Minutes
of
53rd PCC meeting

Date: 04.04.2017
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 53RD PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC, KOLKATA ON 21.03.2017 (TUESDAY) AT 11:00 HOURS

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

Member Secretary, ERPC welcomed all the participants and informed that 5 days training on "Operation, Maintenance & Protection of Substation Plants" will be held from 3rd to 7th April 2017 at Kolkata. Total number of participants are limited to 30. MS, ERPC advised all the constituents to nominate three young engineers from each constituent to attend the training. Constituents were advised to send the nomination to ***mserpc-power@nic.in***.

PART – A

ITEM NO. A.1: Confirmation of minutes of 52nd Protection sub-Committee Meeting held on 16th February, 2017 at ERPC, Kolkata.

The minutes of 52nd Protection Sub-Committee meeting held on 16.02.17 circulated vide letter dated 28.02.17.

Members may confirm the minutes of 52nd PCC meeting.

Deliberation in the meeting

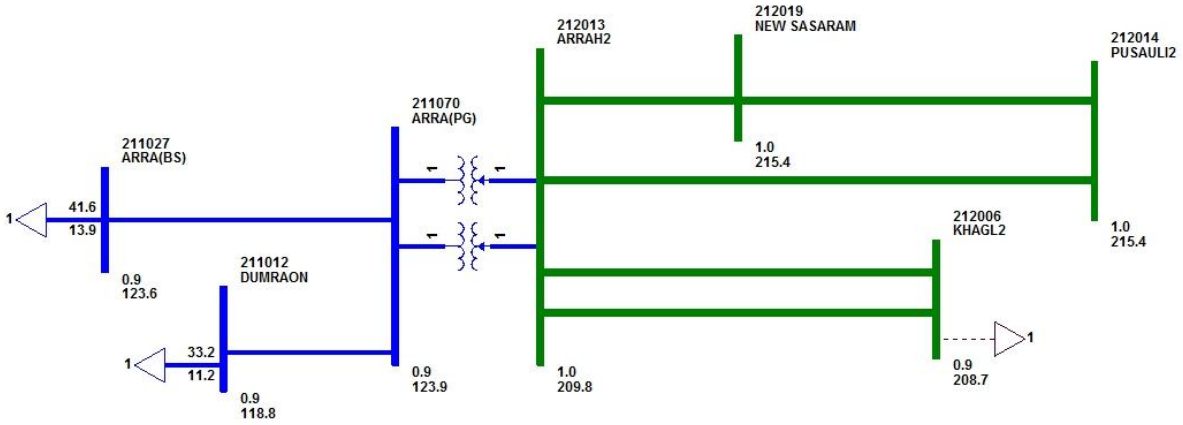
Members confirmed the minutes of 52nd PCC meeting.

PART – B

ANALYSIS & DISCUSSION ON GRID INCIDENCES OCCURRED IN FEBRUARY, 2017

ITEM NO. B.1: Disturbance at 220 kV Arrah (BSPTCL) S/s on 02-02-17 at 00:22 hrs.

1. **Single line diagram:** Not Submitted



2. **Pre fault conditions:** Submitted

220 kV Arrah-Khagul D/C & 220 kV Arrah-New Sasaram (Nandokar) S/C was out of service. So Arrah was radially fed from Sasaram through 220 kV Arrah – Sasaram S/C.

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

At 00:22 hrs, B-N fault occurred at 220 kV Arrah – Sasaram S/C and Sasaram end relay identified the fault in zone 1, B-N, F/C 7.35 kA. Autoreclose operation was initiated from both the ends but after 1000 ms, other two phase breakers were tripped at Sasaram end on pole discrepancy. This resulted in loss of total power supply at 220kV Arrah S/s and its surrounding area i.e. Dumraon & Jagdishpur (all were being radially fed from Sasaram).

4. **Disturbance record:** Submitted

5. **Remedial action taken :** Not submitted

Analysis of PMU plots:

- At 00:22 hrs, 6 kV voltage dip in B phase has been observed in Sasaram PMU data.
- Fault clearing time is less than 100 ms.

Status of Reporting: POWERGRID has submitted DR files on 07-02-17.

Powergrid may explain reason for pole discrepancy operation at 220kV Sasaram end.

Deliberation in the meeting

Powergrid informed that a transient B-N fault occurred in 220 kV Arrah – Sasaram S/C line and Sasaram end relay identified the fault in zone 1. Autoreclose operation was initiated from both the ends but at Arrah end after 1000 ms, poles of other two phases were tripped on pole discrepancy. Autoreclose operation was unsuccessful at Sasaram end also.

PCC advised Powergrid to check the Autoreclose scheme at both Sasaram and Arrah ends and investigate the reason for pole discrepancy at Arrah end.

Powergrid informed that they will verify the scheme during next opportunity shutdown.

BSPTCL informed that 220kV Arrah-New Sasaram S/C line generally kept open during off-peak hours due to over voltage problem at 220kV Arrah end. BSPTCL added that 220kV Arrah-Khagul D/C line was also kept open to avoid the overloading of 220kV Khagul-Samtchak line.

PCC felt that at least two 220kV lines should be in service to maintain the reliability of supply at 220kV Arrah S/s and advised BSPTCL to place an agenda along with the details to ERPC and ERLDC for detailed deliberation in OCC meeting.

ITEM NO. B.2: Multiple elements tripping at 220/132 kV Lalmatia (JUSNL) S/s on 06-02-17 at 16:40 Hrs.

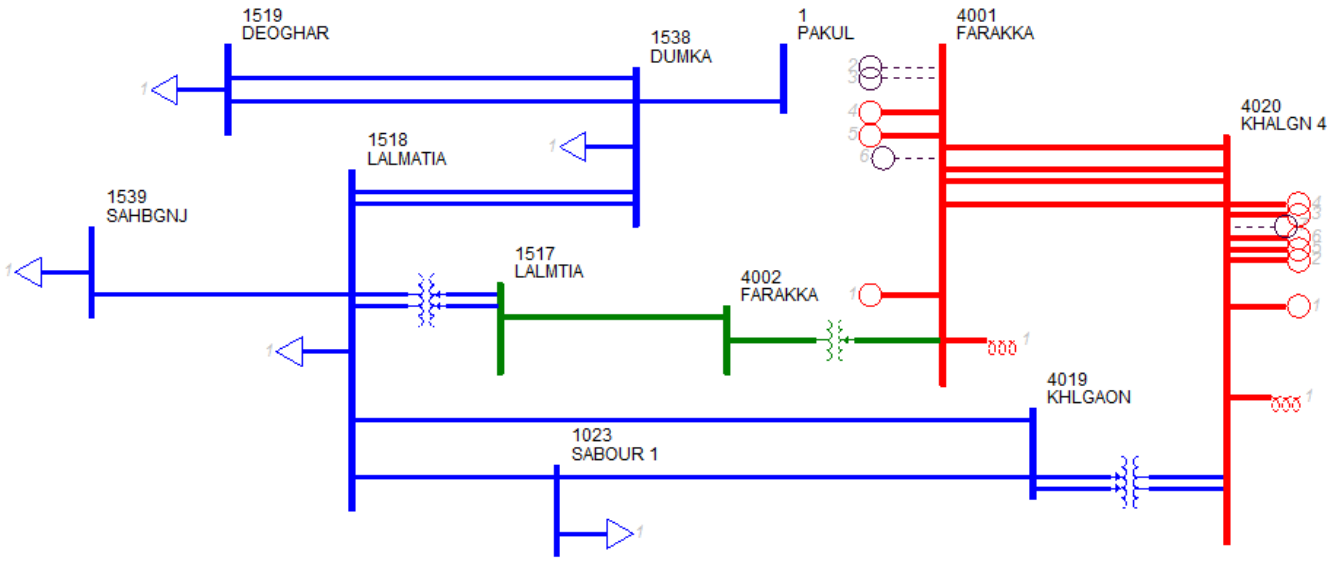
1. **Single line diagram:** Not Submitted

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

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

At 16:40hrs, blasting of 132 kV Y & B phase CTs of 132 kV bus sectionalizer at 220/132kV Lalmatia S/s resulted in following events:

- 132 kV Lalmatia - Kahalgaon and 132 kV Lalmatia - Dumka – II tripped from Lalmatia end on zone IV protection.
- 132 kV Lalmatia -Dumka – I feeder tripped from both end.
- Farakka end of 220 kV Farakka Lalmatia line, remain picked up the fault in zone 1 for 880 ms but no line breaker was tripped.



The relay Indications are as follows:

Time	Name of the element	Relay at Lalmatia	Relay at remote end
16:40 hrs	220 kV Lalmatia - Farakka feeder	Did not trip	R-Y-B phase Z-I started, B phase relay picked at 16:40:28.504 hrs, Y phase relay picked at 16:40:28.664 hrs, R phase relay picked at 16:40:28.905 hrs, F/C 1.5 kA in all three phases. All the relay were in picked condition till the end of time frame captured by NTPC end DR (DR is attached)
	132 kV Lalmatia - KhSTPP feeder	B-N, Z-IV, O/C, IA 0.7kA, IB – 0.9 kA, IC – 3kA, Fault duration 183.8 ms.	Did not trip
	132 kV Lalmatia Dumka – I	E/F	D/P
	132 kV Lalmatia Dumka – II	E/F, Z-IV	Did not trip
	220/132 KV ATR, 132/33 KV ATR – I & II at Lalmatia	E/F protection at Lalmatia	

4. **Disturbance record:** Submitted

5. **Remedial action taken :** Not submitted

Analysis of PMU plots:

- At 16:40 hrs, 4 kV voltage dip observed in all three phases.
- Fault clearance time is 700 ms. Though the voltage fully recovered to pre-fault value after 600 ms of the fault.

Status of Reporting:

- Preliminary report was received from JUSNL on 06-02-17.
- NTPC has sent DR on 09-02-17

JUSNL and NTPC may explain the following:

- Reason for not clearing the fault from 132kV Lalmatia end

- The reason for non-clearing the fault from 220kV Farakka end distance protection of 220 kV Farakka – Lalmatia S/C even after sensing the fault in zone 1 with fault current more than 1.4 kA in all three phases
- How the fault got cleared from 220kV side

Deliberation in the meeting

NTPC informed that 132 kV Y & B phase CTs of 132 kV bus sectionalizer were busted at 220/132kV Lalmatia S/s and Bus bar protection was failed to operate. One 220/132kV ATR at Lalmatia (under NTPC control area) tripped on backup E/F protection other ATR which is under JUSNL control area was failed to clear the fault. As a result, 220kV Lalmatia-Farakka line tripped from Farakka end on directional E/F protection.

JUSNL informed that 132kV Lalmatia-Dumka D/C line and 132kV Lalmatia-Khahalgaon S/C line tripped from Lalmatia end on non directional over current protection. The 220/132kV ATR at Lalmatia under their control area also tripped on over current E/F protection.

PCC observed that 220kV Lalmatia-Farakka line tripped from Farakka end after 6 sec which is not acceptable and tripping of 220/132kV ATRs is not clear.

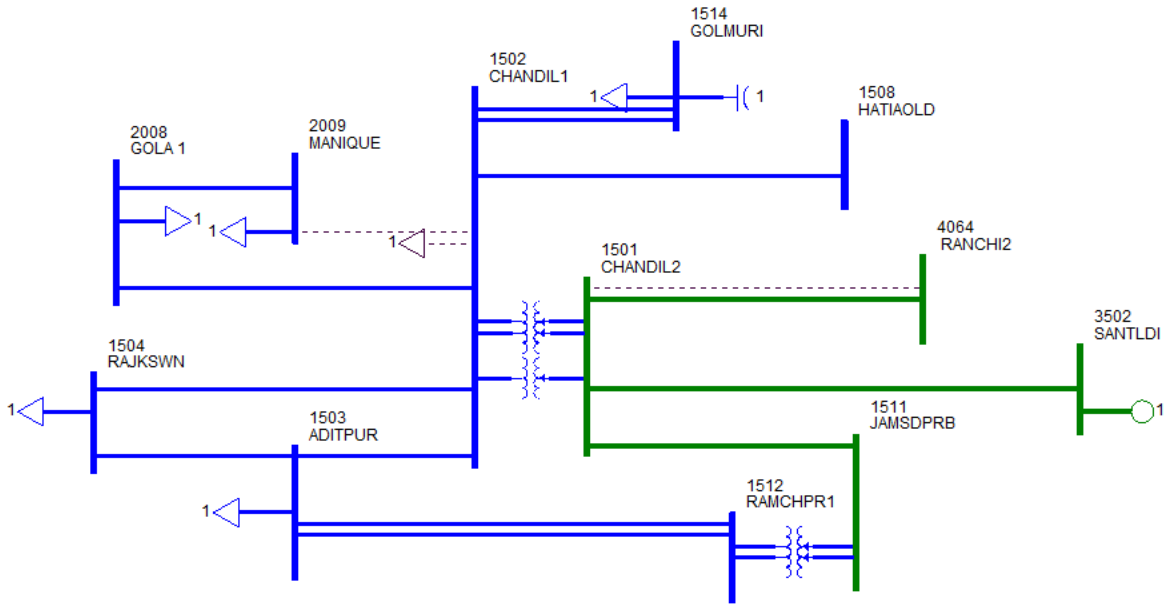
PCC advised the following:

- *NTPC should check the reason for non-operation of busbar protection at 132kV Lalmatia S/s.*
- *NTPC and JUSNL should jointly test the healthiness of the busbar protection at 132kV Lalmatia S/s*
- *NTPC and JUSNL should place the details of ATR tripping along the relevant DR.*
- *JUSNL should disable the non-directional over current protection feature in all 132kV lines and enable directional over current protection with proper relay coordination.*

PCC advised JUSNL and NTPC to submit the action taken report to ERPC and ERLDC within a week.

ITEM NO. B.3: Disturbance at 220 kV Chandil (JUSNL) S/s on 24-02-17 at 09:05 Hrs.

1. **Single line diagram:** Not Submitted



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

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

At 09:05hrs, 220 kV Ranchi – Chandil S/C tripped due to Y phase CT burst at Chandil end. At the same time, 220 kV STPS – Chandil S/C tripped from Chandil end & 220 kV Ramchandrapur – Chandil S/C and 220 kV Ramchandrapur – Joda S/C tripped from Ramchandrapur end.

Analysis of tripping of 220 kV Ranchi – Chandil:

- As per DR, it is observed that Chandil end identified the fault in 220 kV Ranchi – Chandil S/C on zone 1 protection and issued trip command to CBs
- R & B phase breakers at Chandil end tripped within 80 ms but Y phase breaker did not open properly at Chandil end as Y phase current was not zero for 800 ms approx.

Analysis of tripping of 220 kV Ramchandrapur – Chandil:

- Chandil end tripped on zone IV and Ramchandrapur end tripped on zone –II.
- Though Y & B phase current became zero, R phase current remained more than 520 A at both end for 400 ms and then it increased to 2.9 kA.

Analysis of tripping of 220 kV STPS – Chandil:

- Chandil end tripped on zone IV and all the breakers tripped within 60 ms. F/C I_R = 698 A, I_B = 1.8 kA

Analysis of tripping of 220 kV Ramchandrapur – Joda:

- Ramchandrapur end picked up zone 1 and R&B phase current was more than 200 A while phase voltage <5kV.

The relay indications are as follows:

Time	Name of the element	Relay at local end	Relay at remote end
09:05 hrs	220 kV Chandil Ranchi S/C	Y-N, Z-I, O/C, E/F	Yet to be received
	220 kV Chandil STPS S/C	Y-N, Z-IV	Did not trip
	220 kV Chandil Ramchandrapur S/C	Y-N, Z-IV	Y-N, Z-II
	220 kV Ramchandrapur Joda S/C	Z-I at Ramchandrapur	Yet to be received

4. **Disturbance record:** Submitted

5. **Remedial action taken :** Not Submitted

Analysis of PMU plots:

- At 09:05 hrs, 12 kV voltage dip observed in Y phases. Fault clearance time is 800 ms.

Status of Reporting: Preliminary report along with DR was received from JUSNL on 24-02-17.

JUSNL, Powergrid and OPTCL may explain the following:

- Powergrid may place the DR of the event at 220kV Ranchi end
- OPTCL may place the relay indications and DR at 220kV Joda end
- JUSNL and POWERGRID may check the operation of the all the three phase breakers at both ends of 220 kV Ranchi – Chandil S/C and 220 kV Ramchandrapur – Chandil.
- Reason for operation of 220 kV Ramchandrapur – Joda at Ramchandrapur may be investigated.

Deliberation in the meeting

JUSNL explained that at 09:05hrs,

- *220 kV Ranchi – Chandil S/C line tripped due to Y phase CT burst at Chandil end. Ranchi end tripped and cleared the fault on zone 2 protection.*
- *Chandil end relay identified the fault in zone 1 and issued trip command to CB but Y-phase pole of breaker did not open from Chandil end.*
- *As a result, 220 kV STPS – Chandil S/C line tripped from Chandil end on zone –IV protection within 60 ms.*
- *220 kV Ramchandrapur – Chandil S/C line tripped from Chandil end on zone-IV protection within 500 ms.*

JUSNL failed to explain the tripping of 220 kV Ramchandrapur – Chandil S/C line from Ramchandrapur end on zone 2 protection and tripping of 220 kV Ramchandrapur – Joda S/C line from Ramchandrapur on zone 1 protection.

JUSNL added that 315 MVA, 400/220kV ICT also tripped during this disturbance.

PCC advised the following:

- *JUSNL should check the zone IV time setting of 220 kV STPS – Chandil S/C line at Chandil end.*
- *JUSNL should check & rectify the Y-ph pole of CB of 220 kV Ranchi – Chandil S/C at Chandil end*
- *Regarding tripping of 220 kV Ramchandrapur – Chandil S/C, 220 kV Ramchandrapur – Joda S/C and 315 MVA, 400/220kV ICT, JUSNL and Powergrid were advised to collect the details and submit the explanation to ERPC and ERLDC within 2 days.*

ITEM NO. B.4: Disturbance at 220 kV Bakreswar (WBSETCL) S/s on 13-02-17 at 09:55 hrs.

1. **Single line diagram:** Not Submitted

2. **Pre fault conditions:** Submitted

   - WB demand was around 5358 MW.
   - 220 KV Bus-II at Bakreswar was under shutdown

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

As 220 kV Bus-II was under shutdown, all the elements were connected to 220 kV Bus – I at Bakreswar. At 09:55 hrs, all 220 kV feeders and 400/220 kV ICTs were tripped on operation of bus bar protection of bus – II.

- Unit #3, 4 & 5 (units connected to 220 kV bus) were remain in service with house load.
- Unit #3 tripped after 22 sec due to low drum level because of not opening of bypass valve.

Relay indications are as follows:

Time	Name of the element	Relay at local end	Relay at remote end
09:55 hrs	400/220 kV IBT I&II at Bakreswar, 220 kV Bakreswar - Gokharna D/C, 220 kV Bakreswar – Satgachia D/C & 220 kV Bakreswar – Bidhannagar D/C	Bus bar protection	Information is yet to received
	Unit 4 & 5 at Bakreswar	In operation with house load	
	Unit 3	Tripped due low drum level	

4. **Disturbance record:** Not Submitted

5. **Remedial action taken :** Not Submitted

Analysis of PMU plots:

- No fault has been observed in PMU data.

Status of Reporting: Tripping report received from WBSETCL on 14-02-17.

WBPDCL may explain the reason for operation of bus bar protection of Bus-II at 220 kV Bakreswar S/s.

Deliberation in the meeting

WBPDCL informed that there is no fault in the switchyard and none of the protection system operated at 220kV Bakreswar. But master trip relay operated and issued trip command to all the CBs.

WBPDCL added that they did not find any cause for such unwanted operation.

PCC felt that DC ground could be a cause for such unwanted tripping and advised WBPDCL to check the DC grounding.

ITEM NO. B.5: Disturbance at CESC system on 23-02-17 at 09:53 Hrs.

1. **Single line diagram:** Submitted

2. **Pre fault conditions:** Submitted

   - CESC demand was around 1120 MW.
   - Unit protection of 132 kV Chakmir – Taratala – I was out due to fault in optical fiber

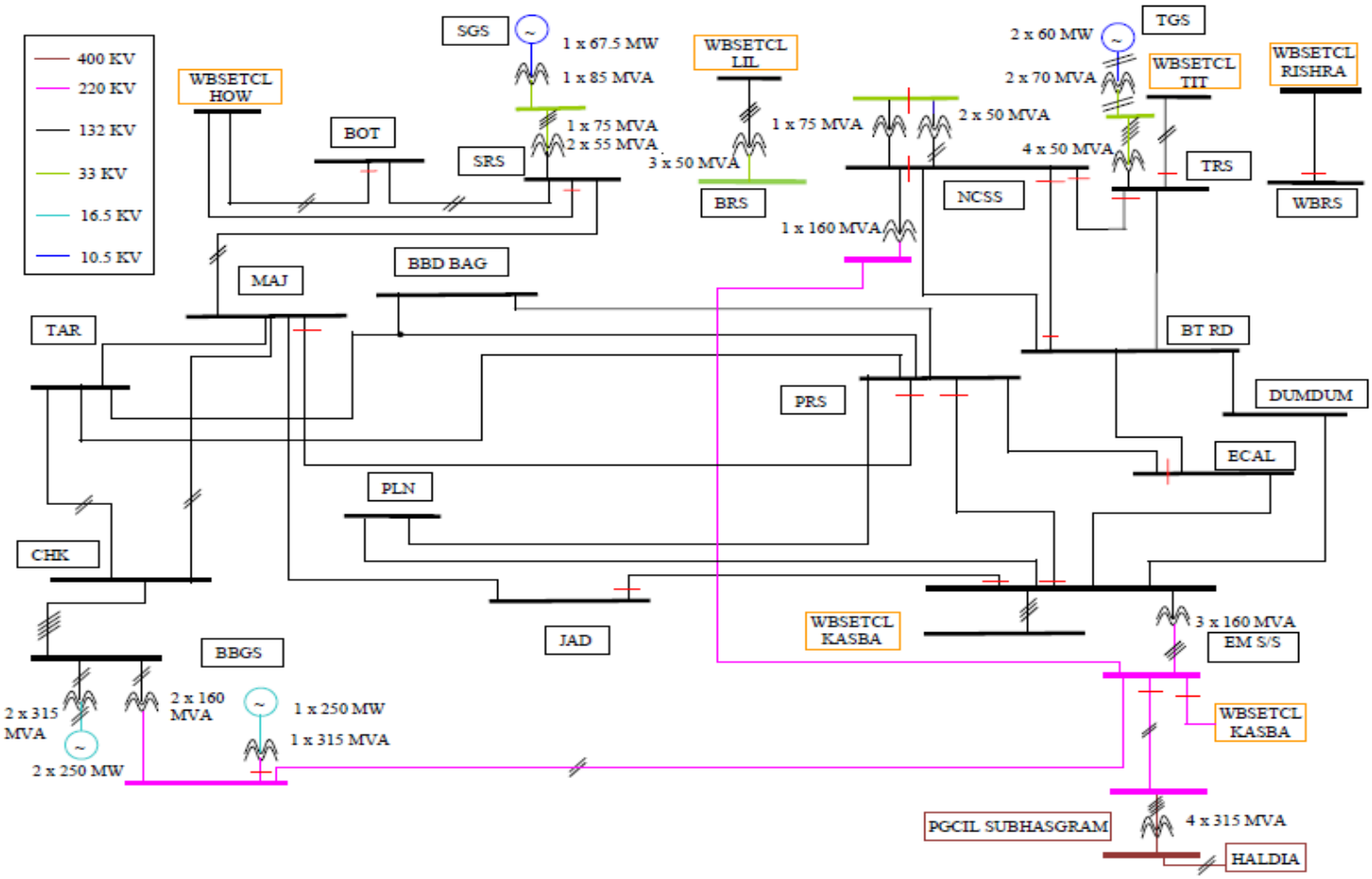
3. **Detailed analysis of tripping incident:** Submitted

At 09:53 hrs, B-N fault occurred in 132 kV Chakmir – Taratala line– I and the line was tripped from both ends within 300 ms. The following events occurred,

- Though fault was cleared by both ends of 132 kV Chakmir – Taratala line– I in 300 ms, 132 kV BBGS – Chakmir Q/C tripped only from BBGS end in zone-II (Fault clearing time is 400 ms as per CESC).
- Tripping of 132 kV BBGS – Chakmir Q/C resulted in instant shutdown of all radially fed substations i.e. SRS (fed from Majherhat), P. ST(fed from Taratala), BBD Bag (fed from Taratala), Majherhat & Chakmir.
- These trippings resulted in 400 MW load loss. So power injected by BBGS flowed through 220 kV BBGS – 220 KV EMSS -132 KV EMSS – 132 KV Kasba (WBSETCL) resulted in hunting of BBGS machines.
- In Durgapur PMU data, oscillation was observed in voltage, frequency, MW flow in 400 kV Durgapur – Jamshedpur and 400 kV Durgapur – Maithon – II for 4-5 sec.
- 132 kV EMSS – Kasba(WBSETCL) T/C tripped from WBSETCL end in O/C protection and from CESC end due to carrier received from WBSETCL end and CESC system got islanded.
- BBGS U#1 and U#2 tripped due to over speed and U#3 tripped due to under frequency.

Relay indications:

Time	Name of the element	Relay at local end	Relay at remote end
09:53 hrs	132 kV BBGS – Chakmir Q/C	Z-II, Time delay 400 ms	CB holding at Chakmir end
	132 kV Chakmir – Taratala - I	Z-I, Time delay 100 ms	Z-II, Time delay 300 ms at Taratala
	132 kV Taratala – Majherhat	Z-II (Reverse), Time delay 200 ms	Inter tripped at Majherhat end
	132 kV EMSS – Kasba(WB) T/C	Inter tripped	Back up O/C at WB end
	220/132 kV ICT I, II at BBGS	Over flux	
	U #I, #2 at BBGS	Over speed	
	U#3	Under frequency	



4. **Disturbance record:** Submitted

5. **Remedial action taken :** Not Submitted

Analysis of PMU plots:

- At 09:53 hrs, no fault has been observed in Durgapur PMU data.
- Oscillations were observed in voltage, frequency, MW flow in 400 kV Durgapur – Jamshedpur and 400 kV Durgapur – Maithon – II for 4-5 sec

Status of Reporting:

- Preliminary report along with DR & EL received from CESC on 24-02-17
- DR data at Kasba (WBSETCL) is yet to be received

.

CESC may explain the following:

- No fault was observed from PMU data as well as DR data except 132 kV Chakmir – BBGS Q/C at Chakmir end. However, CB did not trip at Chakmir end.
- Reason for tripping of 132 kV BBGS – Chakmir Q/C at BBGS end may be explained
- Reason for oscillations in the CESC system

Deliberation in the meeting

CESC explained the disturbance with disturbance recorder as follows:

- *132 kV Chakmir – Taratala – I unit protection was out due to fault in optical fiber*
- *B-N fault occurred in 132 kV Chakmir – Taratala– I line and the line was tripped from Taratala end on zone 1 distance protection.*
- *Chakmir end tripped on zone 2 protection (zone 2 time setting is 300 ms). However, opening of B-pole CB at Chakmir end delayed and tripped at 400 ms.*
- *As a result the adjacent lines 132 kV BBGS – Chakmir Q/C lines tripped from BBGS end on zone 2 protection within 400 ms due to racing (zone 2 time setting is 400 ms).*
- *220/132 kV ICT I, II at BBGS tripped on over flux protection*
- *132 kV Taratala – Majherhat line also tripped from Taratala end on reverse zone.*
- *These trippings resulted in 400 MW load loss and caused severe power flow oscillations in the system.*
- *132 kV EMSS – Kasba(WB) T/C tripped on backup over current protection due to increase in current during the oscillations.*

CESC explained that delayed fault clearing and sudden load loss of 400 MW have caused power flow oscillations in the system.

CESC added that they have replaced the electromechanical relay (CDG31) in 132 kV EMSS – Kasba(WB) T/C lines with numerical relays (Micom P141) during 9th -11th March 2017.

ITEM NO. B.6: Disturbance at 400 kV Meramundali (OPTCL) S/s on 26-02-17 at 14:41 Hrs.

1. **Single line diagram:** Submitted (enclosed at Annexure-B6)

2. **Pre fault conditions:** Submitted

Bus I	Bus II	Tie-Breaker ON
Vedanta-II	Angul-I	401-ON
Mendhsal-I(Idle charged)	Duburi-II	402-ON
Angul-II	Vedanta-I	403-ON
Duburi-I	Mendhasal-II(Not in Service)	404-not in service
JSPL-I	KANIHA	405-ON
ICT-I (B/D)	Future	406- not in service
Future-7	ICT-II	407-OFF
GKEL	JSPL-II	408-ON

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

At 15:08 hrs, heavy fire at grass and bushes outside the fencing of Meramundali switchyard caused tripping of 220 kV Meramundali – Bhanjanagar – II, 220 kV Meramundali – TTPS – II along with 220 kV B/C from Meramundali end. At the same time, 400 kV Meramundali – Mendasal S/C and 220 kV Meramundali – TTPS – I tripped from remote end. Fault clearing time was less than 100 ms as per PMU data.

At 15:32 hrs, idle charged portion of 220 kV Meramundali – Bhanjanagar – I tripped from Meramundali end due to R-N fault. Fault clearing time was less than 100 ms as per PMU data.

At 15:36 hrs, 220 kV Meramundali Bidansi S/C tripped from both end due to R-Y fault. Fault clearing time is less than 100 ms as per PMU data.

Relay indications:

Time (Hrs)	**Name of the element**	**Relay at Meramundali end**	**Relay at remote end**
15:08 hrs	400 kV Meramundali - Mendasal	O/V, L1 and L3 picked up but did not trip	DT received
	220 kV Meramundali – Bhanjanagar - II	B-N, Z-I, 0.5km	B-N, Z-II, 133.08 km
	220 kV Meramundali TTPS - II	Gr B, single phase trip,	B-N, F/C 2.948 kA
	220 kV Meramundali TTPS - I	Did not trip	B-N, F/C 3.088 kA
	220 kV B/C at Meramundali	O/C & E/F	
15:32 hrs	220 kV Meramundali – Bhanjanagar - I	R-N, F/C 12.37 kA	Line was not connected at Bhanjanagar
15:36 hrs	220 kV Meramundali – Bidansi S/C	R-Y, Z-I, I_R = 8.91 kA, I_Y = 9.99 kA, 1.33 km	Z-II, 82.32 km

4. **Disturbance record:** Not Submitted

5. **Remedial action taken :** Not Submitted

Analysis of PMU plots:

- In Rourkela PMU data, R-B phase fault was observed at 15:08 hrs, R-N fault was observed at 15:32 hrs and R-Y phase fault was observed at 15:36 hrs.
- Fault clearing time was less than 100 ms in all three cases.

Status of Reporting: Detail tripping report from OPTCL is received on 06-03-17.

OPTCL may explain the following:

- Reason for tripping of 400 kV Meramundali – Mendasal S/C
- Reason for non-tripping of 220 kV Meramundali – TTPS – I at Meramundali end.
- Remedial measures taken for the tripping of lines along with 220 kV B/C due to fire outside the premises of switchyard may be explained.

Deliberation in the meeting

OPTCL explained that heavy fire at grass and bushes outside the fencing of 400kV Meramundali switchyard caused tripping of 220 kV Meramundali – Bhanjanagar – II, 220 kV Meramundali – TTPS – II along with 220 kV B/C from Meramundali end.

At the same time, 400 kV Meramundali – Mendasal S/C tripped from remote end on receipt of DT. OPTCL informed that DT was sent from Meramundali due to improper configuration of the relay. The

same has been rectified.

PCC advised OPTCL to carry out the line patrolling on regular basis to avoid such fire incidences. PCC felt that 220 kV Meramundali – Bhanjanagar – II and 220 kV Meramundali – TTPS – II should not trip simultaneously and advised to coordinate the relays.

OPTCL informed that a meeting with NTPC has already been scheduled on 22.03.2017 and the relay settings will be reviewed for proper relay coordination.

PART- C:: OTHER ITEMS

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: Disturbance at 220kV NJP (WBSETCL) S/s on 19-01-17 at 00:12 Hrs.

In 52nd PCC, it was felt that 220kV bus section should not trip for a fault in 132kV system.

PCC advised WBSETCL and Powergrid to place the action plan in next PCC meeting to avoid such unwanted tripping of 220kV bus section.

Powergrid and WBSETCL may update.

Deliberation in the meeting

PCC advised WBSETCL and Powergrid to place the action plan to ERPC and ERLDC at the earliest.

ITEM NO. C.2: Total power failure at Hatia-Ranchi-Namkom-PTPS complex of JUSNL system on 25-01-17 at 08:45hrs

In 52nd PCC, JUSNL was advised to do proper relay coordination in 132kV lines at Hatia-I, Hatia old, Kanke and PTPS.

JUSNL informed that they are replacing the old EM relays with numerical relays.

PCC advised JUSNL to update the status in next PCC meeting.

JUSNL may update.

Deliberation in the meeting

JUSNL informed that replacement of old EM relays with numerical relays has been completed. The settings are yet to be incorporated.

ITEM NO. C.3: Disturbance at 220 kV Gaya (PG) S/s on 13-01-17 at 12:49 Hrs.

In 52nd PCC, Powergrid informed that it was maloperation of bus bar protection and the details have been forwarded to Siemens. The analysis report is yet to be received from Siemens.

PCC advised Powergrid to place the outcome in next PCC meeting.

Powergrid may update.

Deliberation in the meeting

PCC advised Powergrid to send the details to ERPC and ERLDC.

ITEM NO. C.4: Disturbance at 400 kV Kahalgaon (NTPC) S/s on 24-01-17 at 17:12 Hrs

In 52nd PCC, NTPC was advised to check the PLCC scheme of Kahalgaon-Barh line-I.

NTPC may update.

Deliberation in the meeting

NTPC informed that the work is in progress.

ITEM NO. C.5: Oscillations in CESC system at 01:57hrs on 07.01.2017.

At 01:57hrs on 07.01.2017, severe fluctuations to the tune of around 300MW were observed at the units of BBGS (Unit 2 & 3) and at synchronizing point, EMSS (Kasba). The following points observed during that time,

- Import at EMSS point fluctuated from +20MW to around -210MW(Export), reactive flow fluctuated between +20MVAR to -40MVAR(export)
- BBGS S/O fluctuated between 290MW to 600MW. Reactive absorption of BBGS fluctated between -130MVAR to -210MVAR.
- SCE BBGS reported fluctuations between 115MW to 300MW in Unit 3 & between 170MW to 300MW in Unit 2.
- HEL also observed minor fluctuations in UNIT 2 to the tune of 10-15 MW

System Conditions prior to the incident:

- Export at EMSS point was around 60MW and reactive flow from EMSS point was NIL.
- Voltages (from SCADA at 01:45hrs- previous time block)
- BBGS (132kV) : 140.8kV
- BBGS (220kV) : 228.6kV
- EMSS (132kV) :137.0kV
- EMSS (220kV) : 237.0kV

In 51st PCC, CESC informed that at 01:57hrs on 07.01.2017, severe fluctuations to the tune of around 300MW were observed at the units of BBGS (Unit 2 & 3) and at synchronizing point, EMSS (Kasba). No tripping was initiated during the oscillations and the oscillations were died out gradually.

CESC added that PSS tuning of Budge-Budge units were done in August 2016 in presence of Prof. S. V. Kulkarni from IIT Mumbai. This is the first incident after the PSS tuning.

ERLDC informed that they have observed the oscillations from Durgapur PMU plot and the dominant frequency component of the oscillations is 0.9 Hz.

After detailed discussion, PCC decided to convey the complete incidence details to Prof. S. V. Kulkarni, IIT Mumbai for further study/advice. PCC advised CESC to submit the details to ERPC and ERLDC.

In 52nd PCC, It was informed that details were not yet received from CESC.

PCC advised CESC to submit the details to ERPC and ERLDC.

Members may update.

Deliberation in the meeting

PCC advised CESC to submit the details to ERPC and ERLDC.

ITEM NO. C.6: Protection Committee visit to BSPTCL and JUSNL Sub-stations

In view of repeated uncoordinated trippings in JUSNL systems

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

JUSNL vide mail dated 5th October 2016 informed that the relay settings have been changed for all the lines of 220kV Chandil, Ramchndrapur and 132kV Adityapur as per the ERPC committee recommendations. Latest status of implementation is enclosed at **Annexure-C6**

JUSNL was advised to monitor and submit a report on performance of the protection system after the implementation of the revised settings.

JUSNL may update.

Deliberation in the meeting

PCC advised JUSNL to monitor and submit a report on performance of the protection system after the implementation of the revised settings.

ITEM NO. C.7: PROTECTION PHILOSOPHY OF EASTERN REGION

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

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

Note:

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

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

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

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

JITPL, MPL and Adhunik may submit the revised zone settings data at the earliest.

Deliberation in the meeting

PCC advised JITPL, MPL and Adhunik to send the revised zone settings to ERPC at the earliest.

ITEM NO. C.8: 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*	46	85.19
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

** Pending observations of Powergrid are related to PLCC problems at other end.*

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
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
19)	765kV Gaya(PG)	Completed on 1st November, 2016
20)	400kV Biharshariff(PG)	Completed on 3rd November, 2016
21)	220kV Biharshariff(BSPTCL)	Completed on 3rd November, 2016

It was informed that the third party protection audit observations are available in the ERPC website in important documents.

PCC advised all the constituents to comply the observations at the earliest.

Members may update.

Deliberation in the meeting

PCC advised all the constituents to comply the observations at the earliest.

ITEM NO. C.9: Implementation of Protection Database Management System Project.

ERPC proposal for "Creation & Maintenance of web based protection database management system and desktop based protection calculation tool for Eastern Regional Grid" has been approved by the Ministry of Power for funding from Power System Development Fund (PSDF) vide No-10/1/2014-OM dated 07.03.2016.

In 49th PCC, PRDC informed that data collection for West Bengal is in progress and it will be completed by December, 2016.

In 50th PCC, It was informed that Software Acceptance Tests are in progress.

In 51st PCC, PRDC informed that data collection of Odisha and Jharkhand has been completed. Data collection in West Bengal and Bihar is in progress. Data collection of Eastern Region will be completed by 15th February 2017.

PRDC added that software acceptance trails of PSCT phase-I have been completed and phase-II will be done from 19th to 21st January 2017. Software acceptance trails of web based PDMS system have been completed and observations will be implemented at the earliest.

It was informed that a format for on-line reporting of tripping incidence has been prepared in PDMS and PRDC will present details in next PCC meeting.

In 52nd PCC, PRDC explained the format for on-line reporting of tripping incidence.

PCC suggested PRDC to include details of the elements under shutdown before the disturbance.

PRDC may update.

Deliberation in the meeting

PRDC informed that data survey and modeling has been completed and PDMS will be operational by 31st March 2017. The login id will be provided soon.

PRDC presented the format for on-line reporting of tripping incidence.

PCC in principle agreed with the format and advised PRDC to include a summery sheet for the each tripping incidence.

ITEM NO. C.10: Zone-2 setting of long line followed by short line

As per ERPC/CEA protection guidelines Zone-2 time setting of two adjacent lines needs to be properly co-ordinated to avoid undesirable trippings on account of racing between relays. In the past major disturbances occurred due to lack of proper coordination in Zone-2 time setting.

For proper coordination of operation of Zone-2 Distance Protection, an effort has been made to list out the adjacent shortest line for 400 kV transmission lines, and all the lines whose Zone-2 reach is overlapping with that of adjacent lines have been highlighted. The details are given in **Annexure-C10**.

Concerned transmission utilities are requested to review the same and share the present Zone-2 time setting and update in case of mismatch.

In 48th PCC, all the constituents were advised to go through the Annexure and review the settings with intimation to ERPC and ERLDC.

Members may update.

Deliberation in the meeting

PCC advised all the constituents to go through the Annexure and review the settings with intimation to ERPC and ERLDC.

ITEM NO. C.11: Line over voltage protection settings for 400 kV and 765 kV Lines in Eastern Region

Last year over voltage protection setting for all 400 kV and above lines was collected from the constituents. However, in the meantime many changes took place in the system, which includes commissioning of new lines as well as LILO of existing line.

Further CEA guidelines suggest that the following should be considered while setting over voltage protection in transmission line.

FOR 400kV LINES: *Low set stage (Stage-I) may be set in the range of 110% - 112% (typically 110%) with a time delay of 5 seconds. High set stage (Stage-II) may be set in the range 140% - 150% with a time delay of 100milliseconds.*

FOR 765kV LINES*: Low set stage (Stage-I) may be set in the range of 106% - 109% (typically 108%) with a time delay of 5 seconds. High set stage (Stage-II) may be set in the range 140% - 150% with a time delay of 100milliseconds.*

However, for over voltage Stage-I protection, a time grading of 1 to 3 seconds may be provided between overvoltage relays of double circuit lines. Grading on overvoltage tripping for various lines emanating from a station may be considered and same can be achieved using voltage as well as time grading. Longest timed delay should be checked with expected operating time of Over-fluxing relay of the transformer to ensure disconnection of line before tripping of transformer.

It is desirable to have Drop-off to pick-up ratio of overvoltage relay better than 97% (Considering limitation of various manufacturers relay on this aspect).

Present overvoltage setting record available at ERLDC is given in **Annexure-C11**. Concerned transmission utilities are requested to provide the missing information and updated the exiting one (if any).

In 48th PCC, all the constituents were advised to go through the Annexure and update the settings, if any.

In 52nd PCC, Powergrid ER-I has submitted the over voltage settings. PCC advised all other constituents to update the settings.

Members may update.

Deliberation in the meeting

PCC advised all the constituents to go through the Annexure and review the settings with intimation to ERPC and ERLDC.

ITEM NO. C.12: Non-commissioning of PLCC / OPGW and non-implementation of carrier aided tripping in 220kV and above lines.

According to CEA technical standard for construction of electric plants and electric lines -Clause 43(4) (c), transmission line of 220 KV and above should have single-phase auto-reclosing facility for improving the availability of the lines. However, from the tripping details attached June-August, 2016 it is evident that the some of 220kV above Inter & Intra-Regional lines do not having auto-reclose facility either at one end or at both ends. Out of these for some of the lines even PLCC/OPGW is not yet installed and carrier aided protection including Autorecloser facility is not yet implemented. Based on the trippings of June- August, 2016 and PMU analysis a list of such lines has been prepared and as given below:

List of line where auto reclose facility is not available(Information based on PMU data analysis)

S. No	Transmission Lines name	Date of Tripping	Reason of Tripping	Owner Detail		Present Status	
				End-1	End-2	OPGW/PLCC Link available	AR facility functional
1	400 KV ANGUL - TALCHER	02.06.16	B-N FAULT	PGCIL	NTPC	PLCC available	Functional
2	400 KV BIHARSARIFF-VARNASI-I	07.06.16	B-N FAULT	PGCIL	PGCIL	PLCC available	Functional (10.11.2016)
3	400KV BIHARSARIFF - BANKA-II	12.06.16	Y - N FAULT	PGCIL	PGCIL	PLCC available	Functional (25.09.2016)
4	220KV SASARAM-SAHUPURI	12.06.16	B - N FAULT	PGCIL	UPTCL	PLCC available	Functional at Pusauli
5	400 KV TALA -BINAGURI -IV	13.06.16	B - N FAULT	Durk Green	PGCIL		Tala end AR is disabled.
6	400 KV KODERMA-BOKARO-I	14.06.16	B-N FAULT	DVC	DVC	PLCC available	
7	400 KV FARAKKA-KAHALGAON-IV	15.06.16	R-N FAULT	NTPC	NTPC	Yes	Yes and operated last on dated 28.09.2016.

8	400 KV MUZAFFARPUR-BIHARSARIFF-II	17.06.16	Y-N FAULT	PGCIL	PGCIL	PLCC available	Functional (08.10.2016)
9	400 KV MERAMUNDALI-NEWDUBRI - I	20.06.16	B-N FAULT	OPTCL	OPTCL	PLCC available	Yes
10	400KV PATNA-BALIA-II	21.06.16	B-N FAULT	PGCIL	PGCIL		
11	400KV PATNA-KISHANGANJ-II	21.06.16	Y-N FAULT	PGCIL	PGCIL	PLCC available	Functional (21.06.2016)
12	400KV PATNA-BALIA-I	21.06.16	R-N FAULT	PGCIL	PGCIL	PLCC available	
13	220KV BUDIPADAR-KORBA-II	23.06.16	Y-N FAULT	OPTCL	CSEB	PLCC available	will be activated in consultation with Korba
14	400 KV ARAMBAGH - BIDHANNAGAR	02.07.16	Y-N FAULT	WBSETCL	WBSETCL		
15	400 KV FARAKKA-DURGAPUR-I	06.07.16	Y-N FAULT	NTPC	PGCIL	Yes	Yes and operated last on 19.07.2016 & 06.11.2016
16	400 KV NEW RANCHI - CHANDWA - I	13.07.16	B-N FAULT	PGCIL	PGCIL	PLCC available	
17	220 KV TSTPP-RENGALI	17.07.16	EARTH FAULT	NTPC	OPTCL		
18	220KV BUDIPADAR-RAIGARH	21.07.16	EARTH FAULT	OPTCL	PGCIL	PLCC defective	
19	400 KV KOLAGHAT-KHARAGPUR	03.08.16	Y-N FAULT	WBPDCL	WBSETCL		
20	220 KV FARAKKA-LALMATIA	03.08.16	B-N FAULT .	NTPC	JUNSL	Yes	Old Relay and not functional. 7-8 months required for auto re-close relay procurement.
21	400 KV PURNEA-MUZAFARPUR-I	03.08.16	R-N FAULT	PGCIL	PGCIL	PLCC available	
22	400 KV GAYA - CHANDWA -II	04.08.16	B-N FAULT .	PGCIL	PGCIL	PLCC available	Functional (01.09.2016)
23	220 KV MUZAFFARPUR - HAZIPUR - II	10.08.16	B-N FAULT	PGCIL	BSPTCL		
24	220 KV ROURKELA - TARKERA-II	11.08.16	B-N FAULT	PGCIL	OPTCL	OPGW available	Expected to install protection coupler by Jan 17
25	220 KV CHANDIL-SANTALDIH	25.08.16	R-N FAULT	JUSNL	WBPDCL		
26	400 KV MPL-RANCHI-II	02.09.16	R-N FAULT	MPL	PGCIL	PLCC available	
27	220 KV BIHARSARIF-TENUGHAT	07.09.16	B-N FAULT	BSPTCL	TVNL		
28	400KV MERAMANDALI-STERLITE-II	10.09.16	Y-N FAULT	OPTCL	SEL	OPGW not commissioned	

29	220 KV RAMCHANDRAPUR - CHANDIL	22.09.16	B-N FAULT	JUSNL	JUNSL		
30	400KV SEL - MERAMUNDALI-I	22.09.16	B-N FAULT	SEL	OPTCL	OPGW not commissioned	
31	400 KV KOLAGHAT - CHAIBASA	28.09.16	B-N FAULT	WBPDCL	PGCIL	PLCC available	

34th TCC advised all the respective members to update the above list along with the last tripping status in next PCC meeting.

TCC further advised all the constituents to give the latest status of PLCC of other 220kV and above lines under respective control area.

TCC advised to review the status of above in lower forums report back in next TCC.

PCC advised Powergrid, DVC, NTPC, WBSETCL, WBPDCL, JUSNL, BSPTCL, MPL and SEL to communicate the latest status along with the last tripping status to ERPC and ERLDC.

Members may update the status.

Deliberation in the meeting

Powergrid and NTPC updated the status of sl no. 1 as mentioned in above table.

ITEM NO. C.13: Non-commissioning / non-functional status of bus-bar protection at important 220 kV Sub-stations.

It has been observed that at many 220 kV substations particularly that of STU, bus-bar protection is either not commissioned or non-functional. The non-availability / non-functionality of bus bar protection, results in delayed, multiple and uncoordinated tripping, in the event of a bus fault.This in turn not only results in partial local black out but also jeopardises the security of interconnected national grid as a whole. The matter was also pointed out during the third party protection audit which is being carried out regularly. Constituents are required to meet the audit compliance and commission or made bus –bar protection functional where ever it is not available. A list of such important 220 kV sub-stations as per the first third party audit is placed in the meeting.

In 34th TCC, members updated the status as follows:

Bus Bar Protection not availble (reccord as per third party protection audit)

Bihar				
Sl No	**Name of Substation**	**Bus Bar protection status**	**Date of audit**	**Present Status**
1	220 kV Bodhgaya	Not available	28-Dec-12	*Single bus and there is no space available for busbar protection*
Jharkhand				
1	220 kV Chandil	Not available	29-Jan-13	*LBB available*
2	220 kV Tenughat	Not available	12-Apr-13	
DVC				
1	220 kV Jamsedpur	Not available	10-Apr-13	*Single bus. Bus bar will*

				be commissioned under PSDF.
West Bengal				
1	220 kV Arambah	Not available	24-Jan-13	*Available in alarm mode. Planning to replace with numerical relay*
2	220 kV Jeerat	Not available	20-Dec-12	*Relays have been received at site. Installation is in progress.*

TCC further advised all the constituents to give the latest status of Bus Bar protection of other 220KV S/S under respective control area.

TCC advised to review the status of above in lower forums report back in next TCC.

Members may update.

Deliberation in the meeting

Members noted.

ITEM NO. C.14: Frequent Blackouts at Kanti TPS

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

51st PCC, NTPC informed that PLCC has been installed in 220kV Kufen line.

PCC advised BSPTCL to install PLCC system for all the transmission lines connected to 220kV Gopalgunj, Darbhanga and Begusarai and enable the carrier tripping for reliable protection.

Members may update.

Deliberation in the meeting

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

ITEM NO. C.15: Members may update the following:

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

In last PCC, OPTCL informed that

- OPTCL informed that they will review the logic of all the newly installed LBB protection
- Old distance protection relays in 132kV system at 220kV Tarkera S/s will be replaced after replacing old relays at 220kV level
- In 48th PCC, OPTCL was advised to change non directional over current E/F relays in 132 KV lines at 220/132kV Tarkera S/s with directional relays.

In 52nd PCC, OPTCL updated the status as follows:

- *Numerical Distance protection Relays are provided at 220kV Tarkera S/s except 132kV Rourkela-1 feeder. As new relay released is not fitting with the existing panel. REL670 relay of Kaunga feeder in is being interchanged.*
- *Procurement of numerical O/C & E/F are under process. On receipt of the same, EM relays will be replaced.*

OPTCL may update.

Deliberation in the meeting

PCC advised OPTCL to comply the observations at the earliest.

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

In 45th PCC, OHPC, was advised the following:

- OHPC should check and restore the bus bar protection at 220 kV Indravati (OHPC) S/s.--- *OHPC informed that they will test the bus bar protection of 220 kV Indravati (OHPC) S/s on 25th Aug, 2016.*
- PCC felt that 400/220kV ICT-I&II should clear the fault on backup overcurrent protection before tripping of 400kV lines from PG end and advised OHPC to install directional O/C relays at both HV & LV side of 400/220kV ICT-I&II. Proper time coordination should be done with the adjacent line relays.

OHPC may update.

Deliberation in the meeting

PCC advised OHPC to comply the observations at the earliest.

3. Disturbance at 220/132 kV NJP System on 01.09.2016 at 09:40 hrs.

In 48th PCC, it was felt that tripping of both the 220kV NJP (POWERGRID) lines for a fault in one bus section is not in order and advised WBSETCL to review the busbar protection scheme.

PCC also advised WBSETCL to submit the enquiry committee report on malfunction of 220 kV Isolator arm driving mechanism of 220/132 kV ATR I.

WBSETCL may update.

Deliberation in the meeting

PCC advised WBSETCL to submit the enquiry committee report to ERPC and ERLDC.

PART- D

Item No D.1 Tripping incidences in the month of February, 2017

Other tripping incidences occurred in the month of February 2017 which needs explanation from constituents of either of the end is given at **Annexure- D1**.

Members may discuss.

Deliberation in the meeting

Constituents explained the tripping incidences. Updated status is enclosed at **Annexure-D1***.*

Item No D.2 Any other issues.

1. Disturbance at 400 kV Meramundali (OPTCL) S/s on 26-02-17 at 14:41 Hrs.

At 14:41 hrs, 400 kV Meramundali – JSPL – I & II along with 400 kV Meramundali- Talcher (Kaniha) feeder tripped from Meramundali end due to snapping of Y phase jumper of circuit - I at the crossing of Talcher – Kolar HVDC link between location no-86 and 86/A. At the same time, 400 kV Meramundali – Angul – I & II tripped from Angul end in Z-III protection.

At 15:31 hrs, 400 kV Meramundali – Talcher was restored but at 15:36 it was hand tripped due to heavy spark at Y & B phase tie side jumper drop at Meramundali end. But no fault has been captured by PMU data.

Time (Hrs)	Name of the element	Relay at Meramundali end	Relay at remote end
14:41 hrs	400 KV JSPL - I	IY = 13.97 kA, IB = 5.6 kA, distance = 35.3 km from Meramundali	Yet to be received
	400 KV JSPL - II	IY = 1.07 kA, distance = 64.4 km from Meramundali	Yet to be received
	400 KV Angul – I	Did not trip	B-N, Z-III, 121.4 km from Angul, I_R = 4.29 kA, I_Y = 4.76 kA, I_B = 4.41 kA. Fault clearing time 2320 ms, Power Swing Detected (DR is attached)
	400 KV Angul – II	Did not trip	B-N, Z-III, 162.6 km from Angul, I_R = 0.32 kA, I_Y = 3.22 kA, I_B = 2.49 kA. Fault clearing time 1120 ms, (DR is attached)
	400 kV Talcher feeder	R-N, Reverse directional	Did not trip

Analysis of PMU plots:

Initially fault was in B phase. After 250 ms, another voltage dip in Y phase has been observed. After 1000 ms , another voltage dip in R phase has been observed.

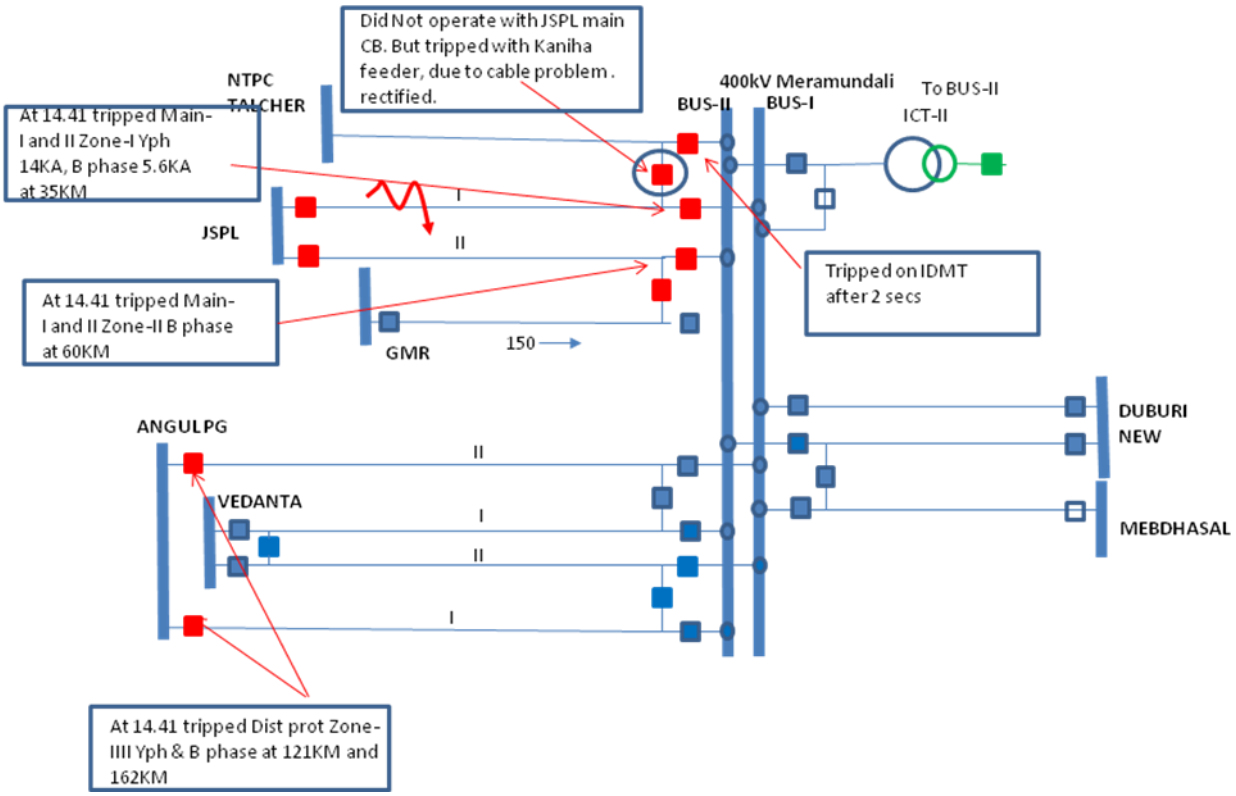
Status of Reporting:

- Detail tripping report from OPTCL is received on 10-02-17.
- DR data along with tripping reports were received on 10-02-17 from POWERGRID & NTPC.

<u>Deliberation in the meeting</u>

OPTCL explained that 400kV Meramundali-JSPL line-II did not trip from JSPL end due to cable cut at the main panel and tie breaker panel. 400kV Meramundali-JSPL line-II tripped from JSPL while tripping of 400kV Meramundali-Talcher line on backup O/C protection after 2 sec. In mean time, 400kV Meramundali-Angul-I&II tripped from Angul end on zone 3 .

OPTCL added that the cable cut between main panel and tie breaker panel of 400kV Meramundali-JSPL line-II has been rectified.


Did Not operate with JSPL main CB. But tripped with Kaniha feeder, due to cable problem. rectified.
NTPC TALCHER
At 14.41 tripped Main-I and II Zone-I Yph 14KA, B phase 5.6KA at 35KM
400kV Meramundali
BUS-II
BUS-I
To BUS-II
ICT-II
JSPL
I
II
Tripped on IDMT after 2 secs
At 14.41 tripped Main-I and II Zone-II B phase at 60KM
GMR
150
ANGULPG
II
VEDANTA
I
II
I
DUBURI NEW
MEBDHASAL
At 14.41 tripped Dist prot Zone-IIII Yph & B phase at 121KM and 162KM

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Annexure - A

Participants in 53rd PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata   Time: 11:00 hrs   Date: 21.03.2017 (Tuesday)

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 53rd PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata Time: 11:00 hrs Date: 21.03.2017 (Tuesday)

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Venue: ERPC Conference Room, Kolkata Time: 11:00 hrs Date: 21.03.2017 (Tuesday)

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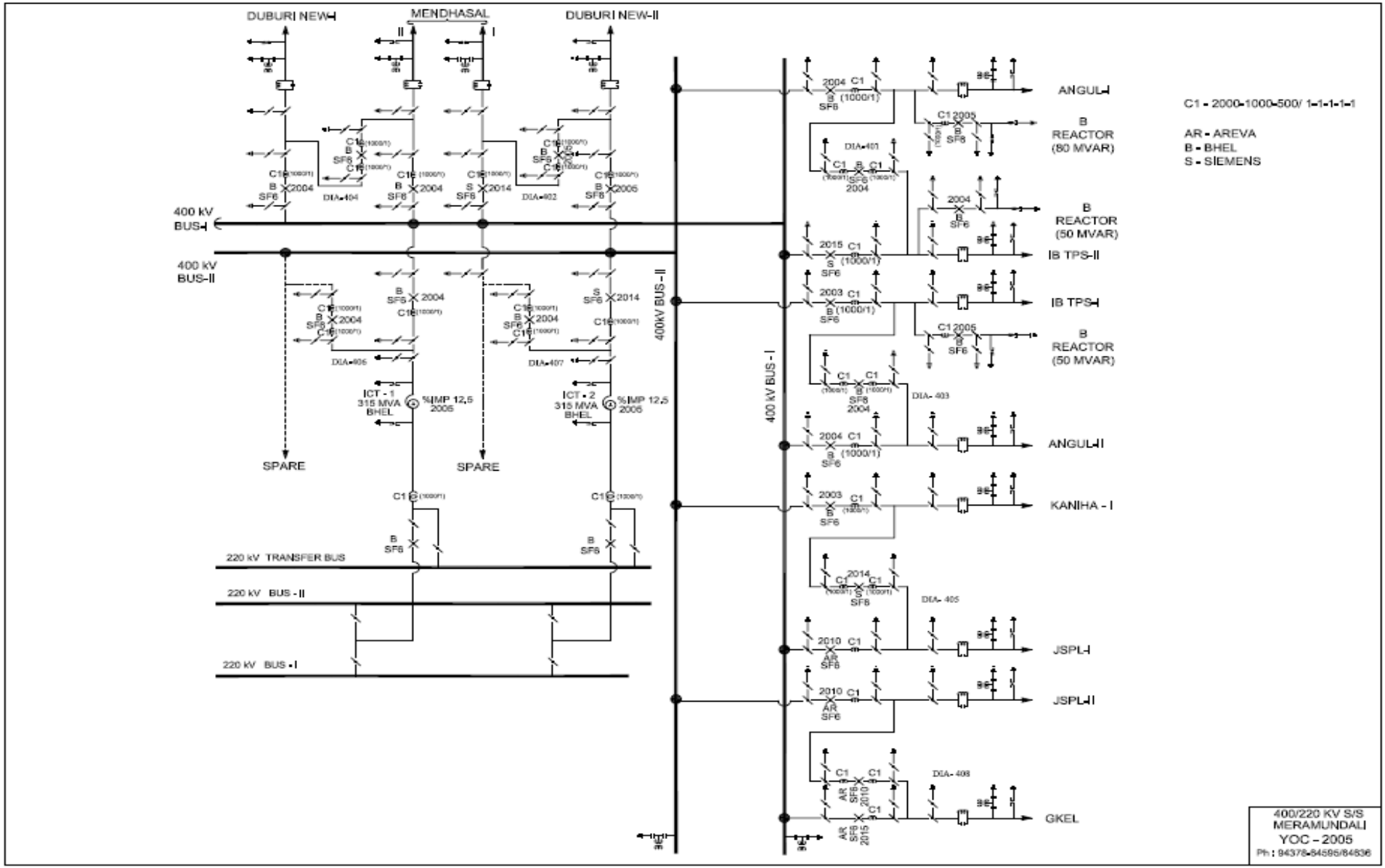
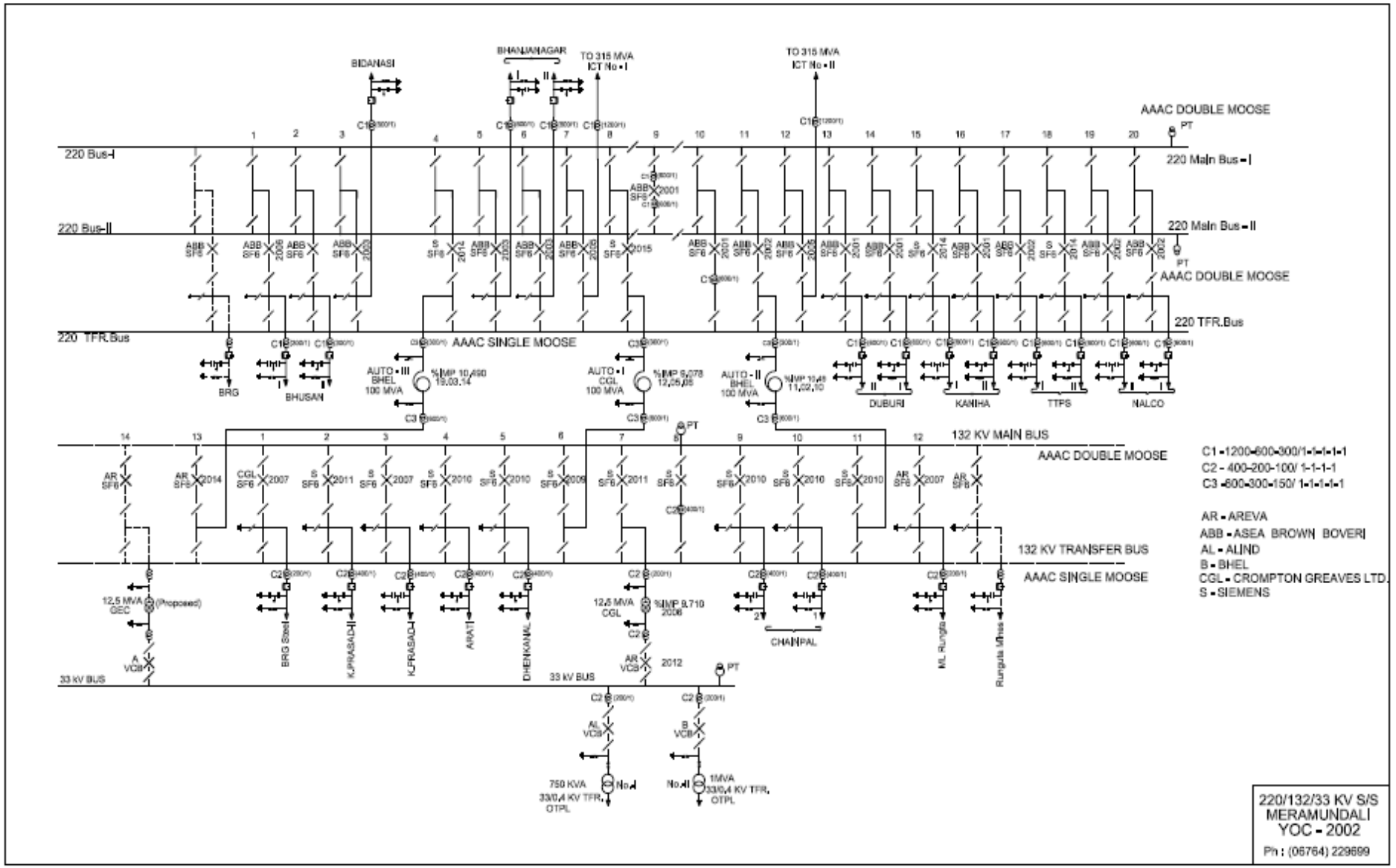
"Coming together is a beginning, staying together is progress, and working together is success." –Henry Ford

400/220kV Meramundali Switchyard Diagram



220/132kV Meramundali Switchyard Diagram



REPORT FOR 220 KV Chandil, Ramchandrapur and 132 KV ADITYAPUR GSS

1. **STATUS OF IMPLEMENTATION OF RECOMMENDED SETTINGS FOR LINES AND ICT AT 220 KV CHANDIL, RAMCHANDRAPUR & 132 KV ADITYAPUR SUBSTTATIONS.**

   Recommended settings given by ERPC are already been implemented for all the lines and ICT's 220 KV Chandil, Ramchandrapur and 132 KV Adityapur GSS's. this has been intimated to ERPC by the mail dated 05.10.2016 (mail copy attached), for which we have even received thanking mail back from the ERPC.

2. **BEHAVIOUR OF PROTECTION SYSTEM POST RECOPMMENDATION PERIOD.**
   After the implementation of the recommended settings given by ERPC, we have noticed a genuine improvement in the stability of the system of the system with the decrease in the unwanted tripping also.

3. **STATUS OF OVERALL IMPLEMENTATION OF RECOMMENDTIONS OF THE PROTECTION TEAM.**
   The status of the overall implementation of recommendations of the protection team are as follows.

Point No. 1- The requirement of Control Panels having Main-1 And Main-2 Distance Protection Scheme are already been forwarded to Transmission O & M, JUSNL, Ranchi for its procurement. It will be implemented after the availability of the panels.

Point No.2- For having Distance Protection Relay and Back up OC/EF Protection Relay feature in single panel needs new Panels for which LOI has already has been issued by Transmission O & M JUSNL, Ranchi. It will be commissioned after its availability.

Point No.3- For enabling these features, settings have already been uploaded to the various relay as per ERPC philosophy.

Point No. 4- Single Phase Auto Reclosing features of 220 KV Ramchandrapur-Chandil Line, 220 KV Chandil -PGCIL Line are already in operation, however for 220 KV Chandil-STPS Line and 220 KV Ramchandrapur- Joda Line, arrangements are completed form our side and we are waiting for it completion report form the other side.

Point No.5- Requirement of New Panels are already been sent to Nigam Headquarters, LOI has already been issued by CE, O & M, Transmission, Ranchi. It will be commissioned after its availability.

Point No. 6- GPS System in 220 KV Ramchandrapur and 220 KV Chandil are already been commissioned.

Point No. 7- At 220 KV Ramchandrapur S/S, Bus Bar Protection is already working properly. In 220 KV Chandil S/S, there is no provision for the second Bus, so Bus Bar Protection is not seems to be possible. However LBB are commissioned in all feeder and an order has already been placed to Alstom T&D for the connection and configuration of LBB and it will be complete after their arrival.

Point No. 8- Tender for procurement of DC Earth Fault location for locating DC earth fault has already been floated, it will be procured shortly.

Point No. 9- Panel Indications are working in all feeders.

Point No.10- All the Pre and post Close Circuit supervision for Trip Coil-I and Trip Coil-2 are healthy

Point No. 11- Annunciation Circuitry for all trip and not trip functions are working as per schematic.

Point No. 12- Old CTJB, PTJB are replaced with new JB's and even the terminations of the cables are also completed in both the sub stations.

Point No.13- Most of the Panel diagrams are available at all the sub stations.

Point No.14- Old Panels are soon to be replaced with the new ones, so no need of removal of redundant relay.

Point No.15- Some 220 KV CT's having old and abnormal Tan Delta characteristics along with 220 KV ICT-I at 220 KV RCP Breakers are being replaced and work order are already been issued for the same.

Point No.16- Earth Resistance of Sub Stations are measured at regular intervals and most of them are under the limit.

Point No.17- Two sources of DC are available at 220 KV Ramchandrapur S/s and working properly. At 220 KV Chandil, other set of Battery has already been supplied and will be commissioned very soon after the arrival of its charger.

Point No.18- Earth wire/OPGW is available in all 220 KV and 132 KV Transmission Lines This is for your kind information and needful action.

REPORT OF 132 KV HATIA-1 and 220 KV Hatia-2 Grid Sub Stations

1. Recommended setting for lines and ICTs at 220 KV Hatia-II and 132 KV Hatia-I has been implemented by CRITL, Ranchi.
2. Till date behaviour of protection system has been found satisfactory.
3. Status and roadmap for implementation of recommendation of protection team are as follows:-

Sl. No.	Recommendation	Status
(i)	Take suitable measure for detection and rectification of the DC earth fault.	Complied
(ii)	To carry out relay coordination as per the revised protection philosophy of ERPC.	Complied as per recommendation settings provided by ERPC.
(iii)	To complete the DPR for PSDF funding towards improvement/development of JUSNL protection system at the earliest.	Tender has been floated by HQ. for appointment of consultant.
(iv)	As per PART 3 of CEA (Technical Standards for connectivity of The Grid) Regulation, 2007, wherein it is clearly mentioned that 220 KV Transmission lines have both Main 1 and Main 2 Distance Protection Schemes applicable for New Sub-Stations and for the Old Sub-Stations, it should be implemented in a reasonable time frame. The Same should be implemented.	Complied
(v)	One Number Numerical Distance Protection Relay has been used for 132 KV Feeders. One Numerical Distance Protection Relay and another Back-up O/C and E/F protection relay (Two Separate units) should be used.	Complied at 220/132 KV GSS Hatia-II. For 132/33 KV GSS, procurement is under process at HQ. Level.
(vi)	In order to provide protection in case of high resistive fault, earth fault protection may be used where Main 1 and Main 2 protection is suggested i.e. for 220 KV Transmission lines. The characteristics should be IDMT (Normal Inverse). The ground over current threshold should be set to ensure detection of all ground faults, but above any continuous residual current under normal system operation. The timing should be coordinated with the Zone-3 timing for a remote end bus fault.	Complied
(vii)	Availability of carrier protection ad single phase Auto-reclose for all 220 KV and above transmission lines.	Complied
(viii)	Replacement of Electromechanical Relays with Numerical Relays, wherever applicable for Transmission lines and transformers.	Complied at 220 KV & 132 KV Line. For 33 KV, Procurement of Numerical Relays is under processed.

(ix)	Connectivity of GPS clock in every Sub-Station with Time synchronisation facility to the Numerical Relays.	Implemented at 220/132 KV GSS Hatia-II. Rest are under process. Completed by 31-01-17
(x)	As per PART 3 of CEA (Technical Standards for connectivity of The Grid) Regulation, 2007, wherein it is clearly mentioned that Bus bar protection shall be [provided on all Sub-Stations at and above 220 KV leaves for all new Sub-Stations. For existing Sub-Stations, this shall be implemented in a reasonable time frame. (i) Local Breaker Back-up (LBB) protection shall be provided for all Sub-Stations of 220 KV and above.	Complied
(xi)	All panel indications wherever applicable for Isolators, Breakers, Circuit Breaker Spring Charge, Trip Circuit Healthy or any other indications as per the scheme should be made healthy.	Complied
(xii)	Pre and Post Close Trip circuit supervision for trip coil 1 (TC#1) and trip coil 2 (TC#2) should be made healthy wherever applicable.	Complied
(xiii)	Annunciation circuitry should be made proper for all trip and non-trip functions as per the schematic.	Complied
(xiv)	CTJB, PTJB should be changed wherever applicable and terminations of the cables should be completed with proper specification of Terminal Blocks and LUGS. The CTJB and PTJB should be earthed through earthing strips.	Procurement of JB for Hatia-I & Namkum is under process. Completed by 31-03-17.
(xv)	All relevant drawings required during trouble shooting should be made available in each of the control rooms of every sub-stations. (i) Update Drawings related to protection and Control Panel of individual bays, CT's PT's, Circuit breakers, Isolators, Transformers etc. are to be made available at sub-station level. (ii) LOGICS and configuration of the Numerical Relays should be made proper with the availability of relevant protection as per CEA guidelines and the same should be made available at the sub-Station level.	Available
(xvi)	Redundant relays which are not in use should be removed from the protection panels and the Numerical Relays and Auxiliaries installed should be newly wired as per the approved scheme.	Under Process. Completed by 31-01-2017.
(xvii)	220 KV and 132 KV CT's should be tasted for characteristics and proper core should be used for proper protection purpose, i.e. PS for Differential, 5P for Distance/Backup protection, 0.2/0.5 for metering purpose. Kindly note that for booth 220 KV and 132 KV CT protection schemes, separate cores should be used for separate protection purpose.	Complied
(xviii)	Earth resistance of sub-station should be measures at regular intervals and the value should be less than 1 ohms. The result should be marked in the sub-station earth pit with the date of	Complied

	testing.	
(xix)	Two source of D.C may be provided to control and relay panels for 220 KV and above system for security and redundancy. Accordingly the Bus wire of the panel is to be segregated and scheme developed accordingly.	Complied
(xx)	Meticulous Patrolling of 220 KV and 132 KV Transmission Lines along with availability of earth wires should be ensured to reduce transient faults. (i) Individual Tower Earthing should also be ensured to provide earth paths to lighting strikes through the shortest path. (ii) Regular Conditioning monitoring of sub-station equipment (Transformer, CT, CVT, PT, LA, CB, etc.) may be done as per CEA recommendation and proper record may be maintained (iii) The types of taste on the sub-station equipments along with the technology used with its duration is provided and the same should be meticulously followed for all 220 KV and 132 KV Sub-Station.	Complied

Annexure-C10

SL No	Zone-2 timer setting at	For line	No of circuits	Length (km)	Zone-2 Reach in %	Zone-2 reach of protected line length (km)	Shortest line at remote end	Length (km)	Considering Ideal Zone-1 reach i.e Upto 80%			Considering Zone-1 under reaches by 30% i.e. Zone -1 reach is only upto 50% (as per ERPC/CEA philosophy)		
									Zone-2 reach (Beyound 80% upto 120/150%) of the shortest line Starts at (km)	Zone -2 Overlap ?	Zone-2 Time setting	Zone-2 reach (Beyound 50% upto 120/150%) of the shortest line Starts at (km)	Zone -2 Overlap ?	Zone-2 Time setting
1	Muzaffarpur	Gorakhpur	D/C	261	150%	392	Gorakhpur-Gorakhpur-UP D/C	46	37	Y	0.5 to 0.6	23	Y	0.5 to 0.6
		Biharshariff	D/C	133	150%	200	Biharsariff Lakhisarai D/C	89	71	N	0.35	45	Y	0.5 to 0.6
		Purnea	D/C	242	150%	363	Purnea-Kishanganj D/C	71	57	Y	0.5 to 0.6	36	Y	0.5 to 0.6
2	Purnea	Muzzafarpur	D/C	242	150%	363	Muzzafarpur-Biharsariff D/C	133	107	Y	0.5 to 0.6	67	Y	0.5 to 0.6
		Kishanganj	D/C	71	150%	107	Kishangaj-Purnea other ckt	71	57	N	0.35	36	N	0.35
		Biharsariff	D/C	231	150%	347	Biharsaiff-Lakhisarai D/C	89	71	Y	0.5 to 0.6	45	Y	0.5 to 0.6
		Malda	D/C	167	150%	251	Malda-Farraka D/C	40	32	Y	0.5 to 0.6	20	Y	0.5 to 0.6
		Binaguri	D/C	168	150%	252	Binaguri-Kishanhanj D/C	98	78	Y	0.5 to 0.6	49	Y	0.5 to 0.6
3	Kishanganj	Purnea	D/C	71	150%	107	Purnea Kishangaj other ckt	71	57	N	0.35	36	N	0.35
		Patna	D/C	348	150%	521	Patna-Barh D/C	69	55	Y	0.5 to 0.6	34	Y	0.5 to 0.6
		Binaguri	D/C	98	150%	147	Binaguri-Kishanhanj other ckt	98	78	N	0.35	49	N	0.35
4	Barh	Patna	D/C	93	150%	140	Patna-Barh D/C	69	55	N	0.35	34	Y	0.5 to 0.6
		Patna	D/C	69	150%	103	Patna-Barh other ckt	69	55	N	0.35	34	N	0.35
		Gorakhpur	D/C	349	150%	524	Gorakhpur-Gorakhpur-UP D/C	46	37	Y	0.5 to 0.6	23	Y	0.5 to 0.6
		Kahalgaon	D/C	217	150%	326	Khalgaon-BankaD/C	48	38	Y	0.5 to 0.6	24	Y	0.5 to 0.6
5	Patna	Kishanganj	D/C	348	150%	521	Kishangaj-Purnea D/C	71	57	Y	0.5 to 0.6	36	Y	0.5 to 0.6
		Barh	D/C	93	150%	140	Barh-Patna D/C	69	55	N	0.35	34	Y	0.5 to 0.6
		Barh	D/C	69	150%	103	Barh-Patna other ckt	69	55	N	0.35	34	N	0.35
		Balia	D/C	185	150%	278	Balia-Mau D/C	9	7	Y	0.5 to 0.6	5	Y	0.5 to 0.6
		Balia	D/C	195	150%	293	Balia-Mau D/C	9	7	Y	0.5 to 0.6	5	Y	0.5 to 0.6
6	Sasaram	Biharsariff	D/C	210	150%	315	Biharsaiff-Lakhisarai D/C	89	71	Y	0.5 to 0.6	45	Y	0.5 to 0.6
		Nabinagar	D/C	82	150%	123	Sasaram-Nabinagar D/C	82	66	N	0.35	41	N	0.35
		Varanasi	S/C	143	120%	172	Varansi-Saranathi S/C	70	56	N	0.35	35	N	0.35
		Allahabad	S/C	212	120%	254	Allahabad-Varanasi S/C	98	78	N	0.35	49	N	0.35
7	Gaya	Maithon	D/C	276	150%	414	Maithon-MPL D/C	32	25	Y	0.5 to 0.6	16	Y	0.5 to 0.6
		Chandwa	D/C	117	150%	176	Chandwa-N.Ranchi D/C	68	54	Y	0.5 to 0.6	34	Y	0.5 to 0.6
		Koderma	D/C	125	150%	188	Koderma-Bokaro D/C	100	80	N	0.35	50	Y	0.5 to 0.6
8	Biharsariff	Muzzafarpur	D/C	133	150%	200	Muzzafarpur-Biharsariff D/C	133	107	N	0.35	67	N	0.35
		Purnea	D/C	231	150%	347	Purnea Kishangaj D/C	71	57	Y	0.5 to 0.6	36	Y	0.5 to 0.6
		Sasaram	D/C	210	150%	315	Sasaram-Nabinagar D/C	82	65	Y	0.5 to 0.6	41	Y	0.5 to 0.6
		Lakhisari	D/C	89	150%	134	Lakhisarai-Biharsaiff Other ckt	89	71	N	0.35	45	N	0.35
		Banka	D/C	185	150%	277	Banka-Khalgaon D/C	48	38	Y	0.5 to 0.6	24	Y	0.5 to 0.6
		Koderma	D/C	111	150%	166	Koderma-Bokaro D/C	100	80	N	0.35	50	Y	0.5 to 0.6
		Balia	D/C	241	150%	362	Balia-Mau D/C	9	7	Y	0.5 to 0.6	5	Y	0.5 to 0.6
9	Lakhisari	Biharsariff	D/C	89	150%	134	Biharsaiff-Lakhisarai D/C	89	71	N	0.35	45	N	0.35
		Kahalgaon	D/C	145	150%	218	Khalgaon-BankaD/C	48	38	Y	0.5 to 0.6	24	Y	0.5 to 0.6
10	Banka	Biharsariff	D/C	185	150%	277	Biharsaiff-Lakhisarai D/C	89	71	Y	0.5 to 0.6	45	Y	0.5 to 0.6
		Kahalgaon	D/C	48	150%	72	Khalgaon-BankaD/C	48	38	N	0.35	24	N	0.35
		Lakhisari	D/C	145	150%	218	Lakhisarai-Biharsaiff D/C	89	71	Y	0.5 to 0.6	45	Y	0.5 to 0.6
		Banka	D/C	48	150%	72	Banka-Khalgaon Other ckt	48	38	N	0.35	24	N	0.35

11	Kahalgaon	Farraka	D/C	95	150%	143	Farraka -Malda D/C	40	32	Y	0.5 to 0.6	20	Y	0.5 to 0.6
		Farraka	D/C	95	150%	143	Farraka -Malda D/C	40	32	Y	0.5 to 0.6	20	Y	0.5 to 0.6
		Maithon	D/C	172	150%	258	Maithon-MPL D/C	32	25	Y	0.5 to 0.6	16	Y	0.5 to 0.6
12	Farraka	Kahalgaon	D/C	95	150%	143	Khalgaon-BankaD/C	48	38	Y	0.5 to 0.6	24	Y	0.5 to 0.6
		Kahalgaon	D/C	95	150%	143	Khalgaon-BankaD/C	48	38	Y	0.5 to 0.6	24	Y	0.5 to 0.6
		Malda	D/C	40	150%	60	Malda-Farraka D/C	40	32	N	0.35	20	N	0.35
		Bahrampur	S/C	71	120%	85	Bahrampur-Sagardighi D/C	26	21	N	0.35	13	Y	0.5 to 0.6
		Sagardighi	S/C	72	120%	86	Sagardighi-Bahrampur D/C	26	21	N	0.35	13	Y	0.5 to 0.6
		Durgapur	D/C	146	150%	219	Durgapur-Bidhannagar D/C	11	9	Y	0.5 to 0.6	6	Y	0.5 to 0.6
13	Malda	Purnea	D/C	167	150%	251	Purnea Kishangaj D/C	71	57	Y	0.5 to 0.6	36	Y	0.5 to 0.6
		Farraka	D/C	40	150%	60	Farraka -Malda D/C	40	32	N	0.35	20	N	0.35
14	Binaguri	Purnea	D/C	168	150%	252	Purnea Kishangaj D/C	71	57	Y	0.5 to 0.6	36	Y	0.5 to 0.6
		Kishanganj	D/C	98	150%	147	Kishangaj-Purnea D/C	71	57	N	0.35	36	Y	0.5 to 0.6
		Rangpo	D/C	12	150%	18	Rangpo-Binaguri D/C	12	9	N	0.35	6	N	0.35
		Bongaigaon	D/C	218	150%	327	Bongaigaon-BTPS D/C	3.12	2	Y	0.5 to 0.6	2	Y	0.5 to 0.6
		Bongaigaon	D/C	221	150%	332	Bongaigaon-BTPS D/C	3.12	2	Y	0.5 to 0.6	2	Y	0.5 to 0.6
		Tala	D/C	145	150%	218	Tala -Malbase S/C	24	19	Y	0.5 to 0.6	12	Y	0.5 to 0.6
		Tala	S/C	140	120%	168	Tala -Malbase S/C	24	19	Y	0.5 to 0.6	12	Y	0.5 to 0.6
		Malbase	S/C	125	120%	150	Malbase -Tala S/C	24	19	Y	0.5 to 0.6	12	Y	0.5 to 0.6
15	Bahrampur	Farraka	S/C	71	120%	85	Farraka -Malda D/C	40	32	N	0.35	20	N	0.35
		Sagardighi	D/C	26	150%	39	Sagardighi-Bahrampur D/C	26	21	N	0.35	13	N	0.35
		Jeerat	S/C	165	120%	198	Jeerat-Subhasgram S/C	63	50	N	0.35	32	Y	0.5 to 0.6
		Bheramara	D/C	100	150%	150	Bheremara-Bahrampur other ckt	100	80	N	0.35	50	N	0.35
16	Sagardighi	Farraka	S/C	72	120%	86	Farraka -Malda D/C	40	32	N	0.35	20	N	0.35
		Bahrampur	D/C	26	150%	39	Bahrampur-Sagardighi D/C	26	21	N	0.35	13	N	0.35
		Durgapur	D/C	128	150%	192	Durgapur-Bidhannagar D/C	11	9	Y	0.5 to 0.6	6	Y	0.5 to 0.6
		Subhasgram	S/C	246	120%	295	Subhasgram-Jeerat S/C	63	50	N	0.35	32	Y	0.5 to 0.6
17	Durgapur	Farraka	D/C	146	150%	219	Farraka -Malda D/C	40	32	Y	0.5 to 0.6	20	Y	0.5 to 0.6
		Sagardighi	D/C	128	150%	192	Sagardighi-Bahrampur D/C	26	21	Y	0.5 to 0.6	13	Y	0.5 to 0.6
		Bidhannagar	D/C	11	150%	17	Bidhannagar-Durgapur D/C	11	9	N	0.35	6	N	0.35
		Jamsedpur	S/C	177	120%	212	Jamsedpur - Adhunilk D/C	1	0	Y	0.5 to 0.6	0	Y	0.5 to 0.6
		Maithon	D/C	71	150%	106	Maithon-MPL D/C	32	25	Y	0.5 to 0.6	16	Y	0.5 to 0.6
18	Bidhannagar	Durgapur	D/C	11	150%	17	Durgapur-Bidhannagar D/C	11	9	N	0.35	6	N	0.35
		PPSP	D/C	185	150%	278	PPSP-Bidhannagar D/C	185	148	N	0.35	93	N	0.35
		Arambagh	S/C	114	120%	137	Arambag-Kolaghat S/C	64	51	N	0.35	32	N	0.35
19	PPSP	Bidhannagar	D/C	185	150%	278	Bidhannagar-Durgapur D/C	11	9	Y	0.5 to 0.6	6	Y	0.5 to 0.6
		Arambagh	D/C	210	150%	315	Arambag-Kolaghat S/C	64	51	Y	0.5 to 0.6	32	Y	0.5 to 0.6
20	Arambagh	Bidhannagar	S/C	114	120%	137	Bidhannagar-Durgapur D/C	11	9	Y	0.5 to 0.6	6	Y	0.5 to 0.6
		PPSP	D/C	210	150%	315	PPSP-Bidhannagar D/C	185	148	N	0.35	93	Y	0.5 to 0.6
		Bakreswar TPS	S/C	130	120%	156	Arambag-Bakreswar S/C	130	104	N	0.35	65	N	0.35
		Kolaghat TPS	S/C	64	120%	77	Kolaghat-Arambagh S/C	64	51	N	0.35	32	N	0.35
21	Bakreswar TPS	Arambagh	S/C	130	120%	156	Arambag-Kolaghat S/C	64	51	N	0.35	32	N	0.35
		Jeerat	S/C	162	120%	194	Jeerat-Subhasgram S/C	63	50	N	0.35	32	Y	0.5 to 0.6
22	Jeerat	Bahrampur	S/C	165	120%	198	Bahrampur-Sagardighi D/C	26	21	Y	0.5 to 0.6	13	Y	0.5 to 0.6
		Bakreswar TPS	S/C	162	120%	194	Arambag-Bakreswar S/C	130	104	N	0.35	65	N	0.35
		Subhasgram	S/C	63	120%	76	Subhasgram-Jeerat S/C	63	50	N	0.35	32	N	0.35
		Kolaghat TPS	S/C	134	120%	161	Kolaghat-Arambagh S/C	64	51	N	0.35	32	N	0.35
23	Subhasgram	Sagardighi	S/C	246	120%	295	Sagardighi-Bahrampur D/C	26	21	Y	0.5 to 0.6	13	Y	0.5 to 0.6
		Jeerat	S/C	63	120%	76	Jeerat-Subhasgram S/C	63	50	N	0.35	32	N	0.35
		Haldia TPS	D/C	90	150%	135	Haldia-Subhasrgram other ckt	90	72	N	0.35	45	N	0.35
24	Kolaghat TPS	Arambagh	S/C	64	120%	77	Arambag-Kolaghat S/C	64	51	N	0.35	32	N	0.35
		Jeerat	S/C	134	120%	161	Jeerat-Subhasgram S/C	63	50	N	0.35	32	N	0.35

24	Kolaghat TPS	Kharagpur	S/C	98	120%	118	Kharagpur-Baripada S/C	98	78	N	0.35	49	N	0.35
		Chaibasa	S/C	240	120%	288	Chaibasa-Jamsedpur S/C	46	37	Y	0.5 to 0.6	23	Y	0.5 to 0.6
25	Kharagpur	Kolaghat TPS	S/C	98	120%	118	Kolaghat-Arambagh S/C	64	51	N	0.35	32	N	0.35
		Baripada	S/C	98	120%	118	Baripada-Kharagpur S/C	98	78	N	0.35	49	N	0.35
		Chaibasa	S/C	161	120%	193	Chaibasa-Jamsedpur S/C	46	37	N	0.35	23	Y	0.5 to 0.6
26	Baripada	Kharagpur	S/C	98	120%	118	Kharagpur-Baripada S/C	98	78	N	0.35	49	N	0.35
		N. Duburi	S/C	190	120%	228	N. Duburi-Meeramandali D/C	90	72	N	0.35	45	N	0.35
		Pandiabilli	S/C	302	120%	362	Pandiabilli-Mendasal D/C	28	22	Y	0.5 to 0.6	14	Y	0.5 to 0.6
		Keonjhar	S/C	156	120%	187	Keonjhar-Rengali S/C	100	80	N	0.35	50	N	0.35
		Jamsedpur	S/C	108	120%	130	Jamsedpur - Adhunilk D/C	1	0	Y	0.5 to 0.6	0	Y	0.5 to 0.6
		TISCO	S/C	140	120%	168	TISCO-Baripada S/C	33	26	Y	0.5 to 0.6	16	Y	0.5 to 0.6
27	N. Duburi	Baripada	S/C	190	120%	228	Baripada-Kharagpur S/C	98	78	N	0.35	49	N	0.35
		Pandiabilli	S/C	143	120%	172	Pandiabilli-Mendasal D/C	28	22	Y	0.5 to 0.6	14	Y	0.5 to 0.6
		Meramandali	D/C	90	150%	135	Meramandali-GMR S/C	8	6	Y	0.5 to 0.6	4	Y	0.5 to 0.6
28	Pandiabilli	Baripada	S/C	302	120%	362	Baripada-Kharagpur S/C	98	78	N	0.35	49	Y	0.5 to 0.6
		N. Duburi	S/C	143	120%	172	N. Duburi-Meeramandali D/C	90	72	N	0.35	45	N	0.35
		Mendasal	D/C	28	150%	42	Mendasal Pandiabilli D/C	28	22	N	0.35	14	N	0.35
29	Mendasal	Pandiabilli	D/C	28	150%	42	Pandiabilli-Mendasal D/C	28	22	N	0.35	14	N	0.35
		Meramandali	S/C	98	120%	118	Meramandali-GMR S/C	8	6	Y	0.5 to 0.6	4	Y	0.5 to 0.6
30	Meramandali	Mendasal	S/C	98	120%	118	Mendasal Pandiabilli D/C	28	22	N	0.35	14	Y	0.5 to 0.6
		Angul	S/C	25	120%	30	Angul-Mermandali S/C	19	15	N	0.35	9	N	0.35
		Angul	S/C	19	120%	22	Angul-Mermandali S/C	19	15	N	0.35	9	N	0.35
		TSTPS	S/C	51	120%	61	TSTPS-Rengali D/C	24	19	N	0.35	12	N	0.35
		JSPL	D/C	38	150%	57	JSPL-Meramandali Other ckt	38	30	N	0.35	19	N	0.35
		GMR	S/C	8	120%	10		999	799	N	0.35	500	N	0.35
		SEL	D/C	220	150%	330	SEL-Meramandali Other ckt	220	176	N	0.35	110	N	0.35
31	Angul	Meramandali	S/C	25	120%	30	Meramandali-GMR S/C	8	6	N	0.35	4	Y	0.5 to 0.6
		Meramandali	S/C	19	120%	22	Meramandali-GMR S/C	8	6	N	0.35	4	N	0.35
		Bolangir	S/C	196	120%	235	Bolangir-Angul S/C	196	157	N	0.35	98	N	0.35
		TSTPS	S/C	68	120%	82	TSTPS-Rengali D/C	24	19	N	0.35	12	Y	0.5 to 0.6
		JITPL	D/C	80	150%	120	JITPL-Angul Other Ckt	80	64	N	0.35	40	N	0.35
		GMR	D/C	31	150%	47	GMR-Angul Other Ckt	31	25	N	0.35	16	N	0.35
32	Bolangir	Angul	S/C	196	120%	235	Angul-Mermandali S/C	19	15	Y	0.5 to 0.6	9	Y	0.5 to 0.6
		Jeypore	S/C	287	120%	344	Jeypore-Indravati S/C	71	57	Y	0.5 to 0.6	36	Y	0.5 to 0.6
33	Jeypore	Bolangir	S/C	287	120%	344	Bolangir-Angul S/C	196	157	N	0.35	98	N	0.35
		Indravati	S/C	71	120%	85	Indravati-Indravti (O) S/C	4	3	Y	0.5 to 0.6	2	Y	0.5 to 0.6
		Gazuwaka	D/C	220	150%	330	Gazuwaka-Jeypore other ckt	220	176	N	0.35	110	N	0.35
34	Indravati	Jeypore	S/C	71	120%	85	Jeypore-Indravati S/C	71	57	N	0.35	36	N	0.35
		Rengali	S/C	356	120%	427	Rengali-TSTPS D/C	24	19	Y	0.5 to 0.6	12	Y	0.5 to 0.6
		Indravati (o)	S/C	4	120%	4		999	799	N	0.35	500	N	0.35
35	Indravati (o)	Indravati	S/C	4	120%	4	Jeypore-Indravati S/C	71	57	N	0.35	36	N	0.35
36	Rengali	Indravati	S/C	356	120%	427	Indravati-Indravti (O) S/C	4	3	Y	0.5 to 0.6	2	Y	0.5 to 0.6
		Keonjhar	S/C	100	120%	120	Keonjhar-Rengali S/C	100	80	N	0.35	50	N	0.35
		TSTPS	D/C	24	150%	36	TSTPS-Rengali D/C	24	19	N	0.35	12	N	0.35
37	Keonjhar	Baripada	S/C	156	120%	187	Baripada-Kharagpur S/C	98	78	N	0.35	49	N	0.35
		Rengali	S/C	100	120%	120	Rengali-TSTPS D/C	24	19	Y	0.5 to 0.6	12	Y	0.5 to 0.6
38	TSTPS	Meramandali	S/C	51	120%	61	Meramandali-GMR S/C	8	6	Y	0.5 to 0.6	4	Y	0.5 to 0.6
		Angul	S/C	68	120%	82	Angul-Mermandali S/C	19	15	N	0.35	9	Y	0.5 to 0.6
		Rengali	D/C	24	150%	36	Rengali-TSTPS D/C	24	19	N	0.35	12	N	0.35
		Rourkela	D/C	171	150%	257	Rourkela-Chaibasa D/C	131	105	N	0.35	66	Y	0.5 to 0.6
		TSTPS	D/C	171	150%	257	TSTPS-Rengali D/C	24	19	Y	0.5 to 0.6	12	Y	0.5 to 0.6
		Jharsuguda	D/C	145	150%	218	Jharsuguda-Rourkela S/C	63	50	Y	0.5 to 0.6	31	Y	0.5 to 0.6

39	Rourkela	SEL	S/C	135	120%	162	SEL-Rourkela S/C	135	108	N	0.35	68	N	0.35
		Chaibasa	S/C	131	120%	158	Chaibasa-Jamsedpur S/C	46	37	N	0.35	23	Y	0.5 to 0.6
		Jamsedpur	S/C	182	120%	218	Jamsedpur - Adhunilk D/C	1	0	Y	0.5 to 0.6	0	Y	0.5 to 0.6
		Ranchi	D/C	144	150%	217	Ranchi-N.Ranchi D/C	79	63	Y	0.5 to 0.6	39	Y	0.5 to 0.6
		Raigarh	S/C	139	120%	167	Raigarh-Raigarg Polling D/C	6	5	Y	0.5 to 0.6	3	Y	0.5 to 0.6
40	Jharsuguda	Rourkela	D/C	145	150%	218	Rourkela-Chaibasa D/C	131	105	N	0.35	66	Y	0.5 to 0.6
		Raigarh	S/C	115	120%	137	Raigarh-Raigarh Polling D/C	6	5	Y	0.5 to 0.6	3	Y	0.5 to 0.6
		IBEUL	S/C	63	120%	75	IBEUL-Raigrah S/C	63	50	N	0.35	31	N	0.35
41	IBEUL	Jharsuguda	S/C	63	120%	75	Jharsuguda-Raigarh S/C	115	92	N	0.35	58	N	0.35
		Raigarh	S/C	91	120%	109	Raigarh-Raigarg Polling D/C	6	5	Y	0.5 to 0.6	3	Y	0.5 to 0.6
42	SEL	Raigarh	S/C	147	120%	176	Raigarh-Raigarg Polling D/C	6	5	Y	0.5 to 0.6	3	Y	0.5 to 0.6
		Rourkela	S/C	135	120%	162	Rourkela-Chaibasa S/C	131	105	N	0.35	66	N	0.35
43	Chaibasa	Kolaghat TPS	S/C	240	120%	288	Kolaghat-Arambagh S/C	64	51	N	0.35	32	Y	0.5 to 0.6
		Kharagpur	S/C	161	120%	193	Kharagpur-Baripada S/C	98	78	N	0.35	49	N	0.35
		Rourkela	S/C	131	120%	158	Rourkela-Chaibasa S/C	131	105	N	0.35	66	N	0.35
		Jamsedpur	S/C	46	120%	55	Jamsedpur - Adhunilk D/C	1	0	Y	0.5 to 0.6	0	Y	0.5 to 0.6
44	Jamsedpur	Durgapur	S/C	177	120%	212	Durgapur-Bidhannagar D/C	11	9	Y	0.5 to 0.6	6	Y	0.5 to 0.6
		Baripada	S/C	108	120%	130	Baripada-Kharagpur S/C	98	78	N	0.35	49	N	0.35
		Rourkela	S/C	182	120%	218	Rourkela-Chaibasa D/C	131	105	N	0.35	66	N	0.35
		Chaibasa	S/C	46	120%	55	Chaibasa-Jamsedpur S/C	46	37	N	0.35	23	N	0.35
		Mejia B	S/C	168	120%	201	Mejia B- Maithon D/C	59	47	N	0.35	30	Y	0.5 to 0.6
		Maithon	S/C	153	120%	184	Maithon-MPL D/C	32	25	Y	0.5 to 0.6	16	Y	0.5 to 0.6
		DSTPS	D/C	157	150%	235	DSTPS-Jamsedpur D/C	69	55	Y	0.5 to 0.6	35	Y	0.5 to 0.6
		TISCO	S/C	33	120%	39	TISCO-Baripada S/C	33	26	N	0.35	16	N	0.35
		Adhunik	D/C	1	150%	2	Jamsedpur - Adhunilk D/C	1	0	Y	0.5 to 0.6	0	Y	0.5 to 0.6
45	Mejia B	Jamsedpur	S/C	168	120%	201	Jamsedpur - Adhunilk D/C	1	0	Y	0.5 to 0.6	0	Y	0.5 to 0.6
		Maithon	S/C	84	120%	100	Maithon-MPL D/C	32	25	N	0.35	16	Y	0.5 to 0.6
		Maithon	D/C	59	150%	89	Maithon-MPL D/C	32	25	Y	0.5 to 0.6	16	Y	0.5 to 0.6
46	Maithon	Gaya	D/C	276	150%	414	Gaya-Chandwa D/C	117	94	Y	0.5 to 0.6	59	Y	0.5 to 0.6
		Kahalgaon	D/C	172	150%	258	Khalgaon-BankaD/C	48	38	Y	0.5 to 0.6	24	Y	0.5 to 0.6
		Durgapur	D/C	71	150%	106	Durgapur-Bidhannagar D/C	11	9	Y	0.5 to 0.6	6	Y	0.5 to 0.6
		Jamsedpur	S/C	153	120%	184	Jamsedpur - Adhunilk D/C	1	0	Y	0.5 to 0.6	0	Y	0.5 to 0.6
		Mejia B	S/C	84	120%	100	Mejia B- Maithon D/C	59	47	N	0.35	30	N	0.35
		Mejia B	D/C	59	150%	89	Mejia B- Maithon D/C	59	47	N	0.35	30	N	0.35
		MPL	D/C	32	150%	47	MPL-Maithon D/C	32	25	N	0.35	16	N	0.35
		Raghunatpur	S/C	55	120%	65	Raghunathpur-Maithon S/C	55	44	N	0.35	27	N	0.35
		Ranchi	S/C	200	120%	240	Ranchi-N.Ranchi D/C	79	63	N	0.35	39	Y	0.5 to 0.6
47	MPL	Maithon	D/C	32	150%	47	Maithon-MPL D/C	32	25	N	0.35	16	N	0.35
		Ranchi	D/C	188	150%	281	Ranchi-N.Ranchi D/C	79	63	Y	0.5 to 0.6	39	Y	0.5 to 0.6
48	DSTPS	Jamsedpur	D/C	157	150%	235	Jamsedpur - Adhunilk D/C	1	0	Y	0.5 to 0.6	0	Y	0.5 to 0.6
		Raghunatpur	D/C	69	150%	104	Raghunathpur-Maithon S/C	55	44	N	0.35	27	Y	0.5 to 0.6
49	Raghunathpur	Maithon	S/C	55	120%	65	Maithon-MPL D/C	32	25	N	0.35	16	N	0.35
		DSTPS	D/C	69	150%	104	DSTPS-Jamsedpur D/C	69	55	N	0.35	35	N	0.35
		Ranchi	S/C	166	120%	199	Ranchi-N.Ranchi D/C	79	63	N	0.35	39	N	0.35
50	Ranchi	Rourkela	D/C	144	150%	217	Rourkela-Chaibasa D/C	131	105	N	0.35	66	Y	0.5 to 0.6
		Maithon	S/C	200	120%	240	Maithon-MPL D/C	32	25	Y	0.5 to 0.6	16	Y	0.5 to 0.6
		MPL	D/C	188	150%	281	MPL-Maithon D/C	32	25	Y	0.5 to 0.6	16	Y	0.5 to 0.6
		Raghunatpur	S/C	166	120%	199	Raghunathpur-Maithon S/C	55	44	N	0.35	27	Y	0.5 to 0.6
		N. Ranchi	D/C	79	150%	118	N. Ranchi-Chandwa D/C	68	54	N	0.35	34	Y	0.5 to 0.6
		N. Ranchi	D/C	79	150%	118	N. Ranchi-Chandwa D/C	68	54	N	0.35	34	Y	0.5 to 0.6
		Sipat	D/C	405	150%	608	Sipat-Korba S/C	100	80	Y	0.5 to 0.6	50	Y	0.5 to 0.6
		Ranchi	D/C	79	150%	118	Ranchi-N.Ranchi D/C	79	63	N	0.35	39	Y	0.5 to 0.6

51	N. Ranchi	Ranchi	D/C	79	150%	118	Ranchi-N.Ranchi D/C	79	63	N	0.35	39	N	0.35
		Chandwa	D/C	68	150%	102	Chandwa-N.Ranchi D/C	68	54	N	0.35	34	N	0.35
52	Chandwa	Gaya	D/C	117	150%	176	Gaya-Chandwa D/C	117	94	N	0.35	59	N	0.35
		N. Ranchi	D/C	68	150%	102	N. Ranchi-Chandwa D/C	68	54	N	0.35	34	N	0.35
53	Koderma	Gaya	D/C	125	150%	188	Gaya-Chandwa D/C	117	94	N	0.35	59	Y	0.5 to 0.6
		Biharsariff	D/C	111	150%	166	Biharsaiff-Lakhisarai D/C	89	71	N	0.35	45	Y	0.5 to 0.6
		Bokaro	D/C	100	150%	150	Koderma-Bokaro D/C	100	80	N	0.35	50	N	0.35
54	Bokaro	Koderma	D/C	100	150%	150	Koderma-Bokaro D/C	100	80	N	0.35	50	N	0.35
55	Rangpo	Binaguri	D/C	110	150%	165	Binaguri-Kishanhanj D/C	98	78	N	0.35	49	Y	0.5 to 0.6
		Teesta V	D/C	12	150%	18	Rangpo-Teesta D/C	12	10	N	0.35	6	N	0.35
56	TISCO	Baripada	S/C	140	120%	168	Baripada-Kharagpur S/C	98	78	N	0.35	49	N	0.35
		Jamsedpur	S/C	33	120%	39	Jamsedpur - Adhunilk D/C	1	0	Y	0.5 to 0.6	0	Y	0.5 to 0.6
57	Teesta V	Rangpo	D/C	12	150%	18	Rangpo-Teesta D/C	12	10	N	0.35	6	N	0.35
58	GMR	Angul	D/C	31	150%	47	Angul-Meramandali S/C	19	15	Y	0.5 to 0.6	10	Y	0.5 to 0.6
59	GMR(0)	Meramandali	S/C	8	120%	10	Meramandali-Angul S/C	19	15	N	0.35	10	N	0.35
60	JITPL	Angul	D/C	80	150%	120	Angul-Meramandali S/C	19	15	Y	0.5 to 0.6	10	Y	0.5 to 0.6

Annexure-C11

Name of the substation	NAME OF LINE	OVERVOLTAGE % SETTING						REMARK
		LOCAL END(STAGE-I)			REMOTE END(STAGE-I)			
		VOLTAGE GARDIENT(% setting)	TIME DELAY(sec)	Drop Off to Pickup ratio	VOLTAGE GARDIENT(% setting)	TIME DELAY(sec)	Drop Off to Pickup ratio	
Binaguri	400KV BINAGURI-RANGPO-I	110	5		112	7		
	400KV BINAGURI-RANGPO-II	112	5		112	7		
	400KV BINAGURI-TALA-I	110	5		105	5		
	400KV BINAGURI-TALA-II	112	5		105	5		
	400KV BINAGURI-MALABASE-III	110	5		105	5		
	400KV BINAGURI-TALA-IV	112	5		105	5		
	400 KV BINAGURI-PURNEA- I	110	5		112	5		
	400 KV BINAGURI-PURNEA- II	112	5		110	5		
	400 KV BINAGURI-KISHANGANJ- I	110	5		112	5		Need to be updated after LILO at Kishanganj
	400 KV BINAGURI-KISHANGANJ- II	112	5		110	7		
	400KV BINAGURI-BONGAIGAON-I	110	5		OTHER REGION			May be submitted by ER - II, Powergrid
	400KV BINAGURI-BONGAIGAON-II	110	6					
	400KV BINAGURI-BONGAIGAON-III	110	5					
	400KV BINAGURI-BONGAIGAON-IV	110	6					
Kishanganj	400 KV KISHANGANJ-PURNEA-I							
	400 KV KISHANGANJ-PURNEA-II							
	400 KV KISHANGANJ-BINAGURI-I							
	400 KV KISHANGANJ-BINAGURI-II							
	400 KV KISHANGANJ-PATNA-I							
	400 KV KISHANGANJ-PATNA-II							
Rangpo	400KV RANGPO-TEESTA-I	112	7		110	7		
	400KV RANGPO-TEESTA-II	112	7		112	5		
	400KV RANGPO-BINAGURI-I	112	7		110	5		
	400KV RANGPO-BINAGURI-II	112	7		112	5		
Tala	400KV TALA-BINAGURI-I	105	5		110	5		
	400KV TALA-BINAGURI-II	105	5		112	5		
	400KV TALA-MALABASE-III	105	5		110	5		
	400KV TALA-BINAGURI-IV	105	5		112	5		
Teesta	400KV TEESTA-RANGPO-I	110	7		112	7		
	400KV TEESTA-RANGPO-II	112	5		112	7		
PURNEA	400 KV PURNEA - MALDA - I	110	7		110	5		
	400 KV PURNEA - MALDA - II	112	5		110	6		
	400 KV PURNEA- BINAGURI - I	112	5		110	5		
	400 KV PURNEA- BINAGURI - II	110	5		112	5		
	400 KV PURNEA- KISHANGANJ - I	112	5		110	5		Need to be updated after LILO at Kishanganj
	400 KV PURNEA- KISHANGANJ - II	112	5		112	5		
	400 KV PURNEA-MUZAFFARPUR-I	110	7		110	7		
	400 KV PURNEA-MUZAFFARPUR-II	112	7		112	7		
	400 KV PURNEA-BIHARSHARIFF-I	110	5		110	5		
	400 KV PURNEA-BIHARSHARIFF-II	110	7		110	7		
MALDA	400 KV MALDA - PURNEA - I	110	5		110	7		
	400 KV MALDA - PURNEA - II	110	6		112	5		
	400 KV MALDA - FARAKKA - I	110	5		110	5		
	400 KV MALDA - FARAKKA - II	110	6		110	5		
	400 KV FSTPP-MALDA-I	110	5		110	5		
	400 KV FSTPP-MALDA-II	110	5		110	6		
	400 KV FSTPP-DURGAPUR-I	112	7		110	5		

FARAKKA	400 KV FSTPP-DURGAPUR-II	110	5		112	5		
	400 KV FSTPP-KhSTPP-I	110	5		110	5		
	400 KV FSTPP-KhSTPP-II	112	5		112	5		
	400 KV FSTPP-KhSTPP-III	110	7		110	7		
	400 KV FSTPP-KhSTPP-IV	112	7		112	7		
	400 KV FSTPP-BEHRAMPUR	110	12		110	6		
	400 KV FSTPP-SAGARDIGHI	112	7		140	0.1		
Behrampur	400 KV BEHRAMPUR-BHERAMARA -I	110	5		110	4		
	400 KV BEHRAMPUR-BHERAMARA -II	110	10		110	5		
	400 KV BEHRAMPUR - FARAKKA	110	6		110	12		
	400KV BERHAMPORE-SAGARDIGHI-I	110	5		110	5		
	400KV BERHAMPORE-SAGARDIGHI-II	110	6		110	7		
	400 KV BEHRAMPUR - JEERAT	110	7		110	7		
Jeerat	400KV JEERAT-SUBHASHGRAM	112	5		112	5		
	400 KV JERAT - BERHAMPUR	110	7		110	7		
	400 KV Jeerat-Bakreswar	110	5		110	5		
	400 KV Jeerat-Kolaghat	NOT INSTALLED AT BOTH ENDS						Present status may be updated
Subhashgram	400 KV SUBHASHSHGRAM-SAGARDIGHI	112	5		112	5		
	400KV SUBHASHGRAM-HALDIA-I	110	5		110	3		
	400KV SUBHASHGRAM-HALDIA-II	110	6		110	5		
	400 KV SUBHASHGRAM-JEERAT	112	5		112	5		
HALDIA	400KV HALDIA-SUBHASHGARM-I	110	3		110	5		
	400KV HALDIA-SUBHASHGRAM-II	110	5		110	6		
SAGARDIGHI	400 KV SAGARDIGHI - FARAKKA	140	0.1		112	7		
	400 KV SAGARDIGHI - DURGAPUR-I	110	5		110	5		
	400 KV SAGARDIGHI - DURGAPUR-II	110	6		110	6		
	400KV SAGARDIGHI-BERHAMPORE-I	110	5		110	5		
	400KV SAGARDIGHI-BERHAMPORE-II	110	7		110	6		
	400 KV SAGARDIGHI - SUBHASHGRAM	112	5		112	5		
Durgapur	400 KV DURGAPUR - SAGARDIGHI-I	110	5		110	5		
	400 KV DURGAPUR - SAGARDIGHI-II	110	6		110	6		
	400 KV DURGAPUR-FSTPP-I	110	5		112	7		
	400 KV DURGAPUR-FSTPP-II	112	5		110	5		
	400 KV DURGAPUR-MAITHON-I	110	5		110	5		
	400 KV DURGAPUR-MAITHON-II	110	6		110	6		
	400 KV DURGAPUR-JAMSHEDPUR	110	5		112	5		
	400 KV DURGAPUR - BIDHANNAGAR-I	110	5		110	5		
	400 KV DURGAPUR - BIDHANNAGAR-II	110	5		110	5		
BIDHANNAGAR	400 KV BIDHANNAGAR-PPSP-I	110	5		110	5		
	400 KV BIDHANNAGAR-PPSP-II	110	5		110	5		
	400 KV BIDHANNAGAR - DURGAPUR-I	110	5		110	5		
	400 KV BIDHANNAGAR - DURGAPUR-II	110	5		110	5		
	400 KV BIDHANNAGAR-ARAMBAG	110	5		110	5		
PPSP	400 KV PPSP-BIDHAN NAGAR-I	110	5		110	5		
	400 KV PPSP-BIDHAN NAGAR-II	110	5		110	5		
	400 KV PPSP-ARAMBAG-I	110	5		110	5		
	400 KV PPSP-ARAMBAG-II	110	5		110	5		
Arambag	400 KVARAMBAG-PPSP-I	110	5		110	5		
	400 KV ARAMBAG-PPSP-II	110	5		110	5		
	400 KV ARAMBAG -KOLAGHAT	110	5		NOT INSTALLED AT KOLAGHAT END			Present status may be updated
	400 KV ARAMBAG-BAKRESWAR	110	5		110	5		
	400 KV ARAMBAG-BIDHANNAGAR	110	5		110	5		
BAKRESWAR	400 KV BAKRESWAR-JEERAT	110	5		110	5		
	400 KV BAKRESWAR-ARAMBAG	110	5		110	5		

KOLAGHAT	400 KV KOLAGHAT-JEERAT	NOT INSTALLED AT BOTH ENDS						Present status may be updated
	400 KV KOLAGHAT-ARAMBAG	NOT INSTALLED TA KOLAGHAT END			110	5		Present status may be updated
	400 KV KOLAGHAT-KHARAGPUR-I	110	5		110	5		
	401 KV KOLAGHAT-CHAIBASA-I	110	5		110	5		Need to be updated after Chaibasa connectivity
KHARAGPUR	400 KV KHARAGPUR-KOLAGHAT-I	110	5		110	5		
	400 KV KHARAGPUR-CHAIBASA-I	110	5		110	5		Need to be updated after Chaibasa connectivity
	400KV KHARAGPUR-BARIPADA	110	5		112	7		
BARIPADA	400 KV BARIPADA-KEONJHAR	110	3		110	5		
	400 KV BARIPADA- TISCO(JAMSHEDPUR)	111	5		110	4		
	400 KV BARIPADA-N. DUBURI -I	112	6		110	5		Needs to be upgated after LILO at N. Duburi
	400 KV BARIPADA-PANDAIABILLI-I	112	6		110	5		Needs to be updated after LILO at Pandiabilli
	400 KV BARIPADA-KHARAGPUR	112	7		110	5		
	400 KV BARIPADA-JAMSHEDPUR	111	5		110	4		
Jamshedpur	400 KV JAMSHEDPUR-CHAIBASA - I	112	5		112	5		
	400 KV JAMSHEDPUR-CHAIBASA- II	110	7		110	6		
	400 KV JAMSHEDPUR - MEJIA	112	5		117	2.5		
	400 KV JAMSHEDPUR - DSTPS(ANDAL)-I	110	5		117	2.5		
	400 KV JAMSHEDPUR - DSTPS(ANDAL)-II	112	5		117	2.5		
	400KV JAMSHEDPUR - APNRL-I	110	5		115	5		
	400KV JAMSHEDPUR - APNRL-II	110	5		115	5		
	400 KV JAMSHEDPUR - DURGAPUR	112	5		110	5		
	400 KV JAMSHEDPUR - TISCO	112	7		112	7		
	400 KV JAMSHEDPUR-MAITHON	110	5		110	5		
	400 KV JAMSHEDPUR-BARIPADA	110	4		111	5		
CHAIBASA	400KV CHAIBASA-JAMSHEDPUR-I	112	5		112	5		
	400KV CHAIBASA-JAMSHEDPUR-II	110	6		110	7		
	400KV CHAIBASA-KHARAGPUR-II							Need to be updated after Chaibasa connectivity
	400KV CHAIBASA-KOLAGHAT-II							Need to be updated after Chaibasa connectivity
	400KV CHAIBASA-ROURKELA-I	112	7		110	5		
	400KV CHAIBASA-ROURKELA-II				110	6		
APNRL	400 KV APNRL-JAMSHEDPUR-I	115	5		110	5		
	400 KV APNRL-JAMSHEDPUR -II	115	5		110	5		
TISCO	400 KV TISCO-JAMSHEDPUR	112	7		112	7		
	400 KV TISCO-BIRPADA	110	4		111	5		
Maithon	400 KV MAITHON-RANCHI	112	5		112	5		
	400 KV MAITHON-KAHALGAON-I	110	5		112	5		
	400 KV MAITHON-KAHALGAON-II	110	6		110	5		
	400 KV MAITHON -MAITHON RB-I	110	5		110	7		
	400 KV MAITHON -MAITHON RB-II	112	5		112	7		
	400 KV MAITHON -GAYA - I	110	5		110	5		
	400 KV MAITHON -GAYA-II	110	6		110	5		
	400 KV MAITHON-JAMSHEDPUR	110	5		110	5		
	400 KV MAITHON -MEJIA- I	110	5		117	2.5		
	400 KV MAITHON -MEJIA- II	112	5		117	2.5		
	401 KV MAITHON -MEJIA- III	110	5		117	2.5		
	400 KV MAITHON - DURGAPURR - I	110	5		110	5		
	400 KV MAITHON - DURGAPURR - II	110	6		110	6		
	400 KV MAITHON -RAGHUNATHPUR	112	6		113	5		
Ranchi	400 KV RANCHI-MAITHON	112	5		112	5		
	400 KV RANCHI-NEW RANCHI-I	110	5		110	5		
	400 KV RANCHI-NEW RANCHI-II	110	5		110	5		
	400 KV RANCHI-NEW RANCHI-III	110	5		110	5		
	400 KV RANCHI-NEW RANCHI-IV	110	5		110	5		
	400 KV RANCHI-RAGHUNATHPUR	110	5		113	5		
	400 KV RANCHI-MAITHON RB-I	112	7		112	7		
	400 KV RANCHI-MAITHON RB-II	110	7		110	7		

	400 KV RANCHI - SIPAT - I	110	7		OTHER REGION			May be submitted by ER - I, Powergrid
	400 KV RANCHI - SIPAT - II	112	5					
	400 KV RANCHI-ROURKELA- I	110	5		110	5		
	400 KV RANCHI-ROURKELA - II	112	7		110	6		
765/400 KV NEW RANCHI S/S	400 KV NEW RANCHI- RANCHI-I	110	5		110	5		
	400 KV NEW RANCHI- RANCHI-II	110	5		110	5		
	400 KV NEW RANCHI- RANCHI-III	110	5		110	5		
	400 KV NEW RANCHI- RANCHI-IV	110	5		110	5		
	400 KV NEW RANCHI- CHANDWA-I							
	400 KV NEW RANCHI- CHANDWA-II							
	765 KV KV NEW RANCHI-DHARMJAYGARH-I	107	5		OTHER REGION			May be submitted by ER - I, Powergrid
	765 KV KV NEW RANCHI-DHARMJAYGARH-II							
CHANDWA	400 KV CHANDWA-N.RANCHI-I							
	400 KV CHANDWA-N.RANCHI-II							
	400 KV CHANDWA-GAYA-I							
	400 KV CHANDWA-GAYA-II							
MAITHON RIGHT BANK	400 KV MAITHON RB-RANCHI-I	112	7		112	7		
	400 KV MAITHON RB-RANCHI-II	110	7		110	7		
	400 KV MAITHON RB-MAITHON-I	110	7		110	5		
	400 KV MAITHON RB-MAITHON-II	112	7		112	5		
DSTPS	400 KV DSTPS-JAMSHEDPUR-I	117	2.5		110	5		
	400 KV DSTPS-JAMSHEDPUR-II	117	2.5		112	5		
	400 KV DSTPS-RAGHUNATHPUR-I	117	2.5		113	5		
	400 KV DSTPS-RAGHUNATHPUR-II	117	2.5		113	5		
KODERMA	400 KV KODERMA-GAYA-I	113	5		110	5		
	400 KV KODERMA-GAYA-II	113	5		110	5		
	400 KV KODERMA-BIHARSHARIFF-I	113	5		112	7		
	400 KV KODERMA-BIHARSHARIFF-II	113	5		110	5		
	400KV KODERMA-BOKARO-A-I	113	5		110	6		
	400KV KODERMA-BOKARO-A-II	113	5		110	6		
BOKARO-A	400KV BOKARO-A-KODERMA-I	110	6		113	5		
	400KV BOKARO-A-KODERMA-II	110	6		113	5		
Mejia	400 KV MEJIA-MAITHON -I	117	2.5		110	5		
	400 KV MEJIA-MAITHON -II	117	2.5		112	5		
	400 KV MEJIA-MAITHON -III	117	2.5		110	5		
	400 KV MEJIA-JAMSHEDPUR	117	2.5		112	5		
RAGHUNATHPUR	400 KV RAGHUNATHPUR-MAITHON	113	5		112	6		
	400 KV RAGHUNATHPUR-RANCHI	113	5		110	5		
	400 KV RAGHUNATHPUR-DSTPS-I	113	5		117	2.5		
	400 KV RAGHUNATHPUR-DSTPS-II	113	5		117	2.5		
MENDHASAL	400 KV MENDHASAL-PANDIABILLI-I	110	5		112	6		Needs to be updated after LILO at Pandiabilli
	400 KV MENDHASAL-PANDIABILLI-II	110	5		112	6		Needs to be updated after LILO at Pandiabilli
	400 KV MENDHASAL-MEERAMUNDALI	110	5		110	5		
PANDIABILLI	400 KV PANDIABILLI-MENDASAL-I							
	400 KV PANDIABILLI-MENDASAL-II							
	400 KV PANDIABILLI-N.DUBURI							
	400 KV PANDIABILLI - BARIPADA							
N. DUBURI	400 KV N.DUBURI-PANDIABILLI							
	4OO KV N.DUBURI-BARIPADA							
	400 KV N.DUBURI-MERAMANDALI-I							
	400 KV N.DUBURI-MERAMANDALI-II							
	400 KV MEERAMUNDALI-TALCHER	110	5		110	5		
	400 KV MEERAMUNDALI-ANGUL-II	112	5		110	5		
	400 KV MEERAMUNDALI-JINDAL-I	110	5		110	5		
	400 KV MEERAMUNDALI-JINDAL-II	110	5		110	5		
	400 KV MEERAMUNDALI-ANGUL-I	112	5		110	5		

MEERAMUNDALI	400 KV MEERAMUNDALI-MENDHASAL	110	5		110	5		
	400KV MERAMUNDALI-GMR	110	5		110	5		
	400 KV MERAMUNDALI-STERLITE -I							
	400 KV MERAMUNDALI-STERLITE -II							
	400 KV MERAMUNDALI-N.DUBURI -I							
	400 KV MERAMUNDALI-N.DUBURI -I							
JINDAL	400 KV JINDAL-MEERAMUNDALI-I	110	5		110	5		
	400 KV JINDAL-MEERAMUNDALI-II	110	5		110	5		
GMR	400 KV GMR-ANGUL-I	110	2		110	5		
	400 KV GMR-ANGUL-II	110	2		110	6		
	400KV GMR-MERAMUNDALI	110	5		110	5		
ANGUL	400 KV ANGUL-MEERAMUNDALI-I	110	5		112	5		
	400KV ANGUL-BOLANGIR	110	5		110	5		
	400KV ANGUL-TSTPP	110	5		110	5		
	400 KV ANGUL-MERAMUNDALI-II	110	5		112	5		
	400 KV ANGUL-JITPL-II	110	5		110	5		
	400 KV ANGUL-JITPL-I	110	5		110	5		
	400KV ANGUL-GMR-I	110	5		110	2		
	400KV ANGUL-GMR-II	110	6		110	2		
	765kV Angul-Jharsuguda-I	110	4		110	4		
	765kV Angul-Jharsuguda-II	110	4		110	4		
JITPL	400 KV JITPL-ANGUL-I	110	5		110	5		
	400 KV JITPL-ANGUL-II	110	5		110	5		
BOLANGIR	400 KV BOLANGIR-ANGUL	110	5		110	5		
	400 KV BOLANGIR-JEYPORE	112	5		112	5		
Jeypore	400 KV JEYPORE-BOLANGIR	112	5		112	5		
	400 KV JEYPORE-GAZUWAKA-I	110	5		110	9		
	400 KV JEYPORE-GAZUWAKA-II	110	10		110	10		
	400KV JEYPORE-INDRAVATI	112	5		110	5		
INDRAVATI(PG)	400 KV INDRAVATI-JEYPORE	110	5		112	5		
	400 KV INDRAVATI-INDRAVATI	115	5		115	5		
	400 KV INDRAVATI-RENGALI	113	5		110	5		
INDRAVATI(GR)	400 KV INDRAVTI(GR)-INDRAVATI(PG)	115	5		115	5		
Rengali	400 KV RENGALI-INDRAVATI(PG)	110	5		113	5		
	400 KV RENGALI-KEONJHAR	110	5		110	5		
	400 KV RENGALI-TALCHER-I	110	5		110	5		
	400 KV RENGALI-TALCHER-II	110	6		112	5		
KEONJHOR	400 KV KEONJHAR-RENGALI	110	5		110	5		
	400 KV KEONJHAR-BIRPADA	110	3		110	5		
Talcher	400 KV Talcher-Rourkela-I	110	5		110	5		
	400 KV Talcher-Rourkela-II	112	5		110	6		
	400 KV Talcher-Rengali-I	110	5		110	5		
	400 KV Talcher-Rengali-II	112	5		110	6		
	400 KV Talcher-MERAMUNDALI	110	5		110	5		
	400 KV Talcher-ANGUL	110	5		110	5		
Rourkela	400 KV ROURKELLA-JHARSHUGUDA-I	110	5		110	10		
	400 KV ROURKELLA-JHARSHUGUDA-II	110	6		110	6		
	400 KV ROURKELLA-RAIGARH	112	5		OTHER REGION			May be submitted by Odisha Project, Powergrid
	400 KV ROURKELLA-STERLITE-II	110	6		115	5		
	400 KV ROURKELA-TALCHER-I	110	5		110	5		
	400 KV ROURKELA-TALCHER-II	110	6		112	5		
	400 KV ROURKELA-CHAIBASA-I	110	5		112	7		
	400 KV ROURKELA-CHAIBASA-II	110	6					
	400 KV ROURKELA-RANCHI-I	110	5		110	5		
	400 KV ROURKELA-RANCHI-II	110	6		112	7		
	400 KV STERLITE - ROURKELA - II	115	5		110	6		

STERLITE	400 KV STERLITE - RAIGARH - II	115	5		OTHER REGION			May be submitted by Odisha Project, Powergrid
	400 KV STERLITE-MERAMANDALI-I							
	400 KV STERLITE-MERAMANDALI-II							
Jharshuguda	400KV JHSUGUDA-ROURKELA-I	110	10		110	5		
	400KV JHSUGUDA-ROURKELA-II	110	6		110	6		
	400 KV JHARSHUGUDA-IBEUL	110	10		110	5		
	765kV Jharsuguda-ANGUL-I	110	4		110	4		
	765kV Jharsuguda-ANGUL-II	110	4		110	4		
	400 KV JHARSHUGUDA-RAIGARH -II	110	6		111	7		
Jharsguda 765KV S/s	765kv Jharsuguda-Dharmjaygarh-I	108	5		OTHER REGION			May be submitted by Odisha Project, Powergrid
	765kv Jharsuguda-Dharmjaygarh-II	108	7		OTHER REGION			May be submitted by Odisha Project, Powergrid
	765kV Jharsuguda-Angul-I	110	4		110	4		
	765kV Jharsuguda-Angul-II	110	4		110	4		
IBEUL	400kV IBEUL-Raigarh	110	5		OTHER REGION			May be submitted by Odisha Project, Powergrid
	400kV IBEUL-Jharsuguda	110	5		110	10		
APNRL	400 KV APNRL-JAMSHEDPUR-I	115	5		110	5		
	400 KV APNRL-JAMSHEDPUR -II	115	5		110	5		
BIHARSHARIFF	400 KV BIHARSHARIFF-BANKA-I	112	7		112	7		
	400 KV BIHARSHARIFF-BANKA-II	110	6		110	6		
	400 KV BIHARSHARIFF - PUSAULI - I	110	5		110	5		
	400 KV BIHARSHARIFF - PUSAULI- II	112	5		112	5		
	400 KV BIHARSHARIFF - VARANASI- I	112	7		112	7		
	400 KV BIHARSHARIFF - VARANASI- II	110	7		110	7		
	400 KV BIHARSHARIFF - BALIA - I	110	5		OTHER REGION			May be submitted by ER-I, Powergrid
	400 KV BIHARSHARIFF - BALIA - II	112	5					
	400 KV BIHARSHARIFF-KODERMA-I	112	7		113	5		
	400 KV BIHARSHARIFF-KODERMA-II	110	5		113	5		
	400 KV BIHARSHARIFF-PURNEA-I	110	5		110	5		
	400 KV BIHARSHARIFF-PURNEA-II	110	7		110	7		
	400 KV BIHARSHARIFF-LAKHISARAI-I	110	7		110	5		
	400 KV BIHARSHARIFF-LAKHISARAI-II	112	5		110	5		
	400 KV BIHARSHARIFF-MUZAFFARPUR-I	110	5		110	5		
	400 KV BIHARSHARIFF-MUZAFFARPUR-II	112	5		112	5		
Kahalgaon	400 KV KhSTPP-BANKA -I	110	6		110	6		
	400 KV KhSTPP-BANKA - II	112	7		112	7		
	400 KV KhSTPP - LAKHISARAI- I	110	7		110	7		
	400 KV KhSTPP - LAKHISARAI- II	112	5		112	5		
	400 KV KhSTPP-MAITHON -I	112	5		110	5		
	400 KV KhSTPP-MAITHON -II	110	5		110	6		
	400 KV KhSTPP-BARH - I	112	6		112	6		
	400 KV KhSTPP-BARH- II	112	6		112	6		
	400 KV KHSTPP-FSTPP-I	110	5		110	5		
	400 KV KHSTPP-FSTPP-II	112	5		112	5		
	400 KV KHSTPP-FSTPP-III	110	7		110	7		
	400 KV KHSTPP-FSTPP-IV	112	7		112	7		
Barh	400 KV BARH-KAHALGAON-I	112	6		112	6		
	400 KV BARH-KAHALGAON-II	112	6		112	6		
	400 KV BARH - PATNA-I	112	6		112	6		
	400 KV BARH - PATNA-II	112	7		112	7		
	400 KV BARH - PATNA-IIII	110	4		110	4		
	400 KV BARH - PATNA-IV	110	5		110	5		
	400 KV BARH - GORAKHPUR-I							
	400 KV BARH - GORAKHPUR-II							
	400 KV PATNA-BARH-I	112	6		112	6		
	400 KV PATNA-BARH-II	112	7		112	7		
	400 KV PATNA-BARH-III	110	4		110	4		

PATNA	400 KV PATNA-BARH-IV	110	5		110	5		
	400 KV PATNA-KISHANGANJ-I							
	400 KV PATNA-KISHANGANJ-II							
	400 KV PATNA - BALIA - I	110	4		OTHER REGION			May be submitted by ER-I, Powergrid
	400 KV PATNA - BALIA - II	110	5					
	400 KV PATNA - BALIA - III	112	6					
	400 KV PATNA- BALIA - IV	112	7					
Sasaram	765KV SASARAM-FATEHPUR	108	5		108	5		
	400 KV PUSAULI - VARANASI	112	5		OTHER REGION			May be submitted by ER-I, Powergrid
	400 KV PUSAULI - ALLAHABAD	112	7					
	400 KV PASAULI-BIHARSHARIFF-I	110	5		110	5		
	400 KV PASAULI-BIHARSHARIFF-II	112	5		112	5		
	400KV PUSAULI-NABINAGAR-I	110	5					
	400KV PUSAULI-NABINAGAR-II	110	6					
Gaya	400 KV GAYA-KODERMA-I	110	5		113	5		
	400KV GAYA-KODERMA-II	110	5		113	5		
	400KV GAYA-MAITHON-I	110	5		110	5		
	400KV GAYA-MAITHON-II	110	5		110	6		
	765 KV GAYA-VARANASI-I							
	765 KV GAYA-VARANASI-II							
	765 KV GAYA-BALIA	110	5		OTHER REGION			May be submitted by ER-I, Powergrid
BANKA	400 KV BANKA-BIHARSHARIFF-I	112	7		112	7		
	400 KV BANKA-BIHARSHARIFF-II	110	6		110	6		
	400 KV BANKA-KAHALGAON-I	110	6		110	6		
	400 KV BANKA-KAHALGAON-II	112	7		112	7		
Muzaffarpur	400 KV MUZAFFARPUR - NEW PURNEA - I	110	7		110	7		
	400 KV MUZAFFARPUR - NEW PURNEA - II	112	7		112	7		
	400 KV MUZAFFARPUR - GORAKHPUR - I	110	7		OTHER REGION			May be submitted by ER-I, Powergrid
	400 KV MUZAFFARPUR - GORAKHPUR - II	112	5					
	400 KV MUZAFFARPUR - BIHARSHARIFF - I	110	5		110	5		
	400 KV MUZAFFARPUR - BIHARSHARIFF - II	112	5		112	5		
LAKHISARAI	400 KV LAKHISARI-BIHARSHARIFF-I	110	5		110	7		
	400 KV LAKHISARI-BIHARSHARIFF-II	110	5		112	5		
	400 KV LAKHISARAI-KAHALGAON-I	110	5		110	7		
	400 KV LAKHISARI-KAHALGAON-II	110	5		112	5		

Annexure-D1

S.NO	LINE NAME	TRIP DATE	TRIP TIME	RESTORATION DATE	RESTORATION TIME	Reason	Fault Clearance time in msec	Relay Indication LOCAL END	Relay Indication REMOTE END	Auto Recloser status	DR/EL received within 24 Hrs	DR/EL received after 24 Hrs	Remarks
Fault clearing time is violating protection standard (As per PMU data)													
1	400KV SUBHASGRAM - JEERAT	14.02.17	17:06	14.02.17	17:16	B-N FAULT	350 ms approx	Information yet to be received	B-N , Z-II, F/C - 4.4 kA, Z-I, 69 Km from Jeerat	No autoreclose operation observed in PMU data	No	No	*Bursting of B phase LA of 400 kV Sagardighi Subhasgram at Subhasgram. Instead of zone 2 tripped on zone 1 from Jeerat. OEM contacted.*
2	400KV SUBHASGRAM - SAGARDIGHI			15.02.17	01:02	B-N FAULT	350 ms approx	B-N, Z-I Tie: No A/R operation Main: Unsuccessful A/R	B-N, Z-II		Yes	Yes	
Multiple tripping at same time													
1	220 KV EMSS - SUBHASGRAM-I	21.02.17	11:17	21.02.17	12:43	R-Y FAULT	<100	Information yet to be received	Information yet to be received	--	No	No	*Multi circuit fault*
2	220KV EMSS-BUDGE BUDGE			21.02.17	13:49	R-Y FAULT	<100	Information yet to be received	Information yet to be received		No	No	
Fault Not observed in PMU data													
1	400 KV RANGPO-TEESTS-III	01.02.17	02:40	01.02.17	05:33	DT RECEIVED AT RANGPO	--	DT received	Information yet to be received	--	No	No	
2	400 KV N RANCHI - CHANDWA # II	18.02.17	12:08	18.02.17	14:04	SPURIOUS TRIPPING	--	Information yet to be received	Information yet to be received	--	No	No	*SF6 lock wiring shorted during PMU wiring*
3	400KV KAHALGAON-BANKA-I	23.02.17	13:13	23.02.17	18:20	DT RECEIVED AT BANKA	--	Information yet to be received	DT received	--	No	Yes	*TEED protection operated*
No autorecloser operation observed in PMU data													
1	400 KV MERAMUNDALI - STERLITE - I	10.02.17	13:08	10.02.17	18:19	Y-N FAULT	<100	Information yet to be received	Information yet to be received	No autoreclose operation observed in PMU data	No	No	*OPGW not yet commissioned. PLCC will be operational by 25th March 2017*
2	400 KV MERAMUNDALI - STERLITE - I	11.02.17	12:16	11.02.17	16:32	Y-N FAULT	<100	Y-N, Z1, 164.5 km from Meramundali, 2 kA	Y-N, Z-1, 93 km from SEL, 2.84 kA	No autoreclose operation observed in PMU data	No	No	*OPGW not yet commissioned. PLCC will be operational by 25th March 2017*
3	765KV ANGUL - SRIKAKULAM-II	15.02.17	15:30	15.02.17	18:29	B-N FAULT	<100	Carrier received but breaker did not open at Angul end	Information yet to be received	No autoreclose operation observed in PMU data	--	No	*AR successful at Angul. Srikakulam end AR un successful due to some logic problem. The same has been rectified.*