EASTERN REGIONAL POWER COMMITTEE

MINUTES OF 21st PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC, KOLKATA ON 17.07.2014 (THURSDAY) AT 11:00 HOURS

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

SE (Commercial), ERPC chaired the meeting and welcomed the participants. He expressed concern over the various tripping incidences that occurred in JSEB, OPTCL and BSPTCL over last two months. He desired in-depth analysis of such disturbances and remedial actions thereof. Thereafter, he requested SE (PS), ERPC to take up the agenda points in seriatim.

PART – A

ITEM NO. A.1: Confirmation of minutes of 20th Protection sub-Committee Meeting held on 19th June, 2014 at ERPC, Kolkata

The minutes of 20th Protection Sub-Committee meeting held on 19.06.13 circulated vide letter dated 04.07.14.

No comments have been received from any constituent.

The minutes of the above meeting may be confirmed.

Deliberation in the meeting

Members confirmed the minutes of the 20th Protection sub-Committee meeting.

PART – B

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

The grid incidences reported during June & July, 2014 are as given below:

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

ITEM NO. B.1: BIHAR System

i. Disturbance at Biharshariff (BSEB), Fatuah, Begusarai, Hullasnagar and Eknagarsarai at 15:03 hrs on 26/06/14

At 12:48hrs 220kV Tenughat-Biharsariff (BSEB) tripped from Biharshariff (BSEB) end only. At 15:03hrs, while trying to close the same line through transfer bus at Biharshariff (BSEB) end, all the three 400/220kV ICTs at Biharshariff (PG) tripped, leading to total power failure at 220kV Biharsariff (BSEB) S/s. Following elements tripped.

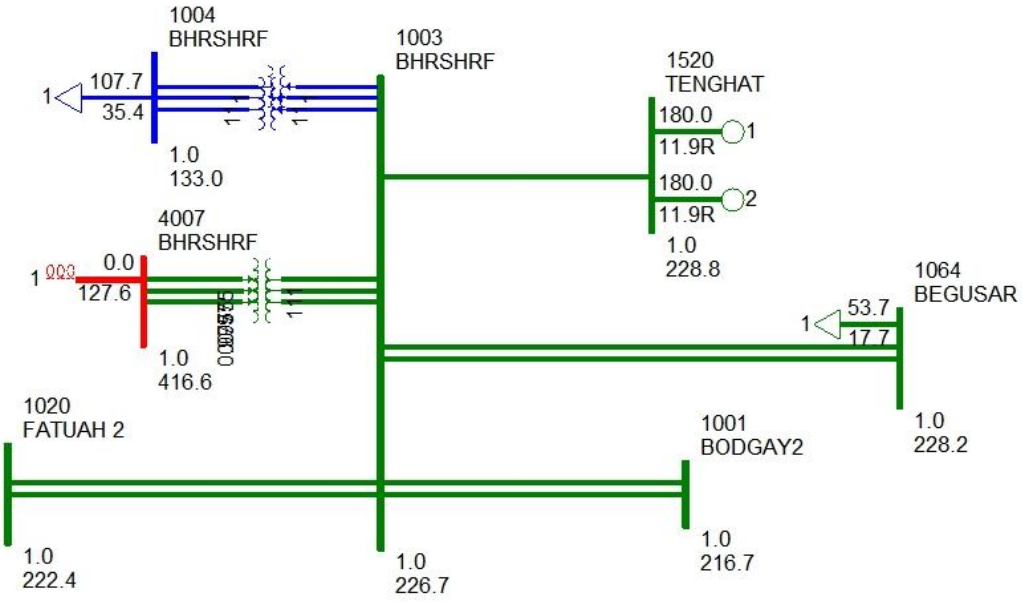
- 220kV Tenughat-Biharsariff (BSEB) (tripped from Biharshariff (BSEB) end only)
- 315MVA 400/220KV ICT –I, II and III at Biharsariff (PG) (from both the sides)

Discrepancies observed and Remedial Measures/Suggestions:

- It has been observed that 220kV Tenughat-Biharsariff has been tripping repeatedly in the past one month, due to operation of only master-trip relay, which is hence suspected to be

maloperating. Accordingly, a through audit of relays at Biharsariff (BSEB) end needs to be done at the earliest.

- An audit of relays at Tenughat end for 220kV Tenughat-Biharsariff also needs to be done at the earliest.
- At 15:03hrs the fault persistence time of 640ms which 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 400/220kV Transmission system is 100ms



BSPTCL may deliberate.

Deliberation in the meeting

ERLDC informed that, detailed tripping report from Biharshariff end was not received from BSPTCL.

PCC advised BSPTCL to send the detailed tripping report as per specified format in time as and when disturbance occurred in their control area. BSPTCL agreed.

On repeated tripping of 220kV Tenughat-Biharsariff line from Biharsariff end, BSPTCL representative informed that, a cable from relay room to master trip relay was found short with 220kV Tenughat-Biharsariff line breaker. As a result, this line CB was getting frequently trip command from Master trip relay.

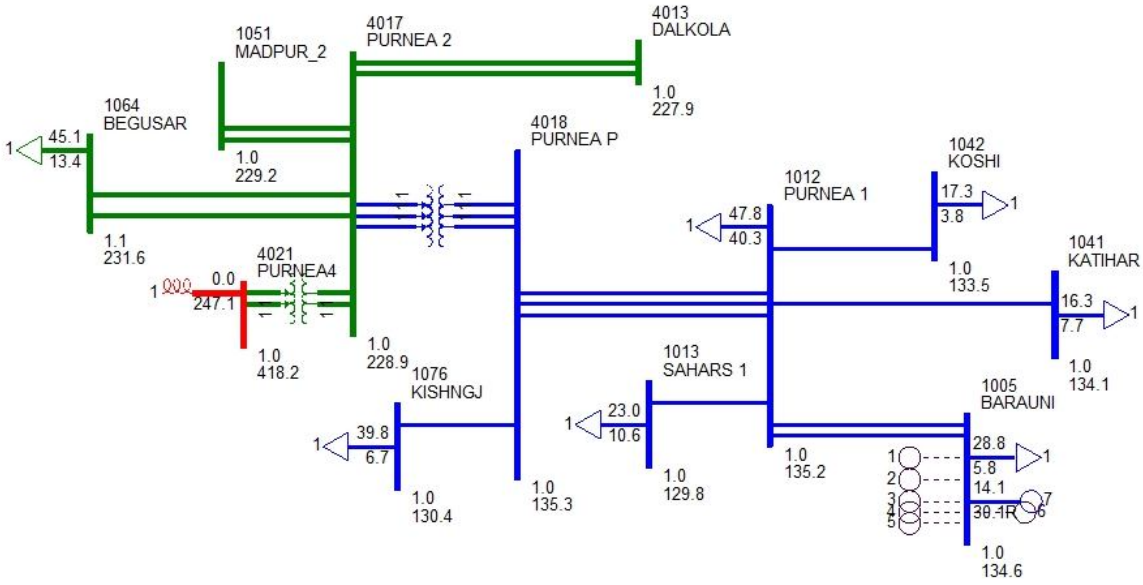
As a remedial measure, the defective cable had been replaced by 18 core new cable and the line was charged at 13:55 hrs on 27.06.2014. No tripping incidence has been reported thereafter. The outcome of remedial actions taken by BSPTCL will be observed for 3 months.

The reasons behind the simultaneous tripping of all the three 315 MVA, 400/220kV ICTs on 26/6/14 at 15:03 hrs from Biharshariff (PG) end, while trying to close the 220kV Tenughat-Biharsariff line from Biharsariff end through transfer bus could not be ascertained by BSPTCL.

It was felt that, there might be earth connector remained close at 220kV Biharsariff S/s during charging of the said line which led to tripping of all the three 400/220kV ICTs on backup over current relay from Biharshariff (PG) end since the fault was still persisted as reported by the Powergrid.

PCC advised BSPTCL to examine the operational procedure carried out during charging of the line at 220 kV Biharshariff S/s and report in next PCC. BSPTCL agreed.

ii. Disturbances at 132 kV Purnea (BSPTCL) S/S



a) Disturbance at 132 kV Purnea (BSPTCL) S/S on 27/04/14, 01/05/14, 16/05/14.

Total power failure at Purnea (Bihar) S/s occurred on 24.03.14 and discussed in 19th PCC Meeting. BSPTCL and Powergrid ER-I were requested to attend discrepancies and deficiencies in and around Purnea S/s within a week and submit a status report. The above incidences are similar in nature.

As informed by BSPTCL vide mail dated 31.05.14, all relay settings of Purnea (BSEB) S/S were reviewed in a joint meeting with Powergrid held on 30.05.14.

In 20th PCC Meeting, BSPHCL informed that CT polarity of 132 kV Purnea-Saharsa & Purnea-Naugachia lines were corrected. After that, the zone settings of all the relays were tested for their operation.

After detailed deliberation, it was opined that all the three incidences the fault clearance time was much higher than the CEA standard. Therefore, the PCC advised the following actions to BSPTCL:

1) Proper co-ordination & grading of over current relays for 33 kV feeders
2) Co-ordination of over current relays timings of 132/33 kV ICTs with 33 kV feeders
3) Checking of operating time of all CBs at Purnea & its downstream systems and rectifying / replacing the faulty CBs, if any.

PCC advised BSPTCL to complete the above actions within 10 days and submit a report to ERPC Secretariat at the earliest. BSPTCL agreed.

Further, PCC felt that a through Protection Audit needs to be carried out again for Purnea 132/33

kV S/s, Biharshariff and Fatua 220/132/33 kV S/s of BSPTCL.

BSPTCL may update the status.

Deliberation in the meeting

*BSPTCL informed that CBs have been tested and submitted the test results & relay settings in the meeting (enclosed in **Annexure-B2ia**). Most of the feeders CBs have been changed at 132 kV Purnea. Further, BSPTCL is in the process of changing the 33 kV CBs for Purnea- Forbesgunj feeders.*

PCC felt that, 132 kV Purnea-Katihar line CBs is also old and taking long time to operate which needs replacement.

Powergrid opined that directional feature of CDD type directional over current relays of Purnea(BSPTCL)-Purnea(PG) line at BSPTCL end should also be checked.

PCC advised BSPTCL to test the relay and report. PCC also advised to change the PSM setting of over current & E/F relay in the interconnected lines from 0.2 to 0.1 in numerical relays.

BSPTCL agreed.

b) **Disturbance at 132 kV Purnea (BSEB) S/S at 15:19 hrs on 07/07/14**

At 15:19 hrs, 07.07.14, total power occurred at 220/132 kV Purnea(old) due to tripping of all outgoing lines from Purnea(old). Inclemental weather conditions were reported at the time of tripping. The following lines tripped:

220KV Purnea(new) – Purnea(old)-D/C
220KV Purnea(old) – Dalkhola D/C
220KV Purnea(PG) – Madherapura Ckt- I

Preliminary Analysis:

As per intimation from Powergrid, fault occurred at loc 41, i.e. 25kms from Purnea (old) in 220kV Purnea(old)-Dalkhola-II (due to insulator decapping). However, the breakers at Purnea(old) did not open and hence 220kV Purnea(old)-Dalkhola-I also tripped and the fault was finally cleared from Purnea(New) end on operation of Backup directional O/C.

Deliberation in the meeting

Powergrid informed that, Auxiliary relay of 220kV Purnea(old)-Dalkhola-II at Purnea(old) was found defective which might be the reason for non operation of CB from 220 kV Purnea(old) S/s.

Powergrid reported that, the Auxiliary relay was rectified and now it is in order.

PCC enquired about tripping of 220KV Purnea(PG) – Madherapura Ckt- I from Purnea(PG) end. In reply, Powergrid explained that no relay indication was found and a temporary earth fault was identified in DC supply, which caused the unnecessary tripping of this line. Powergrid informed that the same has been rectified and now it is in order.

c) **Disturbance at 132 kV Purnea (BSEB) S/S at 19:55 hrs on 07/07/14**

At 19:55 hrs, 07.07.14, The following lines tripped:

i. 132kV Purnea-Purnea-I,III
ii. 132kV Purnea-Purnea-I,II tripped (from PG end only)
iii. 132kV Purnea-Forbesganj

It was reported by BSPHCL that fault originated in 132 kv Purnea-Forbisganj.

ERLDC vide letter dated 4th July, 2014 informed that similar incidents are happened several times which were discussed in PCC meetings. However, there is no significant improvement in the protection system.

In view of above, ERLDC requested for through audit and testing of relays at Purnea (BSPTCL) and Purnea (PG) to prevent further occurrence of the tripping.

Members may discuss and decide.

Deliberation in the meeting

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, PCC advised BSPTCL & Powergrid to provide the following details within a week,

- *SLD of their substations up to 11 kV level*
- *ICT rating*
- *Fault level at the substation*
- *Detailed relay settings (Relay settings downloaded from numerical relays wherever applicable)*
- *Battery maintenance record*

iii. Repeated tripping of 220 KV BSF – TTPS line at BSF end.

BSPTCL reported that, 220 kV BSF-TTPS line was tripped from BSF end on 5th, 6th, 14th, 17th, 19th, 20th, 22nd, 23rd and 24th June, 2014.

BSPTCL reported that, as a remedial measure old control cable of 220 KV TTPS line relay panel to its breaker is replaced by 18 core new cable. Cable is terminated at both ends and layed properly in cable trench. Tripping of CB is checked from remote, local and relays. Line is charged and synchronised at 13:55 hrs on 27.06.2014 and after that no tripping is reported till 03.07.2014, 15:23 hrs.

BSPTCL may deliberate.

Deliberation in the meeting

The issue was discussed in Item no. B2.i.

BSPTCL informed that no tripping has been reported till date after the remedial actions taken.

ITEM NO. B.2: JSEB System

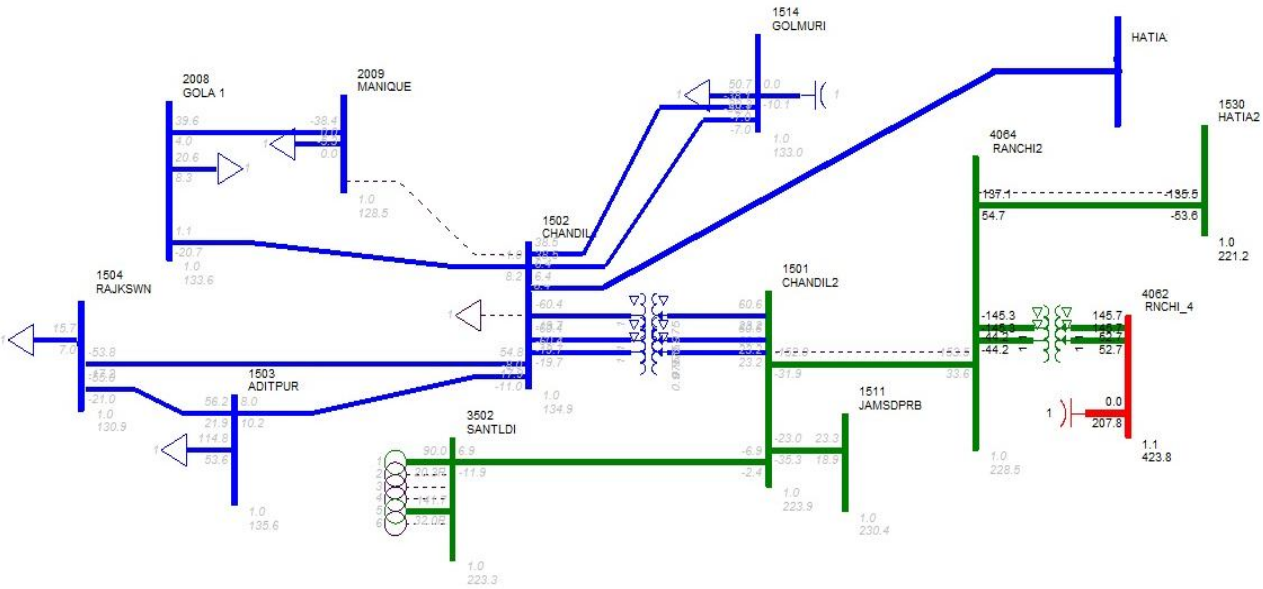
i. Disturbance at Adityapur/Chandil at 13:53 hrs on 08/07/14

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

Total power interrupted at 220 kV Chandil S.S



JSEB may deliberate.

Deliberation in the meeting

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 220 kV 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.

ii. Disturbance at Tenughat/ Patratu/Hatia (JSEB) on 03/05/14 & 31/05/14.

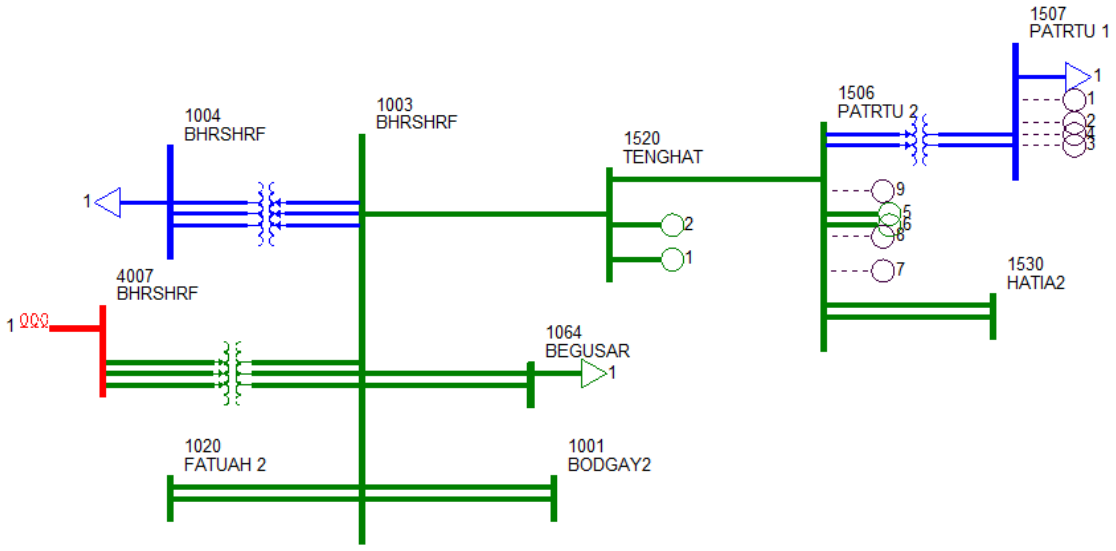
As per preliminary report both the days due to inclement weather conditions the 220 kV Tenughat-Patratu, 220 kV Patratu- Hatia and 132 kV Patratu- Hatia were tripped along with Tenughat and PTPS units.

In 20th PCC, the issue could not be discussed in detail as JSEB representative was not present in the meeting.

PCC advised ERPC Secretariat to take up the issue with JSEB for proper representation in the meeting and also to ask the detail report of the disturbances.

However, from the ERLDC report it appeared that the there was problem in Patratu end. PCC advised for testing of Patratu end relays and circuit breakers and report.

Thereafter JSEB has sent a report which is enclosed at **Annexure-B.2.ii**



JSEB may deliberate.

Deliberation in the meeting

PCC observed that both the occasions (on 03/05/14 & 31/05/14), TVNL maintained around 380 MW generation when 220 kV TVNL-Biharshariff line was under outage. It was an operational problem, which led to cascade tripping of various transmission lines connected to 220/132 kV PTPS on over load after tripping of 220 kV Hatia II-PTPS line-1 from both ends on E/F.

In previous Protection Sub-committee meeting JSEB and TVNL was advised to explore the SPS implementation for inter tripping/or backing down of generation in TVNL in order to avoid above such incidences.

PCC once again advised JSEB and TVNL to restrict/backing down the TVNL generation to 280 MW in order to avoid such cascade trippings of transmission lines on over loading and advised to explore the following as and when 220 kV TVNL-Biharshariff line is outage/tripped condition,

- *SPS for inter tripping of one running unit (when two units running with full generation)*
- *Backing down of the generation using HP and LP bypass*

JSEB and TVNL agreed to review.

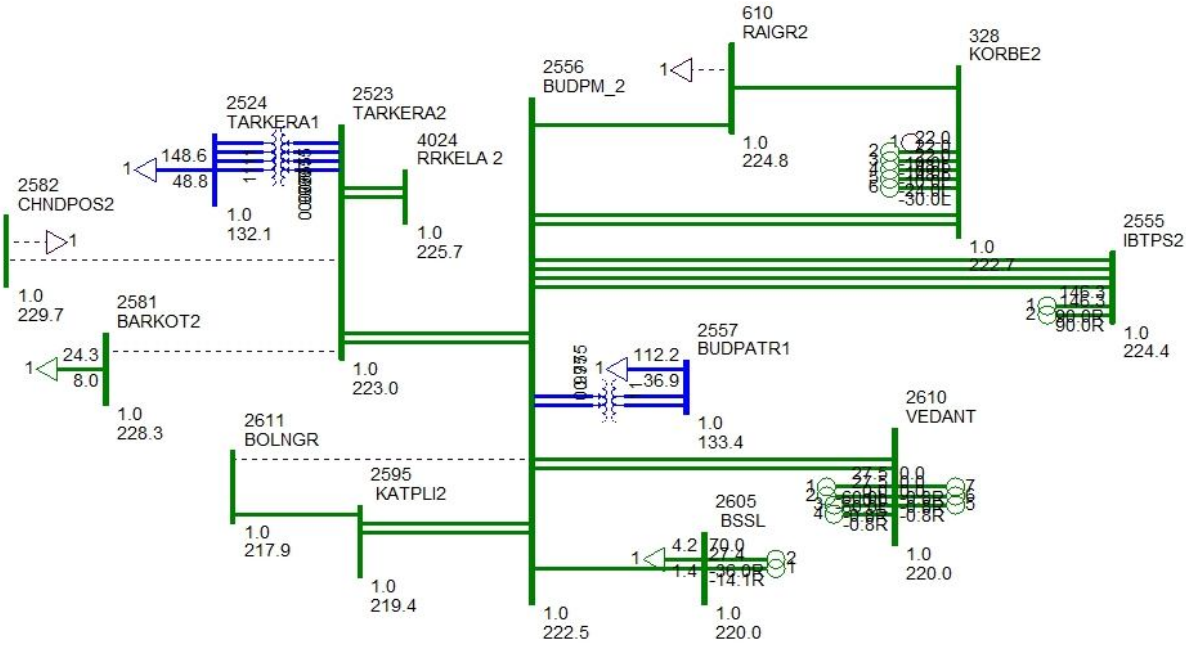
PCC enquired about status of 400 kV up gradation work at 220 kV TVNL and Biharshariff ends. In reply, TVNL informed that 315 MVA ICT is already available at TVNL and the erection work is in progress. TVNL reported that work will be completed by December, 2014 at TVNL end.

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.

PCC advised Powergrid to give the status on this and requested ERPC Secretariat to write a letter to JSEB and Powergrid to resolve the issues arising out for completion of this up gradation work.

ITEM NO. B.3: OPTCL System

i. Disturbance at Budhipadar at 17:21 hrs on 08.07.14



All 220kV lines/ ICTS emanating from 220kV Budhipara SS tripped. Unning unit of SEL (Vedanta) #1 (600 MW) and units #1&2 (210 MW each) of IB Valley tripped due to loss of evacuation path. There was no hydro generation at Burla or Chiplima.

Following lines tripped from Budhipadar S.S:

- 220 kV Budhipadar-Raigarh S/C
- 220 kV Budhipadar-Korba D/C
- 220 kV Budhipadar-Tarkera D/C
- 220 kV Budhipadar-Vedanta D/C
- 220 kV Budhipadar-IB Valley D/C
- 220 kV Budhipadar-Katapalli D/C
- 220 kV Budhipadar-Basundhara S/C
- 220 kV Budhipadar-SPS D/C
- 220 kV Budhipadar-BHUSAN D/C

It has been reported that there was a bus fault at 220 kV Bus-I at Budhipadar switchyard. Restoration was in progress for diverting the load to 220 kV Bus-II

In 20th PCC, OPTCL informed that provision for annunciation to indicate improper functioning of Trip Transfer switch is being arranged. Provision for back up protection of TBC is also being arranged.

RADSS (ABB make) Bus bar protection system of Budhipadar 220 kV S/s was in defective state. New Bus bar protection system already received and installation & commissioning is in process. Expected time of completion is six months.

OPTCL may deliberate.

Deliberation in the meeting

OPTCL informed on that incident, a line to ground fault was occurred near 220kV Budhipadar S/s due to snapping of bottom most conductor (between gantry & dead end tower) of 220 kV Budhipadar-Basundhara ckt-II. The fault was cleared from Basundhara end by distance protection relay on zone 1 but CB at Budhipadar end failed to isolate the fault. The fault continued and led to total power failure at 220 kV Budhipadar S/s. OPTCL reported that there was also a problem in SF6 gas density monitoring unit contact and the CB was locked out at the instant of fault. The same has been rectified and now it is in order.

It was observed that, in view of such tripping at 220 kV Bhudipadar S/s, the evacuation path for IBTPS and Vedanta generating stations got affected. PCC advised OPTCL to explore an alternative to it.

In reply, OPTCL informed they are planning to distribute generation and loads of 220/132 kV Budhipadar S/s such that IBTPS and Vedanta generating stations can operate in islanding mode.

For implementation of bus bar protection at 220 kV Bhudipadar, OPTCL informed that panels have been installed, cabling works is in progress. It is expected that bus bar protection will be in service by December, 2014.

ii. Tripping of all feeders from 220 kV Theruvali S/s at 05:23 hrs on 27.06.14.

At 05:23 hrs on 27.06.14 all 220 kV feeders from Theruvali S/s tripped with operation of bus bar relay. On investigation it was found that 'R' ph post insulator used for bypassing bus-I main breaker (defunct) of 220 kV Theruvali- U. Kolab line burst at Theruvali S/s caused bus fault.

220 kV Theruvali- U. Indravati- III & IV were under shutdown.

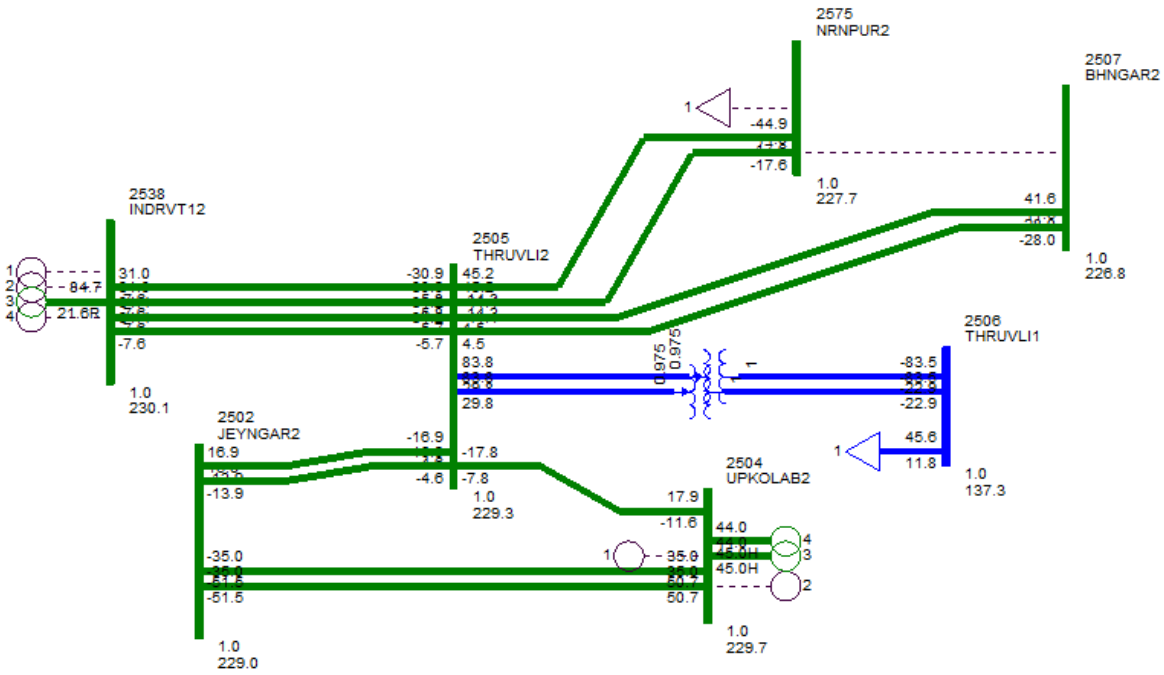
1) 220 kV Theruvali – Narendrapur- II tripped at Theruvali: bus bar protection

2) 220 kV Theruvali- Laxmipur- Jaynagar-I tripped from both ends: Reverse zone at Theruvali and 'R'ph, zone 2 at Laxmipur
3) 220 kV Theruvali- Laxmipur- Jaynagar-II tripped from Laxmipur end on E/F but did not tripped from Theruvali
4) 220 kV Theruvali- U. Indravati-I, II tripped from U.Indravati end: 3-ph, zone 2, distance 114 km at Indravati
5) 220 kV Theruvali- U. Kolab tripped from U. Kolab end: Distance Protection, Zone-2, R ph
6) 220 kV Theruvali- Bhanjanagar- I &II tripped from both ends: Reverse zone at Theruvali and 'R'ph, E/F zone 2, distance 220 km at Bhanjanagar

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.

Following points need to be addressed:

i) Non-tripping of Breaker of 220 kV Theruvali- Laxmipur- Jaynagar-II from Theruvali end.
ii) Operation Time of bus bar protection at 220 kV Theruvali S/s



OPTCL may deliberate.

Deliberation in the meeting

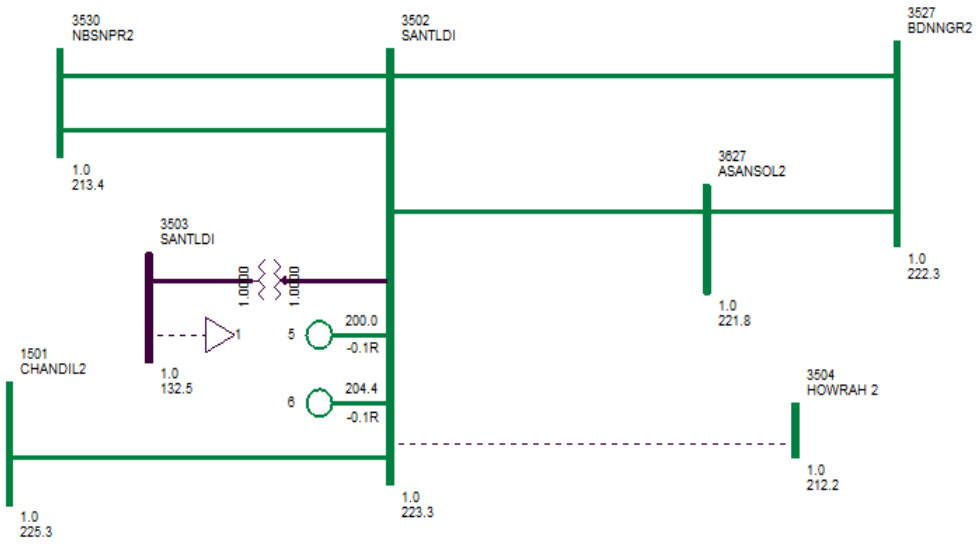
For frequent tripping incidences at 220 kV Theruvali S/s it was observed by OPTCL that, old high impedance bus bar protection is not working properly at there, which was caused the tripping of transmission lines from remote end.

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.

ITEM NO. B.4: WBPDCL System

i. Tripping of 220 kV lines from STPS (WBPDCL) on 04/04/14.

- At 19:36hrs, 220kV STPS-Chandil tripped on 3-Ø, O/C from Chandil end only
- While restoration was in progress, 220kV STPS-Asansol and 220kV STPS-Bidhannagar tripped from both the end at 19:42hrs & 19:45hrs respectively.
- Due to the above trippings, power supply failed at 220kV New Bishnupur S/s, 132kV Old Bishnupur S/s, 132kV Raghunathpur S/s, 132kV Hura S/s, 132kV Khatra S/s, 132kV Purulia S/s, 132kV Baghmundi S/s and STPS auxiliary power supply.



Analysis: 220kV STPS- Chandil had tripped on on 3-Ø, O/C from Chandil end. No tripping occurred at STPS end and this is suspected to be a case of relay mal-operation. After about six minutes later, E/F was detected in 220kV STPS-Asansol S/C at Zone-I from STPS end in a staggered manner with a time gap of around 3 minutes. Due to the above E/F, 220kV STPS-Asansol tripped at 19:42hrs from both ends (R-N fault & Fault seems to be close to STPS due to Zone-2 indication at Asansol). Subsequently, at 19:45hrs, 220kV STPS-Bidhannagar S/C also tripped on Y-B-Ø to ground fault.

Previously, 220kV Arambag-New Bishnupur-D/C was already kept under open condition to avoid over loading of Arambag ICTs and 220kV New Bishnupur s/s & adjacent 132kV S/s were kept on radial mode on STPS. Thus with the above trippings of all incoming feeders at STPS, total power supply failed at STPS along with disruption of power at 220kV New Bishnupur S/s, 132kV Old Bishnupur S/s, 132kV Raghunathpur S/s, 132kV Hura S/s, 132kV Khatra S/s, 132kV Purulia S/s and 132kV Baghmundi S/s.

However, the following points need to be addressed:

1) Tripping of 220kV STPS-Bidhannagar as relay indication shows B-phase fault from STPS end while Y-B Ph faults at Bidhannagar end may also be explained.

   This could not be discussed in 19th PCC and 20th PCC as representative from WBPDCL was not present.

WBPDCL/WBSETCL may please explain on the above.

Deliberation in the meeting

WBPDCL informed that there was no generation at STPS hence STPS was importing the power from the line at that time.

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).

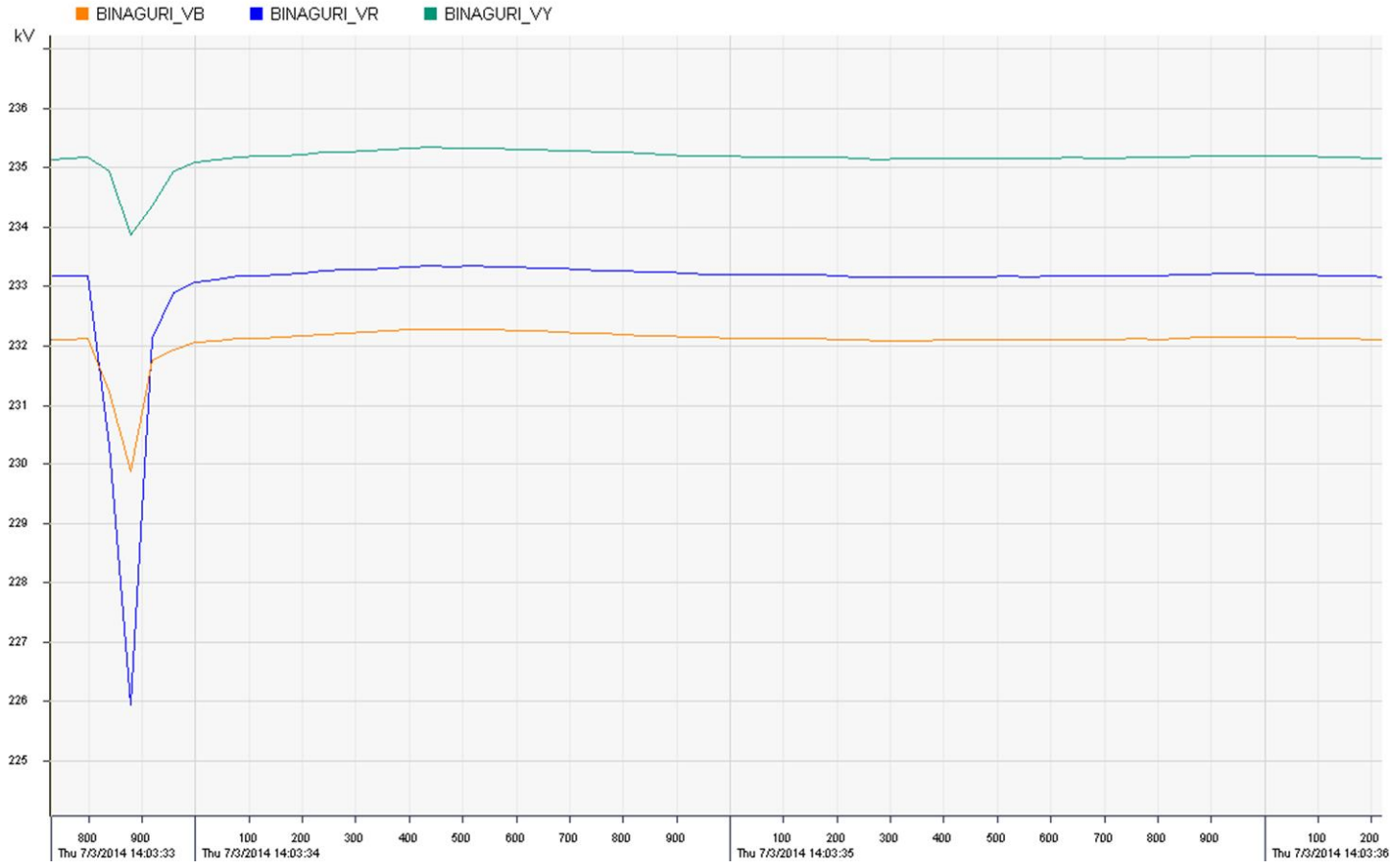
PCC felt that O/C setting at 75% on an important interstate tie line is appeared to be at lower side and advised JSEB to increase the over current relay setting to 100%. PCC also advised WBPDCL to share the O/C relay settings of STPS end with JSEB.

On enquiry, WBSETCL also informed that 4th ICT at Arambag 220/132 kV S/s will be reinstalled before Puja.

ITEM NO. B.5: 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. Some incidences of auto-reclosure are listed for further deliberation & analysis.

1) 400kV Malda-New Purnea-I tripped at 14:29hrs of 03.07.2014 (from Malda end only).

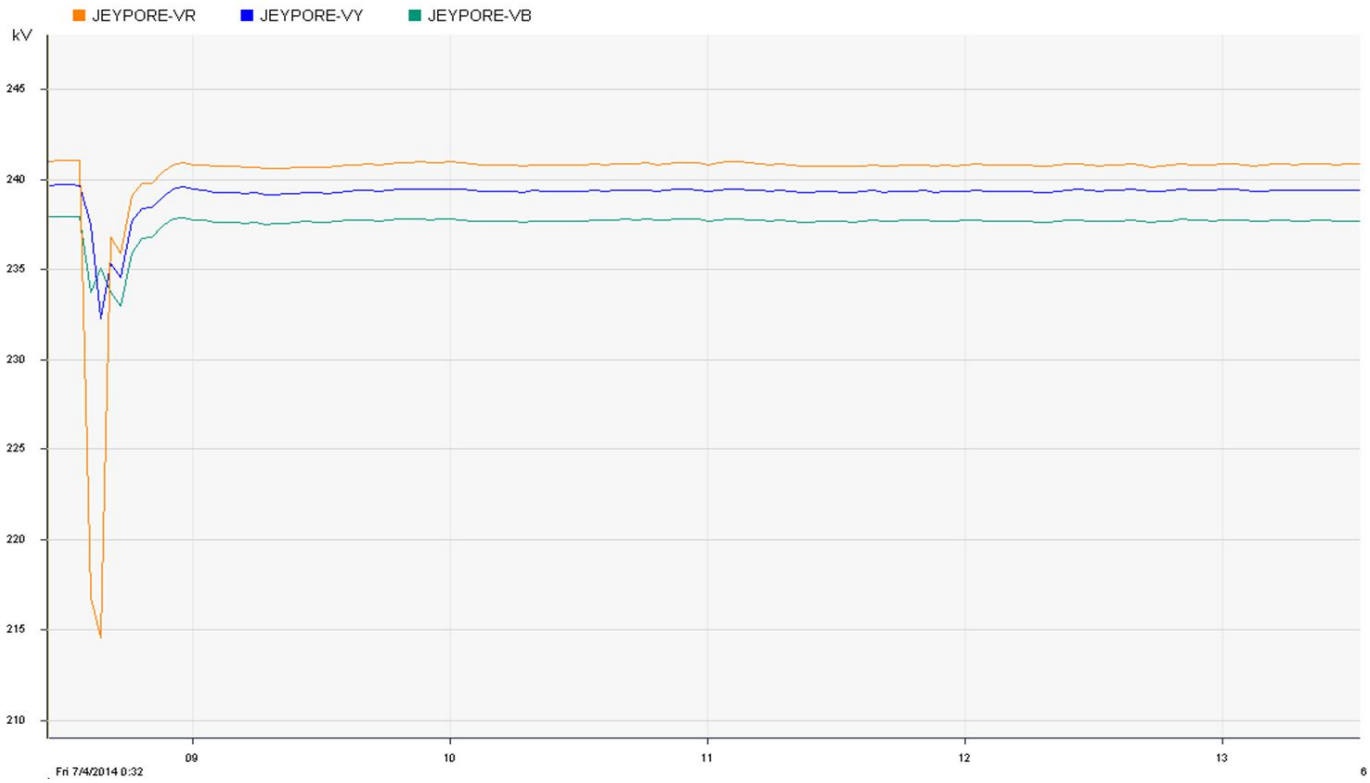


- From the PMU plot of 3-Ø voltage of Binaguri S/s, it can be observed that there was 7kV dip in R-Ø voltage and the fault got cleared in 100ms.
- There was no indication of auto-reclose operation for the said fault.

Deliberation in the meeting

Powergrid intimated that 400kV Malda-New Purnea-I line did not trip on any fault but got tripped on Over Voltage protection at Malda S/s only. However, the voltage dips as appeared in PMU as well as the reason for rise in voltage as observed by PMU plots could not be explained.

2) 400kV Angul – JITPL-I tripped at 00:32 Hrs of 04.07.2014 due to R- N fault.



- From the PMU plot of 3-Ø voltage of Jeypore, it can be observed that, there was 26kV dip in R-Ø voltage and the fault got cleared instantaneously (within 100ms).
- There was no indication of auto-reclose operation in the said line for the above fault.

Deliberation in the meeting

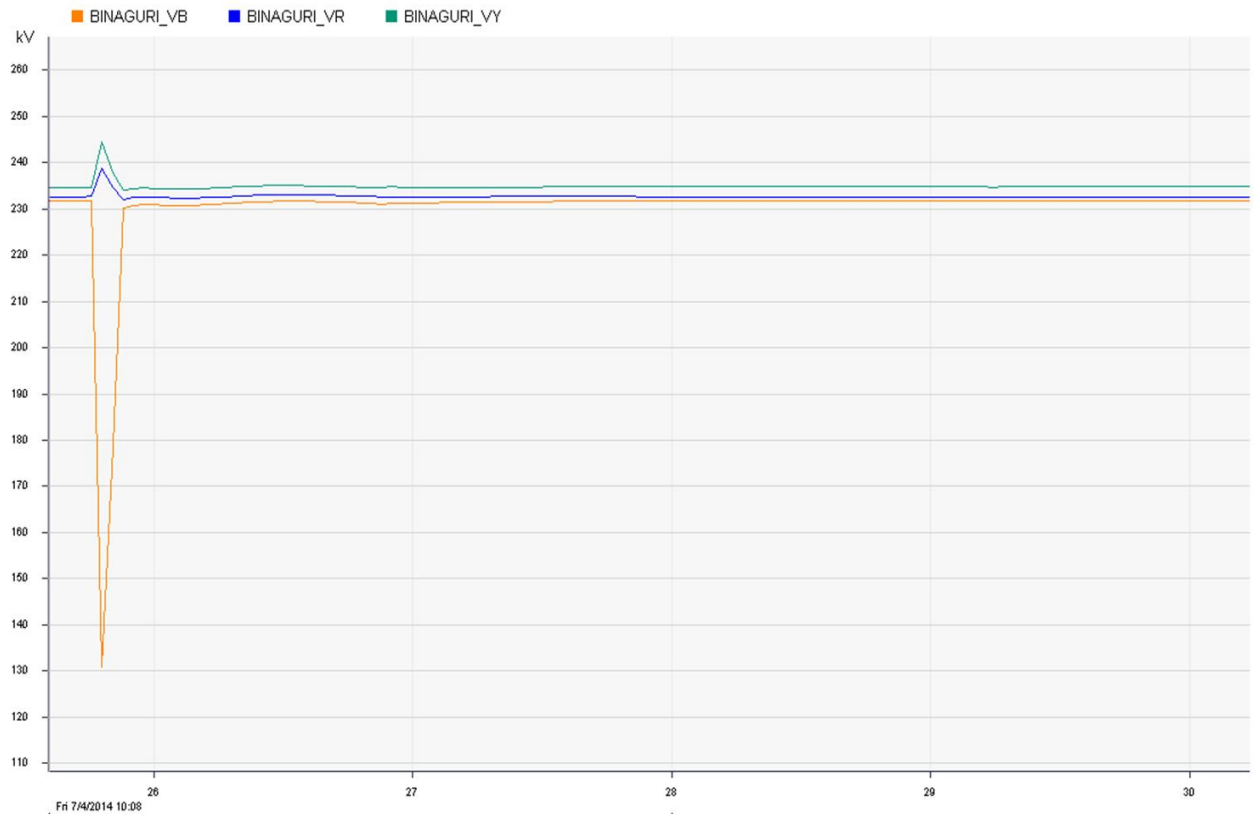
Powergrid explained that code was received for Direct Trip (DT) instead of Permissive under-reach trip. Therefore, Auto-reclosure did not take place at Angul end.

3) 400kV Tala-Binaguri-IV tripped at 10:08 Hrs on 04.07.2014 due to B- N fault.

- From the PMU plot of 3-Ø voltage of Binaguri S/s, it can be observed that, there was 99kV dip in B-Ø voltage and the fault got cleared instantaneously (within 100ms).
- There was no indication of auto-reclose operation in the said line for the above fault.

It is hence reiterated that single phase autoreclosure should be kept in service for all 400kV lines and for 220kV lines for which the facility is available currently. It needs to be noted 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.

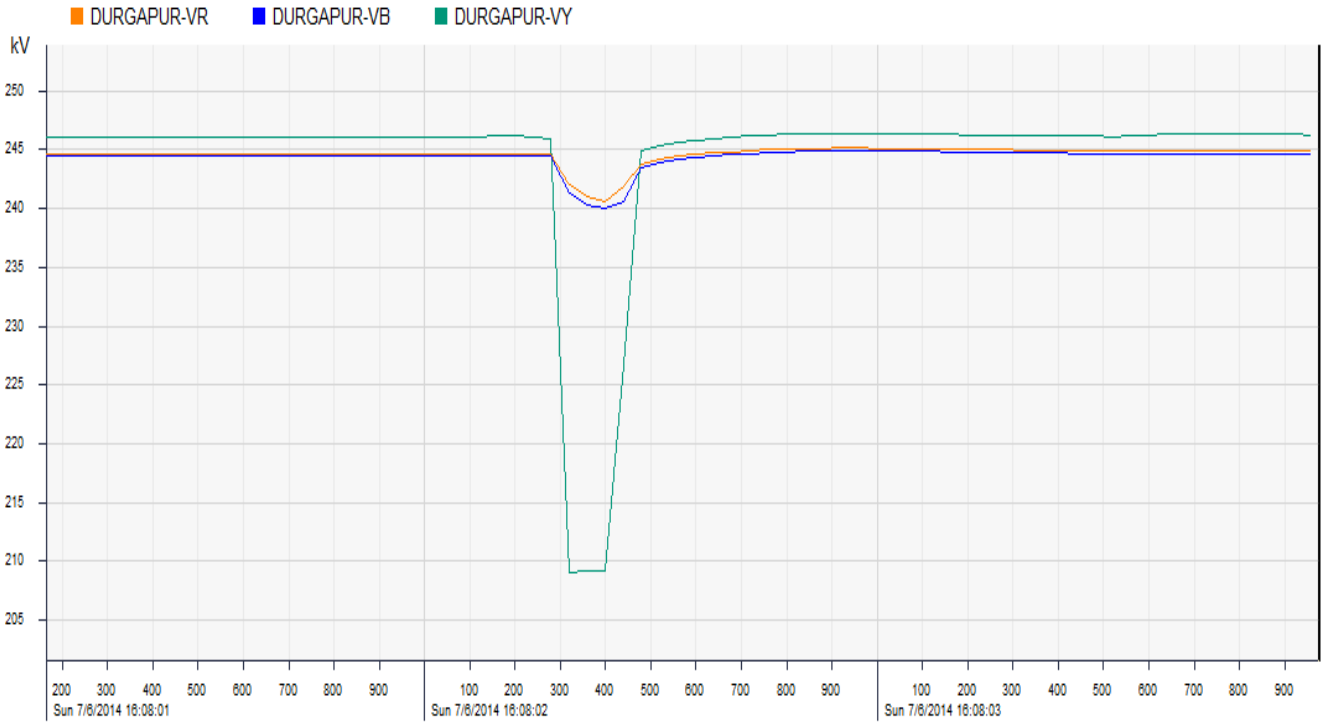
Constituents are hence requested to take note of the same and also forward to ERLDC details of lines for which single phase auto-reclose is presently not in service stating the reasons for the same.



Deliberation in the meeting

Powergrid informed that Auto-reclosure did not take place at Tala end as Auto-reclosure is not in service

4) 400kV Maithon-Durgapur-II tripped at 16:08:02 Hrs on 06.07.2014 due to B- N fault.



- From the PMU plot of 3-Ø voltage of Durgapur S/s, it can be observed that, there was 44kV dip in Y-Ø voltage and the fault got cleared instantaneously (within 100ms).

- There was no indication of auto-reclose operation in the said line for the above fault.

Deliberation in the meeting

Powergrid informed that there might be any fault in 400 kV Maithon-Ranchi line section.

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.

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: BIHAR System.

i. Tripping of 220 kV Biharshariff- Tenughat on 27/04/14.

- At 09:22 Hrs, on 27/04/14 220 kV Biharshariff- Tenughat was tripped on R-N Phase to Neutral fault.
- Charging attempt was made from Biharshariff end at 12:02 Hrs though the fault was permanent in nature.
- 400/220 kV ICTs and 220 kV D/C Biharshariff- Fatuah tripped along with 220 kV Biharshariff –Tenughat line.

From the preliminary report it appears that BSPTCL attempted to charge the 220 kV Biharshariff-Tenughat line from Biharshariff end without clearing the fault. As the fault was permanent in nature the line could not hold and it got tripped. However, the tripping of 400/220 kV ICTs and 220 kV D/C Biharshariff- Fatuah at Biharshariff needs to be explained.

BSPTCL may elaborate the findings of the faults and tripping details of ICTs and 220 kV Biharshariff- Fatuah D/C line.

In 20th PCC, BSPHCL informed that they had observed pole discrepancy at Biharshariff end, so the charging attempt was made through bus coupler CB. Since the line remained faulty, as a result 400/220 kV ICTs and 220 kV D/C Biharshariff- Fatuah got tripped from Fatua end.

PCC advised BSPTCL, TVNL & JSEB to co-ordinate before charging the 220 kV Biharshariff-Tenughat line. Prior to charging such an important line, patrolling should be carried out jointly as decided in 27th TCC/ERPC meeting.

Further, BSPTCL was advised to check the operating time of all CBs at Biharshariff & Fatua along with Purnea S/s and submit a report to ERPC Secretariat.

BSPTCL may update the status.

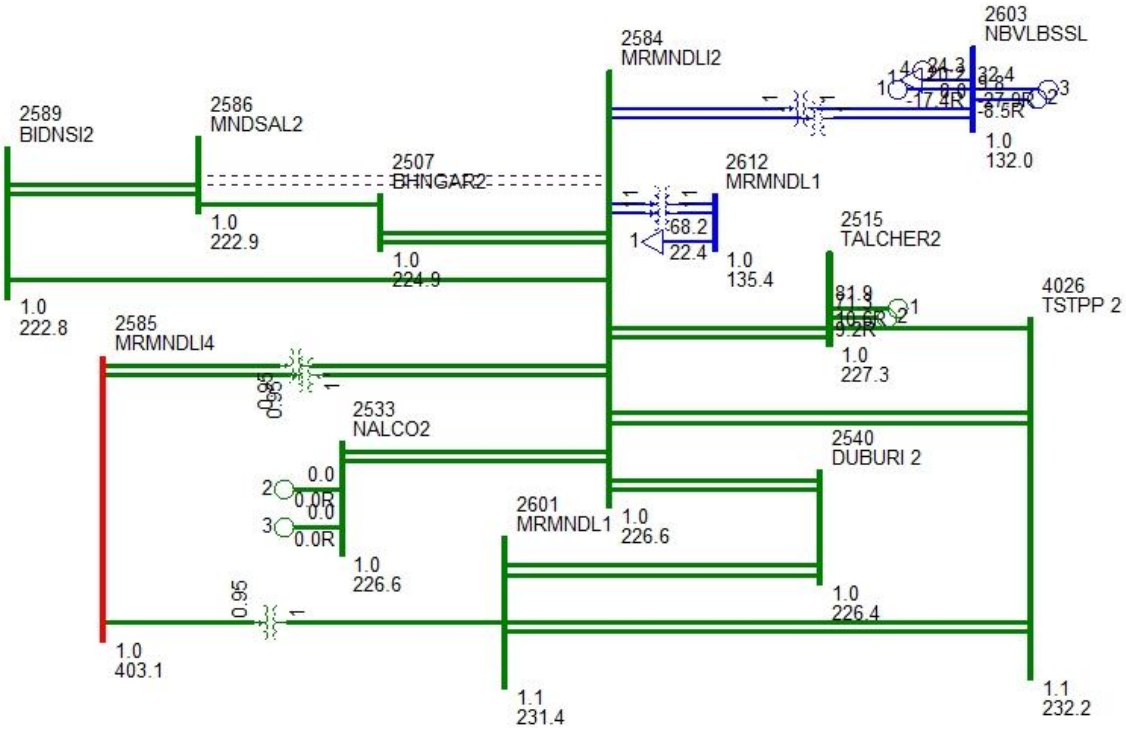
Deliberation in the meeting

*BSPTCL informed that CBs have been tested and submitted the test results and relay settings in the meeting (enclosed in **Annexure-B2ia**).*

ITEM NO. C.2: OPTCL System

i. Disturbance at Meramundali S/s on 30.05.14.

- At 11:05 hrs on 30/05/14, 220kV Meramundali- Kaniha-II tripped at Meramundali end due to Y-Ph jumper snapping which felt on R-Ph conductor at location No. 2.
- 400/220 kV, ICT-II connected to Bus-II from 220 kV side and 220 kV Bus Coupler tripped and 220 kV Bus-II became dead.
- 220kV Meramundali- TTPS– I &II and Meramundali- Bhanjanagar-I tripped at Meramundali end.



Analysis: As per the report the 220kV Meramundali- Kaniha-II tripped at Meramundali end due to Y-Ph jumper snapping with earth wire which felt on R-Ph conductor. The 400/220 kV, ICT-II connected to Bus-II from 220 kV side tripped on O/C, E/F and 220kV Meramundali- TTPS might have tripped due to overloading. However, the following points need to be addressed:

1) The relay settings of O/C, E/F of ICT-II and 220 kV Meramundali- Bhanjanagar-I at Meramundali end needs to checked.
2) Operation of 220 kV Bus-Coupler at Meramundali needs to be clarified.

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. However, the tripping of 220 kV Meramundali- Bhanjanagar-I at Meramundali end is also being

investigated.

PCC advised OPTCL to give a detailed report on above incidence along with action taken. OPTCL agreed.

On query, OPTCL informed that replacement of 220 kV bus bar protection is in progress.

OPTCL may please update.

Deliberation in the meeting

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

ITEM NO. C.3: NTPC System.

i. Tripping of 132KV Kh (NTPC)-Sabour (BSPTCL) & 132 KV Kahalgaon (NTPC) - Kahalgaon (BSPTCL) lines on 07/05/14 & 10/05/14.

In 21st PCC, NTPC informed that initially 1 Ø –E Fault occurred in 132 KV Kh- Sabour line at approx 30 Km distance from NTPC end. While charging from sabour end of the said line, 132 KV Kh- BSEB Kh line once again tripped indicating fault at the same location. However, these tripping details may please be confirmed from remote ends.

PCC advised BSPTCL for proper checking of distance relays for relay indications appeared at Sabour & Kahalgaon (BSPTCL) end to avoid such incidents in future.

BSPTCL may please update.

Deliberation in the meeting

BSPTCL confirmed.

ITEM NO. C.4: Members may update the following:

C.4.1: In 19th 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 the progress of works related to 220 kV two main bus system will be completed as per the schedule.

C.4.2: In 18th PCC after deliberation on **Tripping of 132kV MTPS-Motihari line at 11:58 on 04-08-2013,** PCC advised BSHPCL to take up the matter with Kanti Generating Station for replacement of their old relays with numerical relays and proper protection co-ordination may be done**.**

In 19th PCC, BSPHCL informed that installation of numerical relay at 132 kV Kanti generating station and Motihari S/s are in progress and it will be completed by June, 2014.

BSPTCL may update the status

Deliberation in the meeting

BSPTCL informed that installation of numerical relay at 132 kV Kanti generating station and Motihari S/s are in progress and it will be completed by July, 2014.

C.4.3: In 19th PCC after deliberation on **Tripping of 220kV lines from Fatuah(BSPTCL) and Patna(PG) on 20/03/14,** BSPTCL was advised to check the protection settings of 220 kV Fatuah-Sipara line relays and report.

20th PCC was advised BSPTCL to send a report within 15 days.

BSPTCL may update the status

Deliberation in the meeting

BSPTCL informed that relays have been tested and found correct.

C.4.4: In 19th PCC after deliberation on **Trippings of 220 kV lines at 220 kV Chandil S/s on 22.04.14,** JSEB was advised to attend to the following three main deficiencies at the earliest:

- Measuring the operating time of all CBs at Chandil and rectifying / replacing the faulty CBs
- Checking the protection CT connection polarities of all lines emanating from Chandil S/s and taking necessary corrective actions
- Thorough checking of the LBB protection system recently installed at Chandil for satisfactory performance.

PCC advised JSEB to prepare a report and submit to ERPC Secretariat within 15 days.

JSEB may update.

Deliberation in the meeting

JSEB informed that CT connection polarity has been checked and rectified. Regarding LBB JSEB informed that work is in progress and it will be completed by July, 2014.

C.4.5: 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.

JSEB may update.

Deliberation in the meeting

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

ITEM NO. C.5: 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 BSEB, DVC and West Bengal systems.

It was informed that the above protection philosophy is being implemented for Protection Co-ordination of JSEB and OPTCL systems with its neighbouring utilities.

Members may update.

Deliberation in the meeting

Members noted.

ITEM NO. C.6: ANY OTHER ITEM.

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

ERLDC informed that there was a significant loss of generation of around 560 MW and load around 340 MW in DVC and OPTCL system because disturbance at Joda S/s in Orissa. ERLDC also reported that detailed report was not yet received from OPTCL.

DVC informed that no line tripping observed in their system except 132 kV Koderma-Barhi D/C line tripped on O/C. However, it was only observed that system voltage collapsed along with Bokaro TPS got isolated.

After deliberation, PCC advised OPTCL to submit detailed report within 7 days and the matter will be discussed in detail in the Special protection meeting, which will be held shortly.

OPTCL agreed.

2. 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.

PCC advised Powergrid to submit a detailed report for discussions in next PCC meeting.

3. 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.

Meeting ended with vote of thanks to the chair

Annexure - A

Participants in 21st PCC Meeting

Venue: ERPC Conference Room Time: 11:00 hrs Date: 17.07.14 (Thursday)

Sl No	Name	Designation	Organization	Contact Number	Email	Signature
1	JOYDEB BANDYOPADHYAY	SE(C)	ERPC			
2	U.K. Verma	GM	ERLDC	08902492220	ujwalkumarverma@gmail.com	
3	डी. के. श्रीवास्तव	अ.नि.इ.	[illegible]	9433041802	dkshrivastava55@yahoo.com	डी के श्रीवास्तव
4	P.S. Das	Chief Mgr	ERLDC	9473041837	psdas_psd@yahoo.co	
5	SVS Sathyanarayana	Ch Mgr	ER-II, PowerGrid	9434704038	svs@powergridindia.com	
6	Jiten Das	Ch. Mgr	ER-1, Howrah	9431815768	er_osl@yahoo.com	
7	J. Dutta.	S.E.	DVC Maithon	9681515710	jayanta.dutta@dvc.gov.in	
8	A.K. MISHRA	DGM	NTPC	9437573150	akmishra08@ntpc.co.in	
9	R.P. SINGH	DGM	NTPC	9431011366	rpsingh01@ntpc.co.in	
10	D. CHATTOPADHYAY	GM	NHPC	9800321161	dcnhpc@yahoo.co.in	
11	N. Jeyandhar	DM	Teesta-V NHPC	9[illegible]	jeyandhar_nhpc@rediffmail.com	
12	Purushottam Choudhary	DM(E)	Ranjit Power Station	9800536867	Chowdhary_dulhasti@rediffmail.com	
13	Sri Rama Veerendra	Engineer	ERLDC	9433041833	m.s.r.veerendra@gmail.com	
14	M.K. Thakur	Dy Mgr	ERLDC	9432321832		
15	Rambabu Singh	EEE/CRITL	BSPTCL	7763817723	esecritl@gmail.com	
16	N. Mandal	AGM(E)	Gati	8016082299	niladri.mandal@gatiinfra.com	17/7/14
17	D. Dasgupta	SM(E)	DPL	9434709175	dasgupta_dhanjit@yahoo.in	17/7
18	Rajendra Pd.	A.E.E.	TVHL	9471535346	r.p.ltps@gmail.com	
19	N. De	Manager	ESE Ltd	9831562898	nikhilesh.de@rpsg.in	
20	D.N. Guria	Sr Manager	OPGC	9338715939	dhirendra.guria@opgc.co.in	

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

Participants in 21st PCC Meeting

Venue: ERPC Conference Room   Time: 11:00 hrs   Date: 17.07.14 (Thursday)

Sl No	Name	Designation	Organization	Contact Number	Email	Signature
21	L. Nayak	GM (O&M)	OPTCL	9438907801	ele.lanayak@optcl.co.in	[signature] 17/07/14
22	S. Roy	A.C.E (Testing)	WBSETCL	9434910543	[illegible]-60@yahoo.com	[signature] 17/7/14
23	BHASWATI NATH	SM(OS)	WBPDCL	8336903703	b.nath@wbpdcl.co.in	B.Nath
24	PRABIR HALDER	DGM (Ey)	WBPDCL	8336903685	phalder@wbpdcl.co.in	P.Halder
25	Subhash Mishra	GM/CE Trans. JSR	JUSNL	9431707313	Subhash mishra@gmail.com	[signature] 17/7/14
26	Ajay Prasad.	ESE/CAPTL	JUSNL	943158485		[signature]
27	Mukesh Kumar	A.EE	ERPC	7250145725	mukesh@gmail.com	[signature]
28	G. Rao	AEE	ERPC	9547891353	eseb-coce@yahoo.com	[signature]
29	Akash Bajpai	LE	MPL	9204757804	akash.bajpai@tatapower.com	[signature]
30	P.K.DE	EE	ERPC	9433125844		[signature]
31	J. KEJRIWAL	EE	ERPC			[signature]
32	B. SARKHEL	SE(PS)	ERPC			[signature]
33						
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"Coming together is a beginning, staying together is progress, and working together is success." –Henry Ford

Annexure-B2ia

Breaker Timer Testing of 132 KV Lines at Purnea GSS

Sr.no	Name of Line	Time (ms)-R PH	Time (ms)-Y PH	Time (ms)-B PH	Mode
1	PG-I	56	56	56	C
		32	32	31	O
		38	37	33	C-O
2	PG-II	57	60	57	C
		33	31	33	O
		37	36	37	C-O
3	PG-III	92	93	94	C
		25	25	25	O
		32	31	31	C-O

Sr.no	Name of Line	Time (ms)-R PH	Time (ms)-Y PH	Time (ms)-B PH	Mode
4	132 KV Saharsa	58	56	58	C
		29	32	30	O
		31	35	32	C-O
5	132 KV Khagaria	91	91	93	C
		24	24	24	O
		37	38	37	C-O
6	132 KV Naugachhiya	58	58	57	C
		29	30	28	O
		32	36	32	C-O

Sr.no	Name of Line	Time (ms)-R PH	Time (ms)-Y PH	Time (ms)-B PH	Mode
7	132 KV Katihar	137	142	141	C
		37	35	36	O

Circuit Breaker Status at Purnea GSS

Sr.no.	Name of Bay	MAKE	Yr of comm.	Yr of mfd.
1	132 KV Saharsa	Siemens	_	2001
2	PG-III line	CGL	_	2000
3	PG-II line	Siemens	2014	2013
4	PG-I line	Siemens	2014	2013
5	132 KV Forbesganj	Siemens (under replacement)	_	_
6	132 KV Katihar	CGL	_	2000
7	132 KV B/C	ASEA	_	_
8	132 KV Naugachiya	Siemens	2014	2013

Sr.no.	Name of Bay	MAKE	Yr of comm.	Yr of mfd.
9	132 KV Khagaria	CGL	2013	2012
10	50 MVA Trf-I	Siemens	_	2007
11	50 MVA Trf-II	CGL	_	2011
12	20 MVA Trf-III	ASEA	_	_

Relay Setting at Purnea GSS 33 KV

	O/C		E/F		0.10
Feeder	PSM	TMS0.95	PSM	TMS	CT Ratio
Group Control	0.95	0.10	0.20	0.10	300/5
Dalkola	0.80	0.10	0.20	0.10	300/1
Jalalgarh	0.75	0.05	0.20	0.05	300/5
Incomer-III (20MVA)	0.5	0.05	0.20	0.05	600/1
Incomer-II (50MVA)	0.60	0.095	0.20	0.095	1200/1
Zero mile	0.75	0.05	0.20	0.05	300/5
Bus Coupler	0.75	0.05	0.30	0.05	600/5
Sonouli	0.60	0.10	0.20	0.10	300/1
Incomer-I (50 MVA)	1	0.2	2	0.15	800
Madhubani	0.6	0.05	0.20	0.05	400/1
Maranga	0.80	0.10	0.20	0.10	400/1
Bus Coupler (New)	0.6	0.30	0.20	0.10	400/1

Relay Setting at Purnea GSS 132 KV

	O/C		E/F		0.10
Feeder	PSM	TMS0.95	PSM	TMS	CT Ratio
TR-I (50MVA)	0.95	0.10	0.20	0.10	300/1
Katihar	1	0.1	0.20	0.10	300/1
Khagaria	1	0.09	0.15	0.09	300/1
Saharsa	1	0.09	0.15	0.09	300/1
PGCIL-III	1	0.10	0.20	0.10	600/1
Forbesganj	1.2	0.09	0.15	0.09	300/1
TR-III (20MVA)	0.75	0.10	0.20	0.10	100/1
Bus Coupler	1	0.10	0.20	0.10	
50MVA TR-II	0.7	0.10	0.20	0.10	300/1
Navgachhia	1	0.09	0.15	0.09	300/1
PGCIL-II	1	0.10	0.20	0.10	600/1
PGCIL-I	1	0.10	0.20	0.10	600/1

1. ANALYSIS OF SYSTEM DISTURBANCES on 03/05/2014 of JUSNL(Trasmission)Network.

1. Date and Time of occurance: 03/05/2014 on14:07 Hrs
2. Name of the Substation and Generating Station:
   TTPS , PTPS
3. Details of occurance:
   a. 220 KV Hatia-II- PTPS Ckt-I tripped (Transient E/F) from both end
   b. 220 KV Hatia-II- PTPS Ckt-II Tripped (O/C) from PTPS end
   c. 132 KV Hatia-I- PTPS 8C tripped(O/C) from PTPS end.
   d. 132 KV Hatia-I-PTPS 9C Tripped (O/C) from PTPS end.
   e. TTPS Unit1 &2 Tripped(380 MW) due to loss of evacuation as **220 KV B'Sharif line was already under B/d.**
   f. PTPS unit 6&10 tripped (115 MW) due to loss of evacuation.
   g. 132 KV PTPS- DVC Lightning Arrestor bursting at DVC.

4.Relay Indications

Sl.No.	Name of Line	Local end	Remote End	
1.	220 KV Hatia-II- PTPS CKT I	Hatia-II end Zone-II, 47.51KM, IA=4.06KA, R-phase Fault Duration 199ms,Relay trip Time 797ms	PTPS end Zone-I, 12.36 KM, R-Phase	
2.	220 KV Hatia-II- PTPS Ckt-II Tripped (O/C) from PTPS end	Hatia-II End No relay	PTPS End O/C	
3.	132 KV Hatia-I- PTPS 8C tripped(O/C) from PTPS end.	Hatia-I End No Relay	PTPS End O/C	
4.	132 KV Hatia-I-PTPS 9C Tripped	Hatia-I End No Relay	PTPS End O/C	

4. ANALYSIS

It was stormy raining with thundering. 220 KV Hatia-II –PTPS Ckt-I tripped on transient E/F from both sides. Load(132 MW) of this line

shifted to 220 KV Hatia-II –PTPS CKt-II and total load on Ckt-II became 264 MW leading to tripping of this line on O/C. 264 MW corresponds to 792A on 220 KV side. Overload setting 10 % of 600 i.e 660 A.
Further cascading effect leads to tripping of 132 KV Hatia-I 8C and 9C.
Thus loss of evacuation line for PTPS Units and TTPS units, caused Total power failure at PTPS and TTPS.

5. Remedial Measures and Lesson learnt.
Line maintenance has been increased and trees/bamboos in the vicinity of Hatia –PTPS and PTPS –TTPS lines has been checked .

2. 31/05/2014 of JUSNL(Trasmission)Network.

1. Date and Time of occurance: 31/05/2014 on 05:03 Hrs
2. Name of the Substation and Generating Station:
TTPS , PTPS Total Power failure
3. Details of occurance:
   a. 220 KV Hatia-II- PTPS Ckt-I tripped Zone-III from Hatia End
   b. 220 KV Hatia-II- PTPS Ckt-II Tripped Zone-III from Hatia End
   c. 132 KV Hatia-I- PTPS 8C tripped(E/F) from Hatia end.
   d. 132 KV Hatia-I-PTPS 9C Tripped (E/F) from Hatia end.
   e. 220 KV PTPS-TTPS Line tripped from TTPS end.
   f. TTPS Unit1 &2 Tripped(380 MW) due to loss of evacuation as **220 KV B'Sharif line was already in trip condition since 04:14 AM.**
   g. PTPS unit No.6 tripped (115 MW) on heavy electrical Jerk

4.Relay Indications

Sl.No.	Name of Line	Local end	Remote End	
1.	220 KV Hatia-II-PTPS CKT I	Hatia-II end Zone-III, Trip 130.04KM, Phase BN Fault Duration 556.8ms,Relay trip Time 855.85ms	PTPS end No relay No tripping	
2.	220 KV Hatia-II-PTPS Ckt-II	Hatia-II End Zone-III, Trip	PTPS End No relay	

			No tripping	
3.	132 KV Hatia-I- PTPS 8C tripped(O/C) from PTPS end.	Hatia-I End Dir E/F Relay Trip	PTPS End No relay No tripping	
4.	132 KV Hatia-I-PTPS 9C Tripped	Hatia-I End Dir E/F Relay Trip	PTPS End No relay No tripping	
5.	220 KV PTPS-TTPS Line	PTPS End No trip record reported by PTPS	TTPS End Zone-II, Loc. 55 KM IB= 2.631 KA Phase BN Fault duration 73.14ms,	**EARTH WIRE found BROKEN in between Tower No. 21-22.**

h. Restoration Details.

220 KV Hatia-II-PTPS CKT-I 5:03 to 5:10 Hrs
220 KV Hatia-II-PTPS CKT-I 5:03 to 5:20 Hrs
132 KV Hatia-I-PTPS CKT-8C 5:03 to 5:10 Hrs
132 KV Hatia-I-PTPS CKT-9C 5:03 to 5:23 Hrs
220 KV Hatia-II-PTPS CKT-I 5:03 to 5:27 Hrs
220 KV PTPS-TTPS 5:03 to 16:52 Hrs (**Breakdown ,broken Earth wire replaced)**

i. ANALYSIS

Due to breakage of earth wire near Tower No 21-22 , 220 KV PTPS-TTPS Line tripped.This fault was cleared from TTPS end but from PTPS end , it was not cleared, due to which 220 KV Hatia-II both Ckt and 132 KV Hati-II –PTPS both circuit tripped from hatia End.

4. Remedial Measures and Lesson learnt.

PTPS has to clarify the reason for non clearance of fault from their end. And suggested for checking of breaker and Protective relays of this (220 KV PTPS-TTPS) Line.