EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 23rd PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC, KOLKATA ON 25.09.2014 (THURSDAY) AT 11:00 HOURS

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

Member Secretary (I/C), ERPC chaired the meeting and welcomed the participants. He appreciated all the constituents for significant representation both from SLDC and Protection wings in the meeting. He hoped that there will be meaningful deliberation and analysis of the grid incidences henceforth with representation from SLDCs as well.

Thereafter, he requested SE (PS), ERPC to take up the agenda points in seriatim.

PART – A

ITEM NO. A.1: Confirmation of minutes of 22nd Protection sub-Committee Meeting held on 21st August, 2014 at ERPC, Kolkata

1) The minutes of 22nd Protection sub-Committee meeting held on 21.08.14 circulated vide letter dated 02.09.14.

2) The minutes of Special Protection sub-Committee meeting held on 04.09.14 circulated vide letter dated 22.09.14.

No comments have been received from any constituent.

The minutes of the above meetings may be confirmed.

Deliberation in the meeting

Members confirmed the minutes of above Protection sub-Committee meetings.

PART – B

ANALYSIS & DISCUSSION ON GRID INCIDENCES WHICH OCCURRED IN CTU/STU SYSTEMS DURING AUGUST, 2014.

(The detailed report was highlighted by ERLDC/respective constituents)

ITEM NO. B.1: Repeated tripping of 400kV Durgapur-Farakka – I on 28.08.14

ERPC Secretariat vide letter dated 05.09.14 requested Powergrid and NTPC to furnish the details along with all records (SOE, DR, Relay flags and SLD) for meaningful analysis during the meeting.

Powergrid and NTPC may explain.

Deliberation in the meeting

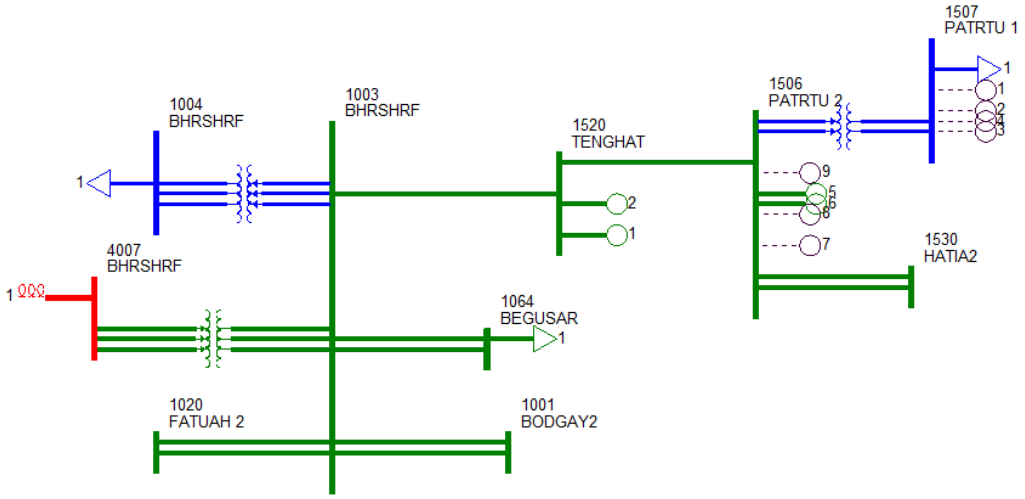
NTPC reported that similar incident took place on 25.08.2014 and 27.08.2014 respectively. During inspection on 28.08.2014, it was observed that some cables termination at junction box of PLCC panel remained loose and being shorted. The PLCC panels were tested and same has been rectified. Thereafter, there was no report of such incidences.

Powergrid informed that only Direct Trip (DT) signal had been received at Durgapur end from Farakka STPS on the above occasions.

PCC advised NTPC to submit the action taken report of PLCC panels testing to ERPC/ERLDC.

ITEM NO. B.2: Bihar System

1. **Tripping at 220 kV Biharshariff (BSPTCL) S/S at 12:26 hrs on 20/08/14.**



TVNL System

At 12:26hrs, 220kV Tenughat-Biharsariff line tripped on earth fault from both the ends. At the same time all the three 400/220kV, 315MVA ICTs at Biharsariff (PG) tripped on back up O/C protection leading to total power failure at 220kV Biharsariff (BSEB) S/s. 220kV Biharsariff-Bodhgaya-D/C also tipped.

It appears that sequences of events were initiated due to Y-Ø earth fault occurred in 220kV Tenughat-Biharsariff line. However there was a delayed clearance of the said fault from Biharsariff (BSPHCL) end (PMU plot of Sasaram shows that the fault was getting cleared in 1400ms) due to which all the three 400/220kV, 315MVA ICTs tripped from Biharsariff(PG) end on backup O/C protection from HV side. 220kV BIharshariff-Bodhgaya-D/C (idle charged from Biharshariff) also tipped at the same time as reported by BSPHCL. As the Biharsariff (BSPHCL) had no other source to feed the downstream load, total power failure occurred at Biharsariff (BSPHCL) end.

Remedial Measures/Suggestions:

Delayed clearance of faults from Biharshariff (BSPHCL) end for 220kV Tenughat-Biharshariff line needs to be checked.

BSPTCL may explain.

Deliberation in the meeting

BSPTCL explained that the fault was detected in zone 1 of 220 kV Tenughat- Biharsharif line from Biharsharif end but CB operation might have delayed the fault clearance. BSPTCL informed that they are facing DC supply problem, which may cause delayed CB operation. They reported that DC cable flashing was also observed behind the control panels and same was rectified.

PCC advised BSPTCL for thorough checking of DC supply system and submit the status report to ERLDC/ERPC Secretariat within ten (10) days.

BSPTCL agreed.

While enquiring about simultaneous 3x315 MVA ICT tripping at Biharsharif S/s, Powergrid informed that the DR plots indicated the fault was isolated by ICTs in 600 msec. However, ERLDC mentioned that PMU plots obtained from Sasaram S/s showed the total fault duration of 1.4sec.

It could not be concluded the reason behind such long duration of fault isolation. It was opined that DR plots at TVNL end may highlight additional information in this respect. Accordingly, PCC advised JSEB to collect the DR files on 20.08.2014 from TVNL and submit soon to ERLDC/ERPC.

JSEB agreed.

2. Tripping at 220 kV Biharshariff (BSPTCL) S/S at 08:15 hrs on 26/08/14.

- 132 KV Biharsharif-Sheikhpura-Jamui T/L tripped on relay indication distance protection PC I, 86 DC and 1A at 8:15 hrs of 26 Aug 2014.

- 220/132 KV 150 MVA Transformer also tripped simultaneously at 8:15 hrs of 26 Aug 2014.

BSPTCL may explain.

Deliberation in the meeting

BSPTCL informed that there was B-ph conductor snapping with ground in 132 KV Biharsharif-Sheikhpura-Jamui T/L which tripped on distance protection. But, the tripping of 220/132 KV, 150 MVA Transformer at Biharsharif might be due to problem in control cable.

PCC advised BSPTCL to check the healthiness of the relays & control cable of Biharsharif S/s and submit the report to ERPC/ERLDC within 10 days.

BSPTCL agreed.

3. Tripping at 220 kV Biharshariff (BSPTCL) S/S at 14:06 hrs on 15/08/14.

At 14:06hrs on 15.08.2014 all 220kV lines hand tripped from Biharsariff(BSPTCL) end due to over flooding of adjacent river Panchyanan within the switchyard and control room. Subsequently, 3x315MVA, 400/220kV ICTs hand tripped from Biharsariff(PG) end at 14:18hrs. 220kV Fathwa load already shifted from Biharshariff to Patna(PG) before the contingency.

BSPTCL may explain.

Deliberation in the meeting

BSPTCL reported the emergent conditions led to hand tripping of all the 220kV lines from Biharsariff(BSPTCL) end and subsequently hand tripping of ICTs from PowerGrid end because of over flooding of adjacent river Panchyanan within the switchyard and control room.

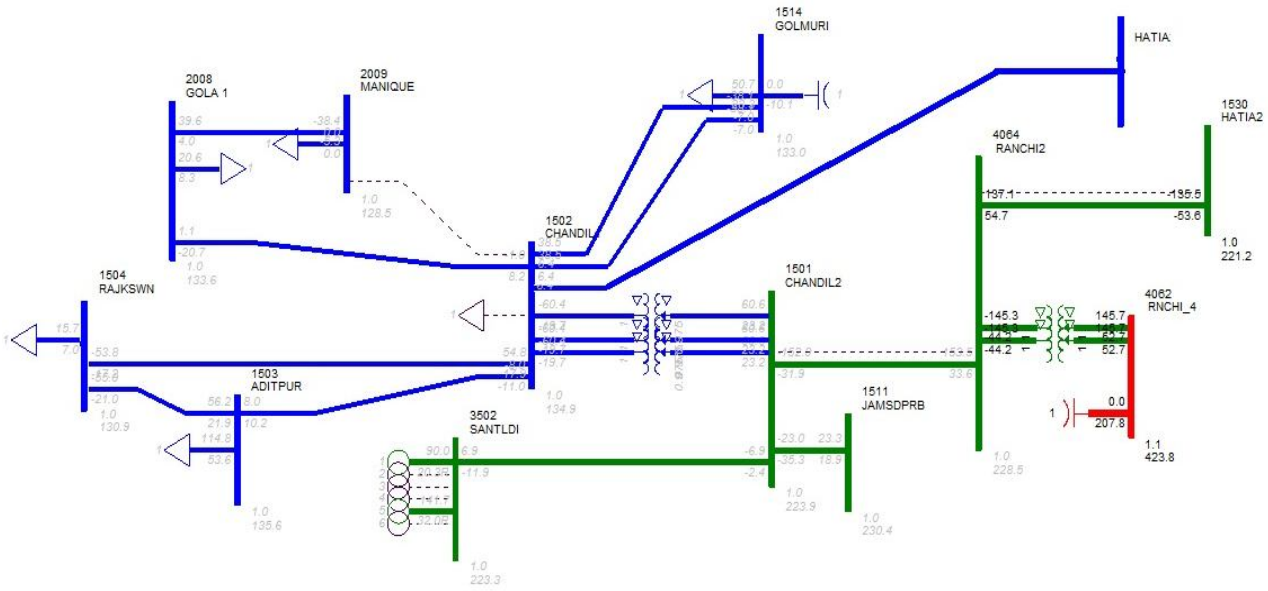
ITEM NO. B.3: Tripping of all 220kV lines from 220kV Chandil S/s at 14:13hrs on 25.08.2014.

At 14:13hrs, total power failure occurred at 220kV Chandil S/s due to Y-N fault occurred in 220kV Chandil-Ranchi (PG) line.

Following lines tripped:

- 220kV Chandil-Ranchi (tripped from both ends)
- 220kV Chandil-Santaldih (tripped from Chandil end)
- 220kV Chandil-Ramchandrapur (tripped from Chandil end)
- 132kV Chandil-Hatia (tripped from Hatia end)
- 132kV Ramchandrapur- Adityapur D/C (tripped from Adityapur end)

It appears that the sequence of events was initiated due to earth fault (Y-N) occurred in 220kV Chandil-Ranchi line which tripped from both ends. However, it was telephonically reported that, all the three pole breakers of the said line did not open simultaneously at Chandil end leading to triggering of master trip relay at Chandil end for 220kV Chandil-Santaldih and 220kV Chandil-Ramchandrapur line and thus Chandil 220kV Bus became dead. As a consequence, total Adityapur load along with traction supply at Chandil started getting power through 132kV Chandil-Hatia and 132kV Ramchandrapur- Adityapur-D/C. This led to operation O/C relay at Ramchandrapur end for 132kV Ramchandrapur-Adityapur D/c which thus tripped on O/C protection from Ramchandrapur end. Tripping of 132kV Chandil-Hatia on 30G/H & master trip needs to be explained. Traction power of around 43MW interrupted at Manique, Golmuri, Kendposi, Chakardharpur, Rajkharsawn GSS and Goelkera. There was a delay in restoration of 220kV Chandil-Ranchi and 220kV Chandil-Santaldih due to defect in master trip relay.



Remedial Measures/Suggestions:

- Operation of Master trip at Chandil needs to be investigated.
- Operation of only 30G/H & master trip at Hatia end for 132kV Chandil-Hatia end needs to be checked.
- The O/C settings at Ramchandrapur end for 132kV Ramchandrapur-Adityapur D/C needs to be checked to see whether the operation was in order and whether the settings need to be changed.

JSEB may explain.

<u>Deliberation in the meeting</u>

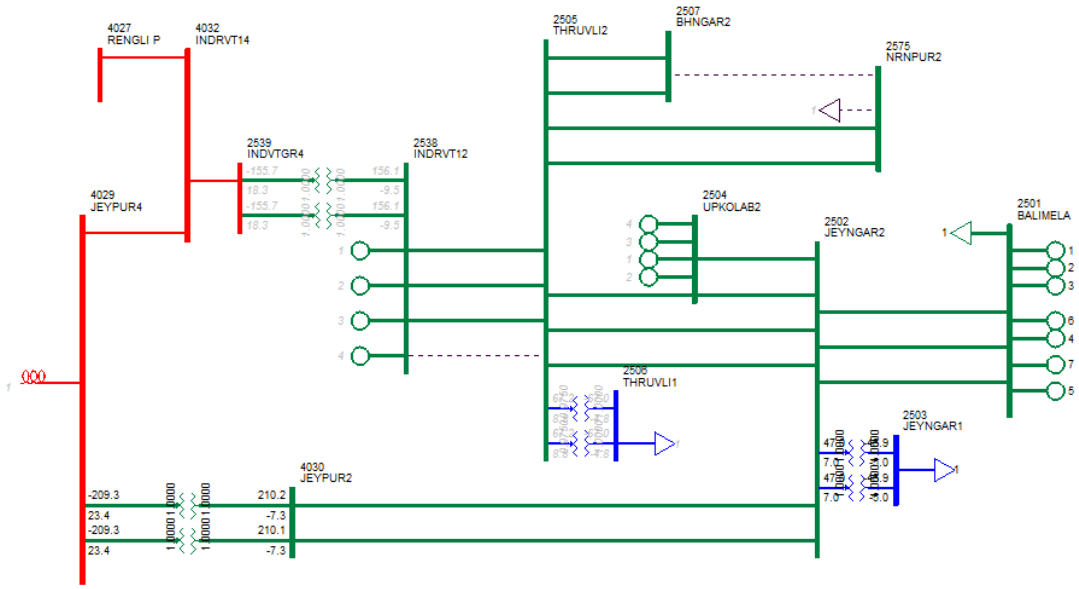
JUSNL informed that M/s. Areva engineer has investigated the tripping incidence and LBB timer of 220kV Chandil-Ranchi line at Chandil S/s was found defective. Hence, the LBB got initiation and tripping all other 220kV lines from Chandil s/s. Further, the manufacturer (Essun Reyroll) of LBB relay was contacted for rectification of the same.

On enquiry regarding the present O/C relay setting of 132kV Ramchandrapur-Adityapur D/C *at Ramchadrapur end, JUSNL stated that it was at 540A with 0.2sec delay. The tripping of 132kV Ramchandrapur-Adityapur D/C on O/C is in order, as this line got overloaded under this contingency.*

PCC noted.

ITEM NO. B.4: OPTCL System

1. **Disturbance at 220/132kV Theruvali & Jaynagar S/s at 19:29 hrs on 16/08/14.**



OPTCL System

At 19:29hrs on 16.08.2014 220kV bus-1 at Theruvali S/s became dead. On investigation it was found that Y-ph post insulator used for bypassing bus-1 main breaker(defunct) of 220kV Theruvali-U.Kolab line burst and Y-ph jumper along with bus side and breaker side isolator post insulator felt on ground at Theruvali S/s causing bus fault. There was no power interruption at Theruvali S/s as 220kV bus-II was in service.

220kV Jaynagar-Jaypore(PG)-I & II tripped at Jaynagar pulling out all the running units at Balimela PH and U.Kolab PH. 220kV bus at Jaynagar became dead.

OPTCL, OHPC & Powergrid may explain.

Deliberation in the meeting

*OPTCL has explained the tripping incidence with detailed presentation as enclosed at **Annexure-B.4.1**. OPTCL informed that, due to bus fault the high Impedance Bus Bar protection at Theruvalli S/s had operated and tripped all the Bus CB of Bus I. Due to delayed Bus bar operation the 220kV Indarvati-1 & 2 tripped from DP Zone 2 operation & 220kV Laxmipur 1 & 2 tripped on DEF function of DP relay. No power failure occurred in 132kV & 33kV system of Theruvali as the Auto transformers were in service.*

The 220kV lines (1 & 2) Jaynagar to Jeypore PGCIL tripped on over current due to overloading consequent upon tripping 400kV link between Indravati PGCIL –Jeypore PGCIL. Due to load throw off, system voltage in the area has increased caused tripping of the Upper kolab –Jaynagar 220kV line 1 & 2 on over voltage.

OPTCL reported that, new bus bar protection will be commissioned by December, 2014.

2. **Disturbance at OPTCL on 26th August 2014**

At 23:08hrs of 26th August 2014, 400kV Indravati(PG)-Indravati(O) tripped on overvoltage (Stg-1) from PGCIL end and 400/220kV ICT –I &II at Indravati PH tripped with over flux relay indication (as per information received from OPTCL). Further, 400kV Indravati(PG)-Jeypur(PG) S/C line tripped on inst. Over-current protection from Jeypur(PG) end only. Subsequently 220kV

Jayanagar –Jeypore D/C tripped at Jayanagar on actuation of over current relay indication and 220kV Theruvali-Bhanjanagar D/C tripped due to R-ph fault. Indravati, U. Kolab and Balimela hydro stations got islanded with loads of Theruvali and Jeynagar complexes. All the running units of Balimela (except #4,#7 and #8), Indravati and U.Kolab tripped . Thus 220kV bus at Jayanagar became dead. And also due to tripping of 220kV Theruvali-Bhanjnagar D/c from both end Theruvali S/S became dead.

Following lines/elements tripped:

1. 400/220kV ICT –I &II at Indravati PH tripped
2. 400kV Jeypore-Indravati 220kV Jayanagar-Jeypore D/C
3. 220kV Theruvali-Bhanjnagar D/C
4. 220kV Jayanagar-U.Kolab D/C
5. 220kV Theruvali-U.Kolab
6. U.Kolab U# I,II,III & IV
7. Balimela U# III, V,VI

Due to this disturbance around 800 MW of load loss and 1200 MW of generation loss occurred in Odisha sytem.

Subsequently, a special meeting was convened on 4th September, 2014 to analyze the incident.

OPTCL explained that at 23:08 hrs, 400kV Indravati(PG)-Indravati(OHPC) S/C line was tripped from Indravati(PG) end on over-voltage (Stg-1) protection, followed by 400kV Jeypur(PG)-Indravati(PG) S/C line from Jeypur end on earth fault. At 23.09 Hrs. ICT 1 & 2 of Indravati Power House tripped on over fluxing relay operation. Thereafter 220kV Jeypur(PG)-Jaynagar(OPTCL) D/C line tripped from OPTCL end. The load flow in each of above circuits to Jeypore PG was 200MW prior to disturbance. As 400kV link to Jeypore PG from Indaravati Power house had tripped earlier, heavy load demand in the area caused tripping of 220kV lines on over current.

The 220kV Therubali – Bhanjanagar ckt.1 & 2 tripped on DP relay operation at both end. The relay indication was Zone-1, 3 phase fault. The cause of above tripping may be attributed to heavy power swing due to high imbalance in load and generation in the loop. The 220kV Narendrapur - Mendhasal circuit tripped at Narendrapur on operation of directional over current. Due to heavy load throw on isolation of PGCIL system and Therubali– Bhanjanagr link, over voltage condition may have experienced.

The 220kV lines from Upper Kolab tripped on over voltage, and all the Generator of the power house tripped on over speed. All the Generator of Indravati power house tripped. The units 3,5 & 6 of Balimela Power house isolated from the Grid and #4,7 & 8 were tripped.

After detailed deliberation, PCC advised Powergrid, OPTCL and OHPC to clarify the following points:

1. Tripping of 400kV Indravati(PG) – Indravati(OHPC) on O/V Stg-I (112%, 5 sec delay) –

   a) Reason for sudden rise of Indravati(PG) voltage by 25 kV (407 kV to 432kV) not understood. DR may be installed at the earliest at Indravati(PG) to analyse voltage, current, CB opening time etc. (Action : Powergrid)
   b) Instances of O/V tripping also observed on 2nd and 3rd September, 2014. Therefore, Powergrid advised to check the electromagnetic O/V relay and CVT output for proper functioning. (Action : Powergrid)

2. Reason for operation of Instantaneous O/C & E/F relay at Jeypur(PG) end of 400kV Indravati(PG)-Jeypur(PG) line not clear, when there was actually no fault in the line (maximum line current in R-ph recorded by PMU was only 400A). Also reason for 50A rise in R-ph current and 200A fall in Y and B-ph currents of Indravati-Jeypur line, just before tripping. (Action : Powergrid)

3. After tripping from Jeypur(PG) end reasons for not sending DT signal to Indravati(PG) end. (Action : Powergrid)

4. When export through HVDC Gajuwaka was reduced from 500MW to 300MW, one ckt of Jeypur-Gajuwaka 400kV line shared 200MW while the other ckt shared 100MW. Earlier, each ckt was carrying 250 MW. Reasons may be explained. (Action : Powergrid)

5. Reason for tripping of both circuits of 220kV Theruvali-Bhanjanagar on DP, Zone-I, 3-ph from Bhanjanagar end, when there was actually no fault in the line (could be charged successfully shortly after tripping). OPTCL advised to send the related DR files of 220kV Theruvali S/s. (Action : OPTCL)

6. After tripping of 400kV Indravati(PG) – Indravati(OHPC) on O/V Stg-I, entire generation (600MW) of Indravati HPS got forced through 220kV Indravati-Theruvali 1 & 2, which did not trip, although their O/C protection is set to operate at 600A. (Action : OPTCL)

7. Tripping of 220kV Narenadrapur-Mendhasal on O/C from Narendrapur can be justified only if it occurs prior to loss of major part of S. Odisha generation (Indravati, Balimela and U. Kolab). (Action : OPTCL)

8. Voltage recorded by station DCS of U. Kolab HPS prior to tripping of its outgoing lines is required to justify tripping of these lines on overvoltage protection. U. Kolab-Jeynagar is only a 6km line whereas Jeynagar-Theruvali is a 123km line. Therefore, tripping of U. Kolab – Jeynagar line instead of Jeynagar-Theruvali appears to be unjustified. It may further be confirmed whether the lines tripped before or after tripping of the U. Kolab units. (Action : OHPC)

9. Reasons for tripping of 220kV Balimela-Jeynagar T/C, Balimela-U. Sileru S/C and station transformer-1 from Balimela HPS at 23:09:57 and reclosing of these CBs at 23:09:58 is also not understood. (Action : OHPC/OPTCL)

10. SOE has not been generated in SCADA system for tripping of 220kV Jeynagar-Jeypur-1, Theruvali-Bhanjanagar D/C from Bhanjanagar, Narendrapur-Mendhasal line from Narendrapur, overflux tripping of 400/220kV ICTs at Indravati HPS. These SOEs may therefore be immediately wired properly into their respective RTUs. (Action : OPTCL)

The issue was placed in 28th TCC meeting.

In 28th TCC, OPTCL, OHPC and Powergrid informed that detail analysis of this type of disturbances need some more time. TCC advised OPTCL, OHPC and Powergrid to place the details in next PCC Meeting for further detail deliberation.

OPTCL, OHPC & Powergrid may explain.

Deliberation in the meeting

During deliberation the reason behind sudden rise of voltage at 400kV Indravati (PG) S/s could not be ascertained.

After detailed deliberation, PCC felt a committee should be formed for detail analysis of this incidence. Accordingly, a committee of comprising of the following members was constituted:

1. *Shri M. R. Mohanthy, Sr. GM, SLDC, OPTCL*
2. *Shri S. Nayak, AGM, NTPC*
3. *Shri S. Roy, ACE (CTD) , WBSETCL, Kolkata*
4. *Shri J. Dutta, SE, CTC, DVC, Maithon*
5. *Shri S. Banerjee, CM, ERLDC,Kolkata*
6. *Shri A. Sen Sarma, DGM,CC, Powergrid*
7. *Shri B.Sarkhel, SE(PS),ERPC,Kolkata - Convenor*

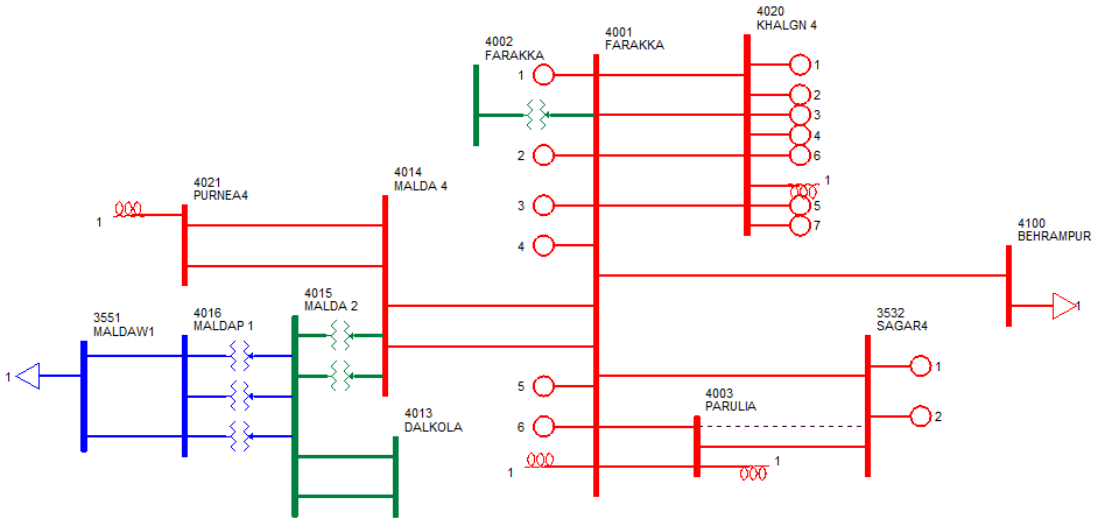
PCC advised OPTCL, OHPC & Powergrid to send reports on the disturbance from their respective ends along with DR, EL, relay flags and SLD to ERPC Secretariat. PCC also suggested to include recommendations in the report. Accordingly, the committee will study and decide the further course of action.

OPTCL, OHPC, NTPC & Powergrid agreed.

ITEM NO. B.5: Disturbance at FSTPP on 28th August 2014.

On 28th August, 2014 at around 11:13hrs, earth fault was suspected to have occurred in B-Ø of 400 kV FSTPP-Malda-II due to which all the running units of FSTPP along with all incoming/outgoing feeders tripped. Power supply to Bangladesh at HVDC Bheramara also got affected. Following elements tripped:

1. 400kv FSTPP-Malda d/c
2. 400kv FSTPP-KhSTPS-Q/c
3. 400kv FSTPP-Sagardighi-s/c
4. 400kv FSTPP-Berhampur-s/c
5. 400kv FSTPP-Durgapur-d/c
6. 400kv Jeerat-Berhampur
7. 315MVA, 400/220kV ICT-III at Malda
8. 132kV Malda-Malda-II (tripped from Malda (WBSETCL) end only)



FSTPP System

A special meeting was convened on 4th September, 2014 to analyze the incident.

NTPC explained that the sequence of events was initiated due to occurrence of E/F in 400kV Farakka-Malda-II at Zone-I from FSTPP end (16kms from Malda). Relay indications at FSTPP indicate Zone-I, E/F. From disturbance recorder it was observed that B-phase tie-3252 CB was failed to operate. Simultaneously LBB did not operate to isolate the faulty line. As a result, all the lines tripped from remote end except 400kV FSTPP-Berhampur-S/c line. Instead of 400kV FSTPP-Berhampur-S/c line the 400kV Jeerat-Berhampur line was tripped from Jeerat end and back up earth fault relay (51NGT) at FSTPP isolated all the running machines (U# 1, 2, 3, 4 & 6) of FSTPP.

NTPC Farakka informed that protection system of 400kV Farakka-Malda-II line at Farakka end is being maintained by Powergrid.

Further, NTPC Farakka clarified that sending of DT on Directional E/F is not included in their protection scheme for 400kV FSTPP-KhSTPP I & II. This feature is available in 400kV FSTPP-KhSTPP III & IV, which are maintained by Powergrid. NTPC was advised to implement the same for 400kV FSTPP-KhSTPP I & II.

Powergrid informed that they are inspecting the protection system at 400kV FSTPP and they will submit the report within 3 days.

After detailed deliberation, PCC advised Powergrid and NTPC Farakka to clarify the following points:

1. Non-clearance of fault at FSTPP end for 400kV FSTPP-Malda-II. (Action : NTPC & Powergrid)
2. DR plots of 400kV FSTPP-Malda-II at FSTPP end (not GPS synchronized) (triggered at 11:06:28:291) depict that opening of 3-ph Tie breakers started at 11:06:28:332 and Main breakers at 11:06:28:333. However opening of the breakers are not confirmed in the DR channels and fault current through B-phase persists even after around 1000ms. It appears that FSTPP end breaker did not open. Powergrid may give a detailed report regarding testing carried out, problems detected and the rectification activities carried out for the main/tie breakers and the associated relays. (Action : Powergrid)
3. LBB for 400kV FSTPP-Malda-II connected to Bus-I did not operate. (Action : Powergrid)
4. Non-opening of Behrampore end breakers due to which Directional E/F was triggered at Jeerat end. (Action : Powergrid)
5. The tripping of 315MVA ICT-III at Malda on backup O/C and that of 132kV Malda(PG)-Malda from Malda(WB) end. (Action : Powergrid)
6. Occurrence of Over-voltage Stage-I subsequently. (Action : Powergrid)
7. The fault persistence time of 4240ms is a violation of CEA (Grid Standards) Regulations, 2010. As per Cl.3 (e) regarding 'Standards for Operation and Maintenance of Transmission Lines', wherein the maximum fault clearance time for 400kV Transmission system is 100ms.

The issue is placed in 28th TCC Meeting.

In 28th TCC, NTPC and Powergrid informed that in depth analysis for this disturbance are being carried out at their end and details will be placed in next PCC for chalking out remedial measures. TCC advised ERPC Secretariat to have detail deliberation on this issue in next PCC Meeting scheduled to be held on 25th September, 2014 and requested NTPC and Powergrid to attend the meeting with all the details.

Powergrid and NTPC agreed.

ERLDC suggested for duplicated LBB scheme to avoid such type of collapse in generating stations. NTPC informed that in all their new stations duplicated LBB is already available. Powergrid expressed that if affective, it would be considered in their system also.

Powergrid and NTPC may deliberate.

Deliberation in the meeting

NTPC once again requested to explain the tripping incidence.

As per Protection Committee observations, NTPC & Powergrid have given the following action plan:

1. Non-clearance of fault at FSTPP end for 400kV FSTPP-Malda-II. (Action : NTPC & Powergrid) --- T*ie CB -3252 (BHEL make) has been tested and found in order but it was suspected the CB operation was sluggish. The existing CB will be replaced.*
2. DR plots of 400kV FSTPP-Malda-II at FSTPP end (not GPS synchronized) (triggered at 11:06:28:291) depict that opening of 3-ph Tie breakers started at 11:06:28:332 and Main breakers at 11:06:28:333. However opening of the breakers are not confirmed in the DR channels and fault current through B-phase persists even after around 1000ms. It appears that FSTPP end breaker did not open. Powergrid may give a detailed report regarding testing carried out, problems detected and the rectification activities carried out for the

main/tie breakers and the associated relays. (Action : Powergrid) --- *The relays LZ and REL relays will be replaced with new Micom and Siprotec relays.*

3. LBB for 400kV FSTPP-Malda-II connected to Bus-I did not operate. (Action : Powergrid)— *Current elements were not functional, the same are being replaced. Duplication of LBB scheme is also in progress.*
4. Non-opening of Behrampore end breakers due to which Directional E/F was triggered at Jeerat end. (Action : Powergrid)--- *Time coordination has been done.*

ITEM NO. B.6: Repeated tripping of 400 kV Gaya-Koderma on R-ph fault- ERLDC

It has been observed that 400kV Gaya-Koderma is tripping repeatedly on R-Ph fault. However, the line can be charged subsequently after a short time. Powergrid may indicate the actions taken for rectification of the same.

Powergrid may update.

Deliberation in the meeting

Powergrid informed that, high resistive fault was occurred in the line due to insulator failure and the fault could not reach the distance protection of Gaya end because of high resistance. Koderma end has successfully identified the fault and sent the DT to Gaya end.

Powergrid informed that the line insulator has been replaced.

PART- C

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

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

ITEM NO. C.1: Reporting and Analysis of disturbance

It is also observed that representatives from respective SLDCs are frequently not attending PCC meetings with detailed analysis of the disturbances occurred in the respective control area. As a result PCC is facing problem in giving proper recommendations towards protection mis-coordination.

22nd PCC meeting held on 21st August, 2014 and 100th OCC held on 22nd August, 2014 advised SLDC personnel of all constituents to be present in PCC meetings of ERPC along with their respective protection people for detail analysis of respective disturbances.

The issue is placed in 28th TCC meeting for further guidance.

In 28th TCC, Member Secretary I/C, ERPC requested all TCC members to:

1. Depute their officers from SLDC as well as Protection wings in Protection Coordination Committee Meetings.
2. Advice concern SLDC to give the preliminary reports of disturbance in their respective systems to ERLDC in time in specific format as per CERC guidelines along with relay flags, DR printout, pre-fault condition etc..
3. Advice concern protection engineers to submit the detail analysis of the disturbance in respective system to ERLDC/ERPC at least ¾ days ahead of monthly PCC meeting.

4. Advice concern officer from SLDC and Protection wing to attend PCC meetings and analytically present the case with all the details including SLD.

TCC members agreed.

Members may note.

Deliberation in the meeting

Members noted.

ITEM NO. C.2: ERPC recommendations on repeated trippings at 132 kV Purnea (BSPTCL) S/S

In 21st PCC, in view of repeated uncoordinated tripping from 220 kV Purnea S/s (PGCIL) due to various line faults in BSPTCL downstream system, it was decided that ERPC team comprises of ERPC, ERLDC, Powergrid, WBSETCL, DVC and BSPTCL members will visit for Audit/testing of relays in neighboring substations in around 220 kV Purnea S/s to review the protection philosophy in 1st week of August, 2014.

Accordingly, ERPC team members visited the 132kV Purnea(PG), 132kV Purnea(BSPTCL) and 132kV Forbesganj S/s from 11-08-2014 to 13-08-2014.

In 22nd PCC, ERPC team presented the audit report of the 132 kV Purnea & adjoining sub-stations and highlighted the list of deficiencies in the protective system installed at there. The recommendation for remedial measures for those sub-stations is also presented.

After detailed deliberations PCC advised BSPTCL to comply all the recommendations at the earliest. BSPTCL agreed to comply the recommendations as pointed by the ERPC team within a month.

BSPTCL was also advised to carry out Tan-Delta (tanδ) and thermo vision tests for all CTs.

Further, PCC referred the issue to TCC for further guidance and advised the team to present the report in the 28th TCC/ERPC meeting scheduled on 12/13.09.2014.

In 28th TCC, Audit team has presented their observations and recommendations of 132kV Purnea and Forbesgunj (BSPTCL). During presentation three types of recommendations (short term, medium term and long term) were given.

TCC advised BSPTCL to implement the short term and medium term recommendations within 2/3 months time and to place the roadmap for implementation of all the recommendations to ERPC Secretariat at the earliest.

BSPTCL may update.

Deliberation in the meeting

PCC advised BSPTCL to submit the action plan at the earliest.

BSPTCL agreed.

ITEM NO. C.3: PROTECTION PHILOSOPHY OF EASTERN REGION

In the Special meetings on "Protection Co-ordination of JSEB System and its neighbouring utilities" held on 12.11.13, 05.12.13 & 28.01.14 the protection philosophy for Eastern Region was agreed as given below:

Sl. No.	Zone	Direction	Protected Line Reach Settings	Time Settings
1	Zone-1	Forward	80%	Instantaneous
2	Zone-2	Forward	120%	300 milliseconds
	Zone-2 (for 220kV and below)	Forward	120 % of the protected line or 100% of the protected line + 50% of the adjacent shortest line (whichever is less)	300 milliseconds
3	Zone-3	Forward	100 % of the protected line + Za	1.0 Sec
4	Zone-4	Reverse	20%	1.2 Sec

Where, Za = Impedance of 100% of the adjacent longest line or 90 % of the Transformer impedance (whichever is less).

In 19th PCC, all the constituents were requested to adopt the same philosophy for their inter as well as intra state lines for better protection co-ordination of their systems and Eastern Regional system as a whole. Implementation of this philosophy may also be extended for BSPTCL, DVC and West Bengal systems.

A special meeting was convened to review the zone settings of BSPTCL, DVC and West Bengal systems on 06.08.14. The zone settings as updated by the constituents (till date) are circulated in the meeting**.** Concerned members are requested to confirm the given settings and also update the bold and blank fields.

The updated zone settings of the various lines are circulated in the meeting**.**

Members may update.

Deliberation in the meeting

House was informed that zone settings of BSPTCL, DVC and West Bengal systems are made available at ERPC website. PCC advised all constituents update the settings at their end by 7th October, 2014. Thereafter, a separate meeting will be convened to discuss the implementation of zone settings recommended by the Special Task Force.

ITEM NO. C.4: Availability of single phase auto-reclosure facility for 220KV and above lines

Single phase Auto-reclosure scheme helps to ensure Grid security by preventing unwarranted tripping of lines on short duration transient faults. However, operation of Auto-reclosure has not been in order in several cases.

In 21st PCC, PCC reiterated that as per CEA(Technical Standards for construction of Electric Plants and Electric Lines) Regulations 2010, single reclose auto-reclosure facility is to be kept in service for all lines 220kV and above.

Accordingly, PCC advised all constituents to forward the list of transmission lines for which single-phase auto-reclosure is not in service, stating the reason for the same to ERLDC with a copy to ERPC Secretariat.

PCC also advised to inform the failure of successful auto-reclosure operation to ERLDC stating the detailed relay indications along with DR/EL outputs.

Constituents agreed.

ERLDC may update the status.

Deliberation in the meeting

PCC advised all the constituents to send the requisite information to ERLDC before 7th October, 2014.

Constituents agreed.

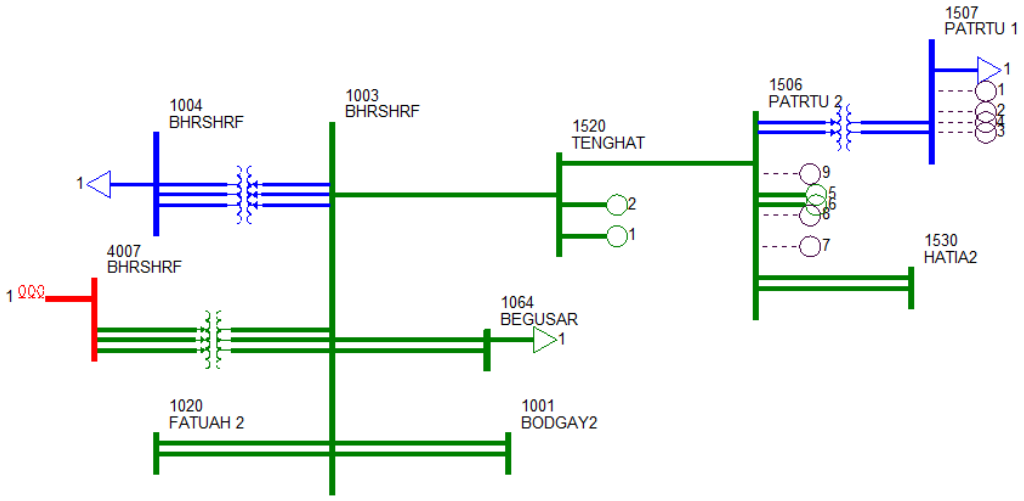
ITEM NO. C.5: Efficient Evacution of Power from 2x210 MW Tenughat TPS, Lalpania—TVNL

Arrangement for evacuation of power from Tenughat TPC is through the following two transmission lines:

1) Tenughat TPS to Bihar Sharif(BSEB) S/S through 400 KV Single Circuit line.
2) Tenughat TPS to Patraru TPS through 400 KV Single Circuit line.

Both lines are operating at 220 kV due to non readiness of 400 K V S/S at terminating ends.

In 27th TCC, TVNL informed that, at TVNL end the up gradation to 400 kV level is in process. Accordingly, TCC also advised JSEB to deposit the requisite amount to Powergrid for up gradation/termination work entrusted to Powergrid for operation of the line at rated voltage. This will facilitate Tenughat-Biharshariff line to be operated at 400 kV and stability of the TVNL units.



TVNL Evacuation System

In 21st PCC, TVNL informed that 2x250 MVA ICT is already available at TVNL and the erection work is in progress. TVNL reported that work will be completed by December, 2014 at TVNL end.

Powergrid informed that, up gradation related works at 400 kV Biharshariff S/s has now stalled due to some payment issues with JSEB. However, it is expected to complete the work by December, 2014, if in the mean time payment issues get settled at earliest.

In 28th TCC Powergrid informed that payment of around 4.58 cr. is pending from JSEB and the completion of the work would take 3 months from date of payment.

JSEB informed that the payment has been delayed due to some fund constraints and it would be released shortly in 2-3 instalments starting from November, 2014.

During deliberation ERLDC expressed that conversion of 220kV Tenughat-Biharshariff line to 400kV level may not bring the total stability of Tenughat Power Station. Status of construction for 400kV Tenughat-New Ranchi D/C line and 220kV Tenughat-Govindpur-Dumka line under Powergrid consultancy were enquired. It was informed that 400kV line is under scope of Powergrid under deposit work of Jharkhand strengthening scheme for which around 450 Cr.

Jharkhand has to deposit. Representative from Jharkhand informed that 220kV line is not under scope of Powergrid consultancy. TCC however advised Jharkhand and CTU to deliberate on this in lower forum of ERPC.

TVNL, JSEB, Powergird may update.

Deliberation in the meeting

Powergrid informed that the status remained same. However, it was informed that JUVNL agreed to start installment payments to Powergrid from November, 2014 onwards.

ITEM NO. C.6: Disturbances in Odisha System

1. Disturbance at Theruvali on 21/07/14

On 21.07.14, 00:40 Hrs Bus-I side R-phase PI of 220 kV Theruvali- U. Kolab ckt burst and R-phase conductor snapped & fell on the ground. All feeders main breakers from bus-I tripped on bus bar protection due to bus fault. There was no power interruption at Theruvali S/S as 220 kV bus-II was in service. The following lines tripped:

i. 220/132 kV, 100 MVA Auto- I main breaker tripped but was in operation on tie-breaker
ii. 220 kV Theruvali – Narendrapur- I &II tripped from Theruvali end (E/F)
iii. 220 kV Theruvali- Bhanjanagar- II tripped from both ends
iv. 220 kV Theruvali- U. Indravati-I & II tripped from U.Indravati end (DP, Z-2)
v. 220 kV Theruvali- Laxmipur- Jaynagar-I &II tripped from Laxmipur end (DP, Z-2)

In 20th PCC, replacement of defective CBs OPTCL informed that all CBs are replaced except Main and Tie CBs for 220 kV U.Kolab and Jaynagar ckt III. Action is also being taken to replace electromagnetic non-directional over current & earth fault relays with numerical relays at Theruvali 220 kV S/s.

In 21st PCC, for frequent tripping incidences at 220 kV Theruvali S/s it was observed by OPTCL that, old high impedance bus bar protection is not working properly at there, which was caused the tripping of transmission lines from remote end.

OPTCL reported that, new numerical bus bar protection is being installed and it will be in service by December, 2014. Further, the backup O/C relays are also being replaced with numerical relays at 220 kV Theruvali S/s.

In 22nd PCC, OPTCL informed that the above tripping took place due to non-operation line CB and Bus- I feeders and ATR tripped on delayed operation of Bus bar protection. The bus bar protection at Theuvalli S/s is now under replacement. However, the details of tripping of 220 kV Theruvali- Bhanjanagar- II needs to be investigated. PCC advised OPTCL to submit a detailed report.

OPTCL also informed that some of the relays of 220 kV Theruvali S/s were already replaced and rest will also be replaced. The installation of bus bar protection is expected to be put in service before December, 2014.

OPTCL may update.

Deliberation in the meeting

OPTCL informed that some relays at 220 kV Theruvali S/s were already replaced and rest will also be replaced by December, 2014. The installation of bus bar protection is expected to be put in service before December, 2014.

2. Disturbance at GMR system on 23/07/14

In 22nd PCC, OPTCL informed that the relay setting at GMR end appeared to be very fast. Subsequent tripping of 400 kV Talcher- GMR line along with GMR units tripping while charging of 400 kV Meramundalli-Ib TPS line without removing of fault by OPTCL was serious concern. The tripping of 400 kV GMR-Talcher line also showed protection coordination needed at GMR with neighbouring 400 kV S/s.

PCC felt that the existing protection coordination of relays needs to be reviewed by OPTCL, Talcher and GMR to avoid indiscriminate tripping in future. OPTCL may submit a report in the next PCC meeting.

OPTCL agreed.

OPTCL & GMR may update.

Deliberation in the meeting

OPTCL informed that a meeting with GMR has been scheduled on 29th September, 2014 to discuss the issue.

PCC advised OPTCL to send the outcome of the meeting to ERLDC/ERPC Secretariat.

OPTCL agreed.

3. Disturbance in OPTCL and DVC system at 17:15 hrs on 12th July, 2014.

As per report from OPTCL, due to staggered tripping of lines from TTPS end(initiated at 16:52Hrs) including both 220/132kV ICTs at TTPS, all the running units of TTPS(viz.Units#1,2,3,4 running on 132kV side) tripped ultimately at 17:04Hrs. Weather was reported to be of inclement condition at the time of trippings. The Units#5 & 6 connected to 220kV Bus at TTPS were out of bar prior to the incident. Consequent to the trippings, Joda remained connected to two sources only, viz. 220kV Joda-Ramchandrapur and 220kV Joda-Jindal-Jamshedpur. 220kV Joda-Ramchandrapur tripped at 17:15hrs on O/C which appears to be a relay mal-operation and needs to be investigated. Due to the above trippings, direction of power flow through 220kV Joda-Jindal-Jamshedpur reversed as Joda S/S became radial on DVC system resulting in heavy drawal from DVC system. Due to such heavy drawal by Joda, 132kV Barhi-Koderma D/c tripped on O/C resulting in islanding of Bokaro-B TPS. The island formed being heavily deficit in generation vis-a-vis load, suffered low voltage and collapsed on Load generation imbalance. Thus 2x210MW units at Bokaro'B' tripped consequent to tripping of 132kV Barhi-Koderma D/C. The Following elements tripped:

i. 220kV Meramundali-TTPS-II (Tripped from Meramundali end)
ii. 220kV Meramundali-Bhanjanagar-I (Tripped from Meramundali end)
iii. 132kV TTPS-Duburi-I (Tripped from both ends)
iv. 160 MVA, 220/132kV ATR-II at TTPS
v. 160 MVA, 220/132kV ATR-I at TTPS
vi. 220kV Meramundali-TTPS-I (Tripped from Meramundali end)
vii. 60 MW TTPS Units-1, 2, 3 and 4
viii. 220kV Joda-Ramachandrapur (Tripped from Ramachandrapur end)
ix. 132kV Barhi-Koderma-D/C (Tripped from Koderma end)
x. 2*210 MW Unit-2 and 3 at BTPS

After detailed deliberation 22nd PCC felt that the incidence could not be analyzed unless the detailed tripping reports are received from all the substations involved. PCC took serious note of non- submission of detailed tripping report by NTPC,TTPS end and advised NTPC to place the details in 100th OCC meeting scheduled to be held on 22nd August, 2014 for detailed deliberations. OPTCL was also advised to inquire about any tripping report from 220 kV TTPS-NALCO-Rengali line or 220 kV TSTPS for further investigation. The tripping incident will be again discussed after compiling reports received from all concerned.

Subsequently, a special meeting was convened on 4th September, 2014 to analyze the incident.

TTPS (NTPC) explained that, at 16:50hrs there was a R phase to ground fault in 132kV Duburi-TTPS line-1 and the fault has been cleared from both ends. Simultaneously 132kV Duburi-TTPS line-2 tripped from Duburi end and autoreclosure of TTPS end was successfully operated load flow is zero. But at the same time ICT-2 at TTPS was tripped on Neutral Directional O/C and 220kV TTPS-Meramundali-2 was tripped from Meramundali end.

Thereafter, at 16:58hrs 220kV Meramundali-TTPS-1 was tripped from Meramundali end on O/C and ICT-1 at TTPS tripped because of OLTC diverter switch Explosion vent R-ph rapture.

Therefore, TTPS completely got isolated from the grid, at 17:01 hrs TTPS units 2, 3, 4 got tripped on over speed and unit 1 got tripped on Drum Level Hi protection.

After detailed deliberation, PCC advised TTPS (NTPC) and OPTCL to clarify the following points:

- Full relay indications from OPTCL/TTPS (NTPC) not yet obtained. Specifically tripping of 220kV TTPS-Meramundali-II and 220kV Meramundali-Bhanjanagar-I from one end only, needs to be explained.
- O/C operation of 220kV Ramchandrapur-Joda needs to be checked.
- Over-current settings of 132kV Barhi-Koderma D/c need to be checked.
- Tripping of 132kV Barhi-Biharshariff needs to be corroborated.
- Tripping of 220kv TTPS-TSTPP, TTPS-Rengali to be cross-checked for occurrence and relay indications.
- Relays at TTPS/Meramundali need to be checked/audited.
- W.r.t the fault at 17:01hrs, the fault persistence time of 560ms is a violation of CEA (Grid Standards) Regulations, 2010. As per Cl.3 e) regarding 'Standards for Operation and Maintenance of Transmission Lines', maximum fault clearance time for 220/132kV Transmission system is 160ms.

OPTCL & NTPC may update.

Deliberation in the meeting

NTPC has given the following clarification:

- *Regarding tripping of 220kV TSTPP-TTPS line from TSTPP end, the circuit breaker was in closed condition but TTPS end breaker got opened without any relay indication.*
- *Protection relay of Auto Transformer 1 & 2 will be done on available opportunity.*
- *Line breaker of 220kV TTPS-Rengali line was tripped from Rengali end on O/C. TTPS end breaker was in closed condition.*

OPTCL was advised to give their clarification in written communication.

OPTCL agreed.

ITEM NO. C.7: Frequent tripping of 132KV Kahalgaon(NTPC)-Kahalgaon(BSPTCL) & 132KV Kahalgaon(NTPC)-Sabour(BSPTCL) lines of BSEB

In the Special PCC held on 06.08.2014, the house advised BSPTCL to replace the old protection relays with numerical distance protection at the earliest as Kahalgaon (NTPC) is a generating station and fault feeding for such a long duration is not desirable.

BSPTCL informed that they have stock of numerical relays (Micom P442) and retrofitting of old relays is already in process of. BSPTCL was advised by PCC and by Secretariat vide letters to

install the relays at Kahalgoan (BSPTCL) and Sabour (BSPTCL) sub-stations on priority basis.

In 28th TCC, BSPTCL informed that numerical relay of main protection (Distance Protection) has been installed at Sabour (BSPTCL) and backup relay Micom P127 has also been installed at Kahalgaon (BSPTCL). The main protection relay at Kahalgaon (BSPTCL) will be installed within next 15 days.

BSPTCL may update.

Deliberation in the meeting

BSPTCL informed that, no undesired tripping has been reported after the installation of numerical relays.

ITEM NO. C.8: Disturbance at Biharshariff (BSPTCL), Fatuah, Begusarai, Hullasganj and Eknagarsarai at 15:03 hrs on 26/06/14

BSPTCL explained that on 26.07.2014 there was control cable flashing in Relay control panel and suspected short circuit in the DC cables. The DC cable needs to be checked for all lines at Biharsharif 220 kV S/s.

PCC requested Powergrid to extend their help to BSPTCL for examining the problem.

Powergrid agreed.

PCC also advised BSPTCL to carry out feeder wise tripping test under external simulation to check the healthiness of the protection system and submit a report in the next meeting.

BSPTCL agreed.

BSPTCL may update.

Deliberation in the meeting

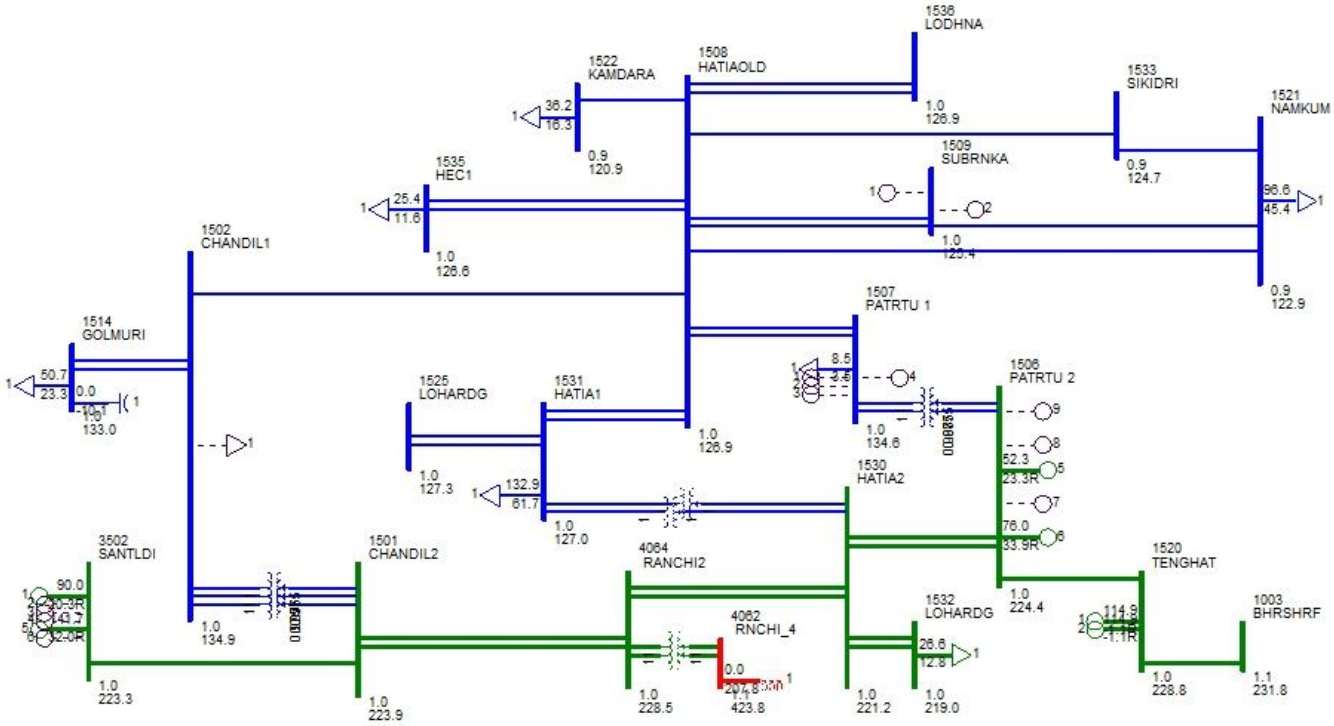
The issue is already discussed in Item no. B.2.1.

ITEM NO. C.9: Disturbance at 220 kV Patratu (JSEB) S/S at 13:10 hrs on 21/07/14.

At 13:09hrs, due to bursting of R-Ø LA of 150MVA Auto transformer-1 burst in switchyard of Patratu S/s, the following lines tripped:

i. 220kV Patratu-Tenughat (tripped at Patratu end)
ii. 220kV Ranchi-Hatia (New) (tripped at Ranchi end)
iii. 132kV Hatia-Patratu-D/C(tripped at Patratu end)
iv. 132kV Hatia-Chandil(tripped at Chandil end)
v. 132kV Hatia- Sikidari(tripped at Hatia end)

Analysis:
It was telephonically reported that the sequence of events were initiated due to bursting of R-Ø HV side LA of 150MVA Auto transformer-1 in switchyard of Patratu S/s. However, the report received from JSEB does not corroborate the same. It appears that the there was a delay in clearance of the said fault from Patratu end. As a result, 132kV Hatia-Patratu-D/C tripped from Patratu end on O/C & E/F protection. As per the report, 220kV PTPS-Hatia D/c did not trip from either ends. Due to nonopening of breakers of 220kV Patratu-Hatia-D/C from both the ends, all other lines from Hatia and Hatia (new) tripped. 220kV Ranchi-Hatia (new) tripped from Ranchi end only and cleared the fault.



Discrepancies observed and Remedial Measures/Suggestions:

- Delay in fault clearance at Patratu end needs to be investigated. Non-opening of breakers of 220kV PTPS-Hatia at either ends also needs to be checked.
- Protection system at Patratu, Hatia, and Tenughat needs to be audited/tested thoroughly.

In 22nd PCC, JUSNL representative informed that the tripping details at Patratu end are available with newly constituted Jharkhand Urja Utpadan Nigam Ltd (JUUNL). Further, he informed that testing of protective relays by M/s Areva is in progress at all Substations in around 220 kV Chandil S/s. The relay settings wherever it is necessary would be changed.

PCC advised JUSNL to submit the detailed report after collection of tripping information from Patratu TPS and Hatia S/s at the earliest.

JSEB may update.

Deliberation in the meeting

SLDC, Jharkhand informed that they have already communicated the issue to JUSNL but reply was not yet received from them.

PCC advised to give a copy of correspondence to ERPC Secretariat for further necessary action.

ITEM NO. C.10: Disturbance at Adityapur/Chandil at 13:53 hrs on 08/07/14

Total power interrupted at 220 kV Chandil S/s. Following lines tripped

220kV Chandil-Ranchi
220kV Chandil-Santaldih
220kV Chandil-Ramhandrapur
132kV Chandi-Hatia
132kV Chandi-Rajk'swan
132kV Chandi- Rajk'swan-Adityapur
132kV Ramchandrapur-Adityapur D/C

In 21st PCC, ERLDC informed that detailed tripping report was not received from JSEB.

During deliberation, ERLDC informed that if detailed report is not received from the constituents in specified time as per the standard format, this would attract to file a petition in CERC.

PCC advised JSEB to send the detailed tripping report in time as and when any disturbance occurred in their control area. JSEB agreed.

JSEB informed that two series of incidences happened successively, one at 13:53 hrs, when R-ph to ground fault was occurred in 220 kV Chandil-Ranchi line and the line was successfully isolated from both ends.

Powergrid confirmed that, a R-ph to ground fault was detected in 220 kV Chandil-Ranchi line at 26 km from 220 kV Ranchi S/s and the fault was isolated by distance protection in zone-1. Whereas, JSEB informed that R-ph to ground fault was detected in zone 4 at a distance 95.77 km from 220 kV Chandil S/s. JSEB reported that the following lines were also tripped at 13:53 hrs,

- 220kV Chandil-Santaldih: tripped from Chandil end only on R, Y, B Ph O/C
- 220kV Chandil-Ramchandrapur: tripped from Ramchandrapur end only on distance protection, zone-1
- 132kV Chandil-Hatia: tripped from both ends, Chandil end on distance protection, B-ph to ground, zone-1 and Hatia end on directional impedance relay 30c.

WBPDCL informed that, no relay indication was observed at STPS end, hence the 220 kV Chandil-STPS line was tripped manually at STPS end after the line was observed under tripped condition from Chandil end.

Thereafter during restoration of 220 kV Chandil-Ramchandrapur line from Ramchandrapur end, a second incidence was occurred at 14:05 hrs when there was LA bursted out at 132 kV Adityapur S/s.

The tripping incidence could not be explained properly by JSEB representative hence, no conclusion on analysis of the incidence was arrived at. PCC took serious note and advised JSEB to collect the details and send the detailed tripping incidence report in standard format within 7 days. PCC also advised JSEB to check the following,

- Zone setting of distance relay of 220kV Chandil-Ramchandrapur line at Ramchandrapur end
- Zone settings of all the distance relays at 220 kV Chandil S/s

PCC advised to send the report within 7 days. JSEB agreed.

In 22nd PCC, JSEB informed that, zone 3 settings at Chandil end of 220kV Chandil-Ranchi (PG) and zone-1 setting of 220kV Chandil-Ramhandrapur found incorrect and the same has been rectified. JSEB informed that M/S Areva is testing all the relays at 220kV Chandil S/s.

JSEB and ERLDC may update the status.

Deliberation in the meeting

JSEB informed that relays have been tested and agreed to give the report to ERPC Secretariat.

ITEM NO. C.11: Tripping of 400 kV Farakka-Berhampore line.

It has been observed quite sometimes that 400 kV Farakka- Berhampore line experienced repeated tripping from Berhampore end only and remained charged from FSTPP end. These incidences are cause of concern for safe grid operation. The tripping report from Powergrid has not yet been received by ERLDC in this regard for which no conclusion could be arrived at.

In reply, Powergrid informed that the fault was in one circuit of 400kV Berhampore-Bheramara

D/C and the same was leading to maloperation at Berhampore end of 400kV FSTPP-Berhampore line. Powergrid indicated that prima facie the SOTF relay at Berhampore end appeared to be mal-operating and such mal-operations would be investigated and rectified shortly.

In 22nd PCC, Powergrid reported that SOTF relay at Berhampore end has been rectified.

PCC advised Powergrid to submit a report in this regard. Powergrid agreed.

Powergrid may please update.

Deliberation in the meeting

PCC advised Powergrid to submit the report.

Powergrid agreed to submit the report on 25th September, 2014.

ITEM NO. C.12: Tripping of 220 kV lines from STPS (WBPDCL) on 04/04/14.

PCC enquired about over current relay settings at Chandil end. In reply, JSEB informed that the existing setting is 75% with time delay of 0.25 sec (CT ratio is 600:1).

PCC felt that O/C setting at 75% on an important interstate tie line is appeared to be at lower side and advised JSEB to increase the over current relay setting to 100%. PCC also advised WBPDCL to share the O/C relay settings of STPS end with JSEB.

JSEB informed that they have changed the O/C relay setting to 100%.

WBPDCL is also advised to review the settings at their end.

WBPDCL agreed.

WBPDCL may update the status.

Deliberation in the meeting

WBPDCL informed that O/C current relay setting at STPS end is 1.5A, 2sec delay and the CT ratio is 800/1.

It was opined that the present setting shall continue till further review.

ITEM NO. C.13: Members may update the following:

C.13.1: In 22nd PCC, WBSETCL informed that 220 kV two main bus system will be made operational at Bidhannagar S/s by Aug, 2014.

WBSETCL may update the present status.

Deliberation in the meeting

WBSETCL informed that 220 kV two main bus system will be made operational at Bidhannagar S/s by Feb, 2015.

C.13.2: In 19th PCC after deliberation on **Trippings of 220 kV lines from Hatia S/s on 24.03.14 & Disturbance in Adityapur area of JSEB on 17/03/14,** JSEB was advised to thoroughly check the relay settings and coordination of relays at 132kV and 220kV S/s for satisfactory performance and report the findings to ERPC Secretariat within 15 days.

In 22nd PCC, JSEB informed that replacement of electromechanical relays of 33 kV lines is in progress and it will be completed by August, 2014.

JSEB may update.

Deliberation in the meeting

JUSNL stated that the replacement of relays is nearly completed, which is under the scope of JBVNL and status will be submitted in the next meeting.

C.13.3: In 20th PCC, OPTCL explained that old Electro Mechanical relays for distance protection were installed in 220kV Meramundali- TTPS– I &II and the backup over current directional element was inoperative. OPTCL informed that old EM relays are being replaced with numerical relays.

In 22nd PCC, OPTCL informed that replacement of existing 220 kV bus bar protection at Meramundali S/s is in progress and the new numerical relays will be in service by December, 2014 along with Theruvali, Budhipadar S/s.

OPTCL may please update.

Deliberation in the meeting

OPTCL confirmed that, all distance protection relay at 220kV Meramundali S/s are numerical relays. They are replacing the old O/C EM relays with numerical relays. The new 220 kV bus bar protection at Meramundali, Theruvali and Budhipadar S/s will be put in service by December, 2014.

ITEM NO. C.14: PLCC problem in 400 kV Sagardighi-Parulia line II

WBPDCL reported that ABB make PLCC link repeatedly receiving carrier protection signal at Sagardighi end from 400 kV Parulia S/s without any fault in the line on following occasions:

Sl. No.	Date	Time	Relay Operated
1	09/06/14	16:16	Carrier protection,
2	11/06/14	16:25	Carrier protection
3	20/06/14	15:52	Carrier protection
4	16/06/14	16:32	Carrier protection
5	01/05/14	15:55	Carrier protection
6	07/05/14	16:19	Carrier protection
7	25/03/14	23:03	Carrier protection

MPL representative informed that ABB make PLCC system at MPL end receiving the carrier signal from 400 kV Ranchi S/s without any fault in 400 kV MPL-Ranchi line.

DVC reported that they are also experiencing the same with ABB make PLCC system in some of their lines.

PCC advised Powergrid to take up the matter with M/s ABB and resolve the problem.

Powergrid agreed.

In 22nd PCC, Powergrid informed that ABB representative would come to rectify the problem on 25th August, 2014 for rectification.

Powergrid may update the status.

Deliberation in the meeting

Powergrid informed that PLCC panel is of BPL make at Sagardighi end and the BPL engineer has been called for rectification, if any.

ITEM NO. C.15: ANY OTHER ITEM.

1. **Frequent mal/non-operation of ABB make REL-670 distance protection relays- DVC**

There has been frequent mal/ non-operation of distance protection relays REL-670 (particularly ABB make) in DVC system causing generation loss in Bokaro TPS as well as system outages. In case of a fault in a line, the performance of REL 670 was sometimes found quiet unsatisfactory since there was no initiation to the tripping relay causing bus fault/ total outages. In DVC system, the instances of main REL-670 failed in 8 occasions and back-up REL-670 in 4 occasions in recent past.

The issue was discussed in detail. It was opined that the performance/ experience of REL-670 in Powergrid system could be obtained and if there is inherent deficiency, M/s ABB may be requested from ERPC forum to rectify/analyse the deficiency in their relay for better operational point of view.

Powergrid agreed to share the performance of REL-670 in their system with the constituents.

Meeting ended with vote of thanks to the chair.

****

Annexure – A

Participants in 23rd PCC Meeting

Venue: ERPC Conference Room   Time: 11:00 hrs   Date: 25.09.14 (Thursday)

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

Participants in 23rd PCC Meeting

Venue: ERPC Conference Room   Time: 11:00 hrs   Date: 25.09.14 (Thursday)

Sl No	Name	Designation	Organization	Contact Number	Email	Signature
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41.	Amar Nath Basu	AEE/RE/Danapur	Railway Electrification	7033592192	[signature]
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43.	G. Rao	AEE	ERPC	9547891353	[signature]
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45.	S. Pane	EE	ERPC	9051089897	[signature]
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47.	S. Ghosh	AM (PS)	WBPDCL	9474363864	[signature]
48.	S.K. Harichandan	DGM Meramundali	OPTCL	9438907042	[signature]
49.	P.K. DAS	DGM (EI), SLDC	OPTCL	9438907408	[signature]
50.	P.K. DE	EE	ERPC	9433125844	[signature]
51.	V. Kalyanaraman	EE	ERPC	—	[signature]
52.					
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Annexure-B.4.1

SYSTM DISTUBANCE REPORT
THERUBALI GRID dated 16.08.2014

Date: 16.08.2014
Time: 19:29 Hrs.

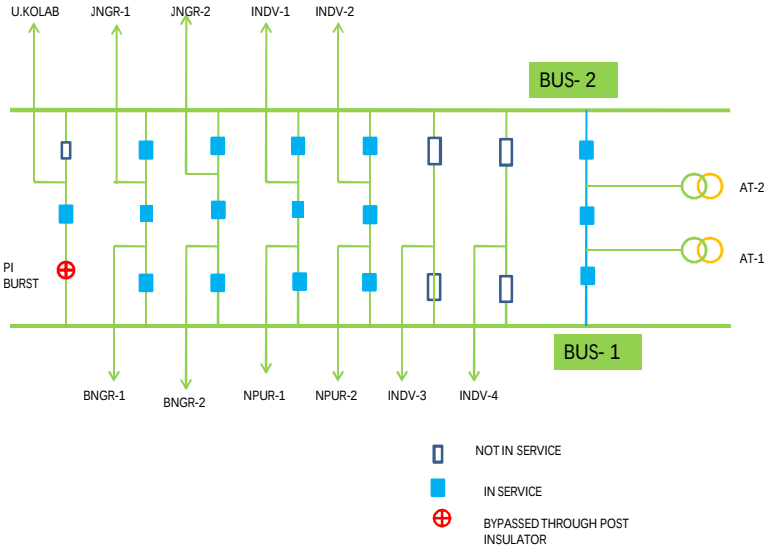
220kV feeders from 220/132kV Grid S/S. Theruvali tripped on Bus fault.

The power supply to the Grid was available with 220kV Bhanjanagar -1 & 2 & Narendrapur – 2 Circuit .

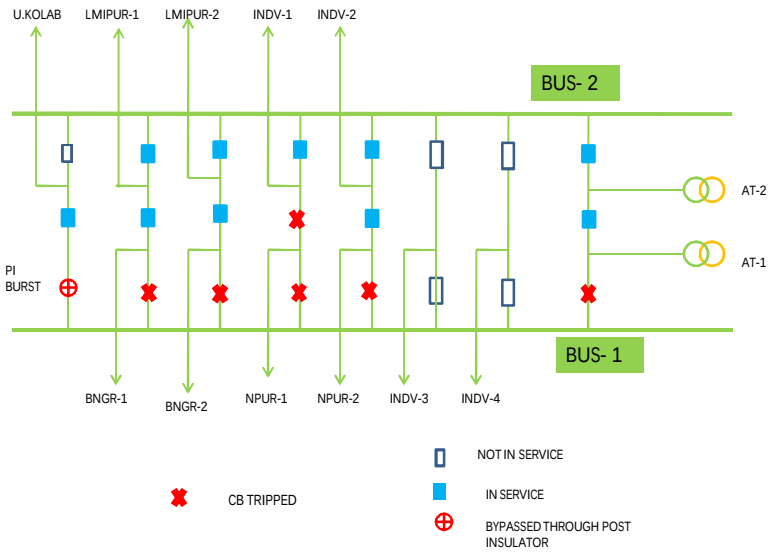
Both the 220/132 kV Auto-transformers were in service.

No interruption in 132kV & 33kV occurred.

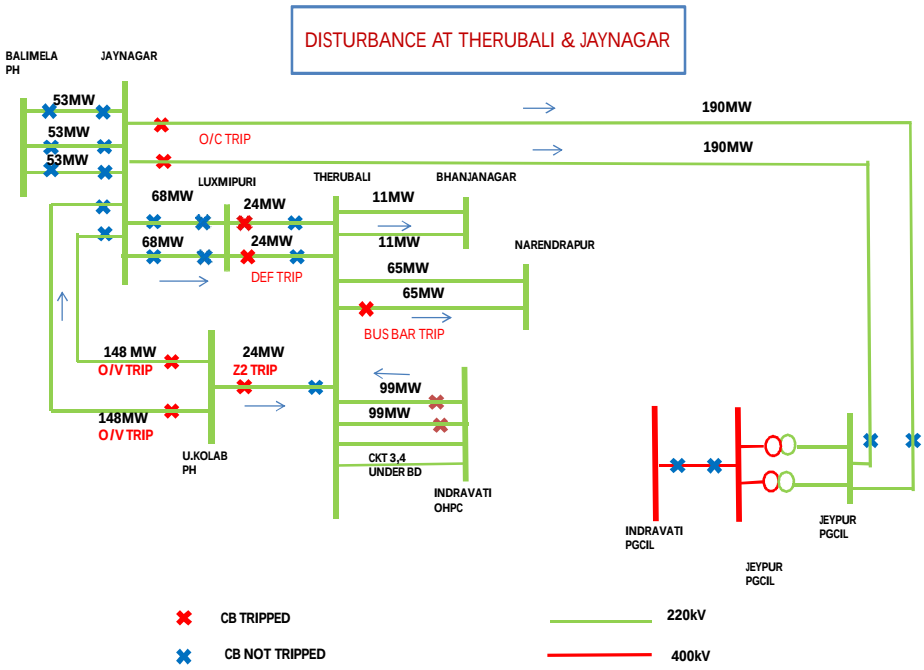
Schematic diagram showing CB in service



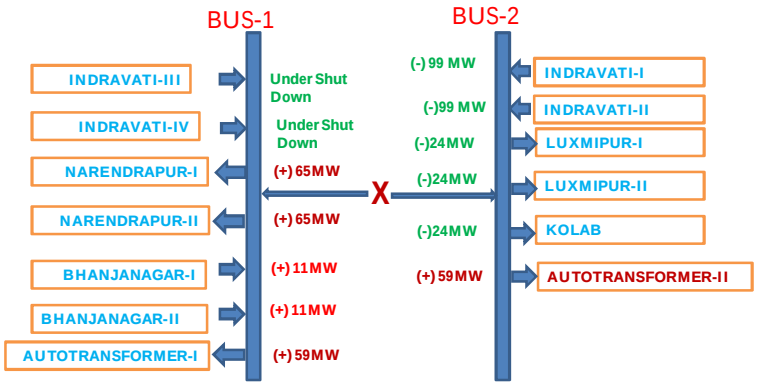
Schematic diagram CB tripped on Bus Bar Protection



DISTURBANCE AT THERUBALI & JAYNAGAR



POWER FLOW BEFORE DISTURBANCE



Relay Operations

Sl.No.	Name of Line	Local end Relay operation	Remote end Relay operation
1.	Indravati I	No Tripping	DP Zone-2
2	Indravati II	No Tripping	DP Zone-2
3	Indravati III	Under Shut Down	Under Shut Down
4	Indravati IV	Under Shut Down	Under Shut Down
5	Bhanjanagar-I	BUS BAR	In service through TIE
6	Bhanjanagar-II	BUS BAR	In service through TIE
7	Narendrapur-I	Bus Bar & TIE Tripped	No Trip
8	Narendrapur-II	Bus Bar	In service through TIE
9	Luxmipur-I (Jnagar-1)	No Tripping	DEF Protection of DP Relay 20% 1 sec. DT
10	Luxmipur-II (Jnagar-II)	No Tripping	DEF Protection of DP Relay 20% 1sec. DT
11	Kolab	No Tripping	Tripping at Kolab end.
12	Auto-Transformer-1	BUSBAR TRIP	In service Through TIE.
13	Auto-Transformer-2	NO TRIP	

Relay Operations

SL.NO	NAME OF LINE /EQUIPMENT	LOCAL END	REMOTE END
1	220kV JAYNAGAR- JEYPUR (PG) 1 & 2	Directional Over Current	PSM-100% TSM- 0.25
2	220kV UPPER KOLAB-JAYNAGAR 1 & 2	OVER VOLTAGE	SETTING; 140%,INST. 120%,0.2 SEC.

Generation TRIP

SL.NO	NAME OF POWER HOUSE & UNITS	TRIP DETAIL
1	UPPER KOLAB #1 ,2 & 4	TRIPPED
2	UPPER KOLAB #3	SPINNING CONDITION
3	BALIMELA # 3,4,5,6,7 & 8	TRIPPED

Status of Breaker in 220kV Therubali Grid Sub-Station on 16.08.2014

Sl. No	Diameter	Bus/Tie/ Reactor	Line/Trfr	CB Condition
1	201	Bus-I		
		Bus-II	Uper Kolab	DEFECTIVE
		Tie	Tie	ON
2	202	Bus-I	Bhanjanagar -1	ON
		Bus-II	Jaynagar-I	ON
		Tie	Tie	ON
3	203	Bus-I	Bhanjanagar-II	ON
		Bus-II	Jayanagar-II	ON
		Tie	Tie	ON
4	204	Bus-I	Narendrapur-I	ON
		Bus-II	Indravati-I	ON
		Tie	Tie	ON
5	205	Bus-I	Narendrapur-II	ON
		Bus-II	Indravati-II	ON
		Tie	Tie	ON
6	206	Bus-I	Indravati-III	NOT IN SERVICE
		Bus-II		NOT IN SERVICE
		Tie	XX	
7	207	Bus-I	Indravati-IV	NOT IN SERVICE
		Bus-II		NOT IN SERVICE
		Tie	XX	
8	208	Bus-I	Auto Trfr-I	ON
		Bus-II	Auto Trfr-II	ON
		Tie		ON

Details of Relay for 220kV system at Therubali S / S

Sl. No	Diameter	Bus/Tie/ Reactor	Line/Trfr	Existing Relay
1	201	Bus-I		
		Bus-II	Upper Kolab	DP : MiCom442 Backup : CDG 31
		Tie	Tie	
2	202	Bus-I	BHANJANAGAR -1	DP : MiCom442 Backup : CDG 31
		Bus-II	LUXMIPUR-I	DP : MiCom442 Backup : CDG 31
		Tie	Tie	
3	203	Bus-I	BHANJANAGAR-II	DP : MiCom442 Backup : CDG 31
		Bus-II	LUXMIPURr-II	DP : MiCom442 Backup : CDG 31
		Tie	Tie	
4	204	Bus-I	NARENDRAPUR-I	DP : SEL311C Backup : CDD11
		Bus-II	INDRAVATI-I	DP : REL670 Backup : CDD11
		Tie	Tie	
5	205	Bus-I	NARENDRAPUR-II	DP : REL670 Backup : CDD11
		Bus-II	INDRAVATI-II	DP : REL670 Backup : CDD11
		Tie	Tie	
6	206	Bus-I	INDRAVATI-III	DP : SEL311C Backup : MiCom P141
		Bus-II		
		Tie	XX	
7	207	Bus-I	INDRAVATI-IV	DP : SEL311C Backup : MiCom P141
		Bus-II		
		Tie	XX	
8	208	Bus-I	Auto Trfr-I	DIFF: DMH31 Backup: CDG31 (3O/C), E/F-CDG11
		Bus-II	Auto Trfr-II	DIFF: DMH31 Backup: CDG31 (3O/C), E/F-CDG11
		Tie		

Analysis of Disturbance

- Y Phase post insulator for by pass arrangement of BUS – I CB of 201 dia puncture & created Bus fault.
- Due to Bus fault the high Impedance Bus Bar protection operated. All the Bus CB of Bus I Tripped. Narendrapur I Tie breaker also tripped.
- Due to delayed Bus bar operation the 220kV Indarvati-1 & 2 tripped from DP Zone 2 operation & 220kV Laxmipur 1 & 2 Tripped on DEF function of DP relay.
- The 220kV Bhanjanagar -1 &2, Narendrapur -2 were in service.
- The 220/132kV,100MVA Auto-transformer 1 & 2 were in service.
- No power failure occurred in 132kV & 33kV system of Theruvali as the Auto transformers were in service.
- The 220kV lines (1 & 2) Jaynagar to Jeypore PGCIL tripped on over current due to overloading consequent upon tripping 400kV link between Indravati PGCIL –Jeypore PGCIL.
- Due to load throw system voltage in the area increased.
- Upper kolab –Jaynagar 220kV line 1 & 2 tripped on over voltage.

Remedial Measures

1. Bus –I defunct breaker in Dia-201 by passed with 3 nos. new Post Insulator above the CB structure.
2. Numerical Bus Bar relay at Jaynagar & Therubali 220kV Bus is under installation & commissioning. Panel erection completed . The cabling work is in progress.
3. The DEF function of distance protection relays at Luxmipur has been reviewed and decided to be disabled.
4. DP relay testing of 220kV Indravati- Jaynagar line has been decided.

OPTCL
Lifeline of Odisha

STATUS OF DP RELAY, LBB & BUSBAR PROTECTION AND EVENT LOGGER AT 220kV SYSTEM AT THERUBALI GRID SUB-STATION

1. DP Relay;	**Numerical relays are provided for distance protection of all the feeders.**
2. Backup Relays:	**Action is being taken for replacement of electromagnetic relays . New relays received . Relays will be installed on configuration & testing within one month.**
3. LBB protection.	**Available in 220kV. It is reconfigured to adopt in New Bus bar protection scheme.**
4. Bus Bar Protection:	**Already available. The high impedance bus bar protection is being replaced with numerical Bus bar protection. New System already is received. It is under installation & commissioning process. Expected time of completion six months.**
5.Event logger ;	**New Disturbance recording & event logger already is received at site. It is under installation & commissioning process. Expected time of completion six months.**