Agenda
for
89th PCC Meeting

Date: 13.03.2020
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

AGENDA FOR 89TH PROTECTION SUB-COMMITTEE MEETING TO BE HELD AT ERPC, KOLKATA ON 13.03.2020 (FRIDAY) AT 11:00 HOURS

PART – A

ITEM NO. A.1: Confirmation of minutes of 88th Protection sub-Committee Meeting held on 18th February, 2020 at ERPC, Kolkata.

The minutes of 88th Protection Sub-Committee meeting held on 18.02.2020 circulated vide letter dated 05.03.2020.

Members may confirm the minutes of 88th PCC meeting.

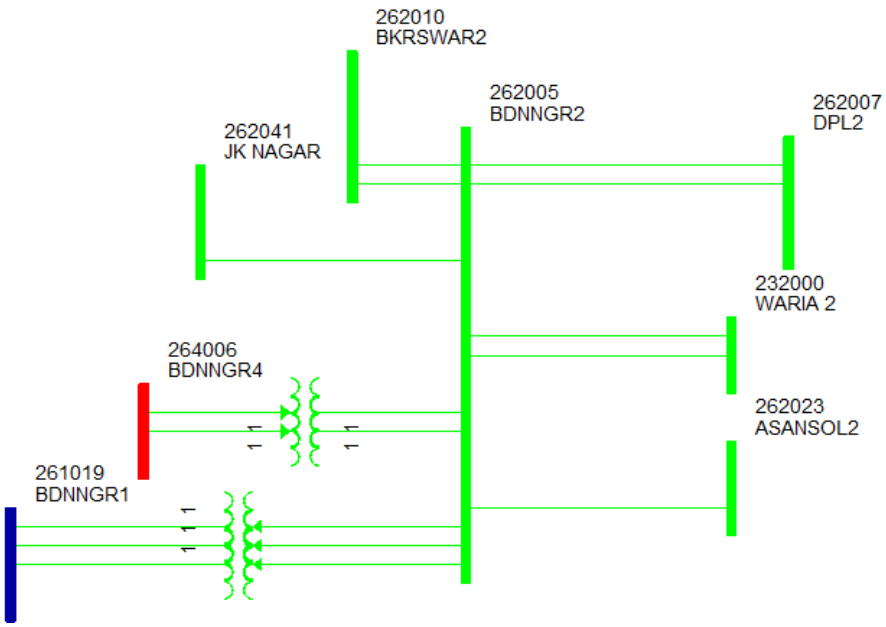
PART – B

ANALYSIS & DISCUSSION ON GRID INCIDENCES OCCURRED IN FEBRUARY, 2020

ITEM NO. B.1: Disturbance at 220 kV Bidhannagar Substation on 01.02.2020 at 21:05 Hrs.

At 21:05 Hrs, R phase CT of 220 kV Bus coupler at 400/220/132 kV Bidhan Nagar (WBSETCL) substation failed which led to Bus fault on both 220 kV Buses. With this, 220 kV both buses and all connected elements tripped on Bus bar protection operation.

Both 220 kV buses at Bidhannagar S/S tripped on Bus differential protection resulting into tripping of all 220kV outgoing feeders connected at Bidhannagar, 2 x 315MVA 400/220kV ICTs at Bidhannagar, 3 x 160MVA 220/132kV ICTs at Bidhannagar and two running units (unit #7 & #8) of DPL due to loss of evacuation path. There is a load loss of approx. 300 MW around Bidhannagar, DPL embedded area and Ukhra.



Relay Indications:

Transmission line/ unit	End 1 Relay Indication	End 2 Relay Indication

220 kV Bidhan Nagar Bus 1	Bus Bar Protection Optd	-
220 kV Bidhan Nagar Bus 2	Bus Bar Protection Optd	
220 kV Bidhan Nagar –Waria 1	Bus Bar Protection Optd	-
220 kV Bidhan Nagar –Waria 2	Bus Bar Protection Optd	-
220 kV Bidhan Nagar –JK Nagar	Bus Bar Protection Optd	-
220/132 kV 200 MVA ICT 1	Bus Bar Protection Optd	-
220 kV Bidhan Nagar –Asansol	Bus Bar Protection Optd	Zone 2 Start
400/220 kV 315 MVA Bidhan Nagar ICT 1	Bus Bar Protection Optd	-
400/220 kV 315 MVA Bidhan Nagar ICT 1	Bus Bar Protection Optd	-
220 kV Bidhan Nagar-DPL 1	Bus Bar Protection Optd	-
220 kV Bidhan Nagar-DPL 2	Bus Bar Protection Optd	-
220/132 kV 200 MVA ICT 2	Bus Bar Protection Optd	-
220/132 kV 200 MVA ICT 3	Bus Bar Protection Optd	-
220 kV Bidhan Nagar-Bakreshwar 1	Bus Bar Protection Optd	-
220 kV Bidhan Nagar-Bakreshwar 2	Bus Bar Protection Optd	-

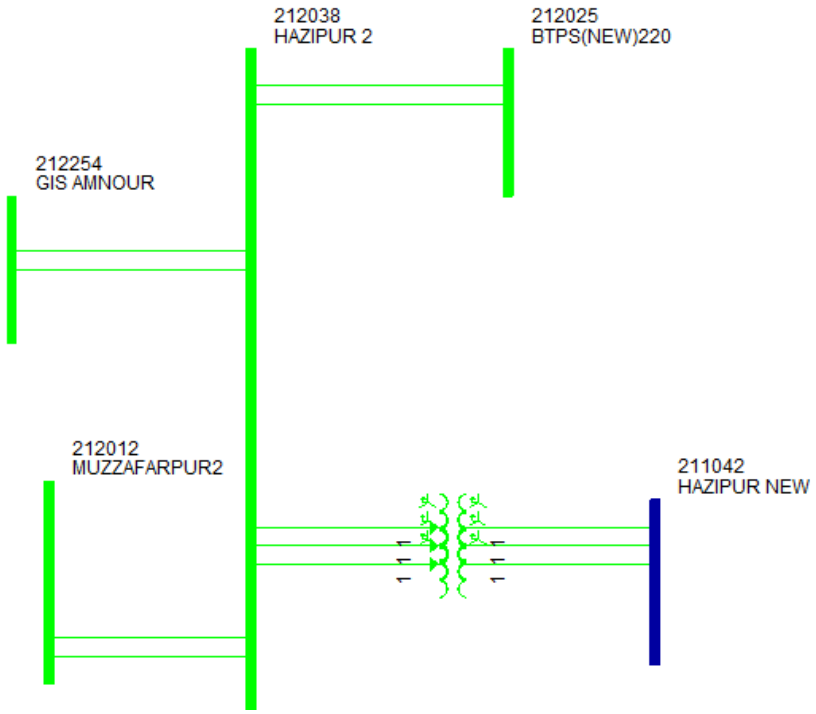
Generation Loss: 350 MW and Load Loss: 350 MW

WBSETCL may explain

ITEM NO. B.2: Tripping of 220 kV Muzaffarpur-Hajipur D/C on 09.02.2020 at 12:53 Hrs.

At 12:53 hrs, 220 kV Muzaffarpur-Hajipur D/C tripped due to bus bar protection operation at Hajipur leading to tripping of all feeders connected to 220 KV Hajipur S/S, causing load loss at Hajipur, Amnour, Siwan, Chhapra, Hathua, New Siwean(Raghunathpur) & Gopalganj (traction load loss of approx. 25MW at Hajipur, Siwan, Chhapra)

As per PMU data at Muzaffarpur, no fault has been observed.



Relay Indications:

Name	Realy indication at end 1	Realy indication at end 2
220 kV Muzaffarpur - Hajipur	Yet to be received	B/B protection operation at

D/C		Hajipur
220 kV Hajipur - Amnour D/C	B/B protection operation at Hajipur	Yet to be received

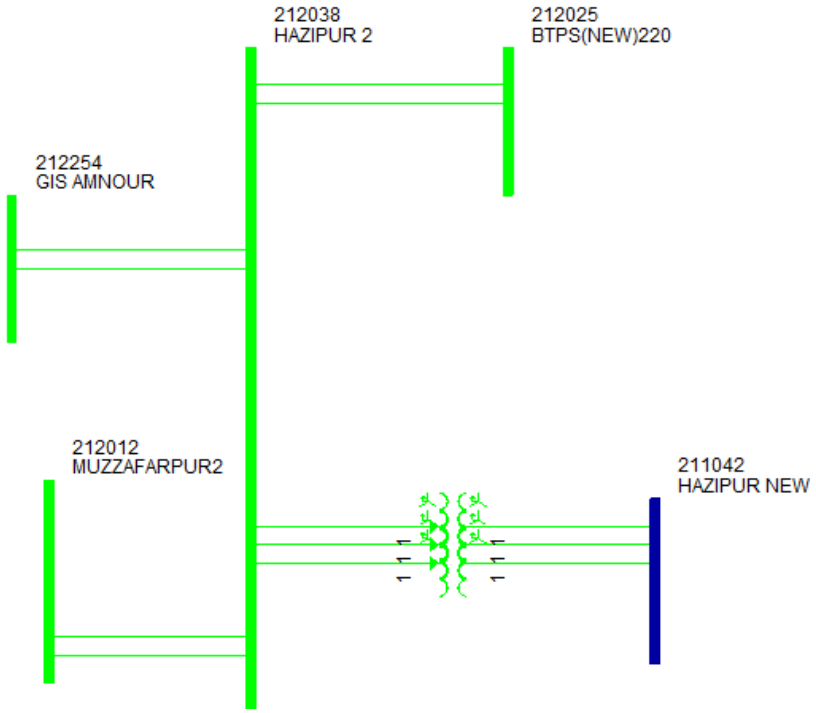
Load Loss: 183 MW

BSPTCL may explain.

ITEM NO. B.3: Tripping of 220 kV Hajipur-Amnour D/C on 10.02.2020 at 17:32 Hrs.

At 17:32 hrs, 220 KV Hajipur-Amnour D/c tripped leading to load loss of 142 MW at Amnour, Siwan, Chhapra, Hathua, New Siwan(Raghunathpur) & Gopalganj (traction load loss of approx. 15MW at Siwan, Chhapra).

As per PMU data at Muzaffarpur, no fault has been observed.



Load Loss: 142 MW

BSPTCL may explain.

ITEM NO. B.4: Disturbance at 220 kV New Melli and Tashiding Substation on 25.02.2020 at 08:14 Hrs

At 08:14 hrs 220 kV Tashiding - New Melli S/C, 220 kV Tashiding - Rangpo S/C, 220 kV Rangpo - New Melli - S/C tripped resulting total power failure at New Melli and Tashiding S/S and tripping of unit #2 at Tashiding due to loss of evacuation path. At the time of the incident, heavy thunderstorm and inclement weather were reported.

Jorethang has also reported that its 220 kV Jorethang-New Melli 1 has also tripped in zone 1 protection on B phase to earth fault.

As per PMU data, R-Y-B phase fault was detected by Rangpo PMU at 08:15:39 hrs. Fault was cleared within 100 ms. No fault was detected by Rangpo PMU at 08:15:45.110 hrs (Based on this DR for Rangpo end time synchronization error is suspected).

Relay Indications:

Name	Relay Indication at end 1	Relay Indication at end 2
220 kV Tashiding - New Melli S/C	Y-N, Z-I, 11.74 km, IR = 0.35 kA IY = 2.29 kA, & IB = 0.68 kA (DR not properly configured)	Yet to be received
220 kV Tashiding - Rangpo S/C	Y-N, IR = 0.225 kA IY = 1.878 kA, & IB = 0.5957 kA (DR not properly configured)	R-B-N, Z-I, IR = 4.3 kA IY = 3 kA, & IB = 3.4 kA,
220 kV Rangpo - New Melli - S/C	R-Y-B-N, Z-I, IR = 4.2 kA IY = 1.9 kA, & IB = 3.4 kA,	Yet to be received
220 kV JLHEP – New Melli - 1	Y-N, Z-I, IY = 1.2 kA	Yet to be received

Generation Loss: 48.5 MW

DANS Energy may explain.

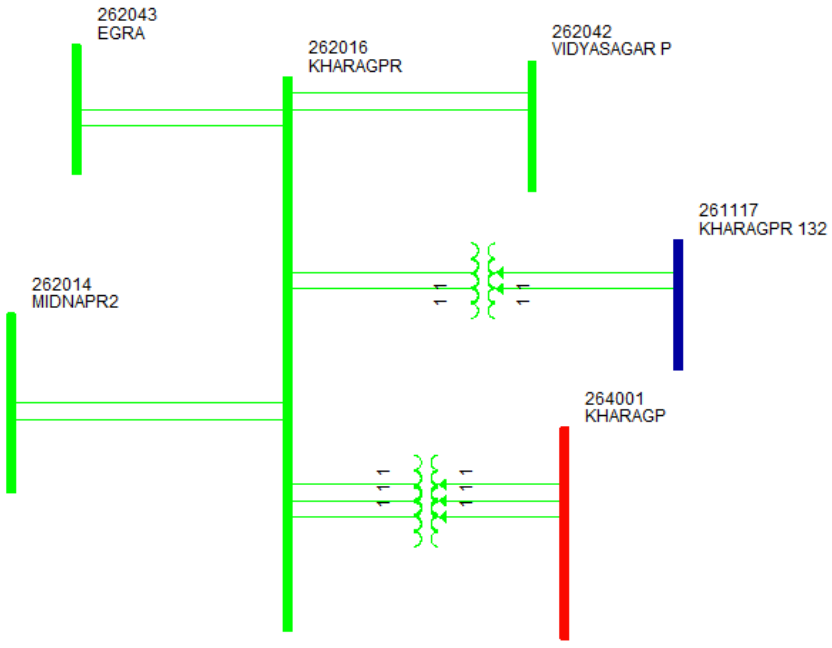
ITEM NO. B.5: Total Power Failure at Egra and Vidyasagar S/s on 11.02.2020 at 08:33 Hrs

220 KV Kharagpur-Midnapore D/c under planned shutdown. At 08:33 Hrs, LBB of 220 KV Kharagpur-Vidyasagar Park I operated due to closing of earth switch at Kharagpur end resulting into tripping of both 220 KV buses at Kharagpur and total power failure at Vidyasagar Park and Egra.

It was reported by WBSETCL that Both Zone 1 and 2 along with check zone of Bus bar protection has operated causing tripping of both 220 kV buses at Kharagpur. This has led to all 220 kV Connected elements tripping from 220 kV buses of Kharagpur along with 400/220 kV and 220/132 kV ICTs.

With this 220 kV and 132 kV buses were having no supply at Kharagpur. This has led to total power failure at radially fed 220/132 kV Vidyasagar Park and Egra substation and 132 kV Keshiary causing load loss of 262 MW.

As per PMU data, fault has been cleared within 100 ms.



Load Loss: 43 MW

Relay Indications:

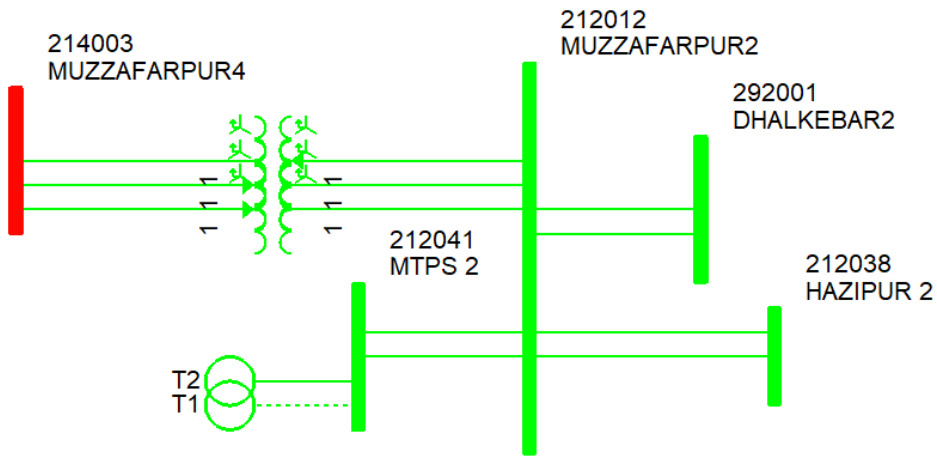
Name	Relay Indication at end 1	Relay Indication at end 2
220 KV Kharagpur-Vidyasagar Park D/c	B/B protection operation at Kharagpur	Yet to be received
220 KV Kharagpur-Egra D/c	B/B protection operation at Kharagpur	Yet to be received
3 x 315 MVA 400/220 KV ICTs at Kharagpur	B/B protection operation at Kharagpur	B/B protection operation at Kharagpur
2 x 160 MVA 220/132 KV ICTs at Kharagpur	B/B protection operation at Kharagpur	B/B protection operation at Kharagpur

WBSETCL may explain.

ITEM NO. B.6: Disturbance at Muzaffarpur Substation on 20.02.2020 at 12:29 Hrs.

At 12:29 Hrs, 220 KV Bus 2 at Muzaffarpur (PG) tripped leading to tripping of 220 KV Muzaffarpur-Dhalkebar 2, 220 KV Muzaffarpur-Hajipur 2, 220 KV Muzaffarpur-MTPS (KBUNL) 2, 500 MVA 400/220 KV ICT III. Subsequently 220 KV Muzaffarpur-Dhalkebar I also tripped on O/c and supply to Nepal interrupted.

As per PMU data at Muzaffarpur, 0.5 kV voltage dip observed in all three phases for more than 6 seconds. All three-phase voltage raised by 1 kV after that.



Load Loss: 260 MW

BSPTCL and Powergrid may explain.

ITEM NO. B.7: Disturbance at Maithon Generating Station on 20.02.2020 at 06:14 Hrs

Both the units at MPL was running with 525 MW generation. At 6:14:02 hrs. CW pump 1A,1C and ACW Pump 1A Tripped followed by initiation of Vacuum Very low trip signal at 06:14:54 hrs and subsequently tripping of turbine resulted tripping of unit #1 at MPL on Class – B protection. At

6:14:00 hrs. MFT of unit #2 occurred due to loss of all fuel as all 6.6KV and 415V bus section got Tripped .

Generation Loss: 1050 MW

MPL may explain.

ITEM NO. B.8: Disturbance at HVDC Talcher Substation on 17.02.2020 at 17:38 Hrs

On 17th Feb 2020, at 17:38 hrs HVDC Talcher-Kolar Pole-2 tripped due to persistent DC line fault. Before tripping the flow on Bipole was 2000 MW and in post outage, flow on Pole-1 jumped to 1250 MW from 1000 MW. After 30 seconds, it came down to 1000 MW and after 75 seconds, flow through the link was 150 MW as per ground return scheme. Due to generation of SPS -3 signal, generation back down of 666 MW occurred at Talcher. At same time, generation reduction occurred at GMR and JITPL also.

Detailed report prepared by ERLDC is given at **Annexure-B8.**

Generation Loss: 836 MW

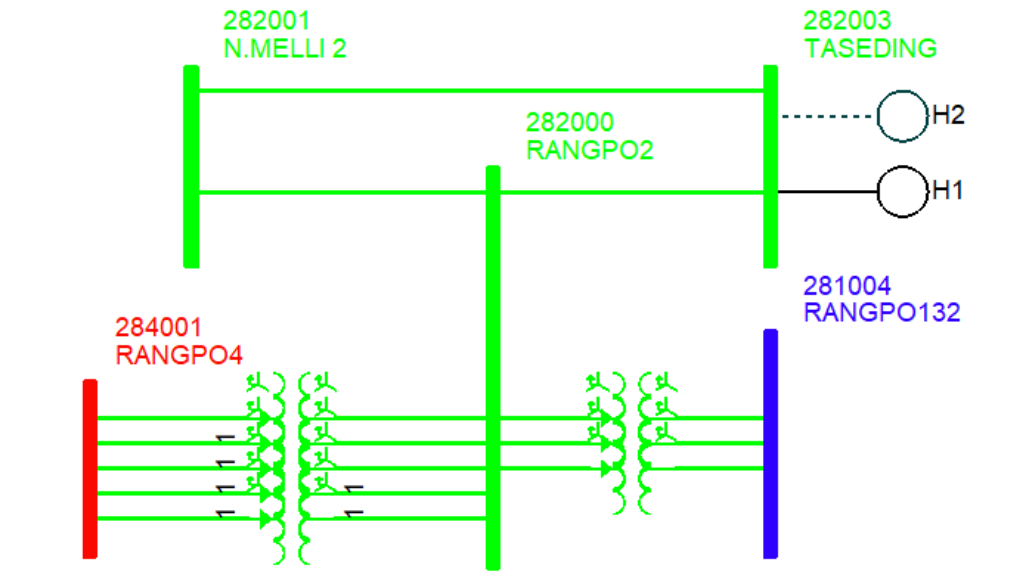
Powergrid may explain.

ITEM NO. B.9: Disturbance at 220 KV Rangpo S/s on 11.01.2020 at 11:45 Hrs

220 kV Bus II at Rangpo was under shutdown. At 11:45 Hrs, 220 KV Bus I at Rangpo became dead due to operation of bus bar protection resulting tripping of all five 315 MVA 400/220 KV ICTs at Rangpo, 220 KV Rangpo-New Melli S/C, 220 KV Rangpo-Tashiding S/C and all 3 100 MVA 220/132 KV ICTs at Rangpo.

Total power failure occured at 220 kV S/S at Tashiding, New Melli and Jorethang S/S. 400 kV bus at Rangpo was in service. Power supply to Gangtok interrupted as it was being fed through 132 KV Rangpo-Gangtok D/c.

No generation occured loss at Jorethang, Tashiding and Chuzachen as no machine was running.

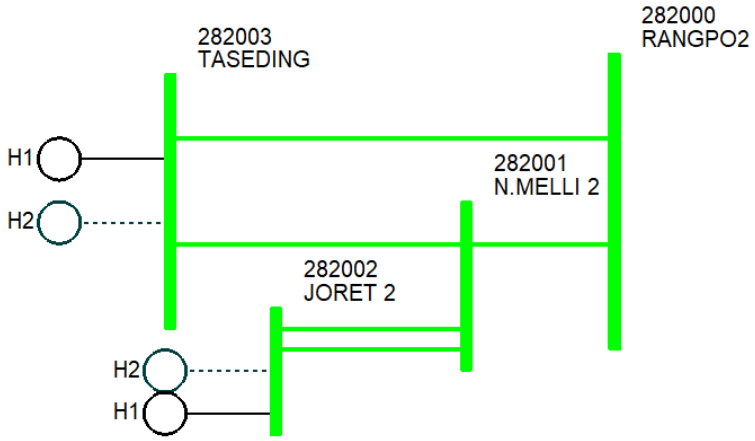


In 88th PCC meeting, Powergrid vide mail informed that MTL was working on Bus 2 for commissioning of their 220 kV bays at Rangpo. Busbar protection relay got initiated due to malfunction of contact.

Powergrid and DANS Energy may explain.

ITEM NO. B.10: Total power failure at Tashiding Substation on 16.01.2020 at 15:48 Hrs.

At 15:48 hrs, 220 kV New Melli-Tashiding S/C, 220 kV-Tashiding-Rangpo S/C, 220 kV New Melli-Jorethang-I tripped on Y-N fault resulting total power failure at Tashiding S/S. There was no generation at Tashiding



In 88th PCC meeting ERLDC informed that there was a B-N fault in 220kV New Melli-Jorethang line -I and Jorethang end tripped on zone 1. The fault got cleared within 100 ms. Reason for tripping of 220 kV New Melli-Tashiding S/C, 220 kV-Tashiding-Rangpo S/C lines needed explanation.

ERLDC informed that no detailed report had been received from DANS Energy.

PCC observed that there was uncoordinated tripping at Jorethang & Tashiding due to improper protection relay settings. In earlier PCC Meetings, DANS Energy was advised to review the relay settings. The compliance report is yet to be received from DANS Energy.

It was decided to pursue the issue with DANS Energy.

PCC decided to conduct protection audit at Jorethang, Tashiding and New Melli S/s in the month of March, 2020.

DANS Energy may explain.

ITEM NO. B.11: Chuzachen HEP Protection setting review and PLCC system commissioning

Protection settings: 132 KV Chuzachen-Rangpo I & II feeders were formed on 01 July 2019. After changes in the line length and termination points, protection settings of Micom relay should be reviewed and verified for proper functioning. Chuzachen HEP has contacted ERPC & PGCIL on the matter and awaited for the response.

PLCC system commissioning: PLCC system commissioning could not be completed during formation of 132 KV Chuzachen-Rangpo I & II feeders due to shutdown constraints in the peak monsoon season. Due to reason, carrier intertripping and Voice communication are not functional. GOS power department and Rangpo PGCIL were in opinion to complete PLCC system commission in lean season. Chuzachen HEP has informed GOS Power department and PGCIL Rangpo to take up the matter in month of Dec-2019 for fully commissioning of PLCC system.

Members may discuss.

ITEM NO. B.12: Tripping Incidences in the month of February, 2020.

Other tripping incidences occurred in the month of February, 2020 which needs explanation from constituents of either of the end is given in **Annexure-B12**.

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.

In 74th PCC, all the constituents were requested to submit the disturbance report along with DR through the new version of on-line portal which was implemented from 01st Jan. 2019.

Members may discuss.

ITEM NO. B.13: List of DR discrepancies in the month of February, 2020.

The list of all DR discrepancies in month of February 2020 which needs explanation from constituents of either of end is given at **Annexure – B13.**

Members may update.

ITEM NO. B.14: Multiple tripping incidents in the month of February 2020

14.1. Multiple tripping incident at RTPS at 01:55 hrs on 08-02-2020

400 kV Andal – Jamshedpur # 1 is under planned outage since 03-02-2020. 400 kV Maithon – RTPS S/C tripped at 01:53 hrs prior to the incident due to DT received from Maithon. At around 01:55 hrs, due to BO9 error of Bus bar protection (Binary output card error), DT signal was sent to remote end for 400 kV RTPS – Ranchi # 1 & 3 and 400 kV Andal – RTPS D/C resulting tripping of these circuits. Detailed report is attached in **Annexure-14.1**.

Following points may be explained by DVC:

1. Remedial action taken after the event may be explained by DVC.
2. Reason for tripping of 400 kV Maithon – RTPS S/C may be explained by POWERGRID ERTS-II.
3. 400 kV Andal – RTPS 1 and 400 kV Ranchi – RTPS # 1 & 3 were connected to bus 1 at RTPS and 400 kV Andal – RTPS 2 was connected to bus 2 at RTPS. Reason for tripping of all four feeders due to BCU problem may be explained by DVC.

14.2. Multiple tripping incident at NBU at 22:01 hrs on 29-02-2020

At 22:01 Hrs on 29-02-2020, B phase CT of 132 KV NBU-Rammam burst, leading to bus fault at NBU and 132 KV NBU S/s became dead. All lines emanating from NBU tripped and power supply to NBU, TCF I, TCF II, TCF III, Islampur interrupted. Following lines at NBU tripped:

- 132 KV NBU-NJP
- 132 KV NBU-Rammam
- 132 KV NBU-Lebong
- 132 KV NBU-TCF
- 132 KV NBU-Siliguri (PG)
- 132 KV NBU-Ujanoo

WB SLDC/WBSETCL may share detailed report along with root cause analysis, DR/EL and remedial actions taken. Switching scheme of substations having single bus bar with transfer bus scheme may be changed to two main bus bar scheme for improving reliability of the system.

14.3. Multiple tripping incident at Arrah at 23:53 hrs on 29-02-2020

At 23:53 Hrs, B phase CVT of 132 KV Arrah (PG)-Jagdishpur II burst at Arrah (PG). Subsequently, all 3*220/132 KV ICTs at Arrah (PG) tripped and 132 KV bus became dead. Power supply interrupted at Arrah, Dumraon and Jagdishpur. Following lines at Arrah tripped:

- 132 KV Arrah (PG)-Arrah
- 132 KV Arrah (PG)-Dumraon
- 132 KV Arrah (PG)-Jagdishpur D/c

Bihar SLDC/BSPTCL may share detailed report along with root cause analysis, DR/EL and remedial actions taken. Switching scheme of substations having single bus bar with transfer bus scheme may be changed to two main bus bar scheme for improving reliability of the system.

14.4. Frequent tripping of 400 KV Barh-Gorakhpur D/C

400 KV Barh-Gorakhpur D/C tripped on several instances in the month of February 2020 as shown in the list. 400 KV Barh-Gorakhpur D/C is a major link in ER-NR corridor. Hence, tripping of this line affects reliability as well as Transfer Capability of ER-NR corridor. Besides, Barh being a 2X660 MW generating station, frequent fault in the lines emanating from Barh is another cause of concern. It is also observed that, for Single-Line-To-Ground (SLG) fault, Auto Reclose (A/R) did not operate on some instances either at one or at both ends. Even DR/EL for the tripping are neither received at ERLDC via email nor uploaded in PDMS portal on time.

In view of the above, POWERGRID ERTS-I is requested to:

1. Maintain healthiness of 400 KV Barh-Gorakhpur D/C by proper patrolling.
2. Ensure the healthiness of Auto Reclosure for maximizing the line availability under transient SLG faults.
3. Share DR/EL for all tripping incidences within 24 hours of tripping in compliance to IEGC section 5.2 (r).

Element Name	Tripping Date	Tripping Time	Reason	Revival Date	Revival Time
400KV-BARH-GORAKHPUR-2	24-02-20	0:52	Y-N Fault	24-02-20	18:52
400KV-BARH-GORAKHPUR-1	24-02-20	0:52	Y-N Fault	24-02-20	12:14
400KV-BARH-GORAKHPUR-2	25-02-20	7:41	DT received at Gorakhpur	25-02-20	8:25
400KV-BARH-GORAKHPUR-1	25-02-20	7:41	DT received at Gorakhpur	25-02-20	9:55
400KV-BARH-GORAKHPUR-1	26-02-20	12:30	R-N Fault (400 kV Barh – Patna – 4 tripped at same time)	26-02-20	17:53

The same was requested to POWERGRID ERTS – I vide letter no. पू० क्षे० भा० प्रे० कें०/ प्र० अ०/2019-20/4442 dated 27-02-2020. POWERGRID ERTS – I may respond.

Members may discuss.

ITEM NO. B.15: Sharing DR/EL for any tripping incident within 24 hrs of the incident and detailed report of any grid disturbance/grid incident/grid event within seven days

As per IEGC section 5.2 (r), all the users, STU/SLDC and CTU are to send information including DR/EL output to RLDC within 24 hours from the tripping incident. But in case of some tripping incidents, DR/EL and detailed tripping report are yet to be received even after the end of the month. All the users, STU/SLDC and CTU are suggested to upload DR/EL of both main 1 and main 2 protection (if available) in comtrade format in PDMS within 24 hours from the tripping

incident. In case of technical constraints related to uploading of DR/EL in PDMS, DR/EL may be sent to erldcprotection@posoco.in and erpcprotection@gmail.com. All the SLDCs and generating stations may send detailed report along with root cause analysis and remedial action taken to ERLDC/ERPC within seven days of any grid disturbance/grid incident/grid event within their control area.

Following table shows the events where DR/EL and detail report are yet to be received for GD/GI events in the month of February 2020.

Date	Time	S/S involved	Reporting status*
09-02-2020	12:53	Hajipur & Amnour	Detail report, DR/EL yet to be received from Bihar SLDC/BSPTCL.
10-02-2020	17:32	Amnour	Detail report, DR/EL yet to be received from Bihar SLDC/BSPTCL.
11-02-2020	08:33	Egra, Vidyasagar Park, Kharagpur	Detail report, DR/EL yet to be received from WB SLDC/WBSETCL (Flash report received)
20-02-2020	06:14	MPL	Detail inspection report yet to be received from MPL.
20-02-2020	12:29	Muzaffarpur	Detail report, DR/EL yet to be received from PG

* As on 08-03-2020

Members may discuss.

ITEM NO. B.16: Protection Coordination for New Lines/ICTs Prior to First Time Charging in ER ISTS system

The details of new units/transmission elements commissioned in the month of February 2020 based on information furnished by the constituents are depicted below:

All the utilities are advised to review the protection setting at the substations which are connected to Meramundali, Mendasal, Talcher and Kahalgaon.

Name of the element	Line length and conductor type	End 1 remote substations	End 2 remote substations
400kV Talcher Meramundali 2	86 km, ACSR twin moose	PG – Rengal, Rourkela	OPTCL - Duburi, Mendasal, JSPL, Lapanga PG - Bolangir
400 KV Meramundali-Mendasal 2	98 km, ACSR twin moose	OPTCL - Duburi, Mendasal, JSPL, Lapanga PG - Bolangir	PG – Pandiabili,

Members may discuss.

ITEM NO. B.17: Severe Fluctuation in Voltage and Power in Jeypore -Gajuwaka Area (HVDC pole 1 tripped) observed on 31 Jan and 4th and 5th Feb 2020

Three events of severe nature have occurred near Jeypore and Gajuwaka Area where severe hunting has been observed in Power and Voltage and HVDC Gajuwaka Pole 1 has tripped.
The timing of the event is as follows:

1. 14:46hrs to 14:51hrs on 31-01-2020
2. 14:34hrs to 14:36hrs on 04-02-2020
3. 08:34hrs to 08:38hrs on 05-02-2020

In addition to the above, similar events have also been observed 17, 18, 24 and 25th February 2020. Based on the significant data that have been received from HVDC, OPTCL, OPGC and PMU data at ERLDC, analysis has been carried out with the following observations.

1. **Gajuwaka HVDC Bipole** : Power order of HVDC has fluctuated from 100 MW to 600 MW. Pole 1 has observed failure of multiple thyristor on two occasions i.e. 3rd and 4th March 2020. Based on PMU data it was observed that the fault signature of pole tripping on thyristor failure and all these voltage dip are similar in nature
2. **STATCOM at Jeypore** : Response is observed due to the Voltage Variation during these events on multiple occasions.
3. **Jeypore-Gajuwaka Line DR from Jeypore** : 400 kv Jeypore-Gajuwaka D/C observed power swing on various occasion during these fluctuation and some of them entered in Zone 3. From the voltage and current plot, the normal fault type signature is not observed. Voltage waveform and current waveform are distorted unline during fault and harmonic content of 2nd and third harmonics is high. On some occasions FSC of these lines have bypassed at Gajuwaka end on Ferro-resonace.
4. **OHPC Units :** Units at Upper Kolab and Balimela have tripped on few occasions on the overall differential protection due to the jerk observed during these events.
5. **OPTCL** : No Fault in any transmission line or any frequenct Auto-reclosure events in any of the lines.
6. **PGCIL Orissa** : No Fault is any transmission lines.

Based on this, it is suspected that these fluctuation are not from the grid side and is due to HVDC. PGCIl is advised to kindly analyse the event further and submit the report.

Members may discuss.

PART- C:: OTHER ITEMS

ITEM NO. C.1: FOLLOW-UP OF DECISIONS OF THE PREVIOUS PROTECTION SUB-COMMITTEE MEETING(S)

The decisions of previous PCC Meetings are given at **Annexure-C1.**

In 73rd PCC, it was observed that latest status on the implementation of the previous PCC recommendations were not updated by the constituents regularly. All the constituents were advised to update the latest status of the recommendations as per the list given in Annexure.

Members may update the latest status.

ITEM NO. C.2: 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 is available at ERPC website (Observations include PLCC rectification/activation which needs a comprehensive plan).

In 77th PCC, BSPTCL has submitted the updated status.

In 79th & 80th PCC, BSPTCL was advised to submit the details of the compliance report.

BSPTCL may update.

ITEM NO. C.3: Non-commissioning of PLCC / OPGW and non-implementation of carrier aided tripping in 220kV and above lines.

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

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

S. No	Transmission Lines name	Date of Tripping	Reason of Tripping	Owner Detail		Present Status	
				End-1	End-2	OPGW/PLCC Link available	AR facility functional
13	220KV BUDIPADAR-KORBA-II	23.06.16	Y-N FAULT	OPTCL	CSEB	PLCC not available	will be activated in consultation with Korba
17	220 KV TSTPP-RENGALI	17.07.16	EARTH FAULT	NTPC	OPTCL	OPGW replaced PLCC.	by March 2018
18	220KV BUDIPADAR-RAIGARH	21.07.16	EARTH FAULT	OPTCL	PGCIL	PLCC defective.	To be commissioned be Chhatisgarh.
20	220 KV FARAKKA-LALMATIA	03.08.16	B-N FAULT .	NTPC	JUNSL	Yes	Old Relay and not functional. 7-8 months required for auto re-close relay procurement.
23	220 KV MUZAFFARPUR - HAZIPUR - II	10.08.16	B-N FAULT	PGCIL	BSPTCL	PLCC commissioned.	Voice established. For carrier required shutdown
24	220 KV ROURKELA - TARKERA-II	11.08.16	B-N FAULT	PGCIL	OPTCL	OPGW available	DTPC installed. A/R to be commissioned.

27	220 KV BIHARSARIF-TENUGHAT	07.09.16	B-N FAULT	BSPTCL	TVNL		
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 : *Contract awarded*
2. 220kV Indravati(PG)-Indravati(PH) : *Contract awarded*
3. 132kV Baripada(PG)-Baripada : *OPGW completed*
4. 132kV Baripada(PG)-Rairangpur : *OPGW completed*

BSPTCL:

Sl No.	***Lines***	***Status***
1	*220 kV Purnea(PG)-Madhepura*	*Protection through PLCC is working properly*
2	*220 kV Biharsharif-BTPS new*	*BHEL would complete this work*
3	*220 kV BTPS new- Begusarai*	*BHEL would complete this work*
4	*220 kV Biharshariff-Bodhgaya line LILO at Khizersarai*	*OPGW is present. Protection is done through DPC.*
5	*132 kV MTPS-Motiari line*	*OPGW is installed.*
6	*220KV Madhepura-New Purnea D/C*	*Protection through PLCC is working properly*
7	*220KV Muzaffarpur-Hajipur D/C line*	*Protection through PLCC is working properly*
8	*220KV Patna-Khagaul-SC*	*PLCC Panel working properly.*
9	*220 kV DMTCL(Darbhanga)-Laukhi Circuit-I*	*PLCC Panel working properly*
10	*220 kV Tenughat-Biharsharif S/C*	*PLCC to be commissioned*
11	*220 kV Gaya-Sonenagar New circuit-I*	*Communication through OPGW*
12	*220 kV Pusauli-Dehri S/C*	*PLCC not working. OPGW commissioned at Dehri end.*
13	*220 kV Begusarai-Purnea(PG) D/C*	*PLCC working properly*
14	*220 kV DMTCL-Motipur ckt-II*	*PLCC to be commissioned.*
15	*220 kV Dehri- Gaya D/C*	*PLCC working properly*
16	*220 kV Kishanganj(PG)-Kishanganj(B)-II*	*PLCC working properly*

In 79th PCC, BSPTCL submitted PLCC status of some of the lines. The details have been updated in above table.

In 80th PCC meeting, BSPTCL was advised to rectify the PLCC & Auto reclose issues in coordination with their communication wing.

Members may update.

ITEM NO. C.4: Any additional agenda – with permission of the Chair.

Annexure-B8

HVDC Talcher - Kolar Pole-II outage at 1738 on 17th Feb 2020

Antecedent Conditions (at 17:38 hrs, 17th Feb 2020)

- ER Demand: 16200 MW
- Frequency: 49.98 Hz
- Flow on HVDC Talcher-Kolar Bipole: 2000 MW

Incident:

On 17th Feb 2020, at 17:38 hrs HVDC Talcher-Kolar Pole-2 tripped due to persistent DC line fault. Before tripping the flow on Bipole was 2000 MW and in post outage, flow on Pole-1 jumped to 1250 MW from 1000 MW. After 30 seconds, it came down to 1000 MW and after 75 seconds, flow through the link was 150 MW as per ground return scheme. As per line fault locator, DC line fault operated at a distance of 621.3Kms from Talcher end with Tower Location: 1678. From Talcher end SPS Signal-3 was generated (Condition: the HVDC power flow is more than 1600 MW & one pole blocked with remaining pole on ground return mode). The generation backdown of 836 MW occurred in Eastern Region. The Pole-II deblocked at 18:32 hrs. The SOE of the event is not captured at ERLDC SCADA.

Sequence of events (as per observation from PMU)

- 17:38:31.600 HVDC Talcher-Kolar Pole-2 tripped
- 17:39:01.200 Ramp down of HVDC Talcher-Kolar Pole-1 from 1250 to 1000 MW.
- 17:39:40:520 Ramping down of HVDC Talcher-Kolar Pole-1 from 1000 to 150 MW.
- 17:39:58:400 Generation relief in Talcher stg-2, GMR and JITPL due to SPS.
- 18:32:00.000 HVDC Talcher-Kolar Pole-2 deblocked

PMU Plots

At 17:38:31.600 hrs, severe transients observed in AC side voltage of Talcher end due to persistent DC line fault in HVDC Talcher-Kolar Bipole. After 17:39 hrs, there was continuously dip in voltages due to switching off of filters due to ramping down of Pole-I from 1000 MW to 150 MW. The bus voltage of Talcher station is given below in Figure-1:

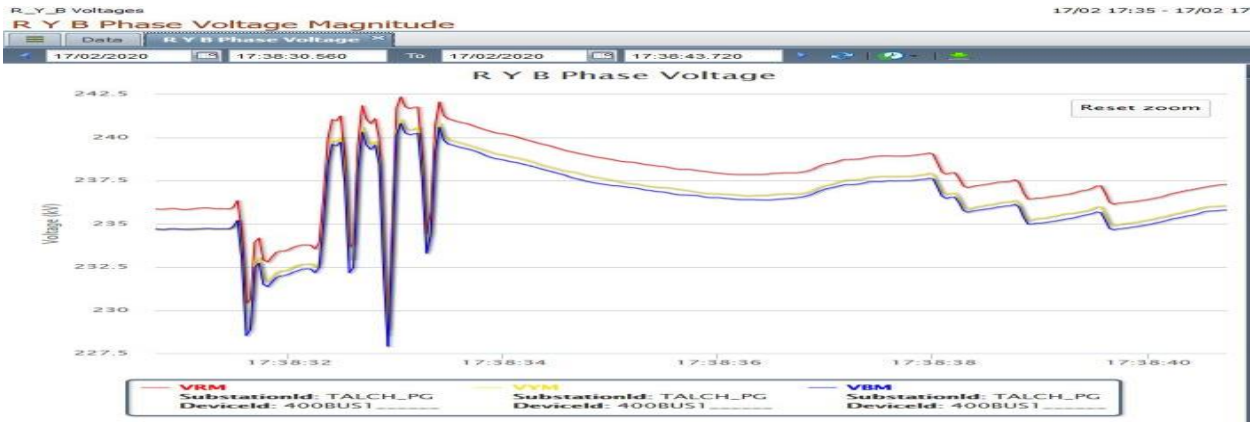


Figure-1

At 17:38:31.600 hrs, pole-II got tripped. At this time TS1 and TS2 signal generated at Kolar end and load relief of 1415 MW obtained in southern region. It led to the frequency rise to 50.10 Hz from 49.935 Hz. Due to primary response, the frequency gone down to 50.025 Hz. Then at 17:39:58.400 hrs, Pole-I went into ground return mode and at Talcher end, signal 3 was generated. Due to instantaneous backdown of 666 MW from Talcher stg II, the frequency dipped to 49.96 Hz from 50.07 Hz and finally settled to a higher value of 50.04 Hz. The frequency during the incident is given below in Figure-2:

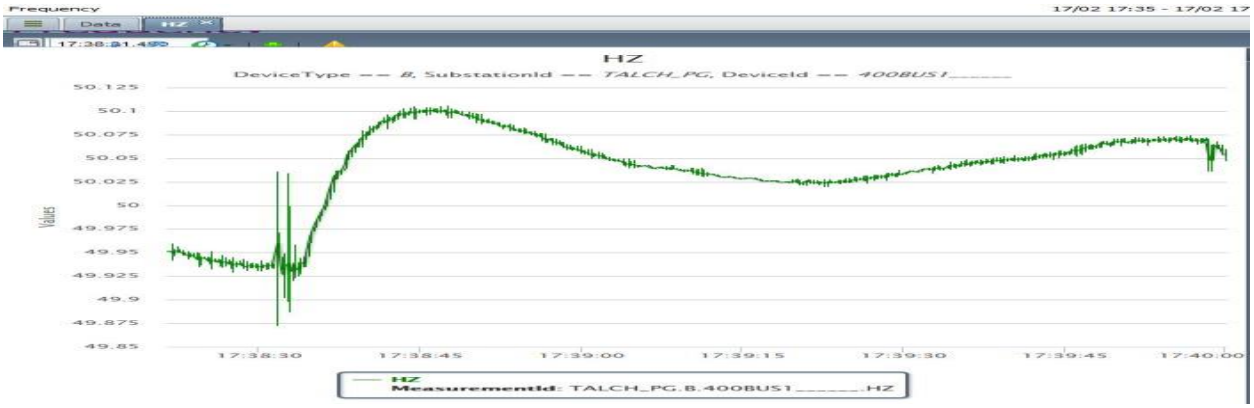


Figure-2

SCADA Plots

The rise of pole –I power flow above 1000 MW after outage of pole-II can also be observed in SCADA plots. The flow of HVDC Talcher-Kolar Bipole is given below. Prior to incident flow is less than 1000 MW as shown in Figure-3

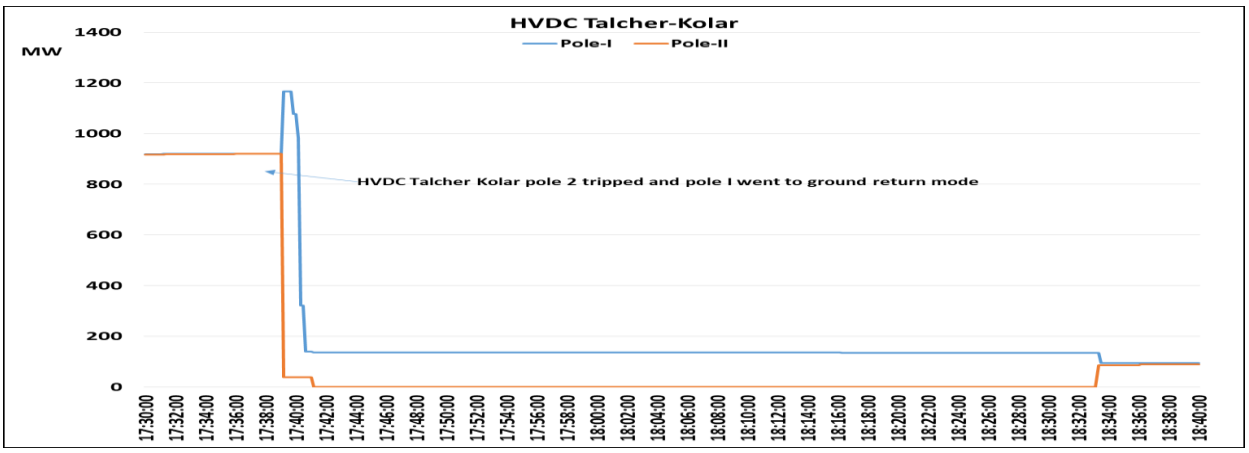


Figure-3

After Pole tripping SPS Signal-3 was generated at Talcher end. Due to this there was instantaneous back down of 666 MW in Talcher stg-2. There was gradual decrease in generation backdown of 50 MW and 130 MW in JITPL and GMR respectively. The generation is given below in Figure-4:

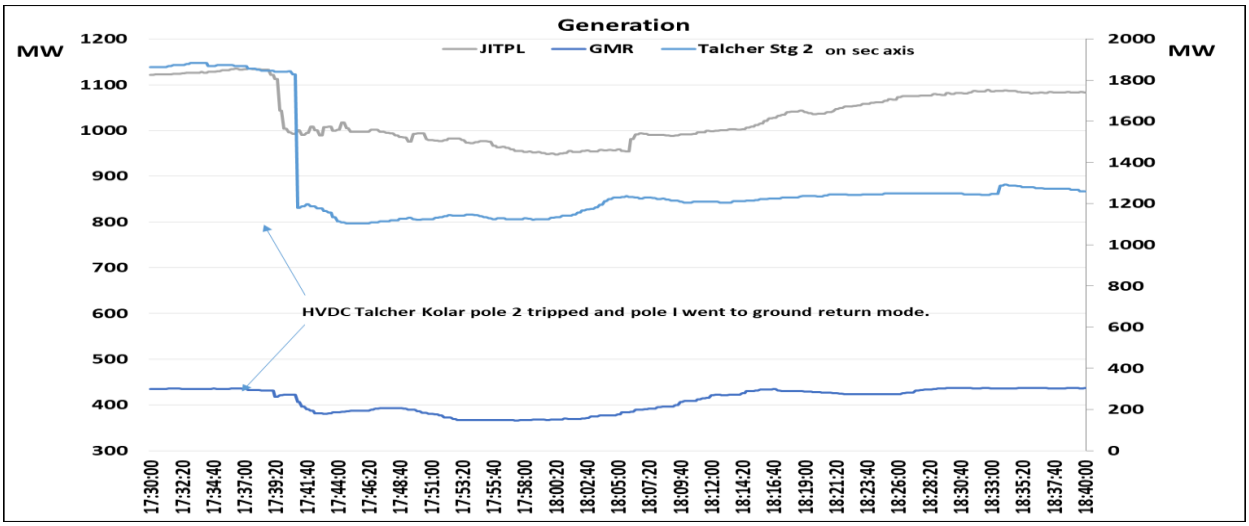


Figure-4

With the loss of 750 MW power flow on Bipole, the flow on 400 kV Talcher-Rengali D/C and 400 kV Talcher- Meramundali D/C is increased with sensitivity of 15.8 % and 35.16 % respectively and flow on 400 kV Rourkela-Talcher decreased with sensitivity of 40 %. The flow on all the 400 kV lines from Talcher end is given below in Figure-5

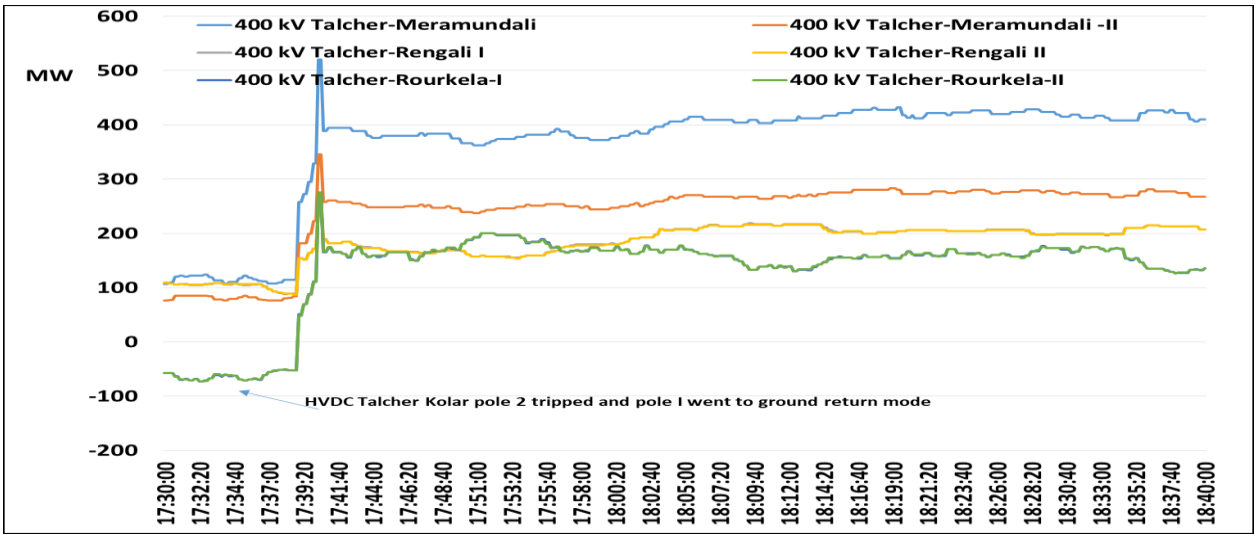


Figure-5

Brief Tripping report, Disturbance and Outage Report (DOR) and SER have been obtained from Powergrid. SER Output is given below in Figure-6 and Figure-7:

Archive Print Selection — 17.02.2020 17:27:00 - 17.02.2020 18:37:00
Printed: 17.02.2020 19:04:26 — Class Selection: -E-W-M-S-C- — Sorting: TIME

EvtNo	Date	Time	Grp	Clss	Device	Event Text	Status
1013	17.02.2020	17:27:30.561	00000	WRN	=11V00-A1	SYSTEM 1, SOFTWARE WARNING	-
6003	17.02.2020	17:38:31.596	00000	EMCY	=12V00-A1	DC LINE SUMMARY TRIP	+
6691	17.02.2020	17:38:31.596	06003	EMCY	=12R01+R2	TRIP: WAVEFRONT PROTECTION	TRIP
13035	17.02.2020	17:38:31.614	00000	WRN	=10X71+X71	LINE FAULT LOCATOR OPERATED	+
6693	17.02.2020	17:38:31.632	06003	EMCY	=12R01+R2	TRIP: DC UNDERVOLTAGE SENSING PROTECTION	TRIP
6691	17.02.2020	17:38:31.646	06003	EMCY	=12R01+R2	TRIP: WAVEFRONT PROTECTION	CLEAR
6003	17.02.2020	17:38:31.700	00000	EMCY	=12V00-A1	DC LINE SUMMARY TRIP	-

Figure-6

Archive Print Selection — 17.02.2020 17:27:00 - 17.02.2020 18:37:00
Printed: 17.02.2020 19:04:26 — Class Selection: -E-W-M-S-C- — Sorting: TIME

EvtNo	Date	Time	Grp	Clss	Device	Event Text	Status
7585	17.02.2020	17:38:32.863	06011	WRN	=12V00-A1	POLE 2 DC LINE FAULT RECOVERY SEQUENCE A	CLEAR
1642	17.02.2020	17:38:32.874	00011	WRN	=11V00-A1	POWER SWING DAMPING ACTIVE	CLEAR
7642	17.02.2020	17:38:32.885	06011	WRN	=12V00-A1	POWER SWING DAMPING ACTIVE	CLEAR
13035	17.02.2020	17:38:32.951	00000	WRN	=10X71+X71	LINE FAULT LOCATOR OPERATED	+
7585	17.02.2020	17:38:32.953	06011	WRN	=12V00-A1	POLE 2 DC LINE FAULT RECOVERY SEQUENCE A	FAULT
1647	17.02.2020	17:38:32.954	00011	WRN	=11V00-A1	CURRENT BALANCE CONTROLLER IS ACTIVE	BEGIN
12310	17.02.2020	17:38:33.030	00000	STAT	=10CF22-Q0	CIRCUIT BREAKER OPEN	-
13035	17.02.2020	17:38:33.033	00000	WRN	=10X71+X71	LINE FAULT LOCATOR OPERATED	-
1434	17.02.2020	17:38:33.034	00000	STAT	=11T01	TAP CHANGER INHIBIT LOWER ACTIVE	+
1737	17.02.2020	17:38:33.034	00011	WRN	=11V00-A1	SSTI DAMPING CONTROLLER ACTIVE	FAULT
12311	17.02.2020	17:38:33.048	00000	STAT	=10CF22-Q0	CIRCUIT BREAKER CLOSED	+
1647	17.02.2020	17:38:33.074	00011	WRN	=11V00-A1	CURRENT BALANCE CONTROLLER IS ACTIVE	END
7628	17.02.2020	17:38:33.205	06011	STAT	=12V00-A1	DC CURRENT LIMIT BY WATER INLET TEMP.	BEGIN
7585	17.02.2020	17:38:33.253	06011	WRN	=12V00-A1	POLE 2 DC LINE FAULT RECOVERY SEQUENCE A	CLEAR
1434	17.02.2020	17:38:33.274	00000	STAT	=11T01	TAP CHANGER INHIBIT LOWER ACTIVE	-
7585	17.02.2020	17:38:33.328	06011	WRN	=12V00-A1	POLE 2 DC LINE FAULT RECOVERY SEQUENCE A	FAULT
1434	17.02.2020	17:38:33.354	00000	STAT	=11T01	TAP CHANGER INHIBIT LOWER ACTIVE	+
1647	17.02.2020	17:38:33.354	00011	WRN	=11V00-A1	CURRENT BALANCE CONTROLLER IS ACTIVE	BEGIN
12983	17.02.2020	17:38:33.363	00000	STAT	=12V01+U1	POLE-2 DEBLOCKED	-
12984	17.02.2020	17:38:33.363	00000	EMCY	=12V01+U1	POLE-2 BLOCKED	TRIP
7434	17.02.2020	17:38:33.365	00000	STAT	=12V00-A1	TAP CHANGER INHIBIT LOWER ACTIVE	+
6002	17.02.2020	17:38:33.368	00000	EMCY	=12V00-A1	CONVERTER TRIPPED	+
7584	17.02.2020	17:38:33.368	06002	EMCY	=12V00-A1	PERSISTING DC-LINE FAULT	TRIP
1647	17.02.2020	17:38:33.434	00011	WRN	=11V00-A1	CURRENT BALANCE CONTROLLER IS ACTIVE	END
7426	17.02.2020	17:38:33.485	00000	STAT	=12V00-A1	STOP SEQUENCE RUNNING	+
6002	17.02.2020	17:38:33.568	00000	EMCY	=12V00-A1	CONVERTER TRIPPED	-
7584	17.02.2020	17:38:33.568	06002	EMCY	=12V00-A1	PERSISTING DC-LINE FAULT	CLEAR

Figure-7

EL and SOE also obtained from Talcher Station as given below in Figure-8 and Figure-9 respectively.

Talcher Event Logger:

[2020-02-17 05:47:29.367 PM]	F2_ECAT.BAY16_400KV_RENGALI_2_CARRIER_CH_II_FAIL_OUT_OF_SERVICE	No
[2020-02-17 05:46:56.997 PM]	G2_ECAT.BAY16_400KV_RENGALI_2_CARRIER_CH_I_III_FAIL_OUT_OF_SERVICE	Yes
[2020-02-17 05:46:56.986 PM]	F2_ECAT.BAY16_400KV_RENGALI_2_CARRIER_CH_II_FAIL_OUT_OF_SERVICE	Yes
[2020-02-17 05:41:28.914 PM]	B4_ECAT.BAY19_400KV_ANGUL_CARRIER_CH_1_FAIL	No
[2020-02-17 05:41:16.901 PM]	B4_ECAT.BAY19_400KV_ANGUL_CARRIER_CH_1_FAIL	Yes
[2020-02-17 05:38:33.789 PM]	I5_ECAT.HVDC_400KV_POLE2_BLOCK	Yes
[2020-02-17 05:38:33.760 PM]	I5_ECAT.HVDC_400KV_POLE2_DEBLOCK	No
[2020-02-17 05:35:31.901 PM]	F2_ECAT.BAY16_400KV_RENGALI_2_CARRIER_CH_II_FAIL_OUT_OF_SERVICE	No
[2020-02-17 05:34:59.930 PM]	G2_ECAT.BAY16_400KV_RENGALI_2_CARRIER_CH_I_III_FAIL_OUT_OF_SERVICE	Yes

Figure-8

Talcher SOE:

2/17/2020 17:35:28.837	20HLAI27	ADOUTUDF_~	OK	H 15		Channel_09		
2/17/2020 17:35:28.837	20HLAI27	ADOUTUDF_~		H 15		Channel_09		
2/17/2020 17:35:46.147	3BYA00AP002	OFFNRM		H 00	HVDC FLOW DEV ALARM	DEVIATION~		
2/17/2020 17:35:46.647	3BYA00AP002	OFFNRM	OK	H 00	HVDC FLOW DEV ALARM	NORMAL		
2/17/2020 17:35:47.557	3BYA00GS000	OFFNRM	OK	L 00	HVDC POLE 2			
2/17/2020 17:35:47.647	3BYA00GS000	OFFNRM		L 00	HVDC POLE 2	BLOCK		
2/17/2020 17:35:48.957	3HLY11_1C21	DEVLOW	OK	L 00		0.383181		
2/17/2020 17:35:50.357	3BAY10GS001	OFFNRM	OK	J 01	11KV AUTO CHANGEOVER TRBL	<Off Desc>		
2/17/2020 17:35:54.357	3BAY10GS001	OFFNRM		J 01	11KV AUTO CHANGEOVER TRBL	<On Desc>		
2/17/2020 17:35:54.797	opcscn	WDT		U 00	TASK FAILED: 304			
2/17/2020 17:35:55.257	3HLY11_1C21	DEVHI		L 00		10.1942		
2/17/2020 17:36:02.900	3HFY02_01	CHANGE		NONE	HFY02_1C21.OP	42.5	%	NTPC-3SRV~
2/17/2020 17:36:03.217	3HFC90EB142	OFFNRM		U 01	PULV-K UNSUC AUT START	Alarm		
2/17/2020 17:36:03.900	3HFY04_01	CHANGE		NONE	HFY04_1C21.OP	42	%	NTPC-3SRV~
2/17/2020 17:36:04.217	3HFC90EB142	OFFNRM	OK	U 01	PULV-K UNSUC AUT START	Normal		
2/17/2020 17:36:04.700	3HFY05_01	CHANGE		NONE	HFY05_1C21.OP	43.5	%	NTPC-3SRV~
2/17/2020 17:36:08.000	3HFY06_01	CHANGE		NONE	HFY06_1C21.OP	44	%	NTPC-3SRV~
2/17/2020 17:36:08.600	3HFY07_01	CHANGE		NONE	HFY07_1C21.OP	54	%	NTPC-3SRV~
2/17/2020 17:36:11.800	3HFY02_01	CHANGE		NONE	HFY02_1C21.OP	37.5	%	NTPC-3SRV~
2/17/2020 17:36:19.217	3HFC90EB142	OFFNRM		U 01	PULV-K UNSUC AUT START	Alarm		
2/17/2020 17:36:20.217	3HFC90EB142	OFFNRM	OK	U 01	PULV-K UNSUC AUT START	Normal		
2/17/2020 17:36:23.890	opcscn	WDT		U 00	TASK FAILED: 303			
2/17/2020 17:36:33.838	20HLAI27	ADOUTUDF_~	OK	H 15		Channel_09		
2/17/2020 17:36:33.838	20HLAI27	ADOUTUDF_~		H 15		Channel_09		
2/17/2020 17:37:11.648	3BYA00_LB05	OFFNRM		H 00	UNTI05 RAMP DOWN FROM SPS1000	U6RAMPDOWN		
2/17/2020 17:37:11.748	3BYA00_LB05	OFFNRM		H 00	UNTI06 TRIP CMD	U6TRIPCMD		
2/17/2020 17:37:13.098	SPS_ACTION	OFFNRM		H 00	UNIT 5 RAMP DOWN 150MW	ON		
2/17/2020 17:37:16.748	3BYA00_LB05	OFFNRM	OK	H 00	UNTI06 TRIP CMD	OFF		
2/17/2020 17:37:19.900	3HFY07_01	CHANGE		NONE	HFY07_1C21.OP	49	%	NTPC-3SRV~
2/17/2020 17:37:20.400	3HFY07_01	CHANGE		NONE	HFY07_1C21.OP	44	%	NTPC-3SRV~
2/17/2020 17:37:32.218	3HFC90EB142	OFFNRM		U 01	PULV-K UNSUC AUT START	Alarm		

Figure-9

SCADA Snapshot before and after tripping of Pole: 17:38 hrs and 17:42 hrs

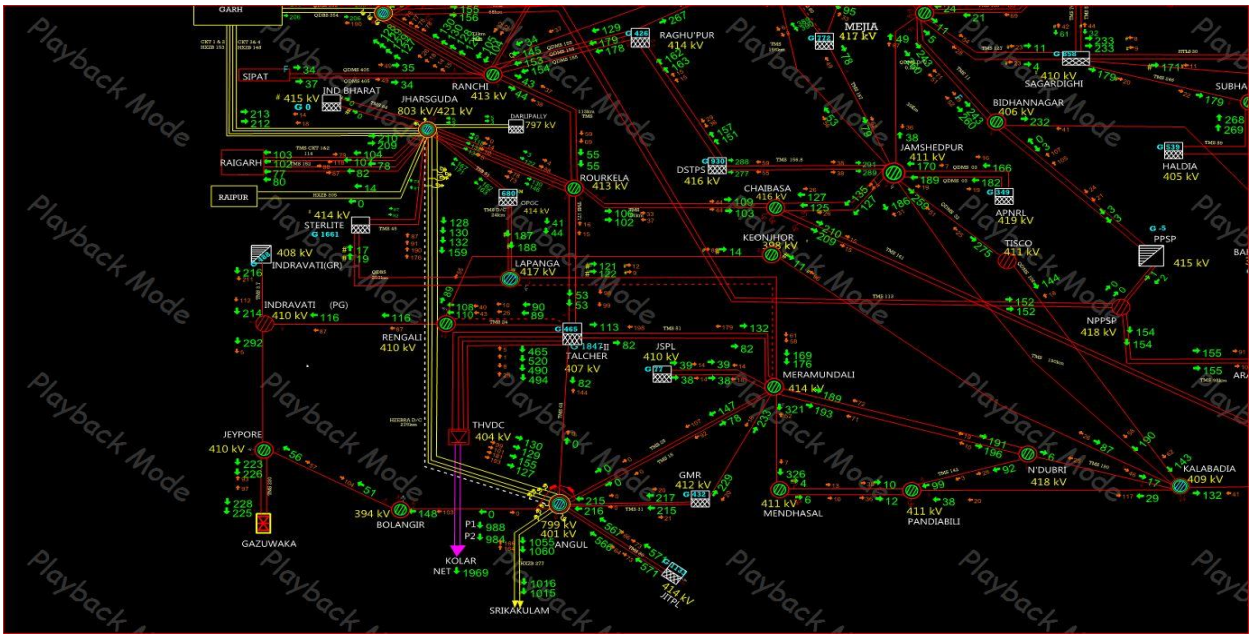


Figure 10 : SCADA Snapshot at 1742 hrs

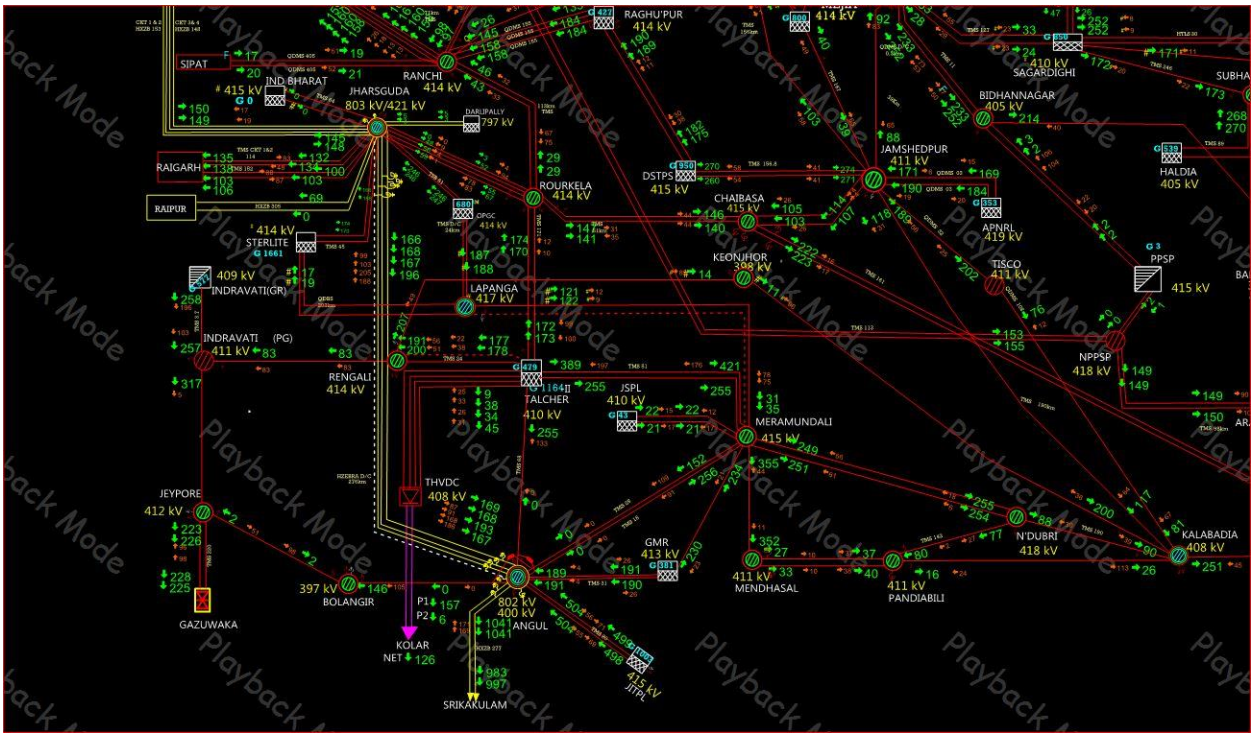


Figure 11 : SCADA Snapshot at 1742 hrs

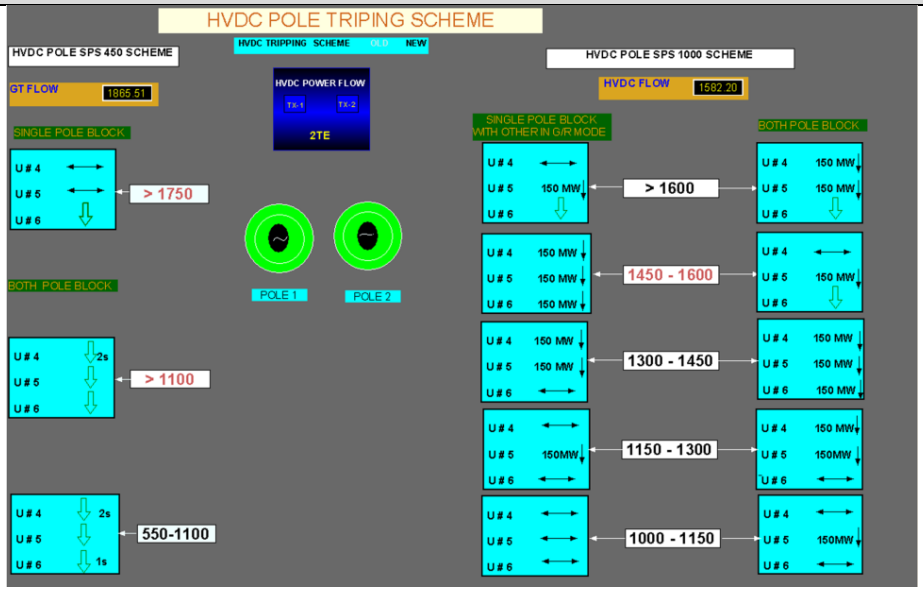
SPS for HVDC Talcher – Kolar at Talcher end

Item	Information
Reporting Party	ERLDC, SRLDC, NLDC, POSOCO
Scheme's Name	SPS for HVDC Talcher – Kolar at Talcher end
Classification	SPS Related to tripping of Single or bi-pole of 500 kV HVDC Talcher-Kolar.
Reference No.	**SPS-1**
Operating Procedure	**SPS 450:** This scheme was originally implemented with a view that Eastern and Western Region would absorb a jerk of 450 MW in the event of tripping of one pole or both poles of HVDC Talcher-Kolar. In this scheme, the generation at Talcher stage II is to be shed to restrict power flow from stage 2 to ER grid within 450 MW. This scheme of SPS at Talcher-Kolar is seldom in operation due to synchronous connection. It is required taken in operation with due coordination of NLDC under any critical outage condition in the rest of the NEW Grid. **SPS 1000:** Post formation of the NEW Grid this scheme was subsequently envisaged in

<table>
<tr><th>Item</th><th colspan="2">Information</th></tr>
<tr><td></td><td colspan="2">order to minimise shedding of generation at Talcher STPP. The basic philosophy of this scheme is to absorb 1000 MW Jerk. However, as one of the prerequisites for arming this scheme Eastern Regional operator has to ensure that sufficient evacuation margin (approx.. 1000 MW) is available at the AC evacuation system of TSTPP which is at present connected with six 400 kV twine moose lines.</td></tr>
<tr><td>Design Objectives</td><td colspan="2">To Relieve impact of tripping of tripping of HVDC Talcher Kolar Poles on NEW Grid and secure operation thereafter</td></tr>
<tr><td>Operation</td><td colspan="2">Generation Reduction in ER</td></tr>
<tr><td rowspan="4">Modelling</td><td colspan="2">SPS 450</td></tr>
<tr><td>Condition</td><td>Action in ER Grid</td></tr>
<tr><td>If HVDC One Pole trips and Net Generation of Talcher Stage 2 >1700 MW</td><td>1. Trip one selected Unit of Talcher Stage 2 (In general Unit 6)
2. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite</td></tr>
<tr><td>If HVDC both Poles trip and Net Generation of Talcher Stage 2 >1100 MW</td><td>1. Trip two selected Units of Talcher Stage 2 (In general Unit 5 and Unit 6)
2. Fast Reduction of 600 MW generation Reduction at GMR, JITPL and Sterlite.
3. Net Generation of Talcher Stage 2 > 550 MW after 250 ms delay, then Trip one more Unit of stage 2 (In general Unit 4)</td></tr>
<tr><td>If HVDC both Poles trip and Net Generation of Talcher Stage 2 is more than 550 and less than 1100 MW</td><td>1. Trip one selected Units of Talcher Stage 2 (In general Unit 5)
2. Fast Reduction of 600 MW generation Reduction at GMR, JITPL and Sterlite.
3. Net Generation of Talcher Stage 2 > 550 MW after 250 ms delay, then Trip one more Unit of stage 2 (In general Unit 4)
4. Net Generation of Talcher Stage 2 > 550 MW after 500 ms delay, then Trip one more Unit of stage 2</td></tr>
</table>

Item	Information	
		(In general Unit 6)
	SPS 1000	
	For One Pole tripping and other pole in Metallic Return Mode	
	Condition	**Action in ER Grid**
	If One HVDC Pole Blocks With remaining Pole On Metallic Return Mode	Fast Reduction of 600 MW generation at GMR, JITPL and Sterlite.
	For One Pole tripping and the other pole in Ground Return Mode(GRM) of Operation (150 MW)	
	Condition	**Action in ER Grid**
	If One HVDC Pole Blocks With remaining Pole On Metallic Return Mode	Fast Reduction of 600 MW generation at GMR, JITPL and Sterlite.
	If the HVDC Power Flow is between 1450 MW - 1600 MW & One Pole Blocks With remaining Pole On Ground Return Mode	1. Fast reduction of 150 MW in Unit 4, 5 and 6 each in Talcher stage 2. 2. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	If the HVDC Power Flow is between 1300 MW - 1450 MW & One Pole Blocks With remaining Pole On Ground Return Mode	1. Fast reduction of 150 MW in each of Unit 4 and 5 of Talcher stage 2. 2. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	If the HVDC Power Flow is between 1150 MW - 1300 MW & One Pole Blocks With remaining Pole On Ground Return Mode	1. Fast reduction of 150 MW in Unit 5 of Talcher stage 2. 2. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	If the HVDC Power Flow is between 1000 MW - 1150 MW & One Pole Blocks With remaining Pole On Ground Return Mode	1. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	If Both HVDC poles trip	

Item	Information	
	Condition	**Action in ER Grid**
	If the HVDC Power Flow was more than 1600 MW & Both Poles Block	1. Trip one selected Unit of Talcher Stage 2 (In general Unit 6) 2. Fast reduction of 150 MW in Unit 4 and 5 each of Talcher Stage 2. 3. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	If the HVDC Power Flow was between 1450 MW - 1600 MW & Both Poles Block	1. Trip one selected Unit of Talcher Stage 2 (In general Unit 6) 2. Fast reduction of 150 MW in Unit 5 of Talcher Stage 2.. 3. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	If the HVDC Power Flow was between 1300 MW - 1450 MW & Both Poles Block	1. Fast reduction of 150 MW in Unit 4, 5 and 6 each of Talcher Stage 2. 2. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	If the HVDC Power Flow was between 1150 MW - 1300 MW & Both Poles Block.	1. Fast reduction of 150 MW in Unit 4 & 5 each of Talcher Stage 2. 2. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	If the HVDC Power Flow was between 1000 MW - 1150 MW & Both Poles Block.	1. Fast reduction of 150 MW in Unit 4 & 5 each of Talcher Stage 2. 2. Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	If the HVDC Power Flow was between 500 MW - 1000 MW & Both Poles Block.	Fast Reduction of 600 MW generation Reduction at GMR ,JITPL and Sterlite
	SPS Signal for Pole tripping Generated of HVDC : HVDC Talcher Substation (PGCIl) and transmissted to NTPC Talcher Substation **SPS of Generation Tripping and reduction at NTPC Talcher :** NTPC Talcher receives signal for Pole tripping information along with Power Order. Based on this, internal logic for Generation Trip /Back down has been implemented.	

Item	Information
	 **SPS at GMR-JITPL:** Talcher NTPC also extends signal to GMR and JITPL and on receipt of that, they also perform backing down at respective plant.
Original In-Service Year	At the time of commissioning of HVDC-Talcher-Kolar
Recent Assessment Group	CEA
Recent Assessment Date	

List of important transmission lines in ER which tripped in February-2020 — Annexure-B12

S.NO	LINE NAME	TRIP DATE	TRIP TIME	Relay Indication LOCAL END	Relay Indication REMOTE END	Reason	Fault Clearance time in msec	Remarks	DR/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END
1	220KV-BUDHIPADAR-KORBA-3	07-02-2020	02:56	Master trip		Master trip at Budhipadar	--	No fault observed in PMU	NO	NO
2	400KV-PATNA-BALIA-2	19-02-2020	22:09	O/V stage 1, DT sent at Patna	DT receipt at Balia	O/V stage-1 at Patna	--	SCADA Voltage 422 KV	NO	NO
3	400KV-MERAMUNDALI-LAPANGA-2	27-02-2020	14:56		Tripped from Lapanga end only	Tripped from Lapanga end only	--		NO	NO
4	400KV-MAITHON-MAITHON RB-2	26-02-2020	09:58	DT received at Maithon		DT received at Maithon	--	DR not properly configured	YES	YES
No A/R Operation										
1	400KV-BINAGURI-KISHANGANJ-1	05-02-2020	15:11	R-N, 41KM, 1.85KA, A/R SUCCESSFUL	R-N, 86KM, 4.6KA	R-N Fault	< 100 msec	No A/R operation from Kishanganj	YES	YES
2	220KV-NEW PURNEA-MADHEPURA-2	24-02-2020	04:35	BN, 3.39 KA, 18.9 KM, A/R Successful	BN, Z1, 73.2 KM		< 100 msec	No A/R operation at Madhepura	YES	NO
3	220KV-DEHRI -GAYA-2	25-02-2020	09:55	R-N,3.2 KA	A/R SUCCESSFULL,R-N		< 100 msec	No A/R operation	YES	YES
4	400KV-ALIPURDUAR (PG)-BINAGURI-3	25-02-2020	17:04	B_N,4.99 kA, AR successful	B_N, 85.4 KM, 2.49 kA		--	No A/R operation at Binaguri	NO	YES
5	400KV-DURGAPUR-SAGARDIGHI-2	26-02-2020	09:58	R-N fault, 2.1 KA, Z-2,146 km			< 100 msec	No A/R operation, As per DR line did not trip from Durgapur	YES	NO
6	400KV-MEERAMUNDALI-MENDHASAL-II	28-02-2020	14:01	R-N, Z1, 73.14 km, 4.016 kA	R-N, Z1, 32.5 km, 5.43 kA		< 100 msec	No A/R operation	YES	NO
A/R related issue										
1	400KV-GAYA-KODERMA-2	25-02-2020	09:19	At Gaya:B-N,6.33 KA,49.16 KM			< 100 msec	Different timimng of A/R at both end	YES	NO
2	400KV-JHARSUGUDA(GIS)-OPGC-2	28-02-2020	12:56	JSG: B-N, 39.63Km, 9.02KA			< 100 msec	Different timimng of A/R at both end	YES	NO
3	400KV-PATNA-KISHANGANJ-1	22-02-2020	05:07	Patna: B-N, 181.241Km, 4.632KA	KSN: B-N, 164.792KM, 4.942KA		< 100 msec	3ph fault as per PMU , A/R attempt	NO	NO
4	400KV-PATNA-KISHANGANJ-2	22-02-2020	05:07	Patna: Y-N, 142.178Km, 2.696KA	KSN: Y-N, 110.09Km, 2.887KA		< 100 msec	3ph fault as per PMU , A/R attempt	NO	NO
5	400KV-PATNA-KISHANGANJ-1	24-02-2020	00:49	77 KM 5 KA Y-N	179 KM 1.59 KA Y-N		< 100 msec	Kishanganj : A/R in 2000 msec	NO	NO
6	400KV-PATNA-KISHANGANJ-2	24-02-2020	01:35	Y_N, FD 125 KM 3.27 KA	140 KM 1.93 KA Y-N		< 100 msec	Kishanganj : A/R attempt after fault in reclaim time	NO	NO

Annexure-B13

Sr No	Date	Time	Name	end	issue
1	05-02-2020	15:11	400 kV Kishangunj Binaguri - 1	Kishangunj	Post fault DR time window less than 1.1 sec; A/R operaton not properly captured; Y and B phase T CB remained open prior to the tripping;
2	16-02-2020	04:11	400 kV Binaguri - New Purnea -1	Binaguri	DR not properly configured
3	16-02-2020	04:11	400 kV Binaguri - New Purnea -1	New Purnea	Main II protection not operated as per main I DR
4	16-02-2020	04:15	400 kV Binaguri - New Purnea -2	Binaguri	DR not properly configured
5	19-02-2020	09:16	400 kV Binaguri - Alipurduar - 3	Binaguri	Whether line tripped by main I or main II protection? If tripped by main II, main II DR required. Z-I trip did not pick up in main I DR, in case of successful A/R operation
6	23-02-2020	20:24	132 kV Chujachen - Rangpo - 1	Chujachen	DR not properly configured
7	24-02-2020	04:34	220 kV New Purnea - Madhepura 2	New Purnea	Breaker operation is not configured in DR
8	25-02-2020	17:04	400 kV Binaguri - Alipurduar - 3	Binaguri	In main I DR, no reason of tripping recorded; Main II DR not received
9	25-02-2020	09:19	400 kV Gaya - Koderma - 2	Gaya	Post fault DR time window around 1.5 seconds, tie breaker A/R operation not properly captured; Even after tripping of main breakers and remaining poles of tie breakers, A/R operation of B pole tie breaker took place
10	26-02-2020	09:58	400 kV MPL - Maithon - 2	Maithon	DR not properly configured
11	26-02-2020	09:58	400 kV MPL - Maithon - 2	MPL	Reason of tripping not recorded in DR

12	28-02-2020	14:01	400 kV Meramundali - Mendasal - 2	Meramundali	DR not properly configured, No breaker operation was recorded
13	28-02-2020	12:56	400 kV IB - Sundargarh - 1	Sundargarh	DR not properly configured, DR time window to be increased

पावर सिस्टम ऑपरेशन करपोरेशन लिमिटेड
(भारत सरकार का उद्यम)
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(A Government of India Enterprise)
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CIN: U40105DL2009GOI188682
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Incident No. 08-02-2020/1 **Dtd: 27-02-2020**

Report on the incident in Eastern Region involving DVC system

1) **Date / Time of disturbance:** 08-02-2020, 01:55 hrs.

2) **Systems/ Subsystems affected:** RTPS and Andal (DSTPS)

3) **Antecedent condition:** 400 kV Andal – Jamshedpur 1 I is under planned outage since 03-02-2020. 400 kV Maithon – RTPS S/C tripped at 01:53 hrs prior to the incident due to DT received from Maithon.

400 kV feeder distribution of RTPS:

400 kV Bus 1	400 kV Bus 2
Maithon	Ranchi - 1
Ranchi – 2	Ranchi - 3
Andal – 1	Andal -2
Unit -2	50 MVAr B/R
50 MVAr B/R	Unit 1

400 kV feeder distribution of Andal:

400 kV Bus 1	400 kV Bus 2
RTPS – 2	RTPS – 1
Jamshedpur - 2	Jamshedpur – 1
Unit -1	ST -1
ST - 2	Unit - 2

4) **Major elements tripped:**

- 400 kV RTPS – Ranchi # I & III
- 400 kV Andal – RTPS D/C

5) Network across the affected area

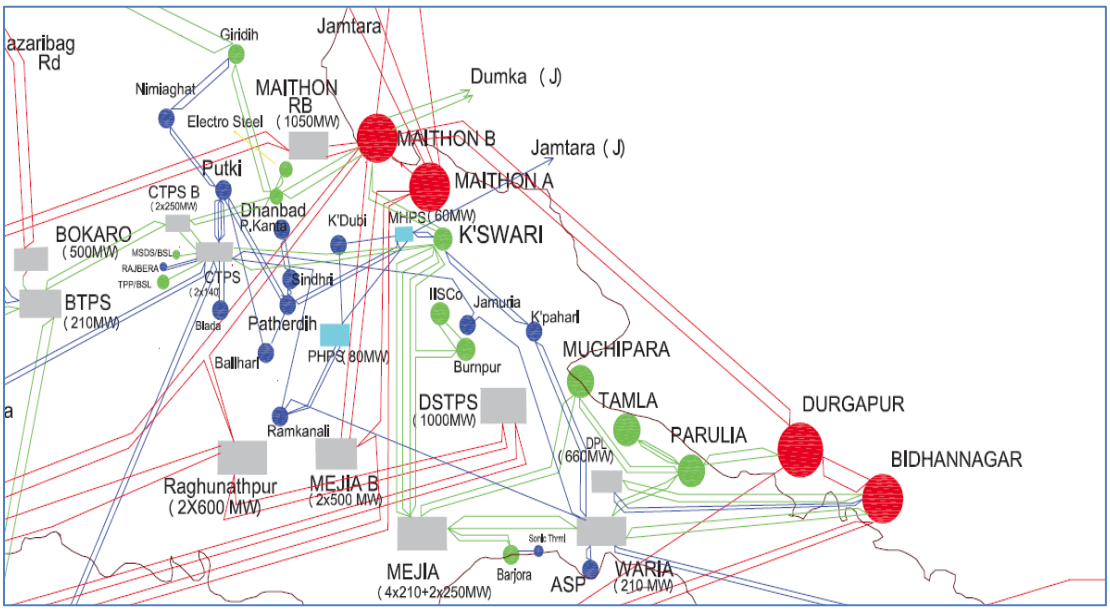

Figure 1: Network across affected area

6) Detailed Analysis:

- 400 kV Andal – Jamshedpur ckt 1 is under planned outage since 03-02-2020. 400 kV Maithon – RTPS S/C tripped at 01:53 hrs prior to the incident due to DT received from Maithon.
- At around 01:55 hrs, due to BO9 error of Bus bar protection (Binary output card error) at 400 kv RTPS substation, DT signal was sent to the remote end for 400 kV RTPS – Ranchi # 1 & 3 and 400 kV Andal – RTPS D/C resulting tripping of these circuits.
- With this, 400 kv RTPS generation was being evacuated through only available 400 kV RTPS – Ranchi ckt 2 and 400 kV Andal (DSTPS) Generation via 400 kV Andal-Jamshedpur circuit 2.

Name of the Element	Relay indication at end 1	Relay indication at end 2
400 kV RTPS – Ranchi # 1 & 3	Did not trip	DT received
400 kV Andal – RTPS D/C	DT received	Did not trip

7) SOE captured during the event:

TIME	MILLI_SEC	OSI_KEY	STATION	DESCRIPTION	STATUS
08-02-2020 01:53	766	01D1C008	RAGHU_DV	400_MAITH_PG_MP1	Closed
08-02-2020 01:53	917	01D1C008	RAGHU_DV	400_MAITH_PG_MP1	Open
08-02-2020 01:55	506	01D1C016	RAGHU_DV	400_RANCH_PG_3_LBB	Open
08-02-2020 01:55	942	01D1C022	RAGHU_DV	400_DSTPS_DV_2_LBB	Open

8) Event logger captured in BCU at RTPS:

Type	Date & Time	Signal name	Status
S	2/8/2020 1:55:20:222 AM	BOM9-Error	On

9) Restoration:

- 400 kV Ranchi – RTPS # 1 was restored at 02:22 hrs
- 400 kV Ranchi – RTPS # 3 was revived at 02:24 hrs.
- 400 kV Andal – RTPS D/C was normalized at 02:33 hrs & 02:43 hrs respectively.

10) Load and Generation loss:

No load or generation loss occurred in this incident. RTPS generation (around 330 MW) was evacuated through 400 kV RTPS – Ranchi ckt 2 and Andal generation (around 640 MW) was evacuated through 400 kV Andal – Jamshedpur ckt 2 after the event. **Around 1000 MW generation loss would have occurred if these two circuits have got tripped causing a major disturbance.**

11) Noncompliance and discrepancies observed:

1. 400 kV Andal – RTPS 1 and 400 kV Ranchi – RTPS # 1 & 3 were connected to bus 1 at RTPS and 400 kV Andal – RTPS 2 was connected to bus 2 at RTPS. The reason for the tripping of all four feeders due to the BCU problem may be explained by DVC.
2. Reason for tripping of 400 kV Maithon – RTPS S/C may be explained by POWERGRID ERTS-II.
3. Remedial action taken after the event may be explained by DVC.

Issues	Regulation Non-Compliance	Utility
Non-Submission of Details for the tripping which is required for appropriate analysis for GD/GI	1. IEGC 5.2 (r), 5.9.6.c (VI) 2. CEA grid Standard 15.3 3. CEA (Technical standards for connectivity to the Grid) Regulation, 2007-6. 4.d	POWERGRID ERTS - II
Incorrect/ mis-operation / unwanted operation of Protection system	1. CEA Technical Standard for Construction of Electrical Plants and Electric Lines: 43.4 .A. 2. CEA (Technical standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1. (6.1, 6.2, 6.3)	POWERGRID ERTS – II, DVC

12) Status of Reporting:

DR/EL yet to be received from POWERGRID ER-II.

ANNEXURE-C1

Sl No.	Name of the incidence	PCC Recommendation	Latest status
88th PCC Meeting			
1.	Disturbance at 220 kV Maithon(PG) Substation on 25.01.2020 at 15:14 Hrs.	PCC advised Powergrid to replace the relay with numerical relay.	
2.	Tripping of 220 KV Gaya Sonenagar D/C on 13.01.2020 at 00:40 Hrs.	PCC advised BSTPCL take the following corrective actions: • Send the PSL logic and relay setting file to ERPC Secretariat. • DR synchronisation need to be reviewed.	
3.	Tripping of 400 kV Teesta V – Rangpo D/C on 05.01.2020 at 20:04 Hrs.	PCC advised NHPC to take following corrective actions: • Revise their Zone-4 time settings to 500 ms. • 400kV Teesta-V – Rangpo Ckt-I distance protection input needed to be checked.	
87th PCC Meeting			
1.	Tripping of 220 KV Darbhanga (DMTCL) – Motipur I on 14.12.2019 at 02:50 Hrs.	PCC advised BSPTCL to take following corrective actions: - • Digital signals configuration of relays at Motipur end need to be checked. • Over voltage settings of relay at Motipur end need to be reviewed.	
2.	Tripping of 132 kV Dumka – Lalmatia D/C on 09.12.2019 at 11:35 hrs	PCC advised JUSNL to collect DRs and discuss above issue with the SLDC and send the details to ERPC/ERLDC.	

		PCC advised NTPC to share the DR at Lalmatia end. In 88th PCC meeting JUSNL informed that they did not got the reply from SLDC Jharkhand yet	
83rd PCC Meeting			
1.	Total power failure at 220 kV Darbhanga (BSPTCL) S/s on 16.08.2019 at 22:23 Hrs.	PCC observed that DR configuration at DMTCL end is not in order. PCC advised DMTCL to configure the DR settings as per the standard. In 87th PCC meeting, DMTCL informed that DR would be configured by end of February, 2020.	
81st PCC Meeting			
1.	Disturbance at 400 kV Dikchu S/s on 30.06.2019 at 09:55 Hrs.	The time setting for the DEF relay at Jorethang end was 500 msec. PCC advised Jorethang to review the timer setting of DEF protection at Jorethang end. PCC advised Chuzachen to review the zone settings for 132 kV Chuzachen-Rangpo line. PCC advised TPTL to do line patrolling for 400 kV Rangpo-Dikchu line to find out the cause of such high resistive fault in the line. In 87th PCC meeting, Chuzachen informed that they have asked for information related to Rangpo end from Powergrid and Sikkim. Further, Chuzachen informed that they would send the zone setting file to ERPC/ERLDC at the earliest.	
2.	Disturbance at 220 kV Budhipadar(OPTCL) S/s on 12.06.2019 at 00:37 Hrs.	PCC advised OPTCL to properly configure the DRs for 220 kV Budhipadar – Korba D/C & 220 kV Budhipadar-Raigarh circuit at Budhipadar end and for 220 kV Budhipadar – Lapanga - II at Lapanga end as per the DR	

		standard finalised in 79th PCC Meeting. PCC also advised OPTCL to check the time synchronization. In 3rd TeST meeting, OPTCL informed that they had replaced the old relay at Korba. In 87th PCC meeting, OPTCL informed that DR for Budhipadar – Korba Circuit-I has been configured.	