Minutes
of
40th PCC meeting

Date: 08.03.2016
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 40TH PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC, KOLKATA ON 25.02.2016 (THURSDAY) AT 11:00 HOURS

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

PART – A

ITEM NO. A.1: Confirmation of minutes of 39th Protection sub-Committee Meeting held on 21st January, 2016 at ERPC, Kolkata.

The minutes of 39th Protection Sub-Committee meeting held on 21.01.16 circulated vide letter dated 03.02.16.

Members may confirm the minutes of 39th PCC meeting.

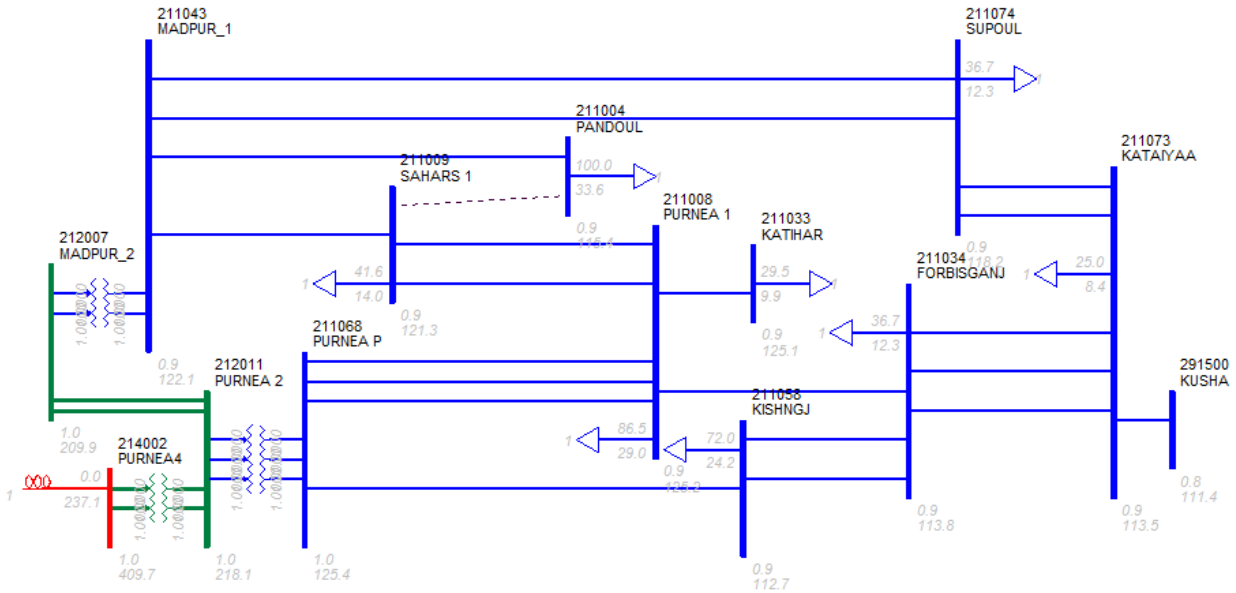
Deliberation in the meeting

Members confirmed the minutes of 39th PCC meeting.

PART – B

ANALYSIS & DISCUSSION ON GRID INCIDENCES WHICH OCCURRED IN CTU/STU SYSTEMS DURING JANUARY, 2016.

Item No B.1. Total power failure occurred at 220/132kV Madhepura S/s of BSPTCL System on 02.01.16 at 06:01 hrs.



At 06:01 hrs, all 220/132kV, 100 MVA ATR-I, II & III tripped at Madhepura on operation of REF protection from 220kV side. However it is suspected that after tripping of above mentioned ATRs at Madhepura local load at Supaul, Phoolpras , Katiya & Nepal were catered through 132kV Purnea (PG)- Kishanganj & 132kV Purnea(B)- Forbisgunj S/c, which caused the tripping of the both 132kV

Ckt on operation of overcurrent protection from Purnea(PG) & Purnea(B) end respectively. During that period Kishanganj load was entirely being fed from Dhalkola (WB) through main bus of 132kV Kishanganj while the 132kV line from Purnea (PG) further connected to Forbisgunj through Kishanganj transfer bus and hence no load loss occurred at Kishanganj s/s.

It is apprehended that after tripping of the above mentioned 132kV line along with all 220/132kV ATRs at Madhepura, total load loss of around 450 MW were occurred at Madhepura, Supaul, Phoolpras , Madhubani, Jainagar, Katiya & Nepal area. Relay indications are as follows:

Time (Hrs)	**Details of tripping**	**Relay at local end**	**Relay at remote end**
06:01 hrs	220/132kV ,100 MVA, ATR-I,II & III at Madhepura	Tripped on REF protection from HV side (As verbally informed by BSPTCL)	
	132kV Purnea(PG)-Kishanganj S/C	At Purnea(PG) O/C, (informed by BSPTCL)	At Kishanganj Did Not Trip
	132kV Purnea(B) - Forbisgunj S/C	At Purnea(B) O/C,E/F, (informed by BSPTCL)	At Forbisgunj Did Not Trip

Report has been submitted by BSPTCL on 02/01/16 with incomplete information. Reports are yet to be received from PGCIL.

BSPTCL and Powergrid may explain.

Deliberation in the meeting

BSPTCL explained that at Madhepura S/s 220/132kV, 100 MVA ATR-III (Kanohar make) tripped due to malfunction of REF protection. This caused the further tripping of other two 100 MVA ATRs on over current protection due to over loading. BSPTCL informed that total load of all the three ATRs of Madhepura S/s was 200 MW before the disturbance.

After tripping of above ATRs at Madhepura S/s the complete load of Supaul, Phoolpras, Katiya & Nepal were getting fed through 132kV Purnea (PG)- Kishanganj & 132kV Purnea(B)- Forbisgunj S/c, which caused the tripping of the both 132kV lines on operation of over current protection from Purnea(PG) & Purnea(B) end respectively.

BSPTCL informed that the tripping of 100 MVA Kanohar make Transformer on REF protection was analysed and concluded that there was problem in neutral earthing of the ATR, hence the depth of Earth pit was enhanced from 3 meter to 6 meter. No tripping was reported thereafter. It was also reported that earlier the earthing resistance was 0.8 ohm, now it has been reduced to 0.2 ohm.

PCC felt that the enhancing the depth of earth pit may not resolve the malfunctioning of REF protection of ATR on no fault condition as the improper earthing of ATR neutral will decrease the sensitivity of the REF protection and it may not detect the fault reliably. Therefore, PCC advised BSPTCL to carry out the stability testing of the REF protection and submit the report to ERPC/ERLDC.

Item No B.2. Total Power failure occurred at 220/132kV TTPS S/s of OPTCL system on 19.01.16 at 10:50hrs.

At 10:50 hrs, all the 220 & 132kV feeders emanating from 220/132 kV TTPS S/s along with all the running unit of TTPS tripped while opening of Bus-II side isolator of 220kV TTPS- Joda –I (idle charged from TTPS) at TTPS end with breaker in closed condition caused the bus fault and

consequently following elements tripped:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
10:50 Hrs	220kV TTPS- Joda-II	At TTPS DP, Zn-IV	At Joda Did not Trip
	220kV TTPS- Meeramandali-I & II	At TTPS Did not Trip	At Meeramandali O/C
	220kV TTPS - Rengali- S/c	At TTPS Did not Trip	At Rengali O/C, E/f
	220kV Joda- Ramchandrapur S/c	At Joda Did not Trip	At Ramchandrapur Trip (As informed by OPTCL)
	220kV Joda- TSIL S/c	At Joda O/V	At TSIL O/V
	220kV TTPS- TSTPS S/c	At TTPS DP, Zn-IV	At TSTPS DP, Zn-II, Dist- 32.2 KM (as informed by OPTCL) DP, R,Y,B TRIP, Dis. -32.2 KM, 129 % (as informed by TSTPS)
	220/132kV ATR-II	*Did not Tripped*	
	132kV TTPS- Jabmayee S/c	At TTPS DP, Zn-IV	At Jabmayee Did not Trip
	132kV TTPS- OPTCL S/c	At TTPS DP, Zn-IV	At OPTCL Did not Trip
	TTPS U # 1,2 ,3,4,5,6	Tripped	

Thus after tripping of above mentioned 220kV & 132kV lines from TTPS S/s along with 220/132kV ATR at TTPS, all the running unit of TTPS connected on both 220kV as well as 132kV system tripped due to loss of evacuation path. Due to above mentioned tripping approx. 460 MW generation loss was occurred in OPTCL system.

Analysis of PMU plots:

- From the Talcher PMU plot 45kV voltage dip has been observed in all there phase voltage at 10:50 hrs.
- 400 A rise in line current of 400kV Talcher- Rengali & Talcher- Meeramandali have been observed during the said period.
- Fault persistence time was approx. 1000 ms

OPTCL has given the tripping report on 20/01/2016. TSTPS has given the tripping report along with DR & EL on 20/01/2016.

Reports are yet to be received from TTPS.

Point to be discussed:-

i) Reason for non-operation of bus differential protection at 220kV TTPS S/s may be explained by OPTCL.

ii) 220kV TTPS- Joda ckt-II tripped from TTPS end on indication of DP, Zone-IV. The line should have tripped from Joda end on zone 2. OPTCL may explain the non-operation of Distance protection at Joda end.

iii) 220kV TSTPS- TTPS S/c tripped on zone 2 from TSTPS end and zone 4 from TTPS end. OPTCL may explain how the relay at TTPS had sense the fault and tripped on Zone-IV after tripping of said line from TSTPS end on Zone-II.
iv) 132kV TTPS- OPTCL S/c & TTPS- Jabmayee S/c tripped on indication of DP- Zone-IV from TTPS end. Tripping of said lines from TTPS end on Zone-IV is to be explained.
v) OPTCL in their report have mentioned only generation loss of approx. 460 MW in their system, whereas no information about of the load loss was reported. So OPTCL may explain whether any load loss had actually occurred in their system.
vi) From the Talcher PMU plot, voltage dip has been observed in all three phase. So it gives the signature of three phase fault. Thus OPTCL may further explain whether any three phase bus fault had occurred in their system.
vii) Fault clearance time of approx. 1000 ms is a gross violation of Clause 3(e) of CEA Grid Standards, 2010, which stipulates that any fault at 220/132KV level should be cleared within 160 ms.

OPTCL may explain.

Deliberation in the meeting

NTPC explained that—

- *While inadvertently opening the isolator with breaker in closed condition, the insulator of Bus-II side isolator of 220kV TTPS- Joda –I (which was idle charged from TTPS end) at TTPS end was damaged.*
- *Heavy spark was observed as Y-phase bus post insulator was burst and the bus string was hanging near to the ground which caused a bus fault at 220kV TTPS s/s.*
- *Since bus bar protection was not in service, the fault was not cleared from TTPS end.*
- *220/132kV ICT-I was under shutdown and 220/132kV ATR-II did not trip due to fluctuating nature of fault which resulted in tripping of 132kV TTPS- OPTCL S/c & 132kV TTPS-Jabmayee S/c lines from TTPS end on zone-IV.*
- *After that all the units of TTPS tripped on dead bus.*

Regarding tripping of 220kV TTPS- Joda ckt-II, OPTCL informed that because of high arcing resistance the fault was detected in zone 3 from Joda end. The resistive reach setting is under review.

NTPC informed that zone-IV time setting at their end is 1 sec hence the line got tripped from TTPS end on Zone-IV.

OPTCL reported that approx 150 MW load loss was occurred at Joda S/s.

PCC advised NTPC to follow the proper operating procedure as such incidences may cause serious damage to the substation equipment and also to humankind. PCC advised TTPS, NTPC to train the operators and implement the locking mechanism for isolator to avoid such mistakes.

NTPC admitted that opening the isolator with breaker in closed condition was an operational mistake done by the operator. NTPC assured the house that in future this type of incidences will not be repeated. Regarding bus bar protection, NTPC informed that now the busbar protection has been put into service.

PCC felt that zone-IV setting of 132kV lines should not encroach higher voltage level i.e. the ATRs but in this case TTPS tripped on zone-IV even with one ATR in service. PCC advised to check and review the Zone-IV setting of the 132kV lines.

PCC also advised TTPS, NTPC to implement the zone setting philosophy as given in Item no. B8 at the earliest.

Item No B.3. Multiple elements tripping occurred at 400/220kV Meeramandali S/s of OPTCL system on 26.01.16 at 20:23 hrs & 21:01 hrs

At 20:23 hrs, B-Ph reactor LA of 400kV Meramundali- Sterlite Ckt-II failed at Meramundali S/s and hence the said line tripped from both end on indication of DP, B-Ph fault. Thereafter, at 20:56 hrs, 315 MVA ICT-I at Meramundali was charged from 220kV side. Charging attempt of 400kV Meramundali- Sterlite- II was taken at 21:01 hrs, but line did not hold and it tripped along with the 315 MVA ICT –I at Meramundali on indication of B-Ph, E/F & O/C relay respectively. The following elements tripped:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
20:23 hrs	400kV Meramundali- Sterlite-II	At Meramundali B-Ph to E/f , F.D- 2.7 KM	At Sterlite Trip (As informed by OPTCL)
	400/220kV Meramundali ICT-I	Tripped on Over current from 220kV side	
	220kV Meramundali-Duburi-I	At Meramundali DP, R-Ph to E/f	At Duburi Did Not Trip
	220kV Meramundali-Bidanasi S/C	At Meramundali DP, R-Ph to E/f	At Bidanasi Did Not Trip
21:01 hrs	400kV Meramundali- Sterlite-II	At Meramundali O/C, B-Ph to E/F, F.D- 3.4 KM	At Sterlite Not Available
	400/220kV Meramundali ICT-I	Tripped on Overcurrent from both side	

Analysis of PMU plots:

At 20:23hrs:

- An observation of Talcher PMU shows approx. 80kV voltage dip in B-Ø at around 20:23:06 hrs.
- 6 KA Rise in B- Ø line current of 400kV Talcher-Meramundali was observed at the time of fault.
- PMU data shows fault getting cleared in about 80 msec.

At 21:01 hrs:

- An observation of Talcher PMU shows approx. 65 kV voltage dip in B-Ø at around 21:01:27 hrs.
- 5KA Rise in B- Ø line current of 400kV Talcher-Meramundali was observed at the time of fault.
- PMU data shows fault getting cleared in about 80 msec.

Point to be discussed:-

- Reason for tripping of 315 MVA ICT-I at Meramundali on actuation of over-current protection from 220kV side.
- Simultaneous tripping of 220kV Meramundali- Duburi –I & 220kV Meramundali- Bidanasi S/c on indication of R-Ph to E/f fault. As from Talcher & Rengali PMU plot no signature of R-Ph fault has been observed.
- OPTCL may also explain, due to tripping of 220kV Meramundali- Bidanasi s/c whether any load loss had occurred at Bidanasi and its surrounded area.

OPTCL may explain.

Deliberation in the meeting

OPTCL explained that---

- *At 20:23 hrs, B-Ph reactor LA of 400kV Meramundali- Sterlite Ckt-II failed at Meramundali S/s and the line was tripped from both ends on zone 1 distance protection.*
- *OPTCL informed that since inter tripping feature is not available for this line, the zone- 1 setting at Sterlite end has been kept 100% to safe guard their generators.*
- *The ICT-1 at Meramundali was tripped on high set over current protection and the high set setting is 600% for E/F and 800% for over current.*
- *220kV Meramundali-Duburi line-I tripped from Meramundali end due to maloperation of distance protection and the relay will be replaced with new numerical relay.*
- *220kV Meramundali-Bidanasi S/C tripped from Meramundali end due to R-ph PT fuse failure as high neutral current was observed.*

PCC felt that distance protection at 220kV Meramundali end should not trip for the fault in 400kV system and advised OPTCL to review the zone settings and direction feature of the distance protection.

Further, PCC advised OPTCL & Vedanta to implement the inter-tripping facility for 400 kV Meramundali- Sterlite D/C line.

Regarding tripping incident at 21:01hrs, OPTCL explained that—

- *The operator inadvertently charged the 400kV Meramundali- Sterlite- II line without confirming the fault clearance which was an operational mistake.*
- *The Reactor LA was busted and the line did not hold and tripped along with the ICT-I.*

PCC advised OPTCL to take care in future to avoid such incidences and to review the high set current setting of the ICT for proper coordination with distance protection of the lines so that the ICT should not trip for zone 1 faults in the line.

OPTCL agreed.

Item No B.4. Total Power failure occurred at 400kV Mejia-B S/s of DVC system on 31.01.16 at 03:27 hrs.

At 03:27 hrs, Generator overvoltage protection initiated for Mejia-B U # 8 connected to Bus-II due to some problem in R-Ph PT of Unit# 8. Due to initiation of O/V protection both R & Y-Ph opened simultaneously but B-Ph pole of GT CB did not open. Hence, both PD relay and LBB protection initiated and all the elements connected to Main Bus-II tripped from local end. LBB command had also initiated for opening of Tie CB but it did not open. Hence LBB protection initiated for tripping of elements connected to main Bus-I. This caused the tripping of other healthy elements connected to main Bus-I. Total power failure occurred at Mejia-B TPS and approximately 769 MW generation loss was reported.

Bus configuration at Mejia-B

Mejia-B has configured with Double Main Transfer bus scheme.

Elements on Bus I	**Elements on Bus II**
400kV Mejia-Maithon-II	400kV Mejia-Maithon-I
400kV Mejia-Maithon-III	Station Transformer-II
Station Transformer-I	400kV Mejia-Jamshedpur S/c

Unit-7 (500 MW) Unit-8(500 MW)

Relay indications are as follows:

Time (Hrs.)	Details of tripping	Relay at local end	Relay at remote end
03:27 hrs	400kV Mejia B-Maithon-I	At Mejia B LBB (50 BF), 96 Relay	At Maithon Did Not Tripped
	400kV Mejia B-Maithon-II	At Mejia B LBB (50 BF), 96 Relay	At Maithon Did Not Tripped
	400kV Mejia B-Maithon-III	At Mejia B LBB (50 BF), 96 Relay	At Maithon Did Not Tripped
	400kV Mejia B-Jamshedpur S/c	At Mejia B LBB (50 BF), 96 Relay	At Jamshedpur Did Not Tripped
	Unit-7 (500 MW)	At Mejia B LBB (50 BF), 96 Relay	
	Unit-8(500 MW)	At Mejia B Over Voltage	
	Bus Tie Breaker	At Mejia B Did Not Tripped	

Analysis of PMU plots:

- During the said period neither signature of fault nor overvoltage has been observed in any PMU location.

Point to be discussed:-

- DVC mentioned that Mejia- B U# 8 tripped on actuation of Overvoltage protection. But from the Jamshedpur PMU plot no indication of overvoltage has been observed during the said period. So, reason for tripping of said unit on O/V may be explained by DVC.
- Reason for non-tripping of Tie CB through LBB protection may be explained.
- Reason for non-opening of B-Ph Pole of GT CB during operation of overvoltage protection may be explained by DVC.

DVC may explain.

Deliberation in the meeting

DVC explained that—

- *There was some problem in R-Ph PT of Mejia-B Unit# 8 which initiated the generator overvoltage protection for U # 8 which is connected to Bus-II.*
- *Due to initiation of O/V protection R & Y-Ph pole of GT CB opened simultaneously but B-Ph pole failed to open.*
- *Hence, both PD relay & LBB protection initiated and all the elements connected to Main Bus-II tripped from local end.*
- *But the Tie CB did not open due to problem in relay contact though the LBB command was initiated.*
- *Hence LBB protection initiated for tripping of all elements connected to main Bus-I. This*

caused the tripping of other healthy elements connected to main Bus-I.

DVC informed that during testing & simulations of tie CB, it was found that the relay contact for opening the bus coupler is getting jammed on certain occasions. The same has been replaced and working satisfactorily.

On query DVC informed that the overvoltage settings of their Mejia units are 105 % for stage-1 and 120 % for stage-2 which is as per BHEL.

However, NTPC pointed that over voltage settings of their same 500 MW units were kept at 110% for 1 second and 140% instantaneous.

DVC informed that they are facing problem with BHEL make 400kV hydraulic operated GT Circuit breakers.

Other constituents informed that they are also facing some problem with BHEL 400kV hydraulic operated circuit breakers.

Item No B.5. Reporting of disturbances to CERC.

ERLDC has to report the energy loss/ energy not served and restoration times to CERC. Constituents are therefore requested to specifically mention the energy not served and time at which 80% of the load is restored following any disturbance, in the preliminary report to be sent to ERLDC.

Constituents may note and comply.

Deliberation in the meeting

ERLDC informed that as per direction of CERC, the grid disturbances are required to be reported along with the restoration time and amount of energy not served during the disturbances.

PCC advised all the constituents to specifically mention the energy loss (in MU) during the grid disturbance and the restoration time for at least 80% of the load in their grid disturbance report.

Constituents agreed.

Item No B.6. Tripping incidences in the month of January, 2016

Other tripping incidences occurred in the month of January, 2016 which needs explanation from constituents of either of the end is given at **Annexure- B.6**.

Members may discuss.

Deliberation in the meeting

Respective members explained the tripping incidences. The updated status is given at **Annexure-B.6**.

Item No B.7. 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 needs the following information in respect of Chandil, Ramchandrapur, Adityapur and adjoining substations in Jharkhand and New Purnea, Madhepura, Biharshariff and adjoining substations in Bihar.

1. SLD of all the affected and surround Sub-station (with CT location)
2. Year of manufacture of all equipments
3. Comprehensive CT details along with name plate (with connected/adopted ratio)
4. VT details
5. Fault level- 3-phase as well as 1-phase (line length, conductor details and Transformer details for computing fault level)
6. Transformer detail (Rating, impedance)
7. Availability of Auto-Reclosure feature
8. Availability of carrier protection
9. Availability of Bus- differential and LBB Protection
10. Junction Box (JB) details
11. Cable details used for CT connections (Cross section/core of cable, Junction Box (JB) details & length of cable between JB & control panel)
12. Grid earthing resistance (With latest test report)
13. Breaker details (operating time)
14. CT/PT earthing details
15. Relay details (Relay type, model, settings, manufacturing, basis of settings)
16. Scheme adopted for protection settings for lines and transformers
17. DC system details with charger and battery

PCC requested JUSNL and BSPTCL to furnish the above listed details latest by 30.11.2015.

Further, PCC decided to convene a special meeting of Protection Team tentatively on 8th December, 2015 at ERPC, Kolkata and advised JUSNL to attend the meeting with all requisite information.

Accordingly, special meeting was held on 8th December, 2015 wherein BSPTCL and JUSNL advised to submit the pending details latest by 23.12.15 so that the issue could be discussed again on next PCC meeting scheduled to be held on 28.12.15.

BSPTCL and JUSNL have submitted the details.

Members may discuss.

Deliberation in the meeting

It was informed that in Shri S. K. Singh, DGM, PGCIL will substitute in place of Shri Jiten Das, Asst GM, PGCIL.

The Protection team has presented a preliminary study report regarding the data as submitted by JUSNL and BSPTCL. The same is enclosed at ***Annexure-B.7****.*

PCC decided to convene a separate meeting tentatively on 15th Mar, 2016 to discuss the road map for this visit and advised all the committee members to give their comments before that.

PCC also advised BSPTCL and JUSNL members to present in the meeting with all the details.

Item No B.8. 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.

In 37th PCC, it was informed that the issue was also discussed in 31st TCC/ERPC meeting wherein the line parameters was agreed as given below:

Tower	R1	X1	B1	R0	X0	B0	Xm	Xom	Load-ability
132kV D/C Single Panther	0.1400	0.4010	2.8600	0.3540	1.3300	1.7800	0.2630	0.8220	
220kV D/C Single Zebra	0.0697	0.3980	2.9100	0.2810	1.2900	1.8400	0.2510	0.8030	400.00
400kV S/C Twin Moose	0.0288	0.3280	3.5500	0.2850	1.0200	2.6100			
400kV D/C Twin Moose	0.0288	0.3070	3.7700	0.2690	1.0700	2.2900	0.2080	0.6750	1500.00
400kV D/C Quad Moose	0.0147	0.2530	4.5800	0.2480	1.0000	2.6400	0.2030	0.6620	2000.00
400kV D/C Tripple snowbird	0.0195	0.2700	4.2700	0.2000	0.8620	2.4900	0.2130	0.5040	
400kV D/C Twin Lapwing	0.0197	0.3060	3.8000	0.2050	0.9010	2.3700	0.1700	0.5020	
765kV S/c Quad Bersimis	0.0114	0.2860	4.0200	0.2400	0.9360	2.6000			3500.00
765kV D/C Hexa zebra	0.0446	0.9070	1.2700	0.8310	3.4100	0.7190			

220 kV SINGLE ZEBRA S/C	0.074875	0.39925		0.219978	1.339228				
132 kV SINGLE PANTHER S/C	0.1622	0.3861		0.4056	1.622				

TCC advised all the other constituents to implement the revised zone settings and submit the settings to ERPC.

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

NTPC and all IPPs may submit the revised zone settings data at the earliest.

Deliberation in the meeting

NTPC ER-I and Vedanta have 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.

Item No B.9. 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 respective constituents to comply the pending observations at the earliest.

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

In 115th OCC, Members decided to carry out the audit for 400kV Bakreswar (WBPDCL), Sagardighi (WBPDCL), Farakka (NTPC), Malda (PG) & Behrampur(PG) in December, 15/January, 16.

Members may note.

Deliberation in the meeting

PCC informed that the audit for Farakka (NTPC), Malda (PG) & Behrampur(PG) is in progress.

It was also informed that consultants M/s Tractebel Engineering is visiting 400kV Jeerat from 3rd to 5th March, 2016 and Arambag from 7th to 9th March, 2016 for protection audit.

WBSETCL requested for interchange of dates for both the sub-stations i.e. Arambag from 3rd to 5th March, 2016 and Jeerat from 7th to 9th March, 2016.

It was informed that the same has been communicated to the consultants for consideration.

PCC advised WBSETCL to make the necessary arrangements.

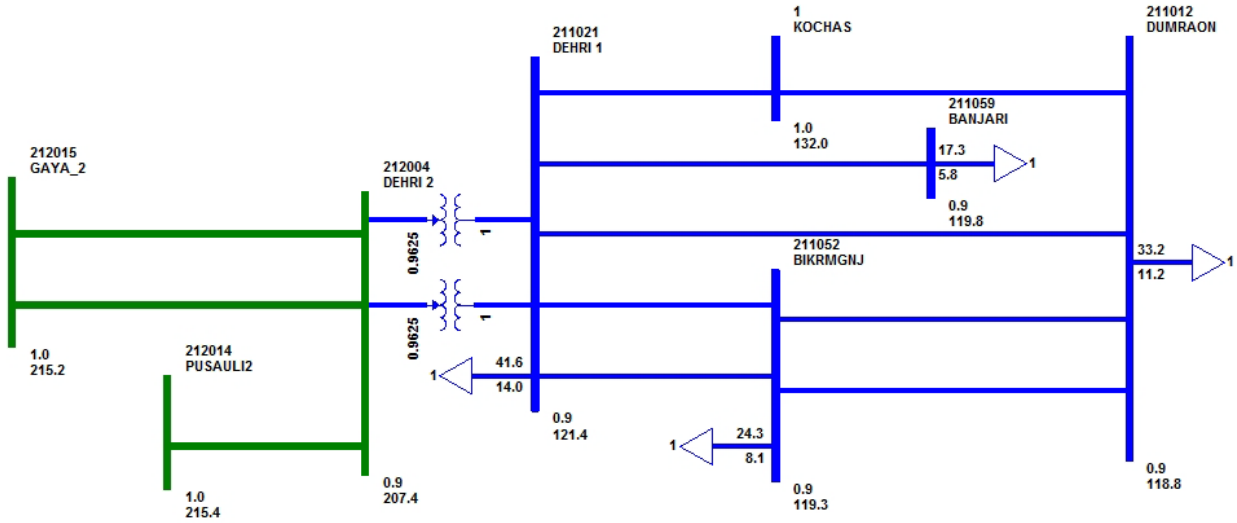
PART- C

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. C.1: Total power failure at 220kV Dehri S/s of BSPTCL system on 16.12.15 at 08:42 hrs.

At 08:42 hrs, R -Ph jumper of 132 kV Dehri-Kochas snapped on Y phase of same line resulting R-Y phase-phase fault and subsequently 220 kV Dehri - Sasaram(PG) S/C and 220 kV Dehri – Gaya (PG) D/C tripped from remote end on zone 3, R-Y phase-phase fault.



In 39th PCC, BSPTCL explained that,

- There was a phase to phase fault in 132kV Dehri- Kochas S/c line.
- Distance protection Micom P442 at 132kV Dehri end failed to detect the fault.
- The backup over current relays of line protection and ATR protection also failed to clear the fault from Dehri end.
- The backup over current relays are very old EM relays which will be replaced with new numerical relays.

After detailed deliberation, PCC advised BSPTCL to check the following and advised to submit a detailed report at the earliest, so that the issue could be discussed in a special meeting scheduled to be held on 5th February, 2016.

- Healthiness of the numerical relay(s) including that of DC supply at Dehri.
- Healthiness of the protection system for the 220/132kV ATRs, including that of the DC supply
- Availability of proper CT and PT signals at relay input (both for the lines as well as the ATRs)
- Availability of trip signal from each relay output to its corresponding CB trip circuit
- Healthiness of each CB including its trip circuit
- Review the settings of distance relay of 132kV Dehri- Kochas S/c at Dehri end.
- Review the settings of 220/132kV ATR protection relays.

BSPTCL agreed.

Thereafter, BSPTCL submitted that DC system is healthy and they are replacing the old EM relays with new numerical relays.

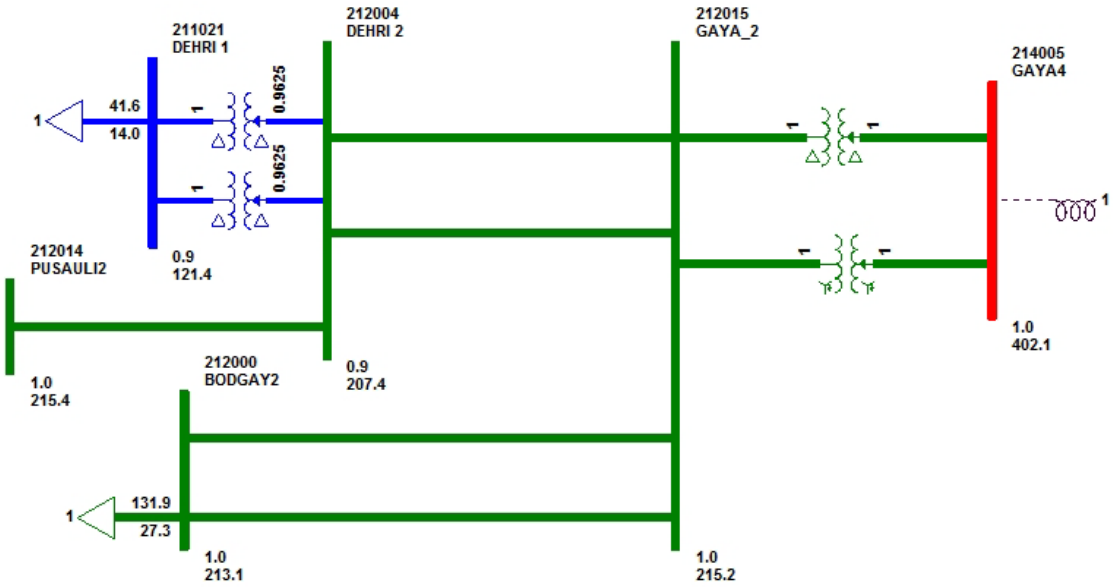
BSPTCL may update.

Deliberation in the meeting

BSPTCL informed that DC system is healthy and they are replacing the old EM relays at Dehri end of 220kV Dehri-Pasauli, 220kV Dehri-Gaya D/C line and 100MVA ICT I & II with new numerical relays.

Regarding non-operation of distance protection of 132kV Dehri- Kochas S/c at Dehri end, BSPTCL reported that PT fuse was blown and the same has been rectified.

ITEM NO. C.2: SPS for ICT tripping at 400kV Gaya S/s.



In 39th PCC, it was felt that N-1 security criterion is not satisfied at 400kV Gaya S/s and advised Powergrid to augment the 315 MVA ICT-II with 500 MVA capacity.

BSPTCL informed that the load at Gaya would increase in the near future and suggested to install one more 500 MVA ICT at Gaya instead of upgrading the existing 315 MVA ICT.

After detailed deliberation, PCC felt that additional 500 MVA ICT may be installed at 400kV Gaya S/s subjected to availability of space. Otherwise, 315 MVA ICT-II should be replaced with 500 MVA. Powergrid was advised to check the required space availability at Gaya S/Stn.

In reply, Powergrid informed that there is space for one dia at 400kV side but space availability at 220kV side needs to be explored by their Engineering wing. They added that 2 nos 220kV bays for a D/C line to Sonenagar and another 2 nos 220kV bays for a D/C line to Kejas are under construction.

PCC also decided to design a SPS as a temporary measure till augmentation of 400/220kV ICT capacity which would reduce the load at Bodhgaya /Gaya in the event of loss of the 500 MVA ICT to avoid overloading of the parallel 315 MVA ICT-II. PCC advised BSPTCL to submit the details of loads envisaged to be shed through SPS action, expected relief and availability of PLCC for sending trip signal from Gaya(PG) to the respective S/Stns.

PCC decided to place the proposal in the next standing committee meeting and advised BSPTCL to submit the details of new lines, substations which are going to connect at Gaya(PG) and expected load growth.

BSPTCL and Powergrid may update.

Deliberation in the meeting

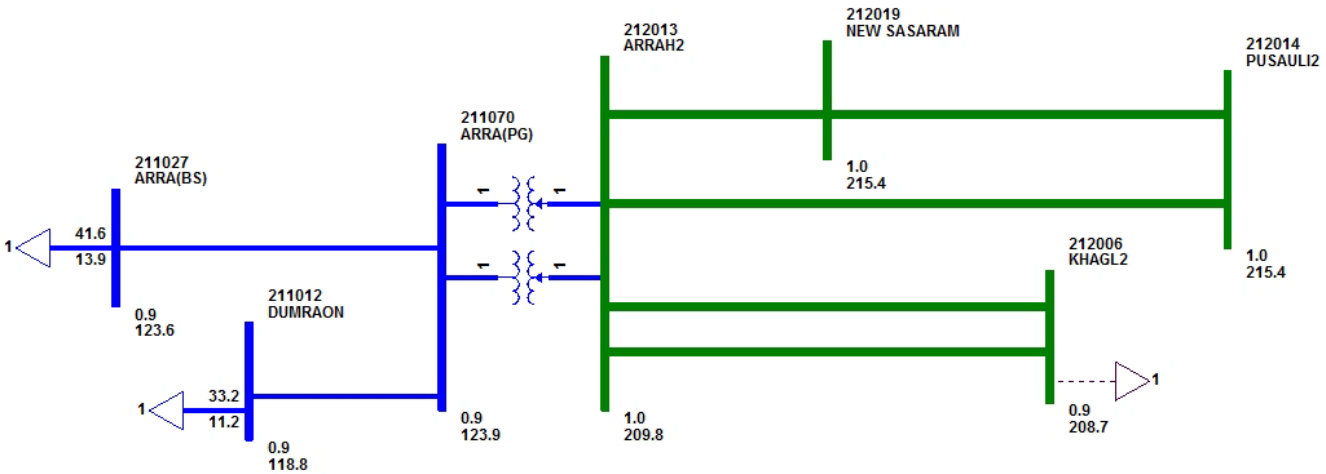
It was informed that in 32nd TCC Meeting, CTU reported that a system study for Bihar system is in progress in consultation with BSPTCL. In that study all the coming proposals of BSPTCL along with future load growth will be studied and most optimum and technically feasible solution will be provided.

PCC felt that the CTU proposal will be the final arrangement and will take time for implementation. So, BSPTCL may plan a SPS as a temporary measure which would reduce the load at Bodhgaya /Gaya in the event of loss of the 500 MVA ICT to avoid overloading of the parallel 315 MVA ICT-II.

ITEM NO. C.3: Total power failure at 220kV Arrah S/s of BSPTCL system on 23.12.15 at 23:06hrs.

At 23:06 hrs, while first time charging attempt of 220/132kV, 160 MVA ICT-III at Arrah(PG) was taken, all the 220kV lines emanating from Arrah(PG) S/s tripped from remote end on indication of B-Ph, Zone 2. Subsequently 132kV lines connected to Arrah also tripped from respective remote ends. Tripping details are as follows:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
23:06 Hrs	220kV Arrah (PG)- Sasaram S/c	At Arrah(PG) Zone -4	At Sasaram B-Ph, Zone-2 (verbally informed by PG)
	220kV Arrah (PG)- New Sasaram S/c	At Arrah(PG) Zone -4	At New Sasaram B-Ph, Zone-2 (verbally informed by PG)
	220KV Arrah(PG) -Khagaul-I	At Arrah (PG) Did Not Trip	At Khagaul Distance=58.02 KM, Zone2, Ir=128.9 A, Iy=282.0A, Ib=1.815 KA, Fault duration 278.4 ms (informed by BSPTCL)
	220KV Arrah(PG)--Khagaul-II	At Arrah (PG) Did Not Trip	At Khagaul Distance=58.06 KM,Zone2, Ir=130.8 A,Iy=279.1A,Ib=1.81 KA, Fault duration 273.4 ms (informed by BSPTCL)
	132kV Arrah (PG)- Dumraon S/C	At Arrah (PG) Did Not Trip	At Dumraon R-Y-B, E/f
	132kV Arrah (PG)- Jagdishpur S/c	At Arrah (PG) Did Not Trip	At Jagdishpur 86 A
	132kV Arrah (PG)- Arrah (B)	At Arrah (PG) Did Not Trip	At Arrah (B) 86



Analysis of PMU plots:

- From the Sasaram PMU plot, 22kV voltage dip has been observed in B-Ph voltage (at 400kV) at 23:06:51 hrs.

- 140 A rise in line current of 400kV Biharshariff- Sasaram-II has been observed during the said period.
- Fault had persisted for approximately 540 ms.

BSPTCL has submitted the tripping report on 24/12/15. Reports are yet to be received from Powergrid.
Powergrid and BSPTCL may explain the following:

1. How 220kV Arrah (PG)- Sasaram S/c and 220kV Arrah (PG)- New Sasaram S/c can be tripped on zone 4 from Arrah (PG) end when remote ends were already tripped on zone 2? Powergrid may furnish the zone 4 time at Arrah.
2. If there is any fault in ICT and the fault was sustained for 540 ms, the other ICTs should also trip. Powergrid may furnish the details of source of fault.
3. BSPTCL may explain the tripping of 132kV lines from their end.

In 39th PCC, Powergrid explained that

- At 23:06 hrs, while charging 220/132kV, 160 MVA ICT-III at Arrah(PG) for the first time, B-ph to earth fault occurred at 220kV bus due to B-ph bus post insulator failure.
- Bus bar protection at 220kV Arrah also failed to clear the fault.
- As a result, the 220kV lines were tripped from remote end on zone 2 protection.
- The zone 4 time setting at Arrah and zone 2 time setting at Sasaram and New Sasaram are same i.e. 0.5 s. Therefore, 220kV Arrah (PG)- Sasaram S/c and 220kV Arrah (PG)- New Sasaram S/c were tripped from both ends simultaneously.

BSPTCL failed to explain the tripping of 132kV lines.

ERLDC informed that charging attempt of 220kV New Sasaram- Arrah (PG) line was taken at 23:15 hrs and both the 220/132kV, 100 MVA ICT-I & II at Arrah (PG) tripped on actuation of overflux protection relay due to high voltage at 220kV level.

After detailed deliberation, PCC felt that zone 2 and zone 4 settings are to be properly coordinated and advised Powergrid to carry out following:

- Verify zone 4 and zone 2 time settings of 220kV Arrah (PG)- Sasaram S/c and 220kV Arrah (PG)- New Sasaram S/c lines and ensure necessary discrimination..
- Check the zone 2 time setting at Khagul end of 220KV Arrah(PG) –Khagaul D/C line as the line was tripped within 280 ms which is less than 350 ms (standard zone 2 timing).
- Correct the settings as per the protection philosophy of Eastern Region.
- Connection arrangement of 220kV lines and 220/132kV ATRs to the 220kV buses at Arrah (with SLD) during the incident, indicating the bus affected by fault may be submitted.
- Ascertain the reason for failure of the bus bar protection at 220kV Arrah and submit the details.
- Submit the voltage and frequency recorded at Arrah that led to tripping of the 220/132kV, 100 MVA ICT-I & II on actuation of overflux relay, alarm and trip setting of the overflux relays and reason for over voltage at 220kV level.

PCC advised BSPTCL to submit the report on tripping of 132kV lines with relay indications and sequence of operation.

Powergrid and BSPTCL agreed.

Thereafter, BSPTCL informed that at 132 kv Arah(PG)- Dumraon line tripped from Dumraon Gss at 11:02pm. Earth fault (R,Y,B-phase) was detected in Distance Protection Relay P442. At the same time both the Transformer T1 & T2 Tripped on Overflux protection enabled in P642 relay.

Powergrid and BSPTCL may update.

Deliberation in the meeting

Powergrid updated that,

- *Zone 4 and Zone 2 time settings of 220 KV Arrah - Sasaram S/c and 220 KV Arrah-New Sasaram S/C line has been verified at POWERGRID end and found that the settings are as per Protection Philosophy of Eastern Region.*
- *Zone 2 time settings at Khagaul end of 220KV Arrah- Khagaul D/C line has been changed from 200 m sec to 350 m sec as per protection philosophy.*
- *Connection arrangement of 220KV lines and 220/132 KV ATRs to the 220KV buses at Ara end during the incident was as follows:*

  Feeders connected with Bus-1:

  1. ICT1 2. SASARAM-1 3. ICT3 4. KHAGAUL-1

  Feeders connected with Bus-2:

  1. ICT2 2. SASARAM-2 3.KHAGAUL-2

- *For ascertaining the reason of failure of bus bar protection, S/D of 220 KV Bus-1 and Bus-2 at Ara SS has been planned on 01.03.2016.*

- *Voltage and Frequency recorded at Ara which led to tripping of ICTs were submitted. The Over Flux relay settings (ALSTOM GTTM22) at Ara end are as follows: Gradual- K1 X Vnom/Fnom (K1 set as 1.15) Instantaneous: K1 X K2 X Vnom / Fnom (K2 set as 1.2).*

ITEM NO. C.4: Total Power failure in part of North Bihar on 19/11/15 at 21:43 hrs.

In 38th PCC, BSPTCL informed that

- The newly commissioned M/S Kanohar make100MVA ATR 3 tripped on REF without any fault in the system
- As a result, the load of ATR 3 (86 MW) was shifted to other two 100MVA transformers and got tripped on over current protection due to overload.

BSPTCL informed that manufacturer has been contacted and they have changed the wiring of REF protection.

In 39th PCC, Powergrid submitted the DR & EL files of the event and explained that BSPTCL was drawing around 480 MW just prior to the disturbance. This resulted in tripping of the lines on overload.

BSPTCL informed that vendor has changed the cable in marshalling box and increased the depth of neutral earthing of ATR from 3 metre to 6 metre.

After detailed deliberation, PCC advised BSPTCL to carry out the stability check of REF protection and explained the procedure in brief.

Thereafter, BSPTCL informed that vendor has made the following changes:

1) All connectors, turret, valve and nuts-bolts have been tightenend.
2) New termination of cable in marshalling box with new cable has been made.
3) Depth of neutral earthing of ATR has been increased from 3 metre to 6 metre.

After doing these works, the transformer tripping on REF is rectified.

BSPTCL may update.

Deliberation in the meeting

PCC advised BSPTCL to carry out the stability testing of the REF protection and submit the report to ERPC/ERLDC.

ITEM NO. C.5: Repeated trippings in BSPTCL (Madhepura)– system at on 07.09.15 and 08.09.15.

In 36th PCC, Powergrid was advised to check the zone settings of 220kV Purnea(PG)- Madhepura line-1 at Purnea(PG) end.

In the meeting, BSPTCL reported that LBB protection at Madhepura was mal-operated and tripped both 220/132kV ICTs.

In 35th PCC, BSPTCL was advised to expedite the Installation of PLCC system for 220 KV Purnea(PG)-Madhepura line-I and II in order to enable the inter-tripping and auto reclose features.

- To carry out protection co-ordination of 220 kV Madhepura, 132 kV Kishenggunj, Forbesgunj and adjoining areas.

BSPTCL may update the status of LBB system at 220kV Madhepura S/s.

In 39th PCC, BSPTCL informed that the work has been initiated and the details will be submitted soon.

BSPTCL may update.

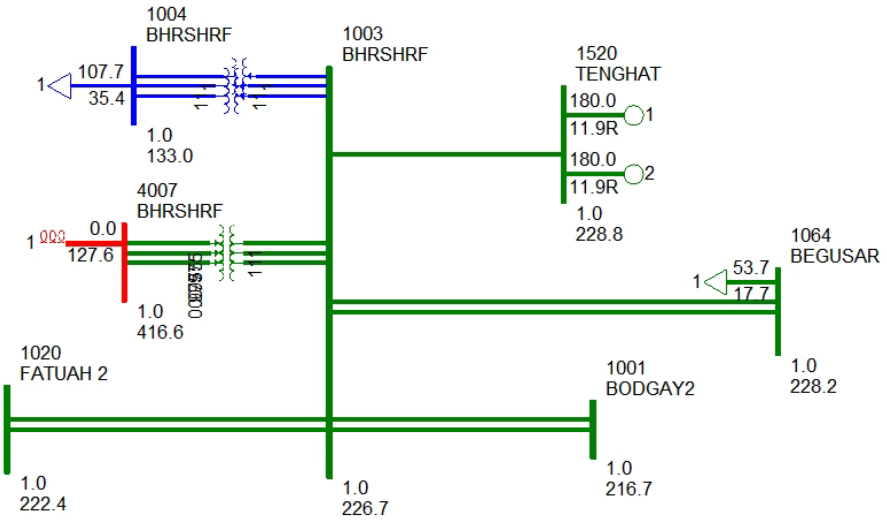
Deliberation in the meeting

BSPTCL informed that the relay settings has been submitted to the Protection team which will visit the site under Item No. B.7.

PCC concluded that BSPTCL shall co-operate with the Protection team as given in Item No B.7 for data collection as well as for on-site visit.

BSPTCL agreed to co-operate with Protection team and also for complying the recommendations of the team.

ITEM NO. C.6: Disturbance at 220 kV Biharshariff (BSPTCL) S/s on 08/10/15 at 08:29hrs



At 08:30 hrs, total power interruption occurred at Biharshariff (BSPTCL) 220/132/33kV S/s due to B-N fault on 220kV Biharshariff- Begusarai-I and subsequent tripping of 220kV Biharshariff-Begusarai-II along with 400/220kV,315 MVA ICT-I,II & III at Biharshariff (PGCIL) on operation of E/F & back up overcurrent protection respectively. The following elements were tripped:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
08:30 hrs	400/220kV , 315 MVA ICT-I	Tripped on Back up O/C from HV side (informed by PGCIL) ICT -1 - 86T, ICT-2 86T, ICT-3 - 86A (informed by BSPTCL)	
	400/220kV , 315 MVA ICT-II		
	400/220kV , 315 MVA ICT-III		
	220kV Biharshariff- Begusarai-I	At Biharshariff trip phase abc, zone Z1, fault location XY 60.48KM, trip relay 86	At Begusarai NA
	220kV Biharshariff- Begusarai-II	At Biharshariff 86A1, 86A2, 130 EF CONTACT MULTI RELAY,86B1,B2 230CD CONTACT MULTIRELAY	At Begusarai NA

Analysis of PMU plots:

- An observation of Biharshariff PMU plots (enclosed) shows 15kV voltage dip in B-Ø at around 08:30:03 hrs.
- 45 A rise in B-Ph line current of 400kV Biharshariff- Ballia-I has been observed during the said period.
- Fault persisted for 940 ms.

Detailed Analysis:

As per the relay indications received from BSPTCL, it appears that Begusarai end failed to clear the fault in 220kV Biharshariff -Begusarai ckt- I and the fault was being fed through other 220kV lines

such as Biharshariff- Begusarai Ckt-II. This resulted in tripping of 220kV Biharshariff- Begusarai ckt-II along with all the 315 MVA ICTs at Biharshariff on earth fault & backup overcurrent protection respectively from Biharshariff end. Thus after tripping of both 220kV Ckt along with all 315MVA ICTs at Biharshariff approx. 350 MW load loss occurred at 220/132/33KV Biharshariff (BSPTCL) GSS.

BSPTCL and Powergrid may explain the following:

i) Relay flags/CB operation at Begusarai end for both Ckt-I&II.
ii) Uncoordinated tripping of 220kV Biharshariff- Begusarai Ckt-II from Biharshariff end and tripping of all 315 MVA ICTs at 400kV Biharshariff.

In 37th PCC, BSPTCL informed that---

- There was a B-N fault in 220kV Biharshariff -Begusarai ckt- I line.
- Due to non clearance of fault from Begusarai end, 220kV Biharshariff -Begusarai ckt-II & all 400/220kV ICTs at Biharshariff got tripped.
- Remedial measures initiated at Begusarai end and relay settings are being reviewed.
- Same type of disturbance was occurred on 14.11.2015 and the 400/220 kV ICTs were not disturbed on this occasion.

However, BSPTCL failed to explain the exact cause for un-coordinated trippings in proper manner and also the remedial measures adopted at Begusarai end.

Regarding submission of DR/EL, BSPTCL informed that their interfacing software has been corrupted; the same is being rectified. After the rectification of interfacing software the DR/EL will be furnished.

After detailed deliberation, PCC felt that BSPTCL should carry out the detailed analysis for such un-coordinated trippings (element-wise) and place the report along with DR/EL inputs.

Further, PCC advised BSPTCL to expedite for carrier protection for 220 kV Biharshariff –Begusarai D/C line as it is an important 220 kV line of BSPTCL system.

BSPTCL may place the report.

Deliberation in the meeting

PCC concluded that BSPTCL shall co-operate with the Protection team as given in Item No B.7 for data collection as well as for on-site visit.

BSPTCL agreed to co-operate with Protection team and also for complying the recommendations of the team.

ITEM NO. C.7: Total Power failure in 220kV Biharshariff (BSPTCL) System at 11:01 hrs on 10.09.15.

In 36th PCC Meeting, Powergrid explained that there was a fault in 220kV Biharshariff-Bodhgaya line, which caused the tripping of 400/220 kV ICTs at Biharshariff end.

Powergrid informed that a letter has been written to BSPTCL on this issue.

PCC advised BSPTCL to check the relays of 220kV Biharshariff-Bodhgaya line at 220kV Biharshariff end.

In 39th PCC, BSPTCL informed that the work has been initiated and the details will be submitted soon.

BSPTCL may update.

Deliberation in the meeting

PCC concluded that BSPTCL shall co-operate with the Protection team as given in Item No B.7 for data collection as well as for on-site visit.

BSPTCL agreed to co-operate with Protection team and also for complying the recommendations of the team.

ITEM NO. C.8: Maloperation of PLCC system at 400kV Farakka.

In 38th PCC, Powergrid explained that 220V DC at Farakka S/s is +ve grounded and creating unbalance in DC supply during switching operation. As a result, PLCC system at Farakka end is sending DT without any fault in the line.

PCC felt that even with any unbalance in 220V DC system, the PLCC system should not maloperate and advised Powergrid to pursue the issue with manufacturer to resolve the problem.

PCC also advised NTPC Farakka to check 220V DC system and rectify the problem.

In 39th PCC, MPL informed that they are using BPL and ABB make PLCC system and it is sending inter trip signal to other end without fault in the line.

Powergrid and NTPC may update.

Deliberation in the meeting

Powergrid informed that old protection coupler of PLCC system at Farakka end has been changed and no such trippings have been reported thereafter.

ITEM NO. C.9: Total Power failure at 400/220kV Rangpo S/s on 17/10/15 at 10:45hrs

In 37th PCC, it was felt that for Double Main Bus system at 400 kV Rangpo S/s, the bus-coupler should have operated and elements of other bus should not have tripped. Further, DT signal from Rangpo S/s should have been sent to remote end.

Powergrid responded that during the same time the Bus PT was under checking as per normal practice and for voltage selection both the isolators of Bus-coupler was in closed condition so bus-coupler did not opened. **Regarding DT signal, Powergrid informed that they will check the scheme and revert back**.

PCC also felt that the tripping of 400 kV Teesta-Rangpo D/C line in zone-1 from Teesta end is not in order and advised NHPC to review the zone settings in co-ordination with Powergrid.

Further, PCC seriously noted the tripping of 220 kV feeders from Jorthang HEP and advised JLHEP to review the protection settings at 220 kV Jorthang end.

No representative of JLHEP was present in the meeting.

On enquiry, ERLDC informed that before synchronisation of JLHEP, they have furnished the recommended settings however the adopted settings are yet to be received from JLHEP.

In 38th PCC, Powergrid informed that they have received the settings from Teesta end and

forwarded to their corporate office for review.

ERLDC informed that the adopted settings are yet to be received from JLHEP.

In 39th PCC, NHPC informed that they received the settings from Powergrid and mentioned that settings are given for CT ratio 2000:1 however; the Teesta end CT ratio is 1000:1. The main 1 distance protection installed at Teesta is Toshiba make having mho characteristics and NHPC requested to provide the zone and resistive reach settings for mho characteristics.

PCC advised NHPC to pursue with Powergrid.

Thereafter, Powergrid submitted the updated settings to NHPC.

NHPC and Powergrid may update.

Deliberation in the meeting

Powergrid informed that as per the scheme, DT would not be initiated.

Further, NHPC has raised some queries about the settings provided by Powergrid.

Powergrid agreed to clarify the queries of NHPC.

ITEM NO. C.10: Disturbance at 400kV Sagardighi S/s (WBPDCL) on 08/05/15 at 11:00hrs.

In 33rd PCC, it was informed that the over current settings of Powergrid feeders from Sagardighi was kept at 200 % with instantaneous trip settings which was provided by Powergrid. WBPDCL requested Powergrid to review the existing settings and advice if there is a need to change.

PCC felt that the O/C settings need to be reviewed and advised Powergrid to check the settings and provide the reviewed settings to WBPDCL for implementation of the same.

Powergrid agreed.

In 34th PCC, WBPDCL informed that they have sent the relay settings to Powergrid. PCC advised Powergrid to review the settings and send to WBPDCL.

In 36th PCC, WBPDCL informed that they received the revised settings from Powergrid.

In 37th PCC, WBPDCL informed that the revised settings will be incorporated on opportunity shutdown.

WBPDCL may update.

Deliberation in the meeting

WBPDCL was not available for discussion.

ERLDC informed that 400 kV Sagardighi- Bahrampore D/C line is an important link for power transfer to Bangladesh and in case of undesired tripping of this line the power transfer to Bangladesh may get affected.

PCC advised WBPDCL to implement the revised settings at the earliest keeping in view of un-interrupted power transfer to Bangladesh.

ITEM NO. C.11: Members may update the following:

1. Powergrid informed that Bus-bar protection at 220kV Birpara S/s will be installed within 2-3 months.

In 39th PCC, Powergrid informed that Bus-bar protection at 220kV Birpara S/s will be installed by 2nd week of February 2016.

Powergrid may update.

Deliberation in the meeting

Powergrid informed that Bus-bar protection at 220kV Birpara S/s will be installed by 2nd week of March 2016.

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

In 39th PCC, OPTCL informed that

- The issue of LBB maloperation at 220kV Meeramundali S/s at 04:59hrs on 18/09/15 has been taken up with Siemens and rectification in LBB logic is in progress.
- OPTCL informed that they will review the logic of all the newly installed LBB protection.
- Old distance protection relays in 132kV system at 220kV Tarkera S/s will be replaced after replacing old relays at 220kV level.

OPTCL may update.

Deliberation in the meeting

OPTCL informed that work is in progress for all the above.

ITEM NO. C.12: Any other items.

Meeting ended with vote of thanks to the chair.

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Annexure-A

Participants in 40th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata Time: 11:00 hrs Date: 25.02.2016 (Thursday)

Sl No	Name	Designation/ Organization	Contact Number	Email	Signature
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"Coming together is a beginning, staying together is progress, and working together is success." –Henry Ford

Participants in 40th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata Time: 11:00 hrs Date: 25.02.2016 (Thursday)

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Annexure-B6

220kV & above Intra Region Transmission Lines												
S.NO	LINE NAME	TRIP DATE	TRIP TIME	RESTORATION DATE	RESTORATION TIME	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	Deliberation in the meeting.
Fault clearing time is violating protection standard (As per PMU data)												
1	220 KV MTPS-MUZAFFARPUR (PG)	01.01.16	20:44	01.01.16	21:20	240 ms (approx)	No information received	Y-B-N, Zone-III 135.5 KM from PG end F/C : Iy= 1.67 KA, Ib = 1.319 KA	--	No	No	Y-B-N FAULT (220 kV MTPS Gopalgunj tripped on same time). *BSPTCL was advised to review the protection settings at MTPS end.*
2	220 KV PUSAULI-SAHAPURI	02.01.16	01:22	02.01.16	02:24	800 ms (approx)	Zone 3, 102.7 km	No information received	--	No	No	Y-B-N FAULT, *No information from UPBCL*
No autorecloser operation observed in PMU data												
1	400 KV JEYPORE - GAZUWAKA-I	12.01.16	04:24	12.01.16	09:24	<100	R-N, Z-I, 114.4 km from Jeypore	R-N, 98 km from Gajuwaka	No autorecloser operation observed in PMU data	No	Yes	R-N FAULT, *Powergrid informed that Gajuwaka end was in non-auto mode at the time of incidence.*
2	400 KV ARAMBAG - BIDHANNAGAR	19.01.16	23:51	20.01.16	14:48	<100	R-N fault, Zone-I, Ib= 3.08 KA 80.7 KM from Arambag	R-N fault, Zone-I, 17.5 KM from Bidhannagar	No autorecloser operation observed in PMU data	No	No	R - N FAULT, *Auto recloser at Bidhanagar end was disabled due to some problem in CB.*
3	400KV PURNEA-MUZAFFARPUR-II	24.01.16	05:53	24.01.16	06:32	<100	Y-N FAULT, 76.6KM FROM PRN	No information received	No autorecloser operation observed in PMU data	No	No	Y-N FAULT, *Purnea end has been succesfully autoreclosed. No information available for Muzaffarpur. Powergrid was advised to coordinate.*
4	40KV ARAMBAG- PPSP-II	29.01.16	12:22	29.01.16	12:44	<100	Y-N fault, Zone-I, Iy= 2.99 KA, 86.76 KM from Arambag end	Y-N fault, Zone-I, 124.8 KM from PPSP end	Autoreclosure is disabled at PPSP end	No	No	Y-N FAULT, *Auto recloser at PPSP end was disabled*
Fault Not observed in PMU data												
1	400 KV MERAMUNDALI-NEW DUBURI-II	05.01.16	15:04	05.01.16	16:51	--	DT Received	No information received	Fault was not observed in PMU data	No	No	SPURIOUS TRIPPPING, *DT recived from Dubri during CB replacement.*
2	400KV MALDA-PURNEA-II	21.01.16	18:29	21.01.16	19:56	--	Tripped from Malda end	Did not trip	Fault was not observed in PMU data	No	No	SPURIOUS TRIPPPING, Powergrid informed that they are investigating the reason for tripping of the line form Malda end.
3	400 KV DURGAPUR- SAGARDIGHI-II	22.01.16	09:51	22.01.16	11:45	--	Did not trip	Tripped from Sagardighi end	Fault was not observed in PMU data	No	No	SPURIOUS TRIPPPING
4	220KV BIHARSHARIFF - TENUGHAT	28.01.16	14:10	28.01.16	14:43	--	No relay operation	Master trip relay	Fault was not observed in PMU data	No	No	SPURIOUS TRIPPPING, *It was an operational mistake.*

Annexure-B.7

Preliminary Study Report on JUSNL/BSPTCL data

The complete data has been provided to the committee members a week before and study of such extensive data requires some more time. However, a preliminary study of the data was carried out and the following in respect of JUSNL & BSPTCL sub-stations were observed:

JUSNL

1. JUSNL –Data of 220kV / 132kV Ramchandrapur and Chandil and 132kV of Adityapur

a. 220kV / 132kV Chandil s/stn

Study of CT details reveal that there are many bays of 220kV & 132 kV bay where the CTs are more than 25 years old.

Tan delta & characteristics of the CTs are required to be re-checked.

BREAKERS HAVE ALREADY BEEN CHANGED

220kV & 132 kV BUS PT is also more than 25 years old and the accuracy class of 132kV PT is 5 while one of the 220kV PT is 1/5.

b. Ramchandrapur s/stn: (clear SLD is required)

i. The CT rating of 132kV side of 150 MVA transformer is set at 600/ 1 which seems on the lower side. It requires further analysis and review
ii. There are only one (1) trip coil in the breakers as seen from the results in 220kV breakers.
iii. Provision of two separate DC as Main DC#1 and Main DC#2 for individual bays are to be studied for redundancy.
iv. Breaker trip time of ICT 220kV Breaker: Y pole- 589 ms, B Pole-589 ms which is very high.
v. Here also the bay CTs which are more than 25 years requires the characteristics of the CT to be analysed.

c. Adityapur 132 kV

i. Breaker time test result not provided.

COMMON ISSUES [KNEE PT VOLTAGE and R_{CT} not provided)

i. Earth resistance values provided have been found to be 2 ohm.
--Improvement of these values and the values more than 1 have to be reduced to less than 1 ohm.
ii. DC system of all the three sub-stations are to be reviewed
DC Voltage between +ve and –ve = 230 V.

But +ve to earth = 191 V at 220kV Chandil
227 V at 220kV Ramchandrapur
210 V at Adityapur

–ve to earth = 20 V at Chandil
7 V at Ranchi
34 V at Adityapur

From the results it signifies that –ve is more or less earthed.
DC earthing is the root of many mal-operation and mal-tripping which has to be addressed.

iii. Auto reclosure and carrier is not active. This has to be brought to service.
iv. Detailed analysis will take some more deliberations before a concrete report can be made.

BSPTCL

A. 220kV Begusarai sub-station

i. Equipment rated for 220 V DC but control DC voltage is 266 V DC which may cause damage to Power Supply units of Protection relays etc
ii. The earth resistance of start point Neutral's of transformers are on higher side i.e. 2.2, 1.4 etc should be reduced below 1 ohm.
iii. Breaker time test of all breakers were not submitted. Again only the trip time of one coil was submitted. Is the 2nd coil there or not used.

B. Biharshariff : Fault level about 19.53 KA

i. DC voltage = 245 V DC
+ve to earth =239.1 V
–ve to earth=6.7 V
–ve is grounded
ii. Breakers having only one trip coil
iii. In 132 kV Sekharpura Line 1 Z2 TIME =0.01 sec and TZ_3 = 0.03 sec
Same for Nalanda line for Hatidah line Z_3=.03 sec – **needs to be checked**
iv. The open time of 220 kV Begusarai Biharshariff line 2 is also too high i.e. 118,109 110 msecs

C. Forbesgunj

i. Closing time of 132kV Katiya line-1 was very high i.e. 447 ms.
Other datas apparently 100ms to be in order

D. Kishenganj- No other details

E. Madhepura 220 kV /132kV: AR & CO available

i. Trip coil only with one coil given the other coil is there or not available
ii. Open time of 220 kV Ckt 1 and Ckt 2 is very high i.e. about 90ms to be checked.