Agenda
for
97th PCC Meeting

Date: 14.12.2020
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

AGENDA FOR 97TH PROTECTION SUB-COMMITTEE MEETING TO BE HELD ON 14.12.2020 AT 10:30 HOURS

PART – A

ITEM NO. A.1: Confirmation of minutes of 96th Protection sub-Committee Meeting held on 12th November 2020 through MS Teams.

The minutes of 96th Protection Sub-Committee meeting held on 12.11.2020 circulated vide letter dated 02.12.2020.

Members may confirm the minutes of 96th PCC meeting.

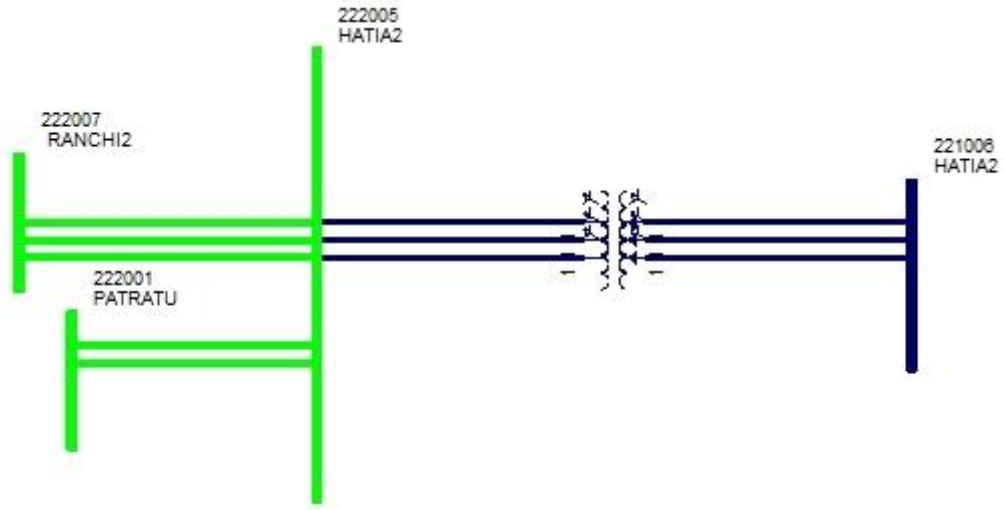
PART – B

ITEM NO. B.1: Total Power Failure at 220 / 132 kV Hatia Substation on 13.11.2020 at 14:36 hrs

On 13th November 2020 at 14:36 hrs, B phase CT at Hatia end of 220 kV Ranchi Hatia – 3 was busted causing bus fault at 220 kV Hatia bus of 220/132 kV Hatia Substation. The following elements got tripped:

- 220 kV Ranchi Hatia – 1 and 2 tripped from Ranchi end
- 220 kV Patratu – Hatia D/C tripped from Patratu end
- 220/132 kV 150 MVA ICT – 3 Hatia also tripped

Thereafter, 220/132 kV ICT – 1 & 2 and 220 kV Ranchi – Hatia – 1 & 2 were hand tripped from Hatia end. As a result total power failure occurred at 220/132 kV Hatia S/S.



Relay indication and PMU observation :

Time	Name	End1	End 2	PMU Observation
14:36 Hrs	220 kV Ranchi – Hatia 1 & 2	Distance protection	Did not trip (Later hand tripped)	Around 30 kV dip has been observed in B phase voltage recorded at Ranchi PMU. The fault clearing time was around 500 ms. Around 1 second later another fault has been observed in Y and B phase. Fault clearing time was around 400 ms. Around 20 and 10 kV dip has been observed in Y and B phase voltage respectively recorded at Ranchi PMU.
	220 kV Ranchi – Hatia 3	Yet to be received	Yet to be received	
	220 kV Hatia – Patratu 1	Yet to be received	B phase Over Current, Earth Fault, Zone-2, 54 km, F/C 1.2 kA	
	220 kV Hatia – Patratu 2	Yet to be received	B phase Over Current, Earth Fault, Zone-2, 58 km, F/C 1.1 kA	
	220/132 kV ICT – 1, 2 & 3 at Hatia	ICT 1 & 2 did not trip (Later hand tripped) while ICt 3 got tripped (Indication not shared)		

Load Loss: 240 MW
Gen. Loss: 54 MW

JUSNL and Powergrid may explain the following:

1) JUSNL may share the healthiness status of bus bar protection at 220 kV Hatia end.
2) JUSNL and Powergrid may share the relay indications of the tripping
3) JUSNL may confirm whether zone – 4 relay picked up at Hatia or not.
4) Reason of non-tripping of 220/132 kV ICTs at Hatia at 220/132 kV Hatia S/s a may be shared.
5) JUSNL/Jharkhand SLDC may share the status of 132 kV connectivity after tripping of all 220 kV feeders connected to Hatia S/S.
6) Similar type of event occurred on 14th May 2020 and 19th May 2020. JUSNL is requested to investigate and share the reason for repeated total power failure at Hatia due to CT burst. Detail of all CTs installed and their testing at Hatia substation may be furnished by JUSNL

JUSNL and POWERGRID may explain.

ITEM NO. B.2: Total Power Failure at 220 kV Dehri Substation on 24.11.2020 at 18:28 hrs

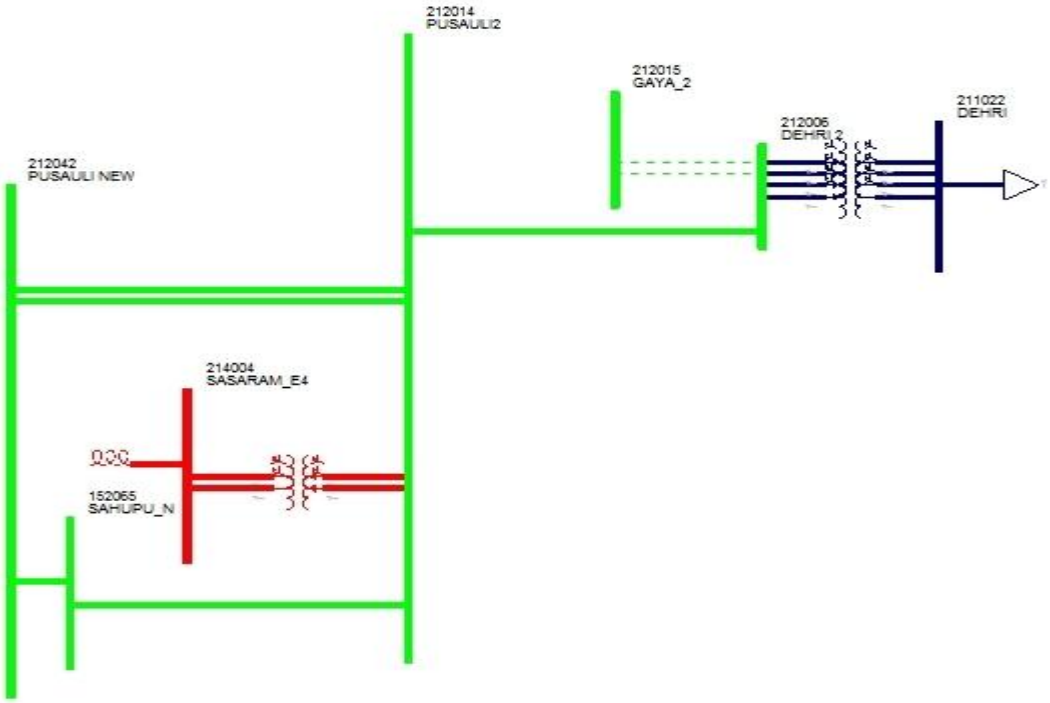
220 kV Gaya-Dehri D/C was under shutdown prior to the event. On 24th November 2020 at 18:28 hrs, tripping of 220 kV Sasaram – Dehri S/C resulted in total power failure at Dehri, Bikramganj, Banjari, Kudra, Kerpa, Tiro areas.

Charging attempt 220 kV SasaramDehri S/C of was taken at 18:53 hrs but it failed.

DR output at Sasaram end is not configured as per ERPC's guideline. Same may be configured as per guidelines

Relay indication and PMU observation :

Time	Name	End 1	End2	PMU Observation
14:36 Hrs	220 kV SasaramDehri S/C	R-B-N, 51km, I_R: 3.6 kA, I_Y: 4 kA	Yet to be received	Around 15 kV dip has been observed in R and B phase voltage recorded at Ranchi PMU. The fault clearing time was less than 100 ms.

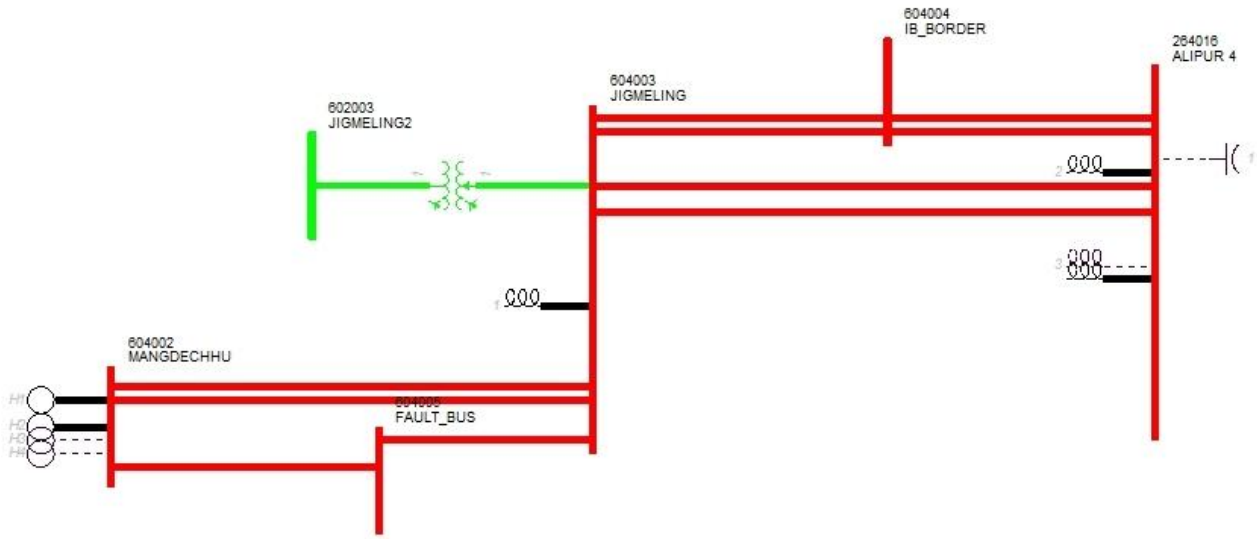


Load Loss: 154 MW

BSPTCL may explain.

ITEM NO. B.3: Disturbance at 400 kV Alipurduar Substation on 07.11.2020 at 11:04 hrs

On 07-11-2020, 400 kV Alipurduar-Jigmelling D/C tripped on R and Y phase fault resulting tripping of both running units at Mangdechu due to loss of evacuation path. Fault location was around 200 km from Alipurduar.



Gen. Loss : 240 MW

Powergrid may explain.

ITEM NO. B.4: Tripping of 400 kV Bus bar – 2 at 400/220 kV Jeerat S/S on 12 – 11– 2020 at 12:10 hrs.

400 kV bus bar – 2 at 400/220 kV Jeerat S/S tripped on 12 – 11– 2020 at 12:10 hrs due to Y phase to earth fault resulting in tripping of following elements:

- 400 kV Rajarhat – Jeerat S/C
- 400 kV Jeerat – Bakreswar S/C
- 400/220 kV 315 MVA ICT – 2 & 4 at Jeerat

Around 130 kV dip has been observed at Y phase bus voltage at Jeerat.

WBSETCL may explain.

ITEM NO. B.5: Islanding schemes of Eastern Region

1) MTPS, Kanti Islanding Scheme:

The islanding scheme was discussed in 68th PCC Meeting held on 18-06-2018.

After detailed deliberation, PCC in principle agreed with the following islanding scheme at Kanti TPS:

· Stage II units (2x195 MW) of Kanti TPS will be islanded with station load of 40 MW and radial load of 150 MW (approx.) of 220kV Kanti TPS-Gopalganj D/C line.
· Once the grid frequency falls to 48.2 Hz, the PLC at Kanti TPS would initiate the islanding process after 500 ms time delay.

The detailed presentation related to Kanti Islanding Scheme is attached at **Annexure B4.1.**

KBUNL and BSPTCL may update.

2) IB-TPS Islanding Scheme:

The islanding scheme was discussed in special meeting held on 12-12-2018

After detailed discussion the following were decided:

- The alarm for islanding scheme shall be initiated at 49.2 Hz at both Budhipadar and IB TPS to alert the operators
- Islanding of one unit (210 MW) of IBTPS with the selected loads of 149 MW connected through 132 kV level at Budhipadar substation will be initiated at 47.8 Hz of grid frequency with 250msec time delay.
- The islanding relay Micom P341 at Budhipadar will give trip command to all 220KV feeders connected to Bus-I and Bus II along with Bus coupler except Auto transformer- I & II and selected islanding IB TPS ckts either (IB -1 & 3) or (IB-2 & 4).
- Give trip command to circuit breakers of 132kV Budhipadar-Lapanga S/c line, 132kV Budhipadar-Jharsuguda D/C line and 132kV Budhipadar-Rajgangpur S/C lines at Budhipadar end.
- It will send carrier command to both Kalunga and Tarkera end to trip 132kV Kalunga-Tarkera S/c line from both the ends to make radial load at Kalunga.
- It will send carrier signal to IB TPS to start ramping and adjust IB TPS (one unit) generation to match the load.

Regarding implementation, OPTCL and OPGC informed the following:

- The islanding relay Micom P341 is already installed at bus coupler panel of 220kV Budhipadar S/s
- OPGW is available for 220 kV lines
- Installation of OPGW is in progress for 132kV lines

- Logic for generation control of islanding after receiving the command from Budhipadar is to be implemented at IB TPS.

OPGC and OPTCL may update.

3) Chandrapura Islanding Scheme:

The islanding scheme in DVC is under Chandrapura TPS considering unit 1, 2 and 3 having capacity of 3x130 MW (Namely CTPS-A plant) along with connected load of CTPS-A itself. However unit 1 and 2 were decommissioned.

In the OCC meeting, DVC informed that they are planning implement the islanding scheme with the new units (unit 7 and 8) of Chandrapura TPS having capacity of 2 x 250 MW (namely CTPS-B plant).

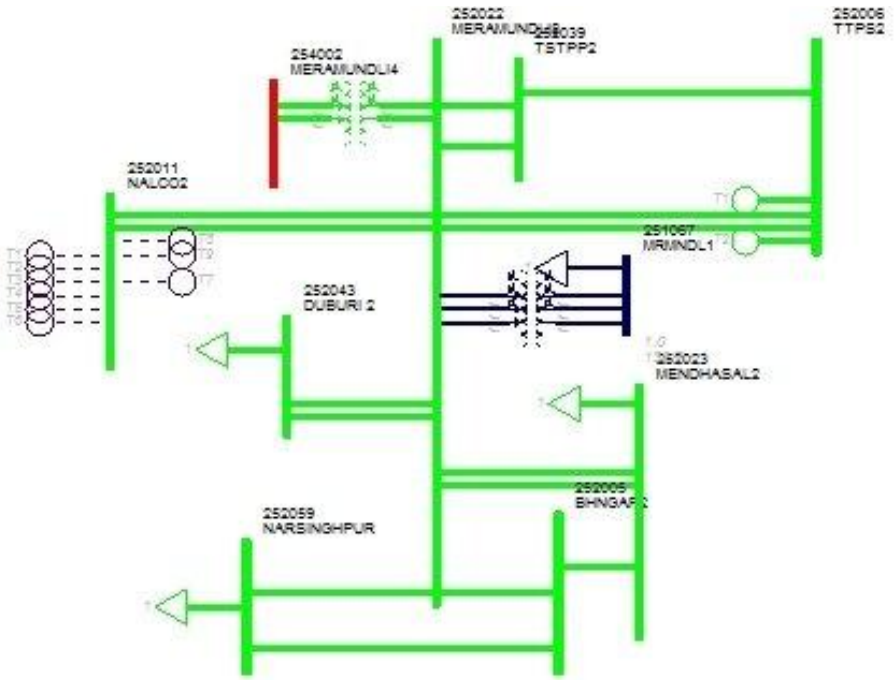
The detailed plan of islanding scheme is given at **Annexure B4.3**

Members may discuss.

ITEM NO. B.6: Disturbance at 220 kV Meramundali Substation on 01.10.2020 at 04:07 hrs

On 30th September 2020 at 22:36 hrs, 220 kV Meramundali – NALCO - 1 was tripped on overcurrent protection. The line was charged at 00:05 hrs on 01st October 2020. At 01:35 hrs, sparking was noticed on this circuit at Meramundali end switchyard due to which GRIDCO SLDC advised NALCO to reduce the loading of the circuit.

At 04:07 hrs, line side pipe at Meramundali end of the above-mentioned circuit got broken and fell on the ground along with the breaker jumper causing line fault at Meramundali S/s. Bus jumper of 220 kV bus 1 at Meramundali also got damaged at several places which led to bus fault at 220 kV bus 1 at Meramundali. All the elements connected with 220 kV bus 1 along with the bus coupler tripped at Meramundali.



Relay Indications:

Time	Name	End 1	End 2	PMU Observation
04:07 hrs	220 kV Meramundali NALCO - 1	B-N, Zone-4, F/C =2.3 kA, 511ms	Yet to be received	Around 20 kV dip has been observed in all three phase voltages at Meramundali PMU data during the fault at 22:36 hrs on previous day. The fault clearing time was around 900 ms. During this event, around 200 kV dip has been observed in Y phase voltage at Meramundali PMU data. But as per Talcher PMU, fault was in B phase. Same has been observed in DR output recorded at Meramundali. The fault clearing time was around 500 ms. Around 70 – 200 kV rise has been captured in healthy phases of Meramundali PMU data during the fault.
	220 kV Meramundali NALCO - 2	B-N, Zone-4, F/C =2.4 kA, 516ms	Yet to be received	
	220 kV Meramundali TTPS - 1	B-N, F/C =5.3 kA, Distance: 1km, 526 ms	Did not trip	
	220 kV Meramundali TTPS - 2	B-N, F/C =5.1 kA, Distance: 1km, 522 ms	Did not trip	
	220 kV Meramundali Narsinghapur S/C	Did not trip, only zone – 4 picked up	B-N, Zone-2, F/C =0.9 kA, 357 ms, Dist. 75 km	
	220 kV Meramundali Duburi S/C	Did not trip, only zone – 4 picked up	B-N, Zone-2, F/C =3.1 kA, 397 ms, Dist. 83 km	
	220 kV Meramundali Bhanjangar S/C	Did not trip, only zone – 4 picked up	B-N, Zone-2, F/C =1.2 kA, 350 ms, Dist. 166.7 km	
	220 kV Meramundali Tata Steel - 1	Did not trip	B/U relay operated, IR=1.1 kA, IY=1.8kA, IB=5.17 kA	
	220 kV Meramundali Tata Steel - 2	Tripped on E/F protection	B/U relay operated, IR=2.3kA, IY=2.7kA, IB=7.8kA	
	220/132 kV ICT – 1 at Meramundali	67N, IB=6.4KA, 494ms	NA	
	220 kV Bus coupler at Meramundali	E/F tripped	NA	

Load Loss : 280 MW

In 96th PCC, OPTCL informed that on 30th Sep 2020, at 22:36 hrs, 220 kV Meramundali – NALCO - 1 was tripped from Meramundali end on overcurrent protection within 900 ms as the voltage dip was very less to pickup by the distance protection. OPTCL explained that as per the information received from NALCO, Bucholz relay was operated at NALCO end and NALCO is yet to share the details of the tripping.

OPTCL explained that at 01:35 hrs on 1st Oct 2020, 160 MW power was flowing in both circuit 1 and circuit 2 of 220 kV Meramundali – NALCO D/C line which resulted in sparking at Meramundali end switchyard. SLDC, Odisha advised NALCO to reduce the loading of the circuit.

At 04:07 hrs, due to heavy load, the line side pipe at Meramundali end of the above-mentioned circuit got broken as the pipes were 20-21 years old, and fell on the ground along with the breaker jumper causing Bus fault at 220kV Bus-1 of Meramundali S/s. All the elements connected with 220 kV bus-1 along with the bus coupler tripped from either remote end or Meramundali end as per the relay indications given in the agenda.

OPTCL submitted the following:

- *Bus Bar Protection at 220kV level of Meramundali S/s was not in service. OEM Siemens visited the site recently and it would be rectified soon.*
- *OPTCL informed that 220 kV Meramundali - NALCO D/C was tripped from NALCO end on zone 2. OPTCL added that they are yet to receive tripping details of 220 kV Meramundali TTPS D/C from NTPC.*
- *220 kV Meramundali-Tata Steel D/C line tripped from Tata Steel on backup O/C, E/F protection. Since the line is 3 km long so they are in process of implementing differential protection for this line.*
- *OPGW work is in progress related to installation of carrier protection at 220 kV Meramundali- Narsinghapur S/C, 220 kV Meramundali -Duburi S/C and 220 kV Meramundali -Bhanjangar S/C.*

ERLDC informed that high voltage in healthy phases were observed in PMU plot during the fault and it may be due to neutral shifting.

PCC advised OPTCL to reduce the zone-4 time settings till restoration of the Busbar protection at 220 kV Meramundali and analyze the reason for rise in healthy phase voltage at Meramundali S/s during single phase to ground fault. PCC advised OPTCL and SLDC, Odisha to collect the tripping details from NALCO & TTPS, NTPC and submit a report to ERLDC and ERPC.

PCC also advised OPTCL to carry out proper maintenance of transmission line and substation equipment to avoid failure of any component and prepare a plan for replacement of old equipment to avoid major disturbances.

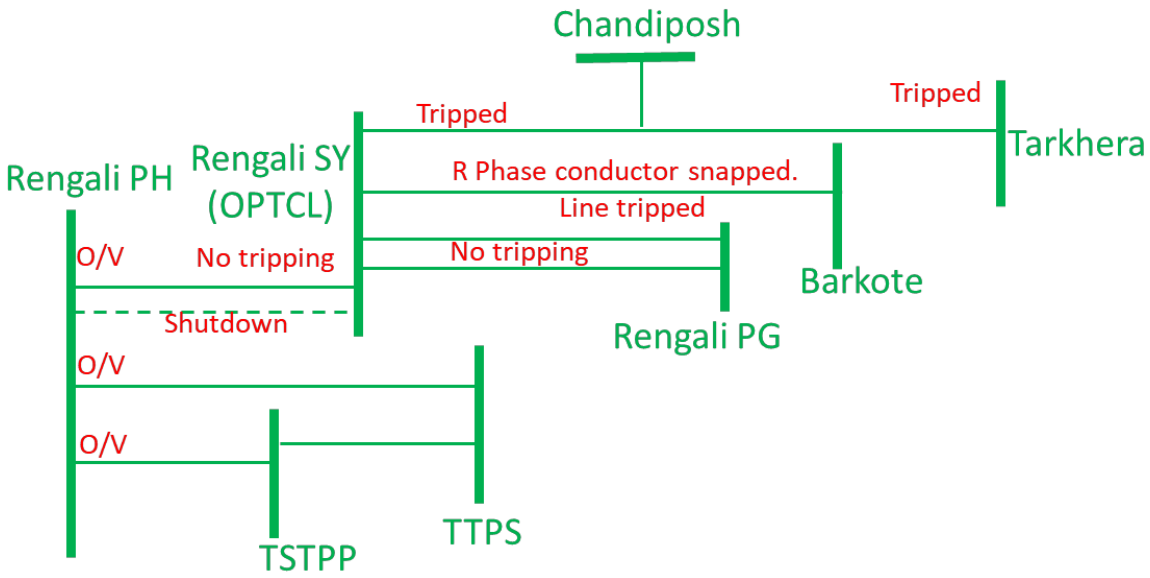
OPTCL may update.

ITEM NO. B.7: Disturbance at 220 kV Rengali Substation on 10.10.2020 at 16:10 hrs

220 kV Rengali Power House (PH) – Rengali Switchyard (OPTCL) – 2 was under shutdown.

On 10th October 2020 at 16:08 hrs, 220 kV Rengali Switchyard (OPTCL) - Barkote S/C and 220 kV Rengali Switchyard (OPTCL)-Tarkera S/C tripped due to R phase to earth fault and B phase to earth fault respectively. It was reported that top conductor (R phase) of 220 kV Rengali Switchyard (OPTCL) - Barkote S/C snapped at location no 336.

Thereafter, 220 kV Rengali PH – TSTPP S/C and 220 kV Rengali PH – TTPS S/C and 220 kV Rengali PH – Rengali Switchyard (OPTCL) – 1 tripped on overvoltage from Rengali PH end. Subsequently all the running units at Rengali PH tripped. 220 kV Rengali Switchyard remained connected to rest of grid through 220 kV Rengali PG – Rengali SY D/C.



Relay Indications :

Time	Name	End 1	End 2	PMU Observation
16:10 Hrs	220 kV Rengali SY – Tarkera S/C	B-N, Zone 2, 75 km from Rengali, F/C 5.2 kA	B-N, Zone 1, 65 km from Tarkera, F/C 2.3 kA	Around 10 kV dip has been observed in B phase voltage and around 9 kV dip has been observed in R phase simultaneously in 400 kV bus voltage of Talcher. The fault clearing time was around 350 ms.
	220 kV Rengali S/Y - Barkote S/C	D/P, Zone 1, 34 km from Rengali, F/C 8 kA	R-N, Zone 1, 13 km from Barkote, F/C 2.3 kA	
	220 kV Rengali (PH) – Rengali SY - 1	Tripped on overvoltage	Did not trip	
	220 kV Rengali PH – TSTPP S/C	Tripped on overvoltage	Yet to be received	
	220 kV Rengali PH – TTPP S/C	Tripped on overvoltage	Yet to be received	
	Unit # 1, 2, & 3 at Rengali PH	instantaneous O/V. 115% over speed trip. 86 KLM operated.		
	Unit # 5 at Rengali PH	Tripped on solenoid trip circuit faulty. 86 LM operated.		

Gen Loss : 190 MW

In 96th PCC, OPTCL informed that there were multiple faults in Rengali due to heavy rain and wind. First R-N fault was occurred in 220 kV Rengali Switchyard (OPTCL) - Barkote S/C line due to snapping of R-ph conductor (top conductor) at location no 336. The line was tripped from both the ends in zone 1. Thereafter, B-N fault was initiated in 220 kV Rengali Switchyard (OPTCL)-Tarkera S/C due to lightening. The line was tripped in zone 2 from Rengali SY end and zone 1 from Tarkera end.

OPTCL further explained that 220 kV Rengali PH – TSTPP S/C, 220 kV Rengali PH – TTPS S/C and 220 kV Rengali PH – Rengali Switchyard (OPTCL) – 1 tripped on overvoltage from Rengali PH end. Subsequently all the running units at Rengali PH tripped on overvoltage and overspeed. 220 kV Rengali Switchyard was remained connected to rest of grid through 220 kV Rengali PG – Rengali SY D/C.

OPTCL informed that electromechanical relays are installed at Rengali PH end so DR is not available. Reason for overvoltage could not be concluded in the meeting.

PCC advised SLDC, Odisha to coordinate with OHPC and provide a detailed report on overvoltage tripping at Rengali PH.

PCC opined that overvoltage protection may not be required at 220kV level. If the overvoltage protection is being used at 220kV level, the settings may be kept higher than the 400kV level settings to avoid unwanted tripping of transmission lines.

OPTCL told that carrier based protection scheme implementation in 220 kV Rengali Switchyard (OPTCL)-Tarkera S/C is in progress.

PCC advised OPTCL to submit the status of implementation of carrier protection in Odisha system to ERPC and ERLDC.

OPTCL, OHPC and SLDC Odisha may update.

ITEM NO. B.8: Tripping of 220 kV bus 2 at Indravati on 06-10-2020 at 13:30 hrs

On 06-10-2020 at 13:30 hrs, 220 kV bus 2 at Indravati tripped due to the operation of bus bar protection. As per the GRIDCO SLDC report, a transient fault occurred at the station. As per PMU data no-fault had been observed. DR/EL is yet to be received from Orissa SLDC.

OHPC and OPTCL may explain.

ITEM NO. B.9: Distrbance at 400/132 kV Dikchu S/S on 18-10-2020 at 13:11 hrs

On 18th October 2020 at 13:11 hrs, 400 kV Teesta III - Dikchu S/C got tripped due to B phase to earth fault resulting in tripping of 400 kV bus – 2 at Dikchu HEP. At the same time, overall differential protection of 400/132 kV ICT at Dikchu also operated leading to its tripping and isolation of both running units at Dikchu HEP from the system and their tripping. 400 kV bus – 1 at Dikchu HEP remained energized through 400 kV Rangpo – Teesta III S/C.

Operational issues Observed:

- The prolonged outage of tie bay at Dikchu is becoming a serious issue for the reliability of the grid as well as the generating power plant (Teesta 3 as well as Dikchu).
- 400 kV Dikchu-Teesta III circuit has observed similar nature fault in the past as discussed in the previous few PCC meeting. Such, resistive nature fault causing uncoordinated tripping is not desirable for system security and reliability.

Protection issues observed:

- Delayed clearance of fault has been observed in PMU data.
- Reason for the operation of overall differential protection of 400/132 kV Dikchu end may be shared. It has been observed that differential protection for units or ICT had operated repeatedly for through fault in several events in the past. **(Dikchu HEP to update)**
- Dikchu HEP may check the reason for non-auto reclose operation of main breaker and dead time for tie-breaker at Dikchu HEP for 400 kV Teesta III – Dikchu S/C. **(Dikchu HEP to update)**
- Teesta III may share the reason for the non-auto reclose operation of 400 kV Teesta III – Dikchu S/C at Teesta III end. **(Teesta III HEP to update)**

In 96th PCC, Dikchu informed that on 18th October 2020 at 13:11 hrs, 400 kV Teesta III - Dikchu S/C got tripped due to B phase to earth fault at 8.7 km from Dikchu end. At the same time, overall differential protection of 400/132 kV ICT at Dikchu also operated leading to its tripping and

isolation of both the running units at Dikchu HEP from the system. 400 kV bus – 1 at Dikchu HEP was remained energized through 400 kV Rangpo – Teesta III S/C.

Dikchu added that they had reviewed the vector group and tertiary MVA settings of overall differential protection of 400/132 kV ICT at Dikchu. The relay has been tested and found okay. Dikchu agreed to resolve the auto reclose issues of 400 kV Teesta III – Dikchu S/C.

PCC advised Dikchu and Teesta III to comply the ERLDC observations given in the agenda and submit the action taken report to ERLDC and ERPC.

Dikchu and Teesta III may update.

ITEM NO. B.10: Uncoordinated line trippings of TPTL Transmission lines--TPTL

TPTL vide letter 30th November 2020 informed that TPTL transmission lines are tripping due to un-coordinated operation of the protection system. TPTL had placed the details in **Annexure-B10** along with the discussions held in different PCC meetings.

TPTL may explain. Members may discuss.

ITEM NO. B.11: Backup Overcurrent Relay coordination of Sikkim Complex

In 96th PCC, Powergrid informed that fault level considered in the study is needed to be reviewed as per the recent connectivity.

PCC decided to implement the backup over current settings with IDMT characteristics at Jorethang and Tashiding as per the report in order to avoid unwanted tripping of the lines due to existing DT characteristics.

PCC advised all the concerned constituents to submit their comments, if any to ERPC so that revised study could be carried out.

Members may discuss.

ITEM NO. B.12: Resistive reach setting guidelines and model calculation for distance protection--ERLDC

1. **Proposed Criteria for Phase-earth fault:**

    a. Calculation of minimum load impedance should be as per Ramkrishna Committee Recommendation:
        - Maximum load current (Imax) may be considered as 1.5 times the thermal rating of the line or 1.5 times the associated bay equipment current rating (the minimum of the bay equipment individual rating) whichever is lower.
        - Minimum voltage (Vmin) to be considered as 0.85pu (85%).
    b. Minimum setting for resistive reach should be such that it must cover fault resistance, arc resistance and the tower footing resistance.
    c. Generally Maximum reach setting should be 80% of the minimum load impedance.
    d. Resistive reach setting < 4.5 times the zone reactive reach setting.

    Resistive reach should be the maximum of the value determined by the above three rules.

2. **Proposed Criteria for Phase-Phase fault:**

    a. Calculation of minimum load impedance as per the same method mentioned above.

b. Minimum setting for resistive reach should be such that it must cover fault resistance and arc resistance.
c. Generally, the resistive reach of zone-3 is set less than 80% of minimum load impedance. For power swing consideration, a margin of DR is given. Therefore, it is essential that load should not encroach this DR. In view of this, R3ph – R4ph is set 60% of minimum load impedance. R2ph and R1ph are set 80% of R3ph-R4ph respectively.
d. Resistive reach setting < 3 times the zone reactive reach setting.

Resistive reach should be the maximum of the value determined by the above three rules.

Another important point is consideration of remote end in feed for zone-2 and 3 reach calculations.

In 96th PCC, Powergrid informed that the specifications in point d) may change with the OEM therefore this condition may not be applicable for all manufacturers.

DVC informed that consideration of thermal loading value (75° or 85°) for the settings to be discussed and finalized.

PCC advised all the constituents to go through the guidelines and submit their comments to ERPC and ERLDC.

Members may discuss.

ITEM NO. B.13: Disturbance at 220 kV Patratu and 220kV Tenughat Substation on 23.09.2020 at 08:45 hrs and 13:49 hrs

In 96th PCC, JUSNL updated the status as follows:

- *LBB protection for 132kV system would be implemented at Patratu S/s after completion of panel shifting work.*
- *Healthiness of differential protection of 220/132kV and 132/33 kV transformers at Patratu was tested and found in order. The same is pending at Hatia end.*

PCC advised JUSNL to check the backup overcurrent settings of 220/132kV and 132/33 kV transformers at Patratu and Hatia.

JUSNL may update.

ITEM NO. B.14: Disturbance at 220 kV Biharsharif Substation on 14.08.2020 at 20:23 hrs

In 94th PCC, 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.

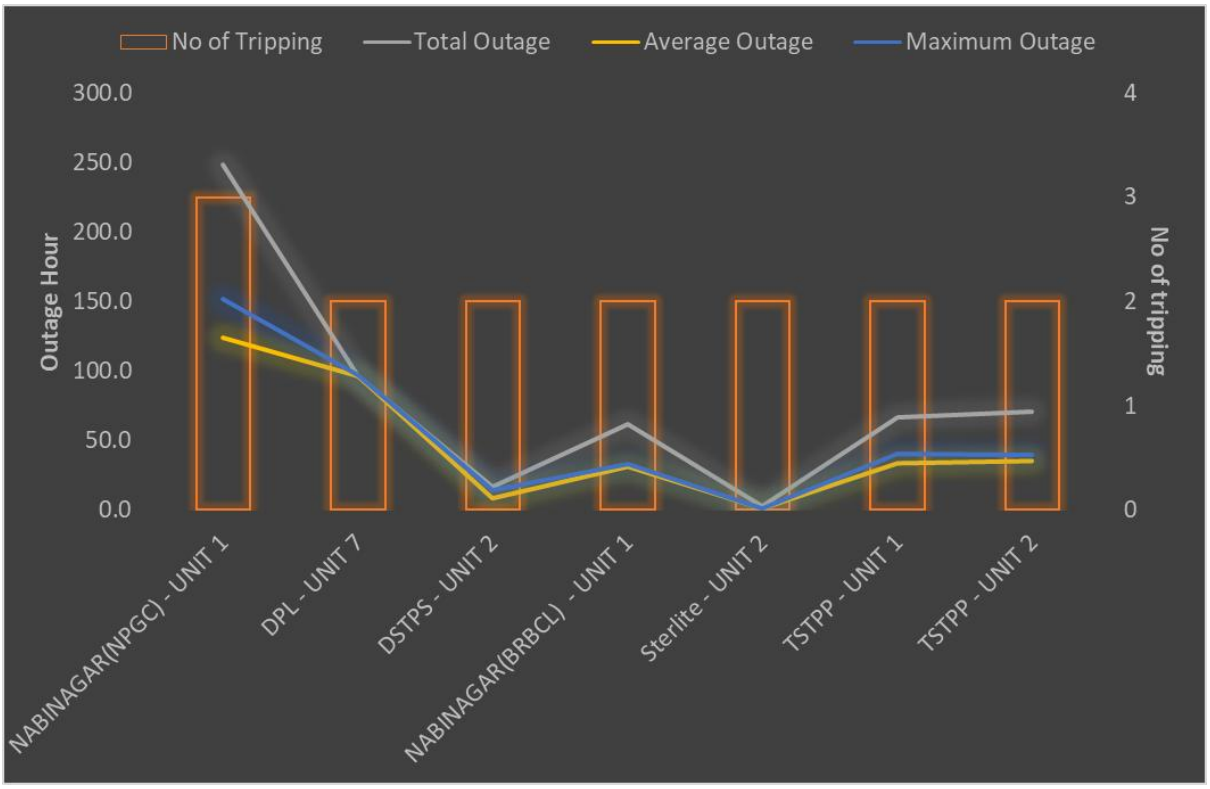
In 96th PCC, BSPTCL informed that electromechanical relays are being used for ICTs protection. Tendering for replacement of EM relays with numerical relays has been completed. BSPTCL added that oil testing of the transformer would be done during winter maintenance after Chat Puja.

PCC advised BSPTCL to comply the PCC observations at the earliest.

BSPTCL may update.

ITEM NO. B.15: Repeated tripping of generating units in November 2020

During November 2020, repeated tripping has been observed for few generating units. A list of such generating units along with the number of tripping and outage duration for each generating in November 2020 are shown below.



Reasons for tripping for units with multiple tripping is given in below table:

Name of generating units	Reason for tripping	No of tripping	Utility to respond
NPGC unit 1	Boiler Tube leakage, Condenser Tube Leakage	3	NPGCL
BRBCL Unit 1	Due to various leakage problem	2	BRBCL
Sterlite Unit 2	Turbine vibration and Primary air pressure problem	2	GRIDCO SLDC
Talcher STPP Unit 1	Boiler tube leakage and Turbine related problem	2	NTPC
Talcher STPP Unit 2	Boiler tube leakage	2	NTPC

Following tripping incidents of generating unitswere reported due to electrical fault or operation of generator protection. But DR/EL outputs are yet to be received from generating stations.

Element Name	Tripping Date	Tripping Time	Reason shared	Utility to share DR/EL
Durgapur STPS Unit 1	04-11-2020	18:10	Operation of generator protection	DVC
BARAUNI TPS - UNIT 6	09-11-2020	03:50	Generator rotor earth fault (same unit tripped on 31-10-	Bihar SLDC/NTPC

Element Name	Tripping Date	Tripping Time	Reason shared	Utility to share DR/EL
			2020 also due to operation of generator protection; Details yet to be shared)	

NPGCL, BRBCL, GRIDCO SLDC, DVC and NTPC may explain.

PART- C:: OTHER ITEMS

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

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

New Substation List

Sl No	SS Name	Data Collection	Owner	State
1	Saltlake Stadium		WBSETCL	West Bengal
2	Kashipur		OPTCL	Odisha
3	Betanati		OPTCL	Odisha
4	Aska New		OPTCL	Odisha
5	Udala		OPTCL	Odisha
6	Narshinghpur		OPTCL	Odisha
7	Mancheswar		OPTCL	Odisha
8	North Karanpura		NTPC	Jharkhand
9	Mangdhechu		MHPA	Sikkim
10	TingTing		….	Sikkim
11	Lethang		….	Sikkim
12	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 93rd PCC, all the concerned utilities were advised to submit the relevant data to PRDC for maintaining the database.

Members may note and comply.

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

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

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

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

Members may note and comply.

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

1) **LILO of 400 kV Gaya Nabinagar D/C at 400/220 kV Chandauti S/S and first time charging of 3 x 500 MVA 400/220 kV ICTs and 2 x 125 MVAr bus reactors at Chandauti S/S**

400 kV Buses 1 & 2 at Chandauti 400/220/132 S/S were synchronized with Eastern Regional Grid by LILO of 400kV Gaya Nabinagar-2 on 03-12-20. 3 x 500 MVA 400/220 kV ICTs and 2 x 125 MVAr bus reactors will also be charged at Chandauti S/S.

Details of modified line after LILO (as received at ERLDC)

Name	Conductor type	Length
400 kV Gaya Chadauti D/C	Quad ACSR Moose	17.36 km
400 kV NabinagarChadauti D/C	Quad ACSR Moose	79.31 km

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

Reason	**S/S may be affected**	**Remarks**	**Utility to respond**	**Response received**
LILO of 400 kV Gaya Nabinagar D/C at Chandauti S/S	Chandauti	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	PMTL/ POWERGRID	Protection coordination has been done as per ERPC's guideline
	Gaya	Protection setting may be revised for 400 kV Gaya – Chandauti D/C (Earlier it was 400 kV Gaya Nabinagar D/C). Shortest line connected to Gaya S/S (Earlier it was 400 kV Gaya Koderma D/C as per details available at ERLDC) may get changed.	POWERGRID ER - 1	Response yet to be received from POWERGRID ER – 1
	Nabinagar	Protection setting may be revised for 400 kV Nabinagar – Chandauti D/C (Earlier it was 400 kV Gaya Nabinagar D/C). Shortest line connected to Nabinagar S/S (Earlier it was 400 kV Gaya Nabinagar D/C as per information available at ERLDC) may get changed	NPGC	Protection setting revised by NPGC
	S/S connected to Gaya: Chandwa, Koderma, Maithon	Shortest line connected to Gaya S/S (Earlier it was 400 kV Gaya Koderma D/C as per details available at ERLDC) may get changed.	POWERGRID ER – 1 & 2, DVC	Protection setting is revised by DVC. * **Response yet to be received from POWERGRID ER**

				– 1 & 2
	S/S connected to Nabinagar: Patna	Shortest line connected to Nabinagar S/S (Earlier it was 400 kV Gaya Nabinagar D/C) may get changed	POWERGRID ER - 1	**Response yet to be received from POWERGRID ER – 1**

*DVC informed that the Zone 2 timer of KTPS Gaya line at KTPS End is revised to **0.5 seconds** in place of existing 0.35s as Zone 2 reach of KTPS is at 150% of line length and it is seen to encroach on Chandauti 400KV bus. All other settings shall remain as existing. Encroachment of Zone 3 at KTPS End on Chandauti 220KV bus is not envisaged due to very strong infeed at PGCIL Gaya bus.

Members may update.

2) Charging of 400/220 KV 315 MVA ICT - 4 at Rourkela Sub-station

As per scheme agreed in ER Standing Committee, 400/220 kV 315 MVA ICT - 4 is to be connected in parallel with existing 315 MVA ICT-2 and 315 MVA ICT-3 in parallel with existing ICT-1, without using any additional CBs for the new elements at Rourkela S/S. Protection coordination may be required as per following table.

Reason	**S/S may be affected**	**Remarks**	**Utility to respond**	**Response received**
Charging of 400/220 KV 315 MVA ICT - 4 at Rourkela Sub-station(Two more 400/220 kV 315 MVA ICT is present at Rourkela)	Rourkela	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	POWERGRID Odisha	Protection coordination has been done as per ERPC's guideline
	S/S connected to Rourkela: Ranchi, Chaibasa, Talcher STPS, Jharsuguda (at 400 kV level) Tarkhera (at 220 kV level)	Protection coordination to be checked for change in impedance due to charging of new ICT	POWERGRID ER – 1, POWERGRID Odisha, NTPC Talcher STPS, OPTCL	No revision required at Jharsuguda, Ranchi and Chaibasa end. **Response yet to be received from NTPC Talcher STPS and OPTCL**

Members may update.

3) LILO of 220 kV ArrahNadokhar D/C at Dumraon(New) S/S

As per information received at ERLDC, **220 kV ArrahNadokhar D/C** will be LILOedat Dumraon (New) S/S.

Details of modified line details after LILO (as received at ERLDC)

Name	Conductor type	Length
220 kV Arrah Dumraon New D/C	Single ACSR Zebra	50.996 km
220 kV Dumraon Nadokhar New D/C	Single ACSR Zebra	98.014 km

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

Reason	**S/S may**	**Remarks**	**Utility to**	**Response**

	be affected		**respond**	**received**
LILO of 220 kV Arrah Nadokhar D/C at Dumraon (New) S/S	Dumraon (New)	Protection coordination to be done for all new connected elements as per ERPC's guidelines	BGCL	Protection coordination has been done as per ERPC's guideline
	Arrah	Protection setting may be revised for 220 kV Arrah Dumraon New D/C (Earlier it was 220 kV Arrah Nadokhar D/C). Longest line connected to Arrah S/S (Earlier it was 220 kV Arrah Nadokhar D/C as per information available at ERLDC) may get changed. Shortest line connected to Arrah also may be checked.	POWERGRID ER - 1	Protection coordination has been done as per ERPC's guideline.
	Nadokhar	Protection setting may be revised for 220 kV Arrah Dumraon New D/C (Earlier it was 220 kV Arrah Nadokhar D/C). Longest line connected to Nadokhar S/S (Earlier it was 220 kV Arrah Nadokhar D/C as per information available at ERLDC) may get changed	BSPTCL	Protection coordination has been done as per ERPC's guideline
	S/S connected to Arrah: Khagul	Longest line connected to Arrah S/S (Earlier it was 220 kV Arrah Nadokhar D/C as per information available at ERLDC) may get changed. Shortest line connected to Arrah also may be checked.	BSPTCL	**Zone – 3 setting is to be changed at Khagul S/S as per POWERGRID. Response yet to be received from BSPTCL**
	S/S connected to Nadokhar : Sasaram (PG)	Longest line connected to Nadokhar S/S (Earlier it was 220 kV Arrah Nadokhar D/C as per information available at ERLDC) may get changed	POWERGRID ER - 1	**Zone – 3 setting is to be changed at Sasaram (PG). Revised setting is yet to be received. S/S**

Members may update.

4) Protection coordination required for charging of 132 kV Rangit - Rangpo S/C and 132 kV Rangpo – Gangtok – 2 as 132 kV Rangit Gangtok S/C

Due to rectification work of multi - circuit tower no 21, 132 kV Rangit - Rangpo S/C and 132 kV Rangpo – Gangtok – 2 will be taken out of service and charged as 132 kV Rangit Gangtok S/C.

The line length and conductor configuration of 132 kV Rangit Gangtok S/C are (50.452+22.624+0.012) = 73.088 km and Single ACSR Panther respectively.

As above mentioned arrangement will be in service for more than 3 months, concerned utilities may need to change protection relay setting as per following table:

S/S may be affected	Remarks	Utility to respond
Rangit	Protection coordination may need to be done for newly charged line.	Rangit HEP (NHPC)
S/S connected to Rangit: Kurseong, Rammam Shagbari	Longest line connected to Rangit HEP will be changed to 132 kV Rangit Gangtok S/C. Hence distance protection of all lines connected to Rangit HEP may need to be coordinated.	WBSETCL/ WBSLDC & Sikkim SLDC
Gangtok	Protection coordination may need to be done for newly charged line.	POWERGRID ERTS - 2
Rangpo	No change in shortest or longest line.	--

Members may update.

ITEM NO. C.4: List of works carried out by PRDC Pvt. Ltd. during the period of November 2019 to October, 2020.

The Protection Database project has been implemented by PRDC and declared "Go Live" on 31st October, 2017. In continuation to above, PRDC submitted a report which is attached at **Annexure C4** for verification of works carried out during the period of November, 2019 to October, 2020.

Members may discuss.

ITEM NO. C.5: Any additional agenda – with permission of the Chair.

****

Annexure B4.1

OUTLINE FOR ISLANDING SCHEME OF KANTI TPS

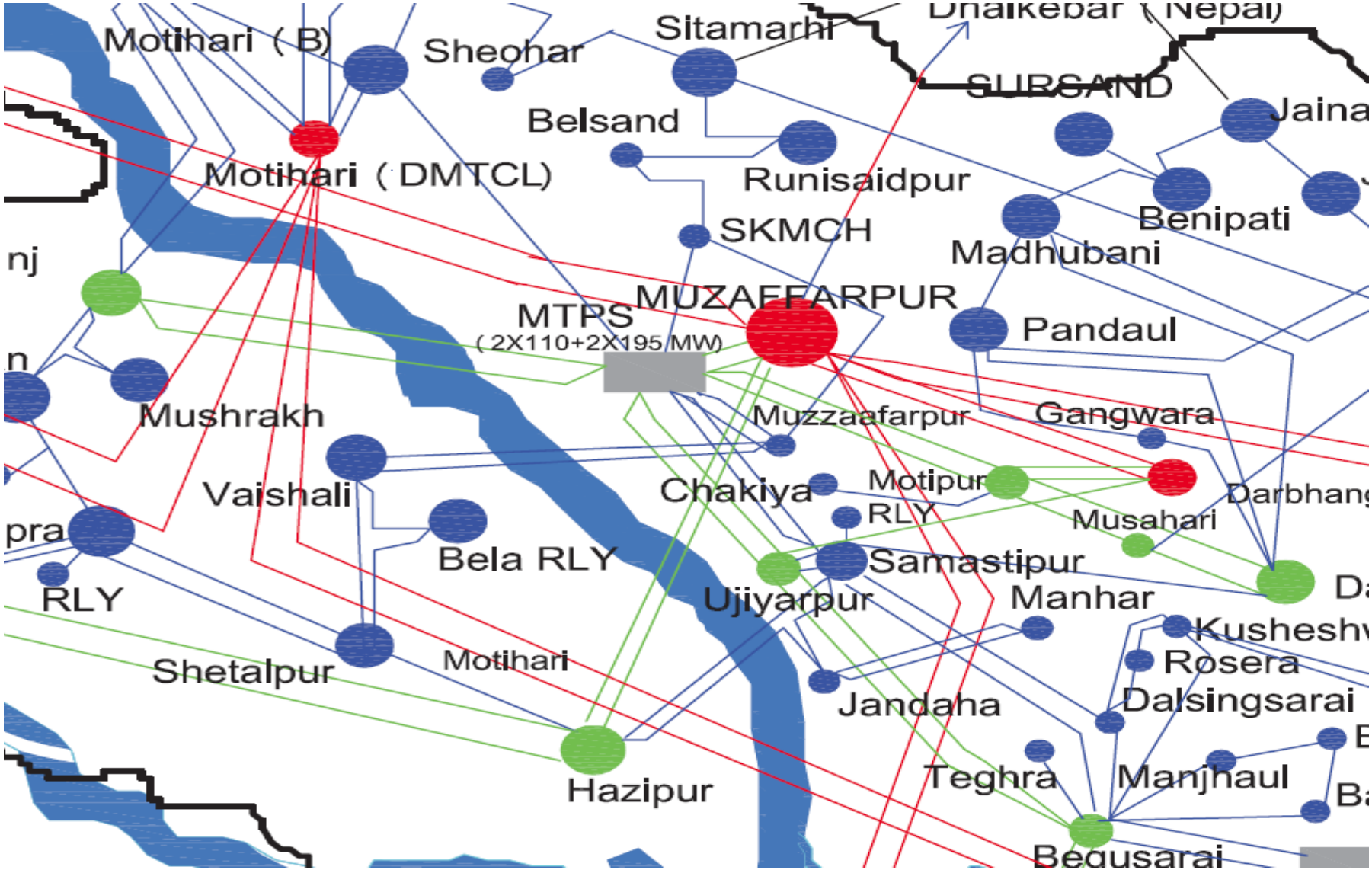
May 2018

ERLDC, POSOCO

Introduction

- Kanti TPS has installed capacity of 610 MW (Stg-I: 2 x 110 MW + Stg-2: 2 x 195 MW) located near to load centres in north Bihar
- At present there is no islanding scheme in Bihar system
- In 142nd OCC meeting it was decided to explore the possibility of implementing a power station islanding scheme for Kanti TPS

Network around MTPS (Kanti)



Lines normally kept open

- Following lines are normally kept open during normal operation
  - 132 kV Motihari-MTPS S/C
  - 132 kV Muzzafarpur-SKMCH S/C
  - 132 kV Sitamarhi-Runisaidpur S/C
  - 132 kV Shetalpur-Chapra D/C
  - 132 kV Shetalpur-Hazipur S/C

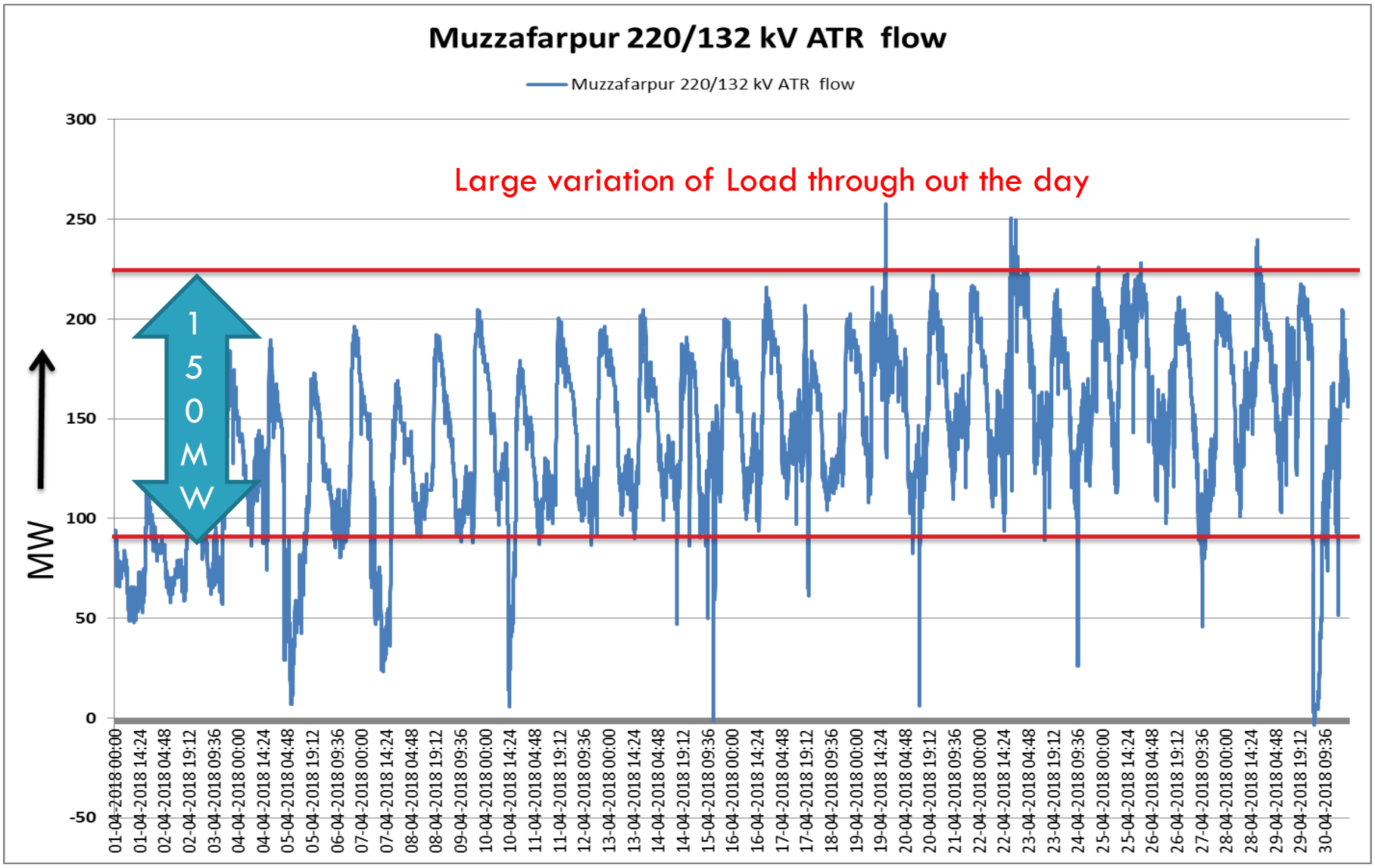
*BSPTCL may please confirm the above

Nearby substations and their loads

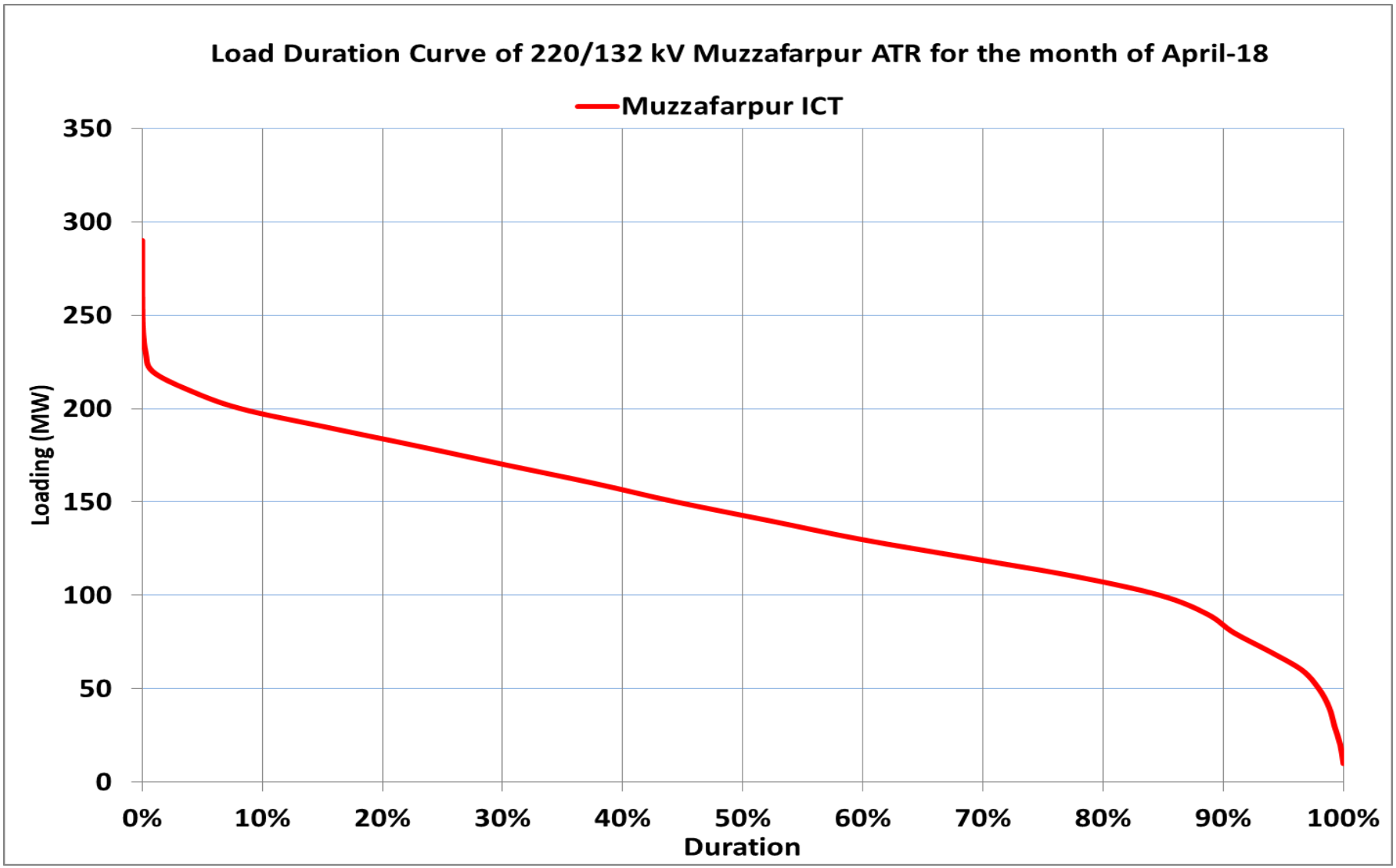
Sl Number	Name of Substation	Peak load	Off Peak Load
1	Kanti TPS	25(Plant load)	25(Plant Load)
2	Muzaffarpur	70	45
3	Vaishali	49	25
4	Shetalpur	25	15
5	SKMCH	57	45
6	Belsand	15	10
7	Runisaidpur	20	12
	Total	261	177

*BSPTCL may please confirm the above load quantum

Flow through 220/132 kV ATRs of MTPS for April-18



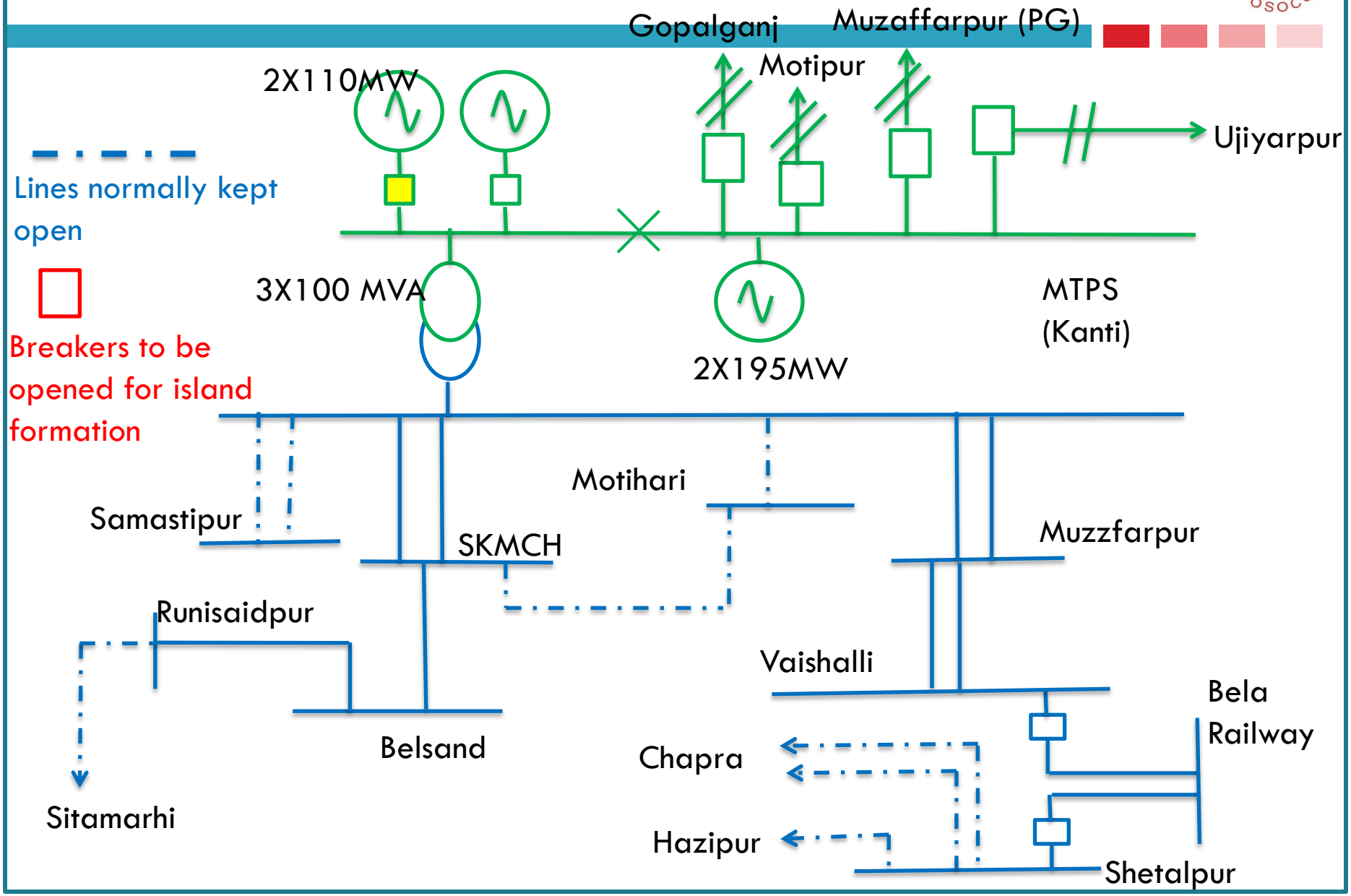
Load duration curve of 220/132 kV ATRs at MTPS for April 2018



Logic for formation of island

- If summation of power flow through 220/132 kV ATRs at MTPS is
  - Greater than 200 MW
    - Select both 195 MW units of KBUNL-2 for Islanding
    - In case one unit is out(planned or forced outage) select one 195 MW unit and one 110 MW unit(KBUNL-1) for islanding
  - In between 110 MW and 200 MW
    - Select one 195 MW unit of KBUNL-2 for Islanding
  - Is below 110 MW
    - Select one 110 MW unit of KBUNL-1 for Islanding

Formation of island (cont.....)



Formation of island

- Once the frequency falls to say 48.2 Hz the PLC at MTPS should give signal to appropriate C.Bs to open following lines to form an island with above loads, after 500 ms delay.
  - At 220 kV MTPS
    - 220 kV Muzaffarpur(PG)-MTPS D/C
    - 220 kV Ujiyarpur-MTPS D/C
    - 220 kV Gopalganj-MTPS D/C
    - 220kV Motipur-MTPS D/C
    - Units of KBUNL-1 and/or KBUNL-2 depending upon logic
  - At 132 kV Vaishali
    - 132 kV Vaishali-Bela Railways S/C
  - At 132 kV Shetalpur
    - 132 kV Vaishali-Bela Railways S/C
- Further PLC will continuously monitor both 195 MW and 110 MW units of Kanti and depending upon parameter of unit (i.e. Steam temp, pressure etc.) it will select the Suitable one for islanding

Load-generation balancing

- Islanding will trigger PMS (Power Management System). Post Islanding Power & Load will be calculated.
- If the mismatch between load and generation of one of the 195 MW units is within (±5%) then the other unit would be tripped. However if the mismatch is within (±5%) of the total generation, then both units would be kept on bar.
- If frequency of the island shoots above 51.0 Hz, then HP-LP steam bypass is to be activated from PMS via DCS.
- Immediately after the islanding, governor operation of the unit(s) of Stg-2 should change from load control to frequency control mode
- If frequency falls below 48.0 Hz, further load shedding within the island has to be carried out by tripping appropriate 33/11 kV feeders (say at 47.9 Hz). Since the power number of formed island will be very low a very precise load generation matching technique is needed

Some Typical numbers/facts

- U#3 CMC mode operation in practice.
- U#4 CMC mode operation to be commissioned.
- Droop characteristic setting for EHTC mode operation is 5%.
- Switchyard SLD attached. 220 kV Bus sectionalizer bay to be erected. Switchyard package for balance of work is under award stage. 220 kV Darbhanga & Begusarai lines only one circuit in service.
- Critical minimum limit to run the unit is 55% of 195 MW, i.e. 107 MW
- Maximum overload capacity on continuous operation is 105% of 195 MW, i.e. 204.75 MW.
- Maximum & minimum ramp up rate is 1 MW/ min.
- Maximum frequency for stable operation of unit < 52.5 Hz, full load rejection at 52.5 Hz.
- Minimum frequency for stable operation of unit is > 47.5 Hz, full load rejection at 47.5 Hz.
- Total auxiliary load during islanding is 25 MW.

Issue of concern

- Large variation of flow through 220/132 kV ATRs at MTPS
- Due to large variation of load and uncertainty of availability of units the 110 MW units of KBUNL may also need to be considered for formation of Island and thus its healthiness is also need to be ensured
- Healthiness of turbine governing system of the units
- Availability of dedicated communication /PLCC in 132 kV lines for formation of island or in the extreme case of absence of same, tripping of requisite CBs using UFR
- Loads selected for power station islanding should not overlap with those under normal UFLS scheme
- Due to small size of island, its power number is expected to be very low (6-10 MW/Hz) so precise load shedding at 33/11 kV is required.

Annexure B4.3

Philosophy towards formulation and implementation of Grid Islanding Scheme considering 2 x 250 MW units (U # 7 & 8) of Chandrapura TPS, DVC connected to 220KV Grid System

The present islanding scheme in DVC is under service at Chandrapura TPS considering Unit # 1, 2 & 3 having capacity of 3 x 130MW (namely, CTPS – A plant) along with connected load of CTPS – A itself. However, U # 1 & 2 were put out of bar.

Hence, a new suitable venue in DVC is felt to be identified towards formulation and implementation of a new Grid Islanding scheme. Accordingly, U # 7 & 8 of Chandrapura TPS having capacity of 2 x 250MW (namely, CTPS – B plant) has been considered after much thinking and threadbare discussions. These units are connected to 220KV grid. Single line connection diagram (DVC Grid) is shown in Annexure – I.

The Grid islanding scheme is proposed to be implemented in two stages namely,

stage I : Islanding from grid &

stage II : Load – Generation balance through sequential load shedding

considering the 2 x 250MW generators of CTPS – B plant along with connected loads of CTPS – A (120 MVA), BIADA (73 MVA), Putki (180 MVA), Patherdih (141 MVA) & Nimiaghat (40 MVA).

The feasibility of the scheme at this preliminary stage is elaborated as below:-

1. Minimum generation of a unit to be considered as 170MW.
2. Monitoring of Total Generation in MW to be implemented using feed from Ex-Bus MW transducers available at 220kV Switchyard of CTPS – B.
3. The Grid Islanding relay (R1) to be placed at CTPS – B end considering 220KV Bus voltage & frequency of CTPS – B as reference.

   [Note :

   a. The old Islanding panel, placed at CTPS – A, may be used after shifting of the same from CTPS – A to CTPS – B. The OEM of this panel i.e. GE (erstwhile ALSTOM) confirmed that the existing panel could be suitably modified.

   b. Entire scheme design including setting of different relays will be taken care of after freezing of the scheme outline.]

4. After actuation of R1 relay – R2, R3, R4, R5, and R6 Relays which will be connected to IEC-61850 compliant substation bus of CTPS – A (220KV), CTPS – A(132KV), Putki (132KV), Patherdih (132KV) & Nimiaghat (132KV) will get actuated through –

   a. OPGW network with gateway & SDH (synchronous digital hierarchy) to be used for communication of inter-tripping logic through tele-protection GOOSE messaging after creation of VLAN.

   b. Media converter (AC/DC operated) for Gateway-SDH link/connectivity to be incorporated, if required (where length between gateway-SDH is greater than 50mtr.).

   and give trip command (stage – I tripping) as per following –

Substation Bus (IEC - 61850)	Relay	Trip command to -
CTPS_B	R1	CTPS – Dhanbad line (L # 203, 204) CTPS – BTPS line (L # 205, 206)
CTPS_A (220KV)	R2	CTPS – Kalyaneswari line (L # 201, 202) CTPS – BSL line (L # 253 & 254)
CTPS_A (132KV)	R3	CTPS – Gola (L # 6 & 7) CTPS – Purulia (L # 58 & 59) CTPS – Ramkanali/Jamuria (L # 60, 61) CTPS - Rajabera (L # 62, 63)
Patherdih	R5	Patherdih - MHS line (L # 14 & 15) Patherdih - Sindri line (L # 49 & 50) 132/25KV Transformer (Traction Load)
Nimiaghat	R6	Nimiaghat – Giridih line (L # 86 & 87) 132/25KV Transformer (Traction Load)

All Railway feeders/Traction load connected to the above buses to be disconnected during stage 1 operation to avoid unbalance loading.

5. The islanded connection after stage – I tripping is shown in Annexure – II and connected loads (CD in MVA) will be as below having average value of 416 MVA –

CTPS_A	119.90	MVA
BIADA	73.05	MVA
Putki	180.45	MVA
Patherdih	141.40	MVA
Nimiaghat	40.00	MVA
Total Load	554.80	MVA
75% of load	416.10	MVA

Apparently there will be no problem in Load – Generation balance in normal condition –

Generation considered: 225 x 2 MW = 450 MW

Average Load connected: 416 MVA or 400 MW

Considering droop of the TG is 5%,

(450 – 400) MW = 50 MW corresponds to $\frac{5}{450}$ x 50 = 0.56 %

If occurrence freq. is 50 Hz, then it may shoot up to 50 + 50 x 0.56 % = 50.28 Hz.

It will be easily taken care of.

6. However, if

a. Gen.>>Load demand or freq. would exceed a given set point, then one unit (lowest MW) will get tripped and

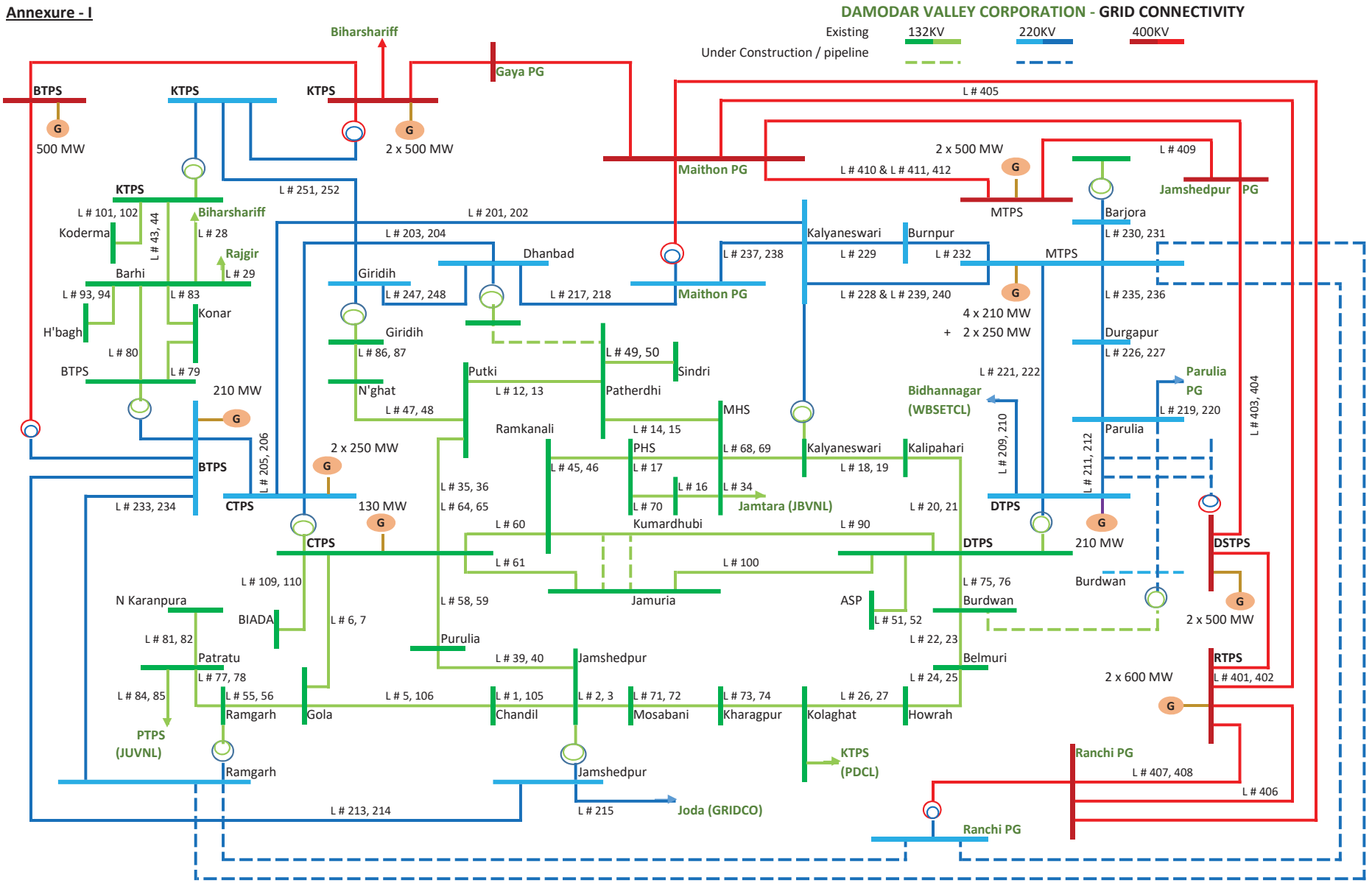
b. Only one unit is in service then

subsequent Load – Generation balancing is to be made by sequential load shedding (stage – II) at different substations as furnished below through protection telemetry (as discussed above) –

Phase - II :: Sequential Load shedding

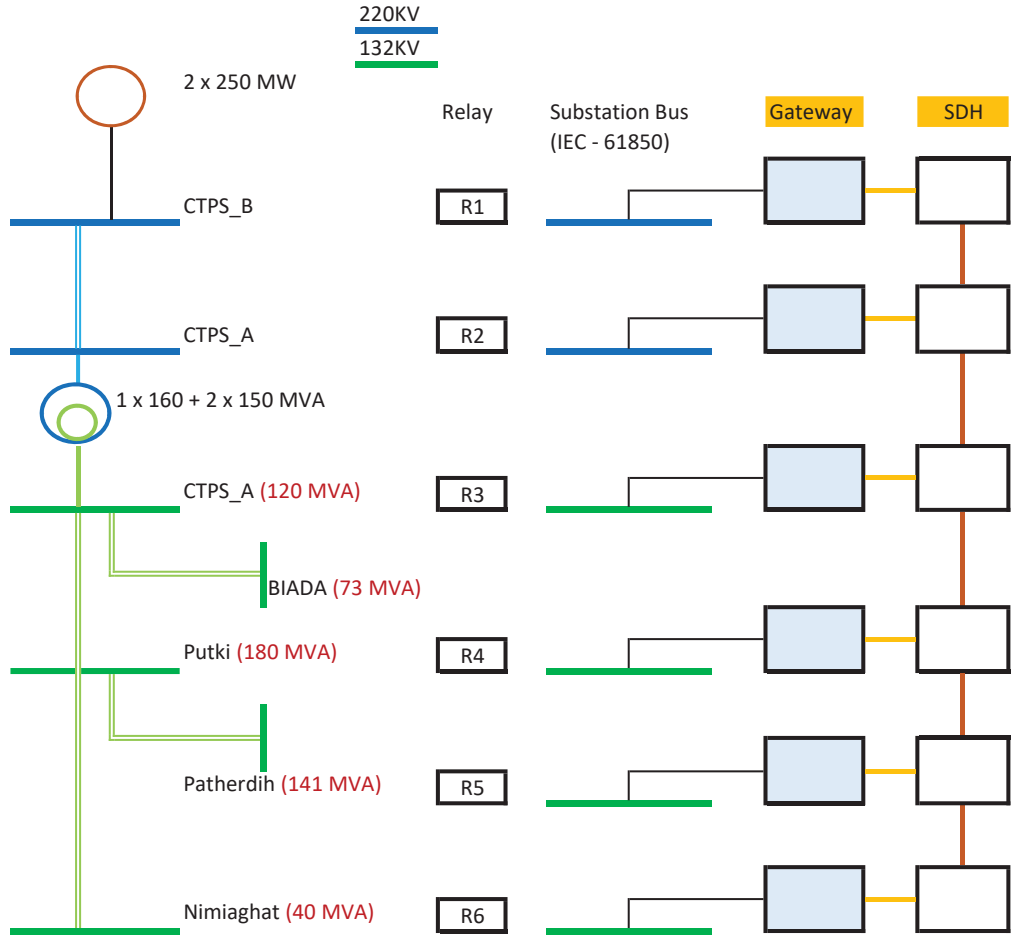
1	JBVNL, Ganeshpur	35.00	Putki
	JBVNL, Digwadih	17.00	Patherdih
		52.00	
2	JUVNL, Godhore	35.00	Putki
	JBVNL, Mukunda	15.00	Patherdih
		50.00	
3	JSEB, Dumri Banaso	40.00	Nimiaghat
4	JBVNL, Dugda	25.00	CTPS
5	JSEB, Jainamore	22.00	CTPS

Annexure - I


DAMODAR VALLEY CORPORATION - GRID CONNECTIVITY
Existing
Under Construction / pipeline
132KV
220KV
400KV
Biharshariff
Gaya PG
BTPS
KTPS
KTPS
500 MW
2 x 500 MW
L # 405
Maithon PG
2 x 500 MW
L # 409
L # 410 & L # 411, 412
MTPS
Jamshedpur PG
KTPS
L # 251, 252
L # 101, 102
Biharshariff
L # 201, 202
Barjora
Koderma
L # 43, 44
L # 28
L # 203, 204
Kalyaneswari
Burnpur
L # 230, 231
Rajgir
Dhanbad
L # 237, 238
L # 229
L # 232
MTPS
Barhi
L # 29
Giridih
L # 247, 248
L # 217, 218
Maithon PG
L # 228 & L # 239, 240
L # 235, 236
L # 93, 94
L # 83
4 x 210 MW
+ 2 x 250 MW
Konar
Giridih
Durgapur
H'bagh
L # 86, 87
L # 226, 227
L # 80
L # 49, 50
Sindri
L # 221, 222
Parulia PG
BTPS
L # 79
Putki
Patherdhi
Bidhannagar (WBSETCL)
210 MW
N'ghat
L # 12, 13
L # 219, 220
L # 47, 48
MHS
Parulia
Ramkanali
L # 14, 15
L # 403, 404
2 x 250 MW
PHS
L # 68, 69
Kalyaneswari
Kalipahari
L # 209, 210
L # 211, 212
L # 205, 206
BTPS
L # 45, 46
L # 17
L # 18, 19
L # 35, 36
L # 64, 65
L # 16
L # 34
Jamtara (JBVNL)
L # 233, 234
CTPS
130 MW
L # 70
L # 20, 21
DTPS
DSTPS
L # 60
Kumardhubi
L # 90
CTPS
DTPS
210 MW
L # 61
L # 100
L # 75, 76
Burdwan
L # 109, 110
Jamuria
ASP
Burdwan
2 x 500 MW
N Karanpura
L # 58, 59
L # 51, 52
BIADA
L # 6, 7
L # 22, 23
L # 81, 82
Purulia
Belmuri
Patratu
L # 39, 40
Jamshedpur
RTPS
L # 77, 78
L # 24, 25
2 x 600 MW
L # 84, 85
L # 55, 56
L # 5, 106
L # 1, 105
L # 2, 3
L # 71, 72
L # 73, 74
L # 26, 27
L # 401, 402
Ramgarh
Gola
Chandil
Mosabani
Kharagpur
Kolaghat
Howrah
PTPS (JUVNL)
KTPS (PDCL)
Ranchi PG
Ramgarh
Jamshedpur
L # 407, 408
L # 406
L # 213, 214
L # 215
Joda (GRIDCO)
Ranchi PG

Islanding Scheme at CTPS

Annexure - II



Phase - I :: Tripping for Islanding

CTPS – Dhanbad line (L # 203, 204)
CTPS – BTPS line (L # 205, 206)

CTPS – Kalyaneswari line (L # 201, 202)
CTPS – BSL line (L # 253 & 254)

CTPS – Gola (L # 6 & 7)
CTPS – Purulia (L # 58 & 59)
CTPS – Ramkanali/Jamuria (L # 60, 61)
CTPS - Rajabera (L # 62, 63)

Patherdih - MHS line (L # 14 & 15)
Patherdih - Sindri line (L # 49 & 50)
132/25KV Transformer (Traction Load)

Nimiaghat – Giridih line (L # 86 & 87)
132/25KV Transformer (Traction Load)

After Phase - I tripping
Load in MVA

CTPS_A	119.90
BIADA	73.05
Putki	180.45
Patherdih	141.40
Nimiaghat	40.00
Total Load	554.80
75% of load	416.10

Phase - II :: Sequential Load shedding

1	JBVNL, Ganeshpur	35.00	Putki
	JBVNL, Digwadih	17.00	Patherdih
		52.00	
2	JUVNL, Godhore	35.00	Putki
	JBVNL, Mukunda	15.00	Patherdih
		50.00	
3	JSEB,Dumri Banaso	40.00	Nimiaghat
4	JBVNL, Dugda	25.00	CTPS
5	JSEB, Jainamore	22.00	CTPS

Annexure B10

CIN: U40109DL2006SGC151871

Email: info@tvptl.com

TEESTAVALLEY

Teestavalley Power Transmission Ltd.

(A Govt. of Sikkim Enterprise)

JV of Teesta Urja Ltd. (Govt. of Sikkim Enterprise) & POWERGRID (Govt. of India Enterprise)

Ref: TPTL/HO/O&M/2026

Date: 30.11.2020

The Member Secretary
Eastern Region Power Committee
14, Golf Club Road
Tollygunge, Kolkata – 700 033.

Sub: Outage of TPTL Transmission Lines due to improper Relay Settings &Co-ordination

Dear Sir,

1.0 Teestavalley Power Transmission Ltd. (TPTL), a Govt. of Sikkim Enterprise, is responsible for operation & maintenance of the following transmission lines in the Eastern Region which are owned by TPTL:

(i) 400 kV Teesta III – Dikchu Line
(ii) 400 kV Dikchu - Rangpo Line
(iii) 400 kV Rangpo – Kishanganj Line
(iv) 400 kV Teesta III – Kishanganj Line

The terminal switchyard/substation at Teesta III HEP, Dikchu HEP and Rangpo is owned by Teesta Urja Ltd., Sneha Kinetic Power Projects Ltd and POWERGRID respectively. Two (2) nos. line bays and two (2) no switchable line reactors associated with Rangpo – Kishanganj line and Teesta III – Kishanganj Line at Kishanganj GIS Substation of POWERGRID are owned by TPTL and O&M of these line bays & reactors are being carried out by POWERGRID as per O&M Agreement between TPTL & POWERGRID.

2.0 It is observed that the TPTL transmission lines are tripping due to implementation of un-coordinated O/C & E/F protection settings and non-operation/non-activation of auto-reclosing featureat the terminal switchyard/ substation. Few such incidents of mal-tripping of TPTL lines along with related minutes of meeting of the PCC are placed below:

Incident 1

Transmission Line	Tripping Date	Time
400 kV Teesta III - Kishanganj line	15.03.2020	16-12 hrs
400 kV Teesta III – Dikchu line	15.03.2020	16-12 hrs
400 kV Dikchu – Rangpo line	15.03.2020	16-12 hrs

Minutes of meeting of the 90th PCC meeting dated 13.05.2020 in regard to above incident:
"PCC observed that uncoordinated tripping's occurred ***due to improper relay co-ordination*** *of O/C, E/F protection among Kishanganj, Teesta III, Rangpo and Dikchu."*

Incident 2

Transmission Line	Tripping Date	Time
400 kV Teesta III – Dikchu line	19.05.2020	20-57 hrs
400 kV Dikchu –Rangpo line	19.05.2020	20-57 hrs

Minutes of meeting of the 91st PCC meeting dated 24.06.2020 in regard to above incident:
"400 kV Dikchu – Rangpo S/C line tripped due to direct trip signal received at Rangpo. Dikchu explained that Dikchu end E/F protection operated for 400 kV Dikchu – Rangpo S/C ***due to wrong settings*** *and sent DT to Rangpo end. Dikchu informed that settings were corrected after the disturbance."*

Incident 3

Transmission Line	Tripping Date	Time
400 kV Teesta III – Dikchu line	16.07.2020	16-27 hrs
400 kV Dikchu –Rangpo line	16.07.2020	16-27 hrs
400 kV Rangpo –Kishanganj line	16.07.2020	16-27 hrs

Minutes of meeting of the 93rd PCC meeting dated 17.08.2020 in regard to above incident:
*"PCC opined that **proper co-ordination is required** keeping IDMT characteristics".*

Minutes of meeting of the 94th PCC meeting dated 28.09.2020 in regard to above incident:
"PRDC informed that they had computed back up over current E/F settings considering IDMT characteristics. Details are in Annexure B-20.
PCC advised all the utilities to study the revised settings done by PRDC and provide their comment within one week."

Incident 4

Transmission Line	Tripping Date	Time
400 kV Teesta III – Dikchu line	18.10.2020	13-11 hrs

Agenda (minutes of the meeting to be issued) of the 96th PCC meeting dated 12.11.2020 in regard to above incident:

- *400 kV Teesta III – Dikchu Circuit has observed similar fault in the past as discussed in previous few PCC meetings. Such resistive fault causing **un-coordinated tripping** is not desirable, for system security and reliability.*
- *Dikchu HEP may check the reason for **non-auto reclose operation** of main breaker and dead time for tie breaker at Dikchu HEP for 400 kV Teesta III – Dikchu S/C. (Dikchu HEP to update)*
- *Teesta III may share the reasons for **non-auto reclose operation** of 400 kV Teesta III – Dikchu S/C at Teesta III end. (Teesta III to update)*

Incident 5

Transmission Line	Tripping Date	Time
400 kV Rangpo – Kishanganj line	03.11.2020	22-22hrs

The transmission line tripped due to operation of Directional Earth Fault (DEF) relay Rangpo end. However,Main I & Main II impedance relay did not operate at Rangpo end. The line was successfully charged after 20 minutes at 22-42 hrs. As DEF operated, fault could be beyond Rangpo – Kishanganj line. The incident is yet to be deliberated in PCC meeting.

3.0 From the above, it is revealed that therewere outages of 400kV transmission lines of TPTL due to improper relay setting/co-ordination,which were not attributable to TPTL.However, such outages had affected monthly availabilityof TPTL transmission lines in the past. Further, it has been observed on many occasions that during single line to earth fault, Main I & Main II impedance relaysdoes not operate and only directional earth fault relay operates which is not desirable, since on DEF tripping, auto-reclosing action does not take place.It may be mentioned here that uncoordinated tripping of aforesaid 400kV transmission lines could cause sudden load throw off/ loss of generation in the large hydro generating complex in Sikkim and affect system stability, security&reliability of the Eastern Region.

In view of the fact as stated above, it is requested that following coordinated actions may be taken to avoid tripping of 400kV transmission lines of TPTL due to improper relay settings/co-ordination in future:

a) Resistive reach ofMainI& Main II distance relays may be reviewed & increased to the extent possible at all ends, so as to cover high impedance faults on line.
b) DEF relay sensitivity may be reviewed/reduced so as toprovide more time before tripping the line, as many a time fault current is much lower than the rated current.
c) Auto-reclose function for DEF trippingmay be activated.
d) Current differential protection may be installed on the short lines such as Teesta III-Dikchu line and Dikchu-Rangpo line, with installation of OPGW on Teesta III – Dikchu - Rangpo Section of Teesta III-Kishanganj line by POWERGRID on priority, which will avoid un-coordinated tripping due to DEF.

<u>It is also requested that the outage of TPTL transmission lines due to aforesaid un-coordinated protection tripping is not accounted to TPTL and monthly availability of the transmission lines is certified accordingly</u>.

Thanking you,

Yours faithfully,

(S. K. Bhowmick)
President

Copy:1. Executive Director, ERLDC, Kolkata
2. Executive Director, NLDC, New Delhi

Annexure C4

SUPPORT PERIOD WORK DONE BY PRDC Pvt. Ltd.

1. Technical analysis for Major grid disturbances and in other protection aspect throughout the year.

a. Load encroachment setting calculation for KBUNL network.
b. Distance Relay Settings calculation for Rangpo (132Kv) to Chuzachen Line.
c. Tripping analysis done for 400 kV Binaguri – Rangpo – II and 220 kV Jorethang – New MelliD/C on 26.10.2019 at 07:27 Hrs.
d. Distance Relay Settings calculation forTashiding to Rangpo line.
e. Distance Relay Settings calculation for Lalmatia to Khalgaon BSPTCL line.
f. Distance Relay Settings calculation for220 kV Begusarai to Samastipur, New Purnea, Khagaria,Barauni line.
g. Distance Relay Settings calculation for Khagaria (220kV) to New Purnea Line.
h. Backup Overcurrent and Earth fault relay settings calculation for PTPS (220KV) to TVNL.
i. Overcurrent Relay Settingscalculation forHatia to Ranchi line.
j. Overcurrent Relay Settings calculation for Sikkim.
k. Split Bus Analysis done for Biharsharif.
l. Consolidated 765kV and 400 kVovervoltage relay settings for eastern region.
m. Attended PCC meetings for protection consultancy.

2. Regular maintenance of Server. Some prime works are listed below.

UPS Activity Checking	
Date	Time
13.11.2019	13:40-14:20
12.12.2019	13:10-13:55
26.12.2019	12:14-12:31
14.01.2020	11:45-11:51
24.01.2020	13:10-13:50
18.02.2020	11:45 - 12:25
17.03.2020	10:45 - 11:20
20.05.2020	UPS shut Down at 12:20
21.05.2020	UPS Restored at 16:40
26.05.2020	15:30-16:12
26.06.2020	14:50-15:30
24.07.2020	12:15-12:55
26.08.2020	12:40-13:20
25.09.2020	13:20-14:00
29.10.2020	11:00-11:40

Hard Drive	
Date	Activity
19.11.2019	Hard drive changed and backup restored
31.01.2020	Head cleaning of LTO-6 Ultrium-6250
13.05.2020	Hard drive changed and backup restored
24.09.2020	Head cleaning of LTO-6 Ultrium-6250

3. New Substation Data collection and database building

Collected SS LIST 2020					
SL. NO.	**SS NAME**	**VOLTAGE LEVEL**	**UTILITY**	**PURPOSE**	**STATE**
1	GOVINDPUR	220/132 kV	JUSNL	DATA COLLECTION	JHARKHAND
2	JHALDA	132/33 kV	WBSETCL	DATA COLLECTION	WESTBENGAL
3	NEW GARHWA	220/132 kV	JUSNL	DATA COLLECTION	JHARKHAND
4	GODDA	220/132	JUSNL	DATA COLLECTION	JHARKHAND
5	GAJOLE	220/132 kV	WBSETCL	DATA COLLECTION	WESTBENGAL
6	REJINAGAR	220/132 kV	WBSETCL	DATA COLLECTION	WESTBENGAL

4. Update new changes of substation elements as discussed in OCC meetings.

5. Regular update of PDMS and Mi-PSCT software.

6. Closed all the points of DMNS.

7. Providing a continuous support in database management and protection simulation for all days being present in ERPC premises.

8. Training done on Advance Protection Analysis of Grid.

TRAINING SCHEDULE FOR ADVANCE PROTECTION ANALYSIS OF GRID

Date	11:00	11:15	11:30	11:30	12:15	12:30	12:45	13:00	13:00-14:00	14:00	14:30	14:45	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00
27.01.2020	**Topic**:- Protection Engineering and its Evolution			**Topic**:- Power Swing Blocking					LUNCH	**Topic**:- Special Schemes of Protection						**Topic**:- Importance of Protection equipments					
	Speaker:-Ms. Debarati Basu[ED, PRDC]			**Speaker**:-Mr. NiteshKumar D[R & D, PRDC]						**Speaker**:-Mr. NiteshKumar D[R & D, PRDC]						**Speaker**:- Mr. Ranjit Das [Sr. Consultant, PRDC]					
	Mr. Ranjit Das [Sr. Consultant, PRDC]																				
28.01.2020	**Topic**:- Overview of IEC 61850								LUNCH	**Topic**:- IEC 61850 based Substation Protection						**Topic**:-Wide area based protection system : Vulnerability Assessment and Secure Zone-3 Protection					
	Speaker:- Prof. Sarasij Das (Prof. IISC Bangalore)									**Speaker**:- Prof. Sarasij Das (Prof. IISC Bangalore)						**Speaker**:-Mr. Gopal Gajjar(Senior Research Scientist , IIT Bombay);(SM IEE)					
29.01.2020	**Topic**:-Centralized Substation Protection and Control								LUNCH	**Topic**:- AFAS Intro						**Topic**:- AFAS Demonstration					Discussion
	Speaker:-Mr. Gopal Gajjar(Senior Research Scientist , IIT Bombay);(SM IEE)									Speaker:- Mr.Nitesh Kumar D (R&D,PRDC) & Mr.Giri Prathivadi (CTO,PRDC)											

9. Online Trainings are done State wise .

Sl No.	Date	State	Topic	Person Attended
1	29.06.2020	West Bengal	PDMS	3
2	30.06.2020	West Bengal	Protection Study	3
3	20.07.2020	Jharkhand	PDMS	34
4	21.07.2020	Jharkhand	Protection Study	34
5	03.09.2020	Odisha	PDMS	5
6	04.09.2020	Odisha	Protection Study	5
7	21.09.2020	Bihar	PDMS	44
8	22.09.2020	Bihar	Protection Study	44