,	Did not trip	Zone – 2 protection	
220 kV Arambag Howrah S/C	Did not trip	Zone – 2 protection	
220 kV Arambag – Rishra S/C	Zone – 2	Did not trip	
132 kV Arambag Tarakeswar D/C	Did not trip	Back up E/F	

132 kV Arambag – Raina D/C	Did not trip	Back up E/F	
132 kV Arambag – Brisingha 2	Did not trip	Back up E/F	

Load Loss : 61 MW

In 94th PCC, WBSETCL explained that there was fault at 220kV bus due to Flash over at B phase pole of 220 kV side breaker of 315 MVA 400/220 kV ICT – 4 at Arambag. Busbar protection was not available for 220kV bus at Arambag. As a result, the fault got cleared from 400kV, 220kV and 132kV side on backup protection with the following relay indications:

- *400/220 kV ICT – 1, 2, 3 at Arambag tripped from backup directional overcurrent E/F protection from HV side but 400/220 kV ICT – 4 was tripped from both LV and HV side on directional overcurrent E/F protection. WBSETCL explained that LV side of ICT-4 was wrongly picked up the fault due to lose neutral wire connection in the PT junction box*
- *400 kV Arambag – New Chanditala S/C, 400 kV Arambag – Bakreswar S/C, 400 kV Arambag-Kolaghat S/C lines tripped from remote on zone 3*
- *220 kV Arambag – Midnapore D/C, 220 kV Arambag – New Bishnupur D/C, 220 kV Arambag – Domjur – 1, 220 kV Arambag Howrah S/C lines tripped from remote end on zone 2*
- *220 kV Arambag – Rishra S/C line tripped from Arambag end on zone 2 instead of Rishra end due to lose neutral wire connection in the PT junction box therefore Arambag end distance protection has seen the fault in forward direction instead of reverse direction*
- *132 kV Arambag-Tarakeswar D/C, 132 kV Arambag – Raina D/C, 132 kV Arambag – Brisingha 2 tripped on backup earth fault protection*

WBSETCL informed that 400kV New PPSP line picked up the fault in zone 3 after tripping of other 400kV lines.

WBETCL added that lose neutral wire connection in the PT junction box was rectified after the disturbance.

PCC observed that 220/132kV Transformers backup protection should operate to clear the fault and 132kV lines should not be tripped in this case.

WBSETCL explained that 220/132kV Transformers II and III tripped from 132kV on earth fault protection and earth fault protection of other 220/132kV Transformers was not enabled.

PCC advised WBSETCL to take following corrective actions:

- *Busbar protection at 220kV Arambag is to be bring into service*
- *220/132kV Transformers backup protection should be made available and coordinate the protection settings with 220kV and 132kV backup protection settings to avoid unwanted tripping of transmission lines.*
- *Review the settings of 315 MVA 400/220 kV ICTs backup protection to coordinate with backup protection of 400kV transmission lines considering different generation levels*
- *PCC opined that DT should not be sent to other end for a tripping related to distance protection. Criteria for sending DT signal to remote ends for all tripping may be reviewed by WBPDCL and WBSETCL.*

WBSETCL may update.

Deliberation in the meeting

WBSETCL updated the following:

- *Busbar protection at 220kV Arambag would be brought into service within one month.*

- *132 kV transmission line settings have been reviewed to coordinate with 220/132kV Transformers backup protection.*

ITEM NO. B.13: Disturbance at 220 kV Bokaro Substation on 16.08.2020 at 01:52 hrs

At 01:52 Hrs, 220/132 kV Bokaro B S/S became dead after tripping of all connected 220 kV lines and 400/220 kV ICTs. Y phase CT burst was reported of 220 KV Bokaro B-Jamshedpur 2 at Jamshedpur end.

Load Loss : 297 MW

DVC may explain.

Deliberation in the meeting

DVC explained that there was R-N transient fault in 220kV Bokaro B -Jamshedpur line-2. Both end relays observed the fault in zone 1. Jamshedpur end cleared the fault in zone 1 but R, Y ploes of CB at 220kV Bokaro B got damaged and resulted in a RY-N fault at 220kV Bokaro B S/s. LBB protection was inadvertently kept in switch off mode for this line. Busbar protection was also not operated due to zone 1 and zone 2 supervision were in operated condition for both Main I & II.

Finally, the fault got cleared from backup overcurrent protection of 400kV side of 400/220kV ICT 1 & 2 and zone 2 protection from remote ends of the 220kV lines. Thereafter, 132 KV Ramgarh-Gola Ckt I & II and 132 KV BTPS B Barhi tripped on directional overcurrent protection due to overload.

*Detailed report received from DVC is enclosed at **Annexure-B13**.*

PCC observed that the protection system installed at 220kV Bokaro-B is very old and the same needed to be upgraded to improve the reliability.

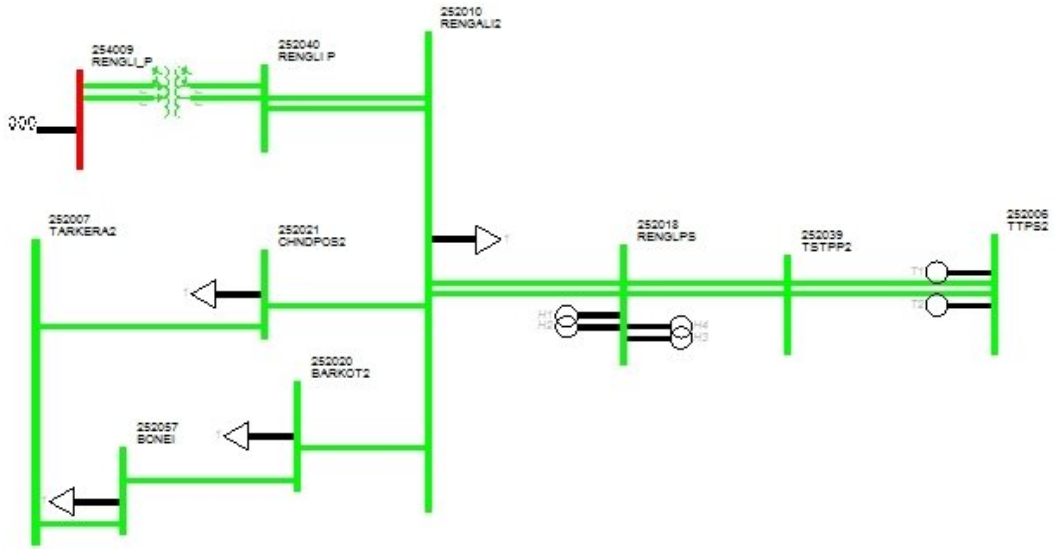
ITEM NO. B.14: Disturbance at 220 kV Rengali Substation on 03.08.2020 at 17:35 hrs

220 kV Rengali Power house (PH) – TTPS S/C was under outage since 19:17 hrs on 2nd August 2020.

The following elements tripped:

- At 16:17 hrs, 220 kV Rengali Switchyard (OPTCL)- Tarkera S/C tripped due to B phase to earth fault.
- At 16:58 hrs 220 kV Rengali Switchyard (OPTCL) - Barkote S/C tripped due to R and Y phase fault.
- At 17:17 hrs 220 kV Rengali Switchyard (OPTCL) - Rengali (PG) - 2 tripped due to Y and B phase fault.
- At 17:35 hrs 220 kV Rengali Switchyard (OPTCL) - Rengali (PG) - 1 tripped due to B phase fault. At same time, 220 kV TSTPP – Rengali PH S/C tripped from TSTPP end resulting in complete power failure at 220kV Rengali Switchyard (OPTCL) and at 220kV Rengali PH.
- All running units at Rengali PH tripped due to loss of evacuation path.

Reason of tripping of 220 kV Rengali Switchyard (OPTCL) - Rengali (PG) - 1 and 220 kV TSTPP – Rengali PH S/C tripped from TSTPP end at same time may be explained by concerned utilities.



Gen Loss :150 MW

OPTCL and Powergrid may explain.

Deliberation in the meeting

OPTCL explained that due to bad weather, heavy lightning and thunderstorm simultaneous faults were occurred in the transmission system. The following elements tripped during the disturbance:

- *At 16:17 hrs, 220 kV Rengali Switchyard (OPTCL)- Tarkera S/C tripped due to B phase to earth fault. Rengali end tripped on zone 2 and Tarkera end tripped on zone 1*

PCC observed that PLCC should be commissioned at the earliest so that carrier tripping could be enabled to minimize the fault clearing time.

- *At 16:58 hrs 220 kV Rengali Switchyard (OPTCL) - Barkote S/C tripped due to R and Y phase fault from Rengali end but the line did not trip from Barkote end due to weak infeed.*
- *While charging the 220 kV Rengali Switchyard (OPTCL) - Barkote S/C at 17:17 hrs, 220 kV Rengali Switchyard (OPTCL) - Rengali (PG) - 2 tripped due to Y and B phase fault on pilot wire protection.*
- *At 17:35 hrs 220 kV Rengali Switchyard (OPTCL) - Rengali (PG) - 1 tripped due to B phase fault. At same time, 220 kV TSTPP – Rengali PH S/C tripped from TSTPP end resulting in complete power failure at 220kV Rengali Switchyard (OPTCL) and at 220kV Rengali PH.*
- *All running units at Rengali PH tripped due to loss of evacuation path.*

PCC advised OPTCL to implement differential protection in 220 kV Rengali Switchyard (OPTCL) - Rengali (PG) D/C line using OPGW to improve the reliability.

PCC also advised OPTCL to collect the relay indications at TSTPP and send a report to ERPC and ERLDC.

ITEM NO. B.15: Tripping of unit 2 of 400 kV GMR Generating Station on 19.08.2020 at 22:04 hrs

GMR unit # 3 was connected to 400/220 kV Meramundali S/S of OPTCL STU network through 400 kV GMR – Meramundali S/C. GMR unit#1 and 2 were connected to ISTS network through 400 kV Angul-GMR D/C.

At 21:51 hrs, 400 kV GMR-Meramundali S/C tripped only from GMR end after receipt of direct trip signal (DT) from remote end. GMR unit # 3 got islanded and remained in house load operation before tripping at 22:04 hrs. 6.6 kV switchgear of unit # 2 and unit # 3 was in coupled condition. This resulted in high circulating current in the unit auxiliary transformer of unit # 2 and tripped tripping of transformer followed by tripping of unit # 2. Around 300 MW generation loss has been observed. Frequency dropped from 50 Hz to 49.97 Hz.

Connecting one 350 MW generating unit with only one 400 kV transmission line may affect the reliability of the generating station. GRIDCO SLDC/OPTCL are requested to check this issue. GMR informed that 6.6 kV switchgear of unit # 2 (connected to ISTS) and unit # 3 (connected to Odisha state network) was in coupled condition during the event. Similar event occurred on 26th June 2020. 400 kV GMR Meramundali S/C tripped only from Meramundali end due to receipt of DT signal from remote end. **PCC advised to GMR to check the PLCC to find out the root cause of sending the DT signal.** GMR may share their analysis. (**GMR/GRIDCO SLDC to update**) Reason for DT received at GMR end may be shared by GRIDCO SLDC/OPTCL/GMR. Meramundali end may confirm whether DT was sent or not.

Reason for tripping of GMR unit # 3 at 22:04 hrs may be shared by GMR/GRIDCO SLDC

Relay Indications:

Time	Element Name	End 1	End 2	PMU Observation
21:51 hrs	400 kV GMR – Meramundali S/C	DT received at Meramundali	Did not trip	No fault has been observed at three phase bus voltage and Three phase line current of 400 kV GMR Meramundali S/C captured by PMU at Meramundali. At same time GMR unit # 3 went in house load operation. As a result, frequency dropped from 50 Hz to 49.96 Hz.
22:04 hrs	GMR unit #2 and #3	Yet to be received	Yet to be received	Frequency dropped from 50 Hz to 49.97 Hz.

Gen. Loss: 611 MW

GMR, OPTCL, GRIDCO SLDC may explain.

Deliberation in the meeting

OPTCL explained that at 21:51 hrs, 400 kV GMR-Meramundali S/C was tripped only from GMR end after receiving direct trip signal (DT) from remote end. GMR unit # 3 got islanded and remained in house load operation before tripping at 22:04 hrs. OPTCL added that 6.6 kV switchgear of unit # 2 and unit # 3 was in coupled condition. This resulted in high circulating current in the unit auxiliary transformer of unit # 2 and tripping of transformer followed by tripping of unit # 2.

ERLDC informed that similar event was occurred on 26th June 2020 when 400 kV GMR Meramundali S/C tripped only from Meramundali end due to receipt of DT signal from remote end.

PCC advised OPTCL to investigate reason for receiving DT at GMR end and provide report to ERPC and ERLDC.

ITEM NO. B.16: Disturbance at 220 kV Joda Substation on 04.07.2020 at 13:19 hrs

At 12:47 hrs 220 kV Joda – TTPS - 1 tripped on Y and B phase to earth fault. Fault clearing time was less than 100 ms. At 13:00 hrs it was charged from Joda end successfully. But while

charging this circuit from TTPS end at 13:01 hrs, it tripped on B phase to earth fault from TTPS end. In PMU data at Jamshedpur end, no fault has been observed. Line was in charged condition at TTPS end at the time of the tripping. At 13:06 hrs 220 kV Joda – TTPS – 2 tripped from both ends on R phase to earth fault. Fault clearing time was less than 100 ms. As per DR recorded at Joda end , around 511 kV phase to neutral Voltage has been observed In R phase at Joda. Around 1.4 kA current has been observed in R phase. At 13:19 hrs 220 kV Joda – Ramchandrapur end tripped from both ends on Y phase to earth fault. It tripped from Joda end in zone – 1. In Ramchandrapur end back up O/C protection operated to trip the line. As per PMU data, fault duration was around 500 ms. As per DR recorded at Ramchandrapur end, Zone – 3 relay sensed the fault. But before tripping in Zone – 3, it tripped in back up O/C protection. As per SCADA data recorded at ERLDC, prior to the tripping, power flow of 220 kV Ramchandrapur – Joda S/C was around 150 MW. At same time, power flow through 220 kV Jamshedpur – JSPL – Joda was 18 MW. After the tripping of 220 kV Ramchandrapur – Joda S/C, 220 kV Jamshedpur – JSPL – Joda S/C tripped on O/C protection from Jamshedpur end. As per relay current data, three phase current was around 0.45 – 0.48 kA (Equivalent to 170-180 MW)

Similar type of event occurred at 11:57 hrs on 23rd June 2020. 220 kV Ramchandrapur – Joda S/C and 220 kV Jamshedpur (DVC) – Jindal S/C tripped on overload after tripping of 220 kV Joda – TTPS D/C at 11:41 hrs on B phase to earth fault. During this event three faults have been observed in the span of 30 min duration. As a result, all the four lines connected to Joda tripped. OPTCL is requested to maintain healthiness of the lines to reduce the repeated faults in same lines.

JUSNL may share the reason for operation of back up overcurrent protection at Ramchandrapur end within 500 ms. It has operated before operation of zone – 3 protection. Reach of distance protection at Ramchandrapur end may also be reviewed. Reason for non-picking of zone – 2 distance protection at Ramchandrapur end may be shared. Reason for tripping of 220 kV TTPS – Joda end at TTPS end at 13:01 hrs may be shared by OPTCL. Whether it was remained charged from Joda end during the event, may also be shared by OPTCL. Reason for high voltage in R phase at Joda end DR output recorded at the time of tripping of 220 kV Joda – TTPS – 2 may be investigated by OPTCL. DR for 220 kV Joda – TTPS – 2 at Joda end may be standardized as per PCC's recommendation.

Relay Indications :

Time	Element Name	End 1	End 2	PMU observation
12:47 Hrs.	220 kV Joda – TTPS - 1	Y-B, Zone -1, 98 km from Joda, IR = 0.23 kA; IY = 1.89 kA; IB = 2.1 kA, IN = 0.007 kA	R-Y-B, Zone -1, 55 km from TTPS, IR = 2.39 kA; IY = 4.36 kA; IB =4.02 kA	Around 2 – 3 kV dip has been observed in Y and B phase voltage captured by PMU at Jamshedpur. Fault clearing time was less than 100 ms.
13:01 Hrs.	220 kV Joda – TTPS - 1	Did not trip (Line was being charged again)	B-N, Zone -1, 74 km from TTPS, IR = 0.060 kA; IY = 0.050 kA; IB = 1.8 kA,	No fault has been observed in PMU data recorded at Jamshedpur
13:06 Hrs.	220 kV Joda – TTPS - 2	B/U relay operated. IR = 0.98 kA; IY = 0.3 kA; IB = 0.3 kA,	R-N, Zone -1, 81 km from TTPS, IR = 1.8 kA; IY = 0.3 kA; IB = 0.3 kA. VRN = 511 kV	Around 2 kV dip has been observed in R phase voltage captured by PMU at Jamshedpur. Fault clearing

				time was less than 100 ms.
13:19 Hrs	220 kV Joda - Ramchandrapur S/C	Y-N, Zone -1, 38 km from Joda, IR = 0.59 kA; IY = 0.95 kA; IB = 0.43 kA, IN =1.6 kA	B/U O/C. IR = 0.91 kA; IY = 1.77 kA; IB = 0.4 kA,	Around 4 kV dip has been observed in Y phase voltage captured by PMU at Jamshedpur. Fault clearing time was less than 450 ms. Voltage got improved by around 1 kV after tripping of 220 kV Joda - Ramchandrapur S/C from Joda end in Zone -1.
13:19 Hrs	220 kV JodaJSPL Jamshedpur S/C	Did not trip at JSPL and Joda end	Directional O/C, IR = 0.47 kA; IY = 0.48 kA; IB = 0.45 kA, IN =0.010 kA	

Load Loss: 110 MW

OPTCL , JUSNL and DVC may explain.

In 94th PCC, ERLDC explained that at 12:47 hrs, 220 kV Joda – TTPS - 1 tripped on YB-N fault on zone 1 from both the ends.

At 13:01 hrs, 220 kV Joda – TTPS – 1 was charged from TTPS end and the line got tripped from TTPS end on B-N, zone 1 as the fault was persisting. OPTCL confirmed that the line was opened from Joda end during this tripping.

At 13:06 hrs, another fault, R-N fault occurred in 220 kV Joda – TTPS – 2 and the line was tripped from TTPS end on zone 1 and Joda end tripped on backup overcurrent protection. OPTCL explained that there was a problem in PT circuit of the distance relay therefore the distance relay was not operated.

ERLDC informed that in the DR of TTPS end DT has been sent to Joda end, even though Joda end tripped on backup over current protection.

OPTCL informed that DT was not received at Joda end.

At 13:19 hrs another fault, Y-N fault with high arc resistance appeared in 220 kV Joda - Ramchandrapur S/C, Joda end cleared the fault in zone 1 and Ramchadrapur end tripped on backup overcurrent protection.

JUSNL informed that zone 3 pickup was observed at Ramchadrapur end but line tripped on backup overcurrent protection within 450 ms.

DVC informed that 220 kV Joda- JSPL-Jamshedpur S/C was tripped from Jamshedpur end on backup directional overcurrent protection due to low pickup setting. DVC added that the pickup value has been reviewed from 500 to 800 A after the disturbance.

ERLDC informed that DR configuration at Joda end is needed to be reviewed.

PCC advised OPTCL to take the following corrective actions:

- Carry out line patrolling of 220 kV Joda – TTPS – D/C line
- DR at Joda end is to be standardized as per the ERPC guidelines
- Reason for sending DT to Joda end during the tripping of 220 kV Joda – TTPS – line 1 for

R-N fault

PCC advised JUSNL to coordinate the backup overcurrent setting of 220 kV Joda - Ramchandrapur S/C at Ramchandrapur with zone 3 distance protection. JUSNL was also advised to configure the DR as per the ERPC guidelines.

Members may update.

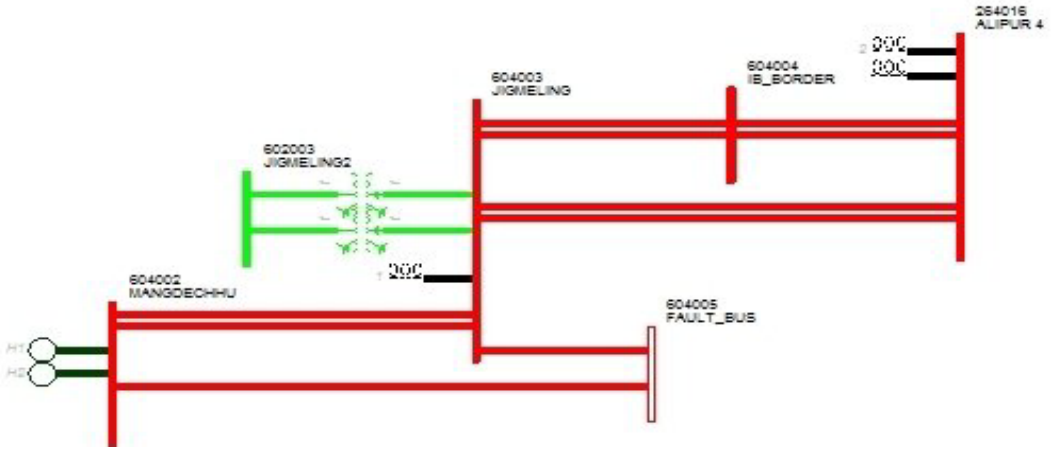
Deliberation in the meeting

OPTCL agreed to send the action taken report to ERPC and ERLDC.

JUSNL informed that 220 kV Joda - Ramchandrapur S/C was charged through bus coupler at Joda at the time of disturbance. Now the line has been charged through respective bay and protection settings are implemented as per the ERPC guidelines.

ITEM NO. B.17: Disturbance at 400 kV Alipurduar Substation on 31.08.2020 at 22:33 hrs

At 22:27 HRs, 400 KV Jigmeling-Mangdechu-2 tripped on B phase to earth fault. At 22:33 hrs, while taking charging attempt of 400 KV Jigmeling-Mangdechu-2, 400 KV Alipurduar-Jigmeling D/C tripped on zone-2 in Y to B phase short circuit fault. At the same time, all the running units of Mangdechu and 400 KV Mangdechu-Jigmeling-1 tripped.



Gen Loss : 520 MW

Powergrid may explain.

Deliberation in the meeting

Powergrid informed that at 22:27 hrs, 400 KV Jigmeling-Mangdechu-2 tripped on B phase to earth fault. Powergrid added that at 22:33 hrs, while taking charging attempt of 400 KV Jigmeling-Mangdechu-2, 400 KV Alipurduar-Jigmeling D/C tripped on zone-2 in Y to B phase short circuit fault.

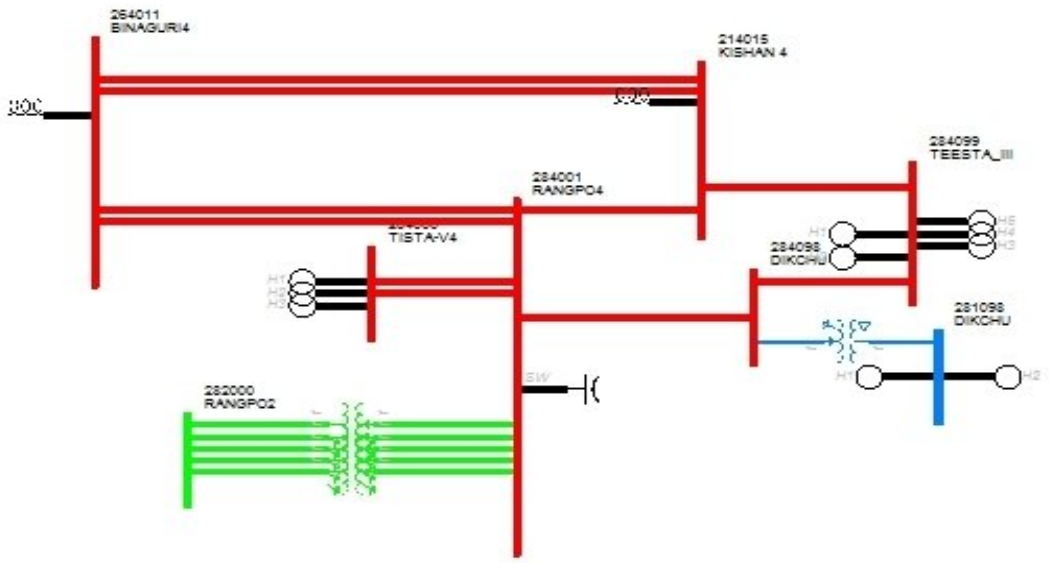
PCC advised ERLDC to take up the issue with Bhutan in the coordination meeting.

ITEM NO. B.18: Tripping of both units of 400 kV Dikchu Generating Stations on 01.08.2020 at 11:47 hrs

400/132 kV Dikchu Hydroelectric Plant is connected to the rest of the grid through 400 kV Teesta III – Dikchu S/C and 400 kV Dikchu – Rangpo S/C. Tie bay of 400/132 kV ICT and 400 kV bus 2 at Dikchu was out of service. Both the running units at Dikchu HEP were connected to bus 1 only

at Dikchu via 400/132 kV ICT. Tripping of 400 kV Rangpo – Dikchu S/C (only outgoing feeder connected to 400 kV bus 1 at Dikchu), would result in tripping of any running unit at Dikchu HEP due to opening of both main and tie CB of this line at Dikchu, resulting in complete isolation of Bus-1.

At 11:47 hrs, 400 kV Dikchu Rangpo S/C tripped from both ends due to B phase to earth fault resulting in tripping of both the running units at Dikchu. At same time Dikchu end breaker of 400 kV Teesta III – Dikchu S/C tripped after receiving SOTF trip signal from Main-2 relay (ABB REL 670). Consequently, 400kV Bus-2 of Dikchu also became dead.



Gen. Loss : 100 MW

DANS Energy and Powergrid may explain .

Deliberation in the meeting

Dikchu informed that there was a B phase to earth fault in 400 k V Dikchu Rangpo S/C at 31 km from Rangpo end. Dikchu end identified the fault in zone 1 and auto reclose operation attempted but tripped on permanent fault. Rangpo end identified the fault in zone 2 and successfully cleared the fault. At the same time, Dikchu end breaker of 400 kV Teesta III – Dikchu S/C tripped on SOTF trip signal generated from Main-2 relay (ABB REL 670).

ERLDC informed that from the analysis, it was observed that SOTF setting was at 1 sec and the same has to be revised from 1 sec to 500 ms.

PCC advised Dikchu to review the SOTF settings in coordination with ERLDC.

PCC advised TPTL to carry out the line patrolling and take corrective actions to minimize the occurrence of faults in the line.

ITEM NO. B.19: Tripping of both units at Jorethang on 04.07.2020 at 14:24 hrs

At 14:24 hrs 400 kV Rangpo – Kishangunj S/C tripped from both ends. Directional Earth fault protection operated at Rangpo and DT was received at Kishangunj. At same time, 220 kV JLHEP – New Melli D/C and 220 kV Tashiding Rangpo S/C tripped on earth fault protection at Jorethang and Tashiding end respectively. As a result both the running units at Jorethang tripped due to loss of evacuation path.

At around 14:24:21.100 hrs one high resistance B phase fault occurred at 400 kV Rangpo Kishangunj S/C. This fault was sensed by B phase directional Over Current relay at Rangpo end of 220 kV Rangpo – Tashiding S/C and Earth Fault relay at Jorethang end of 220 kV Jorethang –

New Melli D/C. round 15 kV dip has been observed at around 14:24: 21.100 hrs. in B phase at Rangpo PMU. At around 14:24:21:900 hrs 220 kV Tashiding – Rangpo S/C tripped from Tashiding end on B phase directional O/C and 220 kV Jorethang – New Melli D/C tripped form Jorethang end on E/F protection. After tripping 220 kV JLHEP – New Melli D/C and 220 kV Tashiding New Melli S/C, it increased to 1 kA before tripping. At 14:24:22.302 hrs, 400 kV Rangpo – Kishangunj S/C tripped from Rangpo end due to operation of Directional Earth fault protection. Though B phase current at Rangpo end was 5.3 kA, no significant amount dip in B phase voltage (Phase voltage was 223 kV prior to the tripping) has not been observed in DR recorded at Rangpo end. Start time of DEF at Rangpo end of 400 kV Rangpo – Kishangunj S/C is not recorded in DR. POWERGRID ERTS – II is requested to event logger output recorded at Rangpo end. 400 kV Rangpo Kishangunj S/C tripped from Kishangunj end after DT receipt at Kishangunj end. As per PMU data, B phase current at Kishangunj end decreased at starting of the fault. After tripping of 220 kV JLHEP – New Melli D/C and 220 kV Tashiding New Melli S/C, it increased to 1 kA before tripping. After tripping of 400 kV Rangpo Kishangunj S/C, SPS signal was sent to hydro generating stations in Sikkim areas. Jorethang HEP, Tashiding HEP and Chujachen HEP have confirmed the recipt of SPS signal. As SPS was disabled at generating stations, no unit tripped due to receipt of SPS signal. As pe information received from POWERGRID ERTS – II, SPS for 400kV Rangpo-Kishanganj line (installed at Rangpo) has been disabled at 10:00 Hrs of 05th July 2020 after the incident.

400 kV Rangpo Kishangunj S/C tripped on 27th June 2020 due to B phase to earth fault. TVPTL is requested to maintain the healthiness of 400 kV Rangpo – Kishangunj S/C.

Reason for tripping of 220 kV Jorethang – New Melli D/C and 220 kV Tashiding – Rangpo S/C before tripping of 400 kV Rangpo – Kishangunj S/C may be shared. POWERGRID ERTS – II may share the time when DEF relay picked up at Rangpo end.

Relay Indications :

Time	Line name	End 1	End 2	PMU observation
14:24 Hrs	220 kV Jorethang - New Melli -1	DEF, IR = 0.08 kA; IY = 0.08 kA; IB = 0.22 kA, IN = 0.169 kA Fault clearing time: 800 ms	Did not trip	Around 15 kV dip has been observed at around 14:24: 21.100 hrs. in B phase at Rangpo PMU. Initially current of 400 kV Kishangunj – Rangpo S/C reduced in B phase at Rangpo end. But after tripping 220 kV JLHEP – New Melli D/C and 220 kV Tashiding New Melli S/C, it increased to 1 kA before tripping
14:24 Hrs	220 kV Jorethang - New Melli -2	DEF, IR = 0.08 kA; IY = 0.08 kA; IB = 0.22 kA, IN = 0.173 kA Fault clearing time: 800 ms	Did not trip	
14:24 Hrs	220 kV Tashiding - Rangpo S/C	DEF, IR = 0.17 kA; IY = 0.17 kA; IB = 0.37 kA, IN = 0.25 kA Fault clearing time: 800 ms	Did not trip	
14:24 Hrs	400 kV Rangpo – Kishangunj S/C	DEF, IR = 0.66 kA; IY = 0.48 kA; IB = 5.3 kA, IN = 5.1 kA VCN = 223 kV	DT received at Kishangunj end	
14:24 Hrs	Unit 1 and 2 at JLHEP	Due to loss of evacuation Path		

Gen Loss : 180 MW

In 94th PCC, Powergrid explained that high resistance B phase fault occurred at 400 kV Rangpo-Kishangunj S/C line and the fault was cleared from Rangpo end on DEF. Kishanganj end tripped after receiving DT from Rangpo end. Powergrid added that because of high arc resistance, the fault was not picked up by distance protection.

ERLDC informed that 220 kV Tashiding - Rangpo S/C line tripped from Tashiding on backup over current protection within 800 ms. 220 kV JLHEP – New Melli D/C tripped on DEF within 800 ms.

PCC concluded that the lines were tripped before tripping of 400kV lines due to DT time setting of 800 ms.

PCC opined that there is a need of relay coordination of DEF protection between the 220kV lines in the Sikkim. PCC decided to review the settings of DEF at 220kV lines.

PCC advised TPTL to carry out the line patrolling of 400 kV Rangpo-Kishangunj S/C line to minimize occurrence of faults.

In 92nd PCC, ERLDC pointed out that 220kV Tashiding – Rangpo S/C line tripped from Tashiding end is not in order, the polarity of the distance protection relay at Tashiding end of 220 kV Tashiding – Rangpo S/C is to be verified.

DANS Energy informed that they also observed that polarity of main I protection of 220kV Tashiding – Rangpo S/C line at Tashiding is not proper and the polarity would be corrected by taking shutdown.

PCC advised DANS Energy to check the CT star point, relay configuration settings etc. to find out the issue and accordingly correct the polarity at the earliest. PCC advised DANS ENERGY to disable the relay till the correction of polarity to avoid maloperation of the relay.

DANS Energy , Dikchu , Jorethang and Powergrid may update.

Deliberation in the meeting

DANS Energy vide mail confirmed that the polarity of main I protection of 220kV Tashiding – Rangpo S/C line at Tashiding has been corrected.

ITEM NO. B.20: Disturbance at 400 kV Teesta III and Dikchu S/S on 16.07.2020 at 16:27 hrs

400 KV Teesta III-Kishanganj S/C was taken under shutdown on emergency basis at 15:49 hrs for gas density monitor replacement work at Kishangunj end. To ensure maximum power evacuation, 400 kV buses at Rangpo were split. Teesta III and Dikchu were connected to 400 kV bus 1 at Rangpo through 400 kV Dikchu – Rangpo S/C their generation was evacuated through 400 kV Rangpo Kishangunj S/C. All other elements at Rangpo S/S were connected to 400 kV bus 2. Generation at Teesta V, Jorethang, Tashiding, Chujachen HEP was being evacuated through 400 kV Rangpo – Binaguri D/C. At 16:27 hrs, 400 KV Teesta III – Dikchu S/C, 400 KV Rangpo-Dikchu S/C, 400 KV Rangpo-Kishanganj S/C tripped resulting total power failure at Teesta III and Dikchu HEP.

It is suspected there was a high resistance B phase to earth fault. The location of the fault is yet to be known. Teesta III end of 400 kV Teesta III – Dikchu S/C, Dikchu end of 400 kV Dikchu – Rangpo S/C and Rangpo end of 400 kV Rangpo Kishangunj S/C sensed the fault in Directional Earth Fault zone and tripped the lines. Though the other end of the above-mentioned lines tripped due to DT receipt, E/F relay also picked up at Dikchu end of 400 kV Teesta III – Dikchu S/C, Rangpo end of 400 kV Dikchu – Rangpo S/C also. Based on the direction earth fault pickup, it is suspected that fault was on 400 kV Rangpo-Kishanganj circuit however the delay in clearance of fault has been sensed by other circuits in upstream which also gave direction earth fault trip from the respective source ends. After tripping of 400 kV Teesta III – Dikchu S/C, Dikchu – Rangpo S/C and 400 kV Rangpo Kishangunj S/C, all the running units at Teesta III and Dikchu

got tripped due to loss of evacuation path. In this case, as the 400 kV Teesta 3-DIkchu-Rangpo-Kishnganj system was in Radial mode with Teesta 3 as source and Kishanganj as sink due to the outage of Teesta 3-Kishangnaj Circuit. The correct operation of DEF on suspected 400 kV Rangpo-Kishanganj circuit should have ensured the isolation of fault however even though due to radial nature the generation would have been lost irrespective of other line tripping on not.
It is suspected the same fault was sensed by Rangpo, Dikchu and Teesta III end. Location and reason of fault may be shared. Delayed clearing of the fault has been observed during this event. The fault indicates the very need to coordinate the directional earth fault protection at all substations. The fault level calculation and setting criteria for DEF used should be uniform for all power plants and stations in Sikkim Complex to ensure there is no such tripping. This will ensure that the line on which fault is there will be tripping first.

Relay Indications:

Line name	End 1	End 2	PMU observation
400 KV Teesta III – Dikchu S/C	Directional O/C and E/F trip, IR = 1.7kA, IY = 1.4 kA, IB = 3.5 kA, IN = 2.7 kA	DT received; E/F relay picked up, IR = 1.7kA, IY = 1.4 kA, IB = 3.5 kA, IN = 2.7 kA	High Resistance B phase to earth fault has been observed in PMU data. Fault clearing time was around 1600 ms. Frequency dropped from 49.99 Hz to 49.86 Hz at nadir point in 16 seconds Later it stabilized at 49.91 Hz
400 KV Rangpo-Dikchu S/C	E/F start, DT received, IR = 1.7kA, IY = 1.5 kA, IB = 3.6 kA, IN = 2.7 kA	E/F start, IR = 1.7kA, IY = 1.6 kA, IB = 3.4 kA, IN = 2.3 kA	
400 KV Rangpo-Kishanganj S/C	Dir. E/F trip, IR = 1.6kA, IY = 1.3 kA, IB = 3.5 kA, IN = 2.8 kA	DT received.	

Gen Loss: 1390 MW

In 94th PCC, Powergrid explained that there was a high resistance B phase to earth fault in 400 kV Rangpo-Kishangunj S/C. Rangpo end identified the fault on DEF and sent DT to Kishanganj end.

It was informed that 400 KV Teesta III – Dikchu S/C tripped from Teesta III end on DEF, DT with 1.5 sec and 400 KV Rangpo-Dikchu S/C tripped from Dikchu end on DEF, DT with 1.5 sec.

PCC observed that 400 KV Teesta III – Dikchu S/C and 400 KV Rangpo-Dikchu S/C lines tripped before tripping of 400 kV Rangpo-Kishangunj S/C line.

PCC opined that proper coordination of backup protection of these 400kV lines is required keeping IDMT characteristics.

PCC advised Powergrid and TPTL to carry out the line patrolling of 400 kV Rangpo-Kishangunj S/C line including the common section of 400 KV Rangpo-Dikchu S/C to minimize occurrence of faults.

DANS Energy , Teesta , Dikchu and Powergrid may update.

Deliberation in the meeting

*PRDC informed that they had computed the backup overcurrent E/F settings considering the IDMT characteristics. The details are enclosed at **Annexure-B20**.*

PCC advised all the concerned utilities to study the revised settings done by PRDC and provide their comments within one week.

ITEM NO. B.21: SPS for taking care of N-2 Contingency of 400 kV outgoing lines form Sikkim Complex--ERLDC

As per the decision taken in 161 OCC meeting no SPS is required when all the four 400 kV evacuating lines are in service. However, based on the study following proposal are made for the consideration of the forum:

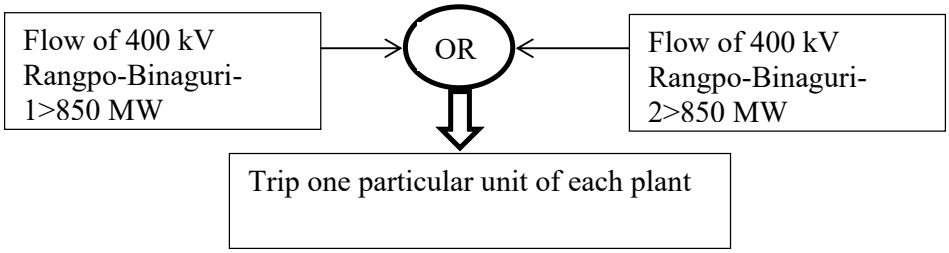
1. When all 4 lines are in service only N-1 contingency of 400 kV Rangpo-Dikchu is critical due to cable portion of Teesta III- Kishenganj section. That part is taken care of by Teesta III local SPS.
2. When all 4 lines in service, following N-2 contingencies are critical
   a. 400 kV Rangpo-Kishanganj & 400 kV Teesta-III-Kishenganj
   b. 400 kV Rangpo-Kishanganj& 400 kV Rangpo-Binaguri one ckt
   c. 400 kV Teesta-III-Kishanganj& 400 kV Rangpo-Binaguri one ckt

From the past experience and due to sharing some common corridor N-2 contingency of 400 kV Rangpo-Kishanganj& 400 kV Teesta-III-Kishanganj is a credible contingency. In 168th OCC meeting ERLDC informed that the SPS is required till completion of reconductoring work of 400kV Rangpo-Binaguri D/C lines for safe evacuation of hydro generation in Sikkim during any contingency.

In 169th OCC, it was decided to discuss the issue along with the protection coordination issues in Sikkim in a separate meeting with the concerned utilities.

Following SPS logic may be implemented for ensuring reliability during the above mentioned three critical N-2 contingency:

SPS:



In 94th PCC, ERLDC explained that flow of 400 kV Rangpo-Binaguri-1 and II is to be measured and if the power flow greater than 850 MW in any one line then SPS signal would be generated and issue trip command to one unit of each plant i.e. Teesta III, Dikchu, Jorethang and Tashiding HEP.

ERLDC informed that trip logic to be connected to the unit which is running at low load. If one unit is already out then tripping of other unit at the particular station is not required.

PCC agreed to implement the SPS at 400kV Rangpo S/s to avoid cascade tripping of the lines and advised Powergrid & ERLDC to discuss mutually for finalization of the SPS settings and implementation of SPS scheme.

Members may update.

Deliberation in the meeting

PCC advised Powergrid to discuss with their corporate office and higher authorities for implementation of SPS scheme.

ITEM NO. B.22: Tripping of both units at BRBCL on 07.07.2020 at 23:58 hrs.

BRBCL, a 4 x 250 MW thermal power plant is connected to rest of the grid via 400 kV BRBCL – Sasaram D/C. 400 kV BRBCL – Sasaram – 1 was charged from Sasaram end. During synchronizing this line from BRBCL end, 400 kV bus 1 at Sasaram got tripped resulting in tripping of 400 kV BRBCL – Sasaram – 2, 765/400 kV ICT at Sasaram. Unit 2 and 3 were in running condition at BRBCL prior to the event. Both the units tripped due to loss of evacuation path.

400 kV BRBCL – Sasaram – 1 was charged from Sasaram end. Before its synchronization from BRBCL end, one R phase to earth fault occurred in this circuit. Sasaram end relay detected the fault in zone – 1 and tripped this circuit from Sasaram end to isolate the fault. Sasaram end Main 1 relay of 400 kV BRBCL – Sasaram – 2 sensed the fault in Zone – 4. Around 1.5kA current was recorded in R phase. Other phase currents were low. But Sasaram end Main 2 relay of 400 kV BRBCL – Sasaram – 2 sensed the fault in Zone – 1. Around 11kA current was recorded in Y phase . It is suspected main 2 relay sensed the fault in Zone – 1 in Y phase and tripped the line. Carrier was sent to BRBCL end also. • In PMU data, existence of R phase to earth fault has been observed at the time of the event. BRBCL end of 400 kV BRBCL – Sasaram – 2 and main 1 relay at Sasaram end of 400 kV BRBCL – Sasaram – 2 sensed the fault in Y phase. POWERGRID ERTS – 1 may investigate the reason for recording of such a high fault current in Y phase by main 2 relay at Sasaram end. At same time, LBB operated for 400 kV BRBCL – 2 bay at Sasaram end . As per DR, around 16 kA current has been observed in Y phase. Reason for such a high current in Y phase in LBB DR may be investigated by POWERGRID ERTS – 1. No fault was observed in Y phase voltage at PMU data at the time of the event. Reason for LBB operation may also be shared. As per PMU and DR data, fault was cleared within 100 ms. It is suspected due to LBB operation 400 kV BRBCL – 2 bay at Sasaram end, 765/400 kV ICT – 1 and 400 kV bus 1 at Sasaram tripped.

Reason for LBB operation of 400 kV BRBCL – 2 bay at Sasaram end may be shared. Reason for tripping of 765/400 kV ICT – 1 at Sasaram, 400 kV Sasaram – BRBCL - 2 and 400 kV Sasaram bus 1 may be also be shared. Reason for recording of such a high fault current in Y phase by main 2 relay at Sasaram end may be investigated by POWERGRID ERTS – 1.

Relay Indications:

Time	Element Name	End 1	End 2	PMU observation
23:58 Hrs.	400 kV BRBCL – Sasaram – 1	Line was not charged	R-N, Zone – 1, IR=13.6kA, IY=0.2kA, IB=2.9kA,	Around 100 kV voltage dip has been observed in R phase voltage measured by Sasaram PMU. At same time around 40 kV rise in Y phase and around 30 kV dip in B phase has been observed in Sasaram PMU data. Fault in R phase was
23:58 Hrs.	400 kV BRBCL – Sasaram – 2	R-N, 123 km from BRBCL, F/C 2 kA	R-N, Zone – 4, IR=1.5kA, IY=0.3kA, IB=0.6kA,	
23:58 Hrs.	765/400 kV ICT – at Sasaram	Did not trip from 765 kV side	Yet to be received	
23:58 Hrs.	400 kV bus 1 at Sasaram	Yet to be received		
23:58 Hrs.	Unit 2 and 3 at BRBCL	Loss of evacuation path		

			cleared within 100 ms. But around 250 ms was taken to clear the voltage dip in B phase.

Gen. Loss : 425 MW

In 94th PCC, Powergrid explained that there was a R-N fault in 400 KV BRBCL – Sasaram – 1 close to Sasaram, the line was tripped within 100 ms but main 2 of 400 KV BRBCL – Sasaram – 2 at Sasaram end also seen the Y-N fault in zone 1 instead of zone 2, R-N fault due to faulty CT circuit cable. LBB relay is also getting feed from same faulty CT circuit cable therefore LBB also operated and tripped all the elements connected to 400kV Bus –I.

ERLDC requested Powergrid to share a report on this incident along with the scheme for the benefit of others.

Powergrid may update.

Deliberation in the meeting

PCC advised Powergrid to send a report on this incident along with the scheme to ERPC and ERLDC.

ITEM NO. B.23: Tripping Incidences in month of August 2020

Other tripping incidences occurred in the month of August 2020 which needs explanation from constituents of either of the end is given in **Annexure-B23.**

In 36th TCC, all the constituents were advised to use the PDMS on-line portal for uploading the single line tripping details along with DR (comtrade files), EL and other relevant files for all trippings of August 2017 onwards. Otherwise, it will be considered as violation of compliance of clause 5.2(r) & 5.9 of IEGC.

In 74th PCC, all the constituents were requested to submit the disturbance report along with DR through the new version of on-line portal which was implemented from 01st Jan. 2019.

Members may discuss.

Deliberation in the meeting

PCC advised all the concerned utilities to send the relevant details to ERLDC.

Regarding tripping of 400 kV Teesta – Kishanganj line at 23:35 hrs on 27th July 2020, TPTL informed that R-B fault was occurred due to lightening during the bad weather because of improper earthing of the ground wire. TPTL added that OPGW installation work is being in done by Powergrid and the fault was occurred due to improper earthing of the ground wire during the installation of OPGW link.

Powergrid informed that severe ROW issues are pending which were not resolved by TPTL and very minimum presence observed from M/s TPTL representative at site towards solving the ROW issues. This is causing hindrance for the said work i.e. replacement of earth wire with OPGW.

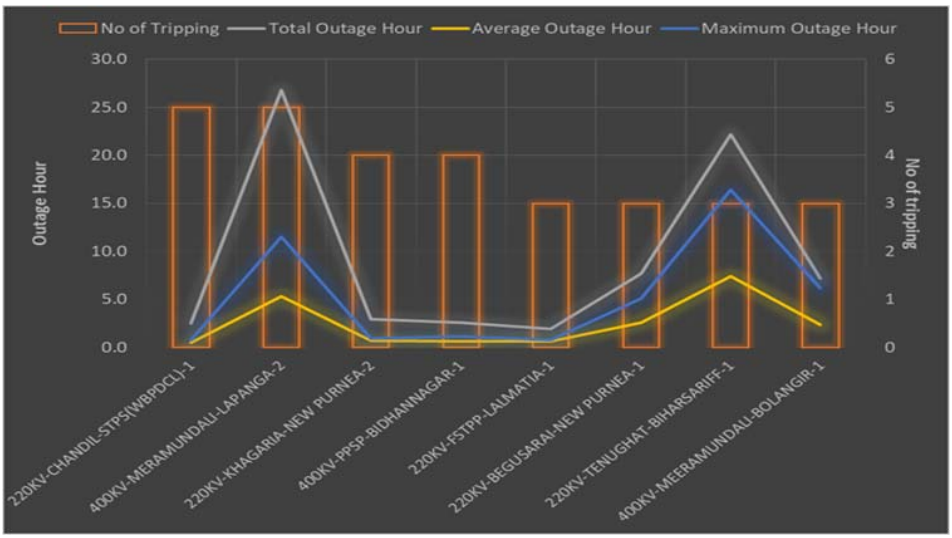
Powergrid added that two earth bonds are installed and earthing connection is made between OPGW and Tower.

Powergrid requested M/s TPTL to depute their representative to resolve the ROW issues at site. Powergrid also requested to accord permission to put Auto-reclose relay in non-auto mode from POSOCO.

PCC advised TPTL to cooperate with Powergrid in resolving the ROW issues being faced during the installation of OPGW.

ITEM NO. B.24: Repeated tripping of transmission lines in August 2020

During August 2020, repeated tripping has been observed in few of the transmission lines. List of these transmission lines along with number of tripping and outage duration are shown below:



It has been observed that few transmission lines have tripped repeatedly on the same reason. Transmission utilities are advised to share the remedial action taken to reduce the number of such tripping of these transmission lines (list given below).

Name of the line	Reason	No of tripping	Utility to respond
220KV-CHANDIL-STPS(WBPDCL)-1	Short circuit faults at 50-60 km from STPS (3 tripping), Short circuit faults at 25 km from STPS (1 tripping), during testing related activity	5	JUSNL/ Jharkhand SLDC & WBSETCL/WBSLDC
400KV-MERAMUNDALI-LAPANGA-2	Short circuit faults at various locations	5	OPTCL/ GRIDCO SLDC
220KV-KHAGARIA-NEW PURNEA-2	Short circuit faults at various locations	4	BSPTCL/Bihar SLDC
400KV-PPSP-BIDHANNAGAR-1	Short circuit faults at various locations	4	WBSETCL/WBSLDC
220KV-FSTPP-LALMATIA-1	B phase to earth fault at 60 km from Farakka	3	JUSNL/ Jharkhand SLDC & NTPC Farakka
220KV-BEGUSARAI-NEW PURNEA-1	R phase to earth fault at 70 km from New Purnea	3	BSPTCL/Bihar SLDC

Name of the line	Reason	No of tripping	Utility to respond
220KV-TENUGHAT-BIHARSARIFF-1	R phase to earth fault at 45-50 km from Tenughat	3	JUSNL/ Jharkhand SLDC & BSPTCL/Bihar SLDC
400KV-MEERAMUNDALI-BOLANGIR-1	R phase to earth fault at 130-140 km from Bolangir	3	OPTCL/ GRIDCO SLDC & POWERGRID

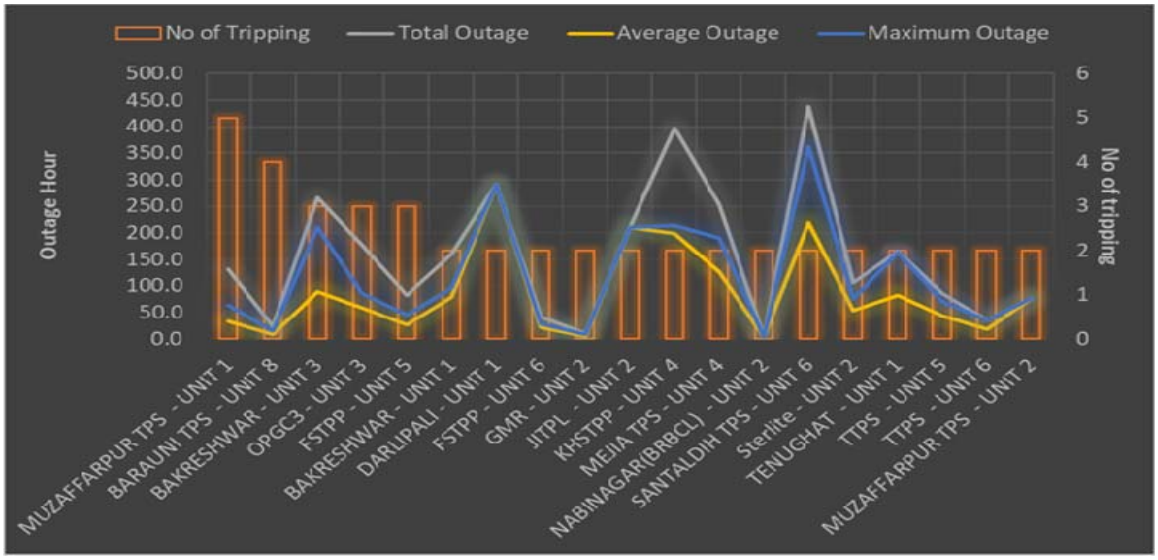
Bihar SLDC/BSPTCL, Jharkhand SLDC/JUSNL, WB SLDC/WBSETCL, GRIDCO SLDC/OPTCL, NTPC Farakka and POWERGRID may share the reason for repeated tripping of transmission lines along with remedial action taken to reduce the no of tripping instances. Utilities are advised to maintain healthiness of the transmission lines.

Deliberation in the meeting

PCC advised all the concerned transmission utilities to take necessary action to avoid repeated trippings and share the report to ERPC and ERLDC.

ITEM NO. B.25: Repeated tripping of generating units in August 2020

During August 2020, repeated tripping has been observed for few generating units. List of such generating units along with number of tripping and outage duration is shown in below plot.



In 170th OCC meeting, it has been decided that generating stations will share detail report to ERPC and ERLDC while restoration of their units after forced outage (unit tripping) along with the following details:

- Root cause of the tripping
- Outage duration
- Remedial action taken after the tripping
- DR/EL output in case of tripping of unit due to electrical fault

Regional generating units (ISGS and IPPs) and SLDCs/State generating stations are advised to share detailed report as mentioned above.

It has been observed that few generating units tripped repeatedly due to same reason. Generating stations may be asked to share the remedial action taken to reduce the no of tripping of these units (list given below).

Name of the line	Reason	No of tripping	Utility to respond
MUZAFFARPUR TPS - UNIT 1	Boiler tube leakage, High drum level, High furnace pressure, ID fan problem and others	5	Bihar SLDC/ KBUNL
OPGC3 - UNIT 3	Ash evacuation problem, Master Fuel trip, Unit bus PT flashover	3	GRIDCO SLDC/ OPGC
FSTPP - UNIT 5	Feed water problem, Drum level low	3	NTPC
DARLIPALI - UNIT 1	Boiler tube leakage	2	NTPC
JITPL - UNIT 2	Bottom Ash Scrapper Problem	2	JITPL
KHSTPP - UNIT 4	Breach in Ash pond dyke	2	NTPC

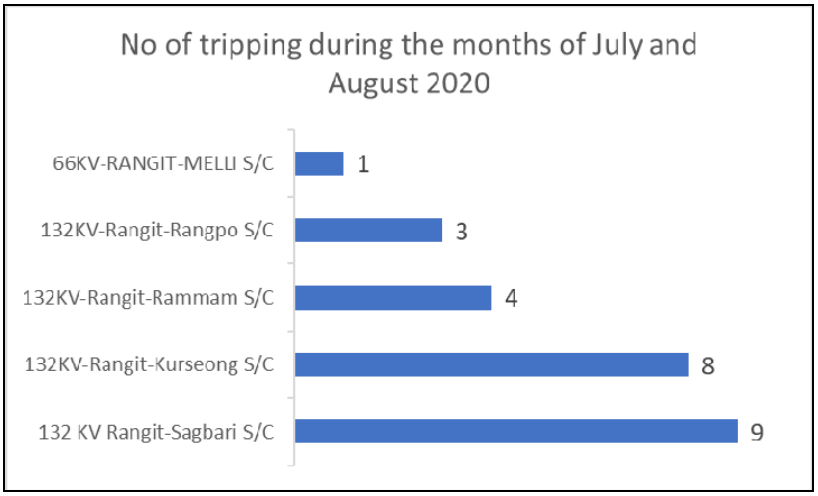
NTPC, JITPL, Bihar SLDC/KBUNL GRIDCO SLDC/OPGC may share the reason for repeated tripping of these generating units along with remedial action taken to reduce the no of tripping instances.

Deliberation in the meeting

PCC advised all the concerned generating utilities to take necessary action to avoid repeated trippings and share the report to ERPC and ERLDC.

ITEM NO. B.26: Repeated tripping of transmission lines connected to Rangit Hydro Electric Plant

During the months of July and August 2020, occurrence of repeated tripping has been taken place for the transmission lines connected to Rangit Hydro Electric Plant due to short circuit faults at various locations. No of tripping incidents for each line is shown below:



During fault, all the running units contribute fault currents. Repeated occurrence of faults may result in damage of the generating units.

Utilities are requested to maintain healthiness of these transmission lines.

Deliberation in the meeting

PCC advised all the concerned utilities to maintain the healthiness of transmission lines mentioned in this agenda to avoid faults in the line.

PART- C:: OTHER ITEMS

ITEM NO. C.1: FOLLOW-UP OF DECISIONS OF THE PREVIOUS PROTECTION SUB-COMMITTEE MEETING(S)

The decisions of previous PCC Meetings are given at **Annexure-C1.**

In 73rd PCC, it was observed that latest status on the implementation of the previous PCC recommendations were not updated by the constituents regularly. All the constituents were advised to update the latest status of the recommendations as per the list given in Annexure.

Members may update the latest status.

Deliberation in the meeting

*All concerned utilities updated the status which is enclosed at **Annexure C1.***

ITEM NO. C.2: Online training program conducting by PRDC

PRDC is conducting the training on PDMS and protection study using PSCT in different states through online. The training has been completed in West Bengal and Jharkhand. The schedule of the training is given below:

Sl No.	Date	State	Topic
1	29.06.2020	Westbengal	PDMS
2	30.06.2020	Westbengal	Protection Study
3	20.07.2020	Jharkhand	PDMS
4	21.07.2020	Jharkhand	Protection Study
5	03.09.2020	Odisha	PDMS
6	04.09.2020	Odisha	Protection Study
7	21.09.2020	Bihar	PDMS
8	22.09.2020	Bihar	Protection Study

Concerned utility may note and attend the program.

Members may note.

Deliberation in the meeting

Members noted.

ITEM NO. C.3: 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:

New Substation List

Sl No	SS Name	Data Collection	Owner	State
1	Bagmundi		WBSETCL	West Bengal
2	Gajole	Collected	WBSETCL	West Bengal
3	Dinahata		WBSETCL	West Bengal

4	Rejinagar		WBSETCL	West Bengal
5	Jhalda		WBSETCL	West Bengal
6	Goghat		WBSETCL	West Bengal
7	Saltlake Stadium		WBSETCL	West Bengal
8	Kashipur		OPTCL	Odisha
9	Betanati		OPTCL	Odisha
10	Aska New		OPTCL	Odisha
11	Udala		OPTCL	Odisha
12	Narashinghpur		OPTCL	Odisha
13	IBTPS		OPGC	Odisha
14	Mancheswar		OPTCL	Odisha
15	Govindpur	Collected	JUSNL	Jharkhand
16	North Karanpura		NTPC	Jharkhand
17	Mangdhechu		MHPA	Sikkim
18	TingTing		….	Sikkim
19	Lethang		….	Sikkim
20	Rongichu		….	Sikkim

In view of COVID-19 pandemic the data is being collected through online. All the constituents may note and submit the relevant data to PRDC for maintaining the database.

In 93th PCC, all the concerned utilities were advised to submit the relevant data to PRDC for maintaining the database.

Members may note.

Deliberation in the meeting

PCC advised all concerned utilities to submit the relevant data to PRDC for maintaining the database.

ITEM NO. C.4: 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.

All the utilities are advised to upload the relay settings in PDMS or send the relay settings to erpcprotection@gmail.com.

Members may note and comply.

Deliberation in the meeting

PCC advised all concerned utilities to submit the relevant data to PRDC for maintaining the database.

ITEM NO. C.5: Protection coordination of the new transmission elements charged in JUSNL system during the month of August 2020

JUSNL informed following transmission elements are charged during the month of August 2020:

Sl no.	Transmission Element	Time of charging	Date of Charging
1	132 KV D/C Sahebganj-Karamtola T/L	13:35 Hrs	01.07.2020
2	220 KV Dumka-Jasidih Ckt-I T/L	13:07 Hrs	07.08.2020
3	220 KV Dumka-Jasidih Ckt-II T/L	13:32 Hrs	07.08.2020
4	220 KV Jasidih BUS-II	14:38 Hrs	09.08.2020
5	150 MVA ICT-I at Jasidih GSS	16:25 Hrs	09.08.2020
6	220 KV Dumka-Godda Ckt-I T/L	14:14 Hrs	10.08.2020
7	220 KV Dumka-Godda Ckt-II T/L	14:25 Hrs	10.08.2020
8	220 KV Giridih-Jasidih Ckt-II T/L	15:53 Hrs	13.08.2020
9	220 KV Giridih-Jasidih Ckt-I T/L	11:42 Hrs	14.08.2020
10	220 KV Giridih BUS-I	15:53 Hrs	13.08.2020
11	220 KV Giridih BUS-II	12:42 Hrs	14.08.2020
12	150 MVA ICT-I at Giridih GSS	12:46 Hrs	13.08.2020
13	132 KV Giridih BUS-I	13:04 Hrs	14.08.2020
14	50 MVA T/F at Giridih GSS	14:43 Hrs	14.08.2020
15	132 KV Giridih -Jamua Ckt-I	15:12 Hrs	14.08.2020
16	132 KV Giridih -Jamua Ckt-II	15:32 Hrs	15.08.2020
17	50 MVA T/F-I atJamua GSS	18:50 Hrs	14.08.2020
18	133 KV Giridih -Sariya Ckt-I	18:40 Hrs	15.08.2020
19	134 KV Giridih -Sariya Ckt-II	17:20 Hrs	15.08.2020
20	132 KV Main BUS AT Sariya GSS	23:06 Hrs	14.08.2020
21	50 MVA Trf. No-01 at Sariya GSS	18:13 Hrs	15.08.2020
22	33 KV Main Bus at Sariya GSS	23:37 Hrs	16.08.2020
23	220 KV Daltonganj(PG)-Garhwa New(JUSNL) Ckt-I	17:03 Hrs	16.08.2020
24	220 KV Daltonganj(PG)-Garhwa New(JUSNL) Ckt-II	17:31 Hrs	16.08.2020
25	220 KV Garhwa New(JUSNL) BUS-I	18:34Hrs	16.08.2020
26	150 MVA ICT-I at Garhwa New (JUSNL)	18:35 Hrs	16.08.2020
27	220 KV Garhwa New(JUSNL) BUS-II	12:06 Hrs	19.08.2020
28	132 KV Garhwa(New) BUS-I	14:28 Hrs	19.08.2020
29	132 KV Garhwa(New)-Garhwa ckt-I	14:30 Hrs	19.08.2020
30	132 KV Garhwa(New)-Garhwa ckt-II	14:31 Hrs	19.08.2020
31	150 MVA ICT-II at Giridih GSS	07:45 Hrs	31.08.2020
32	132 KV S/C Hatia I-Tamar T/L	12:48 Hrs	02.09.2020

JUSNL is requested to confirm the following:

1. Protection setting of new charged elements has been configured as per ERPC's guidelines. Auto-reclose has been enabled (wherever applicable) along with along with removal of any instantaneous setting as kept for first charging for zone 2/zone 3/zone 4.
    - Lines with no auto-reclose facility may be shared.
2. Protection coordination has been done for all new charged elements (at both ends in case of transmission lines). It may be checked that due to the charging of new elements, longest and shortest transmission lines of all remotely connected substations are changed or not. In case of any remote substation belongs to other transmission utility, parameter of new charged elements may be shared to them with copy to ERPC and ERLDC.

3. Protection setting of new charged elements (at both ends in case of transmission lines) has been uploaded in PDMS along with updated SLD of substations. Relay setting may be shared in pdf format.
4. Disturbance recorder of new charged elements (at both ends in case of transmission lines) has been configured as per PCC's guidelines.
5. Bus bar differential protection is in service of all new charged bus. In case of non-availability of bus bar protection, Zone 4 timing may be changed to 250 ms and all carrier protection for connected transmission lines should be in healthy condition.
6. The healthiness of carrier protection of new charged elements may be confirmed.

Deliberation in the meeting

PCC advised JUSNL to note and implement the protection settings as per the ERPC guidelines.

ITEM NO. C.6: Protection coordination for the upcoming 400 kV Sagardighi-Gokarno D/C (WBSETCL)

As per information received, 400 kV Sagardighi-Gokarno D/C is planned to be charged in near future. Protection coordination is to be done at both Sagardighi and Gokarno end for this upcoming circuit. Details for 400 kV Sagardighi-Gokarno D/C shared by SLDC is as

- Conductor type : Quad Moose
- Tower : Double circuit
- Line Length : 41.2 km

Requirement of Protection coordination By Gokarno End (WBSETCL, SLDC WB) with remote end utilities (PGCIL ERTS 1 & PGCIL ERTS 2):

- The two existing circuits are 400 kV Gokarno-New Purnea (S/C, Triple snowbird 250 km) and Gokarno-Rajarhat (S/C, Triple snowbird, 227 km). Thus the above line commissioning will cause a change in short line length for these circuits from remote ends (PGCIL ERTS 1 and PGCIL ERTS 2).
- In addition, the line will result in change in system confirmation causing a long line followed by short lines so the remote end has to coordinate the Zone 2 setting as well as time delays so that there is not uncoordinated tripping.

Requirement of Protection Coordination by Sagardighi end (WBPDCL, WB SLDC) with Remote end utilities (PGCIL ERTS 2, NTPC Farakka, WBSETCL) :

- The Existing shortest line at Sagardighi is 400 kV Sagardighi-Behrampur (HTLS, 30 km) and the longest one is 400 kV Sagardighi-Subhasgram (247 km, Twin moose). The new circuit is Quad moose D/C line with 41.2 km length. Utilities may check the need for protection coordination with upcoming new lines. It is expected that already due to short lines at Sagardighi (30 km) remote end have coordinated time delays for their zone 2 protection setting to avoid unwanted tripping. WBPDCL may provide requisite information to remote ends for coordination required with these lines.

West Bengal SLDC may also confirm that the for the circuits the dia are completed for Main bay as well as tie bay at Sagardighi end (One and half breaker scheme). In addition, WBSLDC/WBPDCL/WBSETCL is requested to confirm following prior to the charging of this line.

1. Protection setting of new charged elements has been configured as per ERPC's guidelines.
2. Protection setting has been uploaded in PDMS. Relay setting has been shared in pdf format with ERPC/ERLDC.

3. Disturbance recorder installed at Sagardighi and Gokarna end has been configured as per PCC's guidelines.
4. Healthiness of carrier protection of this element may be confirmed.
5. The substation event logger have all related information

Members may note.

Deliberation in the meeting

PCC advised the all concerned utilities to note and comply.

ITEM NO. C.7: Any additional agenda – with permission of the Chair.

Meeting ended with vote of thanks to the chair.

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Annexure A

Full Name
ERPC Kolkata
Saswat Swain
Alok Pratap Singh ,ERLDC (Guest)
Ch Mohan Rao
s choudhary
Dilip Jha
Nishant Kumar Shankwar
Raviteja Nowduru
Varun Vineet, EEE/ CRITL
Kumar Satyam ERPC
Raj Protim ERLDC (Guest)
DEEPAK THAKUR , AEE/BSPTCL
JAYATHRANPS
Saibal Ghosh,ERLDC (Guest)
Pallavi Kansal
Arindam Choudhary
Sudipta Maiti (Guest)
Sabyasachi Ghosh
SANJEEV KUMAR (Guest)
SURAJIT BANERJEE (Guest)
Sarfraj Akhtar
RAHUL RAJ
DILSHAD ALAM
05101990pavan
ANKUR ER1 (Guest)
JAYANTA KANJILAL (Guest)
Rajender Kumar Thakur
s kumar
Amaresh Mallick (Guest)
jitesh kumar (Guest)
Satya Deep Tangudu (Guest)
SHYAM KEJRIWAL, ERPC
SLDC ODISHA (Guest)
D.K.Jain ED ERLDC
aditya kumar jha jha
UMAKANTA MISHRA (Guest)
Rajdeep Bhattacharjee, RE, BSPHCL, Kolkata
Sathishkumar Natarajan
Jitesh Kumar
Rajendra Prasad (Guest)
Prasant Senapathy
Chandan Kumar ERLDC (Guest)
s choudhary
Deepak EEE SLDC
Chandan Kumar
RENU (Guest)

Sucharit Mondal
Laldhari Kr ERLDC (Guest)
manoj,EExE,chaibasa,jusnl
Shivam Asati, ERPC (Guest)
tushar ranjan (Guest)
Dharm Das Murmu, CRITL (Guest)
Praveen (Engieer-PSS, PRDC) (Guest)
S M S SAHOO,AGM,OPTCL, MERAMUNDALI
Prince kumar/AEE/BSPTCL
BD Kumar
DAMAN JAIN ERLDC (Guest)
Prince Ranjan (Guest)
Amit Kumar (Guest)
Pallavi (Guest)
Rajendra Prasad (Guest)
Aditi Sen Pradhan, SE(E),SLDC,DVC
Pradeep Mohanty
sukdev (Guest)
D K Bauri, SE, ERPC (Guest)
rajemdra Prasad (TVNL) (Guest)
N S Mondal MS ERPC (Guest)
Rambaboo Singh (Guest)
Yamana Ayyappa
MOUMITA SARKAR
ANUPAMA SAGAR (Guest)
Anupam O&M BSPTCL

Annexure B11

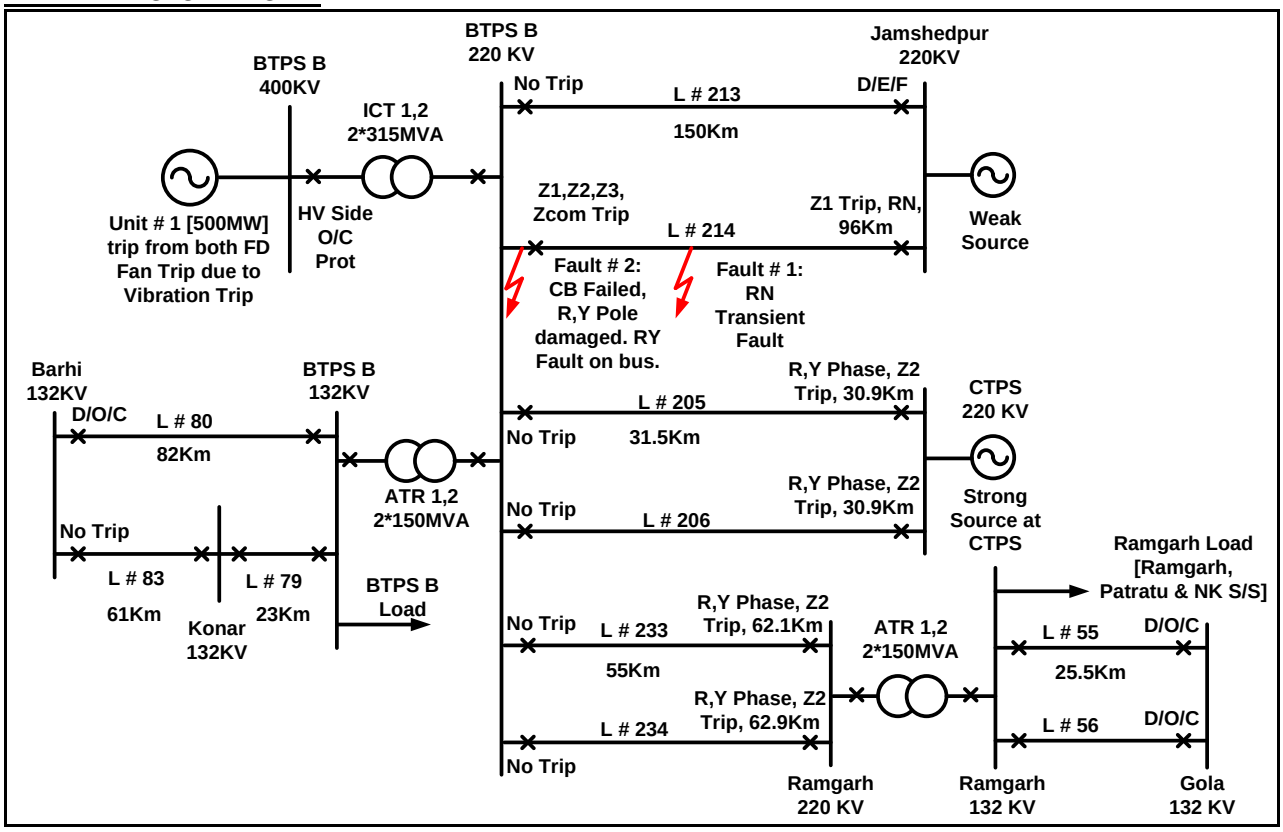
Name of GSS	Transforme Earthing (in Ohm)	Status of Bus- Coupler Healthy/Unhealthy
220/132 KV GSS HATIA-II	**Transformer-I** HV-Neutral Earth:-**0.51** LV-Neutral Earth:-**0.40** Transformer Body Earth:-**0.32**	1 220K Voltage Level:- Healthy 2. 132KV Voltage Level:- Healthy
	Transformer-II HV-Neutral Earth:-**0.63** LV- Neutral Earth:-**0.42** Transformer Body Earth:-**0.12**	
	Transformer-III HV-Neutral Earth:-**1.7** LV- Neutral Earth:-**1.7** Transformer Body Earth:-**0.48**	
	220 KV LINE feeder Earthing (in Ohm)	
	PGCIL ,CKT-1 :-**0.45** PGCIL,CKT-2 :-**0.39** PGCIL,CKT-3 :-**0.38**	
	PTPS, CKT- 1 :- **0.39**	
	PTPS,CKT-2 :-**0.38**	

Annexure 2: Detailed analysis received from DVC

Report on Grid Disturbance at 220kV BTPS-B S/Y, DVC on 16-08-2020 at around 01:52Hrs

BRIEF HISTORY: At around 01:52 Hrs on 16-08-2020, a system disturbance occurred at 220KV BTPS-B S/Y, DVC. As reported, the Y-Pole CB of 220kV Bokaro-Jamshedpur Ckt-II (L#214) burst out at BTPS-B end also causing damage to the R-Ph CB pole leading to TPF at BTPS-B (220& 132kV both), Ramgarh (220& 132kV both), Patratu & NKP S/S. There was also oil splashing of 220KV Y Phase CT of L # 214 at Jamshedpur End. Both the 315MVA ICTs of BTPS-A tripped at BTPS-A end along with the tripping of BTPS-A U#1(500MW Capacity).

RELEVANT SYSTEM SLD:



Bus arrangement at 220kV BTPS-B S/Y pre-fault condition:

Main Bus-I: ATR#1, SST#1, CTPS 1, Jamshedpur 2, Ramgarh 1, ICT#2.

Main Bus-II: ATR#2, SST#2, CTPS 2, Jamshedpur 1, Ramgarh 2, ICT#1.

OPERATED RELAY TARGETS:

Sl. No.	Name of the Element	Relay Indication (Local End)	Relay Indication (Remote End)
1.	400/220 KV ICT I&II	220KV Side – Intertrip Received	400KV Side – O/C Trip.
2.	220 KV BTPS B Jmd Ckt- I	Dist prot "R" & "Y"-Ph, Z1,.B/U-D/E/F.	Dir E/F. Fault Duration as per PMU: 240ms.
3.	220 KV BTPS B Jmd Ckt- II	RN, Z1, Z2, Z3, ZCom Trip.	RN, Z1 trip, F.D-94.5 km.

4.	220KV BTPS CTPS Ckt I & II	No Trip	Dist. Prot Z-2, Flt Dur as per PMU: 320ms.
5.	BTPS-A (500 MW) UNIT	Both FD fan tripped due to vibration.	
6.	220 BTPS B Ramgarh Ckt I & II	No Trip	R, Y Ph, Zone 2, Fault Dist.= 62.1km.
7.	132 KV Ramgarh-Gola Ckt I & II	No Trip	D/O/C Trip in all 3 phases.
8.	132 KV BTPS B Barhi	No Trip	D/O/C Trip in all 3 phases

ANALYSIS OF TRIPPING:

1. There was a transient RN fault at about 95Km from Jamshedpur End (55Km from BTPS B End) in BTPS B Jmd Ckt II [L # 214]. Both ends saw the fault in Zone 1 and relays at both ends tripped instantaneously. However the CB at BTPS B End failed to open and the fault was not cleared from BTPS B End.
2. Under these conditions LBB Protection of L # 214 should have operated to trip the connected BTPS B Main Bus 1. But it failed to operate because the particular protection had been switched OFF inadvertently in the Main Distance protection relay (REL 670).
3. As the fault was about 55Km from BTPS B End and owing to high infeed at BTPS B bus from both ICTs, all the remote ends saw the fault within their Zone 3 reach and would have tripped after their Zone 3 time delay [600ms]. But before these lines could trip the stuck Y Phase CB of L # 214 burst out causing damage to the R Pole of the CB too leading to bus fault on BTPS B 220KV. Both R and Y Phase CB pole of the said line at BTPS B End were found in damaged condition.
4. At BTPS B 220KV busbar protection should have operated but it was later investigated and found that both Main Zone 1 & 2 Supervision were in operated condition and thus Busbar Protection at BTPS B was dysfunctional at the time of fault.
5. In order to clear the bus fault all lines tripped at their respective remote ends through RY Phase Distance Zone 2 and ICT 1 & 2 tripped through 400KV Side O/C Protection correctly. As the fault infeed from 132KV side of 220/132KV ATRs were very minimal, the ATR O/C relays did not pick up. The fault was cleared either by itself or by tripping of two number incoming 132KV lines to BTPS B 132KV. But these 132LV Line trippings were due to overloading of lines as understood from the relay indications (RYB D/O/C Protection) and not due to fault clearing.
6. There was also some oil spilling observed in the Y Phase CT at Jamshedpur End of L # 214 but this had not created a bus fault at Jmd end as it's CB had already tripped from Jamshedpur End. The CT was replaced by a healthy one.
7. BTPS A 500MW Unit # 1 had tripped due to tripping of both FD Fan Motors due to Vibration Protection as reported by C & I Division, BTPS A. The said protection had been kept ON inadvertently and was switched OFF after this incident.

TESTS AND INVESTIGATIONS DONE:

1. The CT terminal connections of CT Switching relays of BTPS CTPS Ckt 2 [L# 206] were found in damaged and burnt out condition leading to mismatch of current in Main Bus Zone 2. The CT

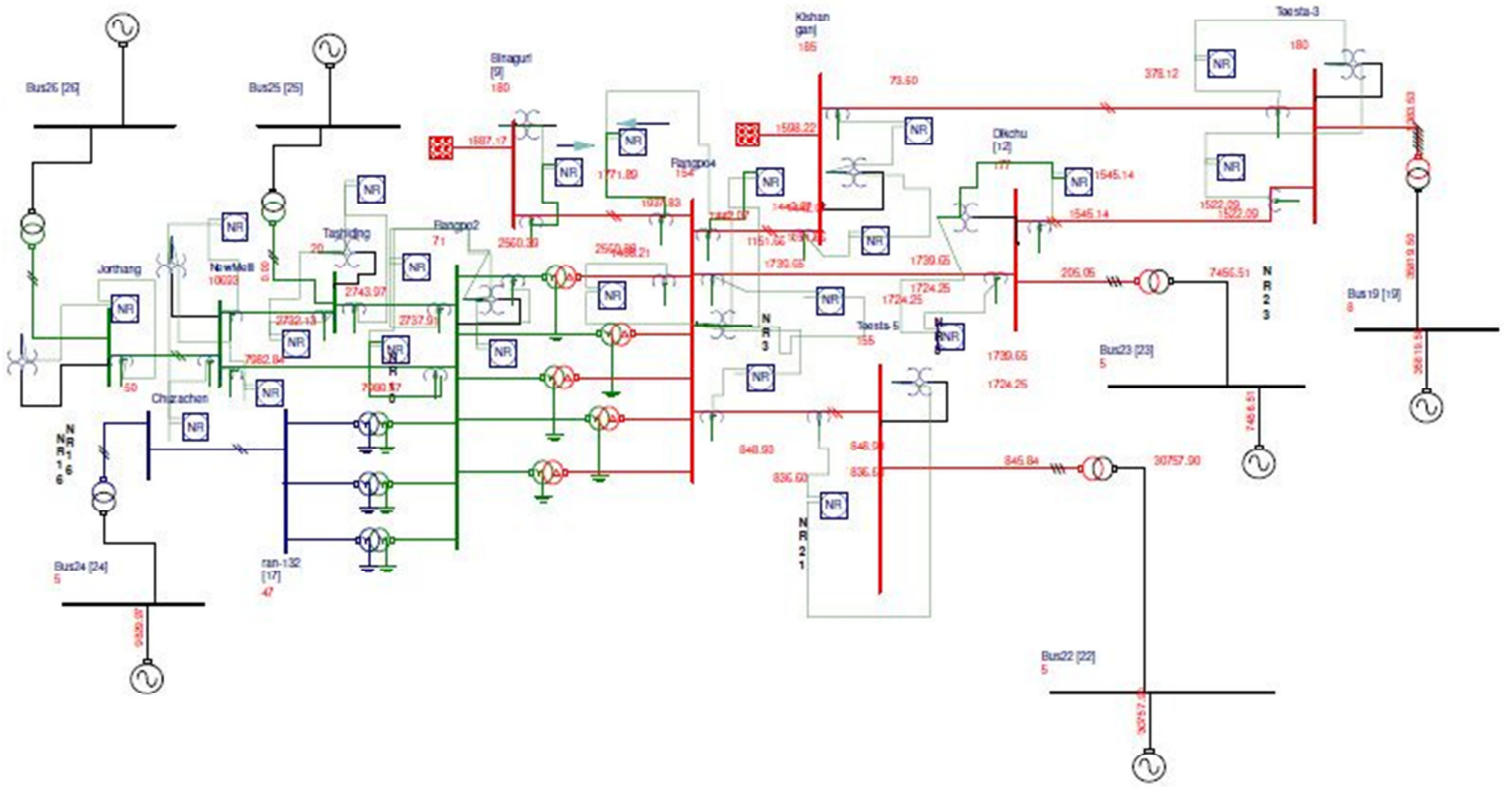
Switching relays of ATR 1 panel was found in operated condition for both buses which had shorted the Bus Zone 1 & 2 CT circuits thereby extending the mismatch to Bus Zone 1 too which had caused Bus Wire supervision to be operated for both Bus Zones.

2. Both the above discrepancies were rectified and busbar protection for both buses normalized.
3. The settings of ATR O/C relays were checked by fault studies and found to be O.K i.e. due to lack of fault current from 132KV side they would not pick up. Thus any tripping from 132KV side would occur only after majority of 220KV sources trip but before such tripping occurs the 132KV lines would trip due to shift of load current.

REMEDIAL ACTION TAKEN:

1. The R & Y CB pole of L # 214 at BTPS B End was replaced and the CB was put into service.
2. R Phase CT at Jamshedpur End of L # 214 was replaced by a healthy one.
3. LBB Protection function in L # 214 was switched ON in the REL 670 distance relay.
4. Vibration Protection in FD Fan motors of BTPS A Unit was switched OFF.

Network:


Bus26 [26]
Bus25 [25]
Binaguri
[3]
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Kishan
(gan)
185
Teesta-3
180
Dikchu
[12]
177
Rangpo2
71
Rangpo4
154
Jorthang
50
NewMelli
10033
Tashiding
20
Chuzachen
Teesta-5
155
Bus23 [23]
5
Bus19 [19]
8
Bus24 [24]
5
ran-132
[17]
47
Bus22 [22]
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NR
73.50
378.12
1598.22
1587.17
1771.89
1545.14
1522.09
1739.65
1724.25
205.05
7466.51
2743.97
2732.13
2737.91
7080.84
7080.57
848.93
836.60
845.84
30757.90

Line	Relay Connected at	CT Ratio in A	Fault Location	Fault Current seen by the Relay	Existing				Proposed			
					Ie> in A (Primary)	Characteristics	TMS/ Time Delay	Top (sec)	Ie> in A (Primary)	Characteristics	TMS	Top in sec
Binaguri-Rangpo	Rangpo end	2000/1	Binaguri	4526	200	IEC NI	0.34	0.776	400	IEC NI	0.36	1
Binaguri-Rangpo	Binaguri end	2000/1	Rangpo	2716	200	IEC NI	0.34	0.889	400	IEC NI	0.28	1
Kishangunj-Rangpo	Rangpo end	3000/1	Kishangunj	2933	1200	IEC NI	0.34	2.639	600	IEC NI	0.25	1
Kishangunj-Rangpo	Kishangunj end	3000/1	Rangpo	2200.46	400	IEC NI	0.28	1.13	400	IEC NI	0.25	1
Rangpo- Dikchu	Rangpo end	3000/1	Dikchu	5213.64	-	-	-	-	600	IEC NI	0.32	1
Rangpo- Dikchu	Dikchu end	3000/1	Rangpo	3440	600	DT	1.5	1.5	600	IEC NI	0.38	1.5
Rangpo- TeesthaV	Rangpo end	2000/1	Teestha V	6531.16	200	IEC NI	0.375	0.85	400	IEC NI	0.42	1
Rangpo- TeesthaV	TeesthaV end	2000/1	Rangpo	6909.83	-	-	-	-	400	IEC NI	0.42	1
Kishangunj-Teestha III	Kishangunj end	2000/1	Teestha III	1381	400	IEC NI	0.28	1.562	400	IEC NI	0.18	1
Kishangunj-Teestha III	Teestha III end	2000/1	Kishangunj	2859.84	-	-	-	-	400	IEC NI	0.3s	1
Dikchu-Teestha III	Dickchu end	3000/1	Teestha III	2482.1	400	DT	1.5	1.5	400	IEC NI	0.40	1.5
Dikchu-Teestha III	Teestha III end	3000/1	Dikchu	5264.25	-	-	-	-	600	IEC NI	0.32	1
Rangpo 220Kv Bus												
Rangpo-Tasheding	Rangpo end	1600/1	Tasheding	2241.47	320	IEC NI	0.35	1.23	320	IEC NI	0.34	1.2
Rangpo-Tasheding	Tasheding end	800/1	Rangpo	361	160	DT	1.2	1.2	160	IEC NI	0.14	1.2
Rangpo- Newmelli	Rangpo end	1600/1	Newmelli	4600.56	320	IEC NI	0.35	0.895	320	IEC NI	0.47	1.2
Rangpo- Newmelli	Newmelli end	1600/1	Rangpo	635.22	320	IEC NI	0.5	5.07	320	IEC NI	0.12	1.2
Tasheding-Newmelli	Tasheding end	800/1	Newmelli	2714.22	160	IEC NI	0.24	0.577	160	IEC NI	0.50	1.2
Tasheding-Newmelli	Newmelli end	1600/1	Tasheding	3200.38	320	IEC NI	0.5	1.485	320	IEC NI	0.40	1.2
Newmelli-Jorethang	Newmelli end	400/1	Jorethang	4170.46	-	-	-	-	100	IEC NI	0.66	1.2
Newmelli-Jorethang	Jorethang end	400/1	Newmelli	2467.65	100	DT	0.6	0.6	100	IEC NI	0.57	1.2

Line	Relay Connected at	CT Ratio in A	Fault Location	Fault Current seen by the Relay	Existing				Proposed			
					I> in A (Primary)	Characteristics	TMS/ Time Delay	Top (sec)	I> in A (Primary)	Characteristics	TMS	Top (sec)
Newmelli-Jorethang	Jorethang end	400/1	Newmelli	650	-	-	-	-	300	IEC NI	0.09	0.8

Case Studies:

By creating a SLG fault at Jorethang(220kV) Bus

Line	Relay connected at	Fault Location	Fault Current Seen in A	Existing		
				Pick up in A (Primary)	TMS	top in sec
Newmelli-Jorethang	Newmelli end	Jorethang Bus	4203.82	-	-	-
Newmelli-Rangpo	Rangpo end		2653.89	320	0.35	1.133813
ICT 315MVA 220kV	315 MVA T/F 220kV end		816.39	160	0.33	1.394448

Line	Relay connected at	Fault Location	Fault Current Seen in A	After Relay Coordination		
				Pick up in A (Primary)	TMS	top in sec
Newmelli-Jorethang	Newmelli end	Jorethang Bus	4203.82	100	0.66	1.190139
Newmelli-Rangpo	Rangpo end		2653.89	320	0.47	1.522549
ICT 315MVA 220kV	315 MVA T/F 220kV end		816.39	160	0.69	2.915665

By creating a SLG fault at Newmelli(220kV) Bus

Line	Relay connected at	Fault Location	Fault Current Seen in A	Existing		
				Pick up in A (Primary)	TMS	top in sec
Newmelli-Tasheding	Tasheding end	Newmelli Bus	2733.14	160	0.24	0.575318
Newmelli-Rangpo	Rangpo end		4666.73	320	0.35	0.889934
Tasheding-Rangpo	Rangpo end		1158.26	320	0.35	1.880214
ICT 315MVA 220kV	315 MVA T/F 220kV end		1435.57	160	0.33	1.029872

Line	Relay connected at	Fault Location	Fault Current Seen in A	After Relay Coordination		
				Pick up in A (Primary)	TMS	top in sec
Newmelli-Tasheding	Tasheding end	Newmelli Bus	2733.14	160	0.5	1.19858
Newmelli-Rangpo	Rangpo end		4666.73	320	0.47	1.195055
Tasheding-Rangpo	Rangpo end		1158.26	320	0.34	1.826494
ICT 315MVA 220kV	315 MVA T/F 220kV end		1435.57	160	0.69	2.153368

By creating a SLG fault at Tasheding(220kV) Bus

Line	Relay connected at	Fault Location	Fault Current Seen in A	Existing		
				Pick up in A (Primary)	TMS	top in sec
Tasheding-Rangpo	Rangpo end	Tasheding Bus	2267.85	320	0.35	1.226766
ICT 315MVA 220kV	315 MVA T/F 220kV end		1073.75	160	0.33	1.190448

Line	Relay connected at	Fault Location	Fault Current Seen in A	After Relay Coordination		
				Pick up in A (Primary)	TMS	top in sec
Tasheding-Rangpo	Rangpo end	Tasheding Bus	2267.85	320	0.34	1.191716
ICT 315MVA 220kV	315 MVA T/F 220kV end		1073.75	160	0.69	2.489119

By creating a SLG fault at Teestha III(400kV) Bus

Line	Relay connected at	Fault Location	Fault Current Seen in A	Existing			Remarks
				Pick up in A (Primary)	TMS	top in sec	
Teestha III-kishangunj	Kishangunj end	Teestha III Bus	1373.94	400	0.28	1.568846	Dickhu end DT charactersetics is used
Teestha III-Dikchu	Dikchu end		2432	400	1.5	1.5	
Dikchu- Rangpo	Rangpo end		1332.24			#DIV/0!	

Line	Relay connected at	Fault Location	Fault Current Seen in A	After Relay Coordination			Remarks
				Pick up in A (Primary)	TMS	top in sec	
Teestha III-kishangunj	Kishangunj end	Teestha III Bus	1373.94	400	0.18	1.008544	Dickhu end Relay from DT to IDMTcharactersetics was changed
Teestha III-Dikchu	Dikchu end		2432	400	0.4	1.523411	
Dikchu- Rangpo	Rangpo end		1332.24	600	0.32	2.785777	

By creating a SLG fault at Dikchu (400kV) Bus

Line	Relay connected at	Fault Location	Fault Current Seen in A	Existing		
				Pick up in A (Primary)	TMS	top in sec
Dikchu- Rangpo	Rangpo end	Dickhu Bus	5096.94	-	-	
Rangpo-Binaguri	Binaguri end		1218.69	200	0.34	1.293287

Line	Relay connected at	Fault Location	Fault Current Seen in A	After Relay Coordination		
				Pick up in A (Primary)	TMS	top in sec
Dikchu- Rangpo	Rangpo end	Dikchu Bus	5096.94	600	0.32	1.02475
Rangpo-Binaguri	Binaguri end		1218.69	400	0.28	1.739792

By creating a SLG fault at Kishangunj (400kV) Bus

Line	Relay connected at	Fault Location	Fault Current Seen in A	Existing		
				Pick up in A (Primary)	TMS	top in sec
Kishangunj-Rangpo	Rangpo end	Kishangunj Bus	2950	1200	0.34	2.622234
Rangpo-Binaguri	Binaguri end		679.37	200	0.34	1.922572

Line	Relay connected at	Fault Location	Fault Current Seen in A	After Relay Coordination		
				Pick up in A (Primary)	TMS	top in sec
Kishangunj-Rangpo	Rangpo end	Kishangunj Bus	2950	600	0.23	0.994891
Rangpo-Binaguri	Binaguri end		679.37	400	0.28	3.680633
Line	**Relay connected at**	**Fault Location**	**Fault Current Seen in A**	**Existing**		
				Pick up in A (Primary)	**TMS**	**top in sec**
Teestha V- Rangpo	Rangpo	Teestha V Bus	6263.51	200	0.375	0.736207
Rangpo-Binaguri	Binaguri end		2155.05	200	0.34	0.977545

Line	Relay connected at	Fault Location	Fault Current	After Relay Coordination

			Seen in A	Pick up in A (Primary)	TMS	top in sec
Teestha V- Rangpo	Rangpo	Teestha V Bus	6263.51	400	0.41	1.014808
Rangpo-Binaguri	Binaguri end		2155.05	400	0.28	1.144333

ANNEXURE-C1

Sl No.	Name of the incidence	PCC Recommendation	Latest status
91st PCC Meeting			
1.	Tripping of all 220 k V lines from 220 k V NJP Substation on 27.05.2020 at 0:56 hrs	PCC advised Powergrid to share the report with ERPC and ERLDC.	On 24 June 2020, PGCIL has share reports to WBSETCL,ERLDC and ERPC.
2.	Nomination of nodal persons for communication related to tripping of grid elements	PCC advised all the utilities including SLDCs to nominate at least two nodal persons within a week for tripping analysis.	All utilities have been intimated for the nomination. Status of Nomination is attaced in annexure C1.2
3.	Multiple tripping incident at Jeeratat 18:08 hrs on 27-05-2020	PCC advised WBSETCL to submit a report to ERPC and ERLDC.	On 21st July 2020, report and data have been received from WB
90th PCC Meeting			
1.	Tripping of both running units at 220 k V TTPS on 15.03.2020 at 16:12 hrs.	PCC advised JUSNL to take the following measures to avoid the unwanted tripping of transmission lines: • Check any fault was appeared in downstream network of Patratu PTPS S/s • Send the relevant DR of zone 4 tripping of 220 kV TTPS – PTPS S/C line at PTPS end • Check the zone 4 reach and time settings of 220 kV TTPS – PTPS S/C line at PTPS end as the line should not trip within 100 ms. • Test the protection relays of 132kV and 220 kV system at PTPS including 220/132kV ATRs	JUSNL updated following points – a) No fault found at downstream network of PTPS according to grid official. Relevant DR was already submitted. b) Z4 reach and time delay of 220 kV PTPS – TTPS was reviewed and found as per ERPC Philosophy. c) Line patrolling and Tree cutting have been done (report enclosed). d) Relay setting was already submitted by mail on 13.05.2020.

2.	Black out at 220 k V Tenughat Substation on 14.04.2020 at 12:47 hrs	After detailed deliberation. PCC opined that tripping of 220 kV TTPS – PTPS S/C line not clear, PCC advised JUSNL to collect the details and submit to ERPC and ERLDC. PCC advised BSPTCL, JUSNL and TVNL to take following corrective measures to avoid frequent tripping of the lines: • 220 kV TenughatBiharshariff S/C tripped 7 times in the months of March and April, 2020. 220 KV TTPS PTPS line also tripped several times in March and April 2020. JUSNL and BSPTCL were advised to carry out the line patrolling and ensure healthiness of these line. • TVNL was advised to review the O/C, E/F protection settings of 220 kV TenughatBiharshariff S/C , O/C , E/F protection settings of PTPS unit so that high resistance faults could be identified reliably.	JUSNL updated following points – a) No fault found at downstream network of PTPS according to grid official. Relevant DR was already submitted. b) Z4 reach and time delay of 220 kV PTPS – TTPS was reviewed and found as per ERPC Philosophy. c) Line patrolling and Tree cutting have been done (report enclosed). **d)** Relay setting was already submitted by mail on 13.05.2020
3.	Total Power failure at 220 k V TTPS on 22.04.2020 at 20:12 hrs	PCC advised JUSNL to submit the relay settings of 220 kV PTPS-TTPS line at PTPS end to ERPC and ERLDC	JUSNL updated following points – a) No fault found at downstream network of PTPS according to grid official. Relevant DR was already submitted. b) Z4 reach and time delay of 220 kV PTPS – TTPS was reviewed and found as per ERPC Philosophy. c) Line patrolling and Tree cutting have been done (report enclosed). **d)** Relay setting was already submitted by mail on 13.05.2020
4.	Disturbance at 220 k V Tenughat Substation on 28.04.2020 at 06:29 hrs.	PCC advised TVNL to replace the EM type Busbar protection with numerical relay.	

5.	Disturbance at 220 k V Chandil Substation on 29.03.2020 at 19:21 hrs.	PCC observed the following discrepancies and advised JUSNL and WBPDCL to take appropriate action: • 220kVChandil-Ramchandrapur S/C line got tripped within 100 ms. (Relay fault pickup details are not available due to incorrect DR configuration) JUSNL may check timing of distance protection at Ramchandrapur. • Disturbance recorders of all the substations of JUSNL involved in this disturbance are to be configured as per the ERPC guidelines. • STPS end DR of 220kV Chandil-STPS line is to be configured as per the ERPC guidelines • Protection system of 220/132kV ATRs to be tested and the settings are to be coordinated with 220kV and 132 kV protection relays. • Busbar protection for all 220kV substations are to be installed to minimize the fault clearing time. • As 220kV Chandil S/s has single bus and transfer scheme, option for sectionalizer may be explored. • Healthiness of carrier signal of 220kV Chandil-STPS line is to be checked. • STPS end DR of 220kV Chandil-STPS line is to be configured as per the ERPC guidelines	JUSNL updated following points: a) Timing of distance protection at Ramchandrapur end was reviewed and found as per ERPC Philosophy. b) Old electromechanical relays are to replaced under PSDF upgradation (In progress). c) Proposal for bus sectionaliser has been sent by Chandil. d) Current PLCC healthiness status report is enclosed. e) Z4 reach and time delay of 220 kV Chandil – STPS line at Chandil end was reviewed and found as per ERPC Philosophy.
6.	Total Power failure at 220 k V Chandil Substation on 15.04.2020 at 17:20 hrs	PCC observed the following discrepancies and advised JUSNL to take appropriate action: • Disturbance recorders of all the substations involved in this disturbance are to be configured as	JUSNL updated following points: a) Timing of distance protection at Ramchandrapur end was reviewed and found as per ERPC Philosophy.

		per the ERPC guidelines. • CB of 220kV STPS-Chandil line at Chandil end is to be tested • Protection system of 220/132kV ATRs to be tested and the settings are to be coordinated with 220kV and 132 kV protection relays. • Busbar protection for all 220kV substations are to be installed to minimize the fault clearing time.	b) Old electromechanical relays are to replaced under PSDF upgradation (In progress). c) Proposal for bus sectionaliser has been sent by Chandil. d) Current PLCC healthiness status report is enclosed. e) Z4 reach and time delay of 220 kV Chandil – STPS line at Chandil end was reviewed and found as per ERPC Philosophy.
7.	Total Power failure at 220 k V Chandil Substation on 30.04.2020 at 19:37 hrs	PCC observed the following discrepancies and advised JUSNL to take appropriate action: • Disturbance recorders of all the substations involved in this disturbance are to be configured as per the ERPC guidelines. • The reach and time settings of distance protection of 220kV STPS-Chandil line at Chandil end are to be reviewed. • Protection system of 220/132kV ATRs to be tested and the settings are to be coordinated with 220kV and 132 kV protection relays.	JUSNL updated following points: a) Timing of distance protection at Ramchandrapur end was reviewed and found as per ERPC Philosophy. b) Old electromechanical relays are to replaced under PSDF upgradation (In progress). c) Proposal for bus sectionaliser has been sent by Chandil. d) Current PLCC healthiness status report is enclosed. e) Z4 reach and time delay of 220 kV Chandil – STPS line at Chandil end was reviewed and found as per ERPC Philosophy.
8.	Total Power failure at 400 k V Teesta III and Dikchu Substations on 15.03.2020 at 16:12 hrs	PCC advised Powergrid to explore implementation of line differential protection for 400 kV Teesta III – Kishangunj S/C, 400 kV Rangpo – Kishangunj S/C and 400 kV Teesta III – Dikchu – Rangpo section to	A sperate meeting to discuss the Sikkim Hydro complex to resolve the issues will be called by ERPC.

		avoid uncoordinated trippings. This would identify the high resistive faults reliably and clear the faults immediately. PCC advised Dikchu to review earth fault settings at 400 k V side of 400/132 kV ICT of Dikchu HEP as tripping of this ICT is not desirable. PCC already advised same in earlier PCC Meetings.	ICT Backup Earth fault setting has already been revised by Dikchu
9.	Tripping of 400 k V Teesta III – Dikchu S/C from both ends on 21.04.2020 at 11:00 hrs	PCC advised Dikchu to review the relay settings. PCC advised TUL to maintain the spare reserves.	Relay block logic has been modified for Main2 relay for DIkchu-Rangpo ckt at Dikchu end. A sperate meeting to discuss the Sikkim Hydro complex to resolve the issues will be called by ERPC. CEA Spare Equipment guidelines has beenshared by ERLDC to all utilities to ensure all spare in adequate quantum is available.
10.	Black out of 132 k V Chujachen Hydro Power Substation on 01.04.2020	PCC advised DANS Energy to send relay settings , SLD and line parameters at Tashiding and Jorethang to ERPC and ERLDC.	The Setting of Jorethang and Tashiding has been reviewed by respective utilities in coordination with PRDC.
11.	Tripping of Unit 1 of JITPL on 05.03.2020 at 19:27 hrs	PCC advised JITPL take following corrective actions: • Reduce zone 4 time setting of transmission lines to 0.5 second. • Bay CT could be taken in reactor differential protection. • As a temporary measure, set reactor bays backup impedance tripping time to 200-300 milisecond instead of 0 second to avoid maloperation.	JITPL : At presently Rector Bay -1 &2 Back up Impedance Tripping time set at relay 100 milli sec . For Appropriate differential Scheme adaptation in both reactors bay we are called consultant(TCE), OEM (Siemens) and Relay testing Engineer ,it is in process of P.O placed . After completion, it will be shared with ERPC and ERLDC

			separately in future.
12.	Tripping of both units of JITPL on 21.04.2020 at 18:29 hrs	PCC advised JITPL to take following action: 1) Tripping of both units at JITPL for bus bar protection operation of any bus may be reviewed. 2) Units shall be connected to grid through remaining healthy bus	As per BHEL tripping scheme any one of the bus trip both generators will be tripped. During Visiting of Consultant (TCE), OEM(SIEMNS), Relay Testing Engineer the bus bar tripping scheme will be reviewed . After completion, it will be shared with ERPC and ERLDC separately in future.
13.	Multiple tripping incident at Melli at 18:29 hrs on 13-03-2020	PCC advised Powergrid and sikkim to take necessary action and submit details to ERPC and ERLDC	Sikkim SLDC has been advised to coordinate with sharing of information with ERLDC and ERPC.
14.	Islanding of CESC system at 14:31 hrs on 28-04-2020	PCC advised WBSETCL and CESC to coordinate the protection settings and islanding scheme settings to minimize separation of CESC system.	The Issues has been resolved by WEBSETCL and CESC in coordination with each other. The 33 kV line protection have been reviewed and corrected by WBSETCL.
89th PCC Meeting			
1.	Disturbance at 220 kV Bidhannagar Substation on 01.02.2020 at 21:05 Hrs.	PCC suggested WBSETCL to take the following remedial measures: • Submit the last test report of the CT which was failed during the disturbance • Carry out the testing of other CTs at Bidhanagar S/s • Avoid uneven distribution of lines between the Buses • WBSETCL along with SLDC, WB should explore to change the network configuration to reduce the fault current level at Bidhanagar	

2.	Tripping of 220 kV Muzaffarpur-Hajipur D/C on 09.02.2020 at 12:53 Hrs and Tripping of 220 kV Hajipur-Amnour D/C on 10.02.2020 at 17:32 Hrs.	PCC advised BSPTCL to take the following actions: • Check the past trippings for successful/unsuccessful operation of LBB and Bus Bar protection • Test LBB protection and Bus bar protection. PCC also advised SLDC Bihar and Powergrid to check reason for voltage unbalance at Muzaffarpur Substation.	
3.	Disturbance at Muzaffarpur Substation on 20.02.2020 at 12:29 Hrs.	PCC advised BSPTCL to resolve the O&M issues with Powergrid at the earliest.	Agreement on Maintenance has been signed between PGCIL and BSPTCL as informed by BSPTCL.
4.	Multiple tripping incident at RTPS at 01:55 hrs on 08-02-2020	PCC advised DVC to change GPS time synchronization.	Time synchronization as checked with Maithon and found ok.
5.	Multiple tripping incident at NBU at 22:01 hrs on 29-02-2020	PCC advised WBSETCL to send detailed report to ERPC.	Details and DR/EL have been received from WBSETCL
6.	Sharing DR/EL for any tripping incident within 24 hrs of the incident and detailed report of any grid disturbance/grid incident/grid event within seven days	PCC advised SLDCs, generating stations and transmission utilities involved to send detailed report along with DR/EL to ERPC and ERLDC	All utilities were informed and they have started submitting the same in line with PCC discussion

88th PCC Meeting			
1.	Disturbance at 220 kV Maithon(PG) Substation on 25.01.2020 at 15:14 Hrs.	PCC advised Powergrid to replace the relay with numerical relay.	
2.	Tripping of 220 KV Gaya SonenagarD/Con 13.01.2020 at 00:40 Hrs.	PCC advised BSTPCL take the following corrective actions: • Send the PSL logic and relay setting file to ERPC Secretariat. • DR synchronisation need to be reviewed.	PSL logic was also checked by BSPTCL and was shared with ERPC. There is no GPS available at the Sonenagar end and is being done manually.
3.	Tripping of 400 kV Teesta V – Rangpo D/Con 05.01.2020 at 20:04 Hrs.	PCC advised NHPC to take following corrective actions: • Revise their Zone-4 time settings to 500 ms. • 400kV Teesta-V – Rangpo Ckt-I distance protection input needed to be checked.	
87thPCC Meeting			
1.	Tripping of 220 KV Darbhanga (DMTCL) – Motipur I on 14.12.2019 at 02:50 Hrs.	PCC advised BSPTCL to take following corrective actions: - • Digital signals configuration of relays at Motipur end need to be checked. • Over voltage settings of relay at Motipur end need to be reviewed.	BSPTCL has configured the DR as per ERPC guidelines. Over voltage setting has been revised and now it has been coordinated.
2.	Tripping of 132 kV Dumka – Lalmatia D/C on 09.12.2019 at 11:35 hrs	PCC advised JUSNL to collect DRs and discuss above issue with the SLDC and send the details to ERPC/ERLDC. PCC advised NTPC to share the DR at Lalmatia end. In 88th PCC meeting JUSNL	

		informedthat they did not got the reply from SLDC Jharkhand yet	
83rd PCC Meeting			
1.	Total power failure at 220 kV Darbhanga (BSPTCL) S/s on 16.08.2019 at 22:23 Hrs.	PCC observed that DR configuration at DMTCL end is not in order. PCC advised DMTCL to configure the DR settings as per the standard. In 87thPCC meeting, DMTCL informed that DR would be configured by end of February, 2020.	DMTCL has configured the DR as per ERPC guidelines
81st PCC Meeting			
1.	Disturbance at 400 kV Dikchu S/s on 30.06.2019 at 09:55 Hrs.	The time setting for the DEF relay at Jorethang end was 500 msec. PCC advised Jorethang to review the timer setting of DEF protection at Jorethang end. PCC advised Chuzachen to review the zone settings for 132 kV Chuzachen-Rangpo line. PCC advised TPTL to do line patrolling for 400 kV Rangpo-Dikchu line to find out the cause of such high resistive fault in the line. In 87thPCC meeting, Chuzachen informed that they have asked for information related to Rangpo end from Powergrid and Sikkim. Further, Chuzachen informed that they would send the zone setting file to ERPC/ERLDC at the earliest. In 89th PCC Chuzachen was advised to review the zone 3 settings for 132 kV Chuzachen-Rangpo line as it is very high	DEF Setting have been reviewed by Jorethang to coordinate for resistive faults in coordination with PRDCand ERPC Chuzachen has also reviewed their setting to ensure timely fault clearance.
2.	Disturbance at 220 kV Budhipadar(OPTCL) S/s on 12.06.2019 at 00:37 Hrs.	PCC advised OPTCL to properly configure the DRs for 220 kV Budhipadar – Korba D/C & 220 kV Budhipadar-Raigarh circuit at Budhipadar end and for 220 kV Budhipadar – Lapanga - II at	

		Lapanga end as per the DR standard finalised in 79th PCC Meeting. PCC also advised OPTCL to check the time synchronization. In 3rdTeST meeting, OPTCL informed that they had replaced the old relay at Korba. In 87th PCC meeting, OPTCL informed that DR for Budhipadar – Korba Circuit-I has been configured.	