

Minutes of 70th PCC Meeting

Date: 06.09.2018 Eastern Regional Power Committee 14, Golf Club Road, Tollygunge Kolkata: 700 033

MINUTES OF 70TH PROTECTION SUB-COMMITTEE MEETING HELD AT ERPC, KOLKATA ON 21.08.2018 (TUESDAY) AT 10:30 HOURS

List of participants is enclosed at Annexure-A.

<u> PART – A</u>

ITEM NO. A.1: Confirmation of inutes of 69th Protection sub-Committee Meeting held on 19th July, 2018 at ERPC, Kolkata.

The minutes of 69th Protection Sub-Committee meeting held on 19.07.18 circulated vide letter dated 31.07.18.

Members may confirm the minutes of 69th PCC meeting.

Deliberation in the meeting

Members confirmed the minutes of 69th PCC minutes.

<u> PART – B</u>

ANALYSIS & DISCUSSION ON GRID INCIDENCES OCCURRED IN JULY, 2018

ITEM NO. B.1: Tripping incidences in 400 kV Rangpo-Binaguri D/C line and subsequent operation of SPS-II.

A. Tripping of 400 KV Rangpo-Binaguri-I and operation of SPS-II on 10.07.18 at 08:14 hrs.

At 08:14:34:538 hrs R-B phase fault took place in 400 KV Rangpo-Binaguri-I and it tripped from both end in zone-1 distance protection within 100 msec. Pre fault flow in 400 KV Rangpo-Binaguri each circuit was around 830 MW.At 08:14:35:648 hrs SPS code-1 generated at Ranpgo S/S and SPS operated at teesta-III at 08:14:35:678 hrs. Also at Dikchu,Jorethang,Chujachen and Tashiding one generating unit tripped as per SPS-1 logic. At 08:14:36:348 hrs SPS-2 operated at Rangpo and 400 KV Teesta-III-Rangpo line tripped from Rangpo end. At the same Time 220 KV Tashiding-Rangpo tripped from Tashiding end, no detail of the tripping received from Tashiding.

Relay indications are as follows:

Name of the elements	Relay Indication at end 1	Relay Indication at end 2
400 KV Rangpo-Binaguri-I	Z-I, R-B phase fault, 48.11 KM,	Z-I, R-B phase fault, 61.61 KM ,
	IR=5.6 KA and IB=6.9KA	
400 KV Rangpo-Teesta-III	SPS-II operated	

Load/Generation Loss: 1046 MW Generation loss with No Load loss.

B. Tripping of 400 KV Rangpo-Binaguri-II and operation of SPS-II on 30.07.18 at 20:48 hrs.

Due to Bad Weather in the Sikkim, 400 kV Binaguri-Rangpo 2 tripped on Y-B phase to Phase to earth fault at 20:42 Hrs due to conductor snapping at 38 km location from Rangpo end. The fault got

cleared in 100 ms as observed from the PMU plot of Binaguri bus voltage. With this, SPS -1 code operated for 400 kV Binaguri-Rangpo ckts which in turn tripped the all running units of Teesta 3 (Except one Unit) and one unit each of Jorethang (Unit 2), Tashiding(Unit 2), Dikchu, Chujachen (Unit 1).

However, it was observed that SPS 2 also has operated causing tripping of 400 kV Teesta3-Rangpo circuit from Rangpo end. At the same time 400 kV Teesta 3-Dikchu circuit also tripped from Dikchu end. This led to the blackout of Teesta 3 and Dikchu generation complex.

Further, it was observed that at the same time, 220 kV Rangpo-Tashiding circuit also got tripped from the Tashiding end.

Total Generation Loss: 1057 MW

Due to Generation Loss Frequency dipped from 49.92 Hz to 49.81 Hz (Drop of .11 Hz) and stabilized at 49.85 Hz.

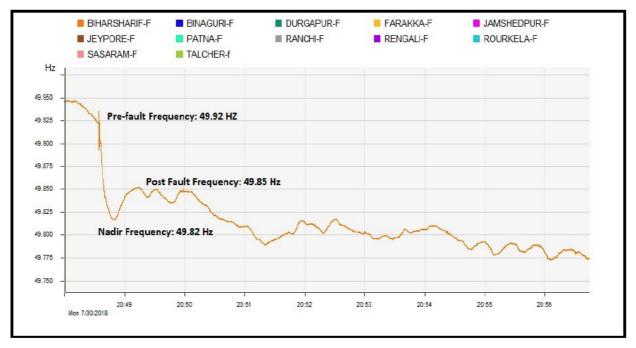


Fig: Frequency dip during the event

Issues of Concern:

1. Operation of Both SPS-1 and SPS-2 operation during one line tripping: It is the cause of concern that both SPS are operating indicating that the line loading of one circuit after tripping of another circuit and SPS-1 operation is not coming below 850 MW after the SPS-1 operation. A similar kind of event took place on 10th July 2018 at 08:14 Hrs where phase to phase fault occurred on 400 kV Bingauri-Rangpo 1 circuit leading to its tripping and operation of SPS-1 as well as SPS 2 causing loss of 1046 MW of generation.

2. Delay in commissioning of 400 kV Rangpo-Kishenganj D/C: The delay in the commission of 400 kV Rangpo-Kishenganj D/C is leading congestion in evacuation of generation of all the hydro IPPs in Sikkim. Tripping of Rangpo-Binaguri line with consequent SPS operation and generation outage is experienced in each rainy season.

3. Phase to phase fault and conductor snapping : The conductor snapping in above case, hot spots and frequent faults on the 400 kV Rangpo-Binaguri D/C are indicating that continuous high loading of these lines is not desirable.

4. Unwanted tripping of 220 kV Rangpo-Tashiding circuit: It was observed that on both days (10 July and 30th July), 220 kV Rangpo-Tashiding circuit got tripped from Tashiding end. No details on cause of tripping have been received from Tashiding end.

Members may discuss.

Deliberation in the meeting

ERLDC informed that the tripping of lines and the fault clearing time for both the disturbances were found to be in order as per disturbance recorder analysis.

Regarding the operation of SPS-II, ERLDC informed that Chujachen, Tashiding, Jorethang and Dikchu units which remained on bar after SPS-I operation (i.e tripping of one of the 400 kV Rangpoo-Binaguri D/C line), were over generating at their overload capacities. As a result, the aggregated inflow of power from the generating stations through one of the remaining 400 kV Rangpoo-Binaguri D/C was more than 850 MW, which had caused triggering of SPS-II operation.

It was informed that the issue was also discussed in 148th OCC meeting, wherein it was decided to modify the logic for SPS-2 so that it operates at a line flow of 900 MW instead of at 850 MW. The time delay for actuation of SPS-2 would continue to be set at 700 ms and might be reviewed in future, if required.

Regarding tripping of 220 kV Rangpo-Tashiding circuit from Tashiding end on 10.07.18.

It was informed that the tripping was due to incorrect settings in SCADA and the settings were rectified after the incidence.

Regarding tripping of Teesta-III – Dikchu S/C from Dikchu end on 30.07.18, the tripping was due to operation of cable protection as per the information received from Dikchu.

PCC opined that the tripping of 400 kV Dikchu-Teesta III circuit for a fault outside of this line section was discussed many instances in this forum.

PCC once again advised Dansenergy to review the relay settings at Dikchu end to avoid unwanted tripping.

ERLDC informed that during the above tripping incidences, it has been observed that voltage of Teesta-III-Rangpo line was increased to a very high value after tripping of Rangpo end breaker on SPS-II operation.

PCC opined that the overvoltage phenomena could be minimized if the Teesta-III end breakers could be tripped on SPS-II operation along with Rangpo end breaker.

Powergrid informed that additional channel is not available for sending SPS-II signal to Teesta-III end.

PCC opined that the opening of breakers at Teesta III end can also be possible by sending DT signal from Rangpo end during the line breaker operation at Rangpo end.

PCC advised Powergrid to configure the DT settings at Rangpo end accordingly.

ITEM NO. B.2: Repeated Grid disturbances at 400/132 kV Motihari(DMTCL) Substation.

400 kV Motihari – Gorakhpur – II and 400 kV Barh – Motihari D/C were out of service due to tower collapse for more than one month. Motihari is connected to Indian grid through 400 kV Motihari Gorakhpur – I which tripped several times in the month of July 2018 due mal operation of SF6 gas monitoring relay resulted frequent interruption of transnational power supply as well as local power supply.

A. Disturbance on 04.07.18 at 10:52 hrs

Motihari was connected with rest of the grid via 400 kV Motihari Gorakhpur – I. At 10:52 hrs 400 kV Motihari Gorakhpur - I tripped on Gas compartment zone trip signal resulting total power failure at Motihari S/s. On investigation it is found that Density Monitor used for Bus-duct to Bushing (SF6 to air) detected false low pressure and sent tripping command to BCU (As per scheme whenever Density Monitor detect low pressure (except CB DM) it will issue trip command to Main & Tie CB and send DTT to remote end) though SF6 Gas pressure in respective duct was as per requirement/specification before fault and after fault. There was no actual fault in the circuit. Line tripped due to mal-operation of Density Monitor.

Load loss: 200 MW

B. Disturbance on 20.07.18 at 09:10 hrs and on 21.07.18 at 07:11 hrs.

400 kV Motihari - Gorakhpur - I tripped on gas compartment zone protection due to maloperation of gas monitoring relay which shows low indication despite proper level being maintained.

Load loss: 280 MW (on 20.07.18) 110 MW (on 21.07.18)

DMTCL may explain.

Deliberation in the meeting

DMTCL informed that the mal-operation of SF6 density monitor was due to moisture ingress in the connector. All the connectors have been covered after these disturbances to avoid the moisture ingress.

PCC opined that DMTCL substation at Motihari is an important substation due to its inter-regional connectivity and major source for power supply to Nepal. Such unwanted tripping of above nature would pose threat to security and reliability of grid operation.

PCC advised DMTCL to contact OEM to avoid such type of unwanted tripping in future.

ITEM NO. B.3: Disturbance at 220kV Mejia & Kalyansweri S/s on 27.07.18 at 01:42 hrs.

220 kV main bus II at Kalyaneswari and Mejia tripped resulting tripping of all elements connected to these buses due to LBB operation after non-opening of breakers at both ends on R-N fault at 220 kV Mejia - Kalyaneswari - I

DVC may explain.

Deliberation in the meeting

DVC explained the disturbance with a detailed presentation. The presentation is attached in Annexure-B.3. DVC explained that

- There was a transient R phase to ground fault in the 220 kV Mejia-Kalyansweri Line, which was cleared from both ends on zone-I distance protection.
- The line was connected to bus# 2 at both the substations and during the instant of above tripping busbar protection operated at both the substations for the bus # 2.
- Regarding busbar operation at Mejia substation, the LBB timer had become instantaneous, which caused tripping of all the feeders connected to Bus #2.
- DVC informed that they have replaced the faulty timer with a new one after this incident.

- Regarding busbar operation at Kalyansweri substation, DVC informed that the reason for operation of busbar protection (in both main zone & check zone) could not be ascertained as relays, Connected CTs, wiring and settings were found in order after thorough checking.
- The busbar relay at kalyaneswari is of electromagnetic type and as a remedial measure, they have increased the busbar differential current pickup set value to its maximum i.e. 0.4 A at Kalyansweri Substation.

PCC advised DVC to replace the old EM type busbar relay at Kalyaneswari with numerical relay.

DVC informed that replacement of old busbar protection at Kalyaneswari had been taken up and it would be soon.

ITEM NO. B.4: Tripping of 400 kV DSTPS (ANDAL)-Jamshedpur D/C on 28.07.18 at 21:07 hrs.

400 kV Andal – Jamshedpur D/C tripped at 21:07 hrs on R-N fault. At same time, unit II at Andal tripped on stator E/F protection.

DVC and Powergrid may explain.

Deliberation in the meeting

DVC explained the tripping incident with the presentation. The presentation is attached in Annexure *B.4.*

DVC informed that there was a R phase to ground transient fault in the 400 kV DSTPS-Jamshedpur circuit-I. At DSTPS end the main breaker cleared the fault in zone-I but the tie breaker of R phase failed to open, as a result LBB of tie breaker operated after 200ms which tripped all the poles of main breakers of both the circuits of DSTPS-Jamshedpur line since both the circuits of DSTPS-Jamshedpur were in same Dia at DSTPS end.

Powergrid informed that the breakers at Jamshedpur end cleared the fault and auto reclose was initiated. However, the breakers of both the circuit got tripped on receipt of DT signal from DSTPS end.

DVC informed that tie CB got damaged and the replacement was in process.

DVC further informed that tripping of DSTPS unit # II on stator earth fault was a different incident. They added that a thorough inspection was carried out but reason for tripping could not be identified.

ITEM NO. B.5: Repeated Grid Disturbances at 220kV Madhepura (BSPTCL) S/s on 19.07.18 at 13:31 hrs.

At 13:15 Hrs , 220 kV Madhepura-New Purnea-II tripped on BN fault. At 13:31 Hrs Purnea – Madhepura I also tripped duet to Y-B phase fault resulting total power failure at Madhepura S/S.

Relay indications are as follows:

Time	Name of the elements	End 1 Relay Indication	End 2 Relay Indication
13:15	220 kV New Purnea -	B-N	B-N
Hrs	Madhepura - II		
13:31	220 kV New Purnea -	Y-B	Y-B
Hrs	Madhepura - I		

Load Loss: 150 MW

BSPTCL may explain.

Deliberation in the meeting

For the disturbance on 19.07.18 at 13:15 hrs, Powergrid informed that relay at New Purnea end has picked up in zone -2.

BSPTCL informed that the 220kV New Purnea-Madhepura circuit-II was tripped in zone-I with relay indication as B-N fault.

In the mean time, when 220kV New Purnea-Madhepura-II was under shutdown due to above tripping, 220kV New Purnea-Madhepura Circuit-I got tripped. Powergrid informed that the circuit-I got tripped from their end on zone-2 with relay indication as Y phase to B phase fault.

BSPTCL added that both the faults were in transient nature and no abnormality was found during line patrolling.

PCC opined that the tripping of circuit-II on transient fault is highly undesirable. On query from PCC, BSPTCL informed that though PLCC of the lines are in operation, autoreclosure was not enabled for the above lines.

PCC advised BSPTCL to check healthiness of PLCC and enable the autoreclosure setting as well as the carrier tripping settings for both the lines and report to ERPC and ERLDC.

ITEM NO. B.6: Total power failure at 220kV TLDP-III S/s on 04.07.18 at 19:00 hrs.

As per flash report received from WBSLDC, 220 kV TLDP III – NJP – S/C tripped on distance protection (fault distance 57 km from TLDP – III) resulting in tripping of all running units at TLDP - III in 51V (under voltage overcurrent protection) due to loss of evacuation path. In PMU data, fault was observed in R & B phases at the time of the incident. Fault clearing time is less than 100 ms.

Relay indications are as follows:

Name of the Element	Relay Indication at end 1	Relay Indication at end 2
220 kV TLDP III – NJP – S/C	Z-I, fault distance 57km	Yet to be received

Generation Loss: 136 MW

WBSETCL may explain.

Deliberation in the meeting

WBSETCL informed that there was a R-B phase fault on 220 kV TLDP-III-NJP S/C line. The Distance relay at NJP end cleared the fault on zone-I distance protection with fault distance 10 km from NJP end. As TLDP-III station had no other evacuation path all the running units were tripped, total power failure occurred in the station.

ITEM NO. B.7: Total power failure at 220kV Hatia(JUSNL) S/s on 20.07.18 at 09:10 hrs.

Due to clearance issue with some 11 KV feeder (which has an in feed from Hatia old) repeated faults occurred in 220 kV Ranchi - Hatia-I and II. As a result total power failed at 220kV Hatia S/s. Detailed report is enclosed at **Annexure-B7**.

JUSNL may explain.

Deliberation in the meeting

JUSNL informed that repeated disturbances and total power failure at Hatia substation on 20.07.18 was due to the clearance issue with 11kV feeder under 220kV Ranchi-Hatia D/C line. JUSNL informed that the 11 kV feeders were re-routed after the above incidences to get the sufficient clearance.

PCC advised JUSNL to check the Sag level and clearance of 220 KV lines to avoid this type of tripping.

From the analysis of PMU plot and disturbance recorders at Ranchi & Hatia end, a number of protection related issues came into notice.

PCC analysed the issue & advised JUSNL to take the following actions

- Whenever PLCC will remain out of service, the auto reclose operation should be made to non-auto mode and zone 2 timing may reduced to minimize the fault clearing time.
- The trip on reclose function should be enabled in the relay whenever autoreclose function is in operation.

Regarding unwanted tripping of ATRs at Hatia and Patratu substations and tripping of Hatia-Patratu line in zone-4, PCC felt that there was a protection coordination issue and advised JUSNL to submit the corresponding relay settings to ERPC/ERLDC at the earliest.

The issue of delayed opening of breaker at Hatia end i.e.400 msec after zone-I tripping initiation was remained unexplained. The sequence of operation as well as the details of elements tripped during the incident could not be explained by JUSNL.

PCC decided to discuss this issue in next PCC meeting and advised JUSNL to explain the issue in next meeting with all the relevant details.

ITEM NO. B.8: Tripping Incidences in the month of July, 2018.

Other tripping incidences occurred in the month of July 2018 which needs explanation from constituents of either of the end is given in **Annexure-B8**.

In 58th PCC, ERLDC informed that most of the constituents are not submitting the DR and EL data for single line trippings.

PCC advised all the constituents to upload the details along with DR and EL in PDMS on-line portal and referred the issue to TCC for further guidance.

In 36th TCC, all the constituents were advised to use the PDMS on-line portal for uploading the single line tripping details along with DR (comtrade files), EL and other relevant files for all trippings of August 2017 onwards. Otherwise, it will be considered as violation of compliance of clause 5.2(r) & 5.9 of IEGC.

Members may discuss.

Deliberation in the meeting

Members explained the tripping incidences. Updated status is enclosed at Annexure-B8.

ERLDC informed that constituents not submitted the information on few tripping incidences which occurred in June 2018.

PCC advised all the concerned constituents to send the relevant details to ERLDC.

PART- C:: OTHER ITEMS

ITEM NO. C.1: Presentation on "Best Practices and Advanced Diagnostic Solutions for O&M of Transmission Lines & Substations".

M/s Taurus Powertronics Pvt. Limited vide a letter expressed their interest to conduct a program on the best practices and advanced diagnostic techniques for O&M of Lines and Substations in PCC forum.

Accordingly M/s Taurus Powertronics was advised to give a brief presentation in 70th PCC meeting.

M/S Taurus Powertronics may present.

Deliberation in the meeting

M/s Taurus Powertronics Pvt. Ltd. gave a detailed presentation on "Best Practices and Advanced Diagnostic Solutions for O&M of Transmission Lines & Substations".

PCC appreciated the presentation and thanked M/s Taurus Powertronics Pvt. Ltd. for enriching the knowledge and sharing the new technology on Advanced Diagnostic Solutions for O&M of Transmission Lines & Substations.

ITEM NO. C.2: Islanding scheme at IbTPS- OPGC

68th PCC opined that the draft scheme submitted by Odisha was three years old and the draft scheme is needed to be reviewed with existing network configuration.

PCC decided to discuss the islanding scheme in next PCC Meeting and advised OPTCL to submit all the relevant details to ERPC and ERLDC.

In 69th PCC, OPTCL presented the revised islanding scheme based on updated network configuration and power flows. The details are enclosed at **Annexure-C.2**.

It was decided that ERLDC and ERPC will study and finalize the islanding scheme in next PCC Meeting.

ERLDC & ERPC may update.

Deliberation in the meeting

OPGC has submitted the updated details which are enclosed at Annexure-C2.a.

It was decided that ERLDC and ERPC will study and finalize the islanding scheme in next PCC Meeting.

ITEM NO. C.3: Auto Reclose scheme for 132KV feeders--Powergrid

Powergrid informed that they are planning to enable three phase autoreclose feature for 132kV lines owned by Powergrid.

Members may discuss.

Deliberation in the meeting

PCC recommended to enable the auto reclose scheme for 132 kV lines wherever PLCC system is in service.

ITEM NO. C.4: Repeated interruption of power supply at Lalmatia and Sahebgunj area

PCC advised JUSNL to comply the earlier observations/recommendations regarding frequent tripping incidences at Lalmatia S/s.

In view of repeated uncoordinated trippings and mal-operation of relays at 220/132kV Lalmatia S/s in the past, PCC decided to form a Committee with members from NTPC, Powergrid, ERLDC and ERPC. The Committee would visit Lalmatia and adjoining substations for on-site inspection and Third Party Protection Audit.

Audit Team may place the report. JUSNL may respond.

Deliberation in the meeting

Audit team presented the report highlighting the major issues with respect to Lalmatia substation. The report is attached in **Annexure C.4.**

PCC advised ERPC secretariat to communicate/intimate the audit observations to JUSNL and NTPC authorities and requesting them for early compliances.

ITEM NO. C.5: Auto-Reclosure on Lines from PPSP Generating station.

It has been observed that, no transmission lines from 400 kV PPSP Plant are having the autoreclosure facility in enabled condition. Further, the auto-reclosure facilities are also not enabled at remote end substation.

Element Name	Tripping Date	Tripping Time	Type of Fault
400KV PPSP-BIDHANNAGAR-I	05-08-16	21:43	R Phase to E/F
400KV PPSP-NEW PPSP-2	25-02-18	12:58	R Phase to E/F
400KV PPSP-BIDHANNAGAR-II	11-03-18	23:45	Y phase to E/F
400KV PPSP-BIDHANNAGAR-II	30-04-18	8:21	Y phase to E/F
400KV PPSP-BIDHANNAGAR-II	10-05-18	6:15	B phase to E/F
400KV PPSP-BIDHANNAGAR-II	20-05-18	16:39	R Phase to E/F
400KV PPSP-BIDHANNAGAR-I	01-06-18	11:37	Y phase to E/F
400KV PPSP-BIDHANNAGAR-II	08-06-18	2:32	B phase to E/F
400KV PPSP-BIDHANNAGAR-II	08-06-18	23:50	Y phase to E/F
400KV PPSP-BIDHANNAGAR-II	12-06-18	14:34	R Phase to E/F

Non-Implementation of Auto-reclosure results in the non-compliance of CEA Technical Standard for Construction of Electrical Plants and Electric Lines 43.4.C.

WBPDCL may kindly update on the status of healthiness and enabling of the auto-reclosure on the transmission lines from PPSP Power plant. It may kindly be noted that, most of the power plant (Thermal/Hydro/Gas) in the Indian Power System have no issue in enabling single-phase auto-reclosure for the line emanating from their plant. This has indeed increased their reliability during bad weather conditions during which transient fault occur on the lines.

Members may discuss.

Deliberation in the meeting

The agenda could not be discussed as WBSEDCL representative was not present in the meeting.

ITEM NO. C.6: Time Setting for Digital Disturbance Recorder in the Relay

Disturbance recorder file is the most important data during any event analysis. Further, it is essential that the disturbance recorder file should have adequate information about the event. In order to achieve that, it is desired to have 3-5 seconds as the recording time so that all the important aspect of event can be captured. However, it has been observed that, most of the Disturbance Recorder files have very small time window of record (0.5-1.5 seconds) and thus leading to lack of data for events like auto-reclosure, PDR operation etc.

In view of this, it is suggested to adopt a pre-event time window of 0.5 second and Post-event time window of 2.5 to 4.5 seconds.

Members may discuss.

Deliberation in the meeting

PCC advised all the constituents to comply the above suggestion.

ITEM NO. C.7: FOLLOW-UP OF DECISIONS OF THE PREVIOUS PROTECTION SUB-COMMITTEE MEETING(S)

The decisions of previous PCC Meetings are given at Annexure-C7.

Members may update the latest status.

Deliberation in the meeting

Regarding disturbance at 400kV Bakreswar on 19.06.2018, WBPDCL informed that Unit #2 CB unhealthy was appeared during changing over from Main CB to Tie CB due to DC circuit fault. LBB protection operated and tripped all the lines connected to 400kV bus.

WBPDCL added that the DC circuit fault was rectified after the disturbance.

DMTCL has submitted a action taken report on recommendations of Protection Audit.

PCC advised all the other constituents to comply the PCC observations.

ITEM NO. C.8: Zone 3 settings of ISTS lines

Based on the data available in PDMS, the zone 3 settings of all ISTS lines in Eastern Region were verified and compared with the corresponding resistive reach of the line thermal loading. Zone 3 settings were also checked with the agreed protection philosophy of ER. The discrepancies observed in the settings will be presented in the meeting.

In 67th PCC, PRDC presented the list of ISTS lines where they observed the discrepancy in zone-3 setting.

In 70th PCC, PRDC was advised to resend the list of the lines to all constituents and constituents were advised to verify the settings at the earliest.

Members may update.

Deliberation in the meeting

PCC advised concerned constituents to verify the settings.

ITEM NO. C.9: Schedule of training program to be conducted by PRDC

As per AMC, PRDC will conduct training on PDMS and PSCT in state utility premises of Eastern

Region. Tentative schedule is given below:

Training in Month	State	Date
June'2018	Bihar	11/06/18 To 15/06/18
July'2018	West Bengal	09/07/18 To 13/07/18
August'2018	Odisha	20/08/18 To 24/08/18
September'2028	Jharkhand	17/09/18 To 21/09/18
October'2018	Sikkim	08/10/18 To 12/10/18

Accordingly, training was conducted at Patna from 11th June 2018 to 15th June 2018 and in West Bengal from 09th July 2018 to 13th July 2018.

In 69th PCC, it was agreed and finalized that the training will be conducted in Odisha from 06.08.18 to 10.08.18 in Bhubaneswar.

PCC advised all the concern state constituents of Odisha to attend the training.

Members may update.

Deliberation in the meeting

PCC decided to conduct the training at Ranchi, Jharkhand from 10th September 2018 to 14th September 2018.

PCC advised all the constituents of Jharkhand to attend the training.

ITEM NO. C.10: Visit to newly commissioned substations by PRDC for data collection

Data of newly commissioned substations in Odisha and Bihar are to be incorporated in Protection data management system. PRDC is planning to visit newly commissioned substations for data collection. Tentative schedule for the visit is given below:

Odisha:

NEW SS NAME	OWNER	Date of visit
TSL-Kalinganagar	OPTCL	20-08-2018
Dhenkikote	GRIDCO	21-08-2018
Bargarh	GRIDCO	23-08-2018
BARGARH NEW	OPTCL	24-08-2018
Ghens	OPTCL	25-08-2018
Kantabanji	GRIDCO	27-08-2018
MUNIGUDA	OPTCL	29-08-2018
Podagada	GRIDCO	31-08-2018
TRITOL	OPTCL	03-09-2018

Bihar:

SL. NO.	NEW SS NAME	OWNER	DATE
1	New Sheikhpura	BSPTCL	21-08-2018
2	Chapra(New)	BSPTCL	22-08-2018
3	Shahpur - Patori	BSPTCL	23-08-2018
4	Amnaur	BGCL	24-08-2018

5	Khijisarai	PGCIL/BGCL	25-08-2018
6	Nawada 220KV	BGCL	27-08-2018
7	Bakhri	BSPTCL	28-08-2018
8	Jamalpur	BGCL	29-08-2018
SL. NO.	NEW SS NAME	OWNER	DATE
1	Manihari	BSPTCL	23-08-2018
2	Baisi	BSPTCL	24-08-2018
3	Barsoi	BSPTCL	25-08-2018
4	Laukhi	BSPTCL	27-08-2018
5	Jhanjharpur	BSPTCL	28-08-2018

Odisha and Bihar may confirm.

Deliberation in the meeting

PCC advised Odisha and Bihar to finalize the dates.

ITEM NO. C.11: Status of Third Party Protection Audit

The compliance status of 1st Third Party Protection Audit observations is as follows:

Name of Constituents	Total Observations	Complied	% of Compliance
Powergrid	54	46	85.19
NTPC	16	14	87.50
NHPC	1	1	100.00
DVC	40	26	65.00
WB	68	49	72.06
Odisha	59	42	71.19
JUSNL	34	25	73.53
BSPTCL	16	5	31.25
IPP (GMR, Sterlite and MPL)	5	5	100.00

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

The substation wise status of compliance are available at ERPC website (Observations include PLCC rectification/activation which needs a comprehensive plan).

Members may note.

Deliberation in the meeting

Members noted for compliance.

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

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

List	List of line where auto reclose facility is not available(Information based on PMU data analysis)							
S.	Transmission Lines	Date of Reason	Reason of		Owner Detail Pres		ent Status	
No	name	Trippin g	Tripping	End-1	End-2	OPGW/P LCC Link available	AR facility functional	
13	220KV BUDIPADAR- KORBA-II	23.06.1 6	Y-N FAULT	OPTCL	CSEB	PLCC available	will be activated in consultation with Korba	
17	220 KV TSTPP-RENGALI	17.07.1 6	EARTH FAULT	NTPC	OPTCL		by March 2018	
18	220KV BUDIPADAR- RAIGARH	21.07.1 6	EARTH FAULT	OPTCL	PGCIL	PLCC defective		
19	400 KV KOLAGHAT- KHARAGPUR-II	03.08.1 6	Y-N FAULT	WBPDC L	WBSET CL			
20	<u>220 KV FARAKKA-</u> LALMATIA	03.08.1 6	B-N FAULT .	NTPC	JUNSL	Yes	Old Relay and not functional. 7-8 months required for auto re-close relay procurement.	
23	<u>220 KV MUZAFFARPUR -</u> HAZIPUR - II	10.08.1 6	B-N FAULT	PGCIL	BSPTCL		Voice established. For carrier required shutdown	
24	<u>220 KV ROURKELA - TARKERA-II</u>	11.08.1 6	B-N FAULT	PGCIL	OPTCL	OPGW available	Expected to install protection coupler by Jan 17	
27	220 KV BIHARSARIF- TENUGHAT	07.09.1 6	B-N FAULT	BSPTC L	TVNL			
32	220KV Bidhannagar- Waria-II			WBSET CL	DVC			
33	220KV Jamshedpur-Jindal- SC							

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

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

OPTCL:

- 1. 220kV Rengali(PG)-Rengali S/Y (Proposal for Commn. in OPGW is pending): PSDF appraisal committee accepted the proposal
- 2. 220kV Indravati(PG)-Indravati(PH) (Proposal for Commn. in OPGW pending): PSDF appraisal committee accepted the proposal
- 3. 132kV Baripada(PG)-Baripada (Tendering in Progress for OPGW): Contract awarded
- 4. 132kV Baripada (PG)-Rairangpur (Tendering in Progress for OPGW): Contract awarded

BSPTCL:

- 1. 220kV Purnea (PG)-Madhepura line
- 2. 220 kV Biharshariff- Begusarai line
- 3. 220 kV Biharshariff- Bodhgaya line
- 4. 220kV MTPS-Motiari line
- 5. 220KV Madhepura-New Purnea D/C
- 6. 220KV Muzaffarpur-Hajipur D/C line
- 7. 220KV FSTPP-Lalmatia-1
- 8. 220KV Patna-Khagaul-SC

Work is in progress expected to be commissioned (by December 2017.

Auto recloser is out of service at Madhepura Auto recloser is out of service at Hazipur Auto recloser is out of service at Lalmatia Auto recloser is out of service at Khagual

In 65th PCC, Powergrid informed that they will replace the Autorecloser relay of 400 kV Rourkela-

Chaibasa 1 and 400 kV Meramundali-Sterlite 1 & 2 by April 2018.

In 67th PCC, BSPTCL informed that they are planning to hire an agency for implementing PLCC system in all the lines in their network.

Members may update the status.

Deliberation in the meeting

WBSETCL informed that PLCC was in service for both the ends of 220kV Bidhannagar-Waria-II line.

ITEM NO. C.13: Checklist for submission of updated data for Protection Database

The network data in Protection Database needs to be updated on regular basis on account of commissioning of new elements in the CTU as well as STU networks. Accordingly a checklist has been prepared which is enclosed in **Annexure-C13**.

All the constituents requested to submit the checklist on monthly bases in every OCC/PCC meetings.

Constituents may note.

Deliberation in the meeting

Members noted.

Meeting ended with vote of thanks to the chair.

Participants in 70th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata

Time: 10:30 hrs

Date: 21.08.2018 (Tuesday)

Sl No	Name	Designation/ Organization	Contact Number	Email	Signature
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4	SURAJIT BANERJEE	DGM, ERLDC	9433041823	surget. banergee Coperoes. in	Dr-
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7	S.K. SAHU	PGICIL, BBSR	9078853643	SKSahu @ powerg oridisation.	- Addin 2
8	S. MATTI	S.D.E, CRITL,DYC	75458674 53	Sidiptam TTMO Jonail . com	5. Naits
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12	Nisman Kumar	Mgr, DMTCL	7987210324	nishart: Kumor @ Jufig. esses	May
13	redesh auft	TUL	3816805252	a androty.cem	Norto
14	D.P. Bhargava	TUL	99 5 8833995	Appharganal techargana	TOP
15	Saibal Chorbs	FOSOCO	8589072079	Sailed @ posoco-in	Sailent
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20	M. Markerjee	PRDC . SR. Engjour	7797827273	mallab more herrice @	Philee

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

Participants in 70th PCC Meeting of ERPC

Venue: ERPC Conference Room, Kolkata

Time: 10:30 hrs

Date: 21.08.2018 (Tuesday)

Sl No	Name	Designation/ Organization	Contact	Email	Signature
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	president in the r	PRDC		deepak. Vin 208 Q gmail. Com	Veek.
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23	B. SARKHEL	Connultant ELPC	9433065724		
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30	D.K. DAS	ACE, WBSETCL	9434910544	cectdwbsetel agmente	20
31	S. Mondal	ASST-Manager CBSU.	7595956952	& ucharit. mondal @rp-19	Smade
32	ParthaDe	Chief Manager HEL	9831011322		PDL
33	D. a. Guren	DGM (Elect)	9338715739	dhisendrang usu coppe.	72.
34	S.S. Nanda	D Gm (clevr)	9438907803	ele, ssnonde & opter: con	
35	Temakanta Sahin	So GM (ED, SLDC, Misha	9438907403	UKS 365 Jako . 200	Yel
36	Sudipta Gehosh	- / / /	833691F005	Sphono 4@ Ubbacl.co.	" S- That
37	H.P. Mabapatra	GM- otipe	73288 40015	hpm. thpc@gmail.com	Ha
38	R. Acharjee	Sr. Manager	9434835280	rages h @ Taures pour proves	R
39	Atish Kr Bisuel	ZM-	7022067631	atish biswal @ fourus pour - - trovics	Ah
40	DEBASISH MUNCHERJEE	TECH. ENGINEER. (ELECT.).	9007649808	debasiel @ rowrus - povertronig	D'

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Date: 21.08.2018 (Tuesday)

Sl No	Name	Designation/ Organization	Contact Number	Email	Signature
41	P. K. Gupta	DGM (03) WISPDCL	833690 3960	pgepta @ coppel. Co. A	a prop
42	PK Mishra	CLD, SLDC Odisha	9438907402	cla-side (solconissa. orgin	Alle
43	JGRae	EE, EER	9547891353	eseb-leadyation	Apda
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"Coming together is a beginning, staying together is progress, and working together is success." -Henry Ford

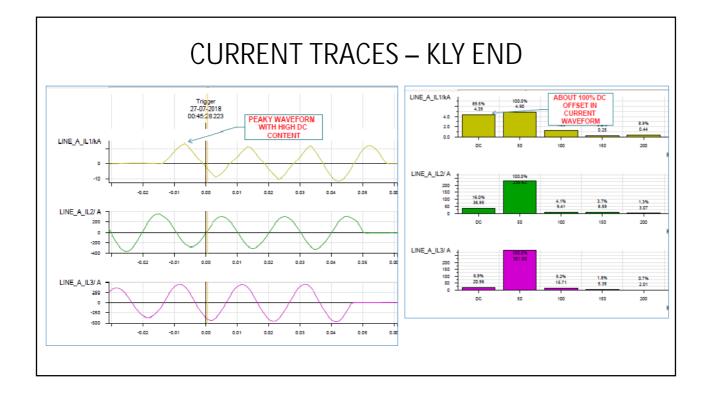
DISTURBANCE AT KALYANESHWARY AND MTPS ON 27.07.18 01:45 HRS

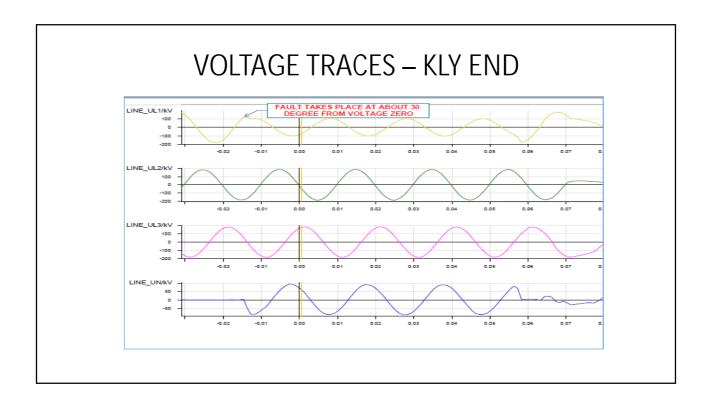
EVENT DETAILS, ANALYSIS AND FINDINGS

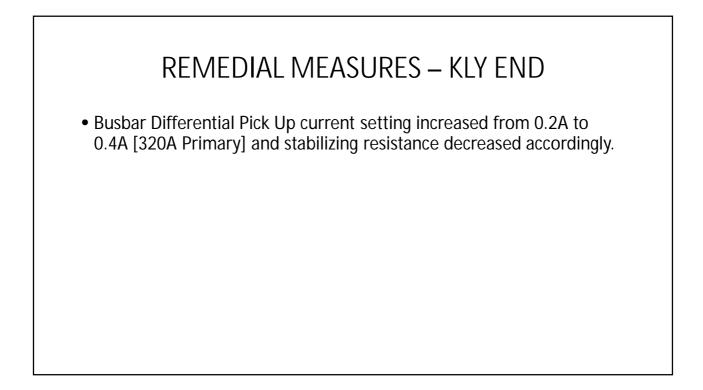
- At about 00:45 hrs of 27.07.18 there was a AN transient fault in L # 228[Kly MTPS]. Fault was cleared at both ends in Distance Zone 1. weather condition during fault was raining and thundering heavily.
- But along with it Kly Bus # 2[Line was in this bus] tripped through Busbar protection – both Main Zone & Check Zone. And at MTPS Bus # 2 [Line was on Bus # 2] tripped through LBB protection of the said line.
- At MTPS end L # 228 LBB timer had become instantaneous and had tripped the entire bus. Timer was replaced with healthy one.
- At Kly end busbar protection relays, CTs of L # 228, Busbar CT circuit IR etc. were done and everything was found O.K.

REASON FOR MALOPERATION OF BOTH MAIN ZONE AND CHECK ZONE

- No clear reason could be furnished.
- Fault was closer to Kly end with RMS current of about 8kA.
- But DR of L # 228 shows fault had occurred nearer to voltage zero and thus DC offset was very high (about 90% of fundamental) in faulted phase current.
- Probably such high DC current was responsible for CT saturation. L # 228 current was seen to be peaky in nature. DR of Kly end indicative of CT saturation.
- Probably lightning fault.



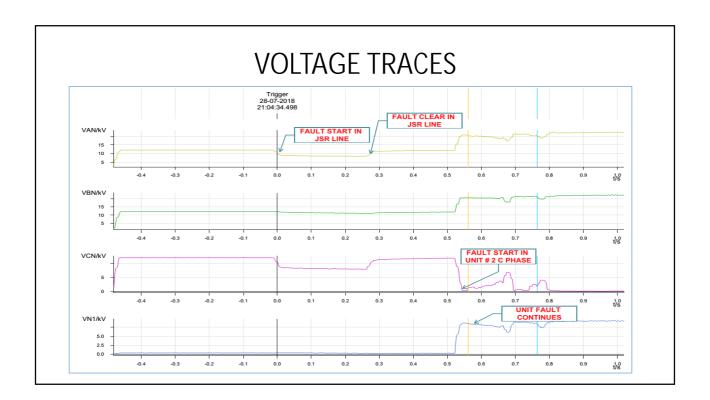


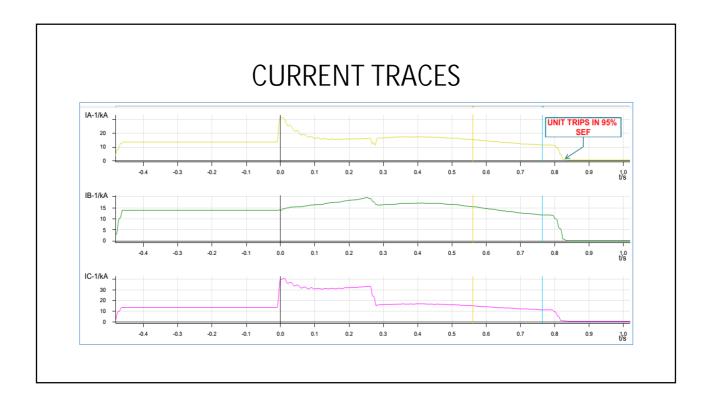


DISTURBANCE IN DSTPS ON 28.07.18 AT ABOUT 21:04HRS

EVENT HISTORY

- At about 21:04 hrs of 28.07.18 there was a transient AN fault (IA= 14.5kA) at about 9.8km from DSTPS End on DSTPS JMD Line # 1.
- Fault seen in Zone 1 cleared by Main CB instantaneously but Tie CB(A pole) failed to OPEN Tie LBB operated after 200ms JMD Line # 2 (in other dia) trips 3 pole and Line # 1 also trips 3 pole but A pole of Tie CB remained stuck. Fault cleared by tripping from other end.
- Tie rod of A Pole found damaged. Replacement in progress.
- Unit # 2 tripping was a separate event which took place after the line fault was cleared (about 267ms later). Unit tripped through Neurtal O/V [95% SEF] and 64GIT.
- Some transient fault was present within SEF zone as C Phase voltage had become almost zero while the other phase voltages rise to LL value.





OTHER POINTS

- No fault found in Unit # 2. Unit was synchronised and had run successfully for about 7 days before going for over hauling.
- Stator Resistance normal, PT ratio / Magnetizing current normal, Surge capacitor values normal, LA megger values normal, relay check normal.

पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड

(भारत सरकार का उद्यम)

POWER SYSTEM OPERATION CORPORATION LIMITED

(A Government of India Enterprise)

Eastern Regional Load Despatch Centre: 14, Golf Club Road, Tollygunge, Kolkata-700 033. CIN: U40105DL2009GOI188682 फ़ोन: 033- 24235755, 24174049 फैक्स : 033-24235809/5029 Website:<u>www.erldc.org</u>, Email ID- erldc@posoco.in

Incident No. 200718/1

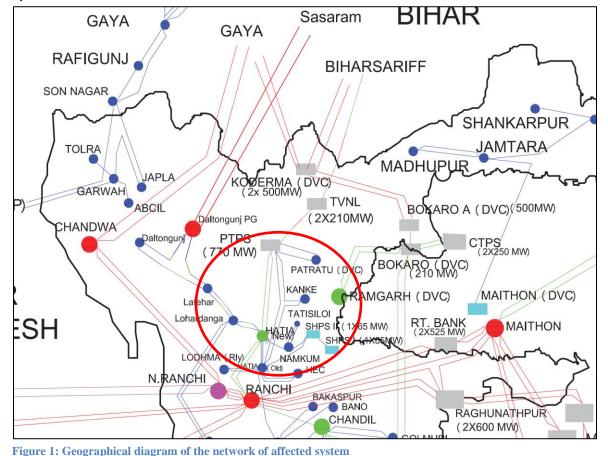
Report on the incident in Eastern Region involving JUSNL system

- 1) Date / Time of disturbance: 20-08-18, 08:44 hrs
- 2) Category :- GD-I
- 3) Systems/ Subsystems affected: 220/132 kV Hatia S/S

4) Quantum of load/generation loss: 170 MW load loss with no

- 5) Antecedent condition:
 PLCC of 220 KV Rahchi-Hatia D/C was out of service and System frequency 50:00 Hz
- Major elements tripped:
 220 kV Ranchi Hatia-I & II
 220 kV Hatia Patratu-I & II
- 7) Network across Hatia

1 | Page





Dtd: 01-08-18

8) Details of relay flag:

of Details of relay			
			Relay Indication at
Time	Name of the elements	Relay Indication at End 1	End 2
		B-N,IB-4.8 kA, Zone-2 and	B-N, IB 6.1 kA, 1.6 km
08:44:14:419	220 kV Ranchi Hatia-I	3phase tripping(also Y phase	from Hatia,Zone-1,
		loop picked up)	single phase tripping
		-	B-N,IB-6.2 kA , Zone-1
			picked up and T1
08:44:15:249	A/R of 220 kV Ranchi Hatia-I from Hatia end		timer started still 3
00.44.13.243			phase tripping took
			place after 400ms
			approximately
At the same Insta	int all ATR of Hatia tripped on o	ver current and 220 KV Patratu-I	Hatia-II and ATR (on o/c)
	at Patratu tripped. But DR/	EL and relay details not submitte	ed
		B-N,IB-3.8 kA, Zone-2 and	Y-B-N, IY 1.7 kA IB-
00.27.00.254		3phase tripping	2.6kA,Zone-1, 3 Phase
09:27:00:351	220 kV Ranchi Hatia-II		tripping phase
			tripping
		B-N,IB-4.3 kA, Zone-2 and	B-N, IB 2.5 kA,
		3phase tripping(also Y phase	3.458km from
09:41:28:831	220 kV Ranchi Hatia-I	loop picked up)	Hatia,Zone-1, single
			phase tripping
		B-N,IB-1.2 kA, Zone-4	No DR ,Relay
	220 kV Hatia-Patratu-II	sensing the same fault of 220	indication received
		kV Ranchi Hatia-I and reset as	malcation received
09:41:28:831		the fault cleared by opening	
		of Hatia end breaker of 220	
		kV Ranchi Hatia-I	
			B-N,IB-1.7 kA , Zone-1
		_	picked up and T1
	A/R of 220 kV Ranchi Hatia-I		timer started still 3
09:41:29:657	from Hatia end		
			phase tripping took place after 350ms
			•
		DNID 121A Zono 4	approximately
		B-N,IB-1.3 kA, Zone-4	No DR ,Relay
09:41:29:657	220 kV Hatia-Patratu-II	sensing the same fault of 220	indication received
		kV Ranchi Hatia-I during it's	
		A/R and tripped after 350 ms	
10:05:13:565	220 kV Hatia-Patratu-I	O/V stage 1 operated line	Not tripped
		voltage 255 KV	
		B-N,IB-3.8 kA, Zone-2 and	Y-B-N, IY 1.5 kA IB-
12:12:53:342	220 kV Ranchi Hatia-II	3phase tripping	3.6kA,Zone-1, 3 Phase
			tripping phase
	unto 9 Datailad Analysia		tripping

9) Sequence of events & Detailed Analysis:

A. At 08:44:14:419 Hrs: Due to clearance issue with some 11 KV feeder (which has an in feed from Hatia old) B-N fault took place in 220 kV Ranchi Hatia-I and at the same time Y phase current also

increases. 220 KV Ranchi-Hatia- tripped from Hatia end(1 phsae) immediately in Z-1 and from Ranchi end(3 phase) after 350 ms in Z-2. Then after 800 ms A/R took place from Hatia end and again B-N fault took place and Z-1 picked up but tripped after 400ms. At the same time all ATR of Hatia and one ATR of Patratu tripped as per verbal information. Also 220 KV Hatia-Patratu-II tripped from Patratu of which no details received.

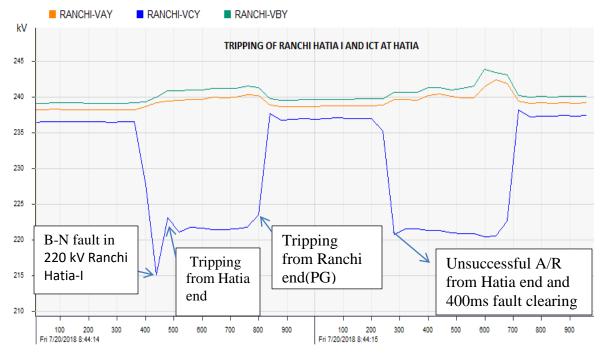


Figure 2: 400 kV Bus voltage at Ranchi

B. At 09:27:00:351 Hrs: Again due to clearance issue with 11 KV feeder Y-B-N fault took place. Though in PMU only B-phase voltage dip observed but from DR it is clear Y phase current also increased. Ranchi end sensed only B-N fault in Z-2 and tripped (3 phase) after 350ms but Hatia end tripped in Z-1, Y-B-N fault immediately (3 Phase).

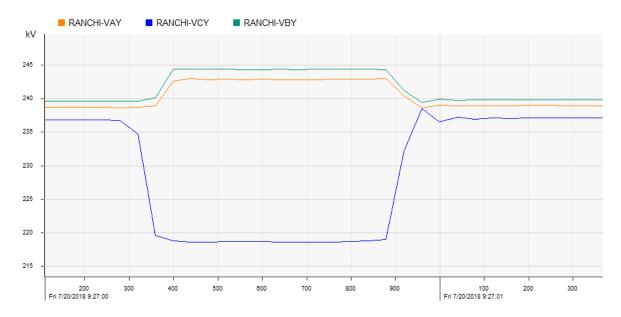


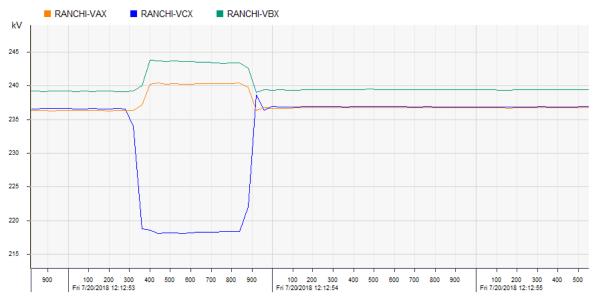
Figure 3: 400 kV Bus voltage at Ranchi at 09:27:00 hrs

C. At 09:41:28:831 Hrs: Due to clearance issue with some 11 KV feeder (which has an in feed from Hatia old) B-N fault took place in 220 kV Ranchi Hatia-I and at the same time Y phase current also increases. 220 KV Ranchi-Hatia- tripped from Hatia end(1phase) immediately in Z-1 and from Ranchi end (3 phase)after 350 ms in Z-2. At the same time Z-4 picked up for 220KV Hatia-Patratu-2 ,at the same time its R phase current reduced drastically with no change in voltage and again restored to pre fault value after 350 ms(??) Then after 800 ms A/R took place from Hatia end and again B-N fault took place and Z-1 picked up but tripped after 400ms. Again Z-4 of 220KV Hatia-Patratu-2 picked up and line tripped from Hatia end. Also from DR it is seen voltage is also becoming zero implying tripping from Patratu end too. But no details received from Patratu end.



Figure 4: 400 kV Bus voltage at Ranchi at 09:41:28:00 hrs

- **D.** At 10:05:13:565 Hrs: 220 KV Hatia-Patratu-1 tripped on over voltage stage-1 and voltage was 254 KV as per DR and there was huge Harmonic content in the line current and Voltage.
- E. At 12:12:53:342 Hrs: Again due to clearance issue with 11 KV feeder Y-B-N fault took place. Though in PMU only B-phase voltage dip observed but from DR it is clear Y phase current also increased. Ranchi end sensed only B-N fault in Z-2 and tripped (3 phase) after 350ms but Hatia end tripped in Z-1, Y-B-N fault immediately (3 phase).



10) Restoration:

ELEMENT NAME	Tripping Time	Restoration Time
	08:44	09:38
220 KV Ranchi-Hatia-I	09:41	17:27
220 KV Ranchi-Hatia-II	09:27	10:24
	12:11	16:52
220 KV Hatia-Patratu-I	10:05	17:34
220 KV Hatia-Patratu-II	08:44	09:00
	09:41	10:07

Other 132 KV line from both Patratu and Hatia opened and closed in between to manage the situation and for doing rectification work.

11) Non Compliance Observed during the event:

Issues	Regulation Non-Compliance	Utility
DR/EL not provided within 24 Hours	1. IEGC 5.2 (r) 2. CEA grid Standard 15.3	JSEB,ER-I
Non-Submission of Details for the tripping which is required for appropriate analysis for GD/GI	 IEGC 5.2 (r), 5.9.6.c (VI) CEA grid Standard 15.3 CEA (Technical standards for connectivity to the Grid) Regulation, 2007-6. 4.d 	JSEB
Incorrect/ mis-operation / unwanted operation of Protection system	 CEA Technical Standard for Construction of Electrical Plants and Electric Lines: 43.4 .A. CEA (Technical standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1. (6.1, 6.2, 6.3) 	ER-I
Fault clearance in more than 100 ms at 400 kV level and above and 160 ms at 220 kV levels		JSEB,ER-1

12) Remedial Measures taken:

Yet to be received from JUSNL

13) Remarks:

JUSNL may share amount of energy unserved and duration of the disturbance and the detail disturbance report.

14) Issues:

- A) **Operational:** While putting PLCC off, zone-2 timing should be made zero and A/R reclose should be put in non-auto mode for quick fault clearing. But in this case the same was not followed which lead to unwanted tripping along with delayed fault clearing.
- B) Protection co-ordination:
 - 1) Tripping of ATR for on line fault is not desirable and clearly indicates lack of proper protection co-ordination. JSEB may immediately look into it for ensuring reliable power supply to the consumers.
 - **2)** During A/R of 220 KV Hatia-Ranchi-I though it is showing zone-1 still why it is taking 400ms to trip need to be checked. Also to accelerate tripping during A/R Tor function of relay may be used.
 - 3) Zone-4 timing co-ordination for220 KV Hatia-Patratu-2 line need be checked.
 - **4)** In 220 KV Hatia-Patratu-1 line there was huge harmonics coming and over voltage taking place when it was almost at no load. Whether it is primary side phenomena or not need to be checked carefully for that system study need to be carried out.
 - **5)** At 09:41 hrs during fault, i.e unbalance system configuration ,why 220 KV Hatia-Patratu-2 R phase current becoming almost zero for 350 ms need to be deeply studied and whether

there is any chance of load encroachment during such condition ,when load would be very high, need to be reviewed .

15) Status of Reporting:

DRs at Hatia end are uploaded in PDMS. ER1 DR received via mail. Patratu end DR not submitted.

Annexure-B8

				LISU	or most apping m	the month of July 2018 whi	on may be alsouss						
LINE NAME	TRIP DATE	trip Time	RESTORATI ON DATE	RESTORA TION TIME	Relay Indication LOCAL END	Relay Indication REMOTE END	Reason	Fault Clearance time in msec	Auto Recloser status	DR/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	Remarks	PCC Comments
					Mult	iple tripping at the sa	ime time						
					B_N, F.D. 59.7 KM, F.C. 3								Bus Bar protection operated
400KV MAITHON-MEJIA-II	07-07-2018	12:54	07-07-2018	15:40	kA		B-N Fault	<100 msec	No A/R operation				in Mejia & DT Sent to Maithon
100KV MAITHON-MEJIA-III	07-07-2018	12:54			B_N, F.D. 74.6 KM, F.C. 4.2 kA		B-N Fault	<100 msec	No A/R operation				Bus Bar protection operated in Mejia & DT Sent to Maithon
220KV PANDIABILI-SAMANGARA-II	15-07-2018	9:05	15-07-2018	9:41		B-N FAULT, TRIPPED FROM SAMANGARA END ONLY	B-N Fault	<100 msec	No A/R operation				Tree Touching issue, Tree cutting done
220KV PANDIABILI-SAMANGARA-I	15-07-2018	9:05	15-07-2018	9:48	B-N FAULT, TRIPPED FROM PANDIABILLI END		B-N Fault	<100 msec	No A/R operation				Tree Touching issue, Tree cutting done
				Mi	scellaneous: 1	ripping on DT, No Fa	ult observed ir	n PMU		4		L	
					DT RECEIPT AT TALCHER								
400KV TSTPP-RENGALI-I	04-07-2018	16:17	04-07-2018	18:42	END. Again tripped at 16:42 hrs due to DT receipt at Tstpp end	No tripping at Rengali end	DT RECEIPT AT TALCHER				Yes	No Fault observed in PMU	Problem solved
400KV GMR-ANGUL-I	06-07-2018	0:56	06-07-2018	2:19	Tripped from only gmr end		Tripped from only gmr end					No Fault observed in PMU	Ingress of moisture in relay contact
400KV MUZAFFARPUR-GORAKHPUR-I	18-07-2018	15:23	18-07-2018	17:03	DT received		DT received at MZF					No Fault observed in PMU	Problem solved
400KV RANCHI-SIPAT-II	26-07-2018	8:03	26-07-2018	8:37	TRIPPED FROM RANCHI END ONLY		TRIPPED FROM RANCHI END ONLY					No Fault observed in PMU	Problem solved
400KV RANCHI-SIPAT-II	26-07-2018	13:17	26-07-2018	16:10	FAULT IN CABLES AT RANCHI		FAULT IN CABLES AT RANCHI					No Fault observed in PMU	Problem solved
400KV BAHARAMPUR-SAGARDIGHI-II	29-07-2018	7:47	29-07-2018	8:15		Tripped at Sagardighi end only	Tripped at Sagardighi end only				Yes	No Fault observed in PMU	During commisioning DT sent
400KV BAHARAMPUR-SAGARDIGHI-I	30-07-2018	12:47	30-07-2018	13:04	DT Received	Not tripped	DT Received at Baharampur					No Fault observed in PMU	During commisioning DT sent
				1	ŀ	Autoreclose related is	sues	1		1		1	
220KV RANCHI-HATIA-II	03-07-2018	16:53	03-07-2018	17:46	B-N,FD 14.7 KM,FC=5.83 KA, A/R successful	B-N,FD 10.80 KM,FC IB 1.8 KA	B-N Fault	<100 msec	No A/R operation				JUSNL to reply
220KV GAYA-SONENAGAR-I	03-07-2018	17:58	03-07-2018	19:32	R-N,22.3 KM,5.35 KA	Z1 58.49 KM,IR=1.24 KA	R-N Fault	<100 msec	No A/R operation				BCU error
220KV BINAGURI-BIRPARA-II	03-07-2018	21:46	03-07-2018	22:58	Y-N, 63.33 KM, FC 2.303 KA	Y-N, FC 2.193 KA, DIST 49.49 KM, A/R successful	Y-N Fault	<100 msec	No A/R operation	Yes	Yes		Auxillary relay contact burned, problem solved
400KV RANGPO-DIKCHU-I	04-07-2018	21:04	04-07-2018	21:34	BN, 25.54 KM, 8.35 KA, A/R SUCCESSFUL	BN, 23.82 KM, 3.134 KA, ONLY TIE CB TRIPPED	B-N Fault	<100 msec	No A/R operation		Yes	LINE SYNCHRONISED FROM DIKCHU END AT 21:34 WITHOUT INFORMING ERLDC	Dikchu to reply
220KV WARIA-BIDHANNAGAR-II	05-07-2018	3:52	05-07-2018	5:01		RN,Z-2,5.4 KA,19.85 KM	R-N Fault	300 msec	No A/R operation				Problem will be solved during next S/D
400KV RANGPO-DIKCHU-I	05-07-2018	14:46	05-07-2018	15:15	B-N, 22.1KM, 7.7KA		B-N Fault	<100 msec	No A/R operation		Yes		Dikchu to reply
220KV STPS(WBSEB)-CHANDIL-SC	06-07-2018	11:37	06-07-2018	19:26	B-N,36 KM,Z1,3.46 KA	Z1,A/R LOCKOUT IN CHANDIL,112 KM REATTEMPTED AT 12;15 A/R LOCKOUT,Z1 B-N,79.81 KM,1.89 KA	B-N Fault	800 msec	No A/R operation			Fault clearance time very high	Audit will be done at Chandil
220KV STPS(WBSEB)-CHANDIL-SC	11-07-2018	3:40	11-07-2018	3:59	Y-N FAULT		Y-N Fault		No A/R operation				Audit will be done at Chandil
400KV ALIPURDUAR-BONGAIGAON-II	11-07-2018	14:04	11-07-2018	15:13	Y-N F/D 19.8 KM F/C 6.238 KA		Y-N Fault		No A/R operation				A/R successful at Alipurduar end
400KV JEERAT-BAHARAMPUR-SC	17-07-2018	15:27	17-07-2018	16:20		B-N fault , A/R successful	B-N Fault	<100 msec	No A/R operation				Relay problem, replaced
400KV MALBASE-BINAGURI-I	20-07-2018	17:54	20-07-2018	18:57	R-N,92.43 KM,3.876 KA		R-N Fault	<100 msec	No A/R operation				ABB relay problem, Malbase will solve the issue
400KV MEERAMUNDALI-STERLITE-I	21-07-2018	16:34	22-07-2018	12:09	Y-N,140.6km, 3.06KA		Y-N Fault	<100 msec	No A/R operation				Blocked because multiple signal is going to Sterlite
220KV KATAPALLI-BOLANGIR(PG)-SC	23-07-2018	11:53	23-07-2018	12:53		B_N, 4.38 kA, 9 KM	B-N fault	<100 msec	No A/R operation				Fault clearance time issue solved, A/R issue is still persisting

List of line tripping in the month of July 2018 which may be discussed in PCC



ISLANDING SCHEME DESCRIPTION

- 1. Islanding schemes are implemented by generating stations & transmission system to isolate the healthy subsystems following a large-scale disturbance. This is a system requirement under contingency conditions according to which the power network may be split into healthy and selfsustaining zones so that cascade tripping of all generating stations in the entire region is avoided.
- 2. With a view to protect the generation of IB TPS during sudden and major disturbance in power system network, one special islanding scheme with part loads of Budhipadar GSS of OPTCL has been proposed.
- 3. Two numbers 210 MW generators of IB TPS connect to 220/132/33kV Grid substation through four numbers dedicated 220kV lines.
- 4. The islanding scheme envisages segregation of a group of matching 132kV load in closed loop with the IB generators.

ISLANDING SCHEME DESCRIPTION

- 5. 132kV feeders will be arranged radially in order to form islanding scheme with IB generation.
- 6. 220kV Budhipadar GSS has system has two main bus and a transfer bus system. The generation & matching loads put into two buses with bus coupler in operation.
- 7. The two numbers 220kV feeders from IB TPS put into Bus –II and the other two are kept in the other bus as normal arrangement.
- 8. 220 kV interstate line to Korba-2 & 3 and Raigarh will be in normal condition distributed to both the buses.
- 9. The islanding relay Micom P341 is installed at Bus coupler panel of the 220kV system.

ISLANDING SCHEME DESCRIPTION

10. In the event of system disturbance and actuation of islanding relay:

- a. Relay will give command to trip all 220KV feeders connected to Bus-I and Bus II along with Bus coupler except selected islanding IB ckts. either (IB -1 & 3)/ (IB-2 & 4) and Auto transformer- I & II.
- b. It will also trip non- selected islanding IB ckts. incomer breaker either (IB -1 & 3)/ (IB-2 & 4).
- c. It will send carrier command to Tarkera end and to trip 132kV Tarkera –Rajgangpur feeder I & II and 132kV Tarkera- Kalunga feeder so as to feed Rajgangpur , Kuchinda and Kalunga Grid Load will be in radial arrangement.
- d. It will send carrier signal to Lapanga end to trip 132kV Lapanga Jharsuguda feeder at Lapanga in order to feed Jharsuguda load radially.
- e. It will send carrier signal to IB thermal to start ramping and adjust IB generation to match the load.

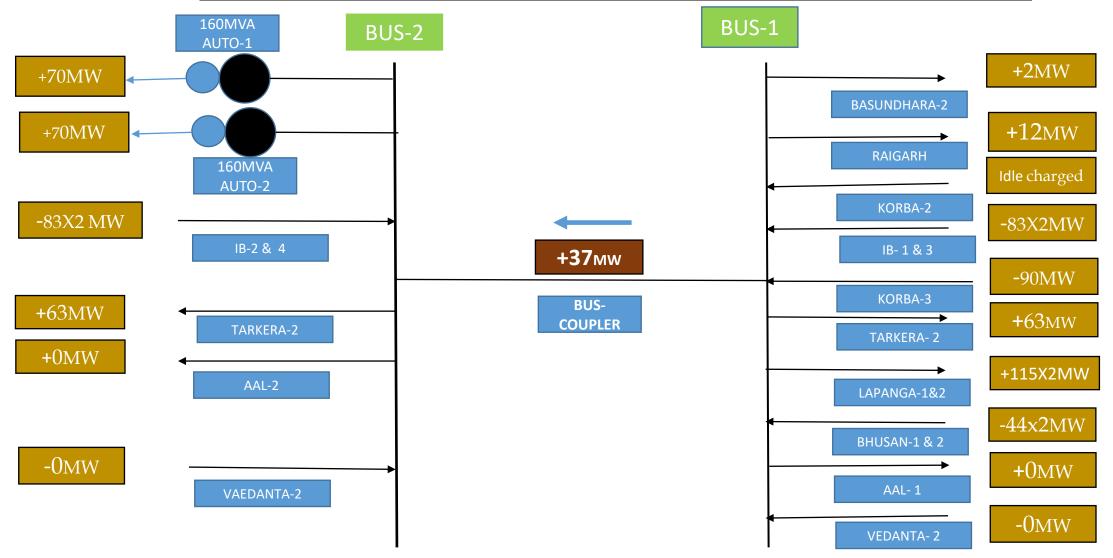
ISLANDING SCHEME DESCRIPTION

11. The CGP feeders such as Vedanta , Bhusan and Aditya Aluminium have their own islanding schemes to cater their industry load.

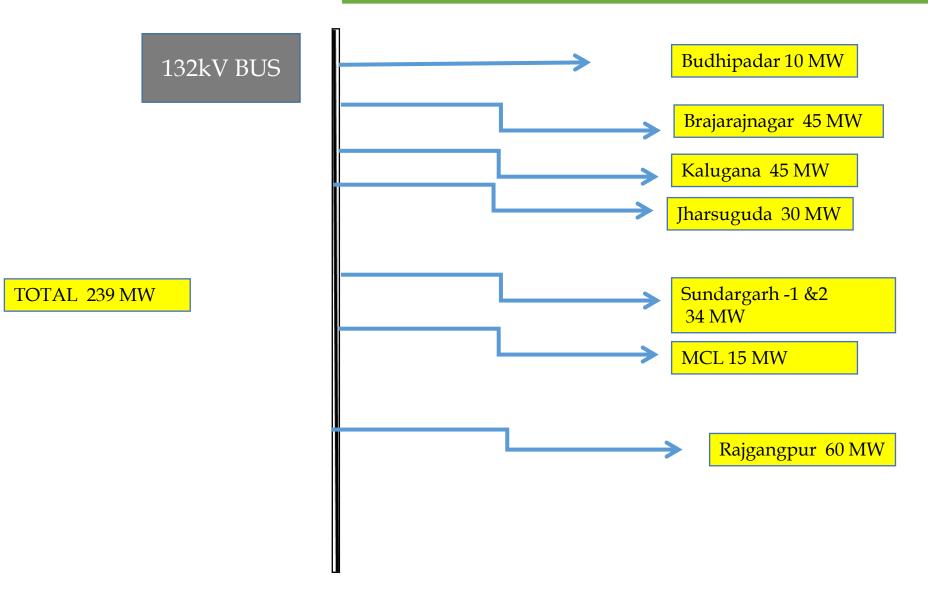
12. The general arrangement of 220kV feeder configuration, 132kV loads for islanding has shown in following slides.

POWER FLOW DETAILS OF 220KV SYSTEM

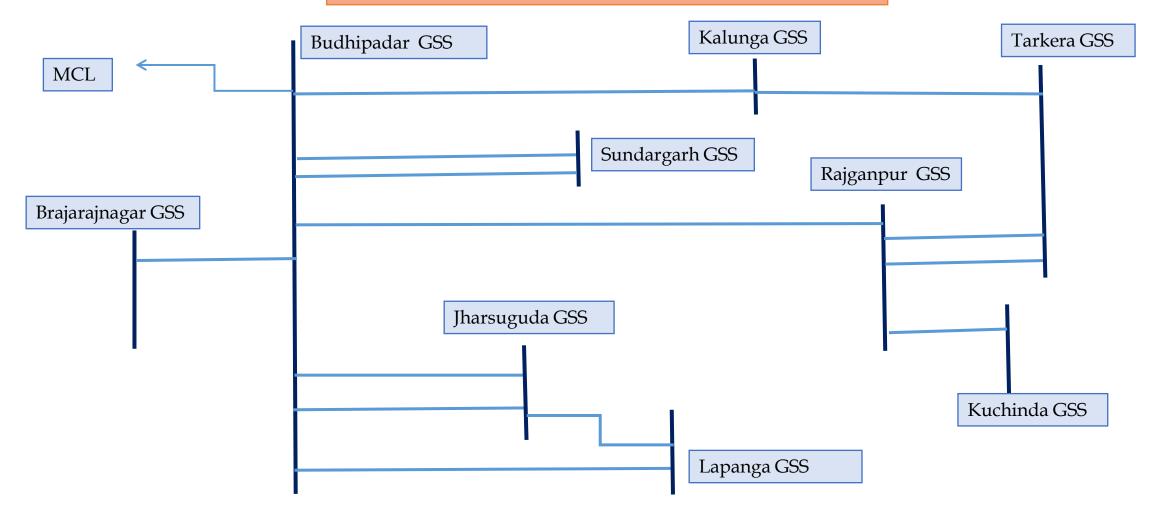
LOAD PATTERN OF DIFFERENT FEEDERS 12.07.2018 AT 12.00 HRS.

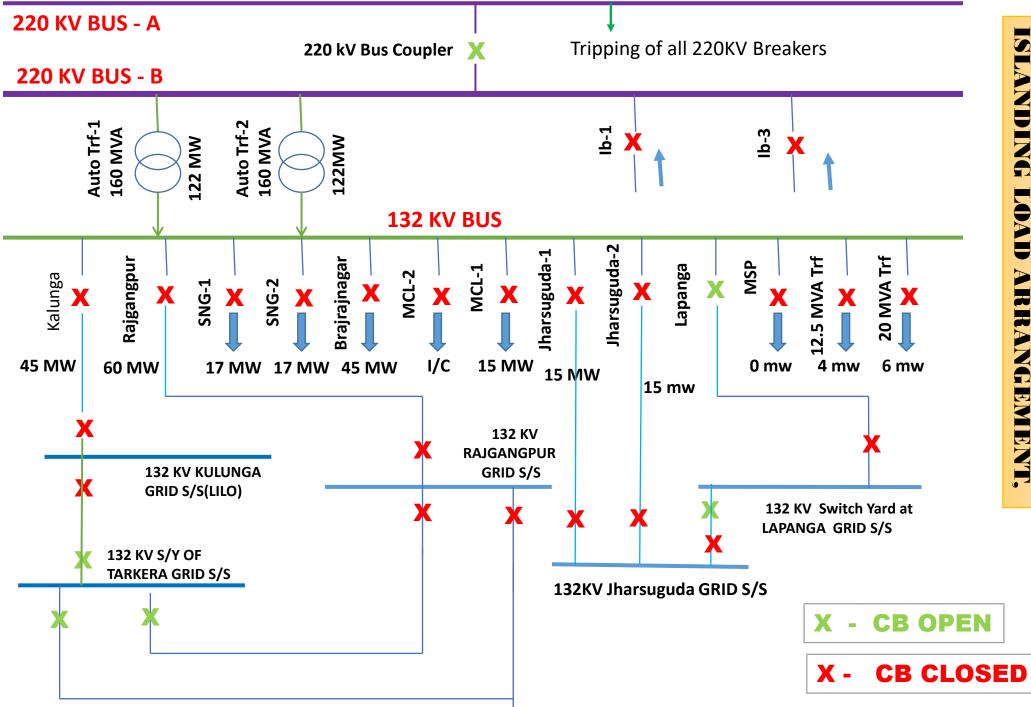


132kV RADIAL LOAD ARRANGEMENT FOR ISLAND SCHEME



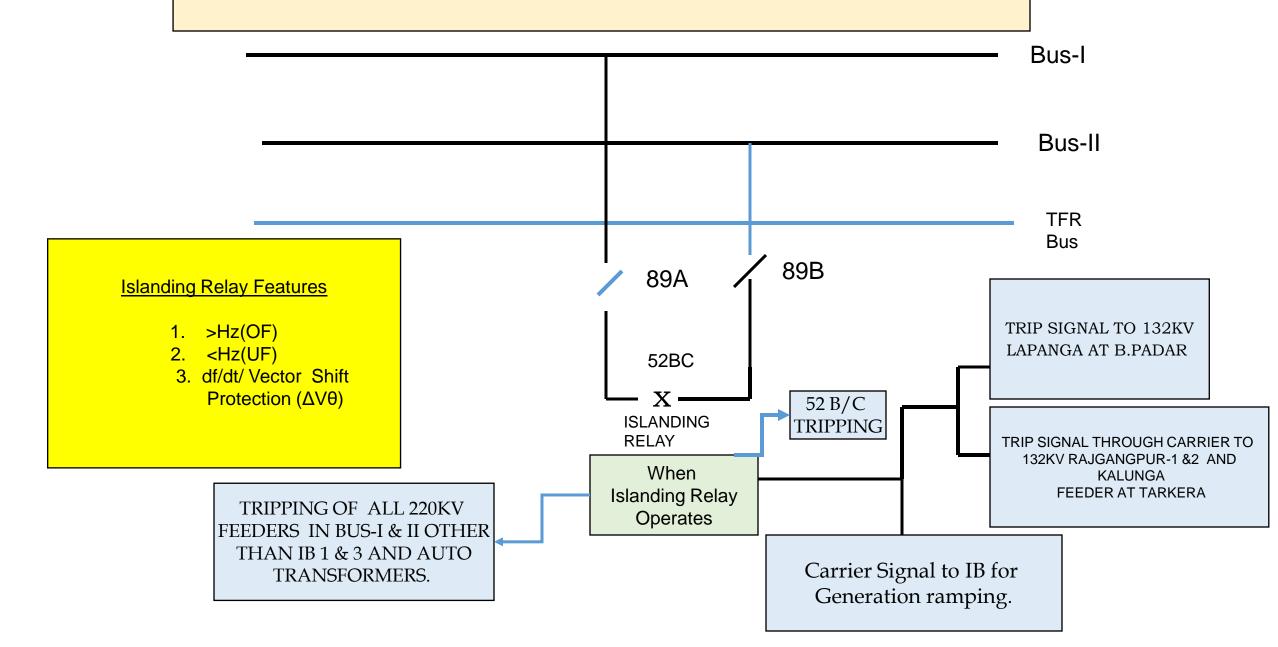
132KV Connectivity of Budhipadar GSS



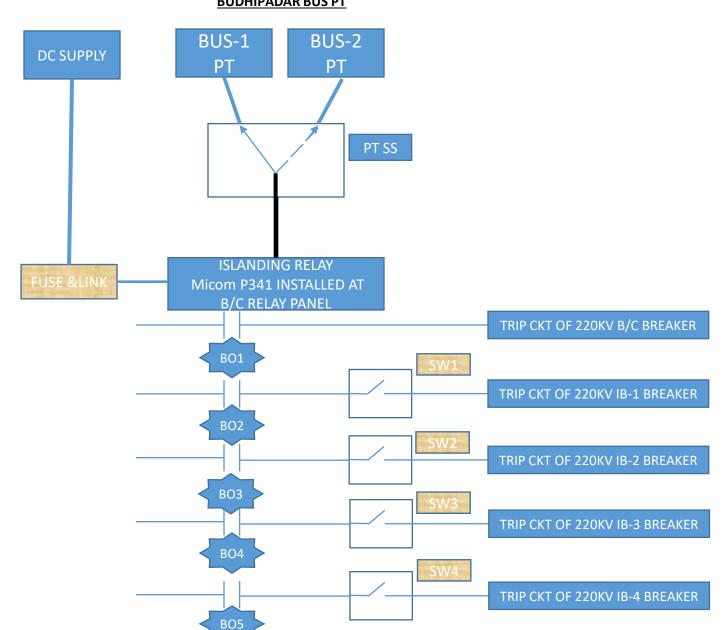


ISLANDING LOAD ARRANGENENT,

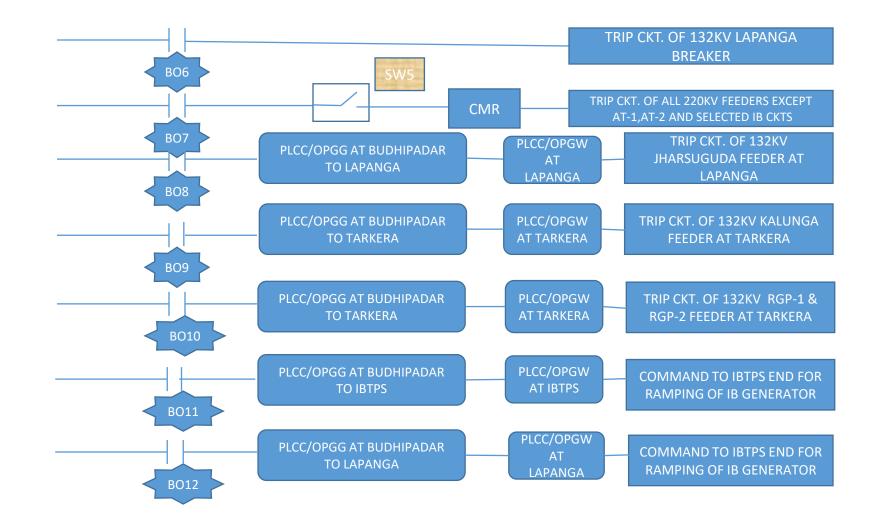
SCHEMATIC DRAWING OF ISLANDING RELAY INSTALLED IN B/C PANEL FOR TRIPPING OF DIFFERENT FEEDERS AT BUDHIPADAR GRID S/S.



CONNECTION DIAGRAM OF ISLANDING RELAY (Micom P341) AT BUDHIPADAR SUB-STATION



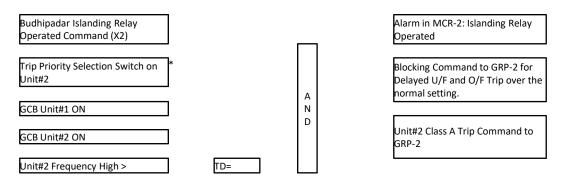
BUDHIPADAR BUS PT



LEGEND PTSS---- PT SELECTOR SWITCH SW1-----SW5- ON/OFF SWITCH CMR- CONTACT MULTIPLICATION RELAY

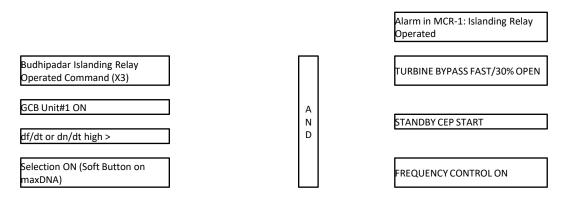
	+220VDC							
	-		Re	eset P	ush Bu	itton		
		/	Islandir	ng Cha	annel-:	1 Comman	d from Budhi	ipadar
	,							
Hold ON Contact of X Relay		/	Islandir	ng Ch	annol_'	2 Comman	d from Budhi	inadar
		/	Islanun		anner			Ipadai
					Islan	ding		
	X			Mul	tiplicat	tion Relay		
	-220VDC							
	220780							
X1			Budhip	adar I	slandiı	ng Relay O	perated Com	mand to Unit#1 GRP
X2			Dudhin	adarl	clandi		norated Com	mand to Unit#2 CDD
λ2			вийтр	audi I	sianuli	ing rieldy U	perated Com	mand to Unit#2 GRP
X3			Budhip	adar I	slandi	ng Relay O	perated Com	mand to Unit#1
X4			Budhip	adar l	slandii	ng Kelay O	perated Com	mand to Unit#2
ISLANDING MULT	ΡΠΟΑΤΙΟ)N RFI		IFIG) IN IRTP		

Unit#1 Frequency High >	>	TD=	\longrightarrow			
GCB Unit#1 ON				А		Unit#1 Class A Trip Command to GRP-1
GCB Unit#2 ON			>	Ν		
				D		Blocking Command to GRP-1 for
Trip Priority Selection Switch on	*					Delayed U/F and O/F Trip over
Unit#1			>			the normal setting.
			\rightarrow			
Budhipadar Islanding Relay						Alarm in MCR-1: Islanding Relay
Operated Command (X1)						Operated
Hardware single selection switch	(3 positio	n: I, OFF, I	l) for botl	า un	its installed c	on one GRP.
		, ,	,			
PRIORITY TRIP	PING SCI	HEME C	ONFIGL	JRE	D IN GRP-	1 NUMERIC RELAY

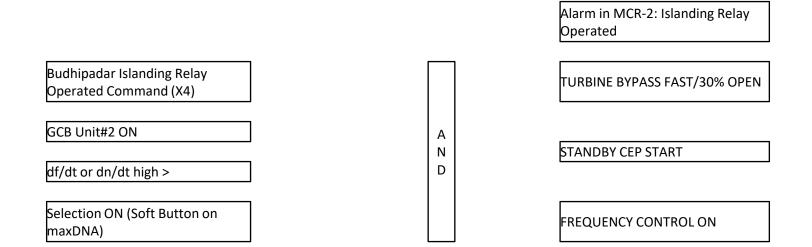


*Hardware single selection switch (3 position: I, OFF, II) for both units installed on one GRP.

PRIORITY TRIPPING SCHEME CONFIGURED IN GRP-2 NUMERIC RELAY



LOAD-GENERATION BALANCE SCHEME CONFIGURED IN UNIT#1 MAXDNA CONTROL SYSTEM



LOAD-GENERATION BALANCE SCHEME CONFIGURED IN UNIT#2 MAXDNA CONTROL SYSTEM

Over voltage protection

An over voltage condition could arise when a generator is running but not connected to a power system, or where a generator is providing power to an islanded power system. Such an over voltage could arise in the event of a fault with automatic voltage regulating equipment or if the voltage regulator is set for manual control and an operator error is made. Over voltage protection should be set to prevent possible damage to generator insulation, prolonged over-fluxing of the generating plant, or damage to power system loads.

Under frequency protection

Under frequency operation of a generator will occur when the power system load exceeds the prime mover capability of an islanded generator or group of generators. Power system overloading can arise when a power system becomes split, with load left connected to a set of 'islanded' generators that is in excess of their capacity. Automatic load shedding could compensate for such events. In this case, under frequency operation would be a transient condition. This characteristic makes under frequency protection a simple form of "Loss of Mains" protection on system where it is expected that the islanded load attached to the machine when the grid connection fails exceeds the generator capacity.

Over frequency protection function

Over frequency running of a generator arises when the mechanical power input to the alternator is in excess of the electrical load and mechanical losses. The most common occurrence of over frequency is after substantial loss of load. When a rise in running speed occurs, the governor should quickly respond to reduce the mechanical input power, so that normal running speed is quickly regained.

Rate of Change of Frequency Protection (81R)

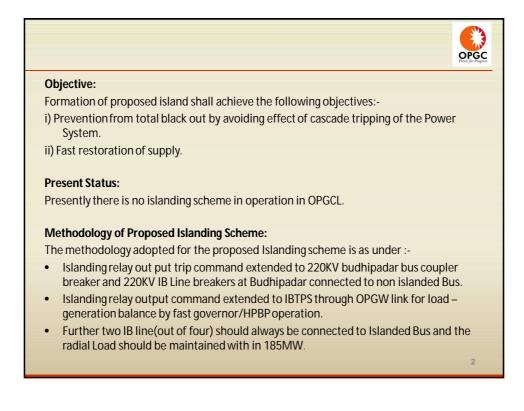
The two main applications for df/dt protection are network decoupling (loss of mains/loss of grid) and load shedding. During severe disturbances, the frequency of the system oscillates as various generators try to synchronize on to a common frequency. The frequency decay needs to be monitored over a longer period of time and time delayed df/dt can be used to make the correct decision for load shedding or provide early warning to the operator on a developing frequency problem.

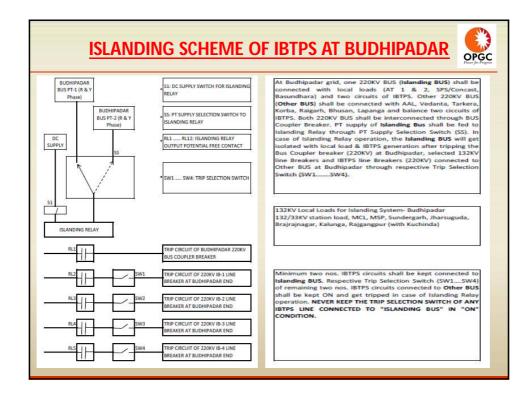
Voltage Vector Shift Protection ($\Delta V \theta$)

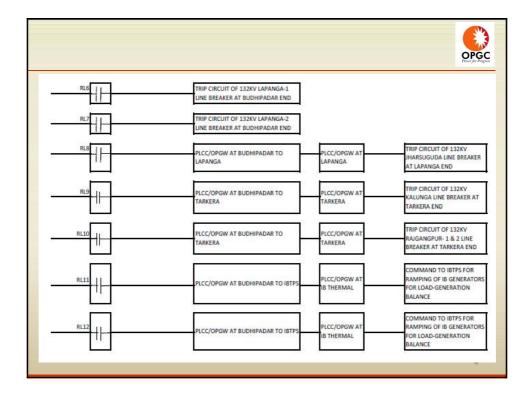
The Voltage Vector Shift protection element measures the change in voltage angle over successive power system half-cycles. The element operates by measuring the time between zero crossings on the voltage waveforms. A measurement is taken every half cycle for each phase voltage. Over a power system cycle this produces 6 results, a trip is issued if 5 of the 6 calculations for the last power system cycle are above the set threshold. Checking all three phases makes the element less susceptible to incorrect operation due to harmonic distortion or interference in the measured voltage waveform.

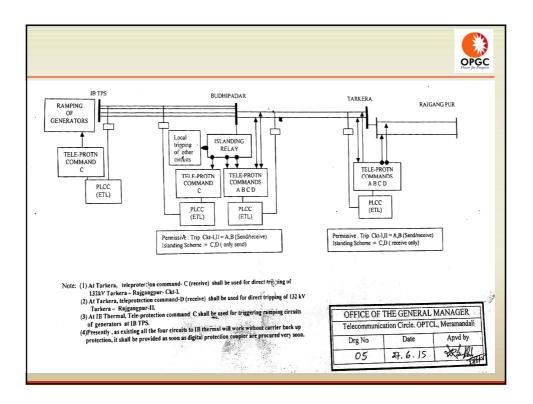
The fast operation of this vector shift function renders it to operate at the instant of a disturbance rather than during a gradual change caused by a gradual change of power flow. Operation can occur at the instant of inception of the fault, at fault clearance or following non-synchronized reclosure, which affords additional protection to the embedded generator.

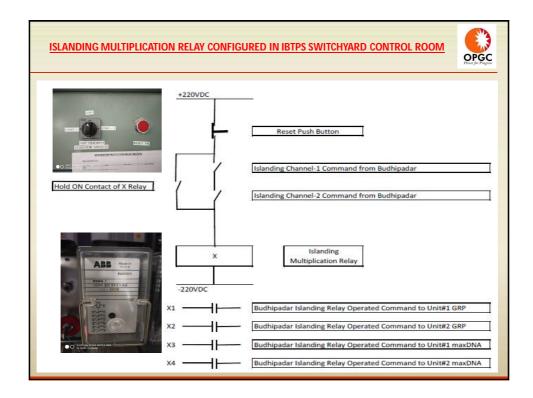


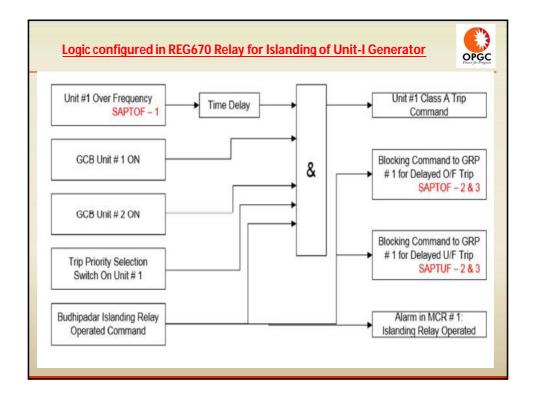


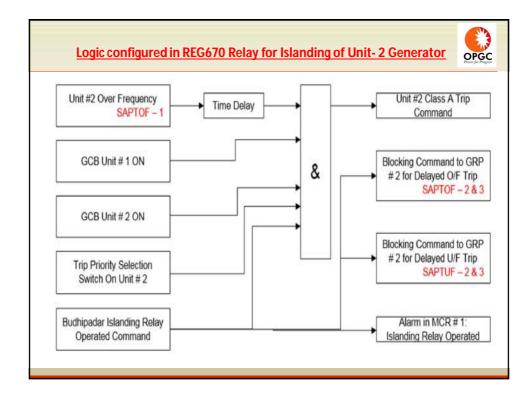


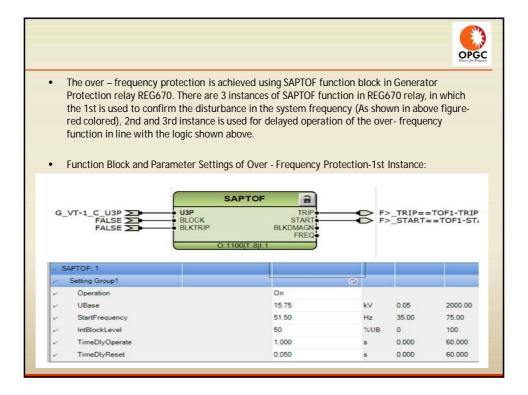


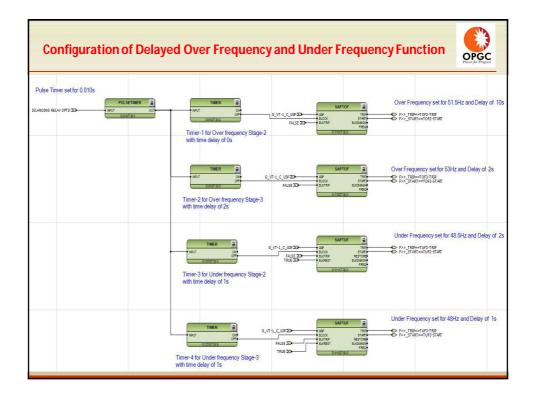


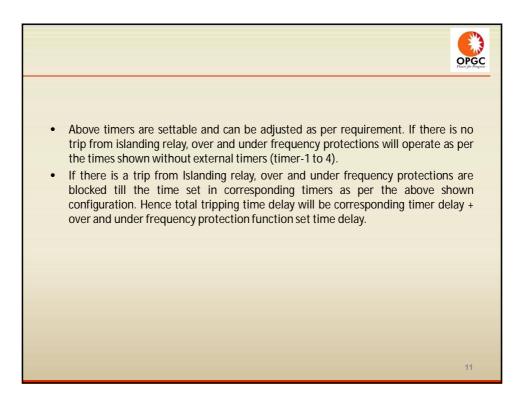


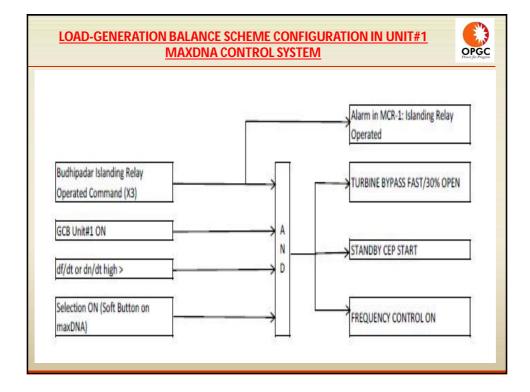


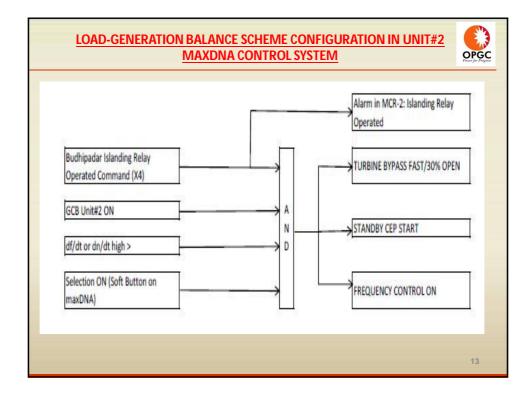












	OPG
Islanding Operation	After islanding operation, IBTPS Generators shall cater to the demand of connected islanded load and maintain the frequency. In case of further extension of power to other loads if required, it may be done with close coordination of SLDC, IBTPS & Budhipadar S/S so that the islanded system shall not collapse and able to maintain at the desired frequency.
Normalisation / Resynchronisation	After system stabilization, islanded system may be synchronised with main grid at IBTPS end. Ensure that unloaded 220KV IB-Budhipadar lines are disconnected from both (IBTPS & Budhipadar) sides. Charge one of same lines from Budhipadar 220KV Other BUS connected to main system. The same line may be synchronized at IBTPS end after acheiving synchronisation permissive then connecting both systems. After this Budhipadar 220KV Bus Coupler breaker can be closed for normilazation. Alternatively both systems may be synnchronized through 220KV Budhipadar Bus Coupler breaker after acheiving required synnchronisation permissive.

Protection Audit Report of 220/132/33 kV Lalmatia Substation Date: 16-08-18

Introduction: Due to the multiple tripping of circuits from 220/132/33 kV Lalmatia substation and associated protection issues, Eastern Region Protection Committee has decided in the 69th PCC meeting to carry out the Protection Audit of Lalmatia substation. Accordingly, a team comprising of ERPC, ERLDC, NTPC, PGCIL and JUSNL visited the 220/132/33 kV Lalmatia substation on 16th August 2018 and performed the protection audit. The Team Members of the Protection Audit Group comprises of following members:

- 1. ERPC: Pranay P Jena, AEE
- 2. ERLDC: Chandan Kumar, Sr. Engineer and Laldhari Kumar, Engineer
- 3. NTPC: Rohit Agarwal, Manager, NTPC Farakka
- 4. PGCIL: Randhir Kumar Ranu, Engineer, Banka Substation
- 5. JUSNL: Vinod Gupta (JE), V. K. Bhoi (EEE)

Substation: Lalmatia substation is having a historical background. The substation was created in around 1989 for catering to the ECL coalmine load. It is 220/132/33 kV substation owned by ECL which was later being maintained by NTPC Farakka. However, subsequently, with the other distribution load coming up, the switchyard was extended by JUSNL with augmentation of 220/132 kV ICT, 132 kV lines and 132/33 kV transformers.

The substation is thus subdivided into two parts out of which one looked after by NTPC Farakka and other by JUSNL. NTPC Farakka is looking after the 220/132 kV switchyard consisting of 220 kV Farakka-Lalmatia ckt and 220/132 kV ICT. While the JUSNL looks after the 220/132 kV ICT 2 (Kanohar Make), 132 kV Kahalgaon(NTPC)-Lalmatia, 132 kV Kahalgaon (BSPTCL)-Lalmatia, 132 kV Kahalgaon (BSPTCL)-Sahebganj, 132 kV Lalmatia-Dumka 1 & 2, 2 X 50 MVA 132/33 kV ICTs and 33 kV switchyard with 6 33 kV feeders (Godda, Mahagama, Patahargaon, Meharama, Barijor and ECL) for JUSNL load. The 132 kV buses maintained by NTPC and JUSNL are coupled and having isolator arrangement decoupling.

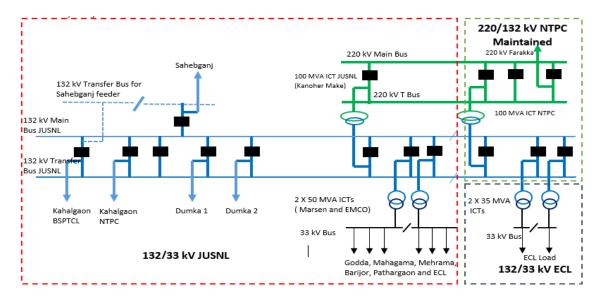


Fig: 220/132/33 kV Lalmatia Substation Single Line Diagram

The Protection Audit findings are thus subdivided into two parts i.e. One for 220/132 kV NTPC Maintained section and other 132/33 kV JUSNL owned section for this substation.

132/33 kV Lalmatia (JUSNL) Section

- 1. Switchyard and its Maintenance: The whole switchyard was in bad shape. As per the details, the JUSNL part switchyard was commissioned in 1991 (27 years old). Following were observed when switchyard inspection during protection audit was carried out:
 - Old Equipment: The switchyard equipment's (Isolator/CT/PT/LA/Breaker) are old and rusty and need immediate attention. Adequate spare management is also required for any emergency. The bays which has been commissioned in 2011 onwards were also found in bad shape due to lack of proper maintenance.
 - **PCC and Gravelling:** Long grasses and weeds were observed throughout the switchyard. Proper graveling was not observed in entire switchyard which may be hazardous to human safety, equipment health and can cause unwanted tripping. There is a need for proper PCC and Gravelling in switchyard along.
 - 132/33 kV Transformers: Severe oil leakage in one of the 132/33 kV ICT was observed and its oil has also penetrated the panel box of OTI/WTI and can result in unwanted tripping. The ICT panel box also needs proper care as gasket was found to be missing and rainwater can ingress which may also result in unwanted tripping. Silica Gel in 132/33 kV ICTs was found pink and needs to be replaced or recovered by heating. 2 no's of the cooling fan in one of the 50 MVA ICT was not working due to non-replacement of the faulty connector.
 - **Bay Equipment Nomenclature:** Proper Bay equipment numbering and phase segregation for identification of equipment have not been done which may result in the wrong operation of equipment and can cause hazard to O & M Personnel.
 - Earthing of LA: Proper earthing was not provided to Las in the switchyard.
 - **O&M Activities:** There was no proper O&M for equipment at the substation. This is the major concern that was observed at the substation. No Records were available for the O&M at the substation level. Even the JUSNL Testing team were not able to tell regarding the O&M plan of the substation and its monitoring.
- 2. Equipment O & M and Testing: During the audit, records were asked for equipment(CT/PT/Breakers) testing and it was observed that:
 - Equipment and relay have been tested only at the time of Commissioning and after that, no routine test and maintenance has been done. Proper record of the pre-commissioning tests were also not available.
 - It was also observed that there was a lack of Testing equipment for Routine testing at the substation level.
 - Details of past equipment failure were also not available at the substation.
- 3. Relay and Associated issues:

- 132 kV Transmission Line Protection: It was found that only one numerical relay has been provided whose Distance and O/C and E/F feature has been utilized to provide the Main as well as backup protection. Only in 132 kV Sahebganj Circuit, separate electromechanical type backup O/C and E/F protection have been provided.
 - A. 132 kV Kahalgaon NTPC(40.3 km)
 - B. 132 kV Kahalgaon BSPTCL (46.66 km)
 - **C.** 132 kV Sahebganj (48.45 km)
 - **D.** 132 kV Dumka 1 (95.88 km)
 - **E.** 132 kV Dumka 2 (96 km)

The impedance setting for various zones along with time setting was found to be not in order in the line relays. Further, Power swing blocking philosophy was not found uniform.

- 100 MVA 220/132 kV Transformer (Kanoher Make): Differential protection is Numerical relay while Backup protection is of Electromagnetic type. The REF protection for ICT is of static type and it is a combined REF for HV/LV rather than separate for 220 and 132 kV. Rest of the protection like OTI/WTI/OSR/ Buchholz were found for the ICTs. The over flux protection is not enabled in Numerical relay due to non-extension of CVT wiring from 220 kV adjacent relay panel room of NTPC to 132 kV relay panel room of JUSNL.
- 2 X 50 MVA 132/33 kV Transformers (EMCO and Marsen make): Differential protections are Numerical relay while Backup protections are of Electromagnetic type. Rest of the protection like OTI/WTI/OSR/ Buchholz were found for the ICTs. The Overflux and REF protection is enabled for one transformer (Mersan) in its differential relay while the same is not done for EMCO make transformer where neutral bushing CT is not present.
- LBB and Bus Bar Protection: 132 kV LBB and Bus Bar Protection of static type has been provided in the substation but it has not operated till now as per the substation staff. The testing and checking has also not been done for both these protections. That's why its operational status is also of concern. The bus bar protection extension is possible or not was also not known to anyone.
- There was no proper record for testing and commissioning of relay along with any relay setting change done at the substation. The JUSNL team also could not provide the complete details for the substation.
- Two under frequency relays, one each for 132 KV Kahalgaon (BSPTCL) and 132 KV Kahalgaon (NTPC) feeder has been provided under the Islanding Scheme of Farakka. The relays have been set at 47.7 Hz without any time delay for tripping of these feeders to isolate 220/132 kV Lalmatia substation and its radial loads with 220 kV Farakka-Lalmatia feeder with Farakka's Unit. When enquired, the operators in the Control Room/ Testing team were not aware of this relay and in one of these, alarm was persisting.

4. AC Distribution Board:

• Overcurrent relay for ACDB protection and Alarm System were not operational.

• Changeover switch for one bus of the ACDB was found in broken condition. This is a serious concern in case of the failure of one of the AC supply as the operator will not be able to transfer the load on the alternate source by coupling of the ACDB buses.

5. DCDB and Battery Bank:

- 220 V Battery Bank: Make: EXIDE Wet Type, Commissioned in 2016.
- 48V Battery Bank: Make: EXIDE Wet type, Commissioned in 2016.
- Alarm System was not operational so any failure of DCDB will not be immediately known to the operator.
- Exhaust fan in Battery Room was not working and cable trench of Battery room was in damaged condition and not covered.
- 6. DC System Healthiness: No major DC earth fault was observed however DC Voltage measurement done during the audit are as follows:

Measurement	Battery	Nearest Feeder	Farthest Feeder
+ve to -ve	255 V	254 V	244 V
+ve to Earth	108 V	113 V	109 V
-ve to Earth	134 V	139 V	134 V

7. Display Panel:

- Voltage difference was observed in 132 kV feeders connected to the same bus in the control room panel box. There is a need for CVT testing and metering equipment calibration at the substation so that correct data can be displayed to the operator.
- For the 220/132 kV ICT, many of the digital display for current and voltage were found not working. One of the issue with voltage display was the non-availability of CVT extension from NTPC side to JUSNL side.
- 8. UFR Relay: As per the data available with ERPC, one UFR relay should have been on the 33 kV Mahagama feeder, however, the same was not found on Mahagama feeder (Max load 14 MW).
- **9. Transmission Line Issues:** It was observed that the transmission lines from the substation is maintained by various utilities. 132 kV Kahalgaon NTPC and 132 kV Kahalgaan BSPTCL lines are being maintained by JUSNL and BSPTCL. While 220 kV Farakka feeder is being maintained by NTPC.

It was intimated that maximum number of tripping has been observed in 132 kV Kahalgaon NTPC and 132 kV Kahalgaan BSPTCL which are on same towers. For these circuits, 1-48 Towers are maintained by BSPTCL while 49-123 towers are maintained by JUSNL. JUSNL intimated that most of the fault are observed in BSPTCL maintained section due to large trees and broken/poor condition for earth wire between 21-34 towers. JUSNL explained that they have recently carried out the complete line patrolling and cut the trees in BSPTCL section after which the number of faults has reduced.

10. Other Observation:

- 132/33 kV ICT II has been tripping on the differential for any 33 kV through fault on several occasion. This was also observed during the period of Audit. This also necessities the testing of relay and checking and review of its relay setting.
- It was found that whenever 220 kV Farakka -Lalmatia trips on fault, then 132 kV Kahalgaon (NTPC) Lalmatia feeder also trip from lalmatia end indicating that the line is tripping on through fault. This may be due to CT polarity, wrong zone protections setting, PSL logic etc. This also needs immediate action.
- This similar issue was also observed with 132 kV Kahalgaon BSPTCL-lalmatia feeder which trip for through fault on 132 kV Sahebganj, 132/33 kV ICTs. This indicates the need of checking of CT Polarity, relay setting, Zone 4 protections setting and time delay and relay testing.
- The JUSNL CRITIL team who were present during the audit were asked regarding the Disturbance recorder files for tripping however they have not extracted the same for any tripping in this year. This is a serious concern and violation of Grid code and Grid standards.
- **11. Manpower Training:** Based on the various inputs received , the audit team observed that substation staff, as well as CRITIL Team of Jharkhand, do not have proper training on O&M, Testing etc. This is one major concern and there is a need of immediate action at this front.

220/132/33 kV Lalmatia (NTPC)

- 1. Switchyard and its Maintenance: The whole switchyard was in bad shape. As per the details the NTPC Maintained section of switchyard was commissioned in 1989 (29 years old). Following were observed when switchyard inspection during protection audit was carried out:
 - Old Equipment: The switchyard equipment's (Isolator/CT/PT/LA/Breaker) are old and rusty and need immediate attention. Adequate spare management is also required for any emergency. These were found in bad shape due to lack of proper maintenance. Severe oil leakage was found in one of the CT in the substation.
 - **PCC and Gravelling:** Long grasses and weeds were observed throughout the switchyard. Proper graveling was not observed in entire switchyard which may be hazardous to human safety, equipment health and can cause unwanted tripping. There is a need for proper PCC and Gravelling in switchyard along.
 - 100 MVA 220/132 kV Transformer (Maintained by NTPC): Severe oil leakage was observed in the ICT. The ICT panel box also needs proper care as gasket was found to be missing and rainwater can ingress which may also result in unwanted tripping. Silica Gel in ICT was found pink and needs to be replaced or recovered by heating. 3 Fans of the ICT cooling system were not found in working condition.
 - **Bay Equipment Nomenclature:** Proper Bay equipment numbering and phase segregation for identification of equipment have not been done which may result in the wrong operation of equipment and can cause hazard to O & M Personnel.
 - Earthing of LA: Proper earthing was not provided to Las in the switchyard.

- **O&M Activities:** There was no proper O&M for equipment at the substation. This is the major concern that was observed at the substation. No Records were available for the O&M at the substation level. Even the NTPC Operating Staff were not able to tell regarding the O&M plan of the substation and its monitoring.
- 2. Equipment O & M and Testing: During the audit, records were asked for equipment(CT/PT/Breakers) testing and it was observed that:
 - Breaker Overhauling of 220 kV breakers was done last in 2009 and for 132 kV breakers in 2010. After that, no testing and overhauling has been done.
 - All 220 and 132 kV CTs have been tested in 2014 and after that, there has not been any routine test and maintenance.
 - It was also observed that there was a lack of Testing equipment for Routine testing at the substation level.
 - Details of past equipment failure were also not available at the substation.

3. Relay and Associated issues:

- All the protection relay for lines and ICTs are of electro-mechanical in nature and are very old.
- Last relay testing and setting have been done in the year 1999 and after that, it has not been done. Records for relay setting calculation were available in the substation.
- LBB and Bus Bar Protection: 220 kV & 132 kV Differential as well as LBB is provided but has not operated till now. The Busbar protection Is combined scheme for both the switchyard, however, no details on its extension is known to the operator/testing person.
- 2 X 50 MVA 132/33 kV Transformers and 100 MVA 220/132 kV Transformer: There was no Differential relay, REF relay, over flux relay available for both 220/132 kV ICT and 2 X 50 MVA 132/33 kV ICTs.
- LBB and Bus Bar Protection: 132 kV LBB and Bus Bar Protection of static type has been provided in the substation but it has not operated till now as per the substation staff. The testing and checking has also not been done for both these protections. That's why its operational status is also of concern. The bus bar protection extension is possible or not was also not known to anyone.

4. AC Distribution Board:

• In Good Condition.

5. DCDB and Battery Bank:

- 220 V Battery Bank and 50 V Battery Bank: Commissioned in 2011
- Two sets of battery charger for 220 and 50 V are there out of which one set for each voltage level was found in faulty condition
- 6. DC System Healthiness: No major DC earth fault was observed however DC Voltage measurement done during the audit are as follows:

Measurement	Battery	Nearest Feeder	Farthest Feeder	220 kV bay
		132 kV bay	132v kv bay	
+ve to -ve	239.5 V	237.6 V	238.1 V	238.1 V

+ve to Earth	78.4 V	78 V	78.3 V	77.8 V
-ve to Earth	161.1 V	159.5 V	160.5V	160.3 V

- 7. Control Room: No AC were found in the control room and relay panel room which are adjoined.
- 8. Manpower Training: One person from NTPC has been stationed at Lalmatia along with outsourcing of remaining staff for substation maintenance. It was observed that no hourly record for voltage and various other parameters are being maintained at the substation by the operating control room staff.

Conclusion from Protection Audit:

- 1. The substation needs a complete renovation along with resolution of the ownership issue in order to improve the O & M. The impact due to the lack of O & M has been observed in the entire switchyard which is in shabby condition. The Human life working in the switchyard is also exposed to threat due to improper earthing, aging equipment, lack of graveling and PCC etc.
- 2. JUSNL who is presently owning the major portion of equipment has not done the maintenance leading to deterioration of newly constructed bays since 2006. Proper O & M practice need to be reinforced by JUSNL in its own portion to avoid unwanted tripping. **JUSNL may kindly take up the same at earliest.**
- 3. A complete check of equipment(CT/CVT/LA/Breakers) and their healthiness through testing need to be ensured for entire switchyard at earliest to avoid unwanted tripping. **JUSNL/NTPC may kindly take up the same at earliest.**
- 4. The old electromechanical relays in the substation need to be replaced with numerical relays and their coordinated setting also to be done subsequently. In the present relay, there is need setting review, wiring and logic check, CT polarity etc. to ensure there is no unwanted tripping as happening on daily basis. Further, the panels/relays which are not in use need to be removed to improve the space utilization. **JUSNL/NTPC may kindly take up the same at earliest.**
- Existing Manpower need to be properly trained for proper O & M activities, daily operational activity, Record Maintenance, Extracting of DR for Events and others. JUSNL/NTPC may kindly take up the same at earliest.
- 6. AC and DC distribution system also need Maintenance at the substation. **JUSNL/NTPC may kindly take** up the same at earliest.

It may kindly be noted that 220/132/33 kV Lalmatia substation is of vital importance for NTPC Farakka, NTPC Kahalgaon and JUSNL. This substation will help in ensuring the proper coal supply as well as act as a path for the black start during emergency between these two large generating stations. So, there is a need for immediate attention in order to improve the condition of this substation at earliest.

Some Pictures from the substation



Annexure-C7

SI	Name of the incidence	PCC Recommendation	Latest status
No.			
69 [™] P0	CC Meeting:		
1.	Disturbance at 400kV Bakreswar S/s on 19.06.2018 at 10:10 hrs.	The agenda item could not be discussed as WBPDCL representative was not present in the meeting.	
2.	Repeated Grid Disturbances at Madhepura S/s.	 PCC advised Powergrid and BSPTCL to take the following corrective actions: Distance relay Zone 2 settings at New Purnea end should be set or incorporated as per the ERPC Protection philosophy Healthiness of PLCC and inter tripping scheme at both the ends should be examined and report. Since 220 KV Madhepura-Laukhi D/C lines were idle charged from Madhepura end, the timing of all forward zone settings including directional O/C & E/F settings should be revised to "Instantaneous" immediately. The line parameters of 220 KV Madhepura-Laukhi D/C lines should be measured. The zone reach settings should be revised as per the actual line parameters. At the time of charging 220 KV Madhepura-Laukhi D/C lines from both ends, the timing of all forward zone settings should be revised as per the actual line parameters. At the time of charging 220 KV Madhepura-Laukhi D/C lines from both ends, the timing of all forward zone settings including directional O/C & E/F settings should be revised as per ERPC protection philosophy to avoid mismatch regarding coordination with adjacent line protection relays. 	
3.	Total power failure at 220/132 kV Sipara S/s (BSPTCL) on 15.06.2018 at 10:58 hrs.	PCC advised BSPTCL to check & analyse the disturbance recorders of all the feeders along with the timing of relay operation and Circuit breaker opening time in order to ascertain the cause of busbar relay operation.	

68 th F	PCC Meeting		
4.	Disturbance at Hatia at 18:22 hrs on 30-05-2018	PCC advised JUSNL to rectify the CVT polarity connection as well as to test the CVT in normal condition and submit a report on this tripping within seven days.	
5.	Issues related with Generation Backing down during Talcher-Kolar SPS operation on 16 th May 2018.	 PCC advised Powergrid to explore for inclusion of pole block with ground return mode signal in the SPS logic. PCC advised NTPC, GMR and JITPL to ensure the generation reduction as per the SPS logic. PCC advised NTPC also to explore for inclusion of pole block with ground return mode signal in the SPS logic. 	Regarding inclusion of pole block with ground return mode signal in the SPS logic, Powergrid informed that the issue was referred to OEM.
6.	Issue of Protection Coordination Observed during Blackout of Tala on 23rd May 2018.	PCC advised Bhutan representatives to submit a detailed report on the above disturbance to ERPC and ERLDC at the earliest.	
7.	Total power failure at 400/132 kV Motihari substation on 07-04-2018 at 09:56 hrs	PCC advised DMTCL to comply the protection audit party observations at the earliest.	
8.	Non-Operation of 400 kV Binaguri-Rangpo D/C SPS on 9th May 2018	PCC advised Powergrid to ensure the relevant data availability of SPS operation to ERLDC through SCADA.	Regarding implementation of SPS through SAS, Powergrid informed that the implementation would complete by July 2018.

9.	Disturbance at 400/220 kV Biharshariff S/s on 28-03- 2018 at 18:43 hrs and 19-03- 2018 at 02:02 hrs.	PCC advised BSPTCL and Powergrid to ensure proper relay coordination between 400kV and 220 kV system including ICTs at Biharshariff S/s.	BSPTCL informed that they are in the process of implementing the revised settings.
10.	Disturbance at 220/132 kV Patratu S/S on 09-02-2018 at 15:00 hrs	 In 65th PCC, JUSNL was advised to take the following measures: Check the healthiness of the DC system including end to end cables at 220/132kV Patratu S/s Check the healthiness of all Circuit Breakers at 220/132kV Patratu S/s Check the healthiness of all the relays installed at 220/132kV Patratu S/s Check the healthiness of all the relays installed at 220/132kV Patratu S/s Check Kanke end relay and CB of 132kV Patratu-Kanke line Check the Directional feature of 132 kV Hatia I – Sikidri and 132 kV Namkum - Hatia I line relays at Hatia-I 	
11.	Disturbance at 220 kV Budhipadar S/s on 01-10-17 at 09:25 hrs	OPTCL informed that Busbar protection maloperated and tripped all the elements connected 220kV bus 1 at Budhipadar. OPTCL added that the issue has been referred to OEM (Siemens) for rectification.	

Checklist for Submission of new transmission elements for updation in Protection Database

NAME OF ORGANISATION:

FOR THE MONTH OF:

SUBSTATION DETAIL:

SI No	DETAILS OF ELEMENTS	DATA TYPE	Status of Submission (Y/N)	Remarks
1	TRANSMISSION LINE	LINE LENGTH, CONDUCTOR TYPE, VOLTAGE GRADE		
2	POWER TRANSFORMER	NAMEPLATE DETAILS		
3	GENERATOR	TECHNICAL PARAMETERS		
4	CURRENT TRANSFORMER	NAMEPLATE DETAILS		
5	VOLTAGE TRANSFORMER	NAMEPLATE DETAILS		
6	RELAY DATA	MAKE, MODEL and FEEDER NAME		
7	RELAY SETTINGS	NUMERICAL RELAYS: CSV or XML file extracted from Relay ELECTROMECHANICAL RELAYS: SNAPSHOT of RELAY		
8	REACTOR	NAMEPLATE DETAILS		
9	CAPACITOR	NAMEPLATE DETAILS		
9	UPDATED SLD			

SIGNATURE: NAME OF REPRESENTATIVE: DESIGNATION: CONTACT: E-MAIL ID: