Minutes
of
41st PCC meeting

Date: 28.03.2016
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 41ST PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC, KOLKATA ON 17.03.2016 (THURSDAY) AT 11:00 HOURS

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

PART – A

ITEM NO. A.1: Confirmation of minutes of 40th Protection sub-Committee Meeting held on 25th February, 2016 at ERPC, Kolkata.

The minutes of 40th Protection Sub-Committee meeting held on 25.02.16 circulated vide letter dated 08.03.16.

Members may confirm the minutes of 40th PCC meeting.

Deliberation in the meeting

Members confirmed the minutes of 40th PCC meeting.

PART – B

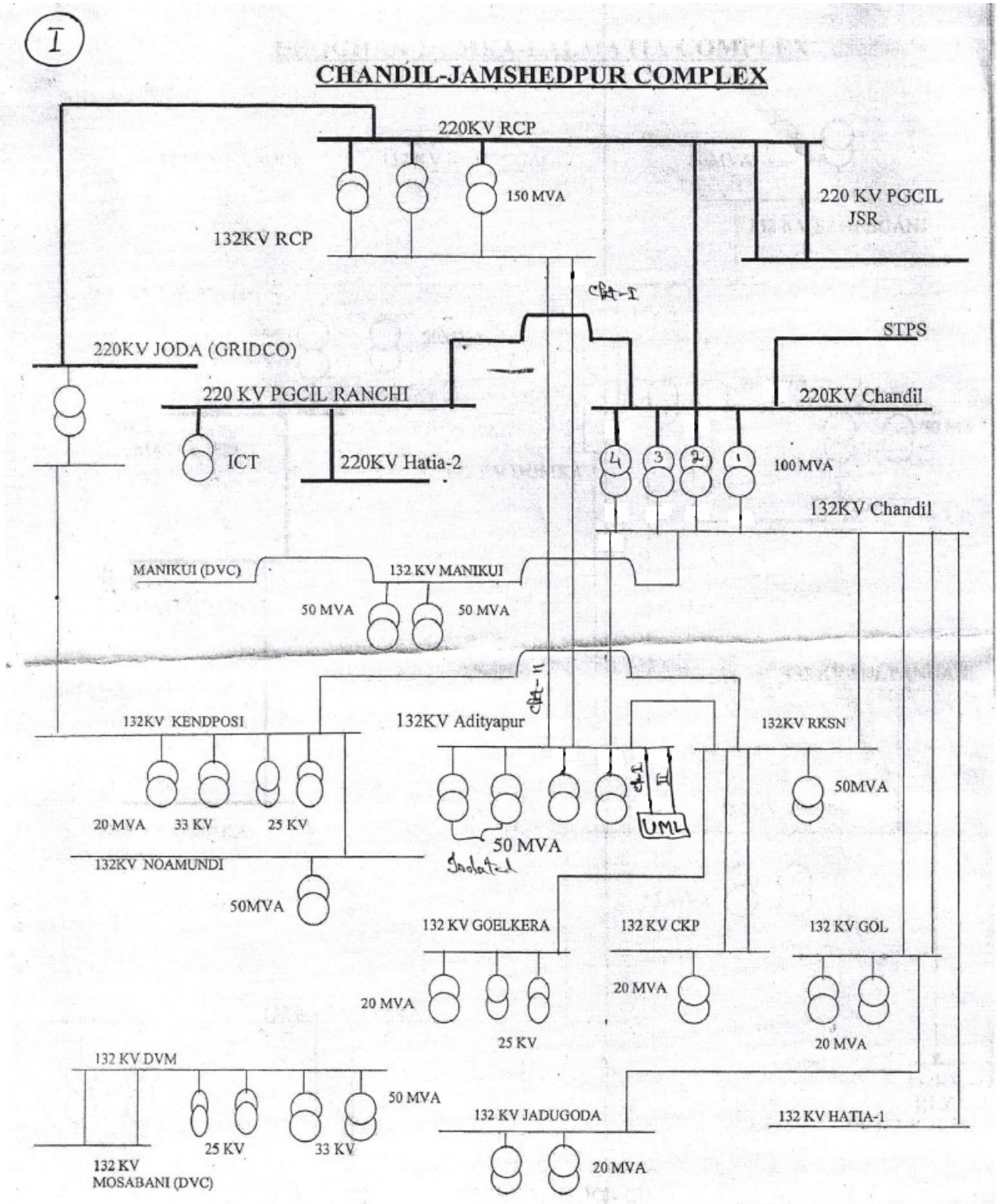
ANALYSIS & DISCUSSION ON GRID INCIDENCES WHICH OCCURRED IN CTU/STU SYSTEMS DURING FEBRUARY, 2016.

Item No B.1. Total power failure at 220kV Chandil S/s of JUSNL system on 24/02/16 at 16:59hrs

At 16:59hrs, the R-ph jumper of 220kV side main bus to isolator of 100 MVA, ICT-IV burnt and grounded which caused a bus fault at 220kV Chandil S/s. The following elements tripped:

Time (Hrs)	Details of tripping	Relay at local end	Relay at remote end
16:59 hrs	220 KV Chandil - Santaldih S/C	AT Chandil Zone –IV distance protection	At Santaldih Did not Trip
	220 KV Chandil – Ramchandrapur S/C	AT Chandil Zone –IV distance protection 1.184 km	At Ramchandrapur Zone-II distance protection
	220/132kV , 100 MVA ATR-III	At HV O/C , E/F	At LV O/C , E/F
	220/132kV , 100 MVA ATR-IV	At HV O/C , E/F	At LV O/C , E/F
	132 KV Chandil – Adityapur S/C	AT Chandil Did not Trip	At Adityapur O/C , E/F
	132 KV Chandil – Rajkharswan S/C	AT Chandil Did not Trip	AT Rajkharswan O/C , E/F
	132 KV Chandil – Manique S/C	AT Chandil U/V	At LV Did not Trip

220kV Chandil -Ranchi S/C and 132kV Chandil-Hatia S/C lines are under shutdown. Total load of 125 MW including 35 MW traction load was interrupted.



Analysis of PMU plots:

- PMU plot of Ranchi shows that there was a 5kV dip in R-Ph voltage during the incident.
- From the Ranchi PMU plot is was observed that R-Ph voltage was partially recovered within 100 ms. This shows that some of the line had tripped in Zone-I time setting. While full recovery of faulted phase voltage has been observed after 1000 ms.

Discrepancies observed:

- 220kV Chandil- Santaldih S/c line should be tripped from Santaldih end on zone 2 distance protection. Reason for tripping of 220kV Chandil- Santaldih S/c on indication of SOTF relay from Chandil end was not understood.
- 220 KV Chandil –Ramchandrapur S/C line tripped from Chandil end on Zone-IV and from Ramchandrapur end on Zone-II. Chandil end should not trip on Zone-IV as the line has already been tripped from Ramchandrapur end on Zone-II. JUSNL may verify the time settings of the distance protection at both ends. Check for any delayed CB operation at Ramchandrapur end. JUSNL may explain.
- 220/132kV, 100 MVA ATR-I & II failed to isolate the fault. JUSNL may explain the reason for not clearing the fault.
- JUSNL may explain the tripping of 132 KV Chandil – Adityapur S/C and 132 KV Chandil – Rajkharswan S/C lines from remote end. May be due to non-clearance of fault from ATRs.
- Tripping of 132 KV Chandil – Manique S/C line from Chandil end on over voltage needs explanation.
- JUSNL has not mentioned the status of 132kV Chandil-Golmuri D/C line. JUSNL may inform the status of 132kV Chandil-Gola D/C line during the incidence.

JUSNL may explain.

Deliberation in the meeting

JUSNL explained that ---

- *On 24.02.16 at 16:59 Hrs the R-ph jumper of 220kV side main bus to isolator of 100 MVA, ATR-I burnt and grounded which caused a bus fault at 220kV Chandil S/s.*
- *220 kV Chandil-Santaldih tripped on Zone-IV from Chandil end only.*
- *220 kV Chandil-Ramchandrapur tripped on Zone-II from Ramchandrapur end and on Zone-IV from Chandil end,*
- *There was a delayed tripping of ATR-I & II because of old EM relays.*
- *Due to delayed clearance of fault form ATRs,132kV Chandil- Adityapur & 132 kV Chandil-Rajkharswan tripped from remote end.*
- *132 kV Chandil-Manique tripped on under voltage from Chandil end, however 132kV Chandil-Golmuri D/C line did not trip from either end.*

PCC felt that 220 KV Chandil –Ramchandrapur S/C line should not trip on Zone-IV from Chandil end as the line has already been tripped from Ramchandrapur end on Zone-II and advised JUSNL to check & review the time settings of 220 KV Chandil –Ramchandrapur S/C line at both ends.

Further, PCC advised JUSNL to review the zone settings of Chandil and adjoining area as per the protection philosophy of ERPC as depicted in Item No B.6.

PCC also advised JUSNL to ensure the protection healthiness of 220/132 kV ATRs I & II by replacing the old EM relays.

On query WBPDCL informed that none of the protection has operated at Santaldih end of 220 kV Chandil –Santadih line.

PCC felt that Santaldih end has failed to detect the fault in zone-II and advised WBPDCL to check & review the zone settings of 220 kV Chandil –Santadih line at Santaldih end.

On query, JUSNL informed that the following works have been taken up at Chandil S/s:

a) *Micom P442 distance relay has been installed in November, 2015 on following lines—*
   1) *220 kV Chandil –Santadih*
   2) *220 KV Chandil –Ramchandrapur*
   3) *132kV Chandil- Adityapur &*
   4) *132 kV Chandil-Rajkharswan*
   5) *132 kV Chandil-Hatia (Now LILOed at Tamar)*

b) *Micom P141 installed on 132kV Chandil-Manique line.*
c) *Rectification & integration of OTI, WTI, MOG of ATRs at Chandil have been completed.*
d) *In 220 KV Chandil –Ramchandrapur line auto-reclosure has been enabled and linked with PLCC panels on 09.03.16.*
e) *In 220 KV Chandil –Ranchi line auto-reclosure has been enabled and termination done in PLCC panels (Auto-reclosure will be in service after testing of PLCC scheduled on 22.03.16)*
f) *In 220 KV Chandil –Santaldih line auto-reclosure has been enabled and termination done in PLCC panels at Chandil end but due to non-availability of PLCC panels at Santaldih(WBPDCL) end the A/R and PLCC scheme could not be activated.*
g) *Also in 220 KV Ramchandrapur-Joda line auto-reclosure has been enabled and termination done in PLCC panels at Ramchandrapur end but due to non-availability of PLCC panels at Joda (OPTCL) end the A/R and PLCC scheme could not be implemented.*
h) *As per the protection philosophy of ER the protection settings at Chandil is under review and will be implemented at the earliest.*

Further, it was informed that JUSNL is ready to share their standby PLCC panels (BPL make) with WBPDCL (for Snataldih end) and OPTCL (for Joda end) to complete the PLCC schemes of both the above lines.

PCC advised WBPDCL and OPTCL to accept the JUSNL offer and implement the PLCC scheme at the earliest for both the 220 kV lines.

WBPDCL and OPTCL agreed and nominated their coordinators as follows to complete the work:

1) *For 220 kV Chandil-Santaldih line:*
   Sh. Amar Pal, DGM (Engg.), M.- 8336904021, e-mail: anpal@wbpdcl.co.in & Sh. Jaydeb Bhattacharyya, Sr, Manager(PS), M.- 8336904059, e-mail: jbhattacharyya@wbpdcl.co.in
2) *For 220 kV Ramchandrapur-Joda line:*
   Sh. L. Nayak, GM, OPTCL, M.- 943890780, e-mail: ele.lanayak@optcl.co.in

(ERPC Secretariat has issued a fax message vide no. 138 dated 21.03.2016 to JUSNL for taking up the issue with the above nominated coordinators for restoring the PLCC scheme of both the lines at the earliest.)

Item No B.2. Disturbance at 220kV Kolaghat S/s of WBPDCL on 24.02.16 at 18:58 hrs.

At 18:54 hrs, LBB protection had operated for 220kV Main Bus-II at Kolaghat TPS and consequently all the elements connected to Main Bus-II tripped from Kolaghat S/s. Tripping details are given as follows:

Time (Hrs)	**Details of tripping**	**Relay at local end**	**Relay at remote end**
18:54 hrs	220 KV Kolaghat-Howrah-II	Tripped due to LBB protection	
	220kV Kolaghat-Haldia-I	Tripped due to LBB protection	

	400/220kV , 315 MVA IBT (Inter Bus Transformer) #2	Tripped from 220kV side due to LBB protection
	220/132kV ATR-III	Tripped from 220kV side due to LBB protection
	Kolaghat U#2 & 3	Tripped due to LBB protection

Due to the tripping of running units of Kolaghat U #2 &3 approximately 267 MW generation loss was reported at Kolaghat TPS and no load loss was occurred at Kolaghat S/s as other 220kV lines, 400/220kV IBT # I and 220/132kV ATR-I & II at Kolaghat were in service and intact from main Bus-I.

Analysis of PMU plots:

- No fault was observed from the Durgapur PMU plot during the said period.

WBPDCL may explain.

Deliberation in the meeting

WBPDCL explained that ---

- *On 24.02.16 at 18:54 Hrs there was R-ph Zone-I fault in 220kV Kolaghat- Haldia-I line but the CB at Kolaghat end failed to operate due to fuse failure of DC supply.*
- *As a result the LBB got initiated and tripped all the 220 kV elements connected to Main Bus-II.*
- *The DC fuse has been rectified with higher rating of 6A (from the earlier 3A).*

On query WBSETCL informed that 1332 kV Kolaghat- Haldia-I line got tripped at Haldia end on Zone-I, R-Ph, 12.8 km.

On query WBPDCL informed that earlier the DC1 & DC2 supply was from a single source which has now been configured from two DC sources for redundancy of DC supply.

It was informed that normally the DC fuse rating should be minimum 10 A for closing coil and 16 A trip coil.

PCC advised WBPDCL to adopt the standard rating of DC fuse to avoid unwanted failure of fuses.

Item No B.3. Disturbance at 220/132kV NJP S/s of WBSETCL system on 29.02.16 at 03:55 hrs.

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

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

The tripping details are as follows:

Time (Hrs)	**Details of tripping**	**Relay at local end**	**Relay at remote end**
	220/132kV, 160 MVA TR-I,II & III at NJP	HV side:- Over flux, 86 L & LV side:- 86 L	

03:55 hrs	220kV NJP-TLDP (IV)- I & II	At NJP High Speed 3-Ph Trip relay (86/LO), Autorecloser L/O	At TLDP (IV) 21 M, 23 Px, PLCC channel unhealthy, 27 RYB, 30 C, 30 D, 86 A,86 B, Autorecloser PTS switch relay
	220kV Binaguri (PGCIL)- NJP Bus Section-A & B	At (NJP end) Did Not Trip (as informed by WBSETCL)	At PGCIL (end) Trip Relay 96 BSA, 96 BSB (as informed by WBSETCL)
	125 MVAr Bus Reactor-II at Binaguri (PGCIL)	Y-Ph differential relay operated	

Analysis of PMU plots:

- No overvoltage has been observed from the Binaguri PMU plot
- From the Binaguri PMU plot 175kV dip has been in Y-Ph at around 03:55:39 hrs.
- 1.1 KA rise in line current of 400kV Binaguri- Purnea has been observed during the incident.
- Fault clearance time was approximately 80 ms.

WBSETCL and Powergrid may explain.

Deliberation in the meeting

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

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

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

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

Item No B.4. Tripping incidences in the month of February, 2016

Other tripping incidences occurred in the month of February, 2016 which needs explanation from constituents of either of the end is given at Annexure- B.4.

Members may discuss.

Deliberation in the meeting

Respective members explained the tripping incidences. The updated status is given at **Annexure-B.4**.

Item No B.5. Protection Committee visit to BSPTCL and JUSNL Sub-stations

In view of repeated uncoordinated trippings in BSPTCL and JUSNL systems, a committee of following protection engineers was formed 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 S. K. Singh, DGM, PGCIL (in place of Shri J. Das, 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 Protection team has presented a preliminary study report regarding the data as submitted by JUSNL and BSPTCL. The same is enclosed at Annexure-B.5.

Members may discuss.

Deliberation in the meeting

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.5****.*

PCC decided to convene a special Meeting tentatively on 29th Mar, 2016 to review the data submitted by BSPTCL & JUSNL and also to discuss the road map for the site visit. PCC also advised all the committee members to give their comments before that.

PCC also advised BSPTCL and JUSNL committee members to go through the observations of committee members as circulated over mail and attend the meeting with their full team along with all

the relevant documents (like SLD, schematic diagrams of relays/ trip-coils/ CB/CT/ PT/ DCDB, communication schemes etc.) for fruitful discussion in the meeting.

(ERPC Secretariat has already issued a meeting notice vide fax message no. 137 dated 17.03.2016 for the special Meeting scheduled to be held on 29th March, 2016 at 11:00 Hrs.)

Item No B.6. PROTECTION PHILOSOPHY OF EASTERN REGION

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

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

Note:

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

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

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

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

NTPC ER-II and IPPs may submit the revised zone settings data at the earliest.

Deliberation in the meeting

It was informed that NTPC ER-II has 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.7. 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
14) 400kV Malda (PG) Completed on 23rd February, 2016
15) 400kV Farakka (NTPC) Completed on 24th February, 2016
16) 400kV Behrampur(PG) Completed on 25th February, 2016
17) 400kV Sagardighi (WBPDCL) Completed on 25th February, 2016
18) 400kV Bakreswar (WBPDCL) Completed on 26th February, 2016

Members may note.

Deliberation in the meeting

Members noted.

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 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.

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

In 40th PCC, 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.

BSPTCL may update the status.

Deliberation in the meeting

BSPTCL informed that DP Setting adjusted as per ERPC Philosophy as follow:

	Nomenclature	Relay setting			
		Zone 1	Zone 2	Zone 3	Zone 4
Main 1(siemens, siprotec 7SA52)	220 kv purnea line-1 ,2	forward, R(Z1)-4.00 ohm, x(Z1)-12.23, ohm, RE-15.00, T-0.00 sec	forward, R-8.00,X-18.49,RE-19.00,T-0.35 sec	Forward,R-13.00,X-30.8,RE-23.00,T 3 Delay-1 sec	Reverse,R-4.54,X-3.06,RE-23.00 ,T4 delay-0.5 sec

Main 2(ABB,REL 670)	220 kv purnea line-1 ,2	forward X1Z1'-30.57 ohm,R1Z1'-5.35 ohm, X0Z1'-99.1 ohm, R0Z1'-21.58 ohm ,T-0.00 sec	Forward,X1Z2'-46.23 ohm,R1Z2'-8.10 ,X0Z2'-149.8,R0Z2'-32.64, ,T-0.35 sec	Forward,X1Z3'-61.14 ohm, R1Z3'-10.7 ohm, X0Z3'-198.2 ohm, R0Z3'-43.08 ohm, T 3 Delay-1 sec	Reverse,X1Z4'-7.64 ohm ,R1Z4'-1.34 ohm ,X0Z4'-24.80 ohm, R0Z4'-5.40 ohm,T-0.5 sec

PCC expressed that this Sub-station is also in the list of site visit so BSPTCL shall co-operate with the Protection team as given in Item No B.5 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.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.

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.

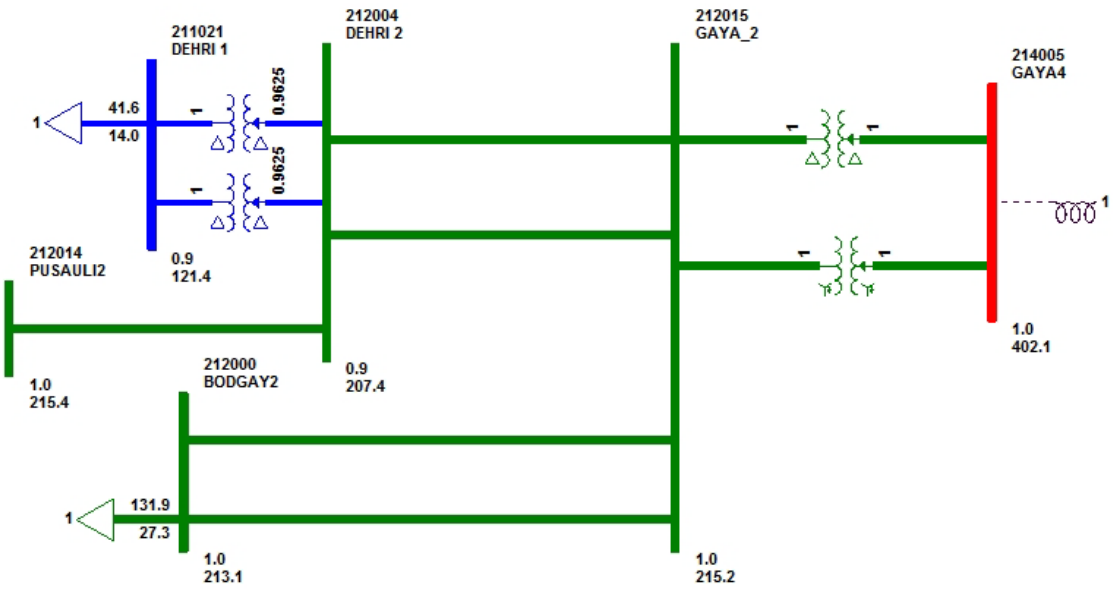
PCC also advised TTPS, NTPC to implement the zone setting philosophy as given in Item no. B8 at the earliest.

NTPC may update.

Deliberation in the meeting

NTPC informed that the zone-IV settings have been reviewed and implemented as per ERPC protection philosophy.

ITEM NO. C.3: 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.

39TH 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.

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.

BSPTCL and Powergrid may update.

Deliberation in the meeting

BSPTCL informed that at present only there are only three 132kV radial feeders which can be used for SPS load shedding but the desired quantum of load could not be achieved with the tripping of these feeders. So, the augmentation of additional (i.e. 3rd 500 MVA ICT) may be expedited.

ITEM NO. C.4: 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.

In 40th PCC, 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.

WBPDCL may update.

Deliberation in the meeting

WBPDCL informed that the revised settings will be incorporated by April, 2016.
Further, WBPDCL inquired that whether the stub protection can be kept in service for this line.
PCC expressed that stub protection may be kept in service.

ITEM NO. C.5: 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 40th PCC, Powergrid informed that Bus-bar protection at 220kV Birpara S/s will be installed by 2nd week of March 2016.

Powergrid may update.

Deliberation in the meeting

Powergrid informed that the testing of Bus-bar protection is expected by 25.03.2016.

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

In 40th 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 Siemens has checked the LBB logic and found ok. Further, OPTCL is exploring for improvement in logic for tripping of single bus in case of LBB operation.

The replacement work of relays at Tarkera is in progress.

Meeting ended with vote of thanks to the chair.

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Annexure- I

Participants in the 41st PCC meeting of ERPC

Venue: ERPC Conference Hall, Kolkata   Time: 11:00 hrs   Date: 17.03.2016 (Thursday)

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Participants in the 41st PCC meeting of ERPC

Venue: ERPC Conference Hall, Kolkata Time: 11:00 hrs Date: 17.03.2016 (Thursday)

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37					
38					
39					
40					

Annexure- B.4

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	Remarks/Brief Reasons
Fault clearing time is violating protection standard (As per PMU data)										
1	400 KV MERAMUNDALI-MENDHASAL	24.02.16	15:30	24.02.16	16:12	approx 320 ms	R-N, Z-II	R-N, Z-I, 10.1 km from Mendasal	No autorecloser operation observed in PMU data	R-N FAULT (There was a PLCC problem for which Siemens is on job)
2	400 KV -MENDHASAL-NEW DUBRI	24.02.16	15:30	24.02.16	16:46	approx 320 ms	Not Tripped	R-N, Z-II at New Duburi	No autorecloser operation observed in PMU data	Tripped with 400 kV Meramundali - Mendasali line as at that time Z-II time at N. Duburi was zero for some works. Now Z-II time has been restored.
3	400 KV STERLITE - MERAMUNDALI-I	25.02.16	12:55	26.02.16	15:18	approx 320 ms	R-B (Sterlite to confirm)	Zone-II, R-B fault, 357.8 KM from Meramundali Fault current : Ir : 1.24 KA Ib: 2.33 KA	--	R - B FAULT (400 kV Sterlite Meramundali tripped from Sterlite end)
4	400KV MERAMUNDALI - MENDHASAL	29.02.16	15:52	29.02.16	16:47	approx 360 ms	R-N, 95.1 km from Meramundali	R-N, Z-I at Mendasal	No autorecloser operation observed in PMU data	R - N FAULT. PLCC restoration work is in progress,
No autorecloser operation observed in PMU data										
1	400 KV PPSP-ARAMBAG-II	06.02.15	13:14	06.02.16	14:29	<100	Y-N fault, Zone-I, 122.3 KM from PPSP	Y-N fault, Zone-IFault current : 2.87 KA, 86.59 KM from Arambag	A/R disabled at PPSP	Y-N FAULT
2	400KV PPSP-ARAMBAGH-II	16.02.16	11:07	16.02.16	11:28	<100	B-N, Dist=48.5Km from PPSP, Z1, fault current=3.242KA	B-N,Dist=165.4Km from Arambag, Z1, Fault current=2.208KA	A/R disabled at PPSP	B-N FAULT
3	400 KV Kolaghat - Kharagpur -I	19.02.16	11:10	19.02.16	11:29	<100	Z1,B-N, 54.38 KM from Kolaghat, 3.67 KA	Z1,B-N, 18.23 KM from KGP F/C=5.6 KA	No autorecloser operation observed in PMU data	B-N FAULT (At 11:41 hrs. this line tripped on same fault indication. But this time direct trip received from Kolaghat end.)
4	400KV KHSTPP - BARH-II	21.02.16	16:20	21.02.16	19:07	<100	R-N , Z-1, 83% from Kahalgaon.	R-N , Z-1, 36 Km from Barh, F/C- 8.6 KA	No autorecloser operation observed in PMU data	R - N FAULT. A/R was in disabled conditions for OPGW work.
Fault Not observed in PMU data										
1	400KV BOKARO-KODARMA-II	09.02.16	10:17	10.02.16	11:24	--	DT RECEIVED AT BOKARO END	No information received	--	SPURIOUS TRIPPING
2	400KV BINAGURI-PURNEA-II	16.02.16	21:39	16.02.16	22:40	--	No information received	DT Received	--	SPURIOUS TRIPPING

Annexure-B.5

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.

General Observation on Protection Data.

BSPTCL

A. Bihar Sharif:

1. Bus bar protection detail not available.
2. DC positive is earthed.
3. 220kV CB only one tripping coil.
4. Relay testing record not available.
5. Open time for Begusarai-2 is high (110 ms)
6. DC 2sets, one set stand by.
7. DP relay setting not as per ERPC philosophy.
    i. Zone 2 & 3 Time for 132kV Sekhpura-1 Line very low.
    ii. Zone 3 Time for 132kV Hatidah Line very low.
    iii. Detail setting to be reviewed in respect of resistive reach and additional functions in respect of 220kV lines.
8. Separate REF relay for Auto Transformer for redundancy.

B. 220/132/33kV Madhepura

1. DP setting not as per ERPC philosophy.
2. DC voltage appears to be high: (120+136=256V dc)
3. Open time high for 220kV incomer-1 & 2 Line CB.(>86mSec.)
4. Zone2,Zone-3 timing of Madhepura-PG 220kv Line 1 & 2 is Zero **C. 132/33kV Purnea**
1. DC positive is earthed.

D. 220/132/33kV Begusarai

1. DP setting not as per ERPC philosophy.
2. DC voltage appears to be high: (136+133=269V dc)
3. Earth resistance high for TRFR

E. 132/33kV Foebsganj

1. DP relay setting not as per ERPC philosophy.
   Zone timing very low.
2. Closing time very high for 132kV Katiya line CB.

JUSNL

A. 132/33KV ADITYAPUR-1

1. DP with O/c & E/F P441 .Separate back up protection suggested.
2. DP setting not as per ERPC philosophy.
3. Differential relay not numerical.
4. Tripping time very high for 220kV CB for ICT-1 (569ms)
5. DC positive is earthed.
6. 220kV CB only one tripping coil.

B. 220/132/33kV Chandil

1. DP setting not as per ERPC philosophy.
2. Differential relay not numerical.
3. Earth resistance high: 2Ω
4. DC positive earthed.

C. 220/132/33kV Ramchandrapur

1. DP setting not as per ERPC philosophy.
2. Differential relay not numerical.
3. Earth resistance high: 2Ω
4. DC positive earthed.