Agenda
for
92nd PCC Meeting

Date: 22.07.2020
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

AGENDA FOR 92ND PROTECTION SUB-COMMITTEE MEETING TO BE HELD ON 22.07.2020 AT 10:30 HOURS

PART – A

ITEM NO. A.1: Confirmation of minutes of 91st Protection sub-Committee Meeting held on 24th June 2020 at ERPC, Kolkata.

The minutes of 91st Protection Sub-Committee meeting held on 24.06.2020 circulated vide letter dated 13.07.2020 .

Members may confirm the minutes of 91st PCC meeting.

PART – B

FOLLOW-UP OF DECISIONS OF 91st PCC MEETING:

ITEM NO. B.1: Disturbance at 220 k V Darbhanga Substation on 05.05.2020 at 19:09 hrs.

On 5th May 2020, at 19:09 Hrs, 220 kV Darbhanga (DMTCL)-Darbhanga (BSPTCL) D/C tripped on Y phase to earth fault. At the same time 220 kV Dharbanga-Mushahari-1 also tripped resulting in load loss at Darbhanga, Madhubani and Pandaul. Later on it was informed by BSPTCL that there was a Y-phase jumper snapping of 220 kV Darbhanga (DMTCL)-Darbhanga (BSPTCL) - 2 which was the root cause of the event.

In 91st PCC, BSPTCL informed that snapping of Y-phase jumper of 220 kV Darbhanga (DMTCL)-Darbhanga (BSPTCL) circuit 1 was the root cause of the event. The line was tripped from BSPTCL end on zone 1 but with 600 msec delay.

BSPTCL explained that there could be delay in circuit breaker operation.

DMTCL informed that fault was on 220 kV Darbhanga (DMTCL)-Darbhanga (BSPTCL) circuit 2 near to BSPTCL end. The line got tripped from DMTCL end on zone 1. No fault pickup was observed for line 1.

After detailed deliberation, PCC observed that there could be confusion in nomenclature at BSPTCL and DMTCL end. PCC advised BSPTCL and DMTCL to check nomenclature of circuit 1 and circuit 2 on both sides and confirm it by today.

PCC also observed that LBB should be operated after 200 ms in case of delay in Circuit Breaker operation. PCC advised BSPTCL to test the Circuit Breaker, LBB operation and verify the distance relay settings of circuit 1 and circuit 2 and submit a detailed report to ERPC and ERLDC.

BSPTCL may update.

ITEM NO. B.2: Total Power failure at 220 k V Sonenagar Substation on 10.05.2020 at 22:51 hrs.

220 kV Gaya-Sonenagar – D/C tripped at 22:51 hrs due to R phase to earth fault resulting total power failure at Sonenagar S/S. Around 130 MW load loss was reported at Aurangabad,

Sonenagar, Rafi Ganj, Japla. Around 15 MW traction load loss was reported at Japla, Garwah and Rafi Ganj.

In 91st PCC Meeting, BSPTCL informed that 220 kV Gaya-Sonenagar line -I tripped from Sonenagar end in Zone 1 due to R phase to earth fault and 2kA fault current was observed.

Powergrid informed that 220 kV Gaya-Sonenagar line -II tripped on R-N fault and auto-reclose was successful.

ERLDC informed that there was much delay in restoration of circuit 2 as it was restored on next day at 12:24 hrs.

PCC advised BSPTCL to check the PLCC and autoreclose relay at Sonenagar end. PCC also advised BSPTCL to check the line parameters and relay reach settings and send detailed report to ERPC and ERLDC by next week.

BSPTCL may update.

ITEM NO. B.3: Total Power failure at 220/132 kV Chaibasa Substation on 06.05.2020 at 01:19 hrs.

At 01:13 hrs 400/220 kV ICT 1 & 2 at Chaibasa (PG) tripped from 220 kV side due to mal-operation of back up impedance relay. At 01:19 hrs, 220 kV Chaibasa (JUSNL) – Chaibasa (PG) D/C and 220 kV Chaibasa (JUSNL) – Ramchandrapur D/C tripped due to R phase to earth fault resulting in total power failure at 220/132 kV Chaibasa (JUSNL) S/S. 132 kV Rajkharswan – Goelkhera S/C also tripped at same time.

In 91st PCC, JUSNL explained that there was a R-N fault in 220 kV Chaibasa(JUSNL) – Ramchandrapur circuit 1 near to Chaibasa end. Chaibasa end identified the fault in zone 1 and issued trip command to respective circuit breaker to clear the fault. But circuit breaker at Chaibasa end failed to open. Both circuits of 220 kV Chaibasa(JUSNL) – Ramchandrapur tripped from Ramchandrapur on zone 2. 220 kV Chaibasa(JUSNL)- Chaibasa (PG) line 1 tripped from JUSNL end on zone 4 within 300 ms.

Powergrid explained that there was another fault (R-Y-B fault) simultaneously occurred in 220 kV Chaibasa(JUSNL)- Chaibasa (PG) line 1. The fault was cleared by line differential protection from PG end. But overvoltage protection also operated which was inadvertently kept enabled. 400/220 kV ICT 1 & 2 at Chaibasa (PG) were also tripped within 60 ms from 220 kV side due to incorrect relay settings.

Powergrid added that over voltage settings of line differential protection and relay settings of 400/220 kV ICT 1 & 2 have been reviewed after the disturbance.

JUSNL failed to explain how the fault in 220 kV Chaibasa – Ramchandrapur circuit 1 got cleared from 220kV and 132 kV side protection system.

PCC opined that since circuit breaker of Chaibasa (JUSNL) end failed to clear the fault in 220 kV Chaibasa – Ramchandrapur circuit 1, the fault should be cleared from 220/132 kV ATRs or 132kV transmission line backup protection. PCC observed that SLDC, JUSNL was not present the meeting and not submitted any report on trippings.

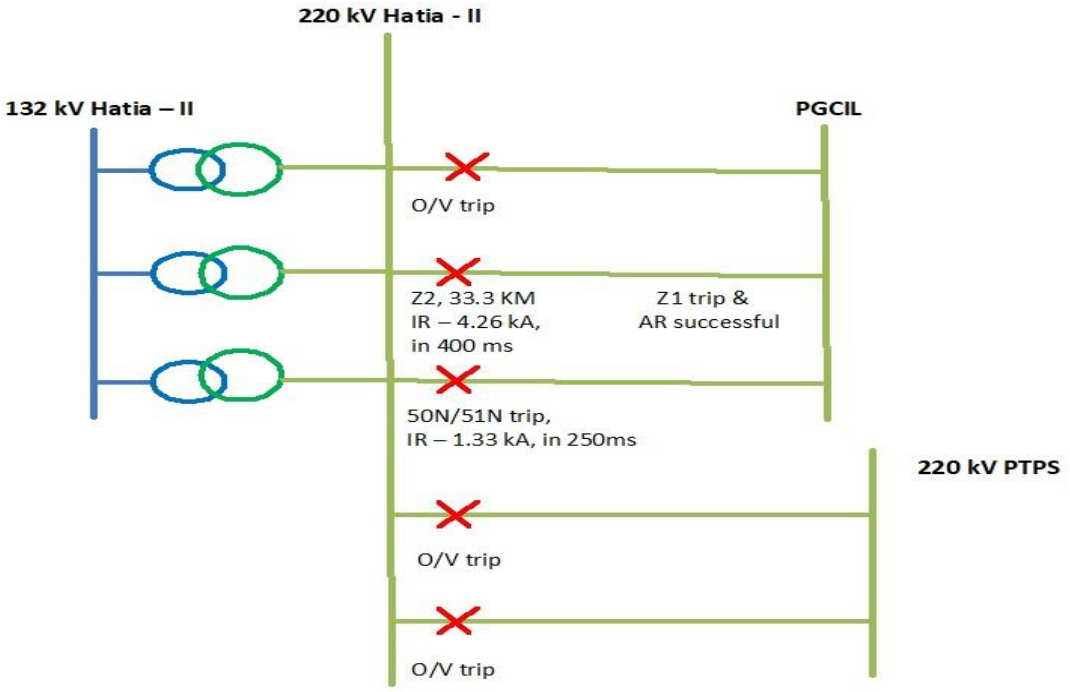
After detailed deliberation, PCC advised JUSNL to take the following action and submit a report to ERPC and ERLDC:

- *SLDC, Jharkhand should check any tripping in 132kV system during this disturbance*
- *CB of Chaibasa(JUSNL) end of 220 kV Chaibasa – Ramchandrapur circuit 1 to be tested*
- *Zone 4 tripping time (300 ms) of 220 kV Chaibasa(JUSNL)- Chaibasa (PG) line 1 from Chaibasa(JUSNL) is not in order. The same needed to be verified and corrected.*
- *Protection system of 220/132 kV ATRs and 132kV transmission lines to be tested*

JUSNL may update.

ITEM NO. B.4: Total Power failure at 220/132 k V Hatia Substation on 14.05.2020 at 15:33 hrs

220 kV Ranchi Hatia T/C, 220 kV Patratu-Hatia D/C and 220/132KV 150MVA ICT-1, 2 and 3 at Hatia tripped at same time resulting in total power failure at 220/132 kV Hatia S/S. In Jamshedpur PMU data, one R phase to earth fault has been captured. Fault was cleared at around 400 ms.



In 91st PCC, JUSNL explained that there was a transient fault in 220 kV Hatia(II) – Ranchi (PG) circuit 2 due to bad weather, the line got tripped on zone 2 from JUSNL end and on zone 1 from Powergrid end.

Powergrid explained that auto-reclose was successful for 220 k V Hatia(II) – Ranchi (PG) circuit 2 at Ranchi end.

JUSNL added that 220 kV Hatia(II) – Ranchi (PG) circuit 3 got tripped from JUSNL end on 50N/51N within 250 ms. JUSNL further added that 220 kV Hatia(II) – Ranchi (PG) circuit 1 and 220 kV Patratu-Hatia D/C got tripped due to overvoltage protection from JUSNL end.

PCC advised JUSNL to check the following and submit a report to ERPC and ERLDC:

- *Verify the reason for non-operation of autorecloser and carrier inter tripping of 220 kV Hatia(II) – Ranchi (PG) circuit 2 from Hatia end*
- *Verify settings of backup overcurrent protection related to false tripping of 220 kV Hatia(II) – Ranchi (PG) circuit 3.*
- *Verify overvoltage settings of 220 kV Hatia(II) – Ranchi (PG) circuit 1 and 220 kV Patratu-Hatia D/C at Hatia especially pickup to drop off ratio.*

PCC observed that as per the DR the voltage was went upto 190 kV (phase to ground) and opined that SLDC, Jharkhand should take necessary action to control the over voltage in their system so that unwanted trippings of the lines could be avoided.

ITEM NO. B.5: Disturbance at 220 k V TTPS Substation on 18.05.2020 at 0:53 hrs.

220 kV TTPS – PTPS S/C tripped from PTPS end only on B phase to earth fault. 220 kV TTPS –

PTPS S/C, unit 2 at TTPS and station transformer 2 at TTPS were connected to 220 kV bus 2 at TTPS. So, both the running units at TTPS and 220 kV bus coupler at TTPS (tripping of bus coupler was verbally informed by TTPS) tripped to clear the fault. 220 kV TTPS – Bihar Sharif S/C and 220 kV bus 1 at TTPS did not trip during this event.Gen Loss: 749 MW

In 91st PCC, JUSNL explained that 220 k V TTPS – PTPS S/C tripped in zone 2 from PTPS end only due to B phase to earth fault. They added that on inspection no physical fault was found in the line.

TVNL explained that both the running units at TTPS and 220 kV bus coupler at TTPS tripped, more than 3kA current was observed at TTPS but line protection of 220 k V TTPS – PTPS S/C was not operated.

PCC opined that distance protection at TTPS end must had operated either in zone 1 or zone 4. PCC advised TTPS to verify the location of the fault once again and advised to submit the distance relay settings to ERPC and ERLDC.

PCC also advised TTPS to test the healthiness of the relay.

TTPS may update.

ITEM NO. B.6: Disturbance at 220 k V Jorethang and 220 k V Tashiding Substation on 27.05.2020 at 04:28 hrs.

220 kV New Melli - Jorethang - 1 tripped on Y phase to earth fault from Jorethang end. 220 kV New Melli - Jorethang - 2 tripped on overcurrent protection from Jorethang end only. At same time 220 kV Tashiding - New Melli S/C and 220 kV Tashiding - Rangpo S/C tripped from Tashiding end only on Y phase to earth fault.

Tripping of more than one circuits due to single fault is very common in 220 kV JLHEP – New Melli – Tashiding HEP – Rangpo section. Similar type of events has occurred on 16th January 2020, 25th February 2020, 01st April 2020 followed by loss of hydro generation. Due to variable hydro generation and high resistance of the fault, configuration of distance protection setting may be very challenging. Possibility of differential protection system may be explored for this section. JLHEP, THEP and POWERGRID may kindly review this for betterment of system.

Polarity of distance protection relay at Tashiding end of 220 kV Tashiding – Rangpo S/C may be reviewed. O/C protection setting at JLHEP may be reviewed also

Relay Indications:

Line name	End 1	End 2	PMU observation
220 kV Jorethang - New Melli -1	Y-N, Zone-1, IR=0.2 kA IY=1.7 kA, IB=0.3 kA	Y-N, Zone – 1, A/R successful	Around 25 kV dip has been observed in Y phase voltage at Rangpo PMU. Fault clearing time is less than 100 ms.
220 kV Jorethang - New Melli -2	O/C, IR=0.1 kA, IY=0.1 kA, IB=0.1 kA	Did not trip, Zone – 3 start in Y phase	
220 kV Tashiding - New Melli S/C	Y-N, Zone-1, 10.64 km, F/C 2.4 kA	Did not trip	
220 kV Tashiding - Rangpo S/C	Y-N, Zone-1, 28 km, F/C 1.75 kA	Did not trip	

In 91st PCC, DANS Energy informed that due to thunderstorm, 220 kV Jorethang - New Melli -1 got tripped from both ends. Because of low overcurrent setting, 220 kV Jorethang - New Melli -2 also tripped from Jorethang. The relay settings of 220 kV Jorethang - New Melli D/C lines were reviewed incoordination with ERPC and ERLDC and implemented the revised settings on 06-06-2020.

PCC observed that 220kV Tashiding – Rangpo S/C line tripped from Tashiding end is not in order PCC advised DANS ENERGY to verify the polarity and reach settings of distance protection relay at Tashiding end of 220 kV Tashiding – Rangpo S/C.

PCC also observed that 220kV lines under the jurisdiction of Govt. of Sikkim were not being maintained properly as a results repeated faults are being occurred due to lot of vegetation.

PCC advised Sikkim to take necessary action to avoid repeated faults in the lines.

Members may discuss.

ANALYSIS & DISCUSSION ON GRID INCIDENCES OCCURRED IN JUNE 2020.

ITEM NO. B.7: Disturbance at 220 k V Darbhanga S/S on 10.06.2020 at 10:54 hrs.

On 10th June 2020, at 10:54 Hrs, 220 kV Darbhanga (DMTCL)-Darbhanga (BSPTCL) D/C tripped from BSPTCL end. At the same time 220 kV Darbhanga (BSPTCL) – Mushahari – 1 and 220 kV Darbhanga (DMTCL) – Motipur – 1 also tripped resulting in load loss at Darbhanga, Madhubani and Pandaul.

Load Loss: 135 MW

BSPTCL and DMTCL may explain

ITEM NO. B.8: Disturbance at 220 kV Joda Substation on 23.06.2020 at 11:58 hrs

At 11:41 hrs 220 kV Joda – TTPS D/C tripped on B phase to earth fault. At 11:57 hrs, 220 kV Ramchandrapur – Joda S/C tripped on overload. Prior to the tripping, power flow was 160 MW. At same time 220 kV Joda JSPL (Jindal) – Jamshedpur S/C tripped at same time from Ramchandrapur and Jamshedpur end respectively in overcurrent protection.

At 11:41 hrs 220 kV Joda – TTPS D/C tripped on B phase to earth fault. Fault clearing time was less than 100 ms. As per relay indication received, 220 kV Joda – TTPS – 1 tripped from TTPS end in zone -1. So, it is suspected fault was at this line. 220 kV Joda TTPS – 2 tripped at same time from Joda end only. Details of protection operated at Joda end for both 220 kV TTPS feeders are not mentioned in OPTCL report. OPTCL informed current was around 0.4, 0.2 and 0.6 kA in R, Y and B phases respectively at Joda end for 220 kV TTPS - 2 feeder. Neutral current was around 0.6 kA at Joda end of 220 kV Joda – TTPS feeder. OPTCL may share the reason for 220 kV Joda – TTPS - 2 at Joda end. After tripping of 220 kV Joda – TTPS D/C, power flow through 220 kV Ramchandrapur Joda S/C increased to 160 MW from 60 MW and power flow through 220 kV JSPL – Joda S/C decreased from around 90 MW to 30 MW. MW power flow through 220 kV Jamshedpur - JSPL- Joda shows that power flow reversed after the tripping of 220 kV Joda - TTPS - S/C at 11:41 hrs. Earlier around 60 MW power was flowing towards Jamshedpur. After the tripping, around 30 MW power was flowing from Jamshedpur to Jindal (around 30 MW was power was flowing towards Jindal from Joda at this time). At 11:57 hrs, 220 kV Ramchandrapur – Joda S/C and 220 kV Joda – JSPL - Jamshedpur S/C tripped from remote end on O/C protection. Prior to the tripping power flow through 220 kV Ramchandrapur – Joda S/C and 220 kV Joda – JSPL S/C was 160 MW (as per DR recorded at Ramchandrapur end current in 3 phases was around 440 A, refer to Annexure 2) and 30 MW respectively Joda end as per ERLDC SCADA data. Around 30 MW power was flowing from Jamshedpur (DVC) to Jindal prior to the tripping. As per relay indication, current in all three phases of 220 kV Joda – JSPL – Jamshedpur S/C at Jamshedpur end was less than 0.5 kA prior to the tripping. Current in 220 kV Joda – Ramchandrapur S/C was around 0.1, 0.4 and 1.1 kA at Ramchandrapur end in R, Y and B phases respectively. No voltage dip has been observed at Jamshedpur PMU at this time. JUSNL and DVC may share DR recorded at Ramchandrapur and Jamshedpur end along with

reason of 220 kV Ramchandrapur – Joda and 220 kV Jamshedpur – JSPL – Joda from Jamshedpur end.

No SOE recorded at the time of the event. GRIDCO SLDC/OPTCL are requested to check this issue
OPTCL may share the reason for 220 kV Joda – TTPS - 2 at Joda end. JUSNL and DVC may share DR recorded at Ramchandrapur and Jamshedpur end along with reason for tripping of 220 kV Ramchandrapur – Joda and 220 kV Jamshedpur – JSPL – Joda from Jamshedpur end

Relay Indications :

Time	Element Name	End 1	End 2	PMU observation
11:41 Hrs.	220 kV Joda – TTPS - 1	B-N, F/C 1.16 kA	B-N, Zone -1, F/C 1.8 kA, 69 km from TTPS	Around 2 kV voltage dip observed in B phase at Jamshedpur PMU at the time of tripping of 220 kV Joda – TTPS D/C. Voltage dip in R and Y phase was around 0.5 kV at Jamshedpur PMU. Fault clearing time was less than 100 ms. During the tripping at 11:57 hrs, no significant voltage dip has been observed in Jamshedpur PMU data
11:41 Hrs.	220 kV Joda – TTPS - 2	B-N, IR = 0.4kA, IY = 0.2kA, IB = 0.6kA, IN = 0.6kA	Did not trip	
11:57 Hrs.	220 kV Joda - Ramchandrapur S/C	Did not trip	O/C, Zone-3, 241km IR = 0.1kA, IY = 0.5kA, IB = 1.1 kA, B-N fault	
11:57 Hrs.	220 kV Joda-JSPL Jamshedpur S/C	Did not trip	Directional O/C, IR = 0.5kA, IY = 0.5kA, IB = 0.5kA, IN = 0.01kA	

Load Loss: 160 MW

OPTCL, JUSNL and DVC may explain.

ITEM NO. B.9: Disturbance at 400 k V GMR Substation on 26.06.2020 at 18:43 hrs.

GMR unit # 3 was connected to 400/220 kV Meramundali S/S of OPTCL STU network through 400 kV GMR – Meramundali S/C. At 18:43 hrs, 400 kV GMR Meramundali S/C tripped due to DT received at Meramundali end. This caused total power failure at GMR (OPTCL) section and GMR unit #3 tripped. In PMU data, no fault was observed at the time of event

Connecting one 350 MW generating unit with only one 400 kV transmission line may affect the reliability of the generating station. It may be treated as non-compliance of CEA grid standard and CEA planning criteria. GRIDCO SLDC/OPTCL to review such arrangement .Detail report along with DR/EL may be shared by GMR/GRIDCO SLDC/OPTCL. No SOE recorded at GMR end at the time of the event. GRIDCO SLDC/OPTCL are requested to check this issue.

Reason for DT received at Meramundali end may be shared by GRIDCO SLDC/OPTCL/GMR .

Relay Indications :

Time	Element Name	End 1	End 2	PMU observation
18:43 Hrs.	400 kV GMR – Meramundali S/C	Did not trip	DT received at Meramundali	No voltage dip observed at Meramundali end at the time of the tripping incident. Same has been observed in current of 400 kV GMR – Meramundali S/C captured by Meramundali PMU.

Gen Loss : 180 MW

OPTCL , GRIDCO SLDC and GMR may explain.

ITEM NO. B.10: Tripping of both units at BRBCL on 29.06.2020 at 21:53 hrs.

400 kV BRBCL – Sasaram – 2 was under break down due to rectification of tower bending. Unit 1 and 2 were in running condition at BRBCL. At 21:53hrs., 400kV Sasaram-BRBCL #1 tripped on R and Y phase fault. Both the units got tripped due to loss of evacuation path

BRBCL is connected to rest of the grid through only one circuit i.e. 400 kV BRBCL – Sasaram – 1. Tripping of this circuit may cause repeated GDs in BRBCL. POWERGRID ERTS – 1 is requested to maintain the healthiness of this line properly so that repeated outage can be avoided. This line tripped again on same fault at 05:50 hrs on 01st July 2020 resulting GD at BRBCL. Rectification work of tower bending may be expedited so that 400 kV BRBCL – Sasaram – 2 can be restored at the earliest. No SOE recorded at Sasaram the time of the event. POWERGRID ERTS – 1 is requested to check this issue.

Relay Indications :

Time	Element Name	End 1	End 2	PMU observation
21:53 Hrs	400 kV BRBCL – Sasaram – 1	Yet to be received	R-Y, 18.2 km from Sasaram, IR 9.3 kA, IY 9.3 kA	At Sasaram end PMU of 400 kV Sasaram – BRBCL – 1, around 5 – 5.5 kA fault current has been observed. Fault clearing time was less than 100 ms. Frequency decreased from
21:53 Hrs.	Unit 1 and 2 at BRBCL	Due to loss of evacuation path		

			50.02 Hz to 49.98 Hz Later frequency stabilized at 50.01 Hz

Gen. Loss : 422 MW

BRBCL , Powergrid may explain.

ITEM NO. B.11: Disturbance at 220 k V Muzaffarpur Substation on 24.06.2020 at 18:23 hrs.

220 kV Muzaffarpur Dhalkebar D/C tripped at 18:23 hrs from Muzaffarpur end on R phase directional earth fault. Prior to the tripping schedule of Nepal drawal over this link was 74 MW and it would increase to 163 MW w.e.f. 18:30 hrs. There was no generation or load loss reported in Indian grid at the time of the event.

No load loss and gen loss

JUSNL, BSPTCL and TVNL may explain.

ITEM NO. B.12: Disturbance at 400 k V Rangpo and Dikchu S/S on 19.06.2020 at 12:54 hrs.

At 12:54 hrs. gas density high alarm initiated in 400 KV Rangpo-Binaguri Ckt-I at Rangpo and tripping command was sent to 400kV Main Bus-I at Rangpo. All feeders connected to 400 kV main bus 1 tripped. Due to unavailability of tie bay of 400/132 kV ICT at Dikchu, both the running units at Dikchu HEP were connected to bus 1 at Dikchu via 400/132 kV ICT. After tripping of 400 kV Dikchu – Rangpo S/C (it was also connected to bus 1 at both Rangpo and Dikchu) due to bus bar operation at Rangpo, both the units tripped due to loss of evacuation path.

Due to non-availability of tie bay of 400/132 kV ICT at Dikchu, both the generating units are connected to 400 kV bus 1 at Dikchu. Both units at Dikchu will trip when 400 kV Rangpo Dikchu S/C trips. As per Dikchu, restoration of tie bay will be done during lean period (After January, 2021). Hence tripping of 400 kV Rangpo – Dikchu S/C will result in repeated GD/GI at Dikchu. .Log and details of gas density monitor at Rangpo S/S recorded during the event may be shared. Whether gas density increase suddenly or gradually with time may be confirmed by POWERGRID.

Reason for tripping bus tripping at Rangpo may be explained by POWERGRID with detail report

Relay Indications :

Line name	End 1	End 2	PMU observation
400 KV Rangpo-Binaguri I	400kV Main BusI at Rangpo tripped due to gas density high alarm initiation	Yet to be received	No voltage has been observed in Binaguri bus voltage. Oscillation has been observed at 400 kV Binaguri bus voltage with dominant mode of 0.8 – 0.9 Hz. Oscillation was damped within 6
400 KV Rangpo-Teesta V-I			
400 KV Rangpo-Dikchu			
400 KV Rangpo-Kishanganj			
400 KV Rangpo-Binaguri I			

315 MVA 400/220 KV ICT3, 4 & 5 at Rangpo	400kV Main Bus-I at Rangpo tripped due to gas density high alarm initiation	seconds.

Gen Loss : 109 MW

Powergrid , Rangpo and Dikchu may explain.

ITEM NO. B.13: Disturbance at Jorethang and Dikchu HEP on 27.06.2020 at 14:48 hrs.

At 14:48 hrs 400 kV Rangpo – Kishangunj S/C tripped due to B phase to earth fault. At same time, unit 1 and 2 at Dikchu HEP and unit 2 at Jorethang tripped due to operation of differential relay.

At 14:42:42 hrs, 400 kV Rangpo Kishangunj S/C successfully auto-reclosed at both ends for transient B phase to earth fault. At 14:42:43 hrs due to another B phase to earth fault during reclaim time, it tripped from both ends. As per SPS for evacuation of hydro power, tripping of 400 kV Rangpo-Kishangunj S/C will result in tripping of one unit of Teesta-III, Teesta V, Dikchu, Jorethang, Chujachen and Tashiding provided pre-tripping flow of 400 kV Rangpo-Kishangunj S/C > 650 MW for more than 900 ms. During 161st OCC meeting, it was decided that POWERGRID will keep this SPS in standby mode. But during the event, SPS signal was received by JLHEP, THEP and Chujachen HEP. As per DR, power flow through 400 kV Rangpo – Kishangunj S/C was less than 650 MW (prior to the tripping, current in all three phases was < 810 A). POWERGRID may share the reason for triggering of SPS. SPS was enabled at JLHEP end. For this reason, unit 1 at JLHEP end tripped due to SPS operation. Unit 1 and 2 at Dikchu HEP tripped due to operation of differential relay.

During 161st OCC meeting, it was decided that POWERGRID will keep this SPS in standby mode. But during the event, SPS signal was received by JLHEP, THEP and Chujachen HEP. As per DR, power flow through 400 kV Rangpo – Kishangunj S/C was less than 650 MW (prior to the tripping, current in all three phases was < 810 A). POWERGRID may share the reason for triggering of SPS.

Reason for operation of differential relay may be shared.

Relay Indications :

<table>
<tr><th>Time</th><th>Line name</th><th>End 1</th><th>End 2</th><th>PMU observation</th></tr>
<tr><td>14:48 Hrs.</td><td>400 kV Rangpo – Kishangunj S/C</td><td>B-N, 24.68kM, F/C 9.9KA</td><td>Yet to be received</td><td rowspan="3">Around 70 kV dip has been observed in B phase voltage at Rangpo PMU. Fault clearing time was less than 100 ms. Line tripped due to occurrence of another fault in reclaim time after successful auto-reclose of initial transient fault.</td></tr>
<tr><td>14:48 Hrs.</td><td>Unit 1 and 2 at Dikchu HEP</td><td colspan="2">Operation of differential relay</td></tr>
<tr><td>14:48 Hrs.</td><td>Unit 1 at JLHEP</td><td colspan="2">Due to receipt of SPS signal from Rangpo end generated due to tripping of 400 kV Rangpo Kishangunj S/C</td></tr>
</table>

Gen loss: 161 MW

Dikchu, Jorethang , DANS Energy and Powergrid may explain.

ITEM NO. B.14: Repeated Disturbance at 220 k V Jorethang and Tashiding S/S

1. Disturbance at 220 k V Jorethang and Tashiding S/S on 11.06.2020 at 22:38 hrs.

220 kV New Melli - Jorethang – D/C tripped from Jorethang end only resulting tripping of all running units at Jorethang. 220 kV Tashiding Rangpo S/C and 220 kV Tashiding New Melli S/C tripped.

Gen Loss : 166 MW

DANS Energy , Powergrid may explain.

2. Disturbance at 220 k V Jorethang and Tashiding S/S on 13.06.2020 at 04:54 hrs.

220 kV New Melli - Jorethang – D/C tripped from Jorethang end only resulting tripping of all running units at Jorethang. 220 kV Tashiding – New Melli S/C tripped from both ends. But both running units at Tashiding tripped on GT O/C protection.

Gen Loss : 175 MW

DANS Energy , Powergrid may explain.

3. Disturbance at 220 k V Jorethang and Tashiding S/S on 13.06.2020 at 07:18 hrs.

220 kV New Melli - Jorethang – D/C tripped from Jorethang end only resulting tripping of all running units at Jorethang. 220 kV Tashiding Rangpo S/C and 220 kV Tashiding New Melli S/C tripped.

Gen Loss : 117 MW

DANS Energy , Powergrid may explain.

ITEM NO. B.15: Repeated Disturbances at 400 k V Alipurduar Substation

1.Disturbance at 400 k V Alipurduar Substation on 25.06.2020 at 02:47 hrs

400 kV Alipurduar -Jigmelling D/C tripped at 02:47 Hrs due to R phase to earth fault. At Alipurduar, auto reclose was successful for both circuits. But both the circuits tripped from Jigmelling. Around 590 MW generation loss was reported at the time of the event. There was no generation or load loss reported in Indian grid at the time of the event.

No load loss and gen loss

Powergrid may explain.

2.Disturbance at 400 k V Alipurduar Substation on 26.06.2020 at 15:40 hrs

400 kV Jigmelling - Alipurduar – 1 along with all four running units (generating around 770 MW) of Mangdechu tripped at 15:40 hrs. DT signal was received at Alipurduar end of 400 kV Jigmelling Alipurduar – 1 at the time of the tripping. Later, at 15:53 hrs, 400 kV Jigmelling - Alipurduar – 2 also tripped due to B phase to earth fault. 400 kV Jigmelling - Alipurduar – 1 was extended from Alipurduar end at 16:24 hrs. But while synchronising at Jigmelling end, it tripped

again at 16:49 hrs with DT received at received at Alipurduar. There was no generation or load loss reported in Indian grid at the time of the event.

No load loss and gen loss

Powergrid may explain.

ITEM NO. B.16: Tripping Incidences in month of June 2020

Other tripping incidences occurred in the month of June 2020 which needs explanation from constituents of either of the end is given in **Annexure-B16**

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.17: Repeated tripping of transmission lines due to same reason/fault at nearby areas.

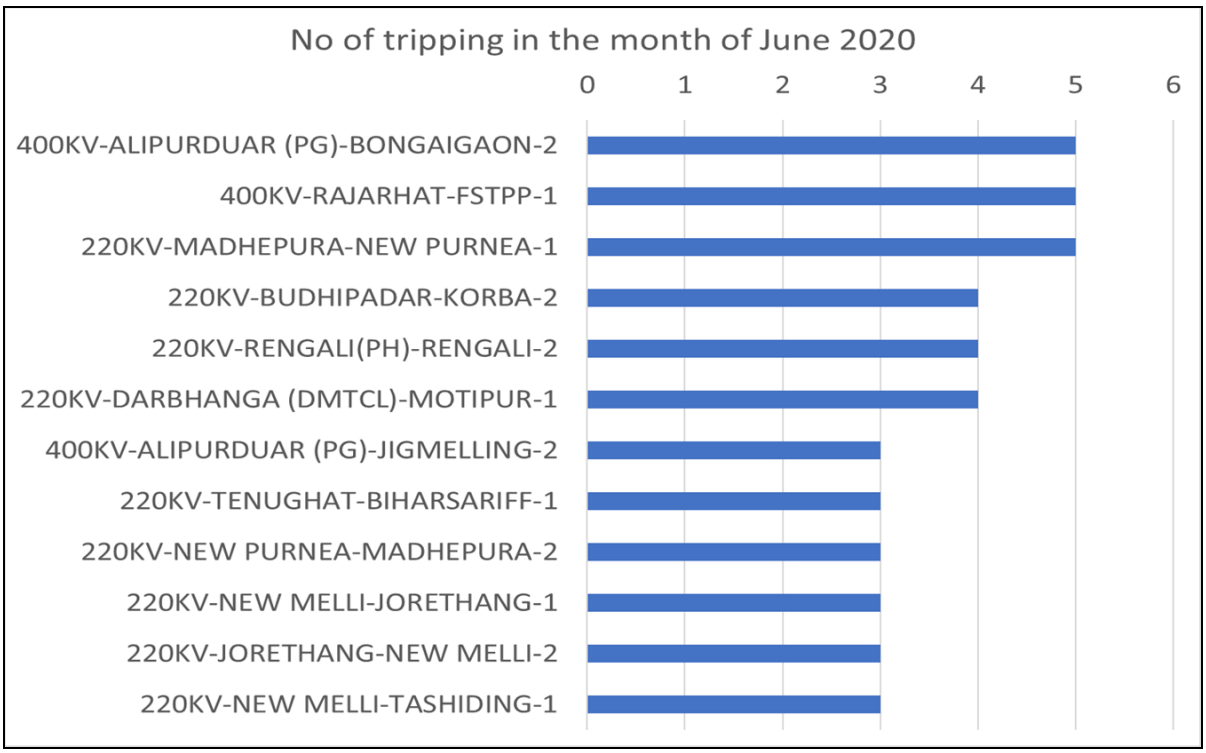


Figure 1: List of the transmission lines which tripped more than two times during the month of May 2020

As shown in Figure 1, there are 12 transmission lines having voltage level 220 kV and above and which tripped more than two times in the month of June 2020. Around 11 and 14 transmission lines having voltage level 220 kV and above tripped more than two times in the month of April and May 2020 respectively. Growing number of repeated tripping of transmission lines is putting

grid in grid in vulnerable condition. Repeated tripping of some transmission lines resulted repeated grid disturbances and grid incidents along with load and generation loss.
Transmission lines utilities are requested to maintain line properly so that repeated tripping may be avoided. In some cases, lines tripped due to same reason or fault at nearby location. List of those lines is shown below.

Name of the line	Reason	No of tripping	Utility to respond
400KV-ALIPURDUAR (PG)-BONGAIGAON-2	R phase to earth fault with location 40 - 65 km from Bongaigaon end. 3 tripping incidents with fault distance at 60 - 65 km from Bongaigaon end.	5	ENICL
400KV-RAJARHAT-FSTPP-1	R phase to earth fault or R & B phase fault at location of 17-23 km from Rajarhat. Line is anti-theft charged from Rajarhat end up to 210 km from Rajarhat on 20th June 2020	4	POWERGRID ERTS - 2
220KV-MADHEPURA-NEW PURNEA-1	B phase to earth fault at 55 - 58 km from Madhepura	3	BSPTCL
220KV-MADHEPURA-NEW PURNEA-1 & 2	LBB operation at New Purnea	2	BSPTCL
220KV-RENGALI(PH)-RENGALI-2	Two incidents due to differential protection operation at PG end. Line did not trip from another end. During other two incidents, line tripped from Rengali (PH) end only on operation of master trip relay or pilot wire protection relay.	4	POWERGRID Odisha and GRIDCO SLDC
220KV-DARBHANGA (DMTCL)-MOTIPUR-1	B phase to earth fault at 81 - 83 km from Darbhanga	3	BSPTCL
220KV-JORETHANG - NEW MELLI- D/C and 220 KV NEW MELLI - TASHIDING S/C	During all 3 events, three was a high resistance fault and then it got converted to Y and B phase fault at 220 kV New Melli - Tashiding. Directional E/F relay of Jorethang end of 220 kV Jorethang - New Melli D/C detected the fault and tripped. Generation loss occurred at Jorethang and Tashiding	3	POWERGRID, Sikkim SLDC, JLHEP and THEP

ITEM NO. B.18: Repetitive LBB operation at New Purnea S/S in the month of June 2020

On 5th June 2020 at 22:35 hrs and on 06th June 2020 at 03:18 hrs, LBB operation at New Purnea S/S resulted tripping of 220 kV New Purnea – Madhepura D/C and 220 kV bus 2 at New Purnea. Vide mail dated 30th June 2020, BSPTCL was requested to maintain the healthiness of 220 kV Madhepura New Purnea D/C share the auto-reclose status for the line at Madhepura and issue on the LBB for circuit 1 at New Purnea. But 220 kV New Purnea Madhepura – 1 already tripped 3 times in the month of July 2020 (as on 09th July 2020).

BSPTCL may share the remedial action taken after the communication from ERLDC.

BSPTCL may explain.

ITEM NO. B.19: Repetitive tripping of Transmission Lines from 220/132 kV Baripada

(PG) substation during March-June 2020

A significant number of repetitive tripping has been observed on the transmission lines from 220/132 kV Baripada substation since last Jan-June 2020. A list of such line tripping is provided below with fault remarks is attached in annexure 1.2. Vide mail dated 01st July 2020, both OPTCL and POWERGRID Odisha were requested to perform root cause analysis of each event and to ensure proper operation and maintenance of transmission lines. But even after communication from ERLDC, reporting of tripping instances has been reported.

Both POWERGRID Odisha and OPTCL may share reason for repeated tripping of these lines along with remedial action taken after the communication from ERLDC

Powergrid and OPTCL may explain.

ITEM NO. B.20: Tripping of large no of transmission lines due to inclement weather condition

During the month of April 2020 to June 2020, more than 30 ISTS transmission lines tripping was reported due to inclement weather condition. Ideally construction, operation and maintenance of lines should take care of such thunderstorms or local effects of weather which are regular during summer season in India. Vide letter dated 08th July 2020, Director SO, POSOCO advised all ISTS and state transmission utilities to analyse these large numbers of line tripping during thunderstorm and carry out corrective actions.

Transmission utilities are requested to share action taken in this regard.

Members may discuss.

ITEM NO. B.21: Grid event at Arrah at 10:27 hrs on 09th June 2020

At 10:27 Hrs on 09th June 2020, 132 KV Bus at Arrah (PG) tripped along with 2 x 100 MVA 220/132 KV ICTs (ICT 1 & ICT II), 160 MVA 220/132 KV ICT III, 132 KV Arrah (PG)-Arrah (BSPTCL), 132 KV Arrah (PG) - Dumraon (BSPTCL) S/C and 132 KV Arrah (PG)-Jagdishpur (BSPTCL) D/C. Reason for bus tripping at Arrah may be shared.

Powergrid may explain.

ITEM NO. B.22: Multiple Tripping's due to Over-voltage stage-II operation with issue of Secondary Arcing and LC Resonance.

During the month of June few tripping incidents were reported due to Over voltage Stage-II operation. After analysis with DR, it was observed it occurred due to Secondary arching issue and LC resonance with the compensated lines where line reactors are installed. These incidents are vulnerable to grid operation as well as life of the equipment. List of lines are mentioned below.

Name of Line	Tripping Date /Time	Utility to Respond
400 kV PATNA- NPGC-1	17/06/2020 , 15:14 Hrs	POWERGRID ERTS-1 , NPGC
400 kV ALIPURDWAR-BINAGURI-2	10/06/2020 , 13:11 Hrs	POWERGRID ERTS-2
400 kV KAHALGAON-MAITHON -2	05/06/2020 , 16:08 Hrs	POWERGRID ERTS-2,NTPC KAHALGAON

Detailed report and analysis for above mentioned trippings citing the issue of secondary arching and LC resonance is attached for reference in the Annexure.
Utilities are requested to submit the details of NGR and whether NGR was in service during tripping.

Severe Over voltages are causing line tripping and can potentially damage equipment's, whether any equipment was damaged during tripping.
Utilities are requested to submit their analysis and observations regarding this.
LC resonance phenomenon due to which high line voltage is appearing even after 3 phase breaker opening may cause problems which requires detailed study and measures to mitigate the same ,Tripping of Line reactors scheme may be implemented after proper study .

Members may discuss.

ITEM NO. B.23: Severe Oscillation at Gazuwaka resulting into Bi-Pole tripping.

Severe oscillations were observed on 23/06/2020 from 13:20 hrs in Jeypore and nearby area and lasted till 14:26 Hrs till both HVDC became out of service.

400 Jeypore – Gazuwaka Pole -2 tripped at 14:08 hrs due to minimum filter unavailability as filter tripped due to fundamental harmonic alarm protection. Pole-1 was hand tripped at 14:26 Hrs as noise was coming from converter Transformer due to these oscillations and after the outage of both poles oscillations vanished.

Similar event occurred again on 26/06/2020 where oscillations were observed from 19:54 Hrs to 20:20 Hrs causing Bi-Pole tripping.

Letter addressing the same issue was sent from NLDC to CEA and CTU for HVDC Gajuwaka fluctuations on multiple occasions is attached for reference.

Odisha may share any unit tripping or abnormality MW/MVARA plot if occurred during this span of time. Power grid ERTS-3 may share details related to above events, root cause analysis.
Such severe oscillation are endangering grid security and also leading to pole tripping causing power interruption in ER-SR corridor hence a Detailed study regarding this is required to find root cause so that source can be identified and mitigation can be done to avoid any future instance.

Members may discuss.

ITEM NO. B.24: Oscillations during 12:04:30 hrs to 12:06 hrs in ER and NER on 22/06/2020

Oscillations were observed from 12:04:36 to 12:06 in ER-NER corridor .In ER oscillations were prominent at NER interfacing areas such as Binaguri , Alipurdwar , Purnea , Kishnaganj .Frequency of Oscillation was 0.55 Hz ,which is inter –area mode.

Teesta3, Teesta5, Dikchu, Chuzachen, Tashiding, Jorethang, TLDP, Farakka, Sagardighi all are requested to share whether any problem is noticed at their units during the time 12:04 to 12:06 on 22.6.20 and whether any kind of control set points/setting change has been effected at their end in their units. MW vs time and Mvar vs time plot may also be shared by them. Alipurduar HVDC may also share whether any change is noticed at their set points during this time.

Members may discuss.

ITEM NO. B.25: Protection Coordination for New Lines/ICTs Prior to First Time Charging

In the month of June 2 Nos of lines were charged first time which are as mentioned below, along with their adjacent substation which require protection co-ordination

400 kV Rajarhat-Gokarno	Adjacent Substation: New Purnea (PGCIL ERTS 2), Gokarna (WBSETCL)
400 kV Rajarhat-Farakka	Adjacent Substation: Rajarhat (PGCIL ERTS2), Farakka (NTPC)

PGCIL ERTS 2, PGCIL ERTS 1, NTPC Farakka and WBSETCL may kindly confirm the following:

Share the Main 1 and Main2 relay settings for these lines from respective ends (PDF format).
Whether with these line commissioning, is there any change in long and short lines happened at these substations.

- If there is a change in short and long lines from any of the above four substations, whether the protection setting of lines has been revised from these four substations as per ERPC protection Philosophy.
- List of lines for which protection setting has been revised to be intimated to ERLDC/ERPC (Along with downloaded relay setting of above four lines in Main 1 and Main2 as well as any other line setting change at these four substations)
- In case long lines and the short line has changed from any of the substations whether Remote End Substations have been informed and their protection setting has been revised by remote end utilities or not to be confirmed by respective substation Owners.

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 B16 List of important transmission lines in ER which tripped in JUNE-2020

S.NO	LINE NAME	TRIP DATE	TRIP TIME	Relay Indication LOCAL END	Relay Indication REMOTE END	Reason	Fault Clearance time in msec	Remarks	PMU Location	DR/EL RECEIVED FROM LOCAL END	DR/EL RECEIVED FROM REMOTE END	Utility to update	Utility Response	ERLDC Comment on Utility Response
1	220KV-CHANDIL-RANCHI-1	01/06/2020	16:20	Ranchi: R-N, 25.7km, 4.14KA	Chandil: R-N, 72Km, 1.954ka	R-N fault .	100	transeient fault in R phase then after 500 ms again fault in Y phase and line tripped .	Ranchi	YES	YES	Powergrid ER-1 , Jharkhand		
2	400KV-FSTPP-MALDA(PG)-1	01/06/2020	00:57	Y-N FAULT,22,43.39 KM,4.76A	FSTPP: Y-N,21,FD 0.2 KM,446A	Y-N fault .	<100	Line tripped in reclaim time .DR pole status showing all 3 phase breaker opened during dead time but it is not the case as rest 2 phase R&B were intact .	Farakka	NO	YES	PG ER-II		
3	220KV-RENGALI(PH)-TSTPP-1	02/06/2020	15:31	ZONE-1 R,B FD-16.9KM FC-8.2 KM	As per PMU only B ph fault		160	No A/R operation.As all 3 phase breaker opened after 160 ms .	TALCHER	NO	YES	OPTCL.		
4	220KV-BUDHIPADAR-KORBA-2	02/06/2020	11:21	Y-N 21 , FD= 147.0 Kms, d(%)=81.2%, IL2= 1.17 KA	Korba-Zone-I Y-N FD=13.354ms Iy=9308Amp	Y-N fualt	900	o-2 picked up but line tripped in z-3 time reason may be explained	ROURKELLA	YES	NO	OPTCL.		
5	220KV-MADHEPURA-NEW PURNEA-1	02/06/2020	13:51	Madhepura :B-N, 21, 58.1km,1.19KA	Purnea : B-N, 84.7 Km, 1.98 KA	B-N FAULT	100	As per DR R &Y phase did not opened at purnea end .No A/R operation observed .Independent pole status not configured in DR.Status of A/r at madhepura.	PURNEA	NO	YES	PG ER-1 ,BSPTCL		
6	220KV-BUDHIPADAR-KORBA-3	02/06/2020	11:16	Direct trip received		No dip observed in PMU.	09/04/1900	No dip observed in PMU,Why DT received may be explained .	ROURKELLA	NO	NO	OPTCL		
7	220KV-TENUGHAT-BIHARSARIFF-1	02/06/2020	06:11	BIHARSARIF: B-N, 96KM, 1.5KA	TENUGHAT: B-N, 92KM, 1.7KA	B-N FAULT	<100	Why 3 phase tripping occurred in case of single phase fault ,Was A/R disabled .R phase breaker status showing as opened prior to fault .Satatus of A/R at Tenughat	BIHARSHARIFF	NO	YES	BSPTCL , JVUSNL		
8	400KV-KODERMA-BIHARSARIF(PG)-1	05/06/2020	20:12	R_N, 217 KM (Koderma)-Line length 130 KM		O/V STAGE -2	<100	While A/R was attempted very high voltage in healthy phases of Rand Y phase observed which caused O/V stag -2 operation .	BIHARSHARIFF	NO	YES	PG ER-1, DVC		
9	400KV-MAITHON-KHSTPP-2	05/06/2020	16:08	DT RECEIVED AT MAITHON		O/V STAGE -2	<100	At the same time A/R was successful in Y phase kahalgaon - farakka IV ,line which caused severe O/V in Khstpp-Maithon -2	KAHALGAON	YES	YES	NTPC KAHALGAON		
10	220KV-BUDHIPADAR-KORBA-2	08/06/2020	13:51	Budhipadar:b-n, 121 km,1.28ka	z1,t-n,43.72 km,3.062 ka from korba	B-N FAULT	160	z-2&z-3 started at Budhipadar end .Current became zero after 160 ms , SEEMS BUS VOLTAGE IS TAKEN AS I/P for line . pole opening status is not showing in DR .Stats of A/R ?	ROURKELLA	YES	NO	OPTCL.		
11	220KV-TTPS-TSTPP-1	09/06/2020	15:29	B_N, 5.6 kA, 24 KM (TTPS)	R_N, 13.76 kA, 3.7 KM (TSTPP)	B-N FAULT	<100	Breaker status may be configured in DR. What votage input has been selected line or Bus as ,Line voltage of R and Y phase are showing healthy voltages .	TALCHER	YES	NO	TSTPS		
12	400KV-ALIPURDUAR (PG)-BONGAIGAON-2	09/06/2020	14:41	APL 95.5 KM, R_N, 22, 1.868 kA	BNG R_N, 53.5 KM, 5.04 kA, 21	R-N fault .	600	Reason for delayed tripping may be explained .Pmu shows 600 ms fault clearance time .	ALIPURDWAR	NO	NO	PG, ER-II		
13	220KV-BOLANGIR(PG)-SADEIPALI-1	10/06/2020	16:52	Sadeipali : R ph, 1.47 Km, 1.02 kA		R-N fault .	<100	No A/r operation.	PANDIABILLY	NO	NO	OPTCL,PGCIB-2		
14	220KV-DARBHANGA (DMTCL)-MOTIPUR-1	10/06/2020	10:54	Darbhanga-2L, B-N FD-38.7km FC-2.9S	Motipur- 2L, B-N FC-0S54kA	B-N FAULT	<100	No A/r is observed whether A/R operated or not as Time frame is not suffisient in DR for A/R observation .	Muzaffarpur	NO	YES	DMTCL,BSPTCL		
15	400KV-BINAGURI-ALIPURDUAR (PG)-2	10/06/2020	13:11	Binaguri Y-N FD-71.56km FC-6.62kA	APD Y-N 21 FD-70km FC-4.08BkA	Y-N FAULT	<100	A/R unsuccessful.In B phase after unsuccessful A/R Line voltage was showing till 3 seconds , reason may be explained ?	SILIGURI			PG EB-2		
16	220KV-ATRI-PANDIABIL-2	10/06/2020	11:50	LBB protection Operated, BGA Trip Relay Operated, BGB Trip Relay Operated.		No fault observed in PMU		No DR received,No fault observed Reason for tripping may be explained.		NO	NO	OPTCL		
17	400KV-ALIPURDUAR (PG)-BONGAIGAON-2	11/06/2020	06:31	R-N,z2,carrier received,2.166 kA ,95.6 km, from alipurduar	R-N,z1,40.3km,5.4 KA at bongaigaon	R-N fault .	500 ms	Delayed clearance observed , Fault was in z-2 of APD although carrier received back.pole tripping occurred and line opened after z-2 time. Unsuccessful A/R observed at Bonaigaon end.	SILIGURI	YES	NO	PG EB-2		
18	765KV-DHARAMJAIGARH-JHARSUGUDA-1	11/06/2020	14:07	DT received at Jharsuguda	R phase CT flashover in Main bay of Jharsuguda-I at Daramjaigarh	B-N FAULT	26/10/1900	Reason for delayed clearance may be explained .No Dr received	JHARSUGUDA	NO	NO	PG EB-3		
19	220KV-TENUGHAT-BIHARSARIFF-1	12/06/2020	13:41	, Ir=884.7 A, Ib=336.5 A, Ic=330.2 A at Tenughat	R-16A	R-N fault .	1500	Reason for slow increase of current in R phase may be explained till 1500 ms after which line tripped , whether it was a high resistive fault?. R phase breaker at Bsf end showing opened status still line current is of increasing trend .Line tripped on which protection not clear PD or what ?	BIHARSHARIFF	YES	YES	BSPTCL , JVUSNL		
20	220KV-RENGALI(PH)-RENGALI-2	12/06/2020	05:36	ON PILOT WIRE PROTECTION RELAY OPERATION. at rengali	no trip at rengali pg end			No fault in PMU .Reson may be explained.	TALCHER	NO	NO	OPTCL.		
21	220KV-RENGALI(PH)-RENGALI-2	13/06/2020	00:10	Master trip relay operated at Rengali PH	Line charged from PG end			No fault in PMU .Reson may be explained.	TALCHER	NO	NO	OPTCL.		
22	220KV-BUDHIPADAR-KORBA-2	14/06/2020	04:09	ZZ,Y-N,204.4Km,1.25KA@Budhipadar		Y-N Fault	400	From Buddipadar line tripped in z-2 .Seems no carrier based protection.				OPTCL.		
23	220KV-KATAPALLI-BOLANGIR(PG)-1	15/06/2020	10:45	BN	BN , 28 KM , 1.5 KA	B-N FAULT	<100	Breaker of all three phase opened from katapalli end within 100 ms of fault whether Carrier based protection is there or not ?,Line voltage becme zero after 1 second of the breaker opening	JEYPORE	YES	NO	OPTCL		
24	400KV-RANCHI-SIPAT-2	15/06/2020	07:56	B-N FD-361.2KM,FC-1.5KA		B-N FAULT	<100	After successful A/R DT received at Ranchi end.Tripping incident after successful A/R not present in DR.	RANCHI	YES	NO	PG EB-1		
25	220KV-MAITHON-OLMKA-1	16/06/2020	12:41	a/r successful at maithon ,L-75 KA B-N,zone 1 34.3 km ,weather bad	zone 1, 3.48 km,R-N,Ir=1.79 ka Ip=190 A,IB=502.7 A	R-N fault .	<100	A/R successful from Maithon end .But at the instant of fault 3 phase tripping at Dumka end .Whether A/R feature is enabled at Dumka end.If so why 3 phase tripping occurred at Dumka 3 phase.Pole opening status is not configured in Dr at Dumak .	MAITHON	YES	YES	JUVNL		
26	400KV-NABINAGAR(NPGC)-PATNA-1	17/06/2020	15:11	Y_N Fault, 9 KA? O/V St II (NPGC)	O/V st II (Patna)	O/V STAGE -2	<100	Initially there was Y -N fault in the line and Y phase breaker opened instantly but after 400 ms of opening of breaker sever high voltage appeared in the opened phase and all 3 phase opened due to DT rrod with O/V stage 2-operation at Patna end .This may please by explained...	PATNA	YES	NO	PG ER-1 , NPGC		
27	220KV-DARBHANGA (DMTCL)-SAMASTIPUR-1	23/06/2020	11:31	R-N,FD 35.2KM,FC 1.839 KA@DARBHANGA		B-N FAULT	<100	Seems Rand Y phase were closed during dead time but when did may got opened not in the DR frame of 1.1 sec .Was A/R successful from DMTCL end .Is there A/R enebled at Samastipur	Muzaffarpur	YES	NO	DMTCL,BSPTCL		
28	220KV-MUZAFFARPUR-DHALKEBAR-1	24/06/2020	18:23	r ph DEF 368 A at Muzaffarpur	in B phase at dhalkebar	R-N fault .	2.5 sec	R phase current was around 500 amps for 2.5 sec after which 3 phase tripping occurred .Directional o/c setting may be shared .Reason for delayed tripping may be shared was it as per DO/C setting ?	Muzaffarpur	YES	NO	PG EB-1		

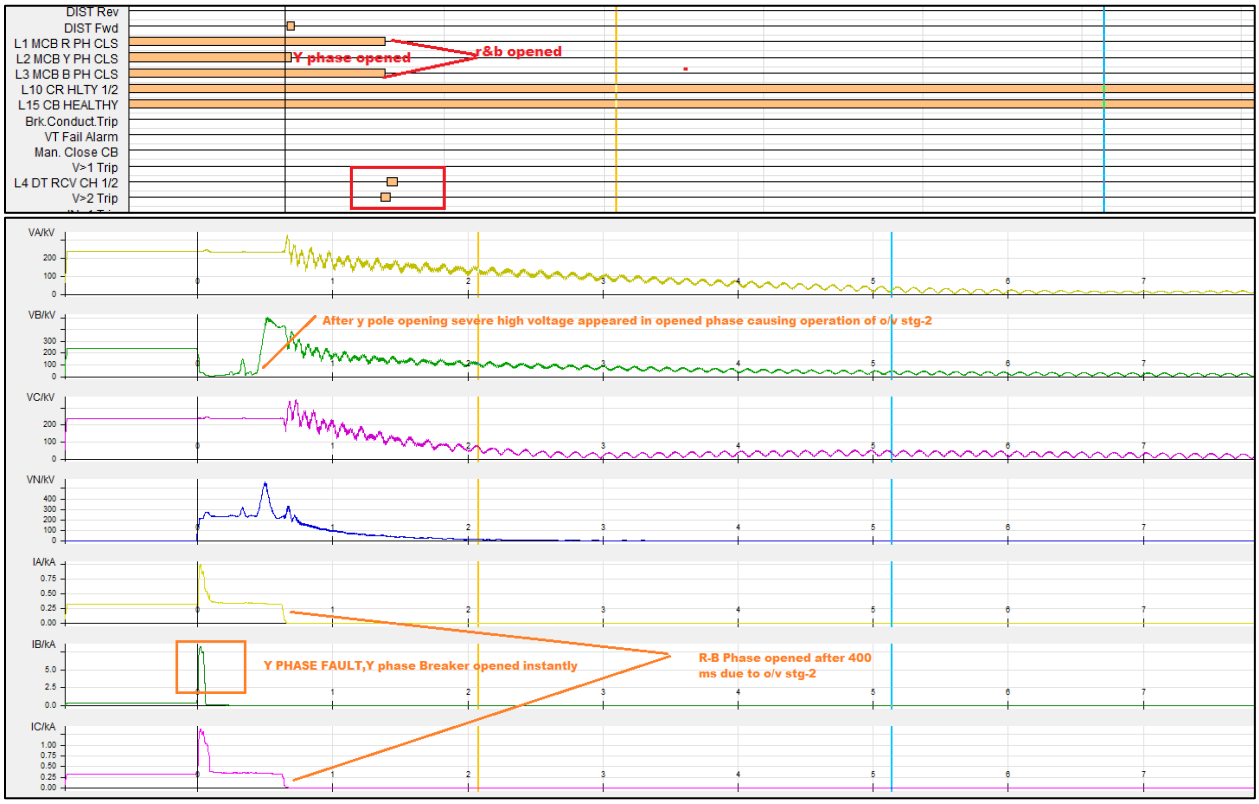
29	220KV-MUZAFFARPUR-DHALKEBAR-2	24/06/2020	18:23	r ph DEF 365 A at Muzaffarpur	In B phase at dhalkebar	R-N fault .	2.5 sec	R phase current was around 700 amps for 2.5 sec after which 3 phase tripping occurred .Directional o/c setting may be shared .Reason for delayed tripping may be shared was it as per DO/C setting ?	Muzaffarpur	YES	NO	PG-ER-1	
30	220KV-DARBHANGA (DMTCL)-DARBHANGA-2	25/06/2020	21:31	Y/F, B-N, 2KA		B-N FAULT	<100	Pole status not configured in DR . A/R not observed in DR time frame .R&Y phase breaker were closed from DMTCL end till DR frame time . When did the opened whether A/R attempted from DMTCL end and successful or not ?Status of A/R at ikihar end	Muzaffarpur	YES	NO	DMTCL,BSPTCL	
31	400KV-GAYA-NABINAGAR(NPGC)-1	25/06/2020	17:03	B_N		R-N FAULT	<100	Seems A/R was off so 3 phase tripping occurred at the instant of fault .Was A/R under planned S/D .	GAYA	YES	NO	PG ER-1	
32	220KV-BEGUSARAI-NEW PURNEA-1	25/06/2020	17:15	R_N, 1.2 kA (Begusarai)		R-N FAULT	<100	Whether A/R operated or not ?	PURNEA	NO	NO	PG-ER-1&BSPTCL	
33	220KV-KISHANGANJ(PG)-DALKHOLA (PG)-1	25/06/2020	06:21	R-N,3 KM,16.5KA@KISHANGANJ		R-N FAULT	<100	Y and B phase opened after 1.5 seconds at dalkhola end ,whether due to Pole descrepancy ,Seems A/R was not enabled .3 phase tripping occurred from kishanganj at the instant of fault and carrier was sent ,then why delay of 1.5 second at Dalkola end ?Status A/R may be clarified .	KISHANGANJ	YES	YES	PG ER-1&WBSETCL	
34	220KV-KISHANGANJ(PG)-DALKHOLA (PG)-2	25/06/2020	15:37	R_N, 21 KM, 4 kA (Dalkhola)		B-N FAULT	<100	A/R was successful from Kishanganj end but from Dalkhola end 3 phase tripping occurred at the instant of fault ,this may be explained ,whether A/R is disabled at Dalkhola.	KISHANGANJ	YES	YES	WBSETCL	
35	220KV-DARBHANGA(DMTCL)-LAUKAHI-1	25/06/2020	06:32	LAUKAHI: R-N, 21, 2.9KA,20.5KM	DARI: R-N,FD 60KM,FC 1.543KA	R-N FAULT	<100	3 Phase tripping occurred for single phase fault at DMTCL end that means A/R is not enabled ,may explain this .At Laukahi end A/R lockout occurred ,what is the status of A/R at Laukahi may be explained . Pole status is not configured in Dr.	Muzaffarpur	YES	YES	DMTCL,BSPTCL	
36	400KV-MEERAMUNDALI-GMR-1	26/06/2020	18:43	Mera-Only DT received		No fault observed in PMU		Reason of why DT send may be explained .	ANGUL	YES	NO	PG_ER-3	
37	400KV-GAYA-NABINAGAR(NPGC)-1	26/06/2020	10:41	NPGC_21 R-N FC-6.6kA Dist- 20km	Gaya-DT received	R-N FULT.	<100	For single phase fault ,3 phase tripping with DT receipt at Gaya end from NPGC .Whrere A/R was disabled at NTPC .	GAYA	YES	NO	NPGC	
38	220KV-MADHEPURA-NEW PURNEA-1	26/06/2020	08:52	Madhepura-2-LB-ph trip,Dist- 55.6km, Ib-1.596kA	Purnea-A/R succesful	B-N FAULT	<100	why A/R not operated at Madhepura .Status of A/R	PURNEA	YES	NO	BSPTCL	
39	400KV-KHSTPP-LAKHISARAI- 1	26/06/2020	07:17	LAK:Y-N,FD-99.800M,FC 3.128kA,R- SUCCESSFUL AT LAKHISARAI END	KHSTPP: Y-N,FD 65.76M,FC 8.37kA, TRIPPED FROM KHSTPP END	Y-N FAULT	<100	Why A/R not operated from Kahalgaon end .DR time frame does not covers A/R frame .From PMU it seems R and B phase breaker opened after 2 seconds approx ,whether due to PD or something else may be explained .	BIHARSHARIFF	YES	NO	NTPC KAHALGAON	
40	400KV-RANCHI-MAITHON RB-1	27/06/2020	12:45	Y_N, 110 KM, 2.35 kA (Maithon RB)		Y-N FAULT.	<100	A/R successful from Ranchi end only .Why A/R not occurred at MPL end .Secondary arching issue observed even after opening of Y phase breaker ,Y phase voltage went upto more than 600 kv.	RANCHI	YES	NO	MPL-ER-1 PG	
41	220KV-TENUGHAT-BIHARSARIFF-1	27/06/2020	09:55	Z1, Y-N, 1.747KA, 76.25Km	111.9Km, Y-N, 1.4kA	Y-N FAULT	<100	3 Phase tripping occurred for single phase fault at Tenghat end ,Seems A/R not enabled .A/R status and individual pole status not configured in DR.	BIHARSHARIFF	YES	NO	JUVNL	
42	220KV-CHANDIL-RANCHI-1	28/06/2020	18:11	Chandil-Z2 R-N FD-82.38km		R-N FAULT.	350	A/R successful from Ranchi end ,Chandil end tripped in zone -2 seems there is no carrier aided tripping scheme .	RANCHI	YES	NO	PG-ER-1 , JVUNL	
43	220KV-NEW PURNEA-MADHEPURA-2	28/06/2020	04:22	A/R SUCCSSFUL AT NEW PURNEA-R-N 15.4KA,75 kA	71.4 KM,R-N,2.2 KA FROM MADHEPURA	R-N FAULT.	<100	why A/R not operated at Madhepura .Status of A/R	PURNEA	YES	NO	BSPTCL	
44	220KV-DARBHANGA (DMTCL)-MOTIPUR-1	29/06/2020	13:59	R-N,Z-1,I/C 2.36A F/D-35KM FROM MOTIPUR	R-N,Z-1,F/C 1.7kA F/D- 81KM FROM DARBHANGA	B-N FAULT	<100	A/R was enbled still 3 phase tripping occurred at motipur end this may be explained .	Muzaffarpur	NO	YES	BSPTCL	
45	220KV-MADHEPURA-NEW PURNEA-1	30/06/2020	11:29	madhepura: R- N, Z1, 1.47 KA 55.6 Km	A/R SUCCSSFUL 50.3 KM 3.24 KA ZA IN NEW PURNEA	R-N FAULT		why A/R not operated at Madhepura .Status of A/R .Dr time not sufficient for AR observation.	PURNEA	YES	NO	BSPTCL	

TRIPPING OF 400 KV NPGC-PATNA –I AT 15:14 HRS ON 17/06/2020 DUE TO OV-STAGE II :

Initially there was Y -N fault in the line and Y phase breaker opened instantly but after 400 ms of opening of breaker sever high voltage appeared in the opened phase and all 3 phase opened due to DT receipt with O/V stage 2-operation at Patna end **.**

After 3 pole opening even line voltage in all 3 phase persisted for 5 seconds .

DR OF NPGC END :



Zoomed

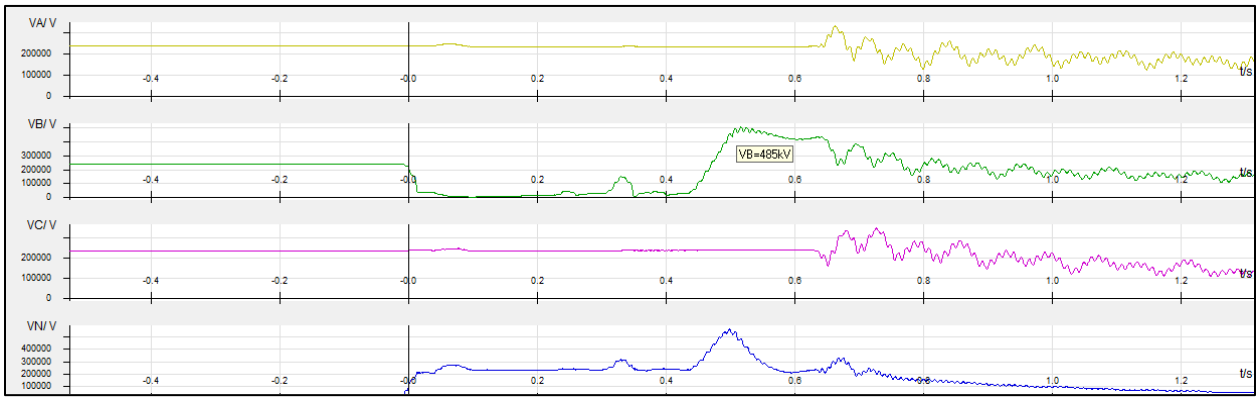


Figure (1) RMS value of line voltage and current

DR of Patna end is required.

Breif Analysis: There was Y-N fault in the line and As the Y phase breaker opened primary arc was extinguished as breaker opened but secondary arching started due to mutual coupling as can be seen in below figure and due to which Y phase line voltage can be seen it persisted with growing magnitude and became severely high up to 800 Kv which caused o/v STAGE -2 protection operation and 3 phase breaker opening occurred .

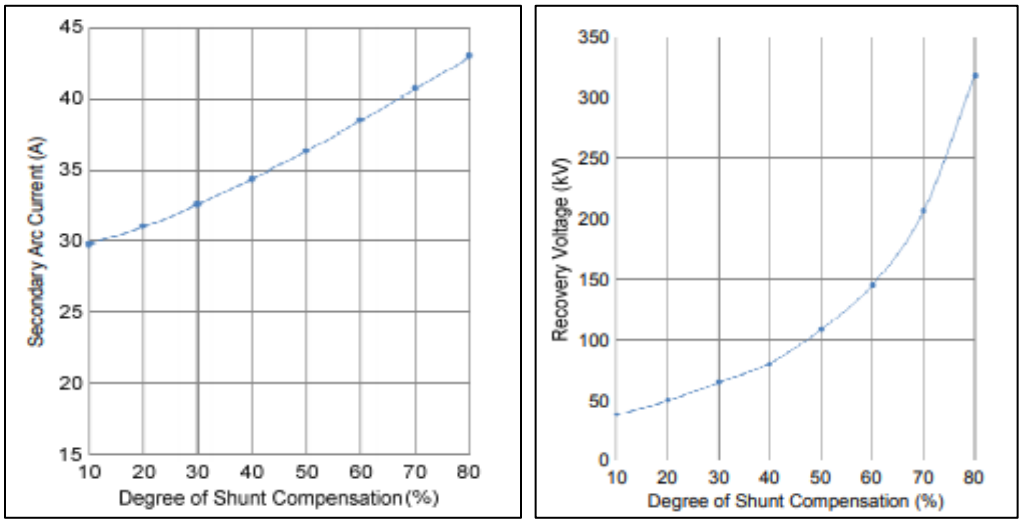
Brief details of secondary arching:

In a three-phase line, there is electromagnetic and electrostatic coupling between the phase conductors. A single-phase-to-ground fault results in the formation of a primary arc between the faulted phase and ground. The line protection system isolates the faulted phase from the power system , thereby extinguishing the primary arc; the other two healthy phases remain in service.

During the dead time capacitive and inductive coupling between the conductor of the open phase and the un-faulted phase conductors induces a voltage in the open phase conductor. Because the air is already ionized from the primary arc, the induced voltage can create a secondary arc and sustain it for a given time after the phase opening.

The secondary arc current depends mainly on the line voltage and length, the fault current and also depends on fault location, load current, line transposition, and reactors connected to the faulted phase. This current should self-extinguish within 500 milliseconds, if the arc current is no greater than 40 A in lines with shunt reactor compensation and no greater than 20 A in uncompensated lines.

Impact of compensation: For a 400 Kv line secondary arc self-extinguishes within 500 ms if arc current is less than 40 A ,in lines with shunt compensation but this arc current increases more than 40 amps as the degree of shunt compensation increase and then this arc do not get self-extinguished. Similarly recovery voltage also keeps on increasing.



Figure(1)Secondary arc current & recovery voltage vs shunt compensation

Here in the above mentioned case also Line is 88% compensated thus secondary arch current will be more than 45 amps and chances are there that it will persist for large time if not suppressed .So NGRs

are used with Line reactors for suppressing secondary arching .Whether NGR was there is service with L/R may be intimated along with rating of NGR and values.

With such amount of high transient recovery voltage, after 3 phases opening LC oscillations started with frequency of 45 Hz approx.

Secondary arching can be seen from figure (2)

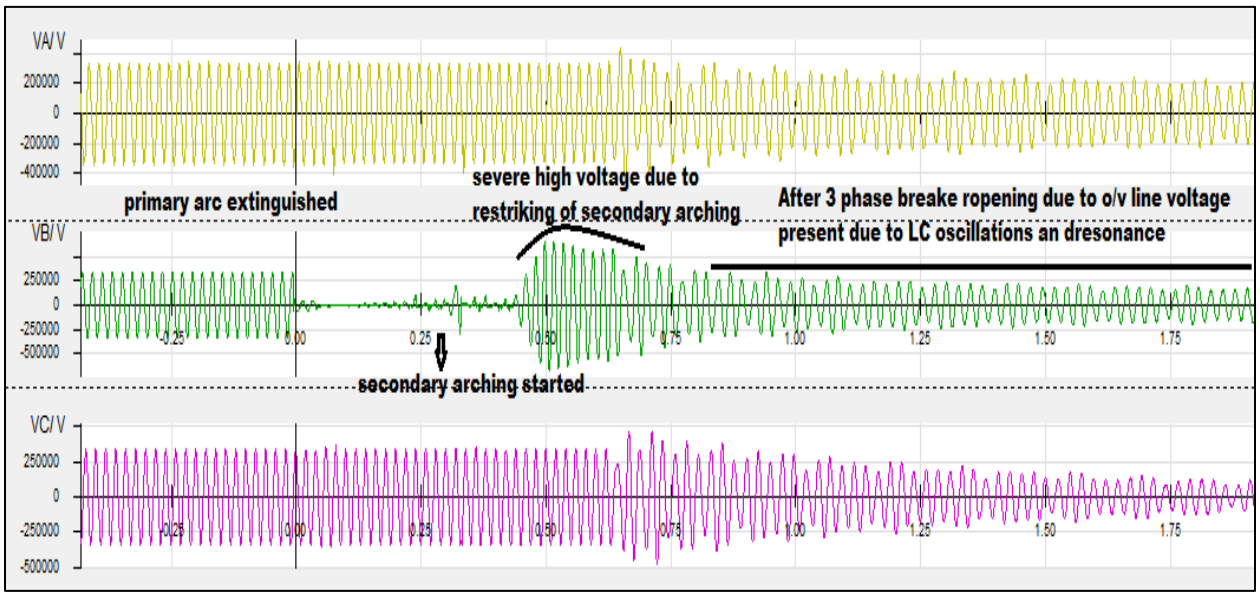
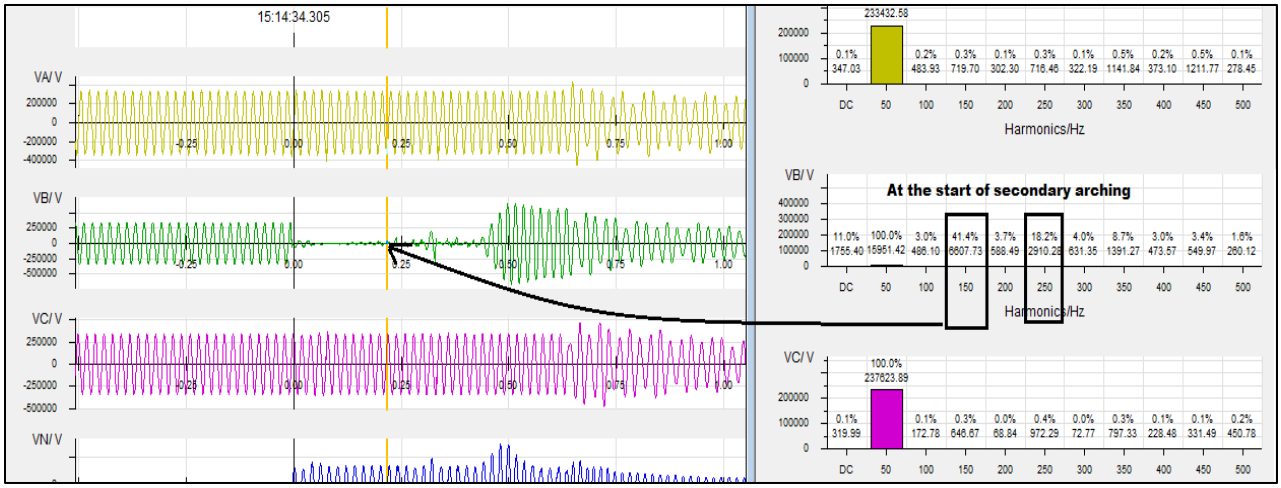
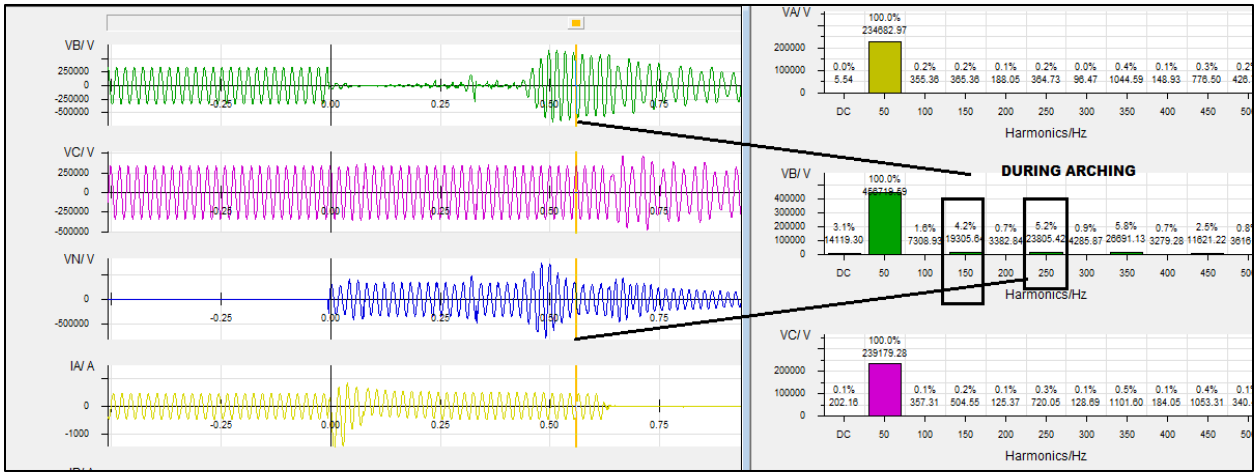


Figure (2) Instantaneous values of DR Line current and voltage,

As per available literature during **secondary arching Third & fifth harmonics** would be present in the faulty phase ,ratio of this **(third+ fifth)** harmonic with fundamental is also used as a indicator for secondary arch extinction detection .which can also be seen from below figure (3&4) harmonics at the start and during secondary arching .



Figure(3) At the start of secondary arching value of 3rd & 5th Harmonics



Figure(4) During secondary arching value of 3rd & 5th Harmonics

Another practice which is used for secondary arc extinguishing is phase shift method as shown in below figure for a faulted phase (A) ,Fig. 5(a) shows the behavior of the A-phase voltage after the breaker opens the A-phase pole to clear an A-phase-to-ground fault in an auto reclose. During the dead time, while the secondary arc is still present, the faulted phase voltage (VA ARC) is severely depressed and lags the phasor corresponding to its healthy state (VA PRE) by approximately 90 degrees. Once the secondary arc extinguishes, the faulted phase voltage increases its magnitude and shifts to lie between the two healthy phase voltages (VA POST). This voltage shift provides information to detect secondary arch extinction for adapting Auto reclosing. For actual case of tripping as mentioned above same is shown in Figure (5b) Arching voltage is lagging by 90 degree with pre fault voltage .

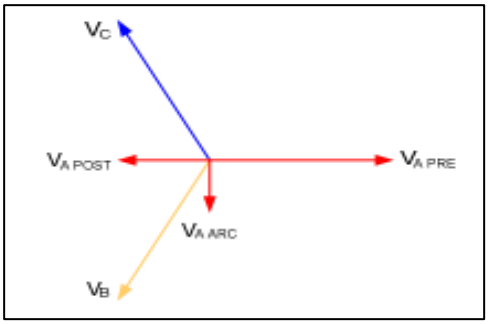


Figure (5A)Phase shift during secondary arching.

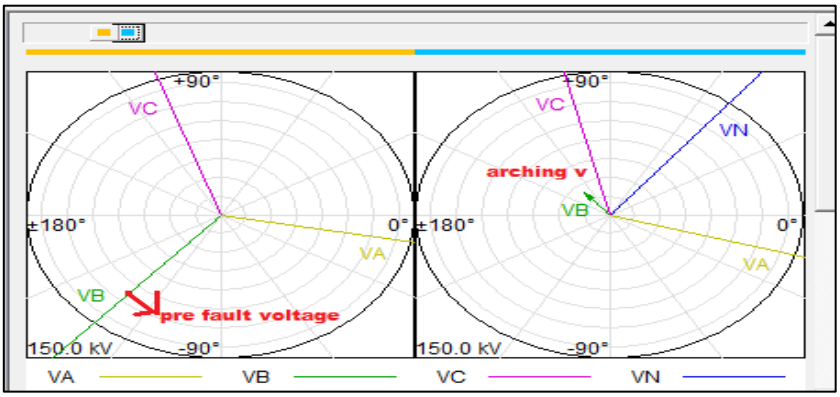
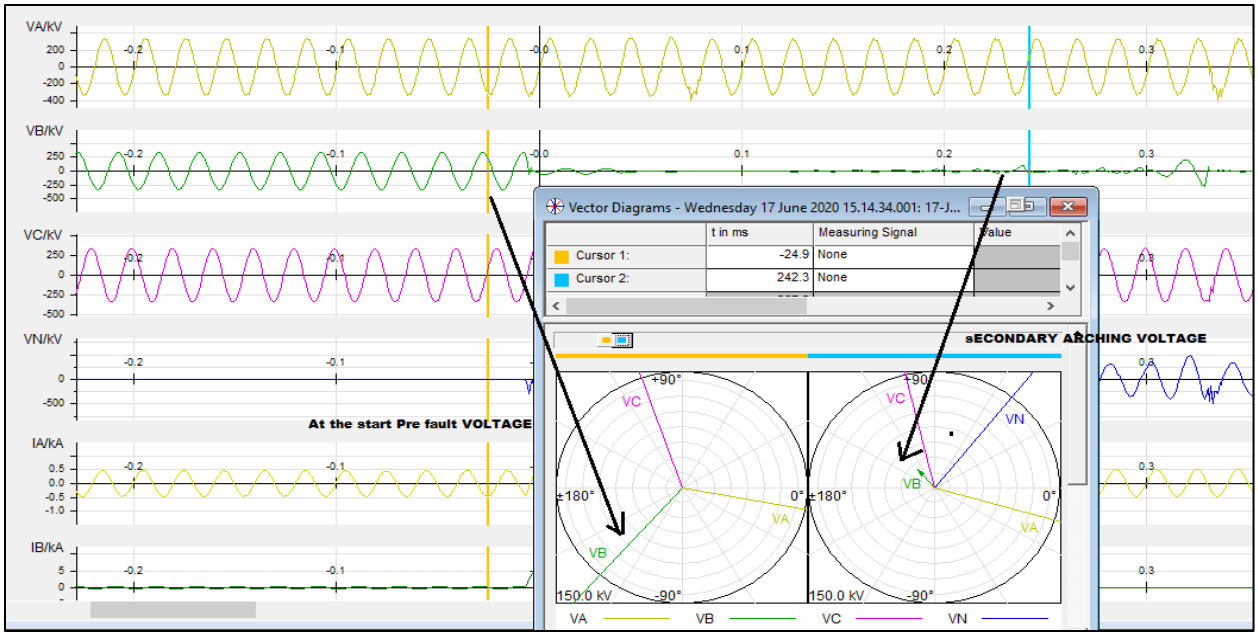


Figure 5(b) Actual tripping case arching voltage lagging 90 degree with pre fault



Figure(6) Phase shift during arching at the start

LC oscillations after the 3 phase tripping:

Ac waveform of instantaneous values showing resonating voltage oscillations due to interaction of Line reactor 80 MVAR at Patna end and line charging mvar . Xl/xc is degree of compensation.

$$f = F(\frac{xl}{xc})^{1/2}$$

As line is compensated more than 85 % ,Line length is 140Km (90 Mvar) , quad moose with 80 Mvar L/R at Patna end .Thus oscillation frequency of LC resonance is coming around 45 Hz which is observed in Dr plot also. Degree of compensation is 80/90=0.88 ,So Fosc=0.88*50=45 Hz.

Oscillations are due to exchange of energy between reactor and line capacitance .Prior to tripping and during secondary arching waveform frequency was 50hz ,but as after the o/v stge -2 when 3 phase breaker opened LC oscillations of 45 Hz started as mentioned above which is due to Line charging var with Line reactor which is also mentioned below.

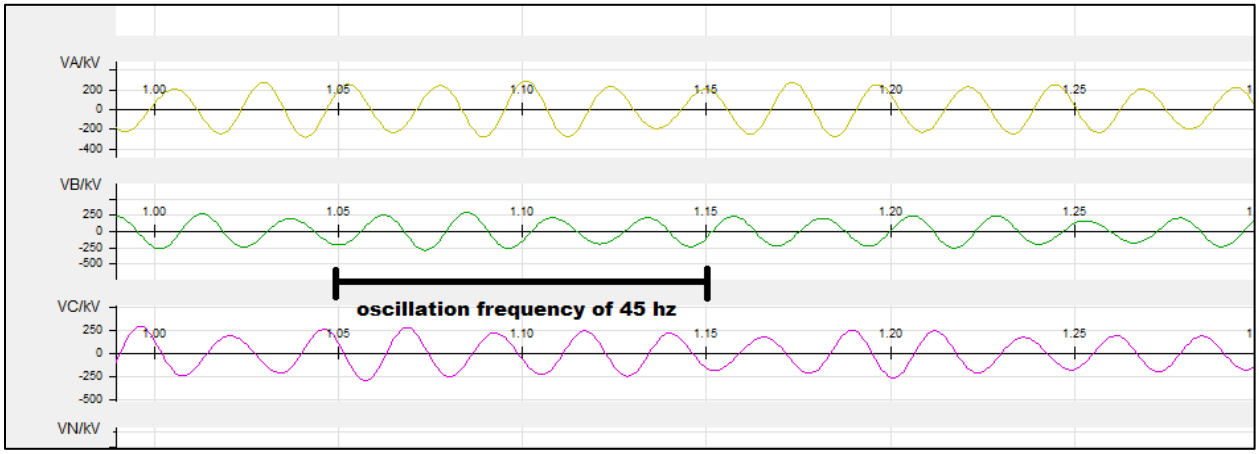
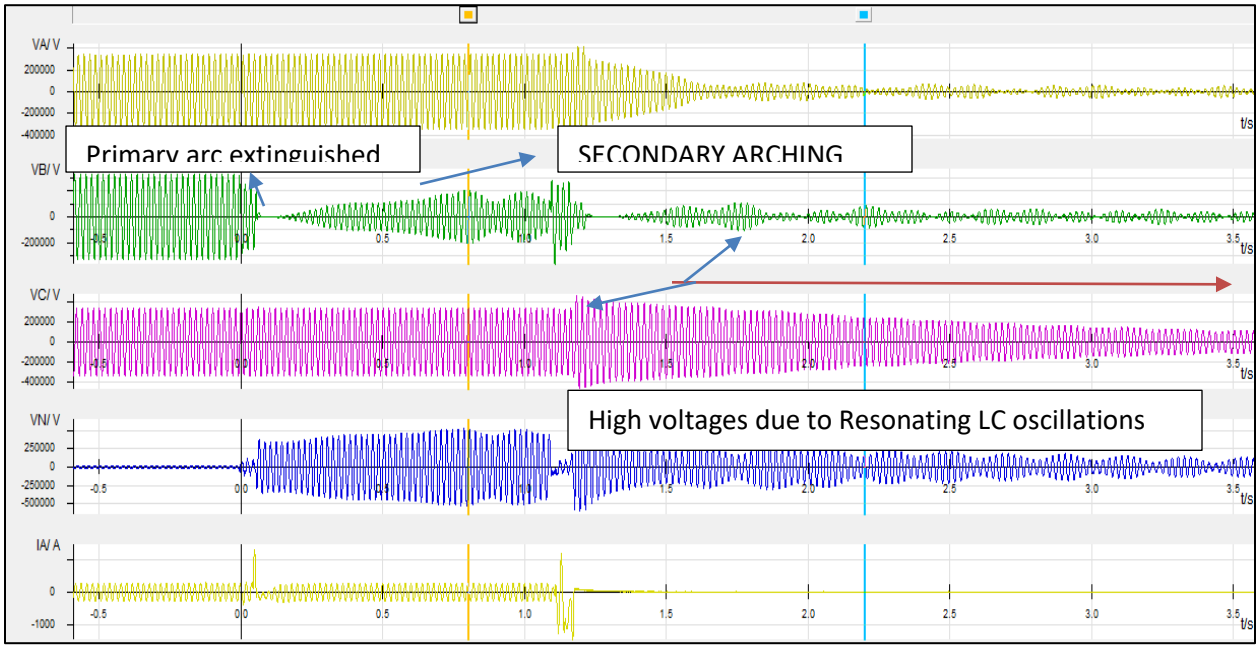


Figure (7) LC resonance oscillating frequency as per compensation coming to 45 hz.

The tuning of the line close to the resonance causes overvoltage that occurs after the extinction of the arc in the dead time. The overvoltage leads to the restriking of the arc, which, in turn, prevents the successful implementation of auto reclosing .Thus, for the compensated lines the detuning of the resonance is the only countermeasure against re-ignition of the arc. To this end one or all three phases of the reactor should be switched off in the dead time.

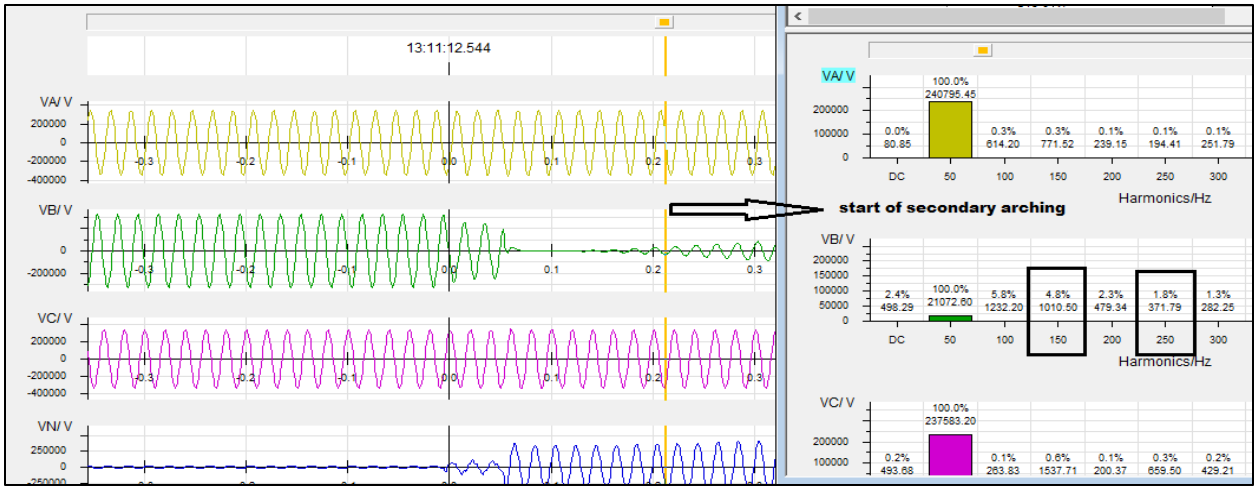
TRIPPING OF 400KV-BINAGURI-ALIPURDUAR (PG)-2 AT 13:11 HRS ON 10/06/2020:

There was Y-N fault in the line and As the Y phase breaker opened primary arc was extinguished during breaker opening but secondary arching started as can be seen in below figure and due to which B phase line voltage can be seen it persisted with growing magnitude up to the dead time till auto reclose was attempted and it got failed .It is hard to say that it failed either due to secondary arching or there was actual fault ,as at the instant of auto reclose with persisting secondary arching and growing voltage if we close the breaker it is same as closing to a permanent fault.
Here in the above mentioned case also Line is 100% compensated thus secondary arch current will be more than 50 amps and chances are there that it will persist for large time if not suppressed .So NGRs are used with Line reactors for suppressing secondary arching .Whether NGR was there is service with L/R may be intimated along with rating of NGR and values.



Figure(8) DR of Alipurdwar end

As per available literature during **secondary arching Third & fifth harmonics** would be present in the faulty phase ,ratio of this third+fifth harmonic with fundamental is also used as a indicator for secondary arch extinction .which can also be seen from below plot:



Figure(9) Presence of third and 5th Harmonics during secondary arching .

There was Y-N fault in the line and A/R was unsuccessful after unsuccessful A/r all 3 phase opened , and B phase voltage suddenly increased upto 700 kv even after breaker was opened ,all 3 phase voltage existed for 3 seconds ,B phase was prominent. Such high voltages can cause equipment failure .

Ac waveform of instantaneous values showing resonating voltage oscillations due to interaction **of Line reactor 80 MVAR at APD end and line charging mvar also 80 Mvar ACSR Quad moose 120Km line** .This is causing oscillation frequency of 50Hz.K is degree of compensation.

$$f = F(\frac{xc}{xl})^{1/2}$$

Oscillations are due to exchange of energy between reactor and line capacitance.

The tuning of the line close to the resonance causes overvoltage that occurs after the extinction of the arc in the dead time. The overvoltage leads to the restriking of the arc, which, in turn, prevents the successful implementation of auto reclosing .Thus, for the compensated lines the detuning of the resonance is the only countermeasure against re-ignition of the arc. To this end one or all three phases of the reactor should be switched off in the dead time.

High voltages appeared at the time of auto reclose was due to Lc resonance as mentioned above with oscillation frequency close to 50 Hz .

RMS value of voltages from DR is shown in figure (10)

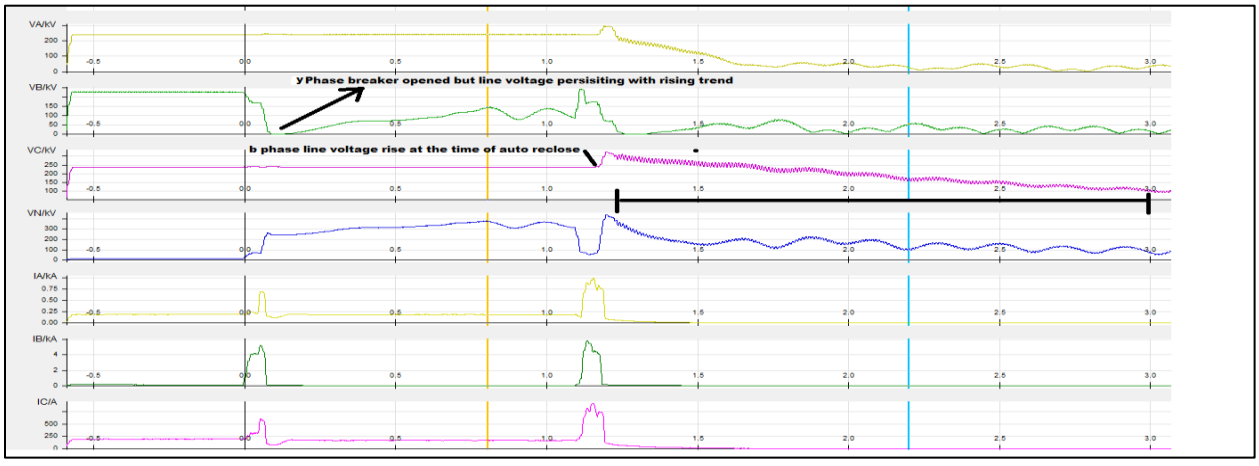


Figure (10)RMS value of voltage and current

TRIPPING OF KAHALGAON - MAITHON II DUE TO OVERVOLTAGE STAGE –II OPERATION DUE TO SWITCHING OVERVOLTAGE

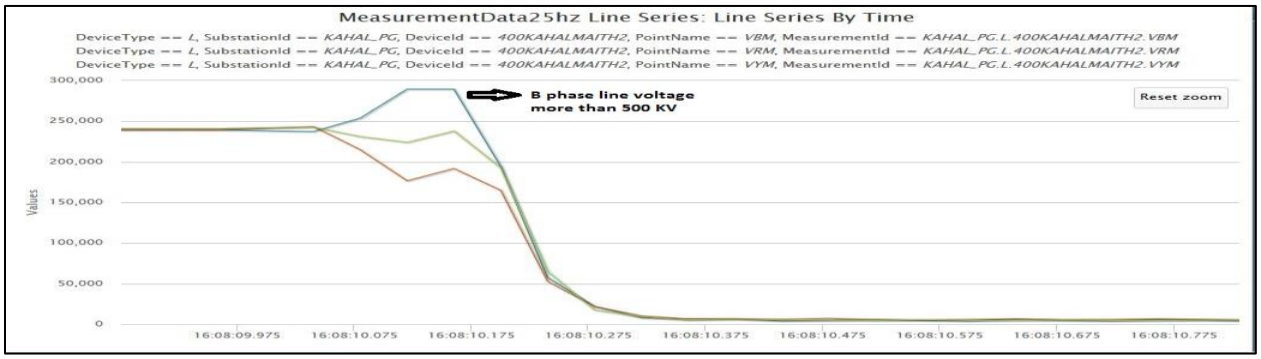
AT 16:08 Hrs 400 Kv Farakka – Kahalgaon Iv Auto Reclose became successful and at the same time 400 Kv Kahalgaon – Maithon II tripped .

400 Kv Kahalgaon – Maithon II is in same dia of 400 Kv Farakka – Kahalgaon Iv.

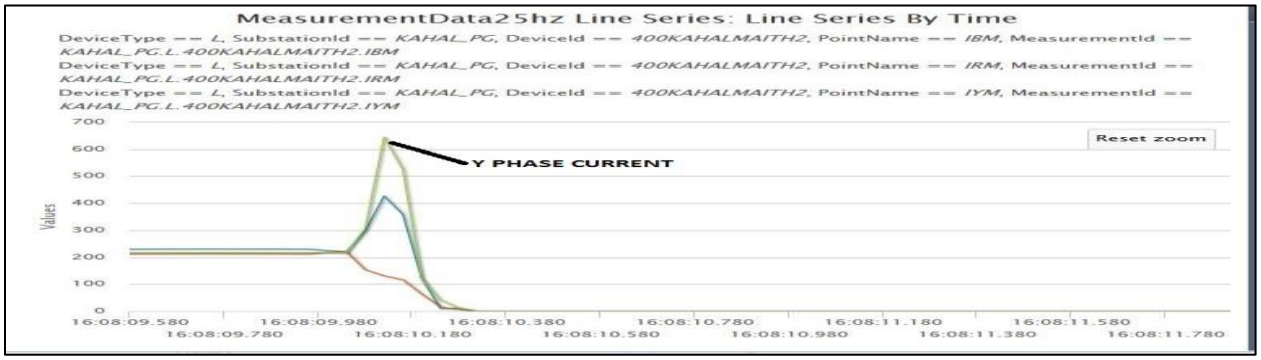
It is anticipated that 400 Kv Kahalgaon – Maithon II tripped due to Overvoltage stage –II (Instantaneous))operation due to Transient switching overvoltage as tie bay shared is same by both line and due to switching of which in A/R , line voltage of 400 Kv Kahalgaon – Maithon II became more than 500 Kv as seen from PMU line voltage .

PMU Observation

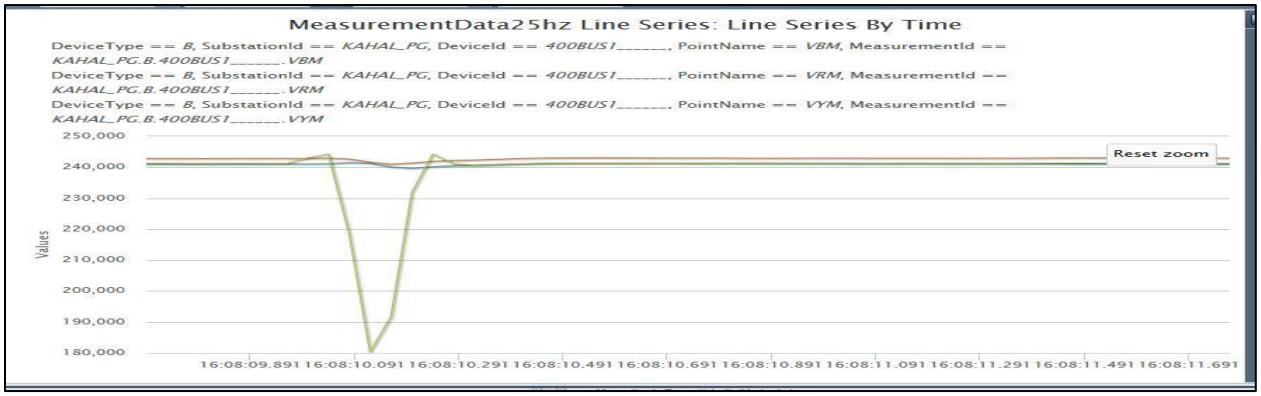
Line voltage of KAHALGAON - MAITHON II



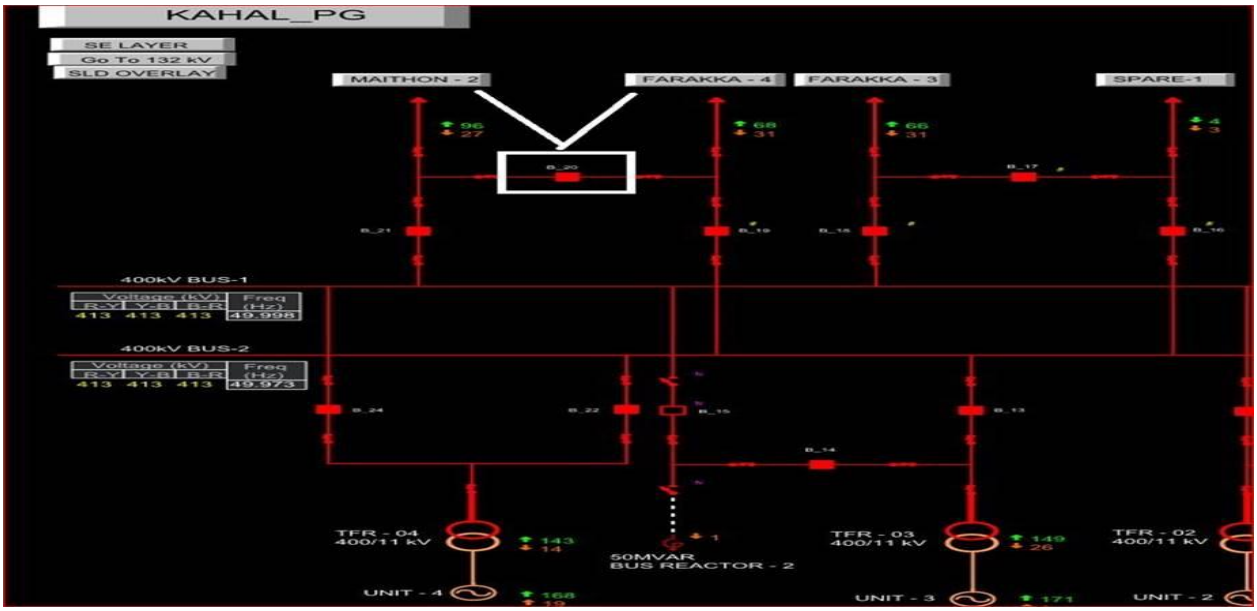
Line current of KAHALGAON - MAITHON II



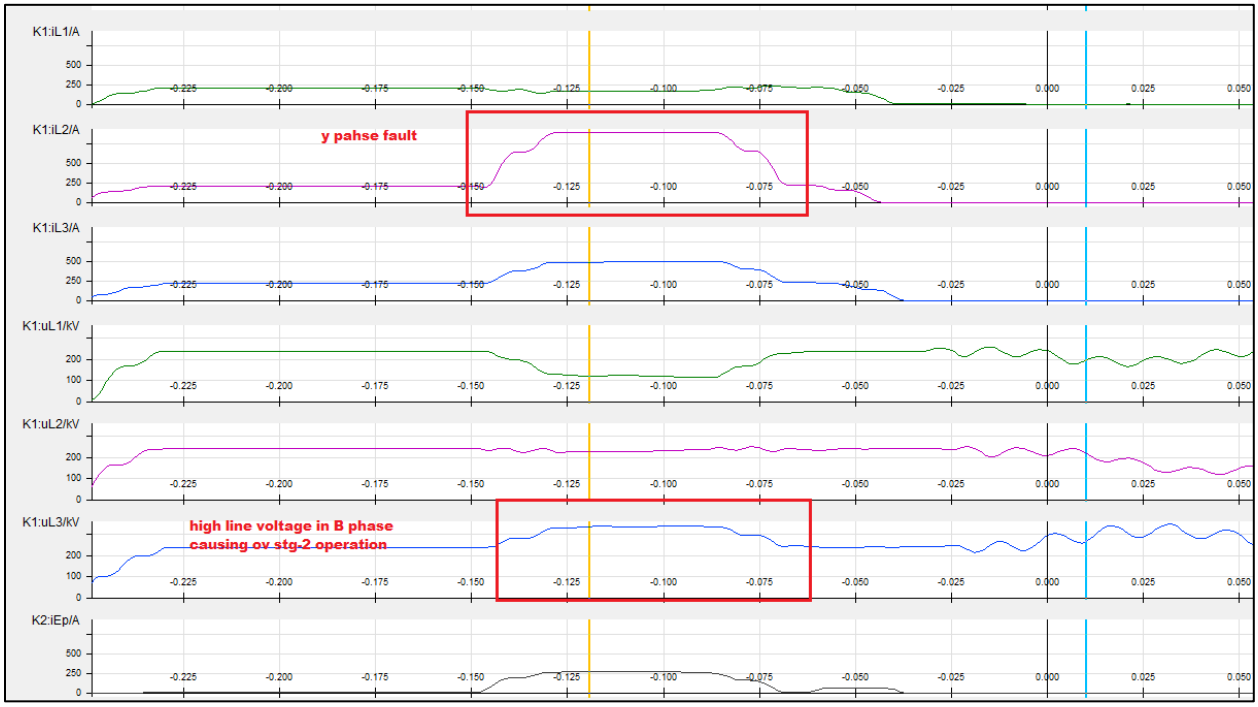
BUS VOLTAGE OF KAHALGAON:



SLD OF KAHALGAON



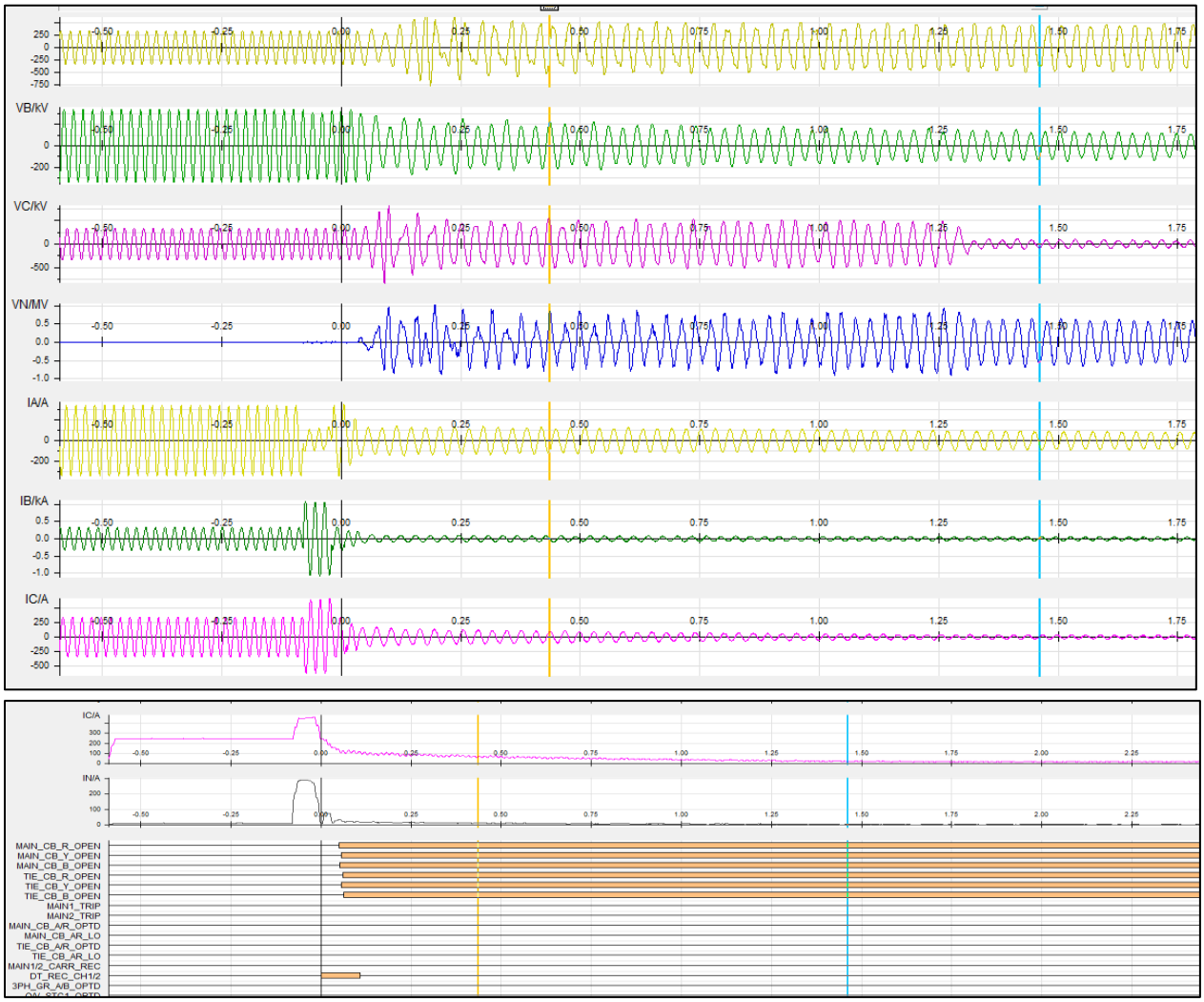
DR OF KHSTPP-MAITHON KAHALGAON END :



DR OF KHSTPP-MAITHON MAITHON END :

Dr shows Y phase current rise sowing y phase fault in FSTPP- Khstpp IV ,and .

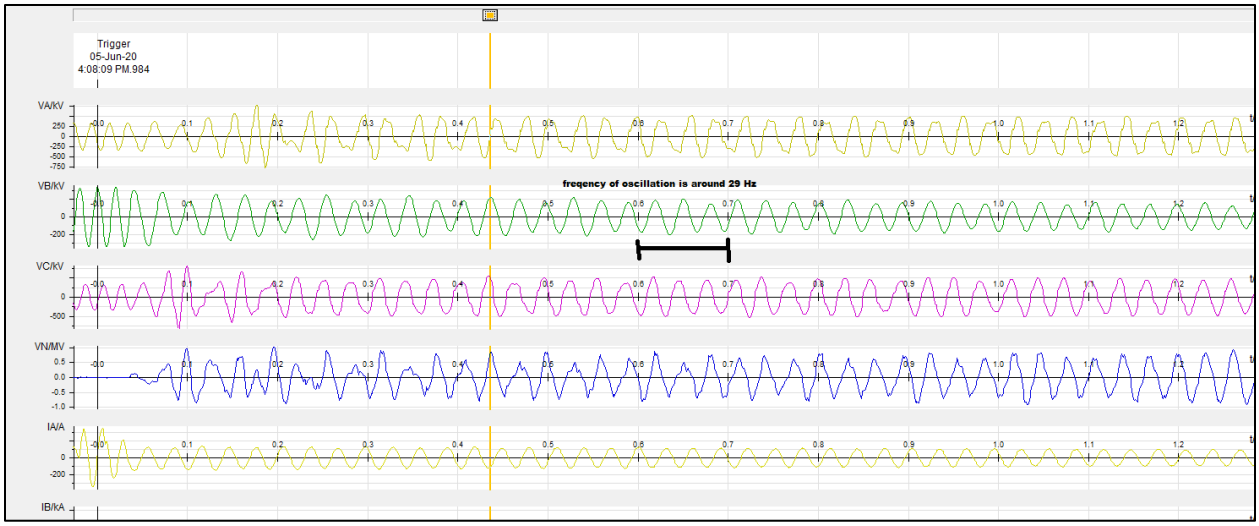
Line opened due to DT receipt at Maithon end from Khatpp end due to OV-STG-2 operation ,after that although breaker opened from Maithon end still high line voltage is appearing **.**



LC oscillations: At maithon end even after breaker opening line voltage was there for few seconds due to LC oscillations due to 50 Mavr line reactor at maithon end .Line is 172 km twin moose line so charging mvar will be 172*0.55 =94 mvar and .Degree of compensation with 50 Mvar reactor at maithon end comes to 50/94=54%.Hence LC oscillation frequency will be **27 Hz** from below formula

$$f = F(\frac{xl}{xc})^{1/2}$$

With Dr at maithon end LC Oscillation frequency is shown below which is around 29 HZ almost same as calculated above so it can be inferred that these Line voltage with are present due to LC oscillations between reactor and line capacitance .



What caused such severe Overvoltage needs to be investigated whether these were originated due to LC oscillations so as to avoid in future such instances of multiple tripping as there was not any fault in line .

Response required from Utility:

>NTPC Kahalgaon and PG-ER2 are asked to submit the details of NGR and whether NGR was there during tripping.

> Such Over voltages are appearing which are causing line tripping and can damage equipment, whether ant equipment was damaged during tripping.

> LC resonance phenomenon due to which high line voltage is appearing even after 3 phase breaker opening may cause problems which requires detailed study and measures to mitigate the same ,Tripping of Line reactors scheme may be implemented after proper study .

> Utilities are requested to submit their analysis and details regarding this in PCC meeting.

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)

केन्द्रीय कार्यालय : 61, आई एफ सी आई टावर, 7,8 एवं 9वीं मंजिल, नेहरु प्लेस, नई दिल्ली -110019
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Ref: POSOCO/NLDC/SO/Jul 20/

Date: 08th July 2020

To,

As per the distribution list

Sub: Ensuring reliability of the transmission network

Madam/Sir,

The reliable operation of transmission system is important to carry out secure grid operation and ensuring uninterrupted supply of power to all. The large number of unplanned tripping of high capacity transmission lines in the power system creates a critical situation in power system operation.

The tripping of a large number of transmission lines (even high capacity lines) are taking place during thunderstorms either due to structural damage or due to faults. Such tripping of lines lead to very critical conditions and or near-miss situation for the reliable power system operation. In this regard, the incident such as that of 28th May 2020 wherein thirteen (13) number of 765 kV lines tripped and resulted in outage of 5256 MW of generation (entire Generation at Sasan, Rihand stg III, Vindhyachal stage IV & V) is a great threat to the grid security. Ideally, construction, operation and maintenance of high capacity lines shall take care of such thunderstorms or local effects of weather which are regular during summer season in India. In order to place the issue in right perspective, the summary and list of transmission lines (132 kV and above for NER and 400 kV and above for other regions) which tripped during thunderstorms for the period Apr 2020 to Jun 2020 is enclosed as Annexe-1.

In respect of equipment failure and tower collapse, the Central Electricity Authority (Grid Standards) Regulations 2010 mentions following *"27. Failure analysis. - (1) All failures of equipment and tower collapse shall be analysed by the Entity to avoid recurrence and a copy of the report shall be submitted to the Regional Power Committee and the Authority."*

Apart from analysis of tower collapse, there is also a need to analyze the large number of 400 kV and above line tripping during such thunderstorms and carry out corrective actions. It is therefore

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important that the critical aspect of maintaining the lines in operation during thunderstorms shall be looked into by all the transmission licensees and all technological, operational measures may be identified and implemented at the earliest in order to enhance the reliability and resiliency of the Indian Grid. A copy of measures identified and taken in this regard may be shared with NLDC/RLDCs.

Thanking you,

Encl: As above.

Yours faithfully,

(S. R. Narasimhan) 8/7/2020
Director (System Operation)

Copy to :

1. Member, (GO & D), CEA
2. Chief Engineer (GM), CEA
3. Member Secretary, NRPC/ERPC/WRPC/SRPC/NERPC
4. COO(CTU) -POWERGRID, Gurugram
5. Director (Operation), POWERGRID
6. ED- WRLDC/ERLDC/NERLDC/SRLDC/NRLDC/NLDC

Annexe_1

Regionwise Summary of Lines(132 kV and above for NER and 400 kV and above for other regions) tripped in bad weather days(when more than two lines tripped) during Apr-Jun 2020			
S.No.	Region	Date	Number of lines tripped
1	NR	03-May-20	4
2	NR	10-May-20	6
3	NR	10-Jun-20	3
4	NR	20-Jun-20	4
5	WR	27-Apr-20	5
6	WR	30-Apr-20	3
7	WR	03-May-20	3
8	WR	04-May-20	6
9	WR	09-May-20	4
10	WR	28-May-20	24
11	WR	29-May-20	5
12	WR	31-May-20	8
13	WR	03-Jun-20	5
14	WR	04-Jun-20	5
15	WR	05-Jun-20	3
16	WR	07-Jun-20	6
17	WR	14-Jun-20	3
18	WR	15-Jun-20	3
19	ER	19-Apr-20	3
20	ER	05-May-20	6
21	ER	20-May-20	10
22	ER	26-May-20	7
23	ER	30-May-20	3
24	ER	14-Jun-20	3
25	SR	07-Apr-20	5
26	SR	09-Apr-20	8
27	NER	09-Apr-20	4
28	NER	15-Apr-20	6
29	NER	17-Apr-20	6
30	NER	13-May-20	7
		Total	168
		Trippings per day in one region	6

LINE TRIPPING(400 kV and above) DUE TO INCLEMENT WEATHER DURING APR-JUN 2020(NORTHERN REGION)								
S. No	Element Name	Req. Type	Owner	Outage		Revival		Reason / Remarks
				Date	Time	Date	Time	
1	765 KV Bara-Mainpuri (UP) Ckt-2	Forced Tripped	UPPTCL, UPPTCL	25-04-2020	16:58	25-04-2020	22:07	At Bara end 710 52- B phase Breaker damaged due to heavy lightning & thunderstorm. Bus-bar protection operated at Bara. All three units also tripped at Bara. Generation loss of 1000 MW (approx.).
2	400 KV Gurgaon(PG)-Sohna Road (Sterlite) (GPTL) Ckt-1	Forced Tripped	POWER GRID	26-04-2020	12:43	26-04-2020	16:13	Phase to earth fault B-N Tripped on B-N fault during heavy storm and rain. FLR:GGN-2.33km/19.05kA,Sohna-5.07km/2.99kA.
3	400 KV Bhiwadi-Hissar (PG) Ckt-1	Forced Tripped	POWER GRID	03-05-2020	17:47	03-05-2020	20:32	Phase to phase fault R-Y line ripped on both end due to R-Y fault fault current IR-28.8KA,IY28.78KA, fault dist 1. 8 meter from Hissar end and from bhiwadi end fault current, IR=IY=1.2KA, during severe storm and rain.
4	765 KV Moga-Bhiwani (PG) Ckt-1	Forced Tripped	POWER GRID	03-05-2020	18:01	04-05-2020	13:23	Line tripped due to B-N fault,fault current-6.8KA, Fault dist-34.16km from Moga end due to bad weather. Damage in Earthwire clamps. Charging attempt failed 21:30 hrs due to B-N fault
5	400 KV Patiala(PG)-Patran(PATR) (PATRAN) Ckt-1	Forced Tripped	POWER GRID,PATRAN	03-05-2020	18:52	03-05-2020	19:53	line tripped due to hanged Y-Phase bandal conductor due to bad weather at Patiala .
6	400 KV Roorkee(PG)-Rishikesh(UK) (PG) Ckt-1	Forced Tripped	POWER GRID,PTCUL	03-05-2020	22:36	04-05-2020	00:15	Line tripped on B-N fault.FLR-RRK-3.71km/11.08kA.Rishikesh-R-Y,fault is in UPPCL/PITCUL portion.Heavy strom/rain reported
7	765 KV Anta-Phagi (RS) Ckt-2	Forced Tripped	RRVPNL	04-05-2020	17:15	05-05-2020	17:02	Tower bent at location No. 355,356,393 & 394 as reported by Rajasthan due to stormy weather.Line under patrolling.

LINE TRIPPING(400 kV and above) DUE TO INCLEMENT WEATHER DURING APR-JUN 2020(NORTHERN REGION)								
S. No	Element Name	Req. Type	Owner	Outage		Revival		Reason / Remarks
				Date	Time	Date	Time	
8	765 KV Anta-Phagi (RS) Ckt-1	Forced Tripped	RRVPNL	04-05-2020	17:16	05-05-2020	17:00	Conductor broken at tower location No. 347to 349 as reported by Rajasthan due to stormy weather.Line under patrolling.
9	400 KV Singrauli(NT)-Allahabad(PG) (PG) Ckt-3	Forced Tripped	POWER GRID	05-05-2020	02:19	05-05-2020	03:24	Phase to earth fault R-N FD:23.07km, FC:16.8kA heavy thunderstorm at Allahabad
10	765 KV Bikaner-Ajmer (PG) Ckt-1	Forced Tripped	POWER GRID	06-05-2020	00:28	06-05-2020	02:30	tripped on Y-N fault.FLR-Bikaner-236.2km/1.87KA. Ajmer-40.72km/5KA.Heavy wind strom /rain reported.
11	400 KV Aligarh-Muradnagar_1 (UP) Ckt-1	Forced Tripped	UPPTCL	10-05-2020	11:34	10-05-2020	16:16	line tripped due to bad weather .
12	400 KV Koteshwar-Meerut (PG) Ckt-2	Forced Tripped	POWER GRID	10-05-2020	11:59	10-05-2020	13:08	tripped at 1159 hrs on R-N fault,Kot-63.1km/3.3kA.heavy wind storm./rain reported
13	400 KV Meja TPS(MUN)-Masoli(UP) (UP) Ckt-1	Forced Tripped	UPPTCL	10-05-2020	20:04	10-05-2020	00:59	line tripped due to Y-N fault , z-1, fault current-1.804KA Dist : 16.893km Bad weather conditions.
14	400 KV Anpara_B(UPUN)-Mau(UP) (UP) Ckt-1	Forced Tripped	UPPTCL	10-05-2020	21:01	10-05-2020	22:11	line tripped due to R-N Fault phase, FC 2.95KA, FD 122.8KMtr Due to stormy weather
15	400 KV Anpara_B(UPUN)-Sarnath(UP) (UP) Ckt-2	Forced Tripped	UPPTCL	10-05-2020	21:56	10-05-2020	23:12	Line tripped due to B-N fault FC 4.953 KA, FD 169.7 KM From Sarnath end Due to stormy weather condition
16	400 KV Singrauli(NT)-Rihand(NT) (PG) Ckt-2	Forced Tripped	POWER GRID	10-05-2020	22:39	10-05-2020	23:00	Line tripped from Rihand end during thunderstorm,au tore closed successfully from Singrauli end.Z1,R Ph-e,19km from Rihand

LINE TRIPPING(400 kV and above) DUE TO INCLEMENT WEATHER DURING APR-JUN 2020(NORTHERN REGION)								
S. No	Element Name	Req. Type	Owner	Outage		Revival		Reason / Remarks
				Date	Time	Date	Time	
17	400 KV Kanpur-Ballabhgarh (PG) Ckt-1	Forced Tripped	POWER GRID	13-05-2020	18:04	13-05-2020	21:10	Tripped on B-N fault during heavy rain and windstorm.FLR-Ballabagarh-18.6KM/12.49KA.KNP-345.7KM.
18	400 KV Kishenpur-NewWanpoh (PG) Ckt-3	Forced Tripped	POWER GRID	19-05-2020	14:54	19-05-2020	16:20	Line tripped on RB fault. FLR Kishenpur: 105.43Km, 4.62KA & New Wanpoh: 29.36Km, 7.07KA Inclement weather (heavy wind).
19	400 KV Dadri(NT)-Kaithal(PG) (PG) Ckt-1	Forced Tripped	POWER GRID	23-05-2020	16:41	23-05-2020	23:04	Line Tripped on B-N fault (to Bad weather) . FLR Kaithal:24.6Km,IB=9.8KA, FLR Dadri: 177.8Km, IB=1.9KA.
20	400 KV Rajpura-Dhuri (PS) Ckt-1	Forced Tripped	PSTCL	27-05-2020	18:07	27-05-2020	21:56	due to inclement weather
21	220 KV RSD(PS)-Jessore(HP) (HPSEB) Ckt-1	Forced Tripped	HPSEB	27-05-2020	18:23	27-05-2020	20:02	due to inclement weather
22	765 KV Bhadla-Bikaner (PG) Ckt-1	Forced Tripped	POWER GRID	29-05-2020	19:32	29-05-2020	23:48	Tripped on Y-N fault.Bhadla-75.78km/2.33KA.Heavy wind storm/rain reported.
23	765 KV Moga-Bhiwani (PG) Ckt-1	Forced Tripped	POWER GRID	30-05-2020	13:35	30-05-2020	18:55	line tripped due to bad weather .
24	765 KV Jhatikara-Bhiwani (PG) Ckt-1	Forced Tripped	POWER GRID	31-05-2020	15:10	31-05-2020	18:28	Phase to earth fault Y-N Tripped on Y-N fault during heavy storm and raining .FLR:M1:Jhatikara-9km/14kA,Bhiwani-M1:73.3km/7.5kA,M2 72.8km/7.5kA.
25	400 KV Kurukshetra-Jind (PG) Ckt-2	Forced Tripped	POWER GRID	31-05-2020	16:46	31-05-2020	18:56	Phase to earth fault B-N Line tripped on B-N fault, FLR-7.0 KM IB-13.0 KA from jind & FLR- 89.0 KM, IB-3.2KA from Kurukshetra end. (Due to bad weather conditions)
26	400 KV Amritsar-Parbati Pooling Banala (PG) Ckt-1	Forced Tripped	POWER GRID	03-06-2020	15:38	03-06-2020	16:37	line tripped due to R-Y fault fault current-IR=IY=2.3KA fault dist-234 km FROM AMRITSAR.during HEAVY RAIN & WIND .
27	400 KV Akal-Kankani (RS) Ckt-1	Forced Tripped	RRVPNL	07-06-2020	22:13	07-06-2020	23:30	Phase to earth fault. B-N fault. B-PH, IMPEDENCE RELAY OPERATED ONLY AKAL END DUE TO BAD WEATHER
28	400 KV Gr.Noida(UPC)-Nawada(HV) (PG) Ckt-1	Forced Tripped	POWER GRID	10-06-2020	17:53	10-06-2020	19:35	Tripped on B-N fault.FLR-Gr.noida-12.35km/16.5kA.Heavy wind storm reported.

LINE TRIPPING(400 kV and above) DUE TO INCLEMENT WEATHER DURING APR-JUN 2020(NORTHERN REGION)								
S. No	Element Name	Req. Type	Owner	Outage		Revival		Reason / Remarks
				Date	Time	Date	Time	
29	400 KV Ballabhgarh-Maharanibagh (PG) Ckt-1	Forced Tripped	POWER GRID	10-06-2020	17:56	10-06-2020	19:02	Tripped on B-N fault ,FLR-Balb-26.32km/10.04kA.Heavy wind storm reported in this area.
30	400 KV Dadri(NT)-Maharanibagh(PG) (PG) Ckt-1	Forced Tripped	POWER GRID	10-06-2020	17:57	10-06-2020	19:11	Tripped on B-N fault.FLR-Dadri-17.1km/15.28kA.Heavy wind storm repoted in this area.
31	400 KV Roorkee-Dehradun (PG) Ckt-1	Forced Tripped	POWER GRID	15-06-2020	14:53	15-06-2020	22:34	Phase to earth fault Y-N Heavy wind storm reported. Y-N fault. FLR, Dehradun-0.76KM/10.9KA, Roork-78.9KM/5.7KA
32	400 KV Dehradun-Abdullapur (PG) Ckt-2	Forced Tripped	POWER GRID	15-06-2020	15:02	15-06-2020	16:06	Phase to earth fault R-N Tripping during heavy wind storm. R-N fault. FLR, Dehradun-36.64KM/5.29KA
33	400 KV Bhiwani-Jind (PG) Ckt-2	Forced Tripped	POWER GRID	20-06-2020	06:16	20-06-2020	09:42	Tripped on R-N fault during heavy windstorm. F.C = 17.2kA, F.D = 15.77KM from Bhiwani end, F.C = 6.498kA. and F.D=56.42km from Jind end.
34	400 KV Bhiwani(PG)-Kabulpur(HV) (PG) Ckt-1	Forced Tripped	POWER GRID	20-06-2020	06:18	20-06-2020	11:27	Phase to earth fault R-N Tripped during heavy windstorm on R-N fault,FLR-(Station details)Bhiwani-M1-12.55KM/17.39KA,M2-12.7KM/16.9KA.
35	765 KV Moga-Bhiwani (PG) Ckt-1	Forced Tripped	POWER GRID	20-06-2020	17:39	21-06-2020	15:50	Phase to earth fault R-N Tripped on R-N fault during heavy windstorm& rainfall.FLR:Moga-M1:149.4km/4.2kA,M2:155km/4kA,Bhiwani-103.4km/6.91kA.
36	400 KV Kurukshetra(PG)-Nakodar(PSG) (PG) Ckt-1	Forced Tripped	POWER GRID	29-06-2020	00:28	29-06-2020	01:40	Phase to phase fault Y-B Line Tripped on Y-B fault due heavy Thunderstrom and Lightning .FLR Kurukshetra:116km,IY=5.5KA,IB=5.2KA

Weather related tripping in 400 KV and above lines in WESTERN REGION from 01st Apr20 to 17th June 2020

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason as per outage report	Weather condition & Reason received from utility
1	WR	765	765KV-RAIPUR-PS (DURG)-CHAMPA-2	POWERGRID-WR1 (PGCIL)	04/Apr/2020	16:29	04/Apr/2020	20:27	A/T due to L/A failure of NGR at Durg end.	Due to heavy rain & wind with thumderstorm line tripped during tripping of 765KV Durg - Jharsuguda ckt # 2 on R-Y phase to phase fault . After site inspection it
2	WR	765	765KV-RAIPUR-PS (DURG)-JHARSUGUDA-2	OGPTL	04/Apr/2020	16:29	04/Apr/2020	20:11	A/T on R-Y phase fault, 235km and 5.03kA from Jharsuguda end.	Because of heavy wind storm
3	WR	765	765KV-BINA-GWALIOR-3	POWERGRID-WR2 (PGCIL)	14/Apr/2020	17:15	14/Apr/2020	19:53	R phase to earth faultBina end : 233 km, 4.2 kAGwalior end: 36 km, 11.2 kA	Tripping due to heavy winds and rains
4	WR	400	400KV-CHANDRAPUR-BHADRAWATI-3	POWERGRID-WR1 (PGCIL)	19/Apr/2020	02:13	19/Apr/2020	05:37	B-E fault	Due to heavy windstorm & thunderstorm along with heavy rain in Bhadrawati carridor leads to line tripped on B-E fault,FD-2.794km,FC-22kA from Bhadrawati and
5	WR	400	400KV-CHANDRAPUR-BHADRAWATI-4	POWERGRID-WR1 (PGCIL)	19/Apr/2020	02:13	19/Apr/2020	06:20	B-E fault	Due to heavy windstorm & thunderstorm along with heavy rain in Bhadrawati carridor leads to line tripped on B-E fault,FD-2.794km,FC-19kA from Bhadrawati and
6	WR	400	400KV-JABALPUR-PS-MB POWER-1	POWERGRID-WR2 (PGCIL)	20/Apr/2020	19:09	20/Apr/2020	19:38	A/T from MB Power end only on Y phase, Zone-1, If= 5.7kA, 257km from MB Power end.	Heavy lightning and rain reported by site at the time of tripping
7	WR	765	765KV-DHARAMJAYGARH-RANCHI-1	POWERGRID-ER	21/Apr/2020	02:45	11/May/2020	22:23	Initially B-phase fault-298km,3.26kA@D. Line is anti theft charged on 22.04.20 at 23:10 Hrs from Dharamjaygarh end.	Due to heavy windstorm & thunderstorm along with heavy rain leads to line tripped on R Ph - Y Ph fault,FD-293km,FC-R-4.136kA & Y-3.821kA from Dharamjaygarh
8	WR	400	400KV-LARA-NTPC-CHAMPA-1	POWERGRID-WR1 (PGCIL)	21/Apr/2020	07:22	21/Apr/2020	10:07	B-phase fault, 7.8KA, 59.8KM at Champa	Due to heavy windstorm & thunderstorm along with heavy rain leads Line tripped on B ph - G fault Champa SS: 40kM, B ph-G,7.28kA
10	WR	765	765KV-DHARAMJAYGARH-JABALPUR-3	JTCL-Sterlite	24/Apr/2020	16:08	24/Apr/2020	17:15	Line tripped on Y ph-E fault. From Dharamjaygarh end, distance-31.1 km, fault current-15.3 kA. From Jabalpur end, 356	LNCC Line tripped due to Transient fault Because of Thunderstorm & Lighting strike.
11	WR	765	765KV-GWALIOR-AGRA-2	POWERGRID-WR2 (PGCIL)	26/Apr/2020	14:38	26/Apr/2020	15:30	Y-E FAULT	Fault in NR-3 Jurisdction. on patrolling found tripping due to swinging of jumpers during cyclonic winds and rains
12	WR	400	400KV-KORBA-NTPC-BHILAI-2	POWERGRID-WR1 (PGCIL)	26/Apr/2020	23:47	27/Apr/2020	02:37	Tripped on B -E fault	Line tripped on B-E fault ,FD-195.9km, FC-1.84kA from Bhilai end & FD-7.3km, FC-100Amps from Korba(NTPC) end.
13	WR	765	765KV-RAIPUR-PS (DURG)-JHARSUGUDA-2	OGPTL	27/Apr/2020	00:37	27/Apr/2020	03:14	Initially auto recloser successful in B phase then line tripped on B phase to earth faultRaipur end DetailsFault location :	Transient fault because of heavy wind storm & Lighting
14	WR	765	765KV-CHAMPA-DHARAMJAYGARH-1	POWERGRID-WR1 (PGCIL)	27/Apr/2020	00:51	27/Apr/2020	03:49	B-E fault.	Substation blocked out due to external flashover of B-ph CT of Main Bay of 765kV ICT-1 (713) Stormy weather with Rains
15	WR	765	765KV-BILASPUR-DHARAMJAYGARH-1	POWERGRID-WR1 (PGCIL)	27/Apr/2020	00:51	27/Apr/2020	06:03	B-E fault.	Substation blocked out due to external flashover of B-ph CT of Main Bay of 765kV ICT-1 (713) Stormy weather with Rains
16	WR	765	765KV-DHARAMJAYGARH-JHARSUGUDA-3	POWERGRID-WR1 (PGCIL)	27/Apr/2020	00:51	27/Apr/2020	04:52	B-E fault.	Substation blocked out due to external flashover of B-ph CT of Main Bay of 765kV ICT-1 (713) Stormy weather with Rains
17	WR	765	765KV-DHARAMJAYGARH-JHARSUGUDA-4	POWERGRID-WR1 (PGCIL)	27/Apr/2020	00:51	27/Apr/2020	07:38	B-E fault.	Substation blocked out due to external flashover of B-ph CT of Main Bay of 765kV ICT-1 (713) Stormy weather with Rains
18	WR	765	765KV-Wardha-RAIPUR-PS (DURG)-2	POWERGRID-WR1 (PGCIL)	29/Apr/2020	19:25	01/May/2020	14:48	A/T on B phase fault, 143 km from Durg end and fault current = 4.74 kA.; 227.7km,2.7kA @Wardha end; trial charged	Due to heavy windstorm & thunderstorm along with heavy rain leads to line tripped on B-E fault, FD-227.7km,FC-2.74kA from Wardha end and FD-
19	WR	765	765KV-BINA-JABALPUR-1	POWERGRID-WR2 (PGCIL)	30/Apr/2020	0.6729	30/Apr/2020	16:47	Y phase to earth fault 6.64 km 18.62 kA from JBP PS229 km/4.9 kA from Bina	Heavy rain along with wind reported by site
20	WR	400	400KV-VINDHYACHAL-JABALPUR-1	POWERGRID-WR2 (PGCIL)	30/Apr/2020	16:43	18/May/2020	22:11	Y-B phase fault Vindhyachal end : 336 km, 1.8 kAJabalpur end : 34.3 km, 11.8 km.04 nos towers (948-951) collapsed.	04 no tower collapsed found between 948-951 due to heavy rain and local circulating wind

Weather related tripping in 400 KV and above lines in WESTERN REGION from 01st Apr20 to 17th June 2020

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason as per outage report	Weather condition & Reason received from utility
21	WR	400	400KV-VINDHYACHAL-JABALPUR-2	POWERGRID-WR2 (PGCIL)	30/Apr/2020	16:43	18/May/2020	22:18	04 nos towers (948-951) collapsed	04 no tower collapsed found between 948-951 due to heavy rain and local circulating wind
22	WR	765	765KV-BILASPUR-Rajnandgaon-RRWTL-2	STL-Adani	01/May/2020	21:54	01/May/2020	23:51	B-N and R-N fault	heavy wind and thunder stromy weather condition
23	WR	400	400KV-WARORA-PG-PARLI-1	PWTL-POWERGRID	02/May/2020	13:21	02/May/2020	13:38	Line tripped on R ph -E fault. From Warora end, 59.2 km, 6 kA fault current. From Parli end, 300 km, 1.14 kA fault current.	Due to heavy windstorm & thunderstorm along with heavy rain leads to line tripped on R Ph -G. fault, FC-1.14 KA, FD-300.2 Kms from Parli end and 6.03 KA, & FD-59.2
24	WR	765	765KV-GWALIOR-Jaipur-2	POWERGRID-WR2 (PGCIL)	03/May/2020	17:43	03/May/2020	20:01	tripped on B-phase Fault. Gwalior end-144.3 km, 4.9 kA	At the time tripping heavy thunder storm and circulating wind. fault under NR#1 jurisdiction
25	WR	765	765KV-BINA-GWALIOR-3	POWERGRID-WR2 (PGCIL)	03/May/2020	0.8049	03/May/2020	22:38	tripped on Y-B fault Details awaitedBina: 158 km, Iy=5.56 kA, Ib=5.31 kA Gwalior: 75 km, Iy=9.35 kA, Ib =9.35 kA	At the time tripping heavy thunder storm and circulating wind
26	WR	765	765KV-GWALIOR-AGRA-1	POWERGRID-WR2 (PGCIL)	03/May/2020	19:34	04/May/2020	15:58	Line tripped on R-E fault. Gwalior End: 58 kM, 7.48 kA	At the time tripping heavy thunder storm and circulating wind. Earthwire suspension clamp broken at loc. no. 174 and
27	WR	400	400KV-KURUD-JAGDALPUR-1	Chattisgarh	04/May/2020	16:00	04/May/2020	21:50	A/T due to tower bent on location number 430.	Lightening and windy weather
28	WR	400	400KV-BHILAI-RAITA-2	Chattisgarh	04/May/2020	16:07	04/May/2020	20:28	Tripped on B-E fault	Lightening and windy weather
29	WR	765	765KV-RAIPUR-PS (DURG)-JHARSUGUDA-2	OGPTL	04/May/2020	17:27	04/May/2020	21:30	Tripped on Y-B fault	Transient fault (Y-Phase to B Phase) because of heavy wind storm
30	WR	400	400KV-Damoh-BIRSINGPUR-1	POWERGRID-WR2 (PGCIL)	04/May/2020	20:00	04/May/2020	20:56	Tripped on B-E fault	Before A/R attempt, DT received from Birsinghpur end resulted in A/R failure. Suspected reason is DC earth fault (DC system at Birsinghpur belongs to MP GENCO)
31	WR	400	400KV-JABALPUR-PS-MB POWER-1	POWERGRID-WR2 (PGCIL)	04/May/2020	20:36	04/May/2020	20:59	Y phase to earth fault	Line A/T from MB power end only and charged at Jabalpur ps end. No fault in line. At the time tripping heavy thunder
32	WR	400	400KV-JABALPUR-PS-MB POWER-2	POWERGRID-WR2 (PGCIL)	04/May/2020	20:36	04/May/2020	22:53	Y phase to earth fault	At the time tripping heavy thunder storm and circulating wind
33	WR	400	400KV JPL(TAMNAR)-RAIPUR I	JPL	06/05/2020	00:34	07/05/2020	18:42	R-E fault	Relay Indication- Protection Operated : Distance protection , Line 1 : 108.3 KM, Fault current: : IA =3.444 KA, IB =
34	WR	765	765KV-RAIPUR-PS (DURG)-JHARSUGUDA-2	OGPTL	08/May/2020	13:24	08/May/2020	13:25	AR successful Y-Phase, Distance: 63.5 Kms, Fault Current: 10 KA,	Because of heavy wind storm
35	WR	765	765KV-BHOPAL-BDTCL-JABALPUR-1	BDTCL-Sterlite	09/May/2020	15:45	09/May/2020	17:58	B phase to earth fault Jabalpur end: 30 km, 13.02 kA Bhopal end: 211.3 km, 3.18 kA	Line tripped because of wind strom which lead to broken down the tree branch and flew aways and comes in conatct with the line, attached here with the news
36	WR	765	765KV-RAIPUR-PS (DURG)-JHARSUGUDA-2	OGPTL	09/May/2020	19:04	10/May/2020	00:35	R-Y phase fault	Transient fault (R-Phase to Y Phase) because of heavy wind storm
37	WR	400	400KV-BINA-MP-BINA-1	POWERGRID-WR2 (PGCIL)	09/May/2020	19:18	09/May/2020	20:57	R phase fault (PMU)	Line A/T at Bina (POWERGRID) end only. 86A & 86B master trip relay optd at Bina end. Heavy wind storm and rains reported at site at time of tripping
38	WR	400	400KV-BINA-MP-BINA-2	POWERGRID-WR2 (PGCIL)	09/May/2020	19:18	09/May/2020	20:58	R phase fault (PMU)	Line A/T at Bina (POWERGRID) end only. 86A & 86B master trip relay optd at Bina end. Heavy wind storm and rains reported at site at time of tripping
39	WR	765	765KV-SATNA-Orai-1	POWERGRID-WR2 (PGCIL)	10/May/2020	15:40	10/May/2020	16:48	Line tripped on B-E fault after successfully Autoreclosing at 15:39 hrs. From Satna end, 207.5 km, 3.9 kA. From Orai end, 56.22 km,	Severe windstorms and lightning in surrounding areas of Orai

Weather related tripping in 400 KV and above lines in WESTERN REGION from 01st Apr20 to 17th June 2020

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason as per outage report	Weather condition & Reason received from utility
40	WR	765	765KV-GWALIOR-Orai-1	POWERGRID-WR2 (PGCIL)	10/May/2020	16:57	10/May/2020	18:05	Line tripped on R-E fault (600 ms after B ph has tripped). From Gwalior end, fault dist-84.4 km, fault current-6.6 kA. From Orai	Severe windstorms and lightning in surrounding areas of Orai
41	WR	400	400KV-WARORA-PG-PARLI-2	PWTL-POWERGRID	10/May/2020	19:15	11/May/2020	15:45	Tripped on R-E Fault. From Warora end, fault dist.-47.85 km, fault current-6.75 kA	Line tripped due to haevy wind storm with rain and lightning at Warora area leads to line tripped R-E fault, FD-47.85km, FC-6.75kA from Warora end & M1: FD-
42	WR	765	765KV-INDORE-KHANDWA-2	JTCL-Sterlite	10/May/2020	21:40	10/May/2020	23:43	A/T on B-phase fault 3.8KA, 60.9KM from Khandwa end	Transient Tripping because of heavy wind storm
43	WR	400	400KV-KORBA-NTPC-BIRSINGPUR-1	POWERGRID-WR1 (PGCIL)	15/May/2020	17:48	15/May/2020	19:33	A/T on B phase zone-1, 4.15kA and 77.73km from KSTPS end.	Due to heavy lightening, wind and thunderstorm line tripped on B ph -G fault. @ Korba-NTPC: FD-77.93kM; FC-4.15kA
44	WR	765	765KV-BHOPAL-BDTCL-JABALPUR-1	BDTCL-Sterlite	16/May/2020	16:46	16/May/2020	18:34	R phase to earth fault Jabalpur end: 30.04 km, 13.05 kA	Line tripped due to Transient fault because of heavy wind storm & Lighting, attached here with the news paper cutting and photograph of lighting spot mark
45	WR	765	765KV-BHOPAL-BDTCL-JABALPUR-1	BDTCL-Sterlite	18/May/2020	14:29	18/May/2020	21:23	Line tripped on R ph-E fault.From Jabalpur, fault dist-30 km, fault current-13 kA. From bhopal end, 198 km, 2 kA	Line tripped due to transient fault because of bad weather condition, attached here with the photograph & news paper cutting.
46	WR	765	765KV-SASAN-Vindhyachal(PS)-2	CWRTL-Adani	22/May/2020	12:09	22/May/2020	19:08	A/T on R-phase fault, 22KA, 4.9KM from vindhyachal end	Due to Hot & stormy weather and Heavy wind flow
47	WR	400	400KV-VINDHYACHAL-JABALPUR-1	POWERGRID-WR2 (PGCIL)	24/May/2020	18:43	24/May/2020	20:08	Y-B ph-ph fault. Vindhyachal end:247.7km,Y-2.7kA,B-2.09kA. Jabalpur end:111.73km,Y-4.6kA, B-5.3kA.	Heavy wind storm reported at the time of tripping
48	WR	765	765KV-SASAN-SATNA-1	POWERGRID-WR2 (PGCIL)	28/May/2020	15:49	10/Jun/2020	17:18	A/T due to tower bent on location number 430.	Heavy cyclonic wind storm. On patrolling found tower bent at loc no- 430
49	WR	765	765KV-SASAN-SATNA-2	POWERGRID-WR2 (PGCIL)	28/May/2020	15:50	28/May/2020	16:59	A/T due to tower bent on location number 430.	Line A/T on R Phase to E/F: Sasan end: F/L=145km, F/C=4.29ka & Satna end: F/L=95.59km, F/C=5.89ka
50	WR	400	400KV-VINDHYACHAL-SATNA-2	POWERGRID-WR2 (PGCIL)	28/May/2020	15:52	28/May/2020	21:34	Tripped (Heavy to very heavy storms reported	Tripping due to Heavy cyclonic Winds
51	WR	765	765KV-SATNA-Orai-1	POWERGRID-WR2 (PGCIL)	28/May/2020	16:13	29/May/2020	04:23	Tripped on Y ph fault	Tripping due to Heavy cyclonic Winds
52	WR	765	765KV-SASAN-SATNA-2	POWERGRID-WR2 (PGCIL)	28/May/2020	17:09	07/Jun/2020	12:57	A/T due to tower bent on location number 673.	Heavy cyclonic wind storm. On patrolling found tower bent at loc no- 673
53	WR	765	765KV-SATNA-GWALIOR-2	POWERGRID-WR2 (PGCIL)	28/May/2020	17:09	28/May/2020	21:29	Tripped on fault(Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
54	WR	765	765KV-SATNA-Vindhyachal(PS)-1	POWERGRID-WR2 (PGCIL)	28/May/2020	17:18	29/May/2020	03:48	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
55	WR	765	765KV-SATNA-Vindhyachal(PS)-2	POWERGRID-WR2 (PGCIL)	28/May/2020	17:18	29/May/2020	00:59	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
56	WR	765	765KV-SATNA-BINA-1	POWERGRID-WR2 (PGCIL)	28/May/2020	17:18	28/May/2020	19:08	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
57	WR	765	765KV-SATNA-BINA-2	POWERGRID-WR2 (PGCIL)	28/May/2020	17:18	28/May/2020	20:25	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
58	WR	765	765KV-Vindhyachal(PS)-JABALPUR-1	PJTL-POWERGRID	28/May/2020	17:26	28/May/2020	20:54	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds

Weather related tripping in 400 KV and above lines in WESTERN REGION from 01st Apr20 to 17th June 2020

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason as per outage report	Weather condition & Reason received from utility
59	WR	765	765KV-Vindhyachal(PS)-JABALPUR-2	PJTL-POWERGRID	28/May/2020	17:26	30/May/2020	14:30	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
60	WR	765	765KV-SASAN-Vindhyachal(PS)-1	POWERGRID-WR2 (PGCIL)	28/May/2020	17:26	28/May/2020	20:47	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
61	WR	400	400KV-Vindhyachal(PS)-SASAN-1	POWERGRID-WR2 (PGCIL)	28/May/2020	17:26	28/May/2020	19:08	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
62	WR	400	400KV-Vindhyachal(PS)-SASAN-2	POWERGRID-WR2 (PGCIL)	28/May/2020	17:26	28/May/2020	19:23	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
63	WR	400	400KV-VINDHYANCHAL-IV-Vindhyachal(PS)-1	POWERGRID-WR2 (PGCIL)	28/May/2020	17:26	28/May/2020	18:46	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
64	WR	400	400KV-VINDHYANCHAL-IV-Vindhyachal(PS)-2	POWERGRID-WR2 (PGCIL)	28/May/2020	17:26	28/May/2020	19:00	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
65	WR	400	400KV-REWA-SASAN-1	POWERGRID-WR2 (PGCIL)	28/May/2020	17:26	28/May/2020	21:22	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds
66	WR	400	400KV-Vindhyachal(PS)-RIHAND-1	PGCIL-NR	28/May/2020	17:26	28/May/2020	18:45	Tripped (Heavy to very heavy storms reported)	Not WR#2 elements. Heavy to very heavy storms reported in the area
67	WR	400	400KV-Vindhyachal(PS)-RIHAND-2	PGCIL-NR	28/May/2020	17:26	28/May/2020	19:30	Tripped (Heavy to very heavy storms reported)	Not WR#2 elements. Heavy to very heavy storms reported in the area
68	WR	765	765KV-SASAN-Vindhyachal(PS)-2	CWRTL-Adani	28/May/2020	17:26	28/May/2020	20:17	Tripped (Heavy to very heavy storms reported)	The tripping occured in S-V line & V-V line Ckt 3 & 4 due to grid failure i.e grid black out due to heavy wind and thunder storm weather.
69	WR	400	400KV-VINDHYANCHAL-IV-Vindhyachal(PS)-3	CWRTL-Adani	28/May/2020	17:26	28/May/2020	20:02	Tripped (Heavy to very heavy storms reported)	The tripping occured in S-V line & V-V line Ckt 3 & 4 due to grid failure i.e grid black out due to heavy wind and thunder storm weather.
70	WR	400	400KV-VINDHYANCHAL-IV-Vindhyachal(PS)-4	CWRTL-Adani	28/May/2020	17:26	28/May/2020	20:02	Tripped (Heavy to very heavy storms reported)	The tripping occured in S-V line & V-V line Ckt 3 & 4 due to grid failure i.e grid black out due to heavy wind and thunder storm weather.
71	WR	765	765KV-GWALIOR-AGRA-1	POWERGRID-WR2 (PGCIL)	28/May/2020	18:38	29/May/2020	16:09	Tripped (Heavy to very heavy storms reported)	Tripping due to Heavy cyclonic Winds. E/W open at loc no 114
72	WR	400	400KV-GWALIOR-MORENA-1	CWRTL-Adani	29/May/2020	19:08	29/May/2020	20:16	Tripped on R-E dault	heavy wind and thunder stromy weather condition
73	WR	765	765KV-GWALIOR-AGRA-1	POWERGRID-WR2 (PGCIL)	29/May/2020	19:10	30/May/2020	11:47	Tripped on B-E fault	Tripping due to Heavy cyclonic Winds
74	WR	765	765KV-GWALIOR-AGRA-2	POWERGRID-WR2 (PGCIL)	29/May/2020	19:11	29/May/2020	22:12	A/T due to tower bent on location number 430.	Line A/T on R phase to E/F: Gwalior end: f/l=35.5km, f/c=10.8ka and Agra end: f/l=86.4km, f/c=6.61ka
75	WR	400	400KV-KORBA WEST-RAITA-1	Chattisgarh	29/May/2020	20:02			Y-B ph fault (Tower collapsed/fall I.e. loc no. 160,159,158.near Beltara.)	Strong winds and lightening
77	WR	400	400KV-Raigarh-JHARSUGUDA-4	POWERGRID-WR1 (PGCIL)	30/May/2020	00:24	30/May/2020	08:51	Y-E fault. FD-145.5km, FC-3.015kA from Raigarh end	Line tripped on Y-G fault. FD-145.5km, FC-3.015kA from Raigarh end.
78	WR	400	400KV-ASOJ-CHORANIA-2	Gujarat	30/May/2020	20:31	30/May/2020	21:16	Y-phase fault; 80.89km, 3.72k@Asoj; 47.8km, 6.189kA@ Chorania	Windy & Cloudy Atmoshere Trial taken at 21:16 Stood Ok

Weather related tripping in 400 KV and above lines in WESTERN REGION from 01st Apr20 to 17th June 2020

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason as per outage report	Weather condition & Reason received from utility
79	WR	400	400KV-VINDHYACHAL-JABALPUR-2	POWERGRID-WR2 (PGCIL)	31/May/2020	14:28	31/May/2020	17:59	A/T on B phase Zone-1 1.044km and 21.25kA from VSTPS end. SOTF operated from VSTPS end.	Tripping due to Heavy cyclonic Winds
80	WR	765	765KV-SASAN-Vindhyachal(PS)-2	CWRTL-Adani	31/May/2020	14:32	31/May/2020	15:28	A/T on Y phase fault, 2.5km and 15.4kA from Vindhyanchal PS end.	Due to thunder stromy weather condition
81	WR	400	400KV JPL(TAMNAR)-RAIPUR I	JPL	31/05/2020	14:36	31/05/2020	16:36	B-E fault	Relay Indication- Protection Operated : Distance protection , Line 1 : Fault Distance- 171 KM, Fault current: IA = 136
82	WR	400	400KV JPL(TAMNAR)-RAIPUR II	JPL	31/05/2020	14:36	31/05/2020	16:39	R-E fault	Relay Indication- Protection Operated : Distance protection , Fault Distance- 205 KM
84	WR	765	765KV-Wardha-AURANGABAD-3	POWERGRID-WR1 (PGCIL)	31/May/2020	16:00	31/May/2020	16:27	A/T on B phase fault.	Line tripped due to heavy wind storm in Jalna area leads to line tripped on B-G fault, M2: FD-276km, FC-2.82kA from Wardha end & M1: FD-59.67km, FC-8.0kA , M2: FD-
85	WR	765	765KV-Wardha-AURANGABAD-4	POWERGRID-WR1 (PGCIL)	31/May/2020	16:00	31/May/2020	16:18	A/T on B phase fault.	Line tripped due to heavy wind storm in Jalna area leads to line tripped on B-G fault, M1: FD-310km, FC-2.6kA, M2: FD-303km, FC-2.4kA from Wardha end & M1: FD-
86	WR	400	400KV-KORBA WEST EXTENSION-MARWA-1	Chattisgarh	31/May/2020	18:15	05/Jun/2020	14:49	due to inclement weather and heavy thunderstorm and rain (Detail awaited).	Stormy weather
87	WR	400	400KV-KORBA WEST EXTENSION-BHILAI-1	Chattisgarh	31/May/2020	18:15	31/May/2020	21:23	due to inclement weather and heavy thunderstorm and rain (Detail awaited).	Stormy weather
88	WR	400	400KV-CHORANIA-KOSAMBA-1	Gujarat	01/Jun/2020	21:13	01/Jun/2020	22:15	tripped on Y-E fault	Windy & Cloudy Atmoshere Trial taken at 22:15 Stood Ok
89	WR	400	400KV-APL-MUNDRA-HADALA-1	Gujarat	03/Jun/2020	17:34	03/Jun/2020	22:08	Line tripped on B ph fault.	Due to heavy wind observed near Samkhiyali area line tripped . Patrolling carried out , nothing found abnormal
90	WR	400	400KV-CGPL-BACHAU-2	POWERGRID-WR2 (PGCIL)	03/Jun/2020	17:44	03/Jun/2020	17:45	Line A/R on R ph-E fault. From Bhachau end, 5.8 km, 20 kA. From CGPL end,89 km, 3.17 km.	There was heavy wind, rain and lightetening at entire area due to the effect of Nisarga Cyclone and it may be the reason of tripping
91	WR	400	400KV-CGPL-BACHAU-2	POWERGRID-WR2 (PGCIL)	03/Jun/2020	17:47	03/Jun/2020	17:48	Line A/R on R ph-E fault. From Bhachau end, 5.6 km, 20 kA. From CGPL end,89 km, 3.17 km.	There was heavy wind, rain and lightetening at entire area due to the effect of Nisarga Cyclone and it may be the reason of tripping
92	WR	400	400KV-APL-MUNDRA-CHARANKA-1	APL-Adani	03/Jun/2020	18:01	03/Jun/2020	21:10	Line tripped on Y ph fault. From Mundra, Z1, 169 km, 2.38 km. From Charanka, Z1, 6.2kA, 34.6 km	At mundra weather normal condition and charanka end windy, no reason observed.
93	WR	400	400KV-APL-MUNDRA-CHARANKA-1	APL-Adani	03/Jun/2020	21:42	04/Jun/2020	12:42	A/T on Y-Phase E/F, ZONE-1, 172KM, fault current-2.38kAmp.@APL	At mundra weather normal condition and charanka end windy, no reason observed.
94	WR	400	400KV-DEHGAM-RANCHODPURA-1	Gujarat	04/Jun/2020	02:23	04/Jun/2020	14:40	A/T on R-Y phase fault Zone-1, 5.402km and 10.28kA from Ranchodpura end.	At loc no: 98 R & Y ph top disc insulator found flashed. Heavy lightning observed
95	WR	400	400KV-TARAPUR 3&4-PADGHE-1	POWERGRID-WR2 (PGCIL)	04/Jun/2020	08:38	04/Jun/2020	16:44	Line tripped on Y-B fault. From Padghe end, 66 km,4 kA in Y & B phase.	At loc no- 47-48 OPGW rope open & hanging due to heavy wind & rain
96	WR	400	400KV-AKOLA-AURANGABAD-1	POWERGRID-WR1 (PGCIL)	04/Jun/2020	13:38	04/Jun/2020	21:42	Line tripped on R-E fault. From Aurangabad end, 6.5 km, 26 kA	Due to heavy windstorm & thunderstorm along with heavy rain leads to line tripped on R phase to E fault,Main-1-FD-6.465km,FC-26.372kA & Main-2-FD-
97	WR	400	400KV-CHARANKA-VARSANA-1	Gujarat	04/Jun/2020	22:09	04/Jun/2020	23:50	A/T on Y-phase E/F 3.6KA, 97.72KM @Varsana end. 6.93KA 26.48KM @Charanka end	Heavy wind strom with rain at both end. Transient fault.
98	WR	400	400KV-APL-MUNDRA-CHARANKA-1	APL-Adani	04/Jun/2020	22:28	05/Jun/2020	01:28	A/T on Y phase E/F 150KM, 2.58KA@APL end.	At mundra weather normal condition and charanka end windy, no reason observed.

Weather related tripping in 400 KV and above lines in WESTERN REGION from 01st Apr20 to 17th June 2020

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason as per outage report	Weather condition & Reason received from utility
99	WR	400	400KV-CHARANKA-KANSARI-1	Gujarat	05/Jun/2020	16:10	05/Jun/2020	22:00	Tripped on B-E fault	No cause of tripping found, Heavy win strom with rain.
101	WR	400	400KV-CGPL-JETPUR-1	POWERGRID-WR2 (PGCIL)	05/Jun/2020	20:48	05/Jun/2020	21:57	Y phase to earth fault CGPL End: 2.44 kA, 186 km	There was heavy Rainfall and winds in entire area which may be cause of tripping.
103	WR	400	400KV-APL-MUNDRA-HADALA-1	Gujarat	05/Jun/2020	22:16	06/Jun/2020	09:38	B Phase distance protection zone-1, fault location – 179.9 Km and fault current-1.968 KA.	During tripping heavy wind & rain observed.On dt:06.06.20 Ground petrolling(,Hadala Juridistion) carried-out from loc no:661 to682 ,nothing found
104	WR	400	400KV-APL-MUNDRA-CHARANKA-1	APL-Adani	07/Jun/2020	12:15	07/Jun/2020	14:48	A/T on R phase, 4.9kA and 74km pilot protection operated at APL end.	At mundra weather normal condition and charanka end windy, no reason observed.
105	WR	400	400KV-CHARANKA-VARSANA-1	Gujarat	07/Jun/2020	12:15	07/Jun/2020	17:51	A/T on R phase, 2.49km Ir=22.37kA and SOTF operated.	Heavy Rain/ wind at varsana end & Ground Patrolling done by Anjar Line team from loc no. 1 to 25 but no cause found.
106	WR	765	765KV-Bhuj-Banaskantha-1	POWERGRID-WR2 (PGCIL)	07/Jun/2020	15:01	07/Jun/2020	23:27	tripped on Y-phase fault; broken conductor connector of Y phase towards Switch yard side at Bhuj end. found	Y-phase fault; broken conductor connector of Y phase towards Switch yard side at Bhuj end Found
107	WR	400	400KV-APL-MUNDRA-HADALA-1	Gujarat	07/Jun/2020	16:21	07/Jun/2020	18:09	A/T on R phase zone-1, 22km and 9.8kA from APL end.	Due to heavy rain and wind near Mundra area line tripped. Trial taken from Hadala end and Line stood OK.
108	WR	400	400KV-APL-MUNDRA-SAMI-2	ATIL-Adani	07/Jun/2020	16:44	07/Jun/2020	17:16	A/T due to distance trip in Y phase.	Wind Speed High (18.1 Kmph) heavy wind pressure and rain at fault location area
109	WR	400	400KV-CGPL-JETPUR-1	POWERGRID-WR2 (PGCIL)	07/Jun/2020	17:50	07/Jun/2020	18:51	A/T on Y-phase E/F, Z1, 2.44KA, 184KM@CGPL end.	There was heavy Rainfall and winds in entire area which may be cause of tripping.
113	WR	765	765KV-SEONI-Wardha-1	POWERGRID-WR1 (PGCIL)	10/Jun/2020	16:35	10/Jun/2020	17:47	On Y-B fault , Wardha end -FC-26.85, FD-0KM Seoni end FC-3.744kA FD 267kM	Due to heavy windstorm & thunderstorm along with heavy rain leads to line tripped on Y to B phase to phase fault.
114	WR	765	765KV-DHARAMJAYGARH-JABALPUR-4	JTCL-Sterlite	11/Jun/2020	13:34	11/Jun/2020	15:46	Tripped on Y-Phase fault, D	Transient Tripping because of heavy wind storm & Lighting
115	WR	765	765KV-BHOPAL-BDTCL-INDORE-1	BDTCL-Sterlite	11/Jun/2020	17:49	11/Jun/2020	20:54	Tripped on B-E fault	Transient Tripping because of heavy wind storm
116	WR	400	400KV-CHARANKA-VARSANA-1	Gujarat	12/Jun/2020	20:05	14/Jun/2020	15:28	A/T on R-Phase E/F, 2.59KA, 160KM, SOTF operated @Varsana end	Heavy wind strom with rain at Charanka end & R-ph LA fire at Charnka end.
117	WR	400	400KV-RAITA-KURUD-1	Chattisgarh	12/Jun/2020	20:22	12/Jun/2020	21:25	A/T on B-Phase E/F 1.4KA, 82KM@Kurud end. 13.0KA, 8KM@Raita end	Rainy
118	WR	400	400KV-APL-MUNDRA-CHARANKA-1	APL-Adani	12/Jun/2020	20:37	12/Jun/2020	21:42	A/T on Y-phase E/F Z-1, 2.62KA @Adani end	At mundra weather normal condition and charanka end windy, no reason observed.
119	WR	400	400KV-ASOJ-WANAKBORI-1	Gujarat	13/Jun/2020	10:45	13/Jun/2020	11:47	Tripped on B-E fault. A/R successful at Asoj end. Breaker is closed at Asoj end.	Rainy & Ground patrolling carried out loc no 92 to 107, No cause found.
120	WR	765	765KV-DHARAMJAYGARH-JABALPUR-2	POWERGRID-WR2 (PGCIL)	13/Jun/2020	15:44	13/Jun/2020	16:01	Tripped on Y-E fault. 125 km, 6.6 kA from Jabalpur end	Heavy rainfall & storm at the time of tripping reported at site
121	WR	400	400KV-Raigarh-JHARSUGUDA-1	POWERGRID-WR1 (PGCIL)	14/Jun/2020	01:51	14/Jun/2020	05:54	Y phase to earth faultRaigarh end: 3.19 kA 110 km	Due to heavy wind and thunderstorm near Jharsuguda area line A/R successful on Y-G fault but tripped during persistent Y-G fault. Double end fault details from

Weather related tripping in 400 KV and above lines in WESTERN REGION from 01st Apr20 to 17th June 2020

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason as per outage report	Weather condition & Reason received from utility
122	WR	765	765KV-DHARAMJAYGARH-JHARSUGUDA-2	POWERGRID-WR1 (PGCIL)	14/Jun/2020	03:53	14/Jun/2020	05:18	R-E fault. Dharamjaygarh end:fault distance-15km, fault current-22kA.	Due to heavy wind and thunderstorm near Dharamjaygarh area line A/R successful on R-G fault but tripped during persistent R-G fault. Fault details from
123	WR	765	765KV-DHARAMJAYGARH-JHARSUGUDA-3	POWERGRID-WR1 (PGCIL)	14/Jun/2020	04:03	14/Jun/2020	11:35	R-E fault. Dharamjaygarh end:fault distance-1.6km, fault current-32kA.	Due to heavy wind and thunderstorm near Dharamjaygarh area line A/R successful on R-G fault but tripped during persistent R-G fault. Fault details from
124	WR	765	765KV-DHARAMJAYGARH-JHARSUGUDA-3	POWERGRID-WR1 (PGCIL)	15/Jun/2020	02:45	15/Jun/2020	19:04	R-B Ph-Ph fault. Dharamjaygarh end:Dist - 42.5km, Ir- 16.45 kA, Ib -17.2 kA	Due to heavy wind and thunderstorm near Dharamjaygarh area, line tripped on R-B to G fault. Fault details from Dharamjaygarh: M-1: 42.54km and R-
125	WR	400	400KV-SIPAT-RANCHI-2	POWERGRID-WR1 (PGCIL)	15/Jun/2020	07:56	15/Jun/2020	10:24	A/T on B phase fault, 361.2km and 1.5kA from Ranchi end.	Due to heavy wind and thunderstorm near Bilaspur area, line tripped on B ph to G fault. Fault details from Sipat: FD-59km and FC-3kA and Ranchi: FD-361.2km and
127	WR	765	765KV-Banaskantha-Chittorgarh-1	POWERGRID-WR2 (PGCIL)	16/Jun/2020	16:09	16/Jun/2020	18:58	A/T on R-Y phase, 2kA and 250.2km from Banaskantha end.	During said transient heavy rain and storm reported by site, Fault in NR#1 jurisdiction
128	WR	400	400KV-BHOPAL-MP-BHOPAL-BDTCL-2	BDTCL-Sterlite	17/Jun/2020	18:21	17/Jun/2020	19:43	B-E fault.	Transient Tripping because of heavy wind storm & Lighting
129	WR	765	765KV-BINA-GWALIOR-3	POWERGRID-WR2 (PGCIL)	17/Jun/2020	21:11	44000	0.62	Tripped on R-ph to Earth fault	During said transient fault Heavy rain along with thunderstorm reported by site.Snapped E/W found at loc no 512

List of Lines tripped on account of thunderstorm during Apr-May-June 2020 (400 kV and above) EASTERN REGION

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
1	ER	765 KV	765KV-SASARAM-FATEHPUR-1	POWERGRID	30/05/20	17:27	30/05/20	19:12	TRIPPED DUE TO R-N FAULT FAULT, F.D=267.4 KM FROM SASARAM, F.C=1.4KA. THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE.
2	ER	765 KV	765KV GAYA VARANASI -1	POWERGRID	19/04/20	18:39	19/04/20	19:59	TRIPPED ON B-N FAULT.F.D.=30KM FROAM GAYA, F.C=4.4KA. INSULATOR FLASHED OVER DUE TO SEVER LIGHTINING A,THUNDER & CYCLONE.
3	ER	765 KV	765KV GAYA VARANASI -1	POWERGRID	28/04/20	19:20	29/04/20	19:59	TRIPPED DUE TO R-N FAULT.F.D.=214.6 KM FROM GAYA(NR-III JURIDISCTION) = ,F.C.=2.53 KAMP.SUSPENSION CLAMP OF EARTH WIRE FAILED AT LOC NO.170 UNDER NR-III JURIDISCTION DUE TO SEVERE CYCLONE AND THUNDER AROUND THE AFFECTED AREA.
4	ER	765 KV	765KV GAYA VARANASI -1	POWERGRID	10/05/20	22:26	11/05/20	00:01	TRIPPED ON B-N FAULT, F.D=131.2KM FROM GAYA, F.C=3.97KA. LINE TRIPPED DUE TO HEAVY THUNDERSTORM AND RAIN AROUND THE FAULT AFFECTED AREA.
5	ER	400 KV	400KV-SAGARDIGHI-SUBHASGRAM-1	POWERGRID	20-05-20	17:48	20-05-20	19:57	Tripped during super cyclone 'AMPHAN'.R/I at Subhasgram: R-N, Z1, F/D:26KM, F/C: 14KA
6	ER	400 KV	400KV-RANGPO-BINAGURI-1	POWERGRID	26-05-20	18:57	26-05-20	19:22	Line tripped during heavy rain and thunderstorm.R/I at Binaguri: B-N fault,F/C:13.99KA, F/D: 13.41KM
7	ER	400 KV	400KV-RAJARHAT-SUBHASGRAM-1	POWERGRID	20-04-20	23:51	21-04-20	00:30	Tripped during during heavy lightning,rain & thunderstorm near Subhasgram.R/I at Subhashgram : R-N,Z1,FD-0 km,FC-9.53 kA.R/I at Rajarhat : R-N,FD-32.95,FC-6.285 kA.
8	ER	400 KV	400KV-MAITHON -DURGAPUR-2	POWERGRID	10-05-20	17:10	10-05-20	18:28	Line tripped.R/I at Durgapur: BN,FC-7.161 kA,FD-70.01(100%) km.R/I at Maithon: BN,FC-17.75 kA,FD-5.5 km.Heavy rain,thunderstorm,lightning observed at maithon end.
9	ER	400 KV	400KV-JEERAT-RAJARHAT-1	POWERGRID	20-05-20	18:38	20-05-20	21:46	Tripped during super cyclone 'AMPHAN'.R/I at Rajarhat: B-N, F/D:3.9KM, F/C: 2.32KA
10	ER	400 KV	400KV-DURGAPUR -JAMSHEDPUR-1	POWERGRID	02-04-20	12:22	02-04-20	18:02	Line Tripped . R/I at Durgapur end: R-N fault, FC:6.13 KA, FD: 41.1 KM.. Charging attempt was taken at 12:42 Hrs. on 02.04.2020 by extending from Durgapur end but tripped immediatly on SOTF. R/I at Durgapur end: R-N fault, FC:6.42,FD:40.755 KM. Due to local storm , a small Tree drop came on x-arm at tower loc no 143 which resulted earth fault R-Phase to ground.

List of Lines tripped on account of thunderstorm during Apr-May-June 2020 (400 kV and above) EASTERN REGION

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
11	ER	400 KV	400KV-BONGAIGAON -BINAGURI-2	POWERGRID	21-04-20	12:07	21-04-20	12:40	Tripped during heavy lightning,rain & thunderstorm.R/I at Binaguri end:B-N,Z-1 F/C-1.9kA F/D-157.2 KM
12	ER	400 KV	400KV-ANDAL-JAMSHEDPUR-2	POWERGRID	21-04-20	02:53	21-04-20	04:16	Tripped during during heavy lightning,rain & thunderstorm.R/I at Jamshedpur end : R-N,Z1,FD-0.421KM,FC-23.74KA..R/I at Andal end : R-N,Z2,FD-237KM,FC-1.627KA.
13	ER	400 KV	400KV PATNA BALLIA -3	POWERGRID	19/04/20	19:48	21/04/20	13:43	TRIPPED DUE TO B-N FAULT CAUSED BY SEVERE THUNDERSTORM AROUND THE FAULT AREA. FAULT DETAILS FROM PATNA :- F.D=90KM AND F.C=5KA. BROKEN EARTH WIRE FOUND AT LOC NO 412
14	ER	400 KV	400KV LAKHISARAI BIHARSARIF-1	POWERGRID	26/05/20	23:50	27/05/20	17:51	TRIPPED DUE TO Y-N FAULT.F.D.=102.9 KM FROM BIHARSHARIFF, F.C.=3.17 KA. THERE WAS HEAVY WINDSTROM & LIGHTENING AT SITE.
15	ER	400 KV	400KV KODERMA GAYA-1	POWERGRID	17/04/20	11:49	17/04/20	12:28	TRIPPED DUE TO B-N FAULT, F.D=113 KM FROM GAYA, F.C=2.76 kA. THERE WAS SEVERE LIGHTNING AND THUNDERSTORM AROUND THE AFFECETED AREA.
16	ER	400 KV	400KV KODERMA BOKARO-1	POWERGRID	30/05/20	12:58	30/05/20	20:37	TRIPPED ON B-N FAULT.MAIN-I DETAILS AT KODERMA END-F.D.=22.4 KM FROM KODERMA,F.C.=NA,MAIN-II DETAILS AT KODERMA END-F.D.=15 KM.THERE WAS SEVERE LIGHTNING,HEAVY RAIN AND THUNDERSTORM AROUND THE AFFECTED AREA.
17	ER	400 KV	400KV KODERMA BIHARSARIF-1	POWERGRID	07/05/20	14:43	07/05/20	19:55	TRIPPED DUE TO R-Y-B FAULT. FD-53.57KM FROM BIHARSHARIF AND FC-Ir-10.5KM.Iy-9.96KA,Ib-10.87KA.THERE WAS SEVERE LIGHTNING,HEAVY RAIN AND THUNDERSTORM AROUND THE AFFECTED AREA.
18	ER	400 KV	400KV KISHANGANJ PATNA-2	POWERGRID	15/04/20	04:32	15/04/20	19:42	TRIPPED DUE TO Y-B FAULT. FAULT DETAILS FROM PATNA:- FD-139.6 KM , FC- Iy-4.475KA,Ib-4.79KA. THERE WAS SEVERE CYCLONE,HEAVY RAIN AND LIGHTNING AROUND THE AFFECTED AREA.
19	ER	400 KV	400KV KISHANGANJ PATNA-2	POWERGRID	23/04/20	22:17	24/04/20	16:12	TRIPPED DUE TO Y-B FAULT, F.D.=206.8 KM FROM KISHANGANJ, F.C.=Iy-3.42 KA, Ib-2.98 KA. THERE WAS SEVERE LIGHTNING ,HEAVY RAIN AND THUNDER AROUND THE AFFECTED AREA.

List of Lines tripped on account of thunderstorm during Apr-May-June 2020 (400 kV and above) EASTERN REGION

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
20	ER	400 KV	400KV KISHANGANJ PATNA-2	POWERGRID	01/05/20	12:22	01/05/20	14:16	TRIPPED DUE TO Y-B FUALT, F.D.=139.5 KM FROM PATNA, F.C.=Iy-4.67 KA,Ib-4.78 KA. THERE WAS SEVERE LIGHTNING,HEAVY RAIN AND THUNDERSTORM AROUND THE AFFECTED AREA.
21	ER	400 KV	400KV KISHANGANJ PATNA-2	POWERGRID	05/05/20	09:39	05/05/20	13:11	TRIPPED DUE TO Y-B FAULT, F.D.=139.9 KM FROM PATNA,F.C.=Iy-4.537 KA,Ib-4.766 KA.THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE.
22	ER	400 KV	400KV KISHANGANJ PATNA-2	POWERGRID	14/05/20	15:09	14/05/20	15:34	TRIPPED DUE TO Y-N FAULT. FD-5.2KM FROM PATNA, FC-18.4KA. THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE.
23	ER	400 KV	400KV KISHANGANJ PATNA-2	POWERGRID	30/05/20	23:28	31/05/20	02:34	TRIPPED DUE TO Y-B FAULT, F.D=207.7KM FROM KISHENGANJ, F.C=Iy=3.46 KA, Ib=3.16 KA.THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE.
24	ER	400 KV	400KV KISHANGANJ PATNA -1	POWERGRID	05/05/20	08:13	05/05/20	08:54	TRIPPED DUE TO R-N FAULT, F.D=19.69 KM FROM PATNA, F.C=9.219KA. THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE.
25	ER	400 KV	400KV KHALGAON LAKHISARAI-2	POWERGRID	21/04/20	10:40	21/04/20	21:08	SD TAKEN FOR RECTIFICATION OF BROKEN OPGW WIRE AT LOC NO. 20-21 DUE TO SEVERE CYCLONE , THUNDERSTORM /LIGHTENING AROUND THE AFFECTED AREA.
26	ER	400 KV	400KV KHALGAON LAKHISARAI-2	POWERGRID	26/05/20	23:50	28/05/20	19:54	TRIPPED DUE TO R-N FAULT.F.D.=4.42 KM FROM LAKHISARAI, F.C.=10.064 KA. THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE.
27	ER	400 KV	400KV KHALGAON LAKHISARAI-1	POWERGRID	15/05/20	16:17	15/05/20	17:39	TRIPPED ON Y- N FAULT DUE TO SEVERE LIGHTENING. FD-.078KM FROM LAKHISARAI AND FC-11.145KA.
28	ER	400 KV	400KV KHALGAON LAKHISARAI-1	POWERGRID	26/05/20	23:50	27/05/20	16:04	TRIPPED DUE TO Y-N FAULT, F.D.=35.76 M FROM LAKHIISARAI, F.C.=5.808 KA. THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE.
29	ER	400 KV	400KV KHALGAON BARH-1	POWERGRID	26/05/20	23:20	27/05/20	18:29	TRIPPED DUE TO B-N FAULT, F.D.=31.98 KM FROM BARH, F.C.=11.19 KA.THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE.
30	ER	400 KV	400KV KHALGAON BANKA-1	POWERGRID	13/05/20	09:01	13/05/20	19:16	REPLACEMENT OF FLASHED INSULATOR STRING DUE TO SEVERE LIGHTNING,HEAVY RAIN AND THUNDER

List of Lines tripped on account of thunderstorm during Apr-May-June 2020 (400 kV and above) EASTERN REGION

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
31	ER	400 KV	400KV GAYA MAITHON-2	POWERGRID	06/04/20	18:36	08/04/20	15:32	TRIPPED DUE TO R-B FAULT. SITE DETAILS GAYA:-MAIN-I-R-B FAULT,IR=11.35 KAMP,IB=11.17 KAMP, F.D.=40.2 KM DUE TO HANGING OF CONDUCTOR. THERE WERE SEVER LIGHTNING,THUNDER & HEAVY RAIN AROUND THE AFFECTED AREA.
32	ER	400 KV	400KV FARAKKA-KHALGAON-2	POWERGRID	05/05/20	11:22	05/05/20	11:55	TRIPPED ONLY FROM FARKKA END ON B-N FAULT.A/R SUCCESSFUL AT KAHALGAON END.F.D.=26 KM FROM KAHALGAON,F.C.=12 KAMP.F.D.=15.THERE WAS SEVERE LIGHTNING,HEAVY RAIN AND THUNDERSTORM AROUND THE AFFECTED AREA.
33	ER	400 KV	400KV BIHARSHARIF VARANASI -1	POWERGRID	26/05/20	23:04	27/05/20	04:18	TRIPPED DUE TO B-N FAULT, F.D.=10 KM FROM BIHARSHARIFF, F.C.=18.03 KA. THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE
34	ER	400 KV	400KV BIHARSARIF SASARAM-1	POWERGRID	26/05/20	23:04	27/05/20	08:27	LINE TRIPPED DUE TO R-N FAULT, F.D.=13.3 KM FROM BIHARSHARIFF, F.C.=15 KA.THERE WAS HEAVY WINDSTROM AND LIGHTENING AT SITE.
35	ER	400 KV	400KV BIHARSARIF MUZAFFARPUR-2	POWERGRID	26/04/20	11:23	27/04/20	19:25	TRIPPED DUE TO Y-N FAULT.F.D.=73.7 KM FROM MUZ,F.C.=4.12 KAMP.INSULATOR STRING DECAPPED AT LOC NO.147 DUE TO HEAVY RAIN AND LIGHTNING.
36	ER	400 KV	400KV BIHARSARIF MUZAFFARPUR-2	POWERGRID	01/05/20	11:07	01/05/20	17:24	TRIPPED ON R-N FAULT.F.D.=24.3 KM FROM BSF,F.C.=10.7 KAMP.THERE WAS SEVERE LIGHTNING ,STORM AND HAEVY RAIN AROUND THE AFFECTED AREA.
37	ER	400 KV	400KV BIHARSARIF MUZAFFARPUR-2	POWERGRID	05/05/20	08:58	05/05/20	17:42	TRIPPED DUE TO Y-N FAULT, F.D.=62.9 KM FROM BSF, F.C.=6.76 KA DUE TO INSULATOR DECAPPING . THERE WAS SEVER LIGHTENING AND WINDSTROM AT SITE.
38	ER	400 KV	400KV BANKA BIHARSARIF-2	POWERGRID	05/05/20	08:53	05/05/20	17:00	TRIPPED DUE TO B-N FAULT, F.D.=18.4 KM FROM BSF, F.C.=12.35 KA DUE TO INSULATOR DECAPPING DURING SEVERE LIGHTNING,HEAVY RAIN AND THUNDERSTORM AROUND THE AFFECTED AREA.
39	ER	400 KV	400KV BANKA BIHARSARIF-2	POWERGRID	26/05/20	23:40	27/05/20	01:24	TRIPPED DUE TO Y-N FAULT, F.D.=25.38 KM FROM BIHARSHARIFF, F.C.=9.8 KA. THERE WAS HEAVY WINDSTROM AND LIGTHENING AT SITE.

List of Lines tripped on account of thunderstorm during Apr-May-June 2020 (400 kV and above) EASTERN REGION

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
40	ER	400 KV	400 KV RANCHI-RAGHUNATHPUR-1	POWERGRID	05/05/20	22:14	05/05/20	22:47	TRIPPED DUE TO R-N FAULT. F.D.=19.5 KM FROM RANCHI, F.C.=11.83 KA. THERE WAS SEVERE LIGHTNING,HEAVY RAIN AND THUNDERSTORM AROUND THE AFFECTED AREA.
41	ER	400 KV	400 KV RANCHI-MAITHON -1	POWERGRID	27/04/20	15:39	28/04/20	01:46	TRIPPED ON B-N FAULT.F.D.=16.8 KM FROM RANCHI,F.C.=4.2 KAMP.TRIPPED DUE TO SNAPING OF OPGW WIRE BETWEEN LOC NO.540-541 .THERE WAS SEVERE CYCLONE AND THUNDER AROUND THE AFFECTED AREA.
42	ER	400 KV	400 KV CHAIBASA-ROURKELA-2	POWERGRID	17/04/20	17:57	17/04/20	18:39	TRIPPED DUE TO R-N FAULT, {Chaibasa DETAILS , F.D=42.37KM FROM CHAIBASA, F.C=Ir=3.623KA, DURING HEAVY RAIN, WINDSTORM AND LIGHTNING.
43	ER	400 KV	400 KV CHAIBASA-ROURKELA-1	POWERGRID	21/04/20	06:35	21/04/20	07:17	TRIPPED DUE TO Y-N FAULT, F.D=82.408 KM FROM CHIABASA, F.C=3.870KA. (AFAS)THERE WAS SEVERE CYCLONE,THUNDER,LIGHTNING AND HEAVY RAIN AROUND THE AFFECTED AREA.
44	ER	400 KV	400 KV Alipurduar - Binaguri 3	ATL	09-04-20	18:28	10-04-20	16:42	Tripped due to Massive Cyclone which hit several areas in North Bengal. ERLDC Charging Code : 214
45	ER	400 KV	400 KV Alipurduar - Binaguri 4	ATL	09-04-20	17:27	09-04-20	18:27	Tripped due to Massive Cyclone which hit several areas of North Bengal. ERLDC Charging Code : 182
46	ER	765 KV	765kV Jharsuguda (sundargarh-PG)-Raipur (PG) Ckt2	OGPTL	04-04-20	16:29	04-04-20	20:11	Line tripped due to Transient fault (R-Phase to Y Phase) because of heavy wind storm, attached here with the news paper cutting. Charging clearance email attached for your reference.
47	ER	765 KV	765kV Jharsuguda (sundargarh-PG)-Raipur (PG) Ckt2	OGPTL	27-04-20	00:37	27-04-20	03:14	Line tripped due to Transient fault because of heavy wind storm & Lighting, attached here with the news paper cutting and photograph of lighting spot mark in the earthwire.
48	ER	400 KV	400 kv (Quad) D/C Bongaigaon - Alipurduar line CKT- 2(BNG- ALIP #2)	ENICL	09-04-20	18:11	09-04-20	18:48	Line tripped due to transient fault because of thunderstorm & bad weather condition foreign material comes in contact with the line, on same time period in NER_Region 11 line tripped Attached here with the news paper cutting of bad weather condition.

List of Lines tripped on account of thunderstorm during Apr-May-June 2020 (400 kV and above) EASTERN REGION

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
49	ER	400 KV	400 kv (Quad) D/C Bongaigaon - Alipurduar line CKT- 1(BNG- ALIP #1)	ENICL	09-04-20	18:17	09-04-20	18:58	Line tripped due to transient fault because of thunderstorm & bad weather condition foreign material comes in contact with the line, on same time period in NER_Region 11 line tripped Attached here with the news paper cutting of bad weather condition.
50	ER	765 KV	765kV Jharsuguda (sundargarh-PG)-Raipur (PG) Ckt2	OGPTL	04-05-20	17:27	04-05-20	21:30	Line tripped due to Transient fault (Y-Phase to B Phase) because of heavy wind storm and lightening , attached here with the news paper cutting. Line outage was converted in to voltage regulation at 21:30 hrs on 04/05/2020
51	ER	765 KV	765kV Jharsuguda (sundargarh-PG)-Raipur (PG) Ckt2	OGPTL	09-05-20	19:04	10-05-20	00:35	Line tripped due to Transient fault (R-Phase to Y Phase) because of heavy wind storm and lightening , attached here with the news paper cutting.
52	ER	400 KV	400KV-BINAGURI-TALA-4	POWERGRID + BPC	25-05-20	21:21	25-05-20	21:54	BAD WEATHER REPORTED AT SILIGURI,FAULT IS IN BHUTAN JURISDICTION;TRANSIENT FAULT MAY BE DUE TO LIGHTNING,
53	ER	400 KV	400KV-NEW PPSP-ARAMBAGH-2	WBSETCL	27-05-20	15:45	27-05-20	16:06	BAD WEATHER,TRANSIENT FAULT
54	ER	400 KV	400KV-PPSP-BIDHANNAGAR-1	WBSETCL	27-05-20	15:42	28-05-20	13:38	BAD WEATHER,TRANSIENT FAULT
55	ER	400 KV	400KV-DURGAPUR-SAGARDIGHI-1	WBSETCL	27-05-20	17:19	27-05-20	18:08	BAD WEATHER,TRANSIENT FAULT
56	ER	400 KV	400KV-BIDHANNAGAR-NEW CHANDITALA-1	WBSETCL	27-05-20	17:29	27-05-20	17:52	BAD WEATHER,TRANSIENT FAULT
57	ER	400 KV	400KV-BINAGURI-TALA-4	POWERGRID + BPC	29-05-20	14:22	29-05-20	15:00	BAD WEATHER REPORTED;TRANSIENT FAULT
58	ER	400 KV	400KV-SUBHASGRAM-HALDIA-1	HEL	20/05/20	15:48	20/05/20	16:03	Tripped due to Cyclone Amphan

List of Lines tripped on account of thunderstorm during Apr-May-June 2020 (400 kV and above) EASTERN REGION

S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
59	ER	400 KV	400KV-NEW CHANDITALA-KHARAGPUR-2	WBSETCL	20/05/20	16:03	20/05/20	22:36	Tripped due to Cyclone Amphan
60	ER	400 KV	400KV-SUBHASGRAM-HALDIA-2	HEL	20/05/20	16:17	20/05/20	19:18	Tripped due to Cyclone Amphan
61	ER	400 KV	400KV-SUBHASGRAM-HALDIA-1	HEL	20/05/20	16:17	20/05/20	18:12	Tripped due to Cyclone Amphan
62	ER	400 KV	400 KV CHANDITALA-BIDHANGAR	WBSETCL	20/05/20	18:33	20/05/20	23:55	Tripped due to Cyclone Amphan
63	ER	400 KV	400 KV JEERAT - CHANDITALA	WBSETCL	20/05/20	18:33	20/05/20	22:29	Tripped due to Cyclone Amphan
64	ER	400 KV	400KV-KOLAGHAT-ARAMBAGH	WBSETCL	20/05/20	18:45	20/05/20	12:50	Tripped due to Cyclone Amphan
65	ER	400 KV	400KV-ARAMBAGH-NEW CHANDITALA-1	WBSETCL	20/05/20	18:45	20/05/20	20:24	Tripped due to Cyclone Amphan
66	ER	400 KV	400KV-JEERAT-BAKRESWAR-1	WBSETCL	20/05/20	19:40	20/05/20	21:02	Tripped due to Cyclone Amphan
67	ER	400 KV	400KV-JEERAT-SAGARDIGHI-1	WBSETCL	20/05/20	19:40	20/05/20	01:20	Tripped due to Cyclone Amphan
68	ER	400 KV	400KV-ALIPURDUAR (PG)-JIGMELLING-2	POWERGRID + BPC	06/04/20	01:29	06/04/20	02:33	TRANSIENT FAULT;BAD WEATHER;200 msec fault deionisation
69	ER	400 KV	400KV-MALBASE-BINAGURI-1	POWERGRID + BPC	06/11/20	20:21	06/11/20	21:07	BAD WEATHER;POSSIBLE TRANSIENT FAULT ON INSULATOR FLASHOVER
70	ER	400 KV	400 KV JHARSUGUDA-RAIGARH I	POWERGRID	14/06/20	01:50	14/06/20	05:54	Heavy rainfall with thundering reported. AR failure after 1 sec
71	ER	765 KV	765 KV JHARSUGUDA-DHARAMJAIGARH II	POWERGRID	14/06/20	03:53	14/06/20	05:18	Heavy rainfall with thundering reported. AR failure after 1 sec
72	ER	765 KV	765 KV JHARSUGUDA-DHARAMJAIGARH III	POWERGRID	14/06/20	04:02	14/06/20	05:18	Heavy rainfall with thundering reported. AR failure after 1 sec

List of Lines tripped on account of thunderstorm during Apr-Jun 2020 (400 kV and above) SOUTHERN REGION

S.No	Region	Voltage Level	Name of Line	Owner		Tripping		Restoration		Reason Reported	Weather Conditions
				Sending End	Receiving End	Date	Time	Date	Time		
1	SR	400kV	400kV NELAMANGALA - HIRIYUR 2	KPTCL	PGCIL SR-2	11-Jun-20	19:58:00	12-Jun-20	08:28:00	TRIPPED ON OVER VOLTAGE.	Rainy
2	SR	400kV	400kV BOOPALPPALLI CHANDLAPUR LINE-1	TSGENCO	TSTRANSCO	10-Jun-20	23:47:00	11-Jun-20	09:39:00	TRIPPED ON OVER VOLTAGE.	Rainy
3	SR	400kV	400kV MALKARAM SURYAPET-2	TSTRANSCO	TSTRANSCO	10-Jun-20	21:45:00	12-Jun-20	11:26:00	THREE PHASE FAULT	Rainy
4	SR	400kV	400kV BPS - JAGALUR-1	KPTCL	KPTCL	01-Jun-20	18:58:00	02-Jun-20	08:25:00	SINGLE PHASE FAULT	Rainy & Windy
5	SR	400kV	400kV YTPS BPS-1	KPCL	KPTCL	01-Jun-20	21:15:00	02-Jun-20	15:29:00	B-N FAULT	Rain and Windy
6	SR	400kV	400kV RAMAGUNDAM - DICHCHIPPALLI	NTPC_RAMAGUNDAM	TSTRANSCO	31-May-20	15:11:00	02-Jun-20	14:23:00	TRIPPED ON Y-N FAULT	Rain and Thunder
7	SR	400kV	400kV YTPS BPS-2	KPCL	KPTCL	26-May-20	20:50:00	28-May-20	14:49:00	SINGLE PHASE FAULT	Heavy rain and lightning
8	SR	400kV	400kV MAHABOOB NAGAR - RAICHUR	TSTRANSCO	KPCL	26-May-20	20:41:00	27-May-20	11:08:00	R-N fault	Thunder,lightning with rain
9	SR	400kV	400kV HASSAN - NEELAMANGALA 1	SR-II, PGCIL	KPTCL	25-May-20	17:32:00	25-May-20	19:39:00	TRIPPED DUE TO R-N FAULT	Rainy
10	SR	400kV	400kV NEYVELI TS 2 - NAGAPATNAM	NLC	SR-II, PGCIL	18-May-20	17:15:00	18-May-20	18:30:00	TRIPPED ON R-Y FAULT	Lightning and Rain
11	SR	400kV	400kV MTPS - KARAMADAI - 2	TANTRANSCO	TANTRANSCO	17-May-20	18:11:00	17-May-20	23:12:00	TRIPPED ON B-N FAULT	Lightning and Rain
12	SR	400kV	400kV NELAMANGALA - MYSORE 2	KPTCL	SR-II, PGCIL	17-May-20	18:01:00	19-May-20	11:05:00	TRIPPED ON OVER VOLTAGE.	Rainy
13	SR	765kV	765kV SRIKAKULAM - ANGUL 2	SR-I, PGCIL	ER-II, PGCIL	16-May-20	18:00:00	16-May-20	18:12:00	TRIPPED ON Y-N FAULT	Heavy wind & rain
14	SR	400kV	400kV JEYPORE - GAZUWAKA 1	ER-I,PGCIL	SR-I, PGCIL	15-May-20	13:11:00	15-May-20	13:31:00	B-N FAULT	Heavy Wind
15	SR	400kV	400kV YTPS BPS-1	KPCL	KPTCL	10-May-20	12:57:00	10-May-20	14:02:00	R-N FAULT	Windy and Rainy
16	SR	400kV	400kV ALAMATHI - THIRUVALLAM-2	TANTRANSCO	TANTRANSCO	29-Apr-20	04:37:00	29-Apr-20	06:51:00	SINGLE PHASE TO GROUND FAULT	Heavy rain and wind
17	SR	400kV	400kV-SHANKARAPALLY-NARSAPUR-1	TSTRANSCO	TSTRANSCO	28-Apr-20	16:35:00	28-Apr-20	17:26:00	SINGLE PHASE FAULT	Rainy
18	SR	400kV	400kV GAJWEL NARSAPUR-1	TSTRANSCO	TSTRANSCO	28-Apr-20	16:35:00	28-Apr-20	17:26:00	TRIPPED DUE TO B-N FAULT IN TUKKAPUR-NARSAPUR1	Rainy

List of Lines tripped on account of thunderstorm during Apr-Jun 2020 (400 kV and above) SOUTHERN REGION

S.No	Region	Voltage Level	Name of Line	Owner		Tripping		Restoration		Reason Reported	Weather Conditions
				Sending End	Receiving End	Date	Time	Date	Time		
19	SR	400kV	400kV-TUKKAPUR-NARSAPUR-1	TSTRANSCO	TSTRANSCO	28-Apr-20	16:35:00	28-Apr-20	17:26:00	B-N FAULT	Rainy
20	SR	400kV	400kV TALAGUPPA - NEELAMANGALA	KPTCL	KPTCL	23-Apr-20	17:42:00	24-Apr-20	15:20:00	TRIPPED ON B-N FAULT	Rainy
21	SR	400kV	400kV RAMAGUNDAM - CHANDRAPUR 1	NTPC_RAMAGUNDAM	WR-I,PGCIL	19-Apr-20	04:54:00	19-Apr-20	05:15:00	Due to heavy windstorm & thunderstorm along with heavy rain in Bhadrawati corridor	Heavy rain and thunder storms
22	SR	400kV	400kV MANALI NCTPS	TANTRANSCO	TANGEDCO	09-Apr-20	15:10:00	10-Apr-20	20:44:00	R-N FAULT	Heavy rain and wind
23	SR	400kV	400kV KLVDPT - VALLUR 1	SR-II, PGCIL	NTECL	09-Apr-20	15:26:00	09-Apr-20	19:09:00	Tripped on OV	Raining
24	SR	400kV	400kV KLVDPT - VALLUR 2	SR-II, PGCIL	NTECL	09-Apr-20	15:26:00	09-Apr-20	19:35:00	Tripped on OV	Raining
25	SR	400kV	400kV ALAMATHI - VALLUR 2	TNEB	NTECL	09-Apr-20	15:26:00	09-Apr-20	19:35:00	Tripped on OV	Heavy rain and thunder storms
26	SR	400kV	400kV NELLORE - SPDR-2	SR-I, PGCIL	SR-II, PGCIL	09-Apr-20	15:25:00	10-Apr-20	09:30:00	Tripped on OV	Rain
27	SR	400kV	400kV VIJAYAWADA - NELLORE 1	SR-I, PGCIL	SR-I, PGCIL	09-Apr-20	15:25:00			Tripped on OV	Rain
28	SR	400kV	400kV KRISHNAPATNAM - NELLORE -2	APGENCO	APTRANSCO	09-Apr-20	15:10:00	15-Apr-20	21:14	Tripped on OV	Heavy rain
29	SR	400kV	400kV ANAIKAVADU - THAPPUGUNDU CKT-1	TANTRANSCO	TANTRANSCO	08-Apr-20	17:42:00	08-Apr-20	19:12	TRIPPED ON R-Y FAULT	Heavy Lightning & Thunder
30	SR	400kV	400kV RAICHUR PG - GOOTY 1	SR-I, PGCIL	SR-I, PGCIL	07-Apr-20	19:04:00	07-Apr-20	19:56	LA BLAST AT RAICHUR (PG)	Heavy wind and Rain
31	SR	400kV	400kV RAICHUR PG - GOOTY 2	SR-I, PGCIL	SR-I, PGCIL	07-Apr-20	19:04:00	07-Apr-20	19:56	LA BLAST AT RAICHUR (PG)	Heavy wind and Rain
32	SR	400kV	400kV RAICHUR - RAICHUR PG 1	KPCL	SR-I, PGCIL	07-Apr-20	19:04:00	07-Apr-20	19:56	LA BLAST AT RAICHUR (PG)	Heavy wind and Rain
33	SR	400kV	400kV RAICHUR - RAICHUR PG 2	KPCL	SR-I, PGCIL	07-Apr-20	19:04:00	07-Apr-20	19:56	LA BLAST AT RAICHUR (PG)	Heavy wind and Rain
34	SR	400kV	400kV JSW TORANAGALLU-GUTTUR	JSW	KPTCL	07-Apr-20	16:10:00	08-Apr-20	16:40	TRIPPED ON CONDUCTOR CUT	Windy and Raining
35	SR	400kV	400kV SRISAILAM - DINDI - 1	TSGENCO	TSTRANSCO	06-Apr-20	14:14:00	09-Apr-20	14:14	single phase to ground	Rainy
36	SR	400kV	400kV MYSORE - KOZHIKODE 2	SR-II, PGCIL	SR-II, PGCIL	06-Apr-20	19:54:00	06-Apr-20	20:05	TRIPPED ON OVER VOLTAGE.	Heavy rain and thunder

List of Lines tripped on account of thunderstorm during Apr-Jun 2020 (132kV and above for NER) NORTH EASTERN REGION									
S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
1	NER	132	KUMARGHAT_R C NAGAR	POWERGRID	03-Apr-20	16:45	03-Apr-20	17:04	TREE FELL ON LINE & TOWER BETWEEN LOC 81-82
2	NER	132	JIRIBAM - TIPAIMUKH #1	POWERGRID	03-Apr-20	17:04	08-Apr-20	17:34	A BIG TREE FELL ON CONDUCTOR FROM UPHILL SIDE AT LOC NO 238-239 DUE TO HEAVY STORM
3	NER	132	AIZWAL_KUMARGHAT	POWERGRID	04-Apr-20	09:00	04-Apr-20	17:49	TRIPPED DUE TO BAMBOO COMING PROXIMITY TO CONDUCTOR FROM OUTSIDE CORRIDOR DURING TURBULENT WEATHER
4	NER	400	BALIPARA_B.CHAIRALI #1	POWERGRID	04-Apr-20	12:54	04-Apr-20	13:05	BAMBOO INFRINGEMENT FROM OUTSIDE CORRIDOR B/W LOC 350-351 DURING STRONG WINDS.
5	NER	132	BADARPUR_KOLASIB	POWERGRID	05-Apr-20	15:00	05-Apr-20	15:20	TRIPPED DURING INTENSE LIGHTNING AND THUNDERSTORM OVER THE KOLASIB REGION.
6	NER	400	BALIPARA_BONGAIGAON # 2	POWERGRID	09-Apr-20	20:41	09-Apr-20	20:55	DURING AN INTENSE STORM OVER REGION A BAMBOO TOUCHED LINE CONDUCTOR B/W LOC 502-503.
7	NER	400	Silchar - Azara	NETC & AEGCL	09-Apr-20	21:21	09-Apr-20	21:29	SIL: R-N, Z-I, 173KM; AZARA: B-N, Z-I, 45.6KM. Heavy rain with thunderstorn was repoerted from site. The fault is due to lightning. Patrolling & Weather reports are enclosed..
8	NER	400	MISA_BALIPARA # 1	POWERGRID	09-Apr-20	22:27	09-Apr-20	22:49	TRIPPED DUE TO LIGHTINING STRIKE. FLASHOVER MARKS IN Y-PH INSULATOR DISCS AT LOC 90.
9	NER	400	MISA-BALIPARA #2	POWERGRID	09-Apr-20	22:27	09-Apr-20	22:51	TRIPPED DUE TO LIGHTINING STRIKE. FLASHOVER MARKS IN Y-PH INSULATOR DISCS AT LOC 90.
10	NER	400	Byrnihat-Bongaigaon	NETC & MePTCL	10-Apr-20	01:09	10-Apr-20	16:21	BNG: R-N, Z-I, 138.6KM; BYR: Y-N, Z-I, 76.3KM. Heavy rain with thunderstorn was repoerted from site. The tripping of the line was due to lightning stroke.
11	NER	132	HAFLONG-UMRANGSO	POWERGRID	11-Apr-20	16:48	11-Apr-20	17:06	TRIPPED DUE TO LIGHTNINIG; BURNT MARKS FOUND IN R-PH CC RING AT LOC 58. INCLEMENT WEATHER AT SITE.
12	NER	400	BALIPARA_BONGAIGAON # 1	POWERGRID	15-Apr-20	12:27	15-Apr-20	12:33	DURING INTENSE THUNDERSTORM TALL BAMBOO CAME INTO PROXIMITY OF Y-PH FROM OUSTIDE CORRIDOR.
13	NER	400	Byrnihat-Bongaigaon	NETC & MePTCL	15-Apr-20	12:32	15-Apr-20	12:45	BNG: R-N, Z-II, 184.8KM. Heavy rain with thunderstorn was repoerted from site. The fault is due to lightning.
14	NER	400	Silchar-Byrnihat	NETC & MePTCL	15-Apr-20	12:51	15-Apr-20	12:59	SIL: B-N, Z-II, 197.4KM. Heavy rain with thunderstorn was repoerted from site. The fault may be due to the lightning stroke.
15	NER	400	BALIPARA-BONGAIGAON #4	POWERGRID	15-Apr-20	14:14	15-Apr-20	14:27	BHALUKA BAMBOO INFRINGEMENT FROM OUTSIDE CORRIDOR B/W LOC 43-44 DURING STRONG WINDS.
16	NER	132	BADARPUR_KHLIERIAT	POWERGRID	15-Apr-20	14:20	15-Apr-20	14:50	INTENSE LIGHTNING AND STORM PREVAILING OVER THE REGION.
17	NER	132	KUMARGHAT_R C NAGAR	POWERGRID	15-Apr-20	17:22	16-Apr-20	16:16	R-PH CONDUCTOR SNAPPED B/W LOC. 183-184 DUE TO FALLING OF A LARGE TREE FROM OUTSIDE CORRIDOR.
18	NER	400	Pallatana_ Silchar 2	NETC	16-Apr-20	00:49	16-Apr-20	13:43	SIL: Y-N, Z-II, 201KM; PAL: Y-N, Z-I, 54KM. Jumper sanpped due to severe wind storm and thunderstorm in various regions of the state.
19	NER	400	Silchar-Byrnihat	NETC & MePTCL	17-Apr-20	02:28	17-Apr-20	02:55	SIL: R-N, Z-I, 37KM; BYR: 272KM, Z-III. Heavy rain with thunderstorn was repoerted from site. The fault may be due to the lightning stroke.
20	NER	132	JIRIBAM_HAFLONG	POWERGRID	17-Apr-20	02:34	17-Apr-20	02:46	TRIPPED DUE TO LIGHTNING.
21	NER	132	JIRIBAM - TIPAIMUKH #1	POWERGRID	17-Apr-20	02:36	17-Apr-20	03:00	TRIPPED DUE TO LIGHTNING
22	NER	400	SILCHAR-IMPHAL #2	POWERGRID	17-Apr-20	03:11	17-Apr-20	03:13	TRIPPED DUE TO LIGHTNING AND TURBULENT WEATHER
23	NER	132	SILCHAR - MELRIAT #2	POWERGRID	17-Apr-20	04:52	17-Apr-20	05:03	TRIPPED DUE TO LIGHTNING

List of Lines tripped on account of thunderstorm during Apr-Jun 2020 (132kV and above for NER) NORTH EASTERN REGION									
S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
24	NER	132	SILCHAR - MELRIAT #2	POWERGRID	17-Apr-20	06:58	17-Apr-20	07:23	TRIPPED DUE TO LIGHTNING
25	NER	132	AIZAWL - TIPAIMUKH #1	POWERGRID	17-Apr-20	08:46	17-Apr-20	09:02	TRIPPED DUE TO LIGHTNING
26	NER	132	KOLASIB-AIZAWL	POWERGRID	18-Apr-20	14:22	18-Apr-20	14:43	TRIPPED DUE TO LIGHTNING.
27	NER	132	AIZWAL_KUMARGHAT	POWERGRID	18-Apr-20	14:23	18-Apr-20	14:37	TRIPPED DUE TO BAMBOO COMING PROXIMITY TO CONDUCTOR FROM OUTSIDE CORRIDOR DURING TURBULENT WEATHER
28	NER	132	AIZAWL - TIPAIMUKH #1	POWERGRID	18-Apr-20	14:38	18-Apr-20	14:48	TRIPPED DUE TO LIGHTNING
29	NER	132	KHANDONG_KHLIERIAT # 2	POWERGRID	20-Apr-20	04:24	20-Apr-20	04:42	TRIPPED DUE TO LIGHTNING. FLASHOVER AT LOC 5 R-PH GRADING RING
30	NER	132	AIZAWL - TIPAIMUKH #1	POWERGRID	20-Apr-20	07:41	20-Apr-20	08:54	TRIPPED DUE TO LIGHTNING
31	NER	132	KHANGDONG-UMRANGSO	POWERGRID	22-Apr-20	15:47	22-Apr-20	16:23	TRIPPED DUE TO LIGHTNING. BURNT MARKS FOUND IN Y-PH INSULATOR CC RING AT LOC 15.
32	NER	132	KOLASIB-AIZAWL	POWERGRID	25-Apr-20	16:37	27-Apr-20	13:47	B-PH CONDUCTOR SNAPPED B/W LOC 127-128 DUE TO FALLING OF BIG TREE FROM OUTSIDE LINE CORRIDOR.
33	NER	132	JIRIBAM - TIPAIMUKH #1	POWERGRID	30-Apr-20	01:12	30-Apr-20	06:37	DELAY DUE TO NO COMMUNICATION WITH TIPAIMUKH S/S. TRIPPED DUE TO LIGHTINING.
34	NER	132	HAFLONG-UMRANGSO	POWERGRID	30-Apr-20	14:05	30-Apr-20	14:31	TRIPPED DUE TO LIGHTNING.
35	NER	400	Silchar-Byrnihat	NETC & MePTCL	01-May-20	12:59	01-May-20	13:08	SIL. B-N, Z-I, 102.5KM, AZARA B-N, Z-I, 186.1KM Tripping is caused due to lightning.
36	NER	132	KHANGDONG-UMRANGSO	POWERGRID	01-May-20	14:21	01-May-20	14:50	TRIPPED DUE TO LIGHTNING
37	NER	132	HAFLONG-UMRANGSO	POWERGRID	03-May-20	00:09	03-May-20	00:33	TRIPPED DUE TO LIGHTNING
38	NER	400	BALIPARA_BONGAIGAON # 1	POWERGRID	12-May-20	15:52	13-May-20	15:21	TRIPPED DUE TO FAILURE OF R-PHASE INSULATOR AT LOC NO. 243 DUE TO LIGHTNING
39	NER	400	MISA_BALIPARA # 1	POWERGRID	12-May-20	21:26	12-May-20	21:56	TRIPPED DUE TO LIGHTNING.
40	NER	400	SILCHAR-IMPHAL #2	POWERGRID	13-May-20	02:47	13-May-20	03:02	TRIPPED DUE TO INFRINGEMENT OF A LONG BAMBOO FROM OUTSIDE CORRIDOR B/W LOC 114-115.
41	NER	132	KOLASIB-AIZAWL	POWERGRID	13-May-20	07:16	13-May-20	07:55	TRIPPED DUE TO LIGHTNING.
42	NER	132	SILCHAR_PKBARI #2	POWERGRID	13-May-20	07:31	13-May-20	08:06	FLASHOVER MARKS FOUND IN B-PH(TOP PHASE) AT LOC 119. TRIPPED DUE TO LIGHTNING.
43	NER	132	SILCHAR-HAILAKANDI #1	POWERGRID	13-May-20	11:21	13-May-20	11:40	TRIPPED DUE TO LIGHTNING.
44	NER	132	SILCHAR-HAILAKANDI #2	POWERGRID	13-May-20	11:21	13-May-20	11:37	TRIPPED DUE TO LIGHTNING.
45	NER	132	BADARPUR_KHLIERIAT	POWERGRID	13-May-20	12:14	13-May-20	12:26	TRIPPED DUE TO LIGHTNING.
46	NER	400	BALIPARA_B.CHAIRALI #3	POWERGRID	13-May-20	14:09	13-May-20	14:17	TRIPPED DUE TO INFRINGEMENT OF 2 CGI SHEETS AT LOC 13 DURING A THUNDERSTORM.
47	NER	132	JIRIBAM_HAFLONG	POWERGRID	14-May-20	15:45	14-May-20	16:33	E/S/D TAKEN FOR BAMBOO CLEARING B/W LOC. 219-220 LEANING TOWARDS LINE FROM OUTSIDE CORRIDOR.
48	NER	400	Silchar-Byrnihat	NETC & MePTCL	16-May-20	06:33	16-May-20	07:28	SIL: B-N, Z-I, 35KM; BYR: B-N, Z-II, 235KM. Tripping is caused due to lightning.
49	NER	400	BALIPARA_B.CHAIRALI #4	POWERGRID	22-May-20	09:16	22-May-20	11:40	TRIPPED DUE TO INFRINGEMENT OF FOREIGN OBJECT INTO B-PH CROSS ARM AT LOC 162 DURING HIGH WINDS.
50	NER	132	SILCHAR_PKBARI #2	POWERGRID	26-May-20	10:55	26-May-20	11:05	TRIPPED DUE TO LIGHTNING
51	NER	400	Silchar-Byrnihat	NETC & MePTCL	26-May-20	21:53	26-May-20	22:13	SIL: B-N, Z-I, 72.8KM; BYR: B-N, Z-II, 183KM. Tripping is caused due to lightning.
52	NER	132	BADARPUR_KHLIERIAT	POWERGRID	26-May-20	22:12	26-May-20	22:33	TRIPPED DUE LIGHTNING AS BURNTMARK WAS OBSERVED IN Y-PH VIBRATION DAMPER AT LOC 9
53	NER	132	KUMARGHAT_R C NAGAR	POWERGRID	30-May-20	08:28	30-May-20	08:44	FLASHOVER MARK AT LOC 32, Y -PH INSULATOR STRING DUE TO LIGHTNING.

List of Lines tripped on account of thunderstorm during Apr-Jun 2020 (132kV and above for NER) NORTH EASTERN REGION									
S.No	Region	Voltage Level	Name of Line	Owner of line	Tripping		Restoration		Reason Reported
					Date	Time	Date	Time	
54	NER	132	JIRIBAM - TIPAIMUKH #1	POWERGRID	31-May-20	07:50	31-May-20	08:04	TRIPPED DUE TO INFRINGEMENT OF BIRD NEST, FOUND AT LOC. NO 07.

Distribution list (Northern Region):

1. Managing Director, Delhi Transco Ltd., Shakti Sadan Building Kotla Road, New Delhi-110 002
2. General Manager (SLDC), Delhi Transco Ltd., SLDC Building, 33 kV Substation Building, Minto Road, New Delhi-110 002.
3. Chairman & Managing Director, Rajasthan RajyaVidyutPrasaran Nigam Limited, VidyutBhawan, Janpath, Jaipur-302005
4. Chief Engineer(LD), State Load Despatch Centre, Rajasthan RajyaVidyutPrasaran Nigam Ltd., Ajmer Road,Heerapura, Jaipur-302024
5. Chairman & Managing Director, Punjab State Transmission Corporation Ltd. Regd. Office, PSEB Head office, The Mall, Patiala-147 001.
6. Chief Engineer (SLDC), SLDC Building, near 220KV grid substation, PSTCL, Ablowal, Patiala-147001.
7. Managing Director, PTCUL, VidyutBhawan, Near I.S.B.T. crossing, Sharanpur Road, Majra, Dehradun-248 001.
8. Chief Engineer(SLDC), VidyutBhawan, Saharanpur Road, Majra, Near ISBT, Dehradun-248001, Uttarakhand
9. Managing Director, HPSEB Limited, Kumar House, VidyutBhawan, Shimla-171 004Himachal Pradesh.
10. Director (SLDC), HP State Load Dispatch Centre, Totu, Shimla-171 001.
11. Chairman & Managing Director, Haryana VidyutPrasaran Nigam Ltd., Shakti Bhawan, Sector-6, Panchkula, Distt. Ambala, Haryana-134 109.
12. Chief Engineer (SO & SLDC), Haryana VidyutPrasaran Nigam Ltd., Shakti Bhawan, Sector-6, Panchkula, Distt. Ambala, Haryana-134 109. Ph: 0172-2560547.
13. Chief Engineer (Power System), 5th-floor Uttar Pradesh Power transmission Corporation Ltd., Shakti Bhawan, 14-Ashok Marg, Lucknow-226 001.Ph: 2287879.
14. Chairman & Managing Director, Uttar Pradesh Power transmission Corporation Ltd., Shakti Bhawan, 14-Ashok Marg, Lucknow-226 001.
15. Director (SLDC), VibhutiKhand, Phase-2, Gomti Nagar, Lucknow-226010, Uttar Pradesh
16. Development Commissioner, Power Development Department (J&K),Lottery Building, Behind Civil Secretariat, Srinagar, J&K Pin code: 190009 Fax no. 0194-2452173.
17. Development Commissioner, Power Development Department (J&K), Grid Station Complex, janipur, jammu. 0191-2530265
18. Executive Engineer, SLDC Building, 220kV Gladini Grid Station Complex, NarwalBala, Gladini-180016, J&K.
19. Chief Engineer, UT of Chandigarh (Elecy. Deptt. 1st Floor), Sector 9-D, Chandigarh-160019.
20. Superintending Engineer (Elect. Op), UT of Chandigarh (Elecy. Deptt. 5th Floor), Sector 9-D, Chandigarh-160019. Ph: 0172-2703242
21. Chairman, Bhakra Beas Management Board, sector-19-B, Madhya Marg, Chandigarh-160019
22. Director(PR), BBMB, SLDC Complex, Industrial Area, Phase-I, Chandigarh-160002
23. CEO, Power links Transmission Ltd. 10th Floor, DLF Tower A, District Centre Jasola, New Delhi -110025.
24. CEO, Jaypee Powergrid Ltd., JA House, 63, Basant Lok, Vasant Vihar, New Delhi-110057.Fax: +91 11 26148890, 26142726
25. Executive Director (NR-1), POWERGRID, B-9, Qutub institutional area, KatwariaSarai,New Delhi-110016
26. Executive Director (NR-2), POWERGRID, Grid Bhawan, Rail Head Complex, Jammu-180012.
27. Executive Director, NR-3, POWERGRID, 12, Maharana Pratap Marg, Near Sikandar Bag Chauraha, Lucknow-226001

28. Director, Adani Power Ltd, AdaniHouse, Plot No.83, Institutional Area, Sector 32, Gurgaon, Haryana-122001

29. Chairman & Managing Director, Parbati Koldam Transmission Company Ltd., JMD Galleria 5th floor, plot no. 12-D, Sector 48,Sohna road Gurgaon-122001

30. Adani Transmission (I) Ltd, 7-A, Sambhav building, Judges Bungalow Road, Bodakdev, Ahmedabad- 380015

31. General Manager, JAYPEE POWERGRID Limited, JA House, 63, Basant Lok, Vasant Vihar, New Delhi-110057

32. The CEO, POWERGRID KALA AMB TL,400/220 KV GIS Sub Station Vill. Meerpur Kotla, PO. Trilokpu Tehsil. Nahan, Distt. Sirmour 173030,Himachal Pradesh

33. CEO, POWERGRID Unchahar Transmission Ltd. 765/400/220kV Substation, Village Chauferava, Post & Dist Fatehpur, Uttar Pradesh, 212601

34. NRSS XXXVI Transmission Ltd. Essel Infraprojects Ltd.06th Floor, Plot No. 19, Film City, Sec-16 A, Gautam Buddha Nagar, Noida U.P. – 201301

35. NRSS XXXI (B) Transmission Ltd. 503, windsor off CST Road, Kalina, Santacruz (E), Mumbai 400098

36. The DIRECTOR, Patran Transmission Company Limited, 4OO KV 22OkV GIS Substation, Village-Banwala, Tehsil-Patran, District: Patiala 147105, Punjab

37. The Vice President, NRSS XXIX TL, RAPP TL &GPTL.
    F-1, Mira Corporate Suite, Ishwar Nagar, Mathura Road, New Delhi – 110065

38. Director, Operations , Powerlinks Transmission Ltd., 10th Floor, DLF Tower-A, District Centre, Jasola, New Delhi-110044

39. The Vice President, Gurgaon Palwal Transmission Ltd., F-1, Mira Corporate Suite, Ishwar Nagar, Mathura Road, New Delhi

Distribution List (Eastern Region)

Managing Director, Bihar State Power Transmission Limited, Vidyut Bhawan, Bailey Road, Patna-800021	Chief Engineer (SLDC) Bihar State Power Transmission Limited, Vidyut Bhawan, Bailey Road, Patna-800021
Chief Engineer (SLDC) Damodar Valley Corporation, GOMD-I Premises, P.O.- Danesh Seikh Lane, Howrah- 711109	Chief Engineer (CTC) Damodar Valley Corporation, P.O. Maithon Dam, Dist. Dhanbad, Jharkhand-828207
Chief Engineer, (CRITL) Jharkhand Urja Sancharan Nigam Limited Kusai Colony, Doranda, Ranchi-834002	Electrical Superintending Engineer (CLD) Jharkhand Urja Sancharan Nigam Limited, Kusai Colony, Doranda, Ranchi-834002
Chief General Manager (O&M), OPTCL, Janpath, Bhubaneswar, Odisha – 751 022. FAX: 0674-2542932 cgm.onm@optcl.co.in	Director, WBSETCL Central Testing Laboratory, Abhikshan, Salt Lake, Kolkata-700091 (Fax no. 2367-3578/1235)
Chief Load Dispatcher, SLDC OPTCL, P.O. Mancheswar Rly. Colony Bhubaneswar-751017	Chief Engineer (CLD) WBSETCL, P.O. Danesh Sheikh Lane, Andul Road, Howrah-711109
Chief Engineer (Trans.) Power Deptt., Govt. of Sikkim, Gangtok-731010	
Executive Director, ER-II Power Grid Corporation of India Ltd., J-I-15, Block-EP, Sector-V,Salt Lake,Kolkata-91	Executive Director ,ER-I Power Grid Corporation of India Ltd., Alankar Place, Boring Road, Patna-800001
General Manager, Powerlinks Transmission Limited Vidyut Nagar, Siliguri WB 734015.	Head- Asset Manament/O&M, Purulia & Kharagpur Transmission Comp. Ltd,634A-Tulip New Minal Residency,J.K Road Near Ayodhya Bypass Road,Bhopal-462023
Sr.Vice President, Teestavalley Power Transmission Ltd.,Vijaya Building, 2nd Floor, 17 Barakhamba Road,New Delhi -110001.	Project Director, Odisha Generation Phase-II Transmission LimitedF-1 Mira Corporate Suites, 1&2 Ishwar Nagar,Okhla Crossing,Mathura Road, New Delhi—110065.
The DGM(Commercial),Power Grid Corporation Of India Ltd.,RHQ, ERTS-II, CF-17, Action Area-1C, New Town, Kolkata 700156,West Bengal.	The General Manager, Darbhanga-Motihari Transmission Company Ltd.,A-26/03,Mohan Cooperative Industrial Estate,Mathura Road,New Delhi

Distribution List (Southern Region)

1. Chairman cum Managing Director, APTRANSCO, Vidyut Soudha, Gunadala, Vijayawada 520 004, Andhra Pradesh.

2. Chairman cum Managing Director, TSTRANSCO, Vidyut Soudha, Hyderabad 500 082, Telangana

3. Managing Director, PCKL, KPTCL building, Cauvery Bhavan, Bangalore-560 009, Karnataka

4. Chairman, KSEB, Vaidyuthi Bhavanam, Pattom, Trivandrum 695 004, Kerala

5. Director (Transmission), TANTRANSCO, 144, Anna Salai, Chennai 600 002, Tamil Nadu

6. Chief Engineer, TANTRANSCO, 144, Anna Salai, Guindy Industrial Estate, SIDCO Industrial Estate, Guindy, Chennai, Tamil Nadu 600002

7. Chief Engineer, Vidyut Soudha Building, Khairatabad Rd, Near Eenadu, Khairtabad, Hyderabad, Telangana

8. Chief Engineer, Transmission Corporation of Andhra Pradesh Limited,Vidyut Soudha, Gunadala, Eluru Rd, Vijayawada, Andhra Pradesh

9. Chief Engineer (Transmission- System Operation), North Kalamassery,, HMT Kalamassery, Kochi, Kerala 683104

10. Chief Engineer, 27/1, Race Course Road, Madhava Nagar, Gandhi Nagar, Bengaluru, Karnataka 560001

11. Executive Director,POWERGRID ISTS, Southern Regional Transmission System – II, Near.RTO Driving Test Track, Singanayakanhalli, Yelahanka, Bangalore – 560 064, Karnataka.

12. The Project In Charge,Raichur Sholapur Transmission Company Limited, Patel Estates, S.V.Road, Jogeshwari (West), Mumbai 400 102, Maharashtra

13. The Project In Charge,Kudgi Transmission Ltd., Building No 3, Second Floor, Sudeep Plaza, MLU Sector - 11, Pocket - 4, Dwarka, NEW DELHI – 110 075, Delhi

14. The Project In Charge, Powergrid Vizag Transmission Ltd. Vizag 400kV SS, Sector 10, Ukkanaguram, Vishakapatnam 530 032, Andhra Pradesh

15. The CEO, Powergrid NM Transmission Ltd., SRTS - II, Near RTO Driving Track, Singanayakanahalli, Yelahanka-Doddaballapur Road, Bengaluru 560 064, Karnataka

16. Head-O&M/Assets Management, Maheswaram Transmission Co. Ltd., Tulip-634, New Minal Residency, J.K.Road, Near Ayodhya Bypass, Bhopal 462023, Madhya Pradesh

17. The Chief Executive Officer, POWERGRID Southern Interconnector Transmission System Ltd, 6-6-8/32 & 395 E, Kavadiguda Main Road, Old Praga tools, Secuderabad 500 080, Telangana

*****

Distribution List (Western Region):

1. Chief Engineer (LD),SLDC Thane - Belapur Rd, MSEB Staff Colony, TTC Industrial Area, Airoli, Navi Mumbai, Maharashtra 400708

2. Gujarat Energy Transmission Corporation Limited,132kV Gotri Sub Station Compound, Near T.B. Hospital, Gotri Road,Vadodara 390021

3. Chief Engineer (LD), MPPTCL, Naya Gaon, Rampur, Jabalpur, Madhya Pradesh 482008 Jabalpur

4. Chief Engineer (LD), CSPTCL, Chhattisgarh State Power Transmission Co. Ltd. Danganiya, Raipur, C.G.

5. Managing Director, MSETCL, Prakashgadh, 5th Floor, Bandra East, Maharashtra Mumbai 400051.

6. Managing Director, GETCO, Sardar Patel Vidyut Bhavan race Course Gujarat Vadodara 390007.

7. Managing Director, MP Power Power Transmission Company Ltd., 3rd Floor, Block No 11, Shakti Bhavan, Rampur, Madhya Pradesh 482008

8. Managing Director, CSPTCL, PO - Sunder Nagar Chhattisgarh Raipur, Dangania 492013.

9. Secretary (Power), Electricity Department, UT of Daman & Diu, Sachivalaya, Daman & Diu Moti Daman 396210

10. Secretary (Power), UT of Dadra Nagar & Haveli, Secretariat, Electric Department, 66kv Amli Road, Dadra Nagar & Haveli Silvassa 396230

11. Managing Director, ESSAR STEEL INDIA LIMITED, 27th KM, Surat Hazira Road, Gujarat Surat 394270

12. Chief Electrical Engineer, Goa Electricity Department, Government of Goa, 3rd Floor, Vidyut Bhavan, Panjim, Goa – 403001.

13. General Manager, Power Grid Corporation of India Ltd. Western Region - I Headquarters, PO - Sampritinagar,Nari Ring Road, Nagpur, Maharashtra - 440026
14. Managing Director, Essar Power Transmission Co. Ltd.- 27 Km Surat Hazira Road, Surat Gujarat -394270 India

15. Executive Director, Jindal Power Ltd., OP Jindal STPP, OP Jindal STPS, PO-Tamnar, Chhattisgarh District - Raigarh, 496107

16. Executive Director, Torrent Power Grid Ltd, Torrent House, Off Ashram Road, Gujarat Ahmedabad 380009

17. General Manager, Western Transco Power Limited., 601,6th Floor,Hallmark Business Plaza,Opp Gurunanak Hospital,,Bandra(E), Mumbai-51

18. General Manager, Western Transmission Gujarat Limited., 601,6th Floor,Hallmark Business Plaza,Opp Gurunanak Hospital,,Bandra(E), Mumbai-51

19. General Manager (Comml), Adani Power Ltd. Achalraj, Opp. Mayor Bungalow, Law Garden, Ahmedabad, Gujarat - 380006

20. Head (Commercial), Bhopal Dhule Transmission Company Ltd., Sterlite Grid Ltd. 634 Tulip, New Minal Presidency, J K Road, Ayodhya Bypass, Madhya Pradesh Bhopal 462023

21. Head (Commercial), Raichur Solapur Power Transmission Company Ltd, Patel Estate, SV Road, Jogeshwari West, Mumbai 400102

22. Head(Commercial), Jabalpur Transmission Company Limited (JTCL)-Sterlite Grid Ltd. 634 Tulip, New Minal Presidency, J K Road, Ayodhya Bypass, Madhya Pradesh Bhopal 462023

23. RAPP Transmission Company, Sterlite Grid Ltd. 634 Tulip, New Minal Presidency, J K Road, Ayodhya Bypass, Madhya Pradesh Bhopal 462023

24. Powergrid Warora Transmission Ltd(PWTL), CEO, Sampriti Nagar, Nari Ring Road, Nagpur, Maharashtra- 440026

25. Chhattisgarh-WR Transmission Limited (CWRTL), General Manager, 8A, Sambhav House, Judges Bunglow Road, Bodakdev Ahmedabad, Gujarat-380015
26. Powergrid Parli Transmission Ltd, CEO, Sampriti Nagar, Nari Ring Road, Nagpur, Maharashtra- 440026

27. Khargone Transmission Limited, O&M Head Office, A (Tulip) - 634 , Project Director – Asset Management and Grid Planning, New Minal Residency , J.K Road Near Ayodha Bypass Road, Bhopal – 462023

28. Sipat Transmission Limited, 8A, Sambhav House Judges Bunglow Road, Bodakdev Gujarat Ahmedabad – 380015

29. Power Grid-Jabalpur Transmission Ltd. Powergrid Corporation of India Limited, WR-II, Head Quarter, Sama Savli Road, Opp. Ambe School, Gujarat Vadodara 390008

30. Odisha Generation Phase II Transmission Ltd, Power Grid Corporation of India Ltd. Western Region - I Headquarters, PO - Uppalwadi, Sampritinagar, Maharashtra Nagpur 440026

31. Raipur-Rajnandgaon Warora Transmission Ltd, 8A,Sambhav House Judges Bunglow Road,Bodakdev Gujarat Ahmedabad 380015

Distribution List (North-Eastern Region):

To:

a. Executive Director,NERTS, Shillong, POWERGRID

b. CGM, SLDC, AEGCL, Near 132 kV Grid Substation, Kahilipara, Guwahati – 781019
c. DGM (MRT), MRT Circle, AEGCL,Narengi, Guwahati, Assam-781026
d. Senior Executive Engineer, SLDC Meghalaya, NEHU Substation, Shillong – 793022
e. Executive Engineer (System Protection), MePTCL, Umiam, Shillong, Meghalaya-793103
f. Director (Projects), NETC, Delhi
g. Executive Engineer, SLDC and Transmission Division Itanagar, Department of Power, Govt. of Arunachal Pradesh, Itanagar-791111
h. Junior Engineer (Power), DoP, Itanagar, Arunachal Pradesh-791111
i. General Manager I/C (O&M), NEEPCO
j. Senior Executive Engineer (SLDC), Tuikhuahtlang, Aizawl, Mizoram – 796001
k. Executive Engineer (MRT), Power & Electricity Department, Govt. of Mizoram, Aizawl, Mizoram-796017
l. Executive Engineer (Transmission), DoP Nagaland, SLDC Nagaland, Electricity Colony, Full Nagarjan, Dimapur, Nagaland – 797112
m. SDO (Testing & Communication), Department of Power, Govt. of Nagaland, Kohima, Nagaland- 797112
n. General Manager (SLDC), Office of MSPCL, Keishampat, Imphal-795001
o. DGM (Substation Division No. 1), MSPCL Keishampat Electricity Complex, Khwai Bazar, Imphal, Manipur -795001
p. DGM (System Operation), SLDC Agartala, TSECL, Tripura (West), Agartala – 799006
q. DGM (Testing & Communication), TSECL, Agartala, Tripura-799006

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)

केन्द्रीय कार्यालय : 61, आई एफ सी आई टावर, 7,8 एवं 9वीं मंजिल, नेहरु प्लेस, नई दिल्ली -110019
Corporate Office : 61, IFCI Tower, 7,8 & 9th Floor, Nehru Place, New Delhi- 110019
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in, Tel.: 011- 40234672

संदर्भ: POSOCO/NLDC/SO/HVDC/06/2 **दिनांक:** 06th Jul 2020

सेवा मे,

Member (Power System)
Central Electricity Authority
Sewa Bhawan, R. K Puram,
New Delhi - 110 066

COO (CTU)
POWERGRID
Saudamini
Gurugram

विषय: Regarding – Severe fluctuations in AC system parameters around HVDC Gazuwaka back to back station

महोदय,

This is in reference to fluctuations observed on AC side voltage and current near the 400/220 kV Gazuwaka substation. The matter was earlier brought to your kind notice vide POSOCO letter dated 2nd Mar 2020 and 20th Jun 2020 (enclosed as Annexe-1). POWERGRID vide letter by Executive Director -SRTS-1 dated 26th Jun 2020 (enclosed as Annexe-2) has informed as below:

"The low frequency oscillations may be possible due to interaction of Generators and elements at East Bus, FSC and STATCOM system at Jeypore and HVDC station at Gazuwaka at low power levels. During design and engineering stage, ABB also advised to take the FSC of 400 kV Jeypore-Gazuwaka circuits into service when power flow is more than 500 MW through HVDC."

It has also been requested by POWERGRID that keeping FSC (Fixed Series Compensation) of 400 kV Jeypore- Gazuwaka -line 1& 2 out of service when power flow on each line is less than 250 MW. However, neither NLDC is in receipt of any such planning study report for the operation of FSCs nor POWERGRID has enclosed the study. Therefore, it is requested that planning study report may please be shared with NLDC/RLDCs for taking appropriate actions during the operations as well as for understanding the phenomenon.

However, it needs to be mentioned here that in few cases fluctuations were there even though FSCs were out of service. The list of FSC status during incidents is enclosed at Annexe-3. Therefore, earlier study on interaction of HVDC/FACTS controllers as well as study in current scenario with validated model is required for understanding the

पंजीकृत कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110016
Registered Office : First Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016

behavior of current problems in power system. Such studies can also throw some light on the issues with various controllers.

The incidents of fluctuations have again been observed recently on 23rd Jun and 26th Jun 2020 and have caused the outage of both the blocks of HVDC Back to Back station. One key observation in these incidents is that fluctuations have subsided in most of the cases after HVDC Gazuwaka Pole-1 is blocked.

Therefore, it is requested that suitable simulation-based studies may be carried out to analyze the phenomenon and suggest suitable measures to avoid the recurrence.

सधन्यवाद,

भवदीय

(देबाशिस दे)
कार्यपालक - निदेशक-रा°भा°प्रे°कें°

प्रतिलिपि सूचनार्थ:

1. Member Secretary, ERPC, Kolkata
2. Member Secretary, SRPC, Bengaluru
3. Executive Director, ERLDC/SRLDC

Annexure 1

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)

पंजीकृत एवं केन्द्रीय कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016
Registered & Corporate Office : Ist Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in,Tel.: 011- 41035696, Fax : 011- 26536901

संदर्भ: POSOCO/NLDC/SO/HVDC/ **दिनांक:** 02nd Mar 2020

सेवा मे,

Executive Director
Asset Management
POWERGRID
Gurugram

Executive Director
HVDC Engg.
POWERGRID
Gurugram

विषय: Regarding – Frequent fluctuations observed in AC side voltage of HVDC Gazuwaka Back to Back station

महोदय,

2 X 500 MW HVDC Gazuwaka back to back is an important inter-regional link for bidirectional power transfer between eastern region and southern region of Indian grid. During the last two months incidents have been observed involving fluctuations in AC side voltage of HVDC Gazuwaka Back to Back station. The automatic reduction in power order at HVDC station has been reported. RLDC/NLDC have also at times given instructions to reduce the HVDC power order as a preventive measure post observing fluctuations in real time. A total of twenty-four(24) number of such incidents have been observed at RLDC/NLDC so far through Phasor Measurement Units (PMU) signals. The list of incidents involving fluctuation in AC side voltage of Gazuwaka is enclosed as *Annexe-1*. The PMU plots of associated parameters of lines of HVDC are enclosed as *Annexe-2*. It can be observed from list that these fluctuations have continued for significant period of time and were repeatedly observed on some particular days.

ERLDC and SRLDC have shared the concerns regarding these incidents with all the constituents/HVDC Gazuwaka station and requested the details of any switching operation during periods of fluctuation. There has been no reports of any switching operation during these periods. The fluctuations of the AC side voltages have also reportedly created issues in the power system elements in and around the HVDC Gazuwaka station. In one such report,the Odisha SLDC has furnished that generator tripping and fluctuations have been observed in its system. The report is enclosed as Annexe-3. It may be appreciated that such long duration fluctuations in power system parameters are threat to reliable power system operation and if left unattended may cause severe issues in power system operation.

Therefore it is requested to carry out a detailed analysis of these events shall be carried out at your end to identify the cause and remedial measures for these fluctuations. The detailed analysis may kindly be shared with us.

सधन्यवाद,

भवदीय

देबाशिस 02/03/2020

(देबाशीश डे)
कार्यपालक-निदेशक-रा॰भा॰प्रे॰कें॰

प्रतिलिपि सूचनार्थ:

1. Executive Director, ERLDC/SRLDC

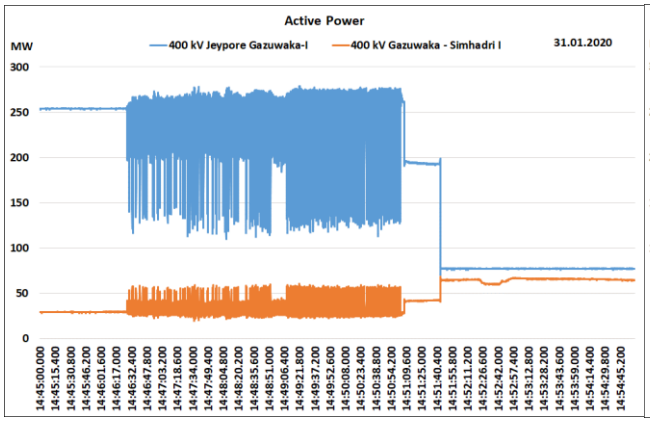
Annexe-1

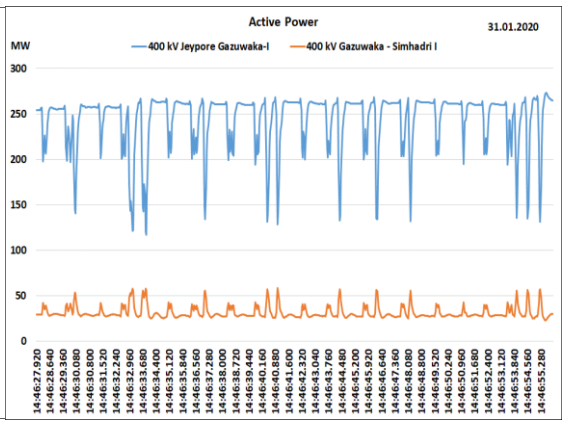
Incidents involving fluctuations in AC side voltage of HVDC Gazuwaka station					
Sl no	**DATE**	**Low A.C Voltage pick up Time**	**Pole 1**	**Pole 2**	**Remarks**
1	31.01.2020	14:46	AC Filter bank WA2.Z11.Z2/Z3 tripped at 14:50:28:356. As a consequence AC Filter Bank AC Filter Breaker WA2.Z11.Z4/Z5 came into service at 14:50:29:041.		Pole 2 power was restricted to 150 MW due to non-availability of the required AC Filter
2	04.02.2020	14:34	No Filter Switching	No Filter Switching	
3	05.02.2020	8:34	No Filter Switching	No Filter Switching	
4	17.02.2020	11:20	No Filter Switching	No Filter Switching	
5	18.02.2020	00:25	No Filter Switching	No Filter Switching	
6	24.02.2020	13:46	No Filter Switching	No Filter Switching	
7	25.02.2020	8.55	No Filter Switching	No Filter Switching	
8	25.02.2020	10.03	No Filter Switching	No Filter Switching	
9	25.02.2020	10.12	No Filter Switching	No Filter Switching	
10	25.02.2020	10.13	No Filter Switching	No Filter Switching	
11	25.02.2020	10.17	No Filter Switching	No Filter Switching	
12	25.02.2020	10.21	East CWD 24 Tripped and East CWD 23 came into service as per RPC Control.	WA2.Z11.Z4Z5- East Tripped and WA2.Z11.Z2Z3-East came into service as per RPC Control.	Ferro-resonance detected and FSC was bypassed at Jeypore end.
13	25.02.2020	10.43	No Filter Switching	No Filter Switching	
14	25.02.2020	10.47	No Filter Switching	No Filter Switching	
15	25.02.2020	11.08	No Filter Switching	No Filter Switching	
16	25.02.2020	11.32	No Filter Switching	No Filter Switching	
17	25.02.2020	11.33	No Filter Switching	No Filter Switching	
18	25.02.2020	12.08	No Filter Switching	No Filter Switching	
19	25.02.2020	12.09	No Filter Switching	No Filter Switching	
20	25.02.2020	12.23	No Filter Switching	No Filter Switching	
21	25.02.2020	12.42	No Filter Switching	No Filter Switching	
22	25.02.2020	13:02	No Filter Switching	No Filter Switching	
23	25.02.2020	13:05	No Filter Switching	No Filter Switching	
24	25.02.2020	13:07	No Filter Switching	No Filter Switching	

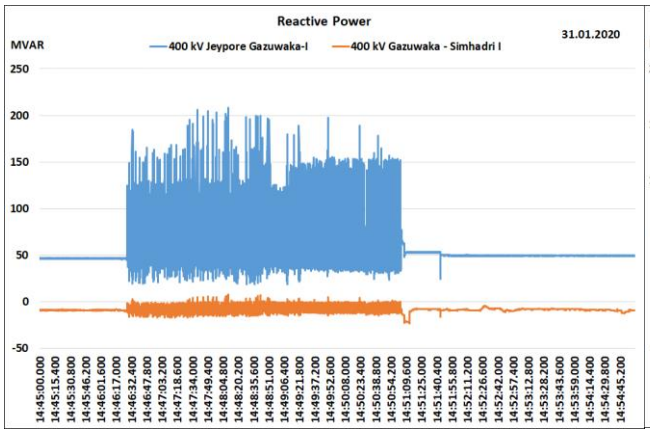
Annexe-2

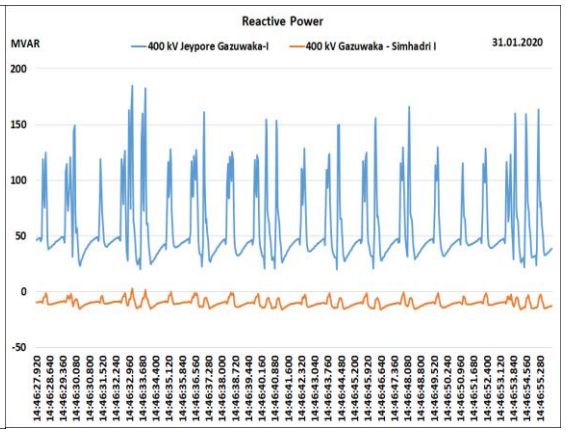
Jeypore-Gajuwaka 1 Active and Reactive Power

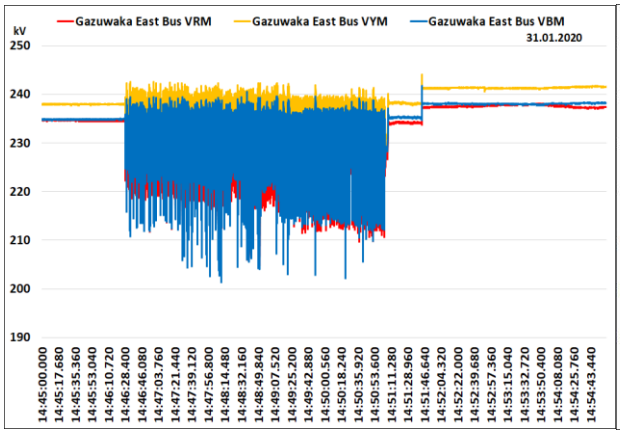
31st Jan 2020

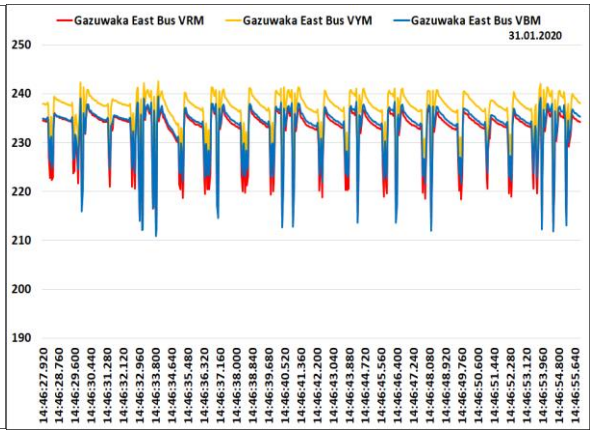




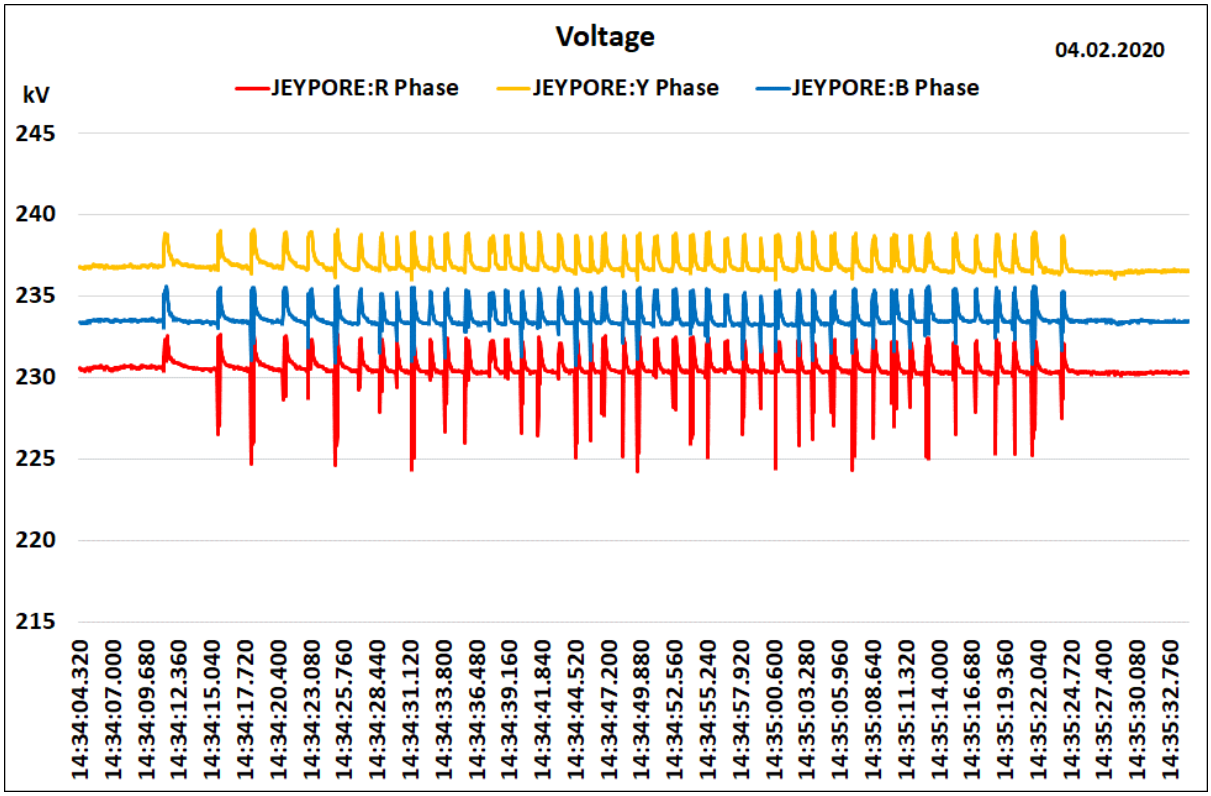




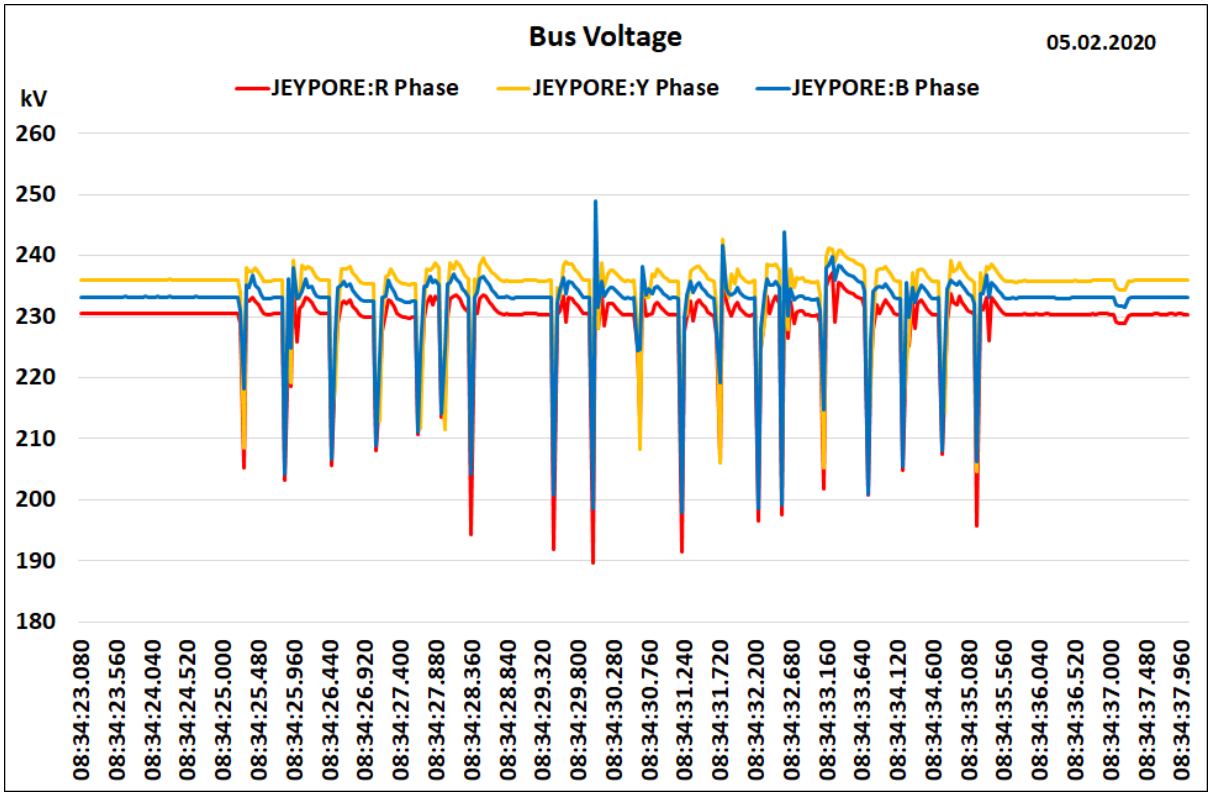




4th Feb 2020

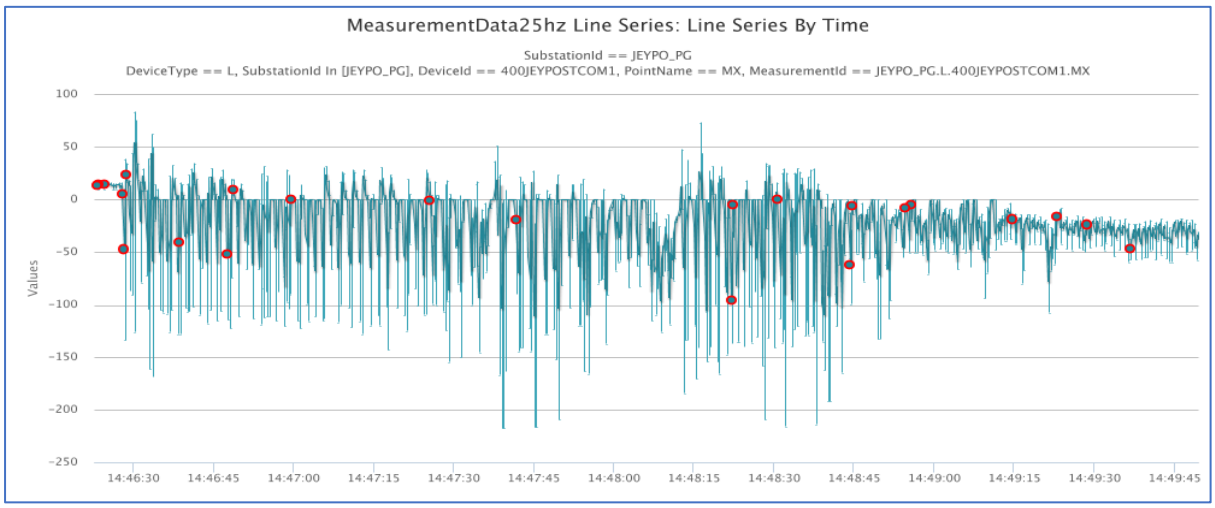


5th Feb 2020



Jeypore Statcom (MVAR)

31st Jan 2020



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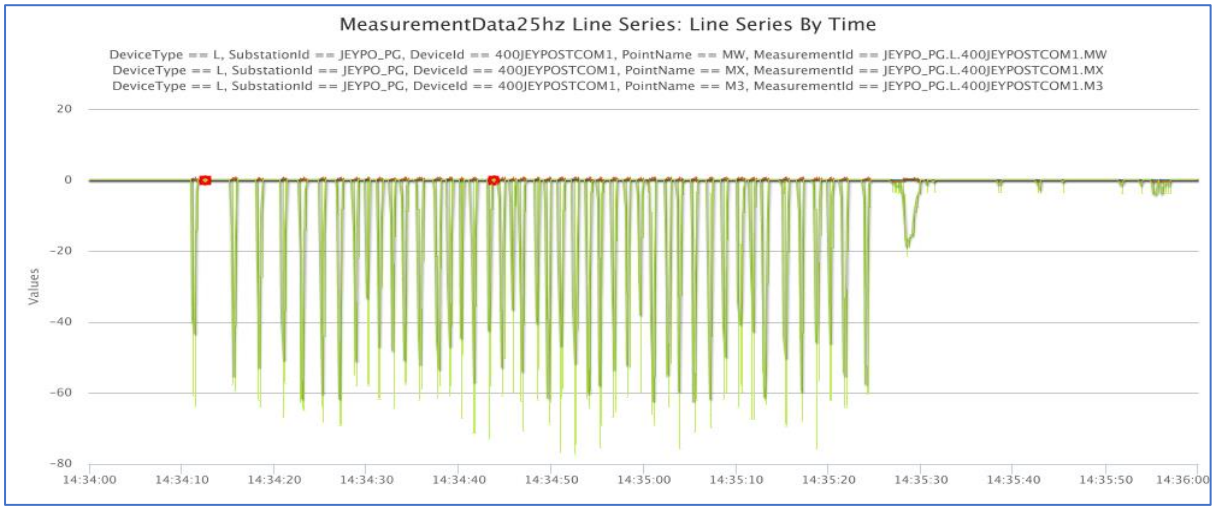

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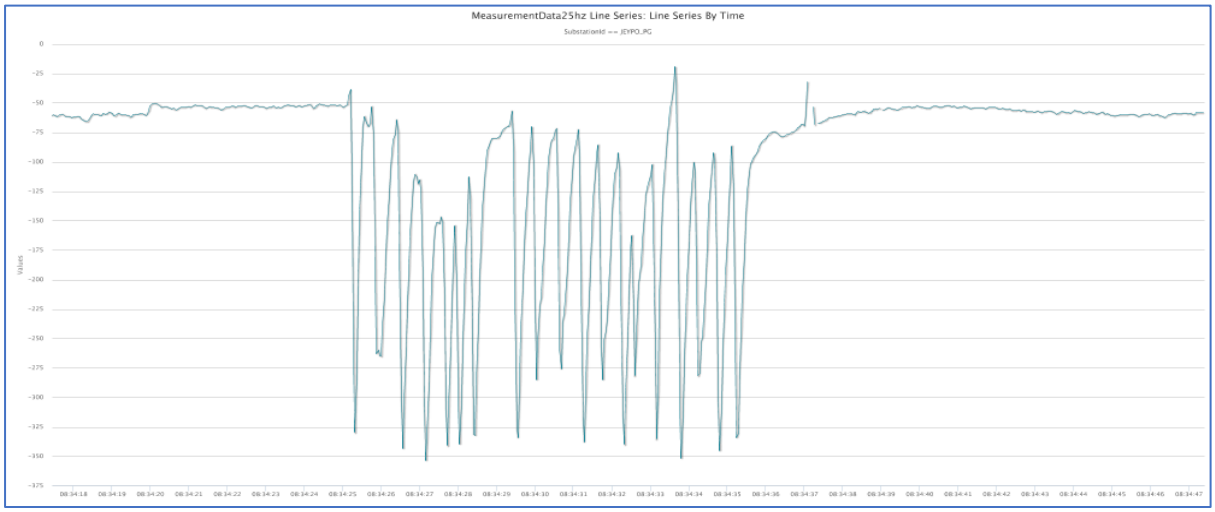


Annexe-3

OPTCL Report

As per the direction of ERLDC, the system study for the time duration of the disturbance near the Jeypore and Gajuwaka area to ascertain the possible causes of the disturbance and also the response of the generators during the fault was carried out and the following observations were made;

System disturbance on 31.01.2020

- The disturbance in the system persisted from 14:46:32 to 14:51:40 Hrs as per the data provided by ERLDC.
- Unit 4 of U.Kolab P.H tripped on GT differential at 14:46:44 hrs.
- Unit-1 of U.Kolab, Unit-5 of Balimela & Unit-3 of Indravati hand tripped at 14:49:32 hrs, 14:48:36 & 14:51:20 hrs respectively due heavy jerk and voltage fluctuation observed in the system.

System disturbance on 04.02.2020

- Voltage fluctuation within a range of 1kV was observed at the Balimela 220kV Bus from 14:34:10 hrs to 14:35:27 hrs.
- Balimela unit-3 & 5 ware running with minimum generation and the respond to the fluctuation cannot be quantifiable.

System disturbance on 05.02.2020

- The disturbance in the system as can be evident from the PMU data provided by ERLDC remained from 08:34:25hrs to 08:34:35hrs.
- During the above period, unit-4 of U.Kolab P.H tripped on GT differential protection at 08:34:42hrs whereas unit-4 & 5 of Balimela P.H experienced heavy jerk and voltage fluctuations and were hand tripped at 08:35:00 & 08:34:56 hrs. respectively.

Annexure 1

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)

केन्द्रीय कार्यालय : 61, आई एफ सी आई टावर, 8 एवं 9वीं मंजिल, नेहरु प्लेस, नई दिल्ली -110019
Corporate Office : 61, IFCI Tower, 8 & 9th Floor, Nehru Place, New Delhi - 110019
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in, Tel.: 011- 40234672

संदर्भ: POSOCO/NLDC/SO/HVDC/06/ **दिनांक:** 20th Jun 2020

सेवा मे,

1. **Executive Director**
   Asset Management
   POWERGRID
   Gurugram

2. **Executive Director**
   HVDC Engg.
   POWERGRID
   Gurugram

विषय: Regarding – Fluctuations observed in AC side voltage of HVDC Gazuwaka Back to Back station

महोदय,

This is in reference to NLDC letter dated 2nd Mar 2020 on the subject "*Frequent fluctuations observed in AC side voltage of HVDC Gazuwaka Back to Back station*". The copy of communication is enclosed as Annexe-1. The request was made to take remedial measures at your end and share them with us. The reply of the letter is still awaited at our end. It is being brought to your kind notice that on 15th Jun 2020, at 0156 hours, both blocks of HVDC Gazuwaka Back to Back station tripped. Prior to tripping of these blocks, severe fluctuations, sustaining for approx. 40 seconds, in voltage of 400 kV Jeypore Bus and current of 400 kV Jeypore-Gazuwaka-1 & 2 were observed through the Phasor Measurement Units (PMU) plots. The PMU plots of fluctuations observed are enclosed as Annexe-2. Repeated occurrences of fluctuation at 400 kV level at Gazuwaka, as reported earlier also, are a cause of concern apart from resultant alarming situation in real time system operation due to outage of both HVDC blocks. The behavior of fluctuations resembles with past cases which were informed vide letter dated 2nd Mar 2020. It may be appreciated that such long duration fluctuations in power system parameters are threat to reliable power system operation and if left unattended may cause severe issues in power system operation.

Therefore in the interest of Grid security, you are kindly requested to carry out the detailed analysis at your end to identify the cause and remedial measures for these fluctuations. The detailed analysis may kindly be shared with us.

सधन्यवाद,

भवदीय,

(देबाशिस दे)
कार्यपालक-निदेशक-रा॰भा॰प्रे॰कें॰

प्रतिलिपि सूचनार्थ:

1. Member Secretary, ERPC, Kolkata
2. Member Secretary, SRPC, Bengaluru
3. Member(PS), CEA, New Delhi
4. COO-CTU, POWERGRID, Gurugram
5. Executive Director, ERLDC/SRLDC

Annexure-1

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)

पंजीकृत एवं केन्द्रीय कार्यालय : प्रथम तल, बी-9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016
Registered & Corporate Office : Ist Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococc@posoco.in,Tel.: 011- 41035696, Fax : 011- 26536901

संदर्भ: POSOCO/NLDC/SO/HVDC/ **दिनांक:** 02nd Mar 2020

सेवा मे,

Executive Director
Asset Management
POWERGRID
Gurugram

Executive Director
HVDC Engg.
POWERGRID
Gurugram

विषय: Regarding – Frequent fluctuations observed in AC side voltage of HVDC Gazuwaka Back to Back station

महोदय,

2 X 500 MW HVDC Gazuwaka back to back is an important inter-regional link for bidirectional power transfer between eastern region and southern region of Indian grid. During the last two months incidents have been observed involving fluctuations in AC side voltage of HVDC Gazuwaka Back to Back station. The automatic reduction in power order at HVDC station has been reported. RLDC/NLDC have also at times given instructions to reduce the HVDC power order as a preventive measure post observing fluctuations in real time. A total of twenty-four(24) number of such incidents have been observed at RLDC/NLDC so far through Phasor Measurement Units (PMU) signals. The list of incidents involving fluctuation in AC side voltage of Gazuwaka is enclosed as *Annexe-1*. The PMU plots of associated parameters of lines of HVDC are enclosed as *Annexe-2*. It can be observed from list that these fluctuations have continued for significant period of time and were repeatedly observed on some particular days.

ERLDC and SRLDC have shared the concerns regarding these incidents with all the constituents/HVDC Gazuwaka station and requested the details of any switching operation during periods of fluctuation. There has been no reports of any switching operation during these periods. The fluctuations of the AC side voltages have also reportedly created issues in the power system elements in and around the HVDC Gazuwaka station. In one such report,the Odisha SLDC has furnished that generator tripping and fluctuations have been observed in its system. The report is enclosed as Annexe-3. It may be appreciated that such long duration fluctuations in power system parameters are threat to reliable power system operation and if left unattended may cause severe issues in power system operation.

Therefore it is requested to carry out a detailed analysis of these events shall be carried out at your end to identify the cause and remedial measures for these fluctuations. The detailed analysis may kindly be shared with us.

सधन्यवाद,

भवदीय

देबाशिस 02/03/2020

(देबाशीश डे)

कार्यपालक-निदेशक-रा.भा.प्रे.कें.

प्रतिलिपि सूचनार्थ:

1. Executive Director, ERLDC/SRLDC

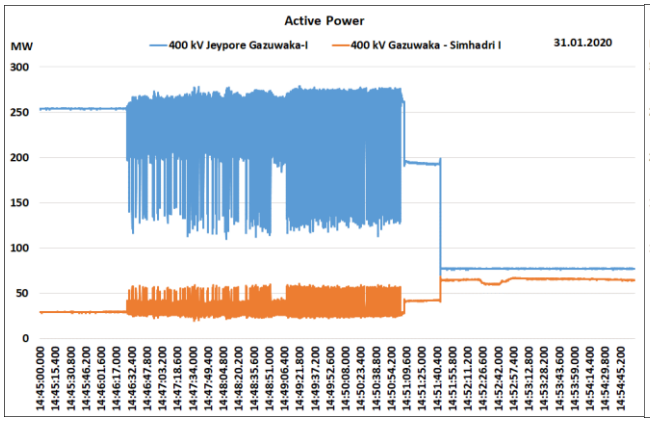
Annexe-1

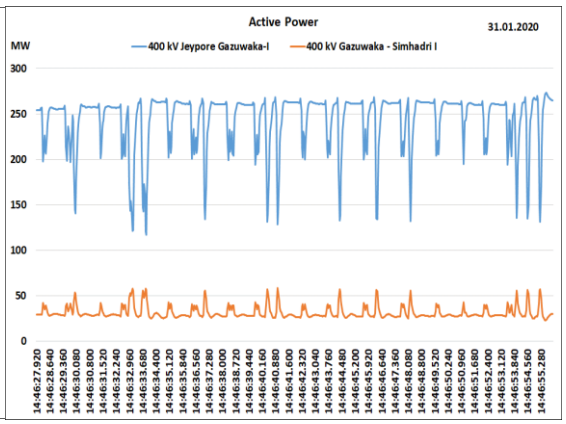
Incidents involving fluctuations in AC side voltage of HVDC Gazuwaka station					
Sl no	**DATE**	**Low A.C Voltage pick up Time**	**Pole 1**	**Pole 2**	**Remarks**
1	31.01.2020	14:46	AC Filter bank WA2.Z11.Z2/Z3 tripped at 14:50:28:356. As a consequence AC Filter Bank AC Filter Breaker WA2.Z11.Z4/Z5 came into service at 14:50:29:041.		Pole 2 power was restricted to 150 MW due to non-availability of the required AC Filter
2	04.02.2020	14:34	No Filter Switching	No Filter Switching	
3	05.02.2020	8:34	No Filter Switching	No Filter Switching	
4	17.02.2020	11:20	No Filter Switching	No Filter Switching	
5	18.02.2020	00:25	No Filter Switching	No Filter Switching	
6	24.02.2020	13:46	No Filter Switching	No Filter Switching	
7	25.02.2020	8.55	No Filter Switching	No Filter Switching	
8	25.02.2020	10.03	No Filter Switching	No Filter Switching	
9	25.02.2020	10.12	No Filter Switching	No Filter Switching	
10	25.02.2020	10.13	No Filter Switching	No Filter Switching	
11	25.02.2020	10.17	No Filter Switching	No Filter Switching	
12	25.02.2020	10.21	East CWD 24 Tripped and East CWD 23 came into service as per RPC Control.	WA2.Z11.Z4Z5- East Tripped and WA2.Z11.Z2Z3-East came into service as per RPC Control.	Ferro-resonance detected and FSC was bypassed at Jeypore end.
13	25.02.2020	10.43	No Filter Switching	No Filter Switching	
14	25.02.2020	10.47	No Filter Switching	No Filter Switching	
15	25.02.2020	11.08	No Filter Switching	No Filter Switching	
16	25.02.2020	11.32	No Filter Switching	No Filter Switching	
17	25.02.2020	11.33	No Filter Switching	No Filter Switching	
18	25.02.2020	12.08	No Filter Switching	No Filter Switching	
19	25.02.2020	12.09	No Filter Switching	No Filter Switching	
20	25.02.2020	12.23	No Filter Switching	No Filter Switching	
21	25.02.2020	12.42	No Filter Switching	No Filter Switching	
22	25.02.2020	13:02	No Filter Switching	No Filter Switching	
23	25.02.2020	13:05	No Filter Switching	No Filter Switching	
24	25.02.2020	13:07	No Filter Switching	No Filter Switching	

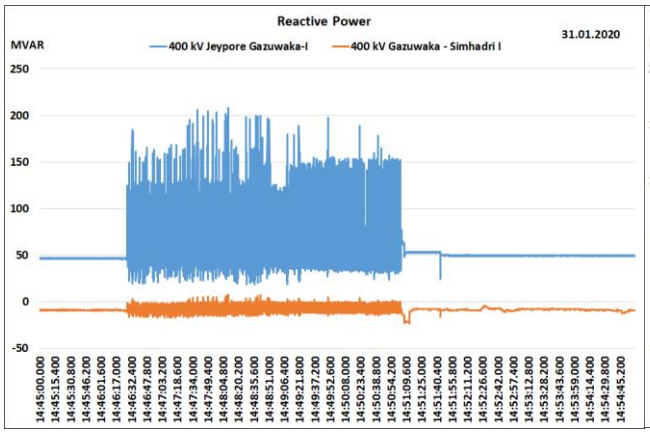
Annexe-2

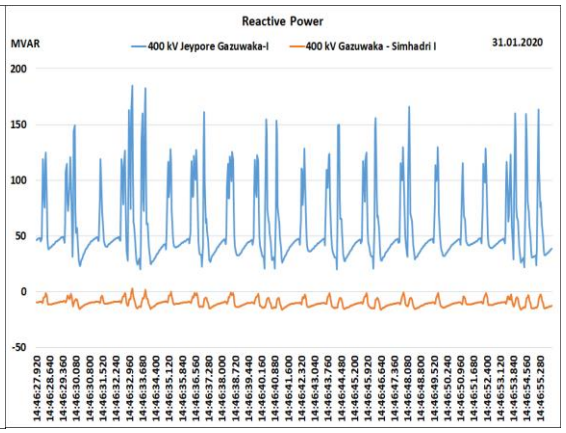
Jeypore-Gajuwaka 1 Active and Reactive Power

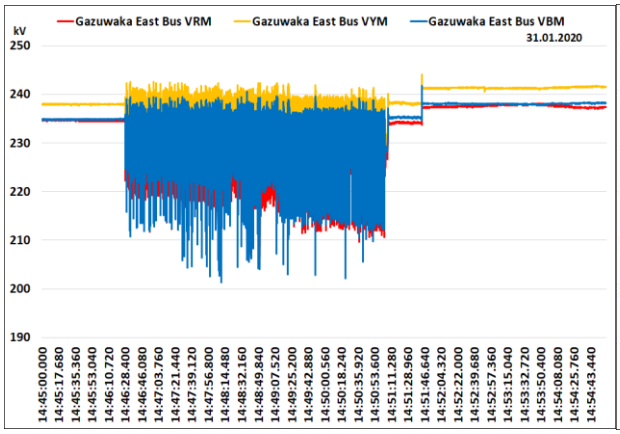
31st Jan 2020

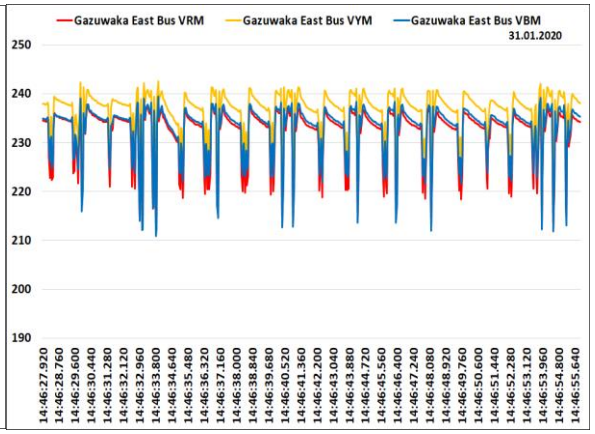




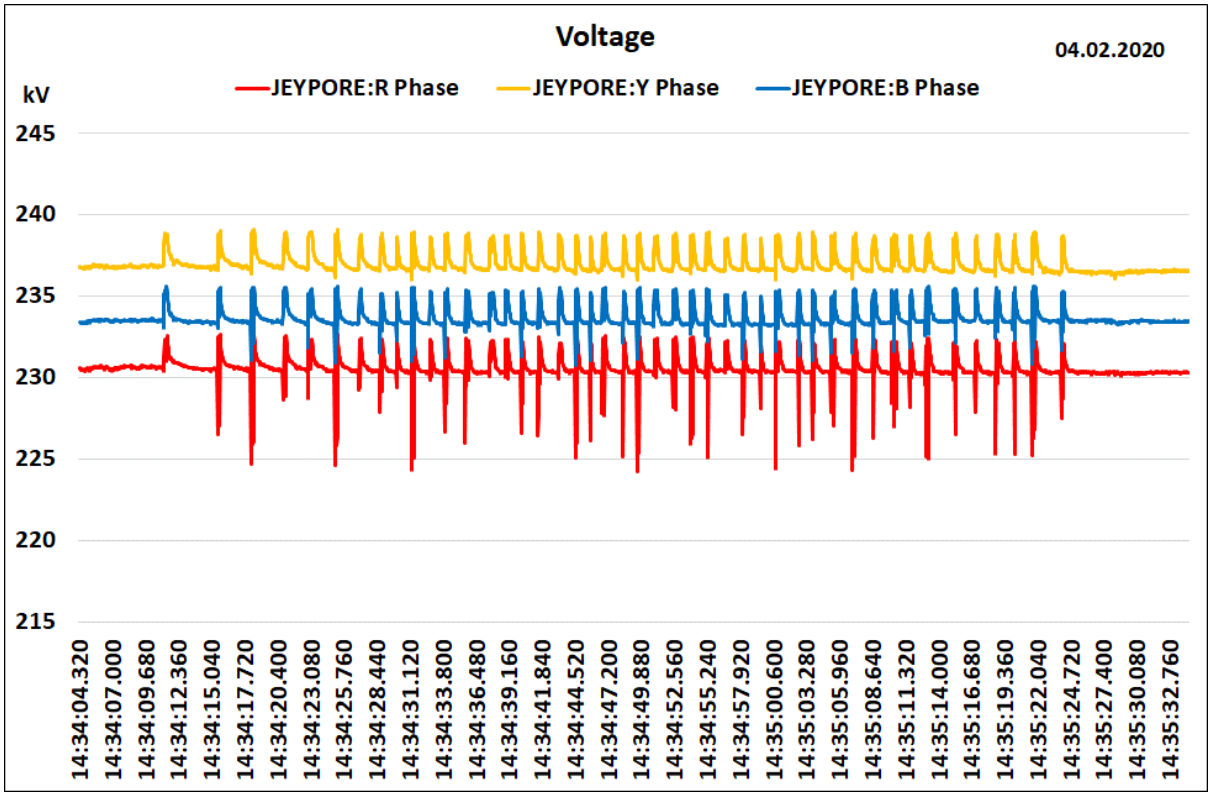




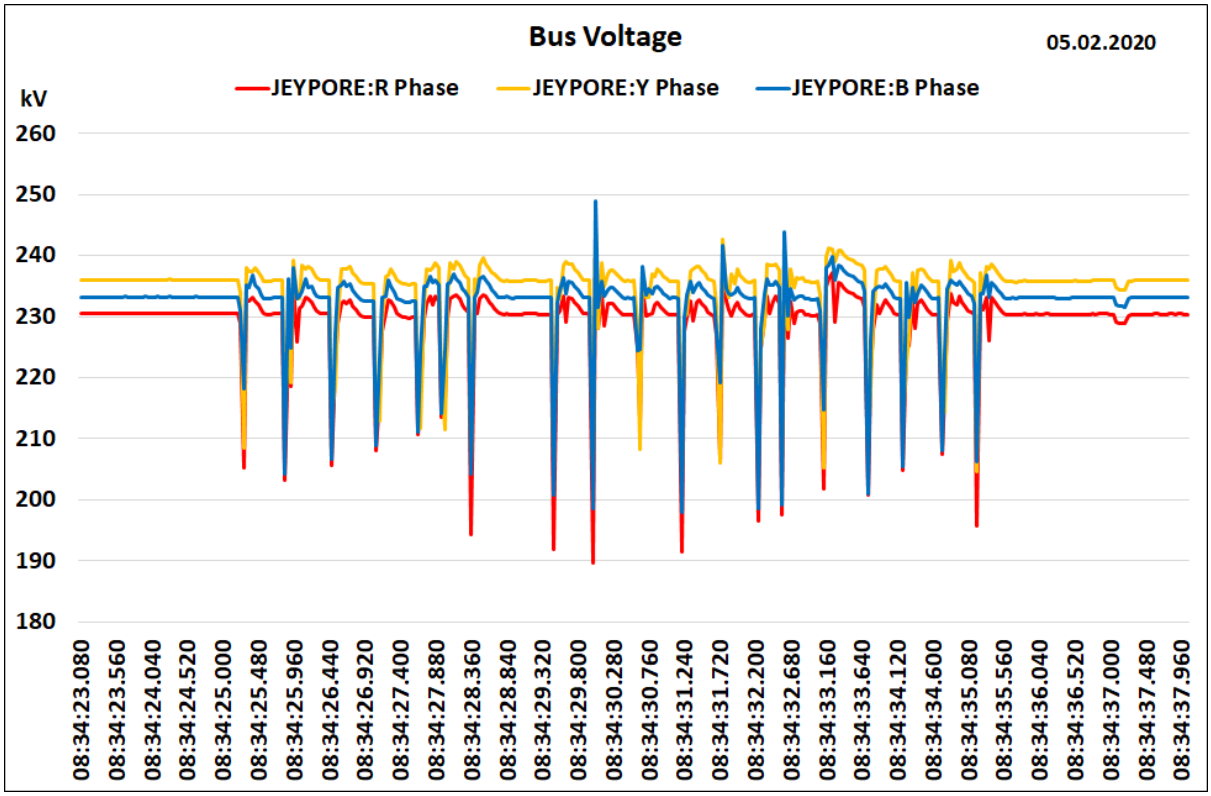




4th Feb 2020

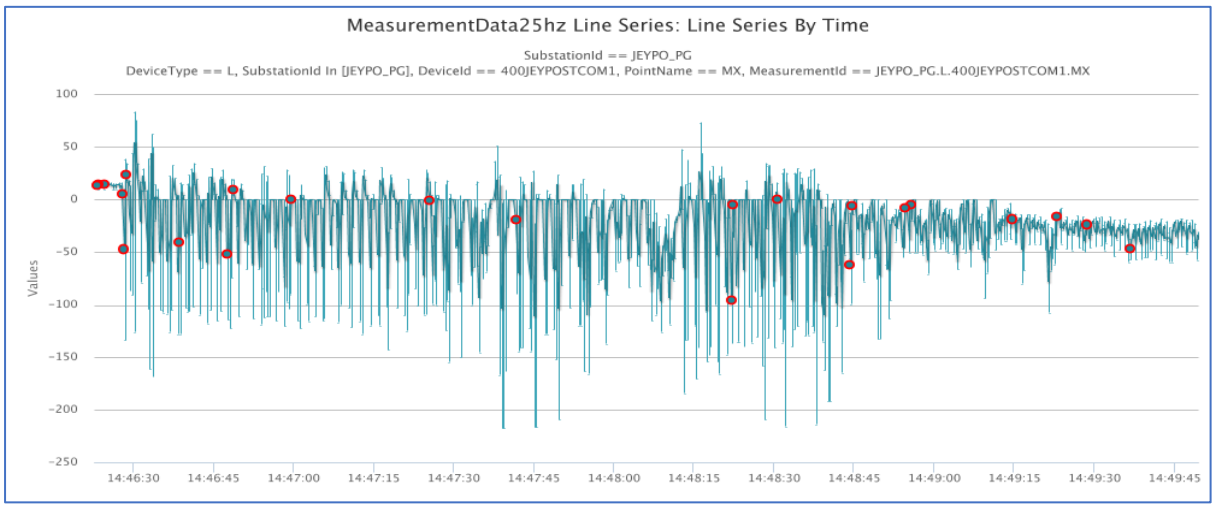


5th Feb 2020



Jeypore Statcom (MVAR)

31st Jan 2020



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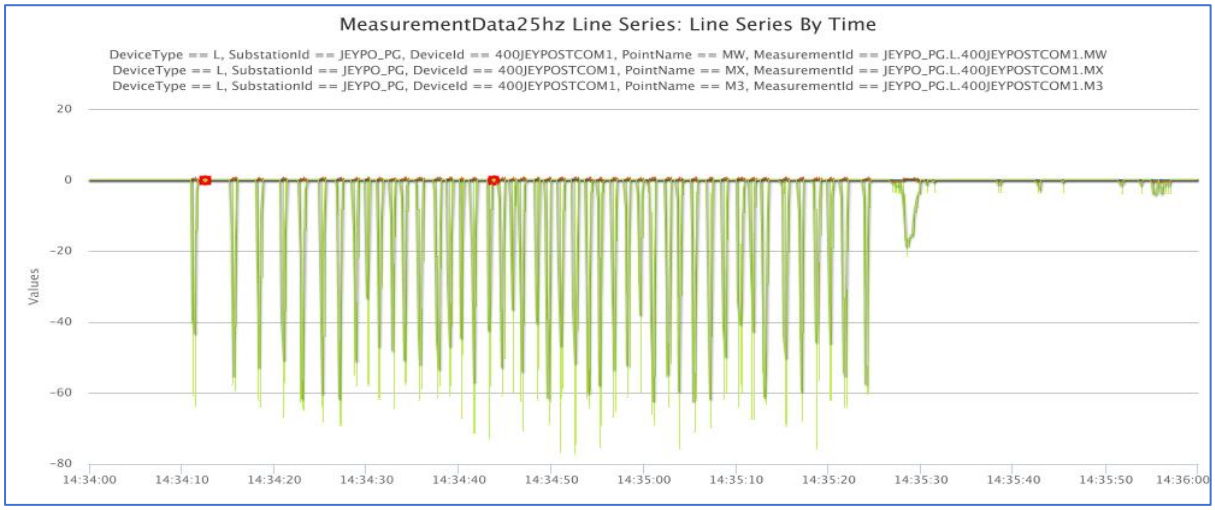

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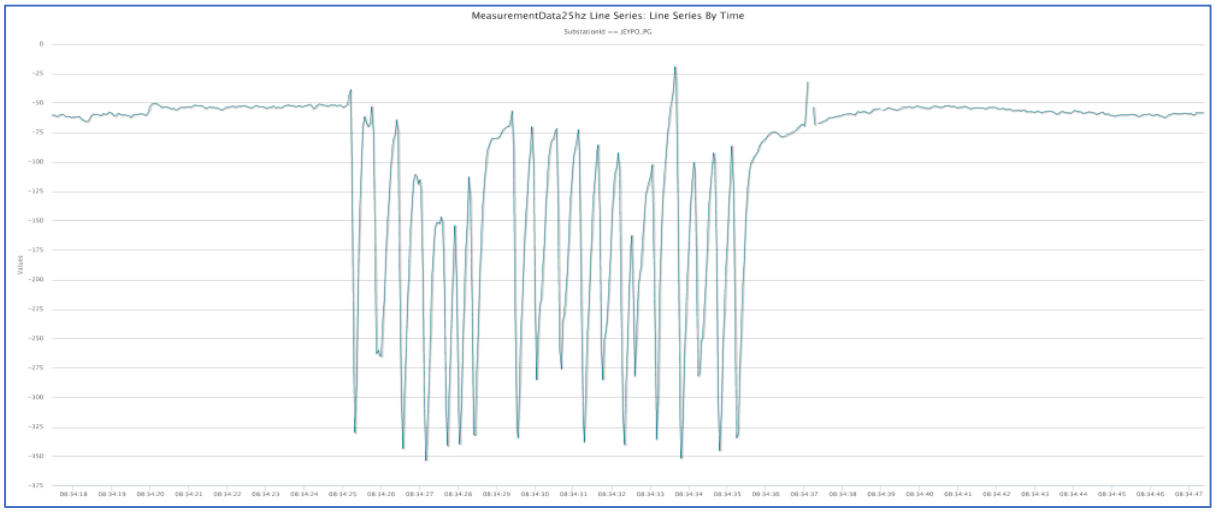


Annexe-3

OPTCL Report

As per the direction of ERLDC, the system study for the time duration of the disturbance near the Jeypore and Gajuwaka area to ascertain the possible causes of the disturbance and also the response of the generators during the fault was carried out and the following observations were made;

System disturbance on 31.01.2020

- The disturbance in the system persisted from 14:46:32 to 14:51:40 Hrs as per the data provided by ERLDC.
- Unit 4 of U.Kolab P.H tripped on GT differential at 14:46:44 hrs.
- Unit-1 of U.Kolab, Unit-5 of Balimela & Unit-3 of Indravati hand tripped at 14:49:32 hrs, 14:48:36 & 14:51:20 hrs respectively due heavy jerk and voltage fluctuation observed in the system.

System disturbance on 04.02.2020

- Voltage fluctuation within a range of 1kV was observed at the Balimela 220kV Bus from 14:34:10 hrs to 14:35:27 hrs.
- Balimela unit-3 & 5 ware running with minimum generation and the respond to the fluctuation cannot be quantifiable.

System disturbance on 05.02.2020

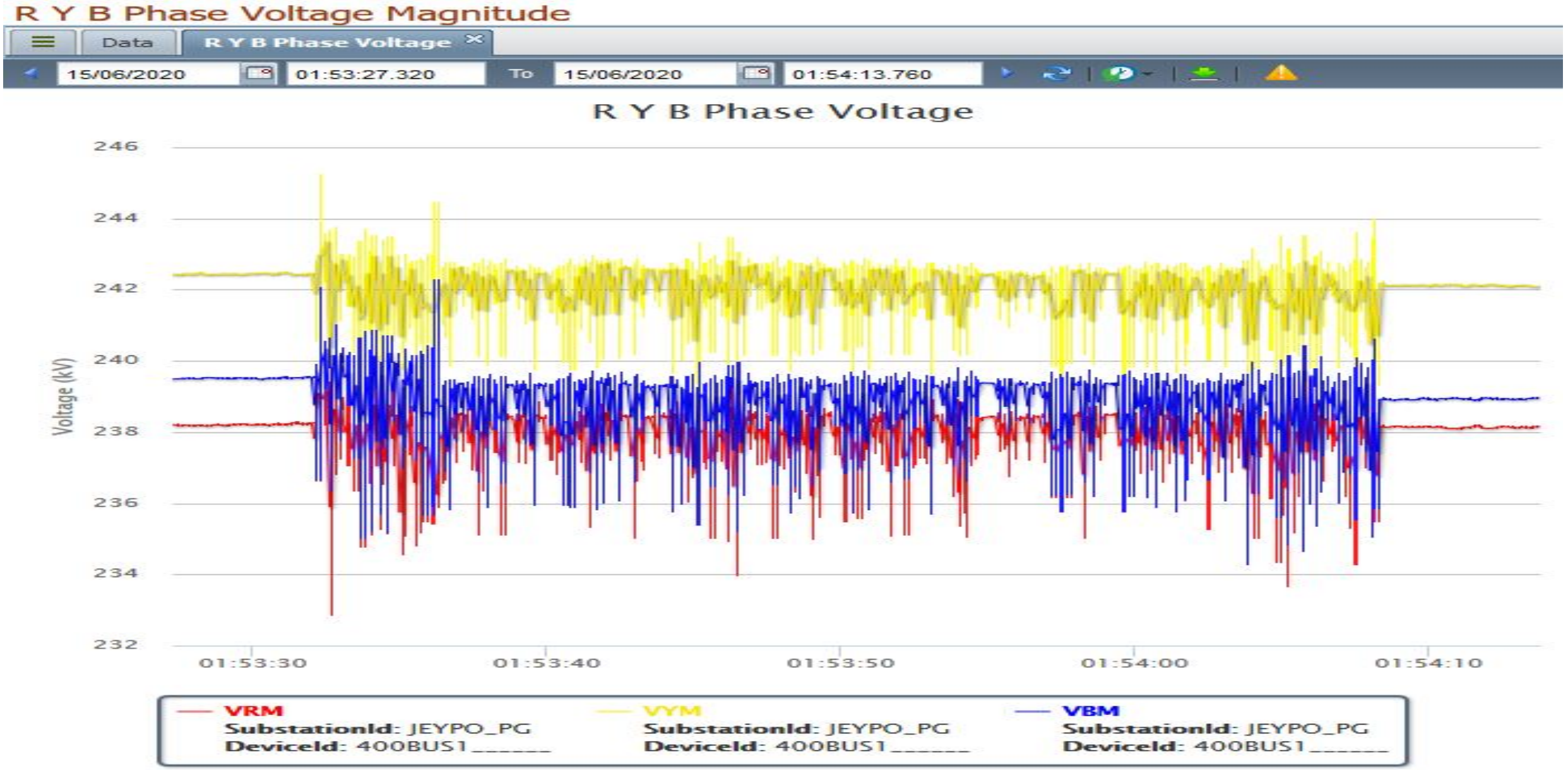
- The disturbance in the system as can be evident from the PMU data provided by ERLDC remained from 08:34:25hrs to 08:34:35hrs.
- During the above period, unit-4 of U.Kolab P.H tripped on GT differential protection at 08:34:42hrs whereas unit-4 & 5 of Balimela P.H experienced heavy jerk and voltage fluctuations and were hand tripped at 08:35:00 & 08:34:56 hrs. respectively.

Annexure-2

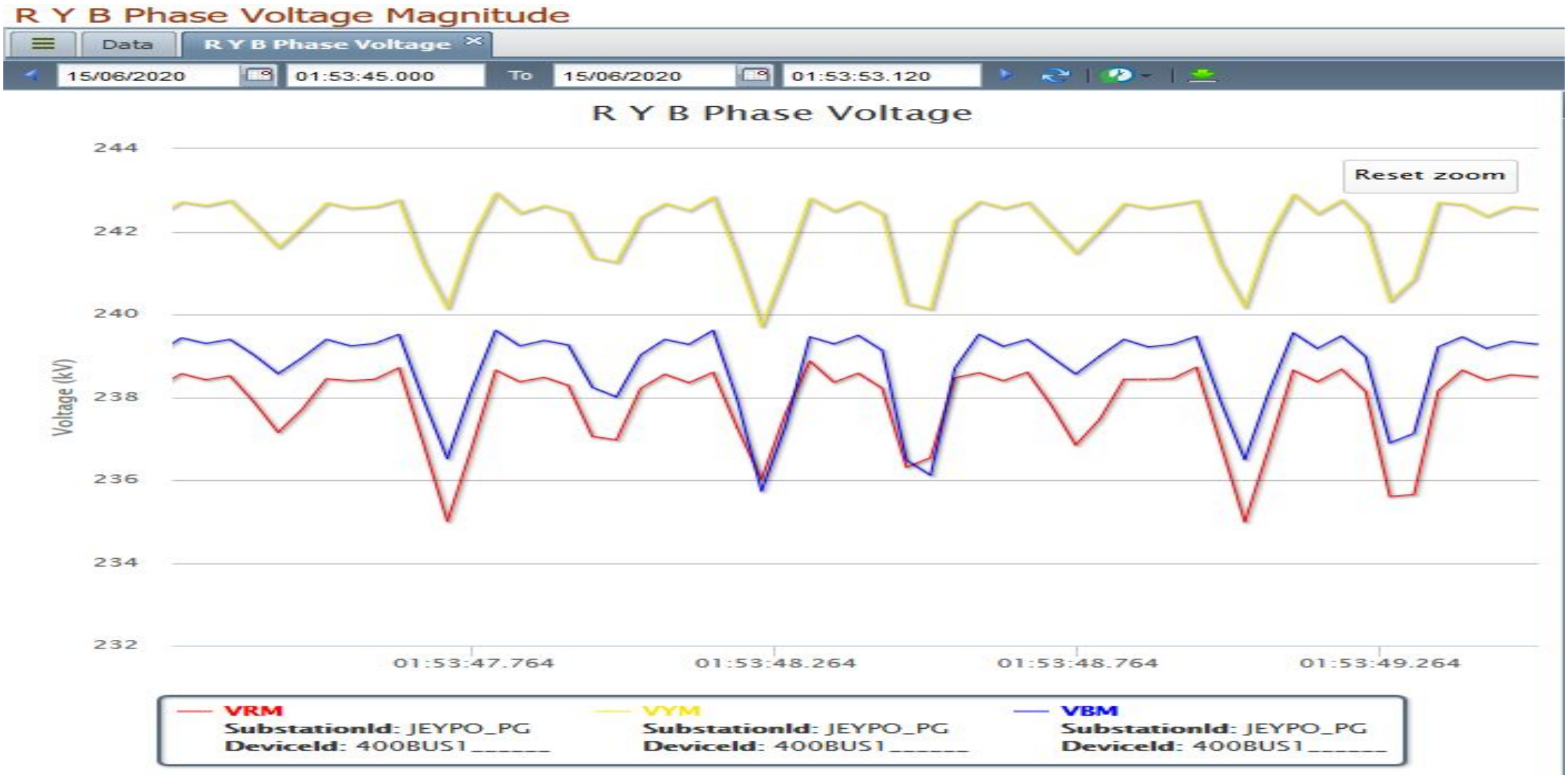
HVDC Gazuwaka related Oscillations_ PMU Plot_15th Jun 2020

Annexure 1

400 kV Jeypore Bus-1 voltage of 3-Phase

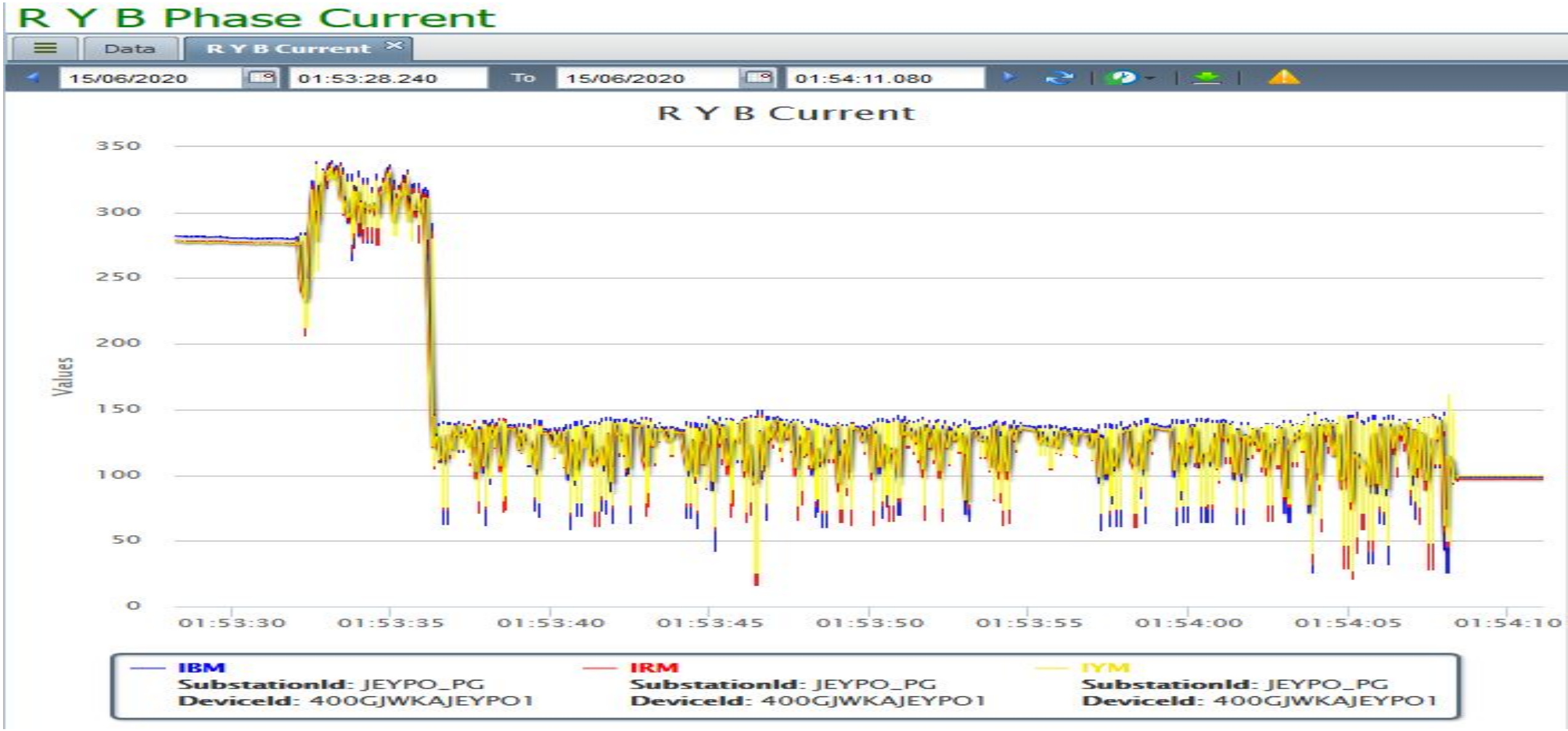


400 kV Jeypore Bus-1 voltage of 3-Phases



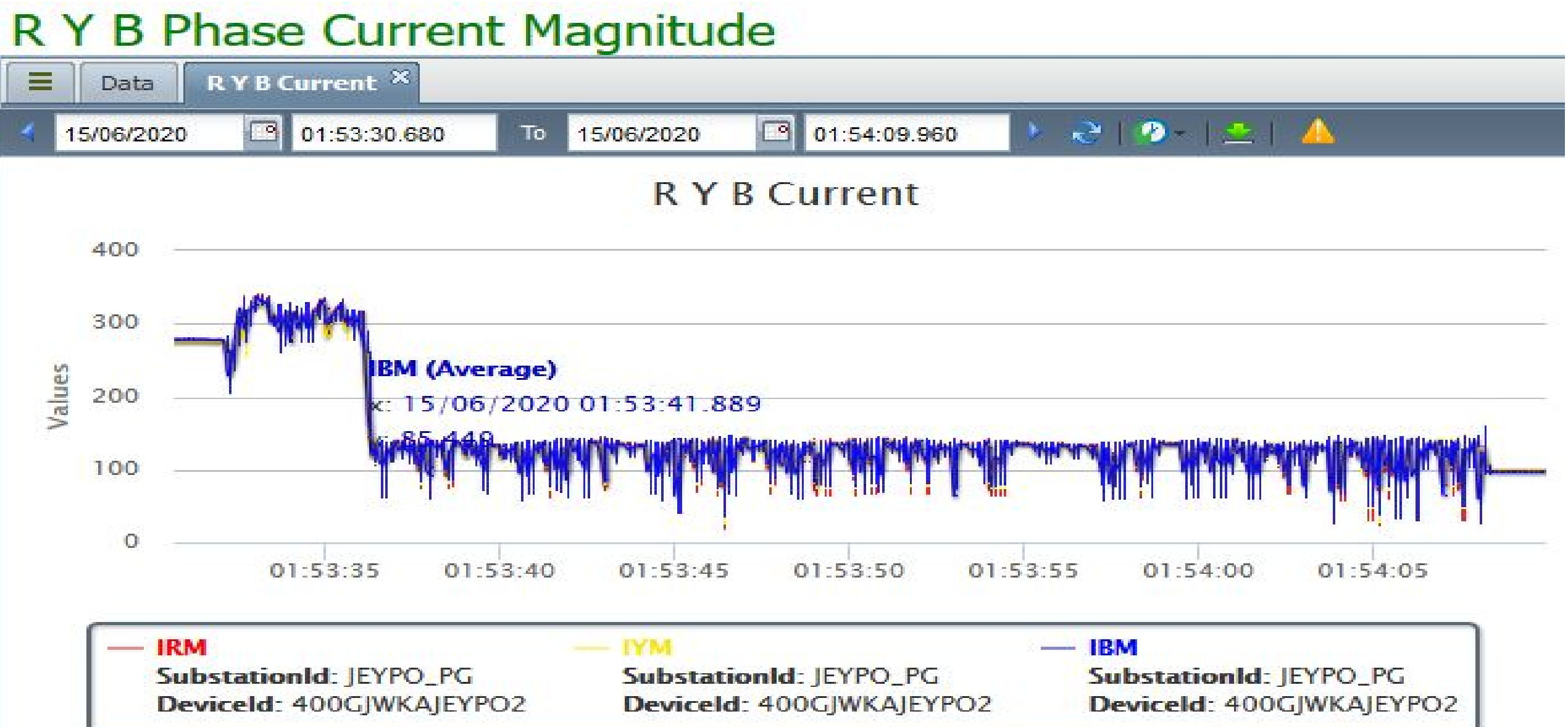
Annexure 1

400 kV Jeypore-Gazuwaka-1 line, 3-phase currents



Annexure 1

400 kV Jeypore-Gazuwaka-2 line, 3-phase currents



पावरग्रिड
POWERGRID

पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
POWER GRID CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

Ref:SR1/AM/VIZAG-OSC/ **Date:**26th June 2020

To
Executive Director,
National Load Dispatch Centre, POSOCO,
61, IFCI Tower, 8th and 9th Floor, Nehru Place,
New Delhi – 110019

Ref: Your Letter Ref: POSOCO/NLDC/SO/HVDC/06 Dated 20.06.2020.

विषय: Frequent Fluctuations observed in AC side voltage of HVDC Gazuwaka Back to Back Station- Reg.

Dear Sir,

This is in reference to your letter dated 20-06-2020 on the above-mentioned subject. POWERGRID is committed to maintain the highest reliability of its system and stability in the GRID. It is a matter of great concern that HVDC Vizag, one of the oldest HVDC installation being subjected to severe operating conditions in which frequent fluctuation is being observed in AC side voltage at east bus. Subsequent to above letter, both the poles are blocked again on similar oscillations on 23-06-2020. These events have been thoroughly analyzed at our end summarized as detailed below-

1. Event DT: 31-01-2020 (14:46 Hrs to 14:51 Hrs) – The detailed report was shared with SRLDC along with events, DR and site observations. The reason for such fluctuations could not be ascertained. There was huge noise in Converter transformers and Line Reactors during the event. To avoid any further serious damage pole I was blocked manually.
2. Event DT. 04-02-2020 (14:34 Hrs to 14:36 Hrs)- No event has been triggered at HVDC VIZAG.
3. Event DT: 05-02-2020 (08:34 Hrs to 08:38 Hrs) - Power swing/dip in the system was observed during the period. The reason for such fluctuations is external to HVDC system and there was no tripping of poles.
4. Event DT. 17-02-2020 (11:20 Hrs)- AC system oscillations recorded for 60ms. The reason for transient is external to HVDC system and there was no tripping of poles.
5. Event DT.18-02-2020 (00:25 Hrs)- AC system oscillations recorded for around 180msec. Ferro-resonance was detected by HVDC controls system. The reason for such fluctuations is external to HVDC system and there was no tripping of poles.
6. Event DT. 24-02-2020 (13:46 Hrs)- Heavy voltage dip was observed which was transient in nature. It was further learnt that 220KV VSS-Paravada Line of AP Transco had tripped at the same time leading to transient disturbance. There was no tripping of poles.
7. Event DT. 25-02-2020 (08:55 Hrs to 13:07 Hrs)- Power swing/oscillations was recorded in both Pole 1 and Pole 2 till 13:07 Hrs. At 10:21 Hrs. ferro-resonance was also detected in the system most likely due to AC side disturbances. There was no tripping of poles.

8. Event DT: 15.06.2020 (**01:53** Hrs) – The oscillations were observed during which pole 2 tripped due to tripping of AC Filter sub Banks on operation of "resistor thermal overload" at high harmonics and pole #1 tripped on commutation failure.
9. Event DT: 23.06.2020 (13:39 Hrs to 14:26 Hrs) – This event is quite similar to the event dated 31.01.2020, where sustained system oscillations were observed. This led to tripping of AC Filter sub Banks on operation of "resistor thermal overload" due to high harmonics and subsequent blocking of Pole 2. Pole 1 was manually blocked to avoid any further possible damages to the equipment.

This is to clarify that the low frequency oscillations are not being generated by HVDC as such but getting initiated from external system. Due to these oscillations, high amount of harmonics are being observed on east side which is beyond the design limit of individual harmonic distortion for performance (i.e. 1%) and leading to tripping of harmonic filters and subsequently tripping of poles as per logic. These oscillations are being observed at low power flow below 400 to 500 MW from East to South. The low frequency oscillations may be possible due to interaction of Generators and elements at East Bus, FSC & STATCOM system at Jeypore and HVDC Station at Gazuwaka at low power levels.

During design and engineering stage, ABB also advised to take the FSC of 400 kV Jeypore-Gazuwaka circuits into service when power flow is more than 500 MW through HVDC.

In view of above and as a preventive measure to avoid such oscillation, the following is proposed as initial action :-

To keep Jeypore FSC in service only when power flow is more than 250 MW in each 400 kV Jeypore-Gazuwaka circuits (total power flow >500 MW on both circuits) and to monitor the oscillation at East bus of VIZAG.

Accordingly you are kindly requested to allow for Jeypore FSC into service when total power flow exceeds 500 MW on both Jeypore-Gazuwaka circuits and to monitor the oscillation in the east bus of VIZAG HVDC station.

Thanking you

Yours faithfully,

अनूप कुमार

(Anoop Kumar)
Executive Director (SR-1)

Copy to :- 1) Director (O)- For Kind inf pls.
2) ED (AM), CC

Annexe-3

Status of FSCs at 400 kV Jeypore-Gazuwaka-1 & 2 during the incidents of blocking of HVDC Gazuwaka poles due to observed fluctuations

Element Name	Tripping Date	Tripping Time	Reason
Pole II at Gazuwaka (500 MW)	26-06-2020	20:20	Tripped
FSC OF 400KV-JEYPORE-GAZUWAKA-2 AT JEYPORE	26-06-2020	20:22	Bypassed on Under Current
FSC OF 400KV-JEYPORE-GAZUWAKA-1 AT JEYPORE	26-06-2020	20:22	Bypassed on Under Current
Pole I at Gazuwaka (500 MW)	26-06-2020	20:22	Hand Tripped on sustained Oscillation
FSC OF 400KV-JEYPORE-GAZUWAKA-2 AT JEYPORE	23-06-2020	14:08	UNDER CURRENT
FSC OF 400KV-JEYPORE-GAZUWAKA-1 AT JEYPORE	23-06-2020	14:08	UNDER CURRENT
Pole II at Gazuwaka (500 MW)	23-06-2020	14:08	Fundamental harmonic alarm trip.
Pole I at Gazuwaka (500 MW)	23-06-2020	14:25	Hand Tripped on sustained Oscillation
FSC OF 400KV-JEYPORE-GAZUWAKA-1 AT JEYPORE	12-06-2020	06:02	Under Current
FSC OF 400KV-JEYPORE-GAZUWAKA-2 AT JEYPORE	15-06-2020	01:03	BPCB issue
Pole II at Gazuwaka (500 MW)	15-06-2020	01:54	Tripped
Pole I at Gazuwaka (500 MW)	15-06-2020	01:54	Hand Tripped
FSC OF 400KV-JEYPORE-GAZUWAKA-1 AT JEYPORE	31-01-2020	14:13	Tripped on ferro resonance
FSC OF 400KV-JEYPORE-GAZUWAKA-2 AT JEYPORE	31-01-2020	14:13	Tripped on ferro resonance
Pole I at Gazuwaka (500 MW)	31-01-2020	14:51	Hand tripped

ANNEXURE-C1

Sl No.	Name of the incidence	PCC Recommendation	Latest status
91st PCC Meeting			
1.	Tripping of all 220 k V lines from 220 k V NJP Substation on 27.05.2020 at 0:56 hrs	PCC advised Powergrid to share the report with ERPC and ERLDC.	
2.	Nomination of nodal persons for communication related to tripping of grid elements	PCC advised all the utilities including SLDCs to nominate at least two nodal persons within a week for tripping analysis.	
3.	Multiple tripping incident at Jeerat at 18:08 hrs on 27-05-2020	PCC advised WBSETCL to submit a report to ERPC and ERLDC.	
90th PCC Meeting			
1.	Tripping of both running units at 220 k V TTPS on 15.03.2020 at 16:12 hrs.	PCC advised JUSNL to take the following measures to avoid the unwanted tripping of transmission lines: • Check any fault was appeared in downstream network of Patratu PTPS S/s • Send the relevant DR of zone 4 tripping of 220 kV TTPS – PTPS S/C line at PTPS end • Check the zone 4 reach and time settings of 220 kV TTPS – PTPS S/C line at PTPS end as the line should not trip within 100 ms. • Test the protection relays of 132kV and 220 kV system at PTPS including 220/132kV ATRs	

2.	Black out at 220 k V Tenughat Substation on 14.04.2020 at 12:47 hrs	After detailed deliberation. PCC opined that tripping of 220 kV TTPS – PTPS S/C line not clear, PCC advised JUSNL to collect the details and submit to ERPC and ERLDC. PCC advised BSPTCL, JUSNL and TVNL to take following corrective measures to avoid frequent tripping of the lines: • 220 kV Tenughat Biharshariff S/C tripped 7 times in the months of March and April, 2020. 220 KV TTPS PTPS line also tripped several times in March and April 2020. JUSNL and BSPTCL were advised to carry out the line patrolling and ensure healthiness of these line. • TVNL was advised to review the O/C, E/F protection settings of 220 kV Tenughat Biharshariff S/C , O/C , E/F protection settings of PTPS unit so that high resistance faults could be identified reliably.	
3.	Total Power failure at 220 k V TTPS on 22.04.2020 at 20:12 hrs	PCC advised JUSNL to submit the relay settings of 220 kV PTPS-TTPS line at PTPS end to ERPC and ERLDC	
4.	Disturbance at 220 k V Tenughat Substation on 28.04.2020 at 06:29 hrs.	PCC advised TVNL to replace the EM type Busbar protection with numerical relay.	
5.	Disturbance at 220 k V Chandil Substation on 29.03.2020 at 19:21 hrs.	PCC observed the following discrepancies and advised JUSNL and WBPDCL to take appropriate action: • 220kVChandil-Ramchandrapur S/C line got tripped within 100 ms. (Relay fault pickup details are not available due to incorrect DR configuration) JUSNL may check timing of distance protection at Ramchandrapur. • Disturbance recorders of all the substations of JUSNL involved in this	

		disturbance are to be configured as per the ERPC guidelines. • STPS end DR of 220kV Chandil-STPS line is to be configured as per the ERPC guidelines • Protection system of 220/132kV ATRs to be tested and the settings are to be coordinated with 220kV and 132 kV protection relays. • Busbar protection for all 220kV substations are to be installed to minimize the fault clearing time. • As 220kV Chandil S/s has single bus and transfer scheme, option for sectionalizer may be explored. • Healthiness of carrier signal of 220kV Chandil-STPS line is to be checked. • STPS end DR of 220kV Chandil-STPS line is to be configured as per the ERPC guidelines	
6.	Total Power failure at 220 k V Chandil Substation on 15.04.2020 at 17:20 hrs	PCC observed the following discrepancies and advised JUSNL to take appropriate action: • Disturbance recorders of all the substations involved in this disturbance are to be configured as per the ERPC guidelines. • CB of 220kV STPS-Chandil line at Chandil end is to be tested • Protection system of 220/132kV ATRs to be tested and the settings are to be coordinated with 220kV and 132 kV protection relays. • Busbar protection for all 220kV substations are to be installed to minimize the fault clearing time.	

7.	Total Power failure at 220 k V Chandil Substation on 30.04.2020 at 19:37 hrs	PCC observed the following discrepancies and advised JUSNL to take appropriate action: • Disturbance recorders of all the substations involved in this disturbance are to be configured as per the ERPC guidelines. • The reach and time settings of distance protection of 220kV STPS-Chandil line at Chandil end are to be reviewed. • Protection system of 220/132kV ATRs to be tested and the settings are to be coordinated with 220kV and 132 kV protection relays.	
8.	Total Power failure at 400 k V Teesta III and Dikchu Substations on 15.03.2020 at 16:12 hrs	PCC advised Powergrid to explore implementation of line differential protection for 400 kV Teesta III – Kishangunj S/C, 400 kV Rangpo – Kishangunj S/C and 400 kV Teesta III – Dikchu – Rangpo section to avoid uncoordinated trippings. This would identify the high resistive faults reliably and clear the faults immediately. PCC advised Dikchu to review earth fault settings at 400 k V side of 400/132 kV ICT of Dikchu HEP as tripping of this ICT is not desirable. PCC already advised same in earlier PCC Meetings.	
9.	Tripping of 400 k V Teesta III – Dikchu S/C from both ends on 21.04.2020 at 11:00 hrs	PCC advised Dikchu to review the relay settings. PCC advised TUL to maintain the spare reserves.	
10.	Black out of 132 k V Chujachen Hydro Power Substation on 01.04.2020	PCC advised DANS Energy to send relay settings , SLD and line parameters at Tashiding and Jorethang to ERPC and ERLDC.	

11.	Tripping of Unit 1 of JITPL on 05.03.2020 at 19:27 hrs	PCC advised JITPL take following corrective actions: • Reduce zone 4 time setting of transmission lines to 0.5 second. • Bay CT could be taken in reactor differential protection. • As a temporary measure, set reactor bays backup impedance tripping time to 200-300 milisecond instead of 0 second to avoid maloperation.	
12.	Tripping of both units of JITPL on 21.04.2020 at 18:29 hrs	PCC advised JITPL to take following action: 1) Tripping of both units at JITPL for bus bar protection operation of any bus may be reviewed. 2) Units shall be connected to grid through remaining healthy bus	
13.	Multiple tripping incident at Melli at 18:29 hrs on 13-03-2020	PCC advised powergrid and sikkim to take necessary action and submit details to ERPC and ERLDC	
14.	Islanding of CESC system at 14:31 hrs on 28-04-2020	PCC advised WBSETCL and CESC to coordinate the protection settings and islanding scheme settings to minimize separation of CESC system.	
89th PCC Meeting			
1.	Disturbance at 220 kV Bidhannagar Substation on 01.02.2020 at 21:05 Hrs.	PCC suggested WBSETCL to take the following remedial measures: • Submit the last test report of the CT which was failed during the disturbance • Carry out the testing of other CTs at Bidhanagar S/s • Avoid uneven distribution of lines between the Buses • WBSETCL along with SLDC, WB should explore to change the network configuration to	

		reduce the fault current level at Bidhanagar	
2.	Tripping of 220 kV Muzaffarpur-Hajipur D/C on 09.02.2020 at 12:53 Hrs and Tripping of 220 kV Hajipur-Amnour D/C on 10.02.2020 at 17:32 Hrs.	PCC advised BSTCL to take the following actions: • Check the past trippings for successful/unsuccessful operation of LBB and Bus Bar protection • Test LBB protection and Bus bar protection. PCC also advised SLDC Bihar and Powergrid to check reason for voltage unbalance at Muzaffarpur Substation.	
3.	Disturbance at Muzaffarpur Substation on 20.02.2020 at 12:29 Hrs.	PCC advised BSPTCL to resolve the O&M issues with Powergrid at the earliest.	
4.	Multiple tripping incident at RTPS at 01:55 hrs on 08-02-2020	PCC advised DVC to change GPS time synchronization.	
5.	Multiple tripping incident at NBU at 22:01 hrs on 29-02-2020	PCC advised WBSETCL to send detailed report to ERPC.	
6.	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	PCC advised SLDCs, generating stations and transmission utilities involved to send detailed report along with DR/EL to ERPC and ERLDC	

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. In 89th PCC Chuzachen was advised to review the zone 3 settings for 132 kV Chuzachen-Rangpo line as it is very high	
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.	