Minutes
of
46th PCC meeting

Date: 01.09.2016
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 46TH PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC, KOLKATA ON 22.08.2016 (MONDAY) AT 11:00 HOURS

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

PART – A

ITEM NO. A.1: Confirmation of minutes of 45th Protection sub-Committee Meeting held on 25th July, 2016 at ERPC, Kolkata.

The minutes of 45th Protection Sub-Committee meeting held on 25.07.16 circulated vide letter dated 03.08.16.

Members may confirm the minutes of 45th PCC meeting.

Deliberation in the meeting

Members confirmed the minutes of 45th PCC meeting.

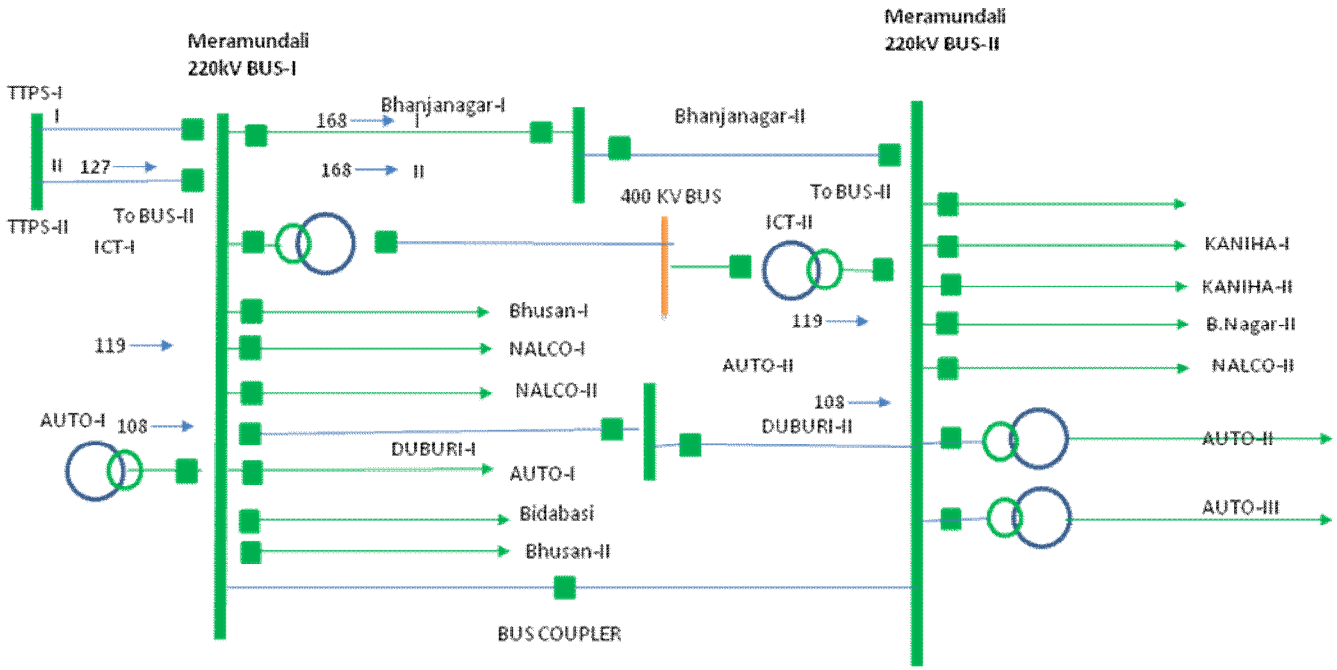
PART – B

ANALYSIS & DISCUSSION ON GRID INCIDENCES FOR WHICH DETAILED REPORT RECEIVED AS PER 33rd TCC/ERPC DECISION WITH IEGC COMPLIANCE

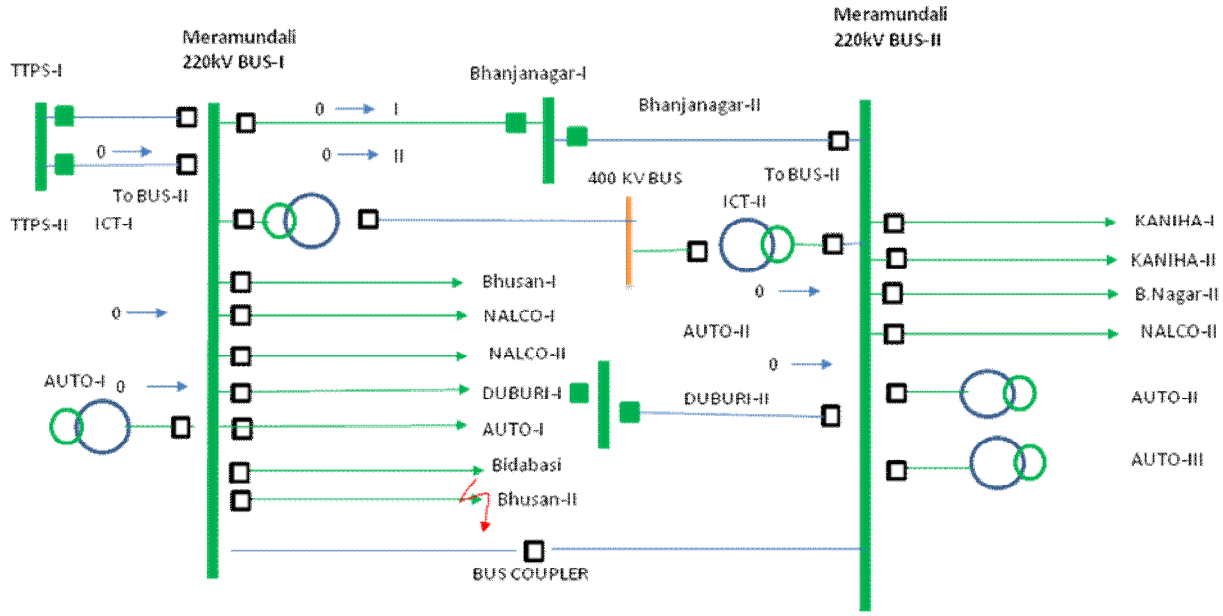
ITEM NO. B.1: Disturbance at 400/220 kV Meramundali S/s on 11-07-16 at 06:21 hrs.

1. **Single line diagram:** Submitted

Pre fault condition



Post fault condition



2. **Pre fault conditions:** Submitted

   Disposition of the feeders at 220kV bus (Two main and one Transfer Scheme):

220 KV MAIN BUS - 1	**220 KV MAIN BUS - 2**
BSL - I & II , B. Nagar – I , Bidanasi, NALCO - I &II , TTPS – I & II, ICT-I, DUBURI – I, AUTO -I	Duburi - II, Kaniha - I & II, Auto - II & III, ICT-II, B. Nagar – II
Bus coupler on	

3. **Tripping incident details:** Submitted

On 11-07-16 at 06:21 hrs, all 220 kV feeders, 400/220 kV ICTs and 220/132 kV ATRs at Meramundali tripped due to bursting of 'Y' phase LA of 220 kV Meramundali – Bhusan – II at Bhusan S/Y. The faulted line tripped on operation of Z-I protection and other elements tripped on bus bar protection at Meramundali S/Y.

4. **Disturbance record:** Submitted

5. **Detailed analysis of tripping incident:** Submitted

6. **Remedial action taken :** Submitted

- 220KV Bhanjanagar bay unit (7SS523) was receiving both the isolators 89A (Bus I side) & 89B (Bus II side) close status due to defective auxiliary contact whereas only 89A was closed. Busbar MCU (Mater control Unit) relay has taken all bays are in BUS Zone-1 without bus separation (Bus zone-1 & bus zone-2) and tripped all the lines.
- The detail relay DR and setting was checked by Service engineer of M/s. Siemens.
- Bus Zone & Check Zone differential current threshold (Id) was very low i.e. 0.3I/In. It was increased to 1.0I/In.
- Actual Bus Coupler's bus bar core CT ratio was 1200/1 whereas ratio set in Bus Bar relay was 600/1. The same has been corrected.

Analysis of PMU plots:

- In Rengali PMU data, approx. 35kV voltage dip has been observed in Y-Ph at 06:21 hrs.
- Fault clearance time was approx. 80 ms.

Status of Reporting: Detail report along with DR/EL was received from OPTCL on 14-07-16

OPTCL may explain the following:

- Since the fault was near to 220kV Bhusan S/s, 220 kV Meramundali – Bhusan – II should trip from Meramundali end on zone 2 instead of zone 1. OPTCL may check zone 1 reach setting.

Deliberation in the meeting

OPTCL explained that

- *220 kV Meramundali – Bhusan line – II tripped from Meramundali end on zone 1 due to bursting of 'Y' phase LA at Bhusan S/Y. The line is 2 km long and it is difficult to segregate the zone settings of the distance relay for such a short line. Hence, the Meramundali end tripped on zone 1 instead of zone 2. OPTCL confirmed that the zone settings are in order.*
- *Simultaneously, the bus bar protection at 220kV Meramundali bus was initiated due to low threshold setting for differential current. The same has been increased from 0.3 to 1.0 after consultation with Siemens.*
- *Regarding operation of bus bar protection for both bus-I & II, OPTCL explained that 220KV Bhanjanagar bay unit (7SS523) was receiving the status of both the isolators 89A (Bus I side) & 89B (Bus II side) as closed due to defective auxiliary contact whereas only 89A was closed. Busbar MCU (Master control Unit) relay has assumed all bays are in BUS -1 and tripped all the lines.*
- *It was also found that the actual Bus Coupler's bus bar core CT ratio was 1200/1 whereas ratio set in Bus Bar relay was 600/1. The same has also been corrected.*

Recommendation by PCC

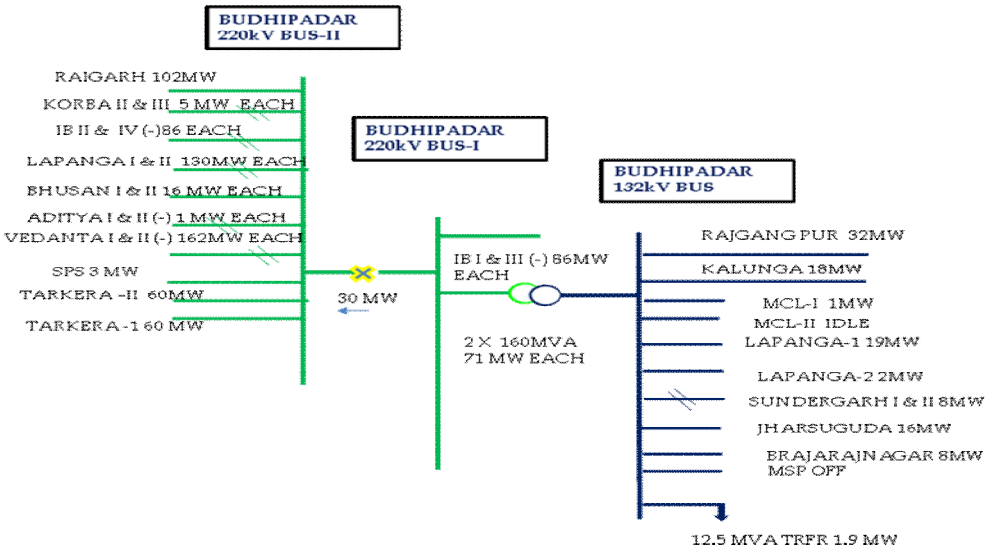
PCC advised OPTCL to check the threshold and CT ratio settings of bus bar protection for other substations.

OPTCL informed that they are verifying and changing the settings wherever applicable.

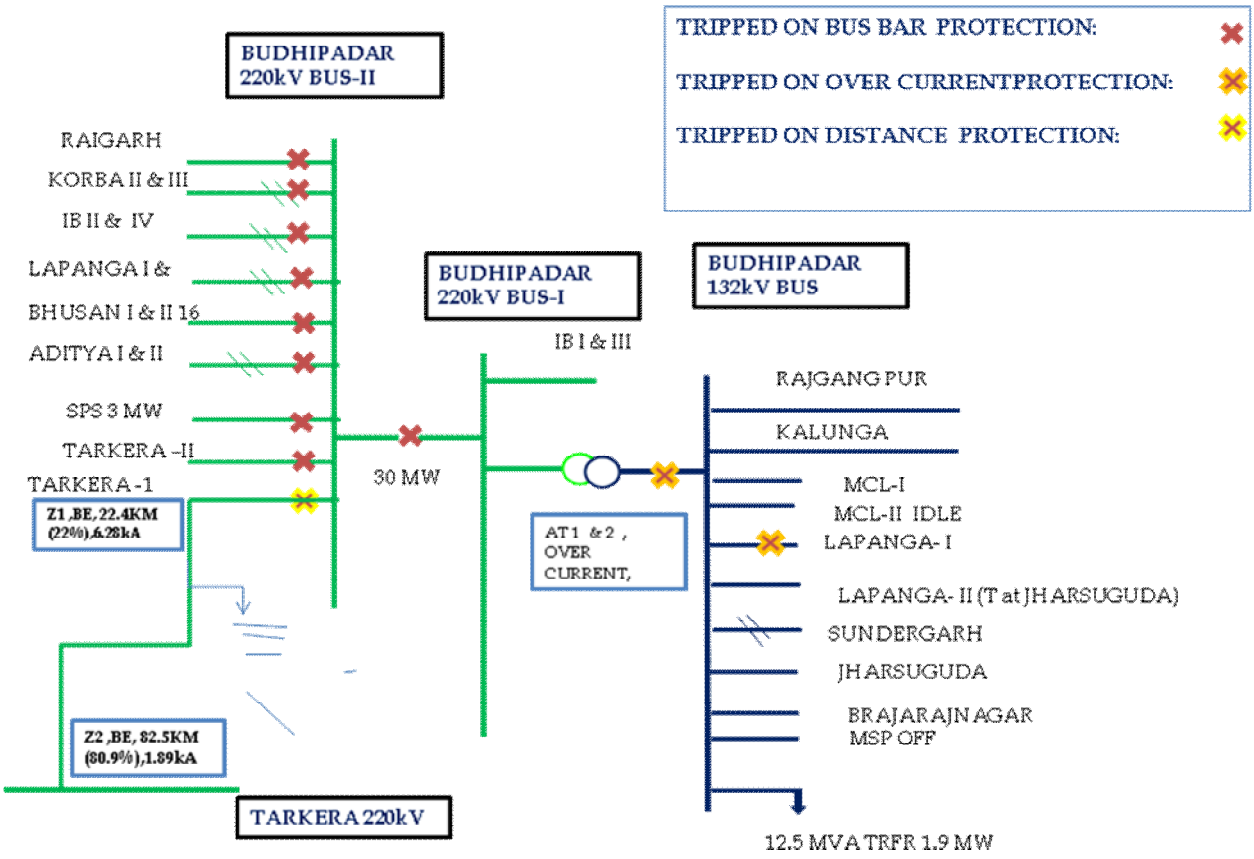
ITEM NO. B.2: Disturbance at 220/132kV Budhipadar S/s of OPTCL System on 14-07-16 at 16:33 hrs

1. **Single line diagram:** Submitted

Pre fault condition



Post fault condition



2. **Pre fault conditions:** Submitted

3. **Tripping incident details:** Submitted

At 16:33 hrs, 220 kV Budhipadar – Tarkera – I tripped on distance protection from both ends on B-N fault. Budhipadar end tripped on Z1 B-N fault and Tarkera end tripped on Z2 B-N fault.

Simultaneously all the feeders connected to 220 kV Budhipadar Bus II along with B/C tripped on Bus Bar differential protection.

After losing connectivity in 220 kV level, load at Lapanga was supplied through 132 kV level. As a result the following elements tripped:

- 220/132 kV ATR I & II at Budhipadar (from HV side) on O/C protection
- 132 kV Budhipadar – Lapanga tripped on O/C protection

At the same time, IBTPS U#1 (on over frequency) & #2 (on loss of excitation) tripped and Vedanta unit went to house load which resulted 220 kV bus dead at Budhipadar.

At 16:51 hrs, 132 kV Budhipadar – Lapanga – I, 132 kV Tarkera – Kalunga-Budhipadar and 132 kV Budhipadar – Rajgangpur tripped from remote end resulting total power supply failure at Budhipadar S/S.

4. **Relay indications:** Submitted

Time	Name	Local end	Remote end
16:33 hrs	220 kV Budhipadar – Tarkera -I	D/P, B-N, 22.4 km from Budhipadar	Z-II, 82.5 km from Tarkera
	220 kV Lapanga-I & II, 220 kV Bhusan – I & II, 220 kV Vedanta – I & II, 220 kV AAL – I & II, 220 kV SPS – I, 220 kV Tarkera – I & II, 220 kV Korba – II & III, 220 kV Raigarh, 220 kV Basundhara – II, 220 kV IB – II & IV feeders at Budhipadar	Tripped at bus bar differential protection at Budhipadar	----
	132 kV Budhipadar – Lapanga - II	Tripped from Budhipadar on O/C protection	Information yet to be received
	220/132 kV ATR I & II at Budhipadar	Tripped from HV side on O/C protection	
	IBTPS #1	Over frequency	
	IBTPS #2	Loss of excitation	
16:51 Hrs.	132 kV Budhipadar – Lapanga - I	Did not trip	O/C, E/F at Lapanga
	132 kV Tarkera – Kalunga _ Budhipadar	Did not trip	E/F, D/P at Tarkera
	132 kV Budhipadar - Rajgangpur	Did not trip	Tripped from Rajgangpur

5. **Disturbance record:** Submitted

6. **Detailed analysis of tripping incident:** Submitted

7. **Remedial action taken:** Submitted

- The Bus bar protection system at 220kV Budhipadar S/s was checked by the service engineer of M/s. Siemens.
- It was observed the Bus bar protection CT core for 220kV Tarkera-1 Circuit was earthed both at panel & field end. The earthing formation was corrected.
- Siemens Engineer observed the setting of bus zone Id> at 0.35 I/Ino is very low. As per the recommendation the setting was changed to 1.0 I/Ino for both bus zones & check zone.

Analysis of PMU plots:

- At 16:32:56 hrs 6 kV voltage dip has been observed in B-Ph voltage at Rourkela PMU data
- Fault clearance time was 160 ms. approximately.

Status of Reporting: Detail reports from OPTCL has been received on 18/07/16

OPTCL may explain the following:

- Tripping of 132 kV Budhipadar – Lapanga –I , 132 kV Tarkera – Kalunga-Budhipadar and 132 kV Budhipadar – Rajgangpur.

Deliberation in the meeting

OPTCL explained that

- *220 kV Budhipadar – Tarkera – I tripped on B-N fault from both ends. Budhipadar end tripped on Zone 1 and Tarkera end tripped on Zone 2.*
- *Simultaneously the bus bar differential protection operated at 220kV Budhipadar S/s and tripped all the elements connected to bus-II along with the bus coupler.*
- *OPTCL explained that the bus bar protection was initiated due to low threshold setting for differential current. The same has been increased from 0.3 to 1.0 after consultation with Siemens.*
- *It was also observed that the Bus bar protection CT core for 220kV Budhipadar-Tarkera line-1 was earthed at both panel & field end. The earthing formation was corrected.*
- *After losing 220kV Bus-II connectivity at Budhipadar, the load at Lapanga was supplied through 220kV Bus-I. This resulted in overloading of the 220/132 kV ATR I & II at Budhipadar and tripped from HV side on O/C protection. 132 kV Budhipadar – Lapanga also tripped on O/C protection due to over load.*
- *OPTCL failed to explain the tripping of 132 kV Budhipadar – Lapanga –I , 132 kV Tarkera – Kalunga-Budhipadar and 132 kV Budhipadar – Rajgangpur lines at 16:51 hrs.*

OPTCL informed that islanding scheme for Ib-TPS has been finalized and they are yet to start the implementation.

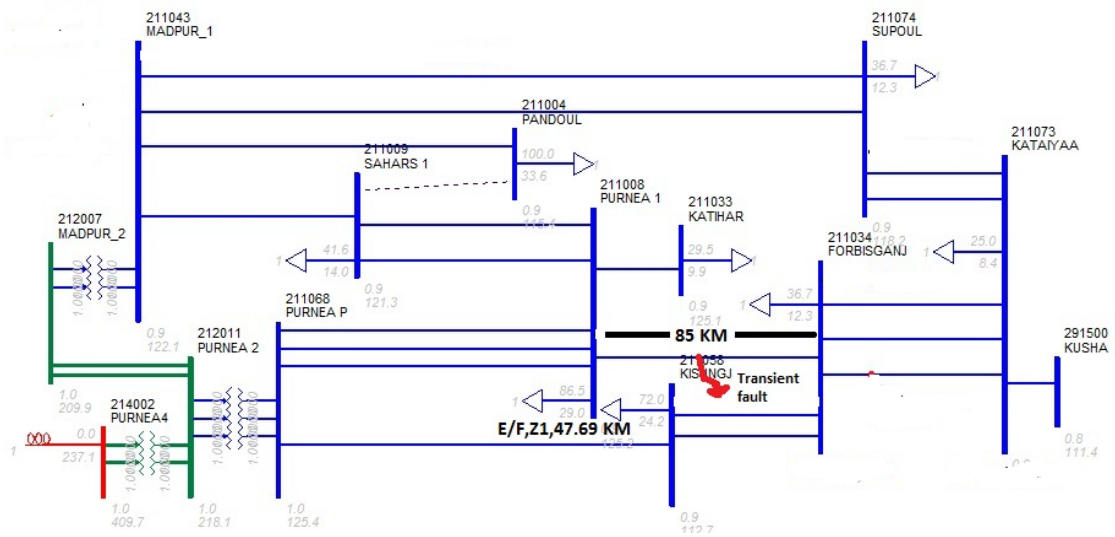
Recommendation by PCC

PCC advised OPTCL to collect the tripping details of 132 kV Budhipadar – Lapanga –I , 132 kV Tarkera – Kalunga-Budhipadar and 132 kV Budhipadar – Rajgangpur lines at 16:51 hrs and submit a report to ERPC and ERLDC.

OPTCL was advised give a presentation on islanding scheme implementing at Ib-TPS in next PCC meeting.

ITEM NO. B.3: Multiple elements tripping at 132kV Purnea (PG) and 132kV Purnea (BSPTCL) system on 31-07-16 at 09:45 hrs.

1. **Single line diagram:** Submitted



2. **Pre fault conditions:** Not Submitted

3. **Tripping incident details:** Submitted

At 09:45 hrs, 132 KV Purnea-Forbisganj transmission line tripped on transient fault, from Purnea GSS (B) end on zone 1 E/F protection. Thereafter,

- 132 KV Purnea (PG)-Kishanganj-Forbisganj got overloaded and tripped from Purnea(PG) end.(load on each 132 KV Purnea (PG)-Kishanganj-Forbisganj was 21 MW,CTR-300/1)
- Due to tripping of above circuits, 132 KV Madhepura-Supaul D/C transmission line got overloaded and tripped from Madhepura end. (load on each 132 KV Madhepura-Supaul ckt was 42 MW,CTR-400/1)

4. **Relay indications:** Submitted

Time	Name	Local end	Remote end
09:45 Hrs	132 KV Purnea-Forbisganj line	E/F,Z1,47.69 KM	No tripping
	132 KV Purnea (PG)-Kishanganj-Forbisganj	67 C,86	No tripping
	132 KV Madhepura-Supaul D/C	O/C	No tripping

5. **Disturbance record:** Submitted

6. **Detailed analysis of tripping incident:** Submitted

7. **Remedial action taken :** Not given

Status of Reporting:

- Detailed tripping report along with DR and EL was received from BSPTCL on 16-08-16.
- Detailed tripping report along with DR and EL was received from POWERGRID on 16-08-16.

BSPTCL may explain the following:

- Reason for no tripping at Forbisganj end for the transient fault in 132 KV Purnea(B)-Forbisganj line at a distance 47 km from Purnea (B).

Deliberation in the meeting

BSPTCL explained that

- *132 KV Purnea-Forbisganj line tripped on B-N fault, from Purnea (B) end on zone 1 E/F protection. Forbisganj end distance protection failed to clear the fault.*
- *BSPTCL informed that they would test the relay at Forbisganj end and replace the relay if required.*

Powergrid shown the DR plot at 132 KV Purnea (PG) end and explained that

- *Since the fault was not cleared from Forbisganj end, the distance protection of 132 KV Purnea (PG)-Kishanganj-Forbisganj line at Purnea(PG) end has observed the fault in Zone 2. In the mean time, one more fault was initiated in 132 KV Purnea (PG)-Kishanganj-Forbisganj line during the stormy weather and the line was tripped from 132 KV Purnea (PG) end on zone 1.*

BSPTCL informed that distance relays of 132 KV Purnea (PG)-Kishanganj-Forbisganj line at

Forbisganj end is not working and no protection is available at Kishanganj end. BSPTCL explained that they are facing problem in selecting the zone settings of the distance relay at Forbisganj end as 132kV Purnea (PG)-Kishanganj line is S/C line and 132kV Kishanganj-Forbisganj connectivity is D/c.

Recommendation by PCC

- *PCC advised BSPTCL to check all the distance relays at Forbisganj end and take the appropriate action to restore the protection system.*
- *PCC felt that BSPTCL is not getting any additional benefit for keeping two circuits connected in the Kishanganj – Forbisganj section as the Purnea-Kishanganj section is single circuit, Therefore, PCC advised BSPTCL to keep only one circuit in service for the Kishanganj – Forbisganj section. This will ease the relay zone setting problem for 132 KV Purnea (PG)-Kishanganj-Forbisganj line.*
- *Since there is no protection available at 132kV Kishanganj S/s, PCC advised BSPTCL and Powergrid to co-ordinate the zone settings of the line considering 132 KV Purnea (PG)-Kishanganj-Forbisganj line as a single section.*

PART- C:: OTHER ITEMS

ITEM NO. C.1: Frequent tripping of 220kV Ranchi-Chandil line

220kV Ranchi-Chandil line has tripped several times on following days:

Date of tripping	Time	Reason
30-07-2016	15:35	B-N fault
03-08-2016	14:44	B-N fault, 22.5 km from Chandil
05-08-2016	00:05	B-N fault, 19.9 km from Chandil
07-08-2016	00:45	B-N fault
07-08-2016	01:17	B-N fault
08-08-2016	01:03	Y-N fault

JUSNL and Powergrid may explain.

Deliberation in the meeting

Powergrid informed that the line was also tripped on 10th & 17th Aug, 2016.

JUSNL informed that thorough line patrolling was carried out on 8th Aug 2016. B-ph CT neutral was loose at Chandil end and the same has been tightened. JUSNL added that ERPC recommended settings were also incorporated at 220kV Chandil end

JUSNL informed that no such kind of tripping reported after 8th Aug 2016 and the trippings on 10th & 17th Aug, 2016 were different from previous trippings.

ITEM NO. C.2: Tripping incidences in the month of July, 2016

Other tripping incidences occurred in the month of July, 2016 which needs explanation from constituents of either of the end is given at **Annexure- C2.**

Members may discuss.

Deliberation in the meeting

Members explained the tripping incidences. Updated list is enclosed at **Annexure- C2.**

ITEM NO. C.3: Protection Committee visit to BSPTCL and JUSNL Sub-stations

In view of repeated uncoordinated trippings in BSPTCL and JUSNL systems, 31st TCC/ERPC formed a committee of following protection engineers to review the situation:

- Shri Sabyasachi Roy, ACE, WBSETCL,
- Shri L Nayak, GM, OPTCL
- Shri Jayanta Datta, SE, DVC
- Shri Surajit Bannerjee Asst GM, ERLDC,
- Shri Jiten Das, Asst GM, PGCIL
- Shri S. B. Prasad, ESE, BSPTCL
- Shri Vidyasagar Singh, ESE, JUSNL

PCC decided that the protection committee members will carry out the site visit of JUSNL substations during 11th to 14th May, 2016 to review the protection system in respect of Chandil, Ramchandrapur, Adityapur and adjoining substations.

In 43rd PCC, it was informed that the Protection team has visited 132/33 kV Ramchandrapur, Adityapur & 220/132 kV Chandil S/s of JUSNL from 11th to 12th May, 2016.

A special meeting was held on 08.06.16 to discuss the observations of the site visit of Chandil, Ramchandrapur, Adityapur & adjoining substations by ERPC team. In the meeting it was emphasized that the distance protection along with the back-up protection of JUSNL system (comprising of 220kV Ramchandrapur, Chandil & Hatia-II and 132 kV Adityapur & Hatia-I) needs to be reviewed for proper protection co-ordination. It was decided that the Protection team will carry out the setting calculations for all the 220 kV & 132 kV lines along with the 220/132 kV ICTs based on the data provided by JUSNL which shall be implemented by JUSNL.

In 33rd TCC, it was advised JUSNL to comply the recommendations given by the ERPC protection team.

Thereafter, a special meeting was held in ERPC on 08.07.16 to review the protection settings of all the 220 kV & 132 kV lines along with the 220/132 kV ICTs of 220/132kV Ramchandrapur, Chandil & Hatia-II and 132 kV Adityapur & Hatia-I substations of JUSNL. Representatives of DVC, WBSETCL and ERLDC as members of ERPC Protection team attended the meeting.

After detail study of the data as submitted by JUSNL, it was observed that there was some missing data/mismatch in the information. Therefore, it was felt that the complete details of all Lines (i.e. Line length, Single or double circuit) originating from the following Sub-stations Bus along with Transformer data (MVA, % Z, Voltage Ratio) are required for finalizing the protection settings for all the 220 kV & 132 kV lines:

1. 220KV Ramchandrapur
2. 132KV Ramchandrapur
3. 132KV Tamar
4. 132KV Golmuri
5. 132KV Rajkharswan
6. 220KV Chandil
7. 132KV Chandil
8. 132KV Adityapur
9. 220KV PTPS
10. 132KV PTPS
11. 132KV Lohardaga
12. 132KV Namkum
13. 132KV HEC
14. 132KV Kanke
15. 132KV Kamdara
16. 132KV Hatia I
17. 132KV Hatia 2
18. 220KV Hatia 2
19. 132KV Sikidri

JUSNL has submitted the desired information and the same has been circulated to protection team.

Protection settings of all the 220 kV & 132 kV lines along with the 220/132 kV ICTs of 220/132kV Ramchandrapur, Chandil & Hatia-II and 132 kV Adityapur & Hatia-I substations of JUSNL were finalized in a special meeting on 28.07.2016. JUSNL was advised to implement the settings.

JUSNL may update.

Deliberation in the meeting

JUSNL informed that they have incorporated the recommended settings at 220 kV Chandil, Hatia-I and 132 kV Hatia-II sub-stations. 220 kV Ramchandrapur & 132 kV Adityapur Sub-stations will be implemented by 1st week of September, 2016.

PCC advised JUSNL to submit a report on improvements observed in protection system performance after implementation of the recommended settings.

JUSNL agreed.

ITEM NO. C.4: PROTECTION PHILOSOPHY OF EASTERN REGION

The Protection Philosophy finalized in special PCC meeting held on 20th July, 2015 is as given below:

Sl. No.	Zone	Direction	Protected Line Reach Settings	Time Settings (in Seconds)	Remarks
1	Zone-1	Forward	80%	Instantaneous (0)	As per CEA
2a	Zone-2	Forward	For single ckt- 120 % of the protected line	0.5 to 0.6 - if Z2 reach overreaches the 50% of the shortest line ; 0.35- otherwise	As per CEA
			For double ckt- 150 % of the protected line		As per CEA
2b	Zone-2 (for 220 kV and below voltage Transmission lines of utilities)	Forward	120 % of the protected line, or 100% of the protected line + 50% of the adjacent shortest line	0.35	As per CEA with minor changes
3	Zone-3	Forward	120 % of the (Protected line + Next longest line)	0.8 - 1.0	As per CEA
4	Zone-4	Reverse	10%- for long lines (for line length of 100 km and above) 20%- for shot lines (for line length of less than 100 km)	0.5	As per CEA

Note:

1) **Zone-2:- Z2 Reach should not encroach the next lower voltage level.**
2) **Zone-3:- If Z3 reach encroaches in next voltage level (after considering "in-feed"), then Z3 time must be coordinated with the fault clearing time of remote end transformer.**
3) **Zone-4:- If utility uses carrier blocking scheme, then the Z4 reach may be increased as per the requirement. It should cover the LBB of local bus bar and should be coordinated with Z2 time of the all other lines.**
4) **The above settings are recommended primarily (exclusively) for uncompensated lines.**

All the constituents agreed on the principles read with notes as above.

Till date DVC, WBSETCL, JUSNL, OPTCL, Powergrid (ER-I, ER-II & Odisha-Projects), NTPC, BSPTCL, NHPC, Vedanta and GMR had submitted the zone settings.

PCC advised all the other constituents to implement the revised zone philosophy and submit the settings to ERPC at the earliest.

IPPs may submit the revised zone settings data at the earliest.

Deliberation in the meeting

Members noted.

ITEM NO. C.5: Third Party Protection Audit

1. Status of 1st Third Party Protection Audit:

The compliance status of 1st Third Party Protection Audit observations is as follows:

Name of Constituents	Total Observations	Complied	% of Compliance
Powergrid	54	37	68.52
NTPC	16	14	87.50
NHPC	1	1	100.00
DVC	40	26	65.00
WB	68	27	39.71
Odisha	59	38	64.41
JUSNL	34	16	47.06
BSPTCL	16	5	31.25
IPP (GMR, Sterlite and MPL)	5	5	100.00

The substation wise status of compliance are available at ERPC website (Observations include PLCC rectification/activation which needs a comprehensive plan).

Members may update.

Deliberation in the meeting

PCC advised all the constituents to comply the pending observations.

2. Schedule for 2nd Third Party Protection Audit:

The latest status of 2nd Third Party Protection audit is as follows:

1) Jeerat (PG) Completed on 15th July 2015
2) Subashgram (PG) Completed on 16th July 2015
3) Kolaghat TPS (WBPDCL)- Completed on 7th August 2015
4) Kharagpur (WBSETCL) 400/220kV - Completed on 7th August 2015
5) Bidhannagar (WBSETCL) 400 &220kV Completed on 8th September, 2015
6) Durgapur (PG) 400kV S/s Completed on 10th September, 2015
7) DSTPS(DVC) 400/220kV Completed on 9th September, 2015
8) Mejia (DVC) TPS 400/220kV Completed on 11th September, 2015
9) 400/220/132kV Mendhasal (OPTCL) Completed on 2nd November, 2015
10) 400/220kV Talcher STPS (NTPC) Completed on 3rd November, 2015
11) 765/400kV Angul (PG) Completed on 4th November, 2015
12) 400kV JITPL Completed on 5th November, 2015
13) 400kV GMR Completed on 5th November, 2015
14) 400kV Malda (PG) Completed on 23rd February, 2016
15) 400kV Farakka (NTPC) Completed on 24th February, 2016
16) 400kV Behrampur(PG) Completed on 25th February, 2016

17) 400kV Sagardighi (WBPDCL) Completed on 25th February, 2016
18) 400kV Bakreswar (WBPDCL) Completed on 26th February, 2016

Members may note.

Deliberation in the meeting

Members noted.

ITEM NO. C.6: Implementation of Protection Database Management System Project.

ERPC proposal for "Creation & Maintenance of web based protection database management system and desktop based protection calculation tool for Eastern Regional Grid" has been approved by the Ministry of Power for funding from Power System Development Fund (PSDF) vide No-10/1/2014-OM dated 07.03.2016. Subsequently, the LOA was given to PRDC and the first implementation meeting was held on 12.04.2016.

Operational load flow requisite data format is available in ERPC website.

All the constituents are requested to submit the filled formats at the earliest and co-operate for smooth implementation of the project in time bound manner.

In last PCC, all the constituents were advised to submit the filled formats at the earliest.

Members may note and co-operate.

Deliberation in the meeting

PRDC delivered a presentation on latest status of the implementation and informed that

1. M/s PRDC informed that some operational load flow data from WB is not yet available
2. DVC representative raised the issue of non-matching of 220 kV level SCADA data of ERLDC and SLDC during the operational load flow results matching. MS clarified that a separate meeting would be scheduled with SCADA for further discussions on the issue. PRDC will inform the lines where the scada data of ERLDC, SLDC SCADA and load flow results were not matching.
3. M/s PRDC gave a brief overview & project status. PRDC informed that all substation visit in Odisha had been completed except S/Ss at Paradip Port, Dhamara port, and Paradip Phosphate. M/s Paradip Port have requested presence of OPTCL testing engineer during data collection. OPTCL representatives agreed to associate their testing personnel for visit of Paradip port. M/s Dhamara Port and Paradip Phosphate could not be contacted.
4. PRDC informed that in few more S/Ss relay data not yet received because of some reason or other. MS requested PRDC to forward the final list of substation where visits were pending so that the issue may be pursued at ERPC end also.

   It was informed that for Sikkim, all sub-station data collection have been completed. Numerical relay data collection is pending. MS informed that plan for collection of the relay data of Sikkim needs to be chalked out in coordination with Sikkim.

   PRDC informed that the data collection for West Bengal would begin by first week of September. MS requested M/s PRDC to give their plan for visiting West Bengal substations.

5. PRDC informed that they have started data collection in Jharkhand state. MS informed that PGCIL, ER-I have already given permission for Jharkhand and PRDC should coordinate with PGCIL authorities. PRDC agreed.

   MS further informed that the schedule of visit of DVC substations had already been shared with Chief Engineer, SLDC, DVC and the same would be shared with DVC protection team also.

   M/s PRDC informed that in JUSNL system, JUSNL authority may fail to associate their testing engineers for collection of relay setting dat. MS advised PRDC to first complete DVC and PGCIL s/s in Jharkhand. In the meanwhile the issue of testing personnel in Jharkhand would be mutually discussed with JUSNL and settled.

6. M/s PRDC also highlighted the issue of non-communicating relays due to which data collection could not be completed in some substations of OPTCL system. DVC suggested that for relays which were not communicating, the utility may write the data downloading it manually from the screen.

   OPTCL informed that there were some relays for which data could not be collected even from the display. MS requested PRDC to inform the locations where data downloading problems existed so that the same could be taken up. Members suggested that such relays may be replaced immediately for safety and security of the grid. PRDC informed that they will configure the application by a week's time and the pending relay setting files can be uploaded by the constituents directly to the application.

   M/s PRDC shared their experience that there were differences between relay manuals of the manufacturers and the setting files collected from the field. The templates being built by PRDC will take care of these discrepancies.

7. Some challenges in data collection were highlighted by M/s PRDC. It was informed that due to unavailability of testing person in CPP's data downloading was becoming an issue. MS requested PRDC to furnish the CPPs where data collection was withheld.

   Further, PRDC informed that, non availability of updated SLD's at some substations was delaying the process of data collection. Members felt that M/s PRDC should arrange the relevant SLD by drawing in case updated SLD was not available. PRDC agreed.

   M/s PRDC informed that in some cases CT, PT nameplates not visible. In such cases, if manufacturer and model are available then that can be matched with the data available for some other comparable equipment. Members accepted that the process followed by M/s PRDC may be continued. However, it was felt that the accuracy class estimated may not be correct

8. M/s PRDC introduced the Data modification and notification system (DMNS). DMNS system would be used to communicate online any changes in the network, relay settings to the ERPC server during the implementation phase. For the present, the changes would be uploaded in the protection database management system (PDMS) manually by M/s PRDC. MS requested PRDC to include DMNS in training. PRDC agreed and requested members to check the data once the same is uploaded in the server. MS once again informed the members present to send participants with laptop for best utilization of training.

9. M/s PRDC informed that they would like to analyse the trippings usually discussed in PCC meeting and requested constituents to forward the comtrade files. MS informed that as per scope of work, M/s PRDC are required to undertake analysis of disturbances. Members agreed to send the comtrade files and other requisite information to PRDC through ERPC.

Further, MS, ERPC informed that based on the progress of the implementation of protection database and protection setting calculation tool for Eastern Region, a hands on training program has been scheduled from 05/09/2016 to 09/09/2016 at ERPC Kolkata 11:00 AM onwards. Dr. R. Nagaraja, MD, PRDC would personally conduct the sessions

He requested to all the constituents to nominate their young protection / SLDC engineers who would be using the tool in day to day works to attend the five (5) day training programme. For this training programme maximum seating capacity is restricted up to 30 (thirty) @ 3 participants/ constituent. Subsequent training programmes are shortly being arranged for accommodating others. The participants must carry their own laptops on which the software would be loaded during the training programme.

Constituents noted and assured to nominate their respective engineers for the training.

ITEM NO. C.7: Preparation of DPR for five year training plan for Eastern Region constituents for PSDF funding.

MS, ERPC informed that the following two DPRs for training of ER constituents is under preparation by ERPC Secretariat for PSDF funding and will be submitted to PSDF Secretariat shortly:

1) Five years training programme at ERPC level (within India)
2) Five years training programme in foreign countries

Deliberation in the meeting

Members appreciated the initiatives taken by ERPC Secretariat and requested Member Secretary to submit both the DPRs to PSDF secretariat at the earliest for the benefit of ER constituents.

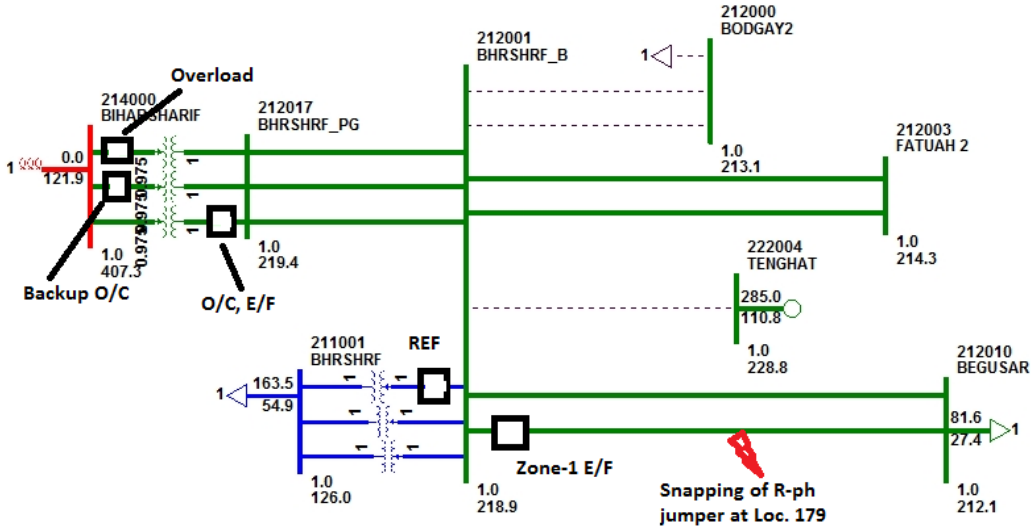
PART- D

FOLLOW-UP OF DECISIONS OF THE PREVIOUS PROTECTION SUB-COMMITTEE MEETING(S)

(The status on the follow up actions is to be furnished by respective constituents)

Item No D.1 Total Power failure at 220/132kV Biharsharif S/s of BSPTCL system on 24-06-16 at 00:15 hrs.

1. **Single line diagram:**



2. Pre fault conditions: Submitted

Name of feeder	Power flow in MW	Name of feeder	Power flow in MW
220KV ICT1	250	132KV Baripahari ckt 1	35
220KV ICT2	250	132KV Baripahari ckt 2	35
220KV ICT3	250	132KV Hathidah ckt 1	00
220KV FATHUA CKT 1	120	132KV Hathidah ckt 2	00
220KV FATHUA CKT 2	120	132KV L28(Nalanda)	20
220KV Begusarai ckt 1	162	132KV L29(Rajgir)	20
220KV Begusarai ckt 2	162	132KV Nawada	56
220KV Bodhgaya ckt 1	00	132KV Ekangarsarai	25
220KV Bodhgaya ckt 2	00	132KV Sheikhpura	00
150MVA Tr no 1	61		
150MVA Tr no 2	61		
150MVA Tr no 3	61		

3. Tripping incident details:

At 00:15 hrs, 220 kV Biharshariff- Begusarai-II tripped from Biharshariff end on zone-1 E/F due to snapping of R-ph jumper at Loc. 179. The tripping details of Begusarai end were not available. The following elements tripped:

- 400/220 kV 315 MVA ICT - II on back up O/C, R-N from 400 kV side.
- 400/220 kV 315 MVA ICT – III tripped from 220 kV side on O/C, E/F.
- After tripping of ICT II & III, 400/220 kV ICT I at Biharshariff tripped on overload from 400 kV side (As per SCADA data, loading of ICT I was 385 MW prior to the tripping).
- 150 MVA, 220/132kV ATR-I at 220 kV Biharshariff (Bihar) S/s on REF protection

At the time of incident, 220 kV Tenughat Biharshariff was not in service due to tower collapse. 220/132 kV Biharshariff (BSPTCL) S/S became dead and power failure occurred at Biharshariff, Begusarai and Fatua.

4. Relay indications:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
00:15 hrs	220 kV Biharshariff- Begusarai-II	Zone 1, E/F	NA
	315 MVA 400/220 kV ICT II	Back up O/C protection in R-Phase from 400 kV side	
	315 MVA 400/220 kV ICT III	Tripped from 220 kV side	
	315 MVA 400/220 kV ICT I	Tripped on overload at 400 kV side	

Analysis of PMU plots:

- From the Biharshariff PMU plot 70 kV voltage dip has been observed in R-Ph at 00:15 hrs
- Fault Clearance time was less than 100 ms.

Powergrid and BSPTCL may explain the following:

- BSPTCL may furnish the tripping details of 220 kV Biharshariff- Begusarai-II at Begusarai

end.

- BSPTCL explain the tripping of 150 MVA, 220/132kV ATR at 220 kV Biharshariff (Bihar) S/s.
- Powergrid may explain the tripping of 400/220 kV ICT I & II on backup O/C protection as the fault was cleared within 100 msec, (as per PMU data).
- Bihar SLDC may furnish amount of energy un-served and duration of disturbance.

In 45th PCC, BSPTCL explained the sequence of events as follows:

- *There was a fault in 220 kV Biharshariff- Begusarai-II line near to 220kV Biharshariff S/s and the line tripped from Biharshariff end on Zone 1*
- *But 220 kV Biharshariff- Begusarai-line I&II lines tripped from Begusarai end. Line-I tripped on high set O/C protection and line-II tripped on directional O/C earth fault protection.*

Powergrid informed that ICT- II tripped from HV end on high set O/C protection and no relay of ICT-III was initiated at PG end however the ICT tripped from LV side. After tripping of ICT-II & III, the ICT-I tripped on overload.

BSPTCL failed to explain the following:

- *Tripping of 315 MVA ICT-III from 220kV side*
- *Tripping of 150 MVA, 220/132kV ATR-I from 220kV side*
- *Tripping of 220 kV Biharshariff- Begusarai-I&II from Begusarai end on O/C & E/F.*

PCC could not able to conclude the tripping incidence and advised BSPTCL to submit a detailed report within a week.

Thereafter BSPTCL submitted a presentation and DR of Begusarai end.

BSPTCL may explain.

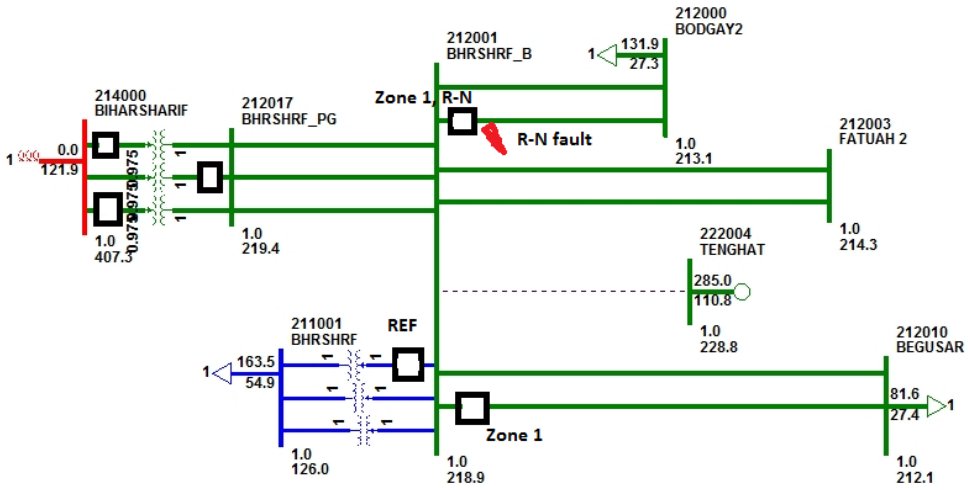
Deliberation in the meeting

BSPTCL failed to explain the cause of unwanted tripping of 150 MVA, 220/132kV ATR-I from 220kV side on REF protection.

PCC advised BSPTCL to submit the schematic diagram and other connectivity details of REF protection of 150 MVA, 220/132kV ATR-I.

Item No D.2 Total Power failure at 220/132kV Biharsharif S/s of BSPTCL system on 26-06-16 at 07:28 hrs.

1. **Single line diagram:**



2. Pre fault conditions: Submitted

Name of feeder	Power flow in MW	Name of feeder	Power flow in MW
220KV ICT1	170	132KV Baripahari ckt 1	30
220KV ICT2	170	132KV Baripahari ckt 2	30
220KV ICT3	170	132KV Hathidah ckt 1	00
220KV FATHUA CKT 1	110	132KV Hathidah ckt 2	00
220KV FATHUA CKT 2	110	132KV L28(Nalanda)	20
220KV Begusarai ckt 1	70	132KV L29(Rajgir)	20
220KV Begusarai ckt 2	70	132KV Nawada	35
220KV Bodhgaya ckt 1	00	132KV Ekangarsarai	20
220KV Bodhgaya ckt 2	00	132KV Sheikhpura	00
150MVA Tr no 1	48		
150MVA Tr no 2	48		
150MVA Tr no 3	48		

3. Tripping incident details:

At 07:28 hrs, R phase jumper of wave trap of 220 kV Biharshariff- Bodhgaya-II snapped at Biharshariff end and 220 kV Biharshariff- Bodhgaya-II tripped on zone 1 from Biharshariff end. Simultaneously the following elements tripped:

- 400/220 kV 315 MVA ICT - II at Biharshariff (PG) on back up O/C, R-N from 400 kV side.
- 400/220 kV 315 MVA ICT – III tripped from 220 kV side
- After tripping of ICT II & III, 400/220 kV ICT I at Biharshariff tripped on overload from 400 kV side.
- 220kV Biharsharif-Begusarai ckt-ll tripped from Biharshariff end on zone 1
- 150 MVA, 220/132kV ATR-I at 220 kV Biharshariff (Bihar) S/s on REF protection

At the time of incident, 220 kV Tenughat Biharshariff was not in service due to tower collapse. So, 220/132 kV Biharshariff (BSPTCL) S/S became after tripping of ICTs and power failure occurred at Biharshariff, Begusarai and Fatua.

4. Relay indications:

Time (Hrs)	**Details of tripping**	**Relay at local end**	**Relay at remote end**
07:28 hrs	220 kV Biharshariff- Bodhgaya-II	Micom P442/(R-N fault) Distance relay, Zone 01	NA
	220 kV Biharshariff- Begusarai-II	Siemens 7SA52,Zone-1	NA
	315 MVA 400/220 kV ICT II	Back up O/C protection in R-Phase from 400 kV side	
	315 MVA 400/220 kV ICT III	Tripped from 220 kV side	
	315 MVA 400/220 kV ICT I	Tripped on Overload at 400 kV side	

Analysis of PMU plots:

- From the Biharshariff PMU plot 80 kV voltage dip has been observed in R-Ph at 07:28 hrs
- Fault Clearance time was less than 100 ms.

Powergrid and BSPTCL may explain the following:

- BSPTCL may furnish the tripping details of 220 kV Biharshariff- Bodhgaya-II at Bodhgaya end.
- BSPTCL may explain the tripping of 220 kV Biharshariff- Begusarai-II
- BSPTCL explain the tripping of 150 MVA, 220/132kV ATR at 220 kV Biharshariff (Bihar) S/s.
- Powergrid may explain the tripping of 400/220 kV ICT I & II on backup O/C protection as the fault was cleared within 100 msec, (as per PMU data).
- Bihar SLDC may furnish amount of energy un-served and duration of disturbance.

In 45th PCC, BSPTCL explained the disturbance as follows:

- *There was a fault in 220 kV Biharshariff- Bodhgaya-II near to 220kV Biharshariff S/s and the line tripped from Biharshariff end on Zone 1 but did not trip from Bodhgaya end.*
- *220 kV Biharshariff- Bodhgaya line-I tripped from Bodhgaya end on high set O/C protection.*

BSPTCL failed to explain the following:

- *Tripping of 315 MVA ICT-II from 220kV side*
- *Tripping of 150 MVA, 220/132kV ATR-I from 220kV side*
- *Tripping of 220 kV Biharshariff- Begusarai-II from Biharshariff end on zone 1.*

PCC could not able to conclude the tripping incidence and advised BSPTCL to submit a detailed report within a week.

Thereafter BSPTCL submitted a presentation and DR of Begusarai end.

BSPTCL may explain.

Deliberation in the meeting

BSPTCL failed to explain the cause of unwanted tripping of 150 MVA, 220/132kV ATR-I from 220kV side on REF protection and 220 kV Biharshariff- Begusarai-II from Biharshariff end on zone 1.

PCC advised BSPTCL to submit the schematic diagram and other connectivity details of REF protection of 150 MVA, 220/132kV ATR-I.

PCC also advised to submit the softcopy of DR files of 220 kV Biharshariff- Begusarai line tripping.

Item No D.3 Total power interruption in S. Orissa system on 15-04-16 at 12:17 hrs – 12:23 hrs.

At 12:17 hrs, 400KV Indravati - Rengali S/c line tripped on transient SLG (i.e. C-N) fault. Auto reclose operation was successful at Indravati end but unsuccessful at Rengali end. After few millisecond, direct trip has been received from Rengali end due to over voltage at Rengali and the line tripped from Indravati end also.

Thereafter, the following elements were tripped:

- 400KV Jeypore-Bolangir line (tripped on high voltage from Jeypore)
- 400KV Indravati-Jeypore line (tripped on high voltage from Jeypore)
- 220/132kV ATR-I,& II at Jayanagar (tripped on over flux)
- 220/132kV ATR-I,& II at Bhanjanagar (tripped on over flux)
- Running units #2& 3 of U.Kolab (tripped on over flux)
- Running unit #5 of Balimela

The bus voltage at Jeypore became zero and 400KV Jeypore-Gajuwaka D/C line was hand tripped from Gajuwaka end.

Thus after tripping of above 400kV lines along with 220/132kV ATRs at Jayanagar & Bhanjanagar, there were no other path left to feed the load at South Orissa system mainly at Theruvali, Bhanjanagar, Narendrapur area. Therefore, flow became zero on all the 220kV lines and bus became dead at Jeypore, Indravati, Jayanagar, Theruvali, and Bhanjanagar & Narendrapur S/s.

Due to tripping of above mentioned lines and units approx. 550 MW load loss and 60 MW generation loss (running units of Balimela & U.Kolab) occurred in south Orissa system mainly at Bhanjanagar, Theruvali, Narendrapur and its surrounded area.

In 43rd PCC, Powergrid explained that--

- At 12:17 hrs, 400KV Indravati - Rengali S/c line tripped on transient SLG (i.e. C-N) fault.
- Auto reclose operation was successful at Indravati end but unsuccessful at Rengali end due to over voltage at Rengali.
- Hence, after few millisecond, the line tripped from Indravati end also on receipt of direct trip from Rengali end.
- After the incident there was oscillations in the system and huge over voltage was observed and the following elements were tripped:

1) 400KV Jeypore-Bolangir line (tripped on high voltage from Jeypore)
2) 400KV Indravati-Jeypore line (tripped on high voltage from Jeypore)
3) 220/132kV ATR-I,& II at Jayanagar (tripped on over flux)
4) 220/132kV ATR-I,& II at Bhanjanagar (tripped on over flux)
5) Running units #2& 3 of U.Kolab (tripped on over flux)
6) Running unit #5 of Balimela

PCC felt that similar incident was happened on 10-03-16 at 12:24 hrs to 12:31 hrs and severe oscillations, high voltage were observed in south odisha system during the disturbance.

The details from HVDC Gajuwaka end are also not available for detailed analysis of the disturbance.

PCC advised Powergrid to carry out the following and submit a detailed report:

- Check the reason for high voltage at 400kV Rengali end during auto reclose operation in 400kV Indravati-Rengali line
- Collect the details of all the events from HVDC Gajuwaka end during the disturbance
- Detailed analysis for the reason of high voltage at Jeypore and adjoining areas.& also for the oscillations observed in the system.

Powergrid agreed.

PCC also felt that the PDO conditions of HVDC, Gajuwaka needs to be reviewed after detail study of the S. Odisha system.

In 45th PCC, Powergrid informed that study is in progress.

Powergrid may update.

Deliberation in the meeting

Powergrid informed that study is in progress.

Item No D.4 Disturbance in BSPTCL System

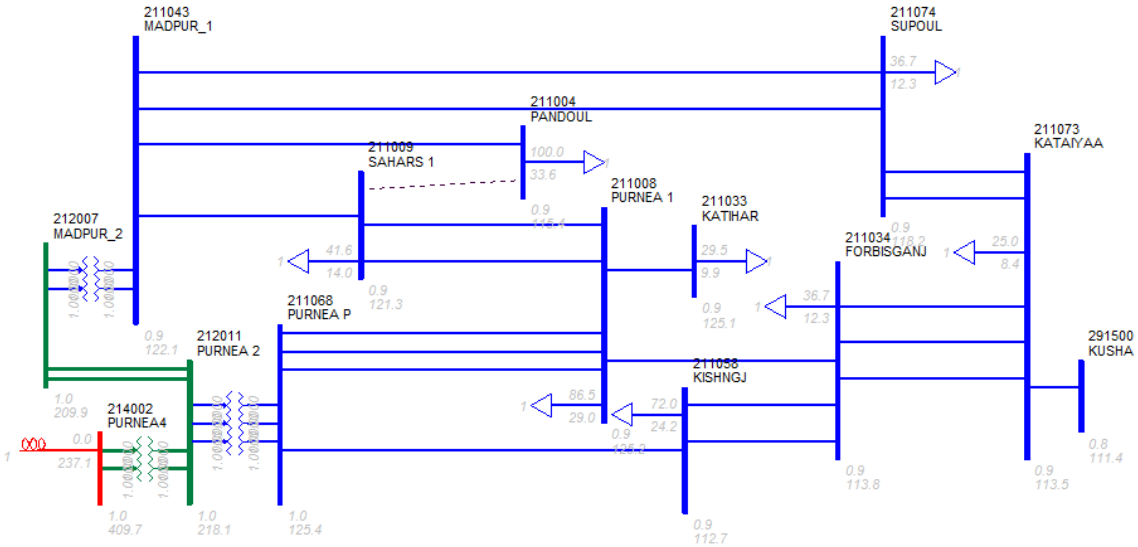
1. Disturbance at 220/132kV Purnea (PG/BSPTCL) & Madhepura S/s on 04-05-16 at 06:08 hrs.

At 06:08 hrs, 220kV Purnea- Madhepura line-I tripped from both end on B-Ph distance protection. After investigation, it was found that B-Ph Jumper of the said Ckt was snapped at Loc. No 28.

Prior to tripping of 220kV Purnea- Madhepura line-I from both ends, 220kV Purnea- Madhepura line-II was already tripped at 05:04 hrs due to snapping of R-Ph Jumper at Loc. No-104.

After tripping of 220kV Purnea- Madhepura line-I & II, load at Madhepura, Supaul & Nepal area was being fed through 132kV Purnea (B)- Forbisgunj S/c line & 132kV Purnea (PG)- Kishanganj S/c line and caused the tripping of the lines on actuation of overcurrent protection from Purnea (B) & Purnea (PG) end respectively.

Due to tripping of above mentioned 220kV & 132kV lines from Purnea (PG & BSPTCL) approx. 110 MW Nepal power interrupted.



Relay indications are as follows:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
05:04 hrs	220 KV Purnea (PG)-Madhepura CKT-II	At Purnea (PG) Y-N fault(29.4 KM from Purnea(PG) end,4.4 KA)	At Madhepura R-Npickup ,67.04 KM from Madhepura end)
06:08 hrs	220 KV Purnea (PG)-Madhepura CKT-I	At Purnea (PG) B-N fault(27.2 KM from Purnea(PG) end,4.8 KA)	At Madhepura B-N Pick up (Z-1,72 KM from Madhepura end)
	132kV Purnea (PG)- Kishanganj S/c	O/C from Purnea (PG)	
	132kV Purnea (B)- Forbisgunj S/c	O/C from Purnea (B)	

Analysis of PMU plots:

- From the Binaguri PMU plot 18kV voltage dip has been observed in B-Ph at 06:08 hrs
- Fault Clearance time was less than 100 ms.

BSPTCL and Powergrid explained that

- *At 05:04 hrs, there was a Y-N fault in 220 KV Purnea (PG)-Madhepura CKT-II, both Purnea (PG) and Madhepura end cleared the fault in zone-1.*
- *At 06:08 hrs, there was another fault B-N fault in 220 KV Purnea (PG)-Madhepura CKT-I, both Purnea (PG) and Madhepura end cleared the fault in zone-1.*
- *Thereafter, 132kV Purnea (PG)- Kishanganj S/c line tripped from Purnea (PG) end and 132kV Purnea (B)- Forbisgunj S/c tripped from Purnea (B) end on over current protection due to over load.*

PCC enquired about status of 220 KV Purnea (PG)-Madhepura CKT-II at 06:08 hrs.

BSPTCL failed explain the sequence of tripping.

PCC advised BSPTCL to submit detailed report to ERPC and ERLDC.

In 45th PCC, BSPTCL submitted a report wherein it was explained that

Status of 220 KV Purnea(PG)-Madhepura CKT-II at 06:08 hrs: *The 220 KV Purnea(PG)-Madhepura CKT-II was under breakdown at 06:08 hrs. 220 KV Purnea(PG) –Madhepura ckt –II line tripped at 05:00 hrs at both ends on zone 1 due to snapping of R-ph Jumper at loc. no.-104. The line restored at 17:07 hrs.*

Sequence of tripping:

- *220KV Purnea (PG)- Madhepura ckt I tripped at 06:03 hrs with distance relay indication zone 1, B-N,72 KM from Madhepura GSS end due to B Phase Jumper snapped at location no.28/0 .After taking remedial action line was charged at 13:43 hrs.*
- *Due to outage of 220KV Purnea (PG)- Madhepura ckt I&II, total power failure occurred at Madhepura GSS & Supaul GSS at 6:03 hrs.*
- *Total power failure occurs at Supaul GSS from 6:03 Hrs to 13:45 Hrs*
- *Tripping of 132KV Purnea –forbesganj line occurs from 4:54 Hrs to 15:20 Hrs with Relay indication Z1,54.32KM from purnea GSS (BSPTCL).The fault was due to Broken top and Bottom disc insulator at location number 197*
- *Due to tripping of 132KV Purnea –Forbesganj line and total power failure at supaul GSS ,132KV Purnea(PG)-Kishanganj double circuit got over loaded and tripped with O/C relay (pick up current =174 A) at Forbesganj end from 6:05Hrs to 6:15 Hrs. Consequently total power failure occurs at Forbesganj GSS from 6:05Hrs to 6:15 Hrs*
- *Due to total power failure at Supaul GSS and Forbesganj GSS, total power failure occurred at Kataiya GSS at 06:05 hrs and restored at 6:35 hrs.*
- *Due to total power failure at Kataiya GSS and synchronisation problem and other formalities, Nepal power interruption took place from 6:05 hrs to 9:15 hrs.*

BSPTCL may explain.

Deliberation in the meeting

Members noted.

2. Total Power failure at 220/132kV Purnea & Madhepura S/s on 17-05-16 at 20:50 hrs.

At 20:48 hrs, 132kV Madhepura- Supaul D/c tripped during inclement weather condition. Thus after tripping of both 132kV Ckt-II, load at Supaul, Katiya & Nepal area was being fed through 132kV Purnea (B)- Forbisgunj S/c line & 132kV Purnea (PG)- Kishanganj S/c line and it had caused the tripping of the said line on actuation of overcurrent protection from Purnea (B) & Purnea (PG) end respectively.

Due to tripping of above mentioned 132kV lines from Purnea (PG & BSPTCL) approx. 120 MW power got interrupted at Nepal area.
Relay indications are as follows:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
20:48 hrs	220kV Purnea -Madhepura CKT-I	Tripped	
	132kV Purnea (PG)- Kishanganj S/c	O/C from Purnea (PG)	
	132kV Purnea (B)- Forbisgunj S/c	O/C from Purnea (B)	

Analysis of PMU plots:

- From the Binaguri PMU plot 5kV voltage dip has been observed in B-Ph at 20:48 hrs
- Fault Clearance time was less than 100 ms.

BSPTCL explained that

- There was B-N fault in 132kV Supaul-Pulbaras line due to LA burst and both 132kV Madhepura-Supaul D/C lines tripped from Supaul on distance protection.
- 220 KV Purnea (PG)-Madhepura CKT-I, tripped from Madhepura end on zone 1 B-N fault.
- 220 KV Purnea (PG)-Madhepura CKT-II is in service.
- 132kV Purnea (PG)- Kishanganj S/c line tripped from Purnea (PG) end and 132kV Purnea (B)- Forbisgunj S/c tripped from Purnea (B) end on over current protection due to over load.

BSPTCL failed to explain the sequence of tripping and reason for tripping of 220 KV Purnea (PG)-Madhepura CKT-I, tripped from Madhepura end and tripping both 132kV Madhepura-Supaul D/C lines tripped from Supaul.

PCC advised BSPTCL to submit the detailed report to ERPC and ERLDC.

In 45th PCC, BSPTCL submitted a report wherein it was explained that

- *At 20:50hrs, there was a B-N fault in 132kV Supaul-Pulbaras line due to LA burst at 132kV Supaul S/s and Supaul end tripped on zone 1, 0.06km.*
- *Due to this fault jerk, 132 KV Madhepura-supaul D/C Tripped at Madhepura end on distance protection showing distance 32.2KM*
- *220 KV Purnea (PG)-Madhepura CKT-I, tripped from Madhepura end on zone 1 B-N fault at 20:50 hrs and restored at 21:00 Hrs.*
- *Due to Tripping of Madhepura-supaul D/C, power failure occurred at Supaul GSS at 20:50hrs.*
- *Due to failure of power at Supaul GSS ,kataiya GSS could not avail power through 132 KV Supaul-Kataiya D/C.*
- *Due to non availability of power through supaul –kataiya D/C to kataiya GSS ,Nepal power was restricted*
- *Madhepura-Supaul D/C was restored at 21:35 Hrs and Supaul-Kataiya power was restored at 22:10 Hrs*

Tripping of 220 KV Purnea(PG)-Madhepura CKT-I might be due to transient fault during prevailing inclement weather conditions.

BSPTCL may explain.

Deliberation in the meeting

Members noted.

Item No D.5 Total Power failure at 220/132kV Hatia S/s of JUSNL system on 20-04-16 at 15:05 hrs

At 14:57 hrs, SLG (i.e. B-N) fault had occurred in 220kV Ranchi- Chandil S/c line near to Chandil S/s. And due to delayed clearance of the fault from Ranchi S/s, the other 220kV lines emanating from Hatia S/s such as 220kV Ranchi- Hatia D/c lines tripped from Hatia end. Thereafter running unit of Patratu (U#10) tripped due to heavy electrical jerk.

Relay indications are as follows:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
14:57 hrs	220kV Ranchi-Chandil S/c	At Ranchi Tripped	At Chandil B-P, Zone-I, Fault location-38.22 KM, Earth Fault
	220kV Hatia-Ranchi-I	At Ranchi Did not Tripped	AT Hatia Earth Fault
	220kV Hatia-Ranchi-II	At Ranchi Did not Tripped	AT Hatia Earth Fault
	Patratu U# 10	Due to electrical Jerk	
15:05-15:10 hrs	220kV PTPS- Hatia –I	At Hatia O/V	At PTPS Did Not Trip
	220kV PTPS- Hatia –II	At Hatia O/V	At PTPS Did Not Trip
	132kV PTPS- Hatia-I	At PTPS O/C	At Hatia Did not Tripped
	132kV PTPS-Kanke-Hatia-	At PTPS O/C	At Kanke Did not Tripped
	220kV PTPS- TTPS S/c	At PTPS O/V	At TTPS Did not Tripped
	TTPS U # 2	Tripped on O/V	

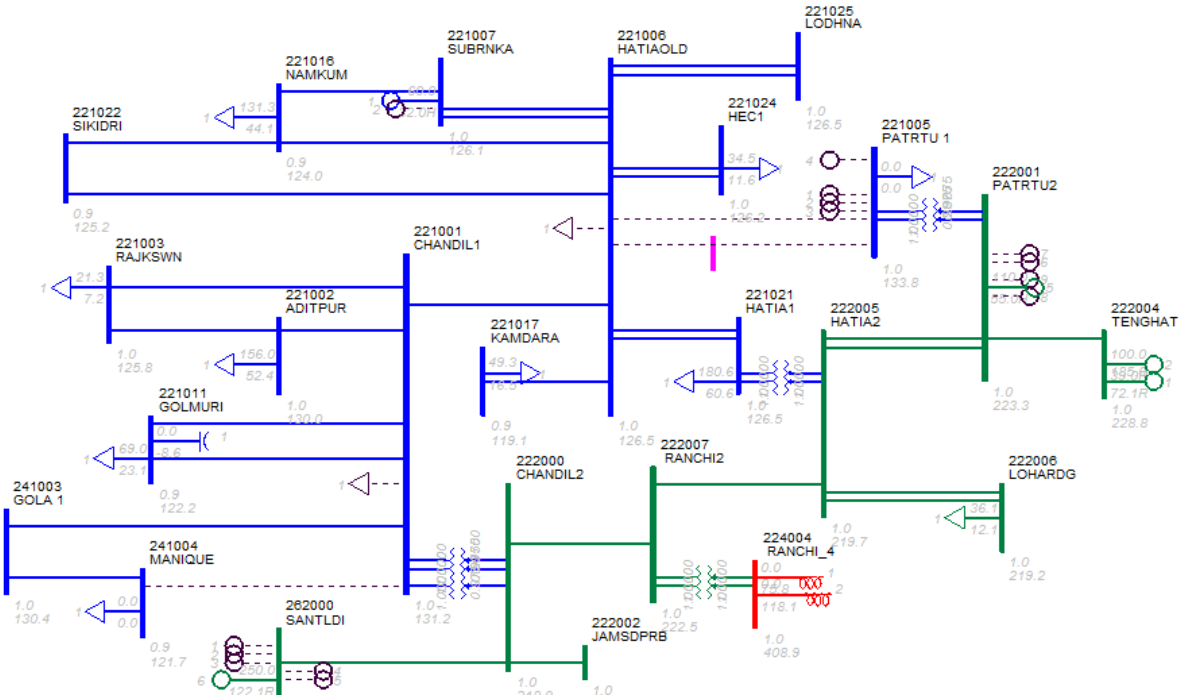
Analysis of PMU plots:

- From the Ranchi PMU plot 9kV Voltage dip has been observed in B-Ph at 14:57 hrs.
- Fault clearance time was approx.440 ms.

JUSNL and Powergrid may explain the following:

- Delayed tripping of Ranchi- Chandil S/c line from Ranchi end may be investigated and explain by PGCIL.
- Tripping of 220kV Patratu- Hatia D/c line and 220kV PTPS- TTPS S/c from Hatia end on over voltage
- Tripping of 132kV PTPS- Kanke-Hatia line from PTPS end on over current
- Status of 220/132kV ATRS at Hatia (tripped or not).

PCC advised JUSNL submit detailed report to ERPC and ERLDC at the earliest.



JUSNL may update.

Deliberation in the meeting

PCC advised JUSNL submit detailed report to ERPC and ERLDC at the earliest.

Item No D.6 Frequent Blackouts at Kanti TPS

On 7th April, 2016, total station power failure (Blackout) incident has occurred at Kanti TPS. There was some fault at 220KV Gopalganj side from Kanti TPS Switchyard and 220kV Muzaffarpur-Kanti D/C line tripped on Zone 3 before fault was cleared from Kanti TPS end. This had resulted in total power failure at Kanti TPS leading to Emergency situation with hot turbine coasting down without normal lub oil supply.

A special meeting was convened at ERPC, Kolkata on 18-04-2016 and the following decisions were taken:

a) As a temporary measure, zone 1 and zone 2 time setting of all 220kV and 132kV lines at Kanti TPS end should be changed to instantaneous and zone 3 time setting as 200ms in order to clear the downstream faults from Kanti TPS end.
b) Powergrid was advised to change the zone 3 time settings at Muzaffarpur (PG) end as per protection philosophy of ERPC.
c) NTPC and Powergrid were advised to activate the PLCC scheme for 220kV Muzaffarpur-Kanti D/C by 26th April, 2016 and give feedback in 42nd PCC Meeting.
d) On activation of PLCC system, Powergrid is to change the zone 2 time setting at Muzaffarpur (PG) end as per protection philosophy of ERPC.
e) BSPTCL was advised to check the clearance between cross arm and jumper and rectify if required.
f) BSPTCL was advised to review the protection system and relay coordination of 220kV Gopalgunj, Darbhanga and Begusarai and all 132kV feeders in around Kanti. Therefore, BSPTCL was advised to submit their relay details to Powergrid by 22nd April, 2016 for review. Powergrid was requested to study the details and give feedback in 42nd PCC Meeting scheduled to be held on 27th April, 2016.
g) It was decided that the above temporary measure will be followed, till BSPTCL protection

system is full proof.

h) Further course of action will be decided in PCC Meeting for relay coordination in BSPTCL system in and around Kanti TPS.

In 42nd PCC, Kanti TPS, NTPC informed that zone settings at their end have been revised as per the recommendation. Regarding activation of PLCC scheme for 220kV Muzaffarpur-Kanti D/C line NTPC informed that cabling has been done but some parts in PLCC panels were defective and needs to be replaced.

Powergrid informed that they have not yet revised the zone 3 time setting at Muzaffarpur (PG) end.

PCC advised Powergrid to revise the zone 3 time setting at Muzaffarpur (PG) end as per protection philosophy of ERPC at the earliest. PCC also advised Powergrid to implement the PLCC scheme for 220kV Muzaffarpur-Kanti D/C line at the earliest.

Members may update.

Deliberation in the meeting

Members noted.

Item No D.7 Disturbance at 220/132kV NJP S/s of WBSETCL system on 29.02.16 at 03:55 hrs

WBSETCL reported that at 03:55 hrs, 220/132kV, 160 MVA TR-I,II & III, 220kV NJP-TLDP (IV)- I & II and 220kV Binaguri (PGCIL)- NJP Bus Section-A & B were tripped due to over voltage. 220kV bus voltage was recorded as 254 kV and 132kV bus voltage was recorded as 148 kV ay NJP.

Powergrid reported that 125 MVAR bus reactor-2 tripped at Binaguri end on Y ph differential protection and reactor Buch relay/PRV/WT1/OTI trip. After physical inspection, it is observed that R & Y phase bushing was heavily cracked from Turret/Bottom and B phase bushing was totally burst and heavy oil leakage was observed.

The tripping details are as follows:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
03:55 hrs	220/132kV, 160 MVA TR-I,II & III at NJP	HV side:- Over flux, 86 L & LV side:- 86 L	
	220kV NJP-TLDP (IV)- I & II	At NJP High Speed 3-Ph Trip relay (86/LO), Autorecloser L/O	At TLDP (IV) 21 M, 23 Px, PLCC channel unhealthy, 27 RYB, 30 C, 30 D, 86 A,86 B, Autorecloser PTS switch relay
	220kV Binaguri (PGCIL)- NJP Bus Section-A & B	At (NJP end) Did Not Trip (as informed by WBSETCL)	At PGCIL (end) Trip Relay 96 BSA, 96 BSB (as informed by WBSETCL)
	125 MVAr Bus Reactor-II at Binaguri (PGCIL)	Y-Ph differential relay operated	

Analysis of PMU plots:

- No overvoltage has been observed from the Binaguri PMU plot
- From the Binaguri PMU plot 175kV dip has been in Y-Ph at around 03:55:39 hrs.

- 1.1 KA rise in line current of 400kV Binaguri- Purnea has been observed during the incident.
- Fault clearance time was approximately 80 ms.

In last PCC, WBSETCL informed that there was a high voltage at 220 kV Binaguri and NJP due to which all the ICT and 220kV Binaguri (PGCIL)- NJP Bus Section-A & B were tripped.

However, the exact cause of tripping of 220kV NJP-TLDP (IV)- I & II could not be ascertained.

Powergrid informed that as per their record there was no over voltage at Binaguri side and all equipments are intact.

PCC advised WBSETCL to get the tripping details of 220kV NJP-TLDP (IV)-I & II and submit a report on the incidence.

WBSETCL submitted the tripping report. Report is enclosed at **Annexure-D7**.

WBSETCL may explain.

Deliberation in the meeting

Members noted.

Item No D.8 Members may update the following:

1. OPTCL may please update the latest status on following substations:

In last PCC, OPTCL informed that

- OPTCL informed that they will review the logic of all the newly installed LBB protection: *Exploring for improvement in logic for tripping of single bus in case of LBB operation*
- Old distance protection relays in 132kV system at 220kV Tarkera S/s will be replaced after replacing old relays at 220kV level*: The replacement work of relays at Tarkera is in progress*

OPTCL may update.

Deliberation in the meeting

OPTCL informed that

- OPTCL informed that they will review the logic of all the newly installed LBB protection: *Siemens service engineer attended the relay configuration discrepancy.*
- Old distance protection relays in 132kV system at 220kV Tarkera S/s will be replaced after replacing old relays at 220kV level*: The replacement work of relays at Tarkera is in progress*

2. Tripping of 400kV Mendhasal- N. Duburi S/C and 400kV Mendhasal - Baripada S/C lines on over voltage from Mendhasal on 30-03-16 at 16:59 hrs., 42nd PCC, OPTCL was advised to check the CVT secondary earthing.

OPTCL may update.

Deliberation in the meeting

OPTCL informed that CVT secondary earthing has been checked and no discrepancy was observed.

3. Disturbance at 400/220kV Indravati (PG) and 400/220kV Indravati (OPTCL) S/s on 11-06-16 at 19:59 hrs.

In 45th PCC, OHPC, OPTCL and Powergrid(Odisha) were advised the following:

- OHPC should check and restore the bus bar protection at 220 kV Indravati (OHPC) S/s.
- PCC felt that 400/220kV ICT-I&II should clear the fault on backup overcurrent protection before tripping of 400kV lines from PG end and advised OHPC to install directional O/C relays at both HV & LV side of 400/220kV ICT-I&II. Proper time coordination should be done with the adjacent line relays.
- It was felt that since the fault was already cleared from 220kV Theruvali end on zone 2, Bhanjanagar end distance relay of 220 kV Theruvali-Bhanjanagar – II should not trip on zone 3. OPTCL was advised to check the zone 3 timing of Bhanjanagar end distance relay.
- PCC felt that increasing zone 3 time at Jeypore end of 400KV Jeypore-Indravati line to 1.5 sec may delay the fault clearing time and advised PGCIL to implement the zone 3 time settings of respective relays as follows:
    - Zone 3 time setting of 400KV Indravati(PG)-Indravati(OHPC) line at Indravati (PG) end -----0.8 sec
    - Zone 3 time setting of 400KV Jeypore-Indravati (PG) line at Jeypore end -----1.1 sec

OHPC, OPTCL and Powergrid(Odisha) may update.

Deliberation in the meeting

Members updated the status as follows:

- *OHPC informed that they will test the bus bar protection of 220 kV Indravati (OHPC) S/s on 25th Aug, 2016.*
- *OPTCL informed that zone 3 time setting at Bhanjanagar end distance relay of 220 kV Theruvali-Bhanjanagar – II is set at 1000 ms.*
- *Powergrid informed that zone 3 timings have been revised as per the PCC recommendation.*

4. In 42nd PCC, on multiple elements tripping at 400kV Bidhannagar S/s of WBSETCL system on 30-03-16 at 16:25 hrs, PCC felt that since the fault was in common zone of the bus differential protection, the differential protection for both Bus-A & B should have operated to clear the fault immediately.

PCC advised WBSETCL to check the bus differential scheme at 400kV Bidhannagar S/s.

WBSETCL may update.

Deliberation in the meeting

WBSETCL informed that they will test the bus differential scheme at 400kV Bidhannagar S/s during next opportunity shutdown.

Meeting ended with vote of thanks to the chair.

****

Annexure-A

Participants in 46th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata Time: 11:00 hrs Date: 22.08.2016 (Monday)

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

Annexure - A

Participants in 46th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata   Time: 11:00 hrs   Date: 22.08.2016 (Monday)

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Participants in 46th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata Time: 11:00 hrs Date: 22.08.2016 (Monday)

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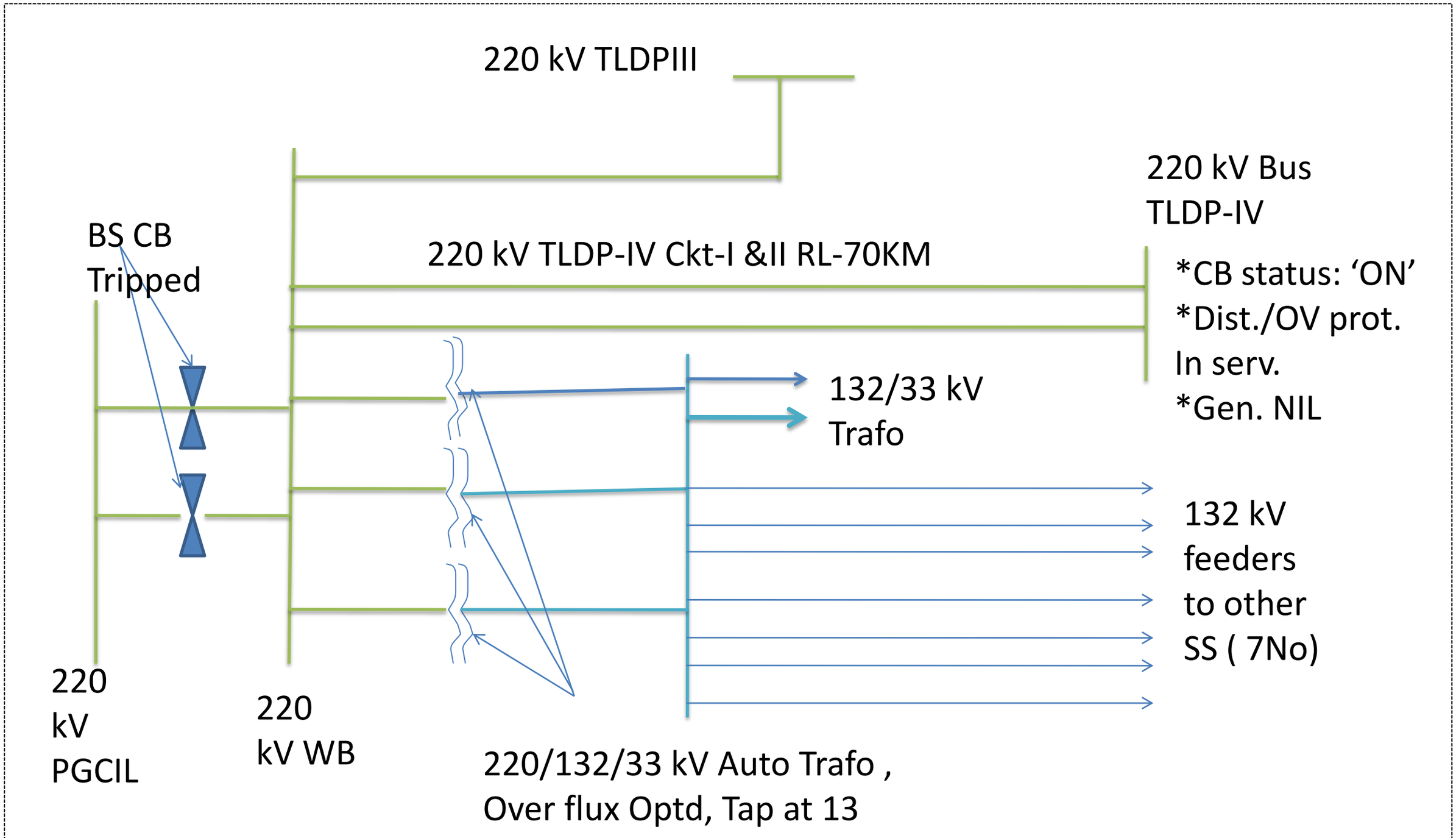
Annexure-C2

List of important transmission lines (220 kV & above) in ER which tripped in July'16

S.NO	LINE NAME	TRIP DATE	TRIP TIME	RESTORATION DATE	RESTORATION TIME	Reason	Fault Clearance time in msec	Relay Indication LOCAL END	Relay Indication REMOTE END	Auto Recloser status	DR/EL received within 24 Hrs	DR/EL received after 24 Hrs	Remarks/Deliberation in the meeting
Fault clearing time is violating protection standard (As per PMU data)													
1	220 KV SASARAM -SAHAPURI	01.07.16	10:17	01.07.16	10:58	B N FAULT	520 ms approx	Zone 2, B-N, 2.32kA, 59.38 km	Yet to be received	No autoreclose operation observed in PMU data	No	No	PCC decided to contact NRLDC/NRPC for remote end information.
2	220 KV TSTPP-RENGALI	17.07.16	15:23	17.07.16	20:00	EARTH FAULT	400 ms approx	R-N, Z-I, F/D 0.4 km from TSTPP	Z-II	No autoreclose operation observed in PMU data	Yes	--	
3	220KV BUDIPADAR-RAIGARH	21.07.16	11:08	21.07.16	13:08	TRIPPED ON EARTH FAULT	520 ms approx	Zone 1, B-N, 17.7 km	Y-B-N	No autoreclose operation observed in PMU data	No	No	PCC decided to contact NRLDC/NRPC for remote end information.
Fault Not observed in PMU data													
1	400 KV BEHRAMPUR - BHERAMARA-II	04.07.16	19:20	04.07.16	19:38	DT RECEIVED AT BHERAMERA	--	Did not trip	DT Received	--	--	--	PLCC Maloperation at Behrampur end due to DC earthing. Scheme has been modified.
2	765KV SASARAM - FATHEPUR	08.07.16	05:32	08.07.16	08:13	DT RECEIVED AT SASARAM	--	DT Received	Yet to be received	--	No	No	PRV of reactor operated at Fathepur end.
3	765KV SASARAM - FATHEPUR	14.07.16	06:48	14.07.16	09:54	DT RECEIVED AT SASARAM	--	DT Received	Yet to be received	--	No	No	PRV of reactor operated at Fathepur end.
4	400 KV BIHARSARIF-VARANASI-I	25.07.16	17:50	25.07.16	19:27	DT RECEIVED AT BIHARSARIF	--	DT Received	Yet to be received	--	No	No	Buchholz relay of line reactor operated at Varanasi
No autorecloser operation observed in PMU data													
1	220 KV BUDHIPADAR-KORBA-II	01.07.16	18:52	01.07.16	19:40	B-N FAULT	<100	Yet to be received	Yet to be received	No autoreclose operation observed in PMU data	No	No	PLCC not available
2	400 KV ARAMBAGH - BIDHANNAGAR	02.07.16	11:20	02.07.16	18:10	Y-N FAULT	<100	Yet to be received	Yet to be received	No autoreclose operation observed in PMU data	No	No	Autoreclosing was not successful due to Y-phase CB problem at Bidhannagar. The CB will be replaced.
3	400 KV FARAKKA-DURGAPUR-I	06.07.16	00:33	06.07.16	04:40	Y-N FAULT	<100	Yet to be received	Y-N, D/P, A/R successful at DGP end, Line Tripped after DT Receipt	No autoreclose operation observed in PMU data	Yes	--	DT recieved at Durgapur end. Shunt reactor backup protection operated.
4	400 KV DSTPS - JAMSHEDPUR-I	12.07.16	15:35	12.07.16	16:35	R-N FAULT	<100	R-N, Z-I, F/C 1,8 kA, f/d 124 km from Andal	R-N fault, f/d 14 km, 14.34 kA, A/R Started but failed on DT receipt	No autoreclose operation observed in PMU data	Yes	--	Gas pressure lockout for CB at DSTPS end. Contact has been changed.
5	400 KV NEW RANCHI - CHANDWA I	13.07.16	11:02	13.07.16	12:18	B-N FAULT	<100	Yet to be received	B-N, Z-I, A/R started at Chandwa end	No autoreclose operation observed in PMU data	No	Yes	Maloperation during the stability test at New Ranchi.

Disturbance at 220/132 kV NJP System on 29.02.2016 at 03:55 hrs
----------SLD of Disturbed area



Pre -fault Condition as recorded

- **Report on Disturbance at NJP220 kV Bus(WBSETCL) on 29.02.2016 in between 03:55 hrs & 03:59 hrs**

- **Observation/Information**
- 1] 220 kV B/S CB for Main Bus –I & II were in service----Bus-I Power flow- 23 MW (I)Bus-II Power flow- 20 MW(I)
- 2] 220/132 kV 160 MVA TR-I, II & III were in service----------3X 15 MW load
- 3] 220 kV TLDP-III feeder----------ON
- 4] 220 kV TLDP-(IV) feeder-I&II----------ON
- 5] 132 kV PGCIL feeder ----------9 MW (I)
- 6] 132 kV Siliguri feeder I&II----------2X8 MW(E)
- 7]132/33 kV , 50MVATr-I&II----------2X11 MW
- 8]132 kV TCF-I feeder----------4 MW (E)
- 9] 132 kV NBU feeder----------4 MW(E)
- 10] 132 kV Moynaguri feeder----------14 MW (E)
- 11]132 kV Chalsa feeder----------6 MW (E)

Tripping details & Relay indications at NJP (WBSETCL) end:

Date & time	Feeder/Transformer	Relay Indication at NJP (WB) end	Relay indication at Other end(s)
29.02.2016 03=58 hrs	160 MVA 220/132/33kV Transformer-I,II &III	Over-Flux , 86L (HV) & 86(L) IV [OF Settings-Alarm-109%, Trip-112%]	NA
29.02.2016 03=59 hrs	220 kV(TLDP-IV) # I&II [D/C Line, RL-66 KM]	3-Ph Trip Relay operated (86L/O) Auto reclose L/O. DT received from TLDP end.	21M,23P$_x$, PLCC Channel unhealthy,27 RYB,30C,30D,86A,86B as informed to NJP operating personnel. Subsequent interaction with TLDP-IV, it has been intimated that the DR of relays of the feeders are not available as the dates / time setting of relays were incomplete
29.02.2016 03=59 hrs	220 kV PGCIL(Binnaguri)-NJP Bus Section CB A & B	No indication/Relay at NJP end	Trip Relay 96BSA & 96BSB as informed.

Disturbance record & analysis of tripping

1] Tripping of 220/132 kV 160 MVA Tr-I,II & III at NJP (WBSETCL) at about 03=58 hrs	1]-(a) Transformers with **tap position 13** were running parallel. System voltage at 03=00hrs, as recorded **was 230 kV at HV side& 140 kV** at IV side. Total quantum of load drawal was **45 MW & 09 MW** at 220 kV & 132 kV from PGCIL system. (b) All 3 (three) Transformer tripped due to actuation of Over Flux relays. Settings for all OF relays [Model: GTTM] are as follows: (i)Alarm set at:109% when tested (ii) Trip set at :112% when tested Being static relay, it could not be **possible to furnish disturbance data**. From log sheet it is under stood that **there was considerable rise in Voltage at WBSETCL system after isolation from PGCIL system. Voltage rise as recorded were 254 kV &132 kV respectively. There was no power failure/ interruption in 132 kV System** which was connected to other 132 kV Sub-stations via different feeders.
2] 125 MVAR Bus Reactor-2 tripped at PGCIL 400 kV SS due to actuation of Differential relay at about 03:55hrs. 220 kV Bus Section Breakers between PGCIL (Binnaguri)-NJP (WBSETCL) tripped at the same time with relay indications 96BSA & 96 BSB at PGCIL end .	Not very clear regarding such tripping of Bus section breaker since no relay actuated at NJP (WBSETCL) end.

Analysis & Conclusion

1] **Voltage above normal** of was found/ recorded at 03=00 hrs while Bus Reactor having capacity of **125 MVAR was in service at PGCIL (Binnaguri) 400kV Bus**. Sudden outage of **Bus reactor caused appreciable Voltage rise since** load demand was very low & 3(three) medium length 220 kV Transmission lines of TLDP were in charged condition from NJP 220 kV Bus & there was no Generation at TLDP.
2] while the system was running normal, system Voltage was 140 kV as recorded at 03=00 hrs. There **was no power failure in 132 kV System of WB even after** tripping Bus Section CBs & outage of 400 kV Bus Reactor.
3] Tap position of all three Auto Transformers were at 13 & running parallel . HV side (i.e. 220 kV of ATR) stepped up from 132 kV side Bus Voltage which was high in pre fault condition after being isolated from PGCIL system.
4] Over Flux Relay Operation at 254 kV Bus Voltage is justified
5] Over Voltage Protection operation at TLDP end having a source end Voltage of 254 kV is also justified.