Minutes
of
39th PCC meeting

Date: 03.02.2016
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 39TH PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC, KOLKATA ON 21.01.2016 (THURSDAY) AT 11:00 HOURS

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

PART – A

ITEM NO. A.1: Confirmation of minutes of 38th Protection sub-Committee Meeting held on 28th December, 2015 at ERPC, Kolkata.

The minutes of 38th Protection Sub-Committee meeting held on 28.12.15 circulated vide letter dated 07.01.16.

WBPDCL vide mail dated 12th January, 2016 requested for amendment in Item no C13 as follows:

"PCC recommended for removal of high set tripping and advised WBPDCL to implement the revised settings received from Powergrid on opportunity shutdown."

The minutes of 38th PCC meeting may be confirmed with the above amendment.

Deliberation in the meeting

Members confirmed the minutes of 38th PCC meeting with the above amendment.

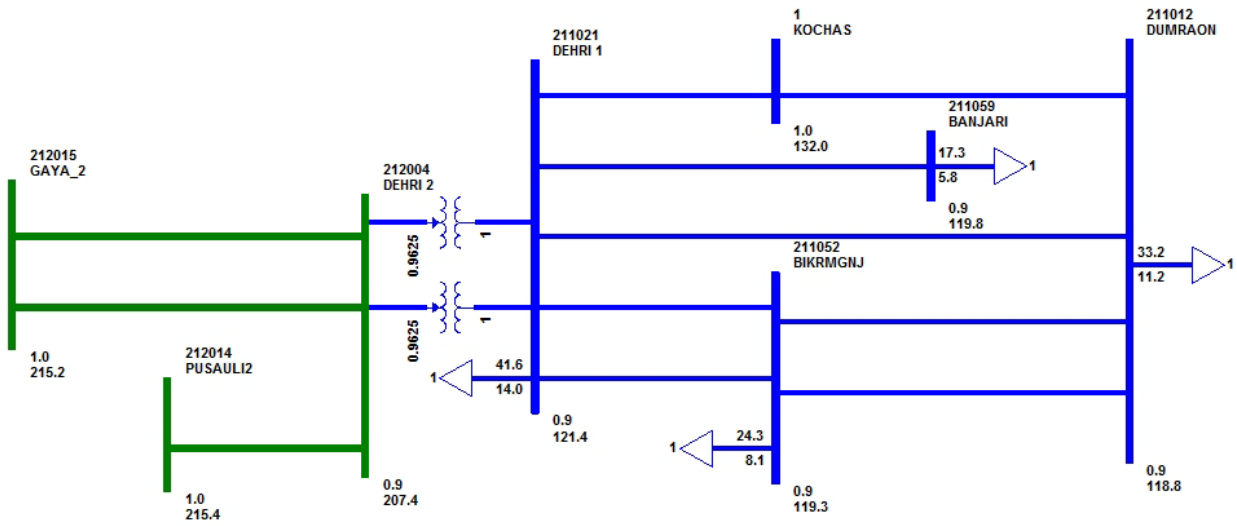
PART – B

ANALYSIS & DISCUSSION ON GRID INCIDENCES WHICH OCCURRED IN CTU/STU SYSTEMS DURING DECEMBER, 2015.

Item No B.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. The tripping details are as follows:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
08:42 Hrs.	220 kV Dehri- Sasaram S/C	**At Dehri** Did Not Trip	**At Sasaram** Z-III, R-Y PH FAULT, F.D.=64 KM, F.C.- Ir=1.965 KA, Iy=1.779KA
	220KV Dehri –Gaya D/C	**At Dehri** Did Not Trip	**At Gaya** Z-III, R-Y PH FAULT, F.C.- Ir=1.2KA ,Iy=1KA
	132kV Dehri- Kochas S/c	**At Dehri** Did Not Trip	**At Kochas** Did Not Trip



Analysis of PMU plots:

- From the Sasaram PMU plot, 15 kV voltage dip (of 400kV phase voltage) has been observed in R and Y Ph at 08:42:58.200 hrs.
- 120 A rise in R-Ph line current of 400kV Biharshariff- Sasaram-II has been observed during the said period.
- Fault persistence time was approx. 840ms.

PGCIL has submitted the tripping information through email on 16/12/15 and reports are yet to be received from BSPTCL.

BSPTCL may explain the following:

1. Reason for not clearing the fault in 132kV Dehri- Kochas S/c from both ends.
2. Reason for not clearing the fault from 220/132kV ATRs at Dehri S/s.

<u>Deliberation in the meeting</u>

ERLDC informed that tripping report yet to be received from BSPTCL.

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)

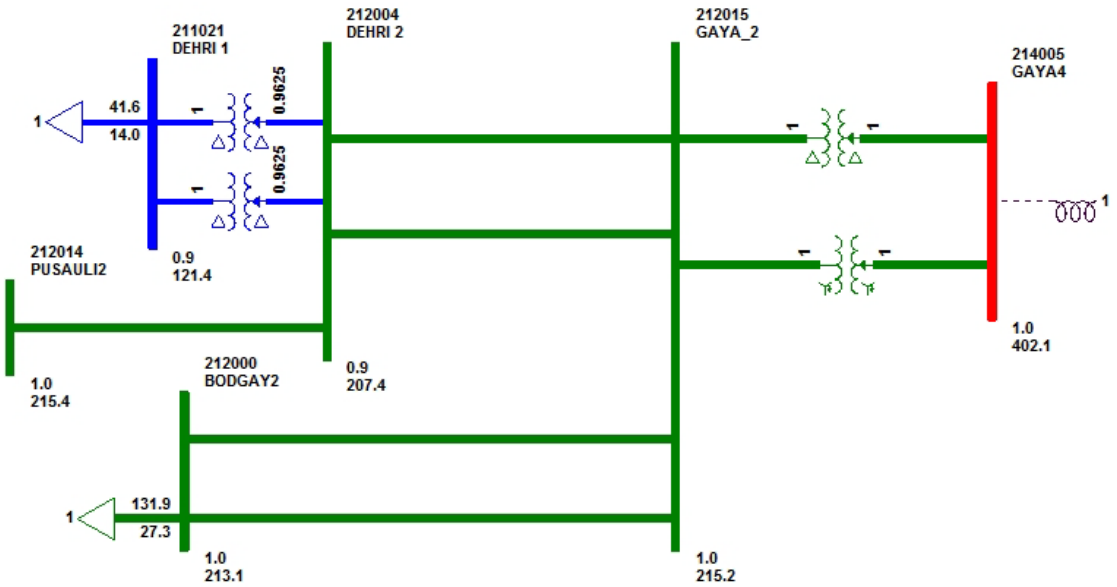
- *Availability of trip signal from each relay output to its corresponding CB trip circuit*
- *Healthiness of each CB including its trip circuit*
- *Review the settings of distance relay of 132kV Dehri- Kochas S/c at Dehri end.*
- *Review the settings of 220/132kV ATR protection relays.*

BSPTCL agreed.

Item No B.2. Disturbance at 400/220kV Gaya S/s of PGCIL & BSPTCL system on 17.12.15 at 17:10hrs.

At 17:10hrs, 400/220kV, 500 MVA ICT-I at Gaya(PG) tripped due to mal operation of oil surge relay and consequently other 400/220kV, 315 MVA ICT-II at Gaya on thermal overload protection, leading to very high loading of 220kV Sasaram-Dehri S/C line. The tripping details are as follows:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
17:10 Hrs	220 kV Dehri- Sasaram S/C	Made Manually Off from Dehri (as informed by BSPTCL)	
	400/220kV, 500 MVA ICT- I at Gaya	Tripped from HV side on operation of Oil surge relay	
	400/220kV, 315MVA ICT- II at Gaya	Tripped from HV side on overload	
	220kV Gaya- Bodhgaya- I & II	Made Manually Off (as informed by BSPTCL)	



Analysis of PMU plots:

- No indication of fault has been observed from both Sasaram & Biharshariff PMU plot, during the said period.

Detailed analysis:

After tripping of 400/220kV, 500MVA ICT-I at Gaya on maloperation of oil surge relay, the load shifted to other 315 MVA ICT-II at Gaya and this resulted in tripping of the said ICT on thermal

overload protection. After the tripping of both 400/220kV ICTs at Gaya, loads met from Dehri, Bodhgaya, Gaya started being fed through 220kV Sasaram- Dehri S/c line and flow on said ckt went beyond 400 MW with heavy sparking. As a safety measure, CB of the said line was switched off manually by BSPTCL. BSPTCL reported that 220kV Gaya- Bodhgaya D/c along with all 150 MVA 220/132kV ATRS at Bodhgaya were made manually off one by one. Due to above mentioned tripping total load loss of approx. 410 MW occurred at Gaya, Dehri, Bodhgaya S/s & its surrounded areas.

BSPTCL has submitted the tripping report on 19/12/15. Reports are yet to be received from Powergrid.

Powergrid may explain.

Deliberation in the meeting

It was informed that Powergrid ER-1 has submitted the report on 18th January, 2016.

Powergrid explained that

- *Oil surge relay of 400/220kV, 500MVA ICT-I at Gaya mal-operated due to moisture ingress and tripped the ICT-I.*
- *The load shifted to other 315 MVA ICT-II and this resulted in tripping of the said ICT on overload.*

PCC 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.

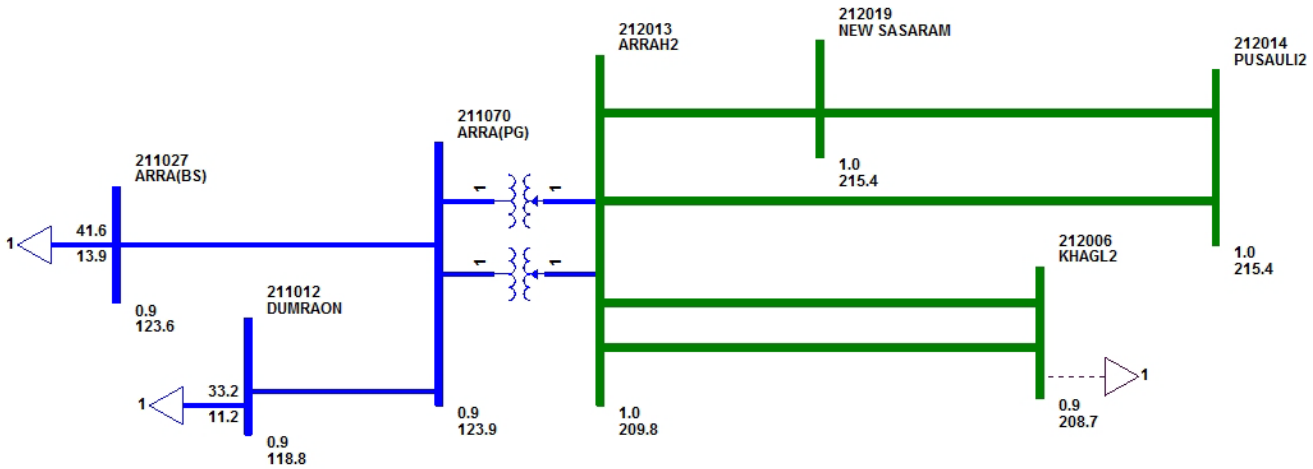
PCC also decided to design a SPS as a temporary measure till augmentation of 400/220kV ICT capacity which would reduce the load at Bodhgaya /Gaya in the event of loss of the 500 MVA ICT to avoid overloading of the parallel 315 MVA ICT-II. PCC advised BSPTCL to submit the details of loads envisaged to 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.

Item No B.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.

Deliberation in the meeting

It was informed that Powergrid ER-1 has submitted the report on 18th January, 2016.

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 given in Item no. C.13.*
- *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.

Item No B.4. Tripping incidences in the month of December, 2015

Other tripping incidences occurred in the month of December, 2015 which needs explanation from constituents of either of the end is given at **Annexure- B.4**.

Members may discuss.

Deliberation in the meeting

Members explained the tripping incidence. Updated status is enclosed at **Annexure- B.4**.

PART- C

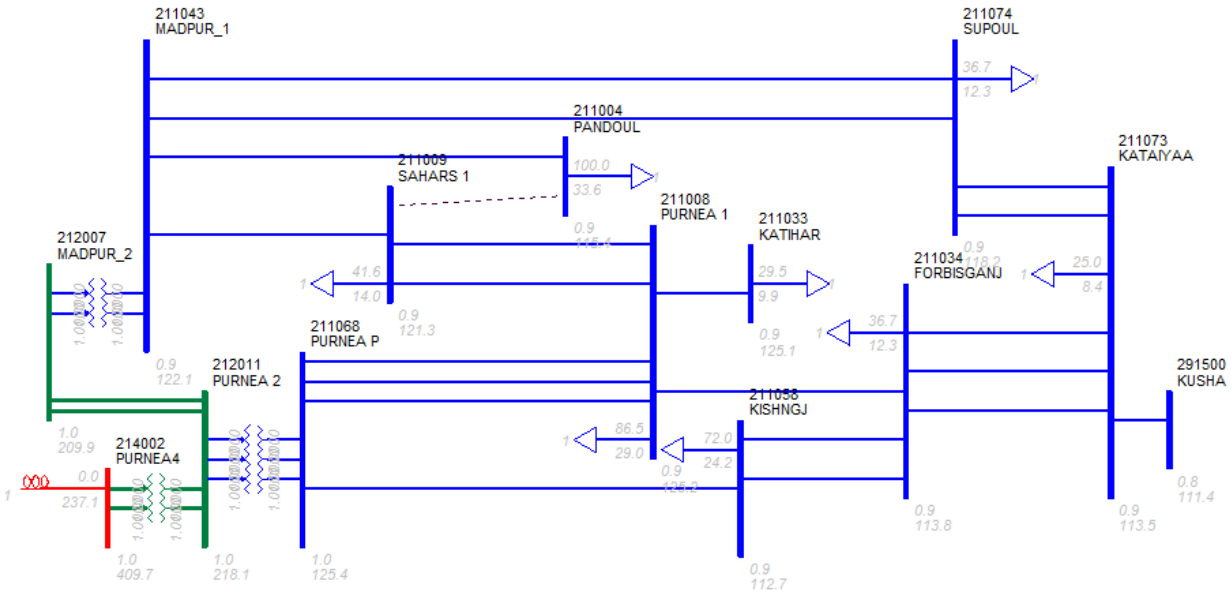
FOLLOW-UP OF DECISIONS OF THE PREVIOUS PROTECTION SUB-COMMITTEE MEETING(S)

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

ITEM NO. C.1: Total Power failure in part of North Bihar on 19/11/15 at 21:43 hrs.

As per information received from BSPTCL through telephonic conversation, 132kV Madhepura-Supaul D/c line tripped at 21:43 Hrs, followed by 132kV Purnea (PG)- Kishanganj S/C and 132kV Purnea (PG)- Purnea(B) T/C.

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
21:43 hrs	132kV Purnea(PG)- Purnea(B)-I,II & III	At Purnea(PG) directional O/C	At Purnea(B) Did Not Tripped
	132kV Purnea(PG) - Kishanganj S/C	At Purnea(PG) Tripped (As informed by BSPTCL through telephonic conversation)	At Kishanganj Did Not Tripped
	132kV Madhepura- Supaul D/C	(As informed by BSPTCL through telephonic conversation, both the line tripped)	



From SCADA data recorded at ERLDC it is observed that coincident with tripping of 132kV Purnea(PG) – Purnea(B) T/C, power flow through 220kV New Purnea-Madhepura D/C also became zero. Power supply to Madhepura and Sonebarsa also failed.

After tripping of all 132kV lines from Purnea(PGCIL & BSPTCL), load loss of around 486 MW occurred at Purnea, Naugachhia, Khagaria, Katihar, Saharsa, Madhepura, Sonebarsa, Supaul, Katiya, Forbesganj & Nepal areas.

Analysis of PMU plots:

- From the Binaguri PMU plot 38kV voltage dip has been observed in B-Ph at 21:43:39:800 hrs.
- Fault persistence time was approx. 80 ms.

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.

PCC advised BSPTCL to collect the details of changes made in REF protection wiring from the manufacturer.

ERLDC informed that tripping report was not yet received from Powergrid ER-1.

PCC could not conclude the tripping incidence due to non availability of tripping details of 132kV Purnea(PG)- Purnea(B)-I,II & III and 132kV Purnea(PG) - Kishanganj S/C from Powergrid ER-I.

PCC took serious note of not submitting the tripping report by Powergrid ER-1 and non-representation in the meeting.

BSPTCL and Powergrid may explain.

Deliberation in the meeting

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.

ITEM NO. C.2: Total Power failure in 220kV Malda & Dhalkhola of WBSETCL system on 20/11/15 at 20:55hrs.

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.

Powergrid and NTPC may update.

Deliberation in the meeting

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.

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 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. The updated status is enclosed at **Annexure-C3.**

BSPTCL and JUSNL may update. Members may discuss.

Deliberation in the meeting

BSPTCL and JUSNL submitted the details.

ITEM NO. C.4: Repeated Disturbances at 220kV Chandil S/s of JUSNL System.

1. Total power failure at 220kV Chandil S/s of JUSNL system on 01/10/15 at 10:50hrs

In 37th PCC, JUSNL explained with the given diagram that---

- The above tripping occurred due to B-Ø conductor snapping between location no 2 & 3 of 132kV Adityapur – Ushamartin circuit-I.
- Though the 132kV Adityapur – Ushamartin circuit-I tripped from both the end, the fault got extended due to delayed tripping/clearance.
- Subsequently, the following elements tripped:

At Adityapur GSS:

a) 132 KV Adityapur – Ushamartin circuit –I tripped both end.
b) 132 KV Adityapur – Ushamartin circuit –II tripped at Adityapur end.
c) 132/33Kv 50 MVA Transformer I & II tripped.

At Ramchandrapur GSS:

a) 132KV Ramchandrapur-Adityapur circuit-1 tripped at Ramchandrapur end.
b) 132 KV Ramchandra-Adiyapur circuit-2 tripped at Adityapur end.

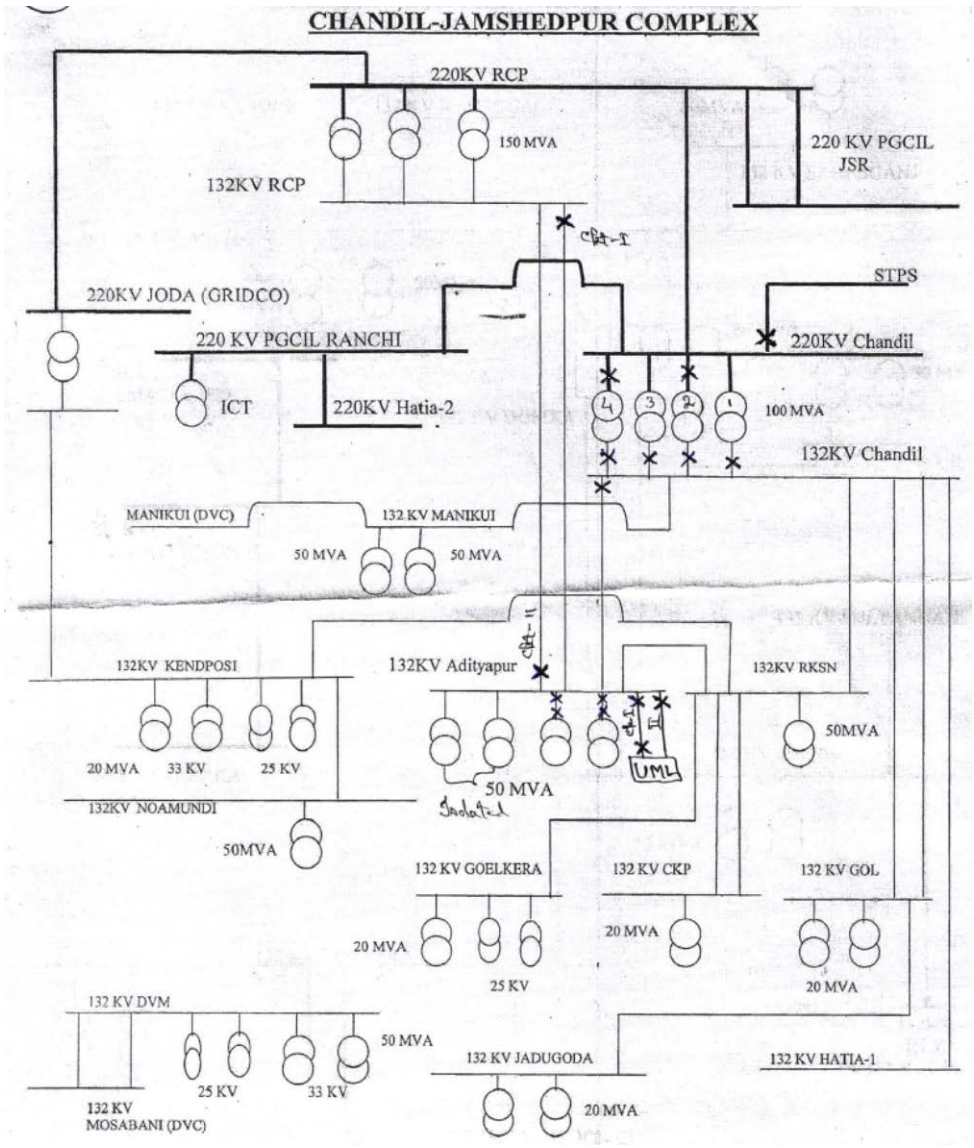
At Chandil GSS:

a) 220KV Chandil –STPS T/L Tripped at chandil end.
b) 132kv Chandil-Adityapur Tripped at Chandil end.
c) 220/132kv 100MVA transformer I, II, III &IV all are tripped.

- The details of relay indications as furnished by JUSNL are as follows:

Sl.No.	Name of Line	Local end relay	Remote End relay	Remarks
1.	220kV Chandil- STPS T/L	86,95/86	Not tripped	Chandil end- SEL 311C STPS-P442
2.	220kV Chandil-Ramchandrapur	Normal	Normal	Chandil end- Micom P430C RCP end-P430C
3.	220KV Chandil-PGCIL Ranchi.	Normal	Normal	Chandil-SEL 311C
4	132KV Chandil-Adiyapur.	Tripping relay 186	Not tripped	Chandil-P430C Adpur-P441
5	100MVA, 220/132 KvTr.I at Chandil	B Ø , O/C (LV side trip)		
6	100MVA, 220/132 KvTr.II at Chandil	B Ø , O/C (Both side trip)		
7	100MVA, 220/132 KvTr.III at	B Ø , O/C (LV side trip)		

	Chandil			
8	100MVA , 220/132 KvTr.IV at Chandil	Master trip relay 86HV, Diff.operated LV-O/C (Both side trip)		
5	132KV Ramchandrapur-AdityapurCkt-I	12km,Z-III	Not tripped	RCP- P442 Adpur-P442
6	132KV Ramchandrapur-AdityapurCkt-II	Not tripped	O/C & E/F	RCP-P442 Adpur-P442
7	132kv Adityapur-Ushamartinckt.- I	86,O/C,E/F,A/R relay lock out	O/C & E/F Fault this line BØ	Adpur-Eusion Reyrolle UML- Eusion Reyrolle
8	132kv Adityapur-Ushamartinckt.-II	O/C & E/F	Not tripped	Adpur-P441 UML-P441
9	50 MVA,132/33Kv Tr.no - I at Adpur	O/C,86 (HV & LV both side triped)		
10	50 MVA, 132/33 Kv Tr.no - II at Adpur	O/C, 86 (HV & LV both side triped)		



However, JUSNL failed to explain the tripping sequence & exact cause for un-coordinated trippings in proper manner and also the protection available for each element involved in the said disturbance.

Regarding submission of DR/EL, JUSNL informed that the DR of the relays could not be downloaded as the relays were old and interfacing software is also not available with them. It was further informed that the old relays of Chandil S/s have been replaced with new relays.

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

JUSNL may place the report.

Deliberation in the meeting

JUSNL informed that the DR/EL files could not be retrieved from relays as the relays of Chandil were old which were under replacement.

PCC concluded that this was an un-coordinated tripping and advised JUSNL to co-ordinate with the Protection committee as given in Item No C.3 for data collection as well as for on-site visit.

2. Total power failure at 220kV Chandil S/s of JUSNL system on 21/10/15 at 00:15hrs

Total power failed at 220kV Chandil S/s at 00:15 hrs, due to bursting of R-Ph CT of 220/132kV ATR-I at Chandil on 132kV side. The following elements were tripped:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
00:15 hrs	220 KV Chandil - Santaldih S/C	AT Chandil Did not Trip	At Santaldih R-Ph, O/C, E/F
	220 KV Chandil -Ranchi S/C	AT Chandil Master Trip Relay	At Ranchi NA
	220 KV Chandil – Ramchandrapur S/C	AT Chandil Master Trip Relay	At Ramchandrapur E/f , O/C, Tripping relay VAJ
	132kV Ramchandrapur-Adityapur--I	At Ramchandrapur Power Swing, E/F, O/C, Tripping relay type VAJ	At Adityapur Did not Trip
	132kV Ramchandrapur-Adityapur--II	At Ramchandrapur Did not Trip	At Adityapur E/f , O/C
	132 KV Chandil – Adityapur S/C	AT Chandil Did not Trip	At Adityapur E/f , O/C
	132 KV Chandil – Rajkharswan S/C	AT Chandil Did not Trip	AT Rajkharswan O/C
	220/132kV , 100 MVA ATR-I	At HV E/F	At LV E/F, O/C
	220/132kV , 100 MVA ATR-II	At HV E/F	At LV O/C
	220/132kV , 100 MVA ATR-IV	At HV Did not Trip	At LV E/F, Master trip

Analysis of PMU plots:

- An observation of PMU plot of Ranchi Shows, there was a 8kV dip in R-Ph voltage and 6 kV dip in Y phase voltage during the incident.
- 70 A rise in R-Ph line current of 400kV Ranchi- Maithon has been observed during the said period.
- Fault persistence time was approx. 540 ms.

Detailed analysis:

It is suspected that there was a delayed opening of the breaker either at HV or LV side for ATR-I and it caused the tripping of other elements. Due to above mentioned tripping approx. 320 MW load loss occurred at Chandil & their surrounded area including traction loss of 50 MW at Rajkharswan, Goelkera, Kendposi, Chakardharpur, Golmuri, and Manique.

JUSNL may explain the following:

- Any delayed operation of CB of 220/132kV ATR-I.
- Tripping of 132kV Ramchandrapur- Adityapur—II from Adityapur on E/F, O/C

In 37th PCC, JUSNL informed that---

- There was a fault at 220kV Chandil S/s due to bursting of R-Ph CT of 220/132 kV ATR-I on 132kV side.
- Due to delayed clearance of fault by ATR-I the two other 220/132 kV ATRs got tripped at Chandil S/s.
- 220 kV as well as 132 kV feeders of Chandil and other 132 kV feeders also got tripped.

However, JUSNL failed to explain the tripping sequence & exact cause for un-coordinated trippings in proper manner and also the protection available for each element involved in the said disturbance.

Regarding submission of DR/EL, JUSNL informed that the DR of the relays could not be downloaded as the relays were old and interfacing software is also not available. It was further informed that the old relays of Chandil S/s have been replaced with new relays.

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

JUSNL may place the report.

Deliberation in the meeting

JUSNL informed that the DR/EL files could not be retrieved from relays as the relays of Chandil were old which were under replacement.

PCC concluded that as this was an un-coordinated tripping and advised JUSNL to co-ordinate with the Protection committee as given in Item No C.3 for data collection as well as for on-site visit.

ITEM NO. C.5: Disturbance at 220kV Ramchandrapur S/s on 20/10/15 at 05:38hrs

At 05:38 hrs, 400/220KV, 315 MVA ICT-I & II tripped at Ramchandrapur due to busting of R-phase CT of 220KV Ramchandrapur-Chandil line at Ramchandrapur end. The Following lines tripped:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
05:36 hrs	220 KV Ramchandrapur - Chandil S/C	At Ramchandrapur Zone-III	At Chandil Zone-III, Master trip relay
	220kV Ramchandrapur- Joda S/c	At Ramchandrapur NA	At Joda NA
	400/220kV ICT-I at Jamshedpur	At Jamshedpur O/c	At Ramchandrapur Master Trip
	400/220kV ICT- II at Jamshedpur	At Jamshedpur Back up O/c, R-ph	At Ramchandrapur Master Trip
	132kV Chandil-Adityapur	At Chandil Trip relay 186	At Adityapur Did Not Trip
	132kV Chandil-Rajkharswan S/c	At Chandil Back up E/F, O/C	At Rajkharswan Did Not Trip
	132kV Ramchandrapur-Adityapur-I	At Ramchandrapur Did Not Trip	At Adityapur E/F, O/C
	132kV Ramchandrapur-Adityapur-II	At Ramchandrapur Did Not Trip	At Adityapur E/F, O/C
	220/132kV , 150 MVA ATR-I at RCP	O/C	

Analysis of PMU plots:

- An observation of PMU plot of Jamshedpur Shows, there was a 50kV dip in R-Ph voltage during the incident.
- 540 A rise in R-Ph line current of 400kV Jamshedpur- Chaibasa has been observed during the said period.
- Fault persistence time was approx. 40 ms.

Detailed analysis:

Fault was in 220KV Ramchandrapur-Chandil line close to Ramchandrapur end. Due delayed fault clearance from Ramchandrapur end, 400/220kV ICTs at Jamshedpur, 220/132kV , 150 MVA ATR-I at RCP and 132kV Ramchandrapur- Adityapur-I & II got tripped.

JUSNL may explain the following:

- Tripping of 220 KV Ramchandrapur -Chandil S/C line from both ends on zone 3 distance protection
- Tripping details of 220kV Ramchandrapur- Joda S/c
- Tripping of 132kV Chandil- Adityapur and 132kV Chandil- Rajkharswan S/c

In 37th PCC, JUSNL informed that---

- There was a fault at 220kV Ramchandrapur S/S due to bursting of R-phase CT of 220kV Ramchandrapur-Chandil line.
- Due to delayed fault clearance from Ramchandrapur end, 400/220kV ICTs at Jamshedpur, 220/132kV , 150 MVA ATR-I at Ramchandrapur and 132kV Ramchandrapur- Adityapur-I & II got tripped.

However, JUSNL failed to explain the tripping sequence & exact cause for un-coordinated trippings in proper manner and also the protection available for each element involved in the said disturbance.

Regarding submission of DR/EL, JUSNL informed that the DR of the relays could not be downloaded as the relays were old and interfacing software is also not available.

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

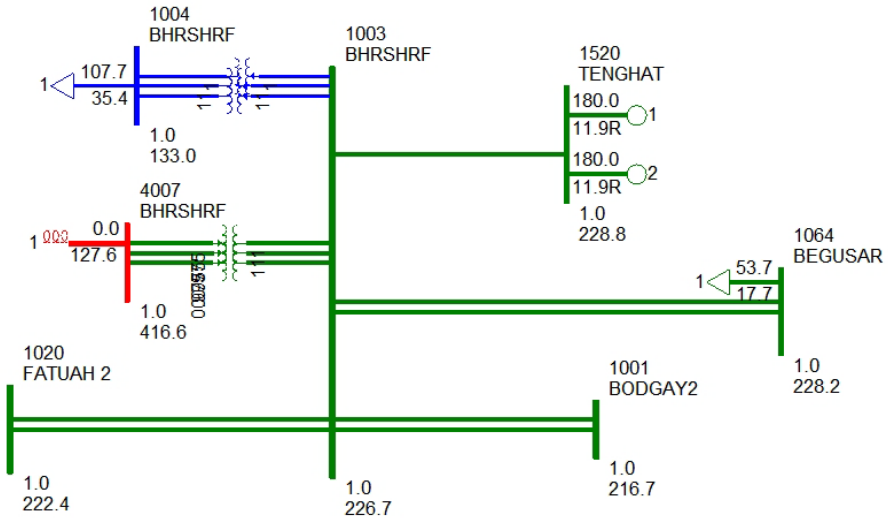
JUSNL may place the report.

Deliberation in the meeting

JUSNL informed that the DR/EL files could not be retrieved from relays as the available relays of were old which were under replacement.

PCC concluded that as this was an un-coordinated tripping and advised JUSNL to co-ordinate with the Protection committee as given in Item No C.3 for data collection as well as for on-site visit.

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	<u>At Biharshariff</u> trip phase abc, zone Z1, fault location XY 60.48KM, trip relay 86	<u>At Begusarai</u> NA
	220kV Biharshariff- Begusarai-II	<u>At Biharshariff</u> 86A1, 86A2, 130 EF CONTACT MULTI RELAY,86B1,B2 230CD CONTACT MULTIRELAY	<u>At Begusarai</u> 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 advised BSPTCL to submit the report.

ITEM NO. C.7: Total Power failure at 400/220kV Rangpo S/s on 17/10/15 at 10:45hrs

In 37th PCC, Powergrid informed that---

- The tripping of 400 kV Teesta –Rangpo was due to mal-operation of SCADA at Rangpo S/s.
- The new 400 kV bay for 400 kV Teesta-III –Rangpo was under construction and the SCADA engineers were working.
- Unknowingly, the Auto- sequencing feature of SCADA was under ON condition.
- During SAS upgradation work the Auto- sequencing feature operated the breaker and isolator of new 400 kV bay.
- This led to grounding of Y-phase as it was hanging near to gantry and converted into a Bus fault.
- This tripped all the elements connected to 400 kV Rangpo Bus.

PCC took on adverse note mal-operation due to negligence during construction activities and advised Powergrid to ensure the compliance of all safety measures before carrying out any activities in online SAS system.

PCC 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.

Powergrid and NHPC may update.

Deliberation in the meeting

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.

ITEM NO. C.8: Total power failure at 220/132 kV Hatia S/s (JUSNL) on 14/09/15 at 11:38hrs.

In 36th PCC, PCC advised JUSNL to check the following and report to ERPC/ERLDC:

1. The main and backup protection of 132kV Hatia-Kanke line at 132kV Kanke end needs to be tested and JUSNL should find out why the fault was not detected from Kanke end.
2. CB of 132kV Hatia-Kanke line at 132kV Hatia end should be tested.
3. Protection system of 220/132kV, 150 MVA T/F-I at 220 kV Hatia is to be tested.
4. The directional feature of over current protection of 132kV Chandil-Hatia S/C at both end to be verified.
5. JUSNL was advised to collect the tripping details of ICTs and generators at PTPS.

In 37th PCC, JUSNL informed that relay settings have reviewed and for further review and co-ordination of relay at Hatia complex a work order have already been placed with M/s Alstom on 10/08/2015. It will be carried out soon.

In 38th PCC, JUSNL informed that M/s Alstom yet to review the relay settings. PCC advised JUSNL to pursue with Alstom.

JUSNL may update.

Deliberation in the meeting

JUSNL submitted the test reports and updated the status as follows:

1. The main and backup protection of 132kV Hatia-Kanke line at 132kV Kanke end needs to be tested and JUSNL should find out why the fault was not detected from Kanke end.---*Tested and found satisfactory.*
2. CB of 132kV Hatia-Kanke line at 132kV Hatia end should be tested. ---*Tested and found satisfactory.*
3. Protection system of 220/132kV, 150 MVA T/F-I at 220 kV Hatia is to be tested. ---*Tested and found satisfactory.*
4. The directional feature of over current protection of 132kV Chandil-Hatia S/C at both end to be verified. --*upgraded to 220kV Hatia-Ranchi line.*

ITEM NO. C.9: 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 38th 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 work is in progress.

ITEM NO. C.10: 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 38th 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 work is in progress.

ITEM NO. C.11: 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 informed that the revised settings will be incorporated on opportunity shutdown.

ITEM NO. C.12: 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 38th PCC, Powergrid informed that Bus-bar protection at 220kV Birpara S/s will be installed by 1st week of January 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 February 2016.

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

In 38th 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 rectification in LBB logic at 220kV Meeramundali S/s is in progress.

ITEM NO. C.13: 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 and Powergrid ER-II had submitted the zone settings.

BSPTCL, Powergrid (ER-I & Odisha-Projects), NTPC, NHPC, all IPPs may submit the revised zone settings data at the earliest.

Deliberation in the meeting

Powergrid ER-I and BSPTCL have submitted the revised zone settings. PCC advised all other constituents send the revised zone settings.

ITEM NO. C.14: 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 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

Members noted.

ITEM NO. C.15: Any other items.

Meeting ended with vote of thanks to the chair.

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Annexure-A

Participants in 39th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata Time: 11:00 hrs Date: 21.01.2016 (Thursday)

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

Participants in 39th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata   Time: 11:00 hrs   Date: 21.01.2016 (Thursday)

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

Annexure - B4

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	400 KV JEERAT-KOLAGHAT	04.12.15	14:54	04.12.15	15:46	480 ms (approx)	Z2, 121 KM from Jeerat, 3.532 KA	Z1, 20.73 KM from KTPP Fault current 7.94 KA	--	No	No	R-Y FAULT, Inter trip has been sent from Kholaghat. Jeerat end failed operate due to fuse blown PLCC system. Fuse has been replaced.
2	400KV MERAMUNDALI - MENDHASAL	26.12.15	16:45	27.12.15	06:42	approx 300 ms	B-N, Z-I	B-N , ZONE-2 , Fault current- 2.5 KA	No autorecloser operation observed in PMU data	No	No	B-PHASE LA BURST AT MERAMUNDALI, DR has been submitted. ICT tripped at Meramundali due to bursting of B-ph LA. BPL make PLCC at Mendhasal is not working properly. The same will be replaced with Siemens.
No autorecloser operation observed in PMU data												
1	400KV ARAMBAG-BAKRESWAR	04.12.15	12:22	04.12.15	17:02	<100	R-N fault, Z-I, 96 KM from Arambag, Fault current = 1.59 KA	R-N fault, 45.2 KM from Bakreswar, Fault current = 4.9 KA	No autorecloser operation observed in PMU data	No	No	R-N FAULT, Autoreclosure operated at Bakreswar end. Arambagh end failed to operate due to PLCC problem. The PLCC system will be replaced with ABB PLCC system.
2	400KV ARAMBAG - BAKRESWAR	08.12.15	12:32	08.12.15	12:55	<100	R-N, Z-I 15 KM from Arambag	No information received	No autorecloser operation observed in PMU data	No	No	R-N FAULT, Autoreclosure operated and tripped from Bakreswar end. Arambagh end Main-1 distance relay has detected the fault as R-N fault correctly but Main 2 detected as ph-ph fault. WBSETCL advised to check the relay.
3	400KV PATNA-BALIA-III	08.12.15	23:33	08.12.15	23:38	<100	No information received	No information received	No autorecloser operation observed in PMU data	No	No	Y-N FAULT,
Fault Not observed in PMU data												
1	400 KV KODERMA--BOKARO-I	04.12.15	11:10	04.12.15	19:35	--	--	--	--	--	--	TRIPPPED DURING TESTING IN CONTROL AND PROTECTION CKT, No fault in the line.
2	400KV MALDA-NEW PURNEA-I	07.12.15	01:58			--	No information received	No information received	--	No	No	DT RECEIVED AT NEW PURNEA
3	400 kV SAGARDIGHI-BAHARAMPUR -I	10.12.15	09:38	10.12.15	09:54	--	Not tripped	Tripped	--	No	No	SPURIOUS TRIPPING, DT recieved from Sagardighi end.
4	400 KV MEJIA - MAITHON-III	16.12.15	19:18	16.12.15	22:33	--	Broken conductor start	DT Received at Maithon	--	No	No	Y PHASE BREAKER WAS NOT CLOSED AT MEJIA END. WHILE OPENING THE LINE TRIPPED FROM MEJIA END
HVDC pole block												
1	HVDC SASARAM	12.12.15	09:58	12.12.15	14:49	--	--	--	--	No	No	DUE TO BIRD PERCHING
2	HVDC GAJUWAKA POLE - II	31.12.15	09:06	31.12.15	09:45	--	--	--	--	No	No	POLE BLOCKED DUE TO PROBLEM OF HIGH HARMONICS, Filter bank tripped.