



Agenda
for
99th PCC Meeting

Date: 12.02.2021
Eastern Regional Power Committee
14, Golf Club Road, Tollygunge
Kolkata: 700 033

EASTERN REGIONAL POWER COMMITTEE

AGENDA FOR 99TH PROTECTION SUB-COMMITTEE MEETING TO BE HELD ON 12.02.2021 AT 10:30 HOURS

PART – A

ITEM NO. A.1: Confirmation of minutes of 98th Protection sub-Committee Meeting held on 13th January 2021 through MS Teams.

The minutes of 98th Protection Sub-Committee meeting held on 13.01.2021 circulated vide letter dated 28.01.2021.

Members may confirm the minutes of 98th PCC meeting.

PART – B

ITEM NO. B.1: Total Power Failure at 400 k V HEL Substation on 05.01.2021 at 13:37 hrs

400 kV HEL- Subhasgram - 1 was under shutdown since 04-01-2021 for rectification of damaged OPGW. HEL unit #2 was also not in service due to annual overhauling. HEL was connected to rest of the grid through 400 kV HEL - Subhasgram - 2 with only unit#1 in service.

As per the information received from HEL, during relay testing of 400 kV HEL Subhasgram -1 at HEL, CT Switching relay malfunctioned and bus bar protection operated at HEL end. As a result, 400 kV HEL - Subhasgram - 2 tripped and total power failure occurred at HEL. DT signal was sent to Subhasgram.

No fault was observed in PMU data at the time of the fault.

The detailed report received from HEL is enclosed at **Annexure B1**.

Gen. Loss : 280 MW

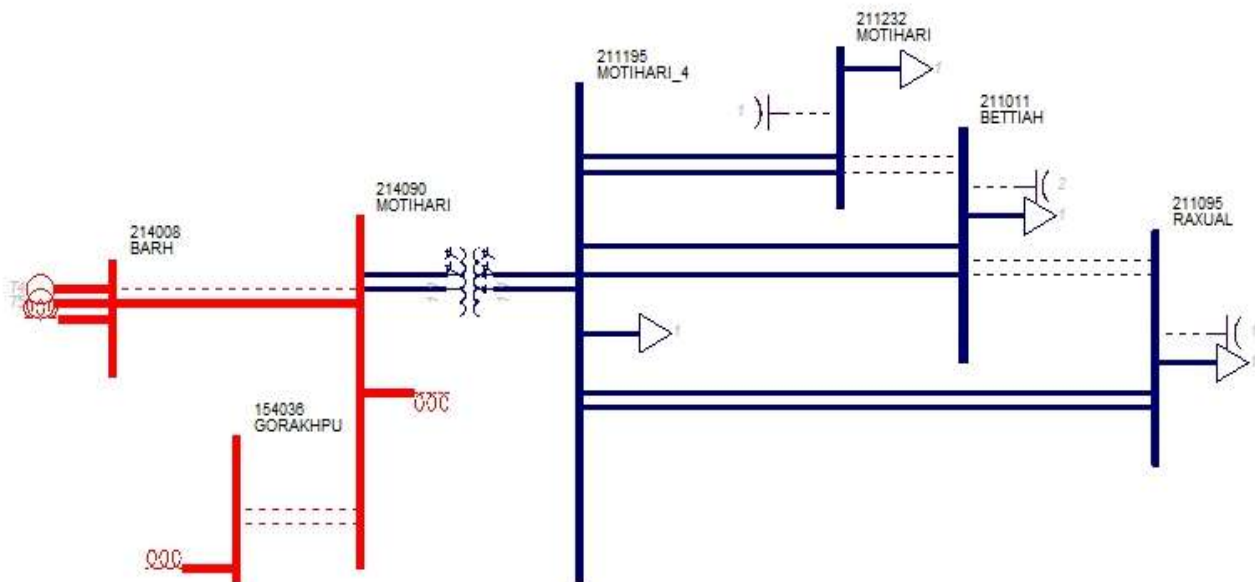
HEL & Powergrid may explain.

ITEM NO. B.2: Total Power Failure at 400 kV Motihari Substation on 15.01.2021 at 05:36 hrs

400 kV Motihari-Gorakhpur D/C and 400 kV Motihari-Barh-1 were out of service due to tower collapse. Motihari was connected to rest of the grid through 400 kV Motihari-Barh - 2.

On 15-01-2021 at 05:36 hrs, 400 kV Barh-Motihari - 2 tripped due to R and B phase to earth fault resulting in total power failure at Motihari S/S and loss of power supply to nearby areas such as Motihari, Bettiah, Raxaul, Ramnagar, Narkatiaganj, Dhaka and Areraj.

Barh end tripped in Zone -1 protection and Motihari end tripped after DT receipt from Barh end.



Relay Indications :

Time	Name	End 1	End 2	PMU Observations
05:36 Hrs	400 kV Barh Motihari – 2	R-B-N, Zone – 1, F/C 10 kA, 46 km from Barh	DT received. Pre tripping current < 0.3 kA	Around 40 kV dip has been observed in R & B phase voltage at Barh PMU data. The fault clearing time was less than 100 ms.

Load Loss : 187 MW

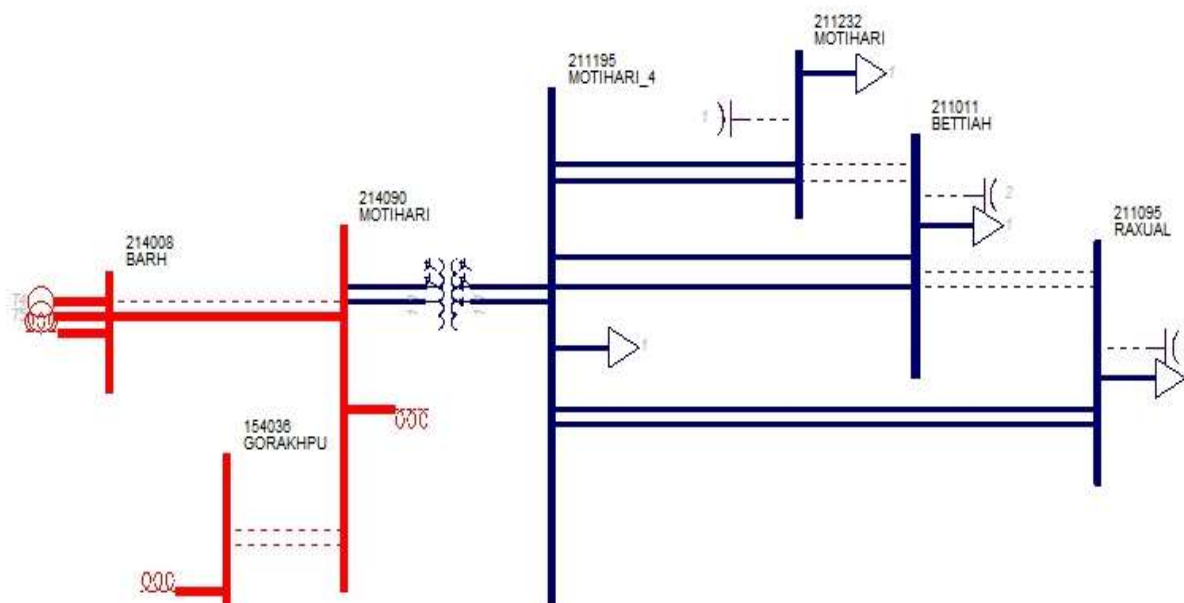
DMTCL & NTPC may explain.

ITEM NO. B.3: Total Power Failure at 400 k V Motihari Substation on 21.01.2021 at 11:20 hrs

400 kV Motihari-Gorakhpur D/C and 400 kV Motihari Barh-1 were out of service due to tower collapse. Motihari was connected to rest of the grid through 400 kV Barh Motihari - 2. On 21-01-2021 at 11:20 hrs, a transient Y-phase to earth fault occurred at 400 kV Barh-Motihari - 2. Successful auto reclose operation was occurred at Motihari end.

At Barh end, the tie breaker was successfully auto reclosed. But main breaker tripped again after auto-reclose operation. Then 400 kV Barh Motihari - 2 tripped from Motihari end on receipt of DT signal from Barh end. As a result total power failure occurred at Motihari S/S and loss of power supply occurred at nearby areas such as Motihari, Bettiah, Raxaul, Ramnagar, Narkatiaganj, Dhaka and Areraj.

Load Loss : 215 MW



Relay Indications :

Time	Name	End 1	End 2	PMU Observations
11:20 Hrs	400 kV Barh Motihari – 2	B-N, Zone – 2, F/C 2.6 kA, 175 km from Barh. PD operated for main breaker	B-N, Zone – 1, F/C 0.8 kA, 28 km from Motihari. DT received	Around 15 kV dip has been observed in B phase voltage at Barh PMU data. The fault clearing time was less than 100 ms.

Following points need to be explained by concerned utility:

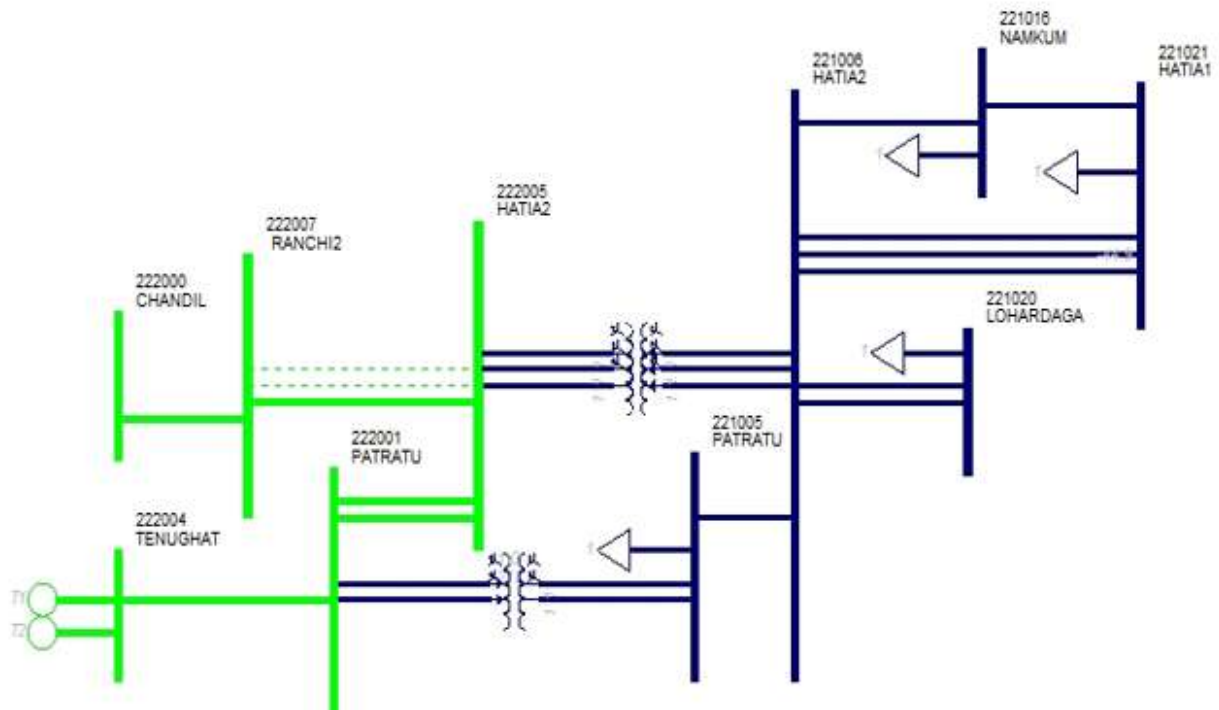
- a) As the line was charged through tie-breaker at Barh end such occurrence of grid disturbance could have been avoided if DT was not sent from Barh end. The reason for sending DT from Barh end during the event may be explained.
- b) The reason for non-reclose of B pole (faulted phase) of the main breaker at Barh may be shared.
- c) Breaker operation of tie-breaker is not captured by DR recorded at Barh end. The same may be implemented in DR output as unused channels are available.

NTPC & DMTCL may explain.

ITEM NO. B.4: Disturbance at 220 k V Hatia Substation on 29.01.2021 at 10:44 hrs

220 kV Ranchi - Hatia - 1 and 220 kV Hatia - Patratu - 2 were under shutdown.

220 kV Ranchi - Hatia - 3 was being shifted from 220 kV bus-1 to 220 kV bus-2 at Hatia. During changeover, sparking was observed in 220 kV bus-2 isolator at Hatia of Ranchi-3 feeder. Bus bar protection was not in service at Hatia at 220 kV voltage level. All 220 kV feeders tripped from remote ends.



Load Loss : 195 MW , Gen. Loss :54 MW

JUSNL may explain.

ITEM NO. B.5: Major grid events other than GD/GI

ITEM NO. B.5.1: Grid event at 220/132 kV Lalmatia S/s on 11-01-2021 at 11:57 hrs.

On 11-01-2021 at 11:57 hrs, 132 KV KhSTPP - Lalmatia S/C, 132 KV Kahalgaon (Bihar)-Lalmatia S/C, 132 KV Lalmatia – Sahebgunj S/C tripped on R phase to earth fault. As a result, 40 MW load loss occurred. Power was supplied to Sahebgunj and Rajmahal areas through transfer bus at Lalmatia via 132 kV Kahalgaon – Lalmatia – Sahebgunj link. There was no power failure at 220 kV voltage level at Lalmatia.

Repeated tripping of 132 kV KhSTPP – Lalmatia S/C and 132 kV Khalgaon (BSPTCL) – Lalmatia S/C is reducing the reliability of power supply to Sahebgunj and Rajmahal areas. Tripping incidents of 132 kV KhSTPP – Lalmatia S/C and 132 kV Khalgaon (BSPTCL) – Lalmatia S/C in 2020-21 are shown below.

Element Name	Tripping Date	Tripping Time	Reason	Revival Date	Revival Time
132KV-KHSTPP-LALMATIA-1	11-01-2021	11:57	R_N Fault, 9.4 KM, Ir: 3.08 kA (Lalmatia) R_N, 28 KM, 3.2 kA(KhSTPP)	11-01-2021	13:47
132KV-Kahalgaon(BSEB)-LALMATIA-1	11-01-2021	11:57	R_N Fault, 9.4 KM, Ir: 3.08 kA (Lalmatia) R_N, 34 KM, 1.42 kA(kahalgaon BSEB)	11-01-2021	12:27

132KV- KAHALGAON(BSEB)- LALMATIA-1	06-01- 2021	07:05	from jseb end on overload	06-01- 2021	07:24
132KV-KHSTPP- LALMATIA-1	03-01- 2021	13:42	KHALGAON: OC EARTH FAULT, Y_N,FD-104Km, FC-1.316Km: LALMATIA: Z-1, EARTH FAULT	03-01- 2021	14:35
132KV-KHSTPP- LALMATIA-1	15-12- 2020	11:50	R-N, 2.15 KA, Z1, 21.1 Km from lalmatia. KHSTPP: R-N 15.km, Z1, 4.35 KA.	15-12- 2020	12:16
132KV-KHSTPP- LALMATIA-1	24-11- 2020	13:54	R_N, 24.9 KM, 1.9 kA (Lalmatia)	24-11- 2020	14:21
132KV-KHSTPP- LALMATIA-1	24-10- 2020	12:12	Lalmatia: Z1, FD 24.1 kM, R-N, Ir 1.92 kA	24-10- 2020	13:05
132KV- KAHALGAON(BSEB)- LALMATIA-1	22-10- 2020	05:40	Kahelgaon: Distance protection location, Z1	22-10- 2020	06:20
132KV-KHSTPP- LALMATIA-1	25-09- 2020	11:23	Lalmatia: R-N, Z- 1,FC-1.9kA, 25.7km	25-09- 2020	13:35
132KV-KHSTPP- LALMATIA-1	20-09- 2020	17:00	R-N, 37.3 KM	20-09- 2020	19:38
132KV- KAHALGAON(BSEB)- LALMATIA-1	15-09- 2020	17:40	R_Y_N Fault, 73.1 KM, Ir: 2.1 kA, Iy: 1.8 kA	15-09- 2020	17:58
132KV- KAHALGAON(BSEB)- LALMATIA-1	08-09- 2020	13:51	Kahelgaon: R-N, Z1	08-09- 2020	14:28
132KV- KAHALGAON(BSEB)- LALMATIA-1	21-08- 2020	07:01	Z1	21-08- 2020	07:30
220KV-KHALGAON BSEB-LALMATIA-1	16-08- 2020	07:11	Y_N, 0.9 kA (Lalmatia)	16-08- 2020	07:41
132KV- KAHALGAON(BSEB)- LALMATIA-1	30-07- 2020	14:05	Over Current in R phase,Distance protection zone 1 operated	30-07- 2020	14:25
132KV-KHSTPP- LALMATIA-1	06-07- 2020	12:50	RY Fault Z2 R=3.06 KA Y=3.05 KA 39.1km from khstpp	06-07- 2020	17:18
132KV-KHSTPP- LALMATIA-1	03-07- 2020	19:31	B_N, 27 KM, 1.24 kA (Lalmatia)	03-07- 2020	20:02
132KV- KAHALGAON(BSEB)- LALMATIA-1	03-07- 2020	12:20	Y_N, 3.7 kA, 8.8 KM (Kahalgaon)	09-07- 2020	18:12
132KV-KHSTPP- LALMATIA-1	03-07- 2020	12:19	KHSTPP: Y- N,34.2Km,	03-07- 2020	13:05

			2.52KA		
132KV- KAHALGAON(BSEB)- LALMATIA-1	26-06- 2020	06:45	R-Y PH O/C & E/F	26-06- 2020	07:10
132KV- KAHALGAON(BSEB)- LALMATIA-1	04-06- 2020	22:46	R_Y_N, Ir: 2.077 kA, Iy: 1.816 kA, 77.46 KM	04-06- 2020	23:09
132KV- KAHALGAON(BSEB)- LALMATIA-1	27-05- 2020	16:10	BSTPCL-O/C operated	27-05- 2020	16:54
132KV- KAHALGAON(BSEB)- LALMATIA-1	20-05- 2020	21:13	R-N	20-05- 2020	21:30
220KV-KHALGAON BSEB-LALMATIA-1	20-05- 2020	12:40	Kahalgaon: O/C	20-05- 2020	13:25
132KV-KHSTPP- LALMATIA-1	13-05- 2020	13:05	KHSTPP:Y-B- N,37.1 KM	13-05- 2020	13:58
132KV- KAHALGAON(BSEB)- LALMATIA-1	07-05- 2020	15:42	tripped due to heavy wind and rain	07-05- 2020	16:20
132KV-KHSTPP- LALMATIA-1	04-05- 2020	07:01	CVT blast in Lalmatia-ECL line at Lalmatia	04-05- 2020	09:16
132KV- KAHALGAON(BSEB)- LALMATIA-1	04-05- 2020	07:01	CVT blast in Lalmatia-ECL line at ECL	04-05- 2020	07:58
220KV-KHALGAON BSEB-LALMATIA-1	02-05- 2020	14:20	E/f	02-05- 2020	14:38
132KV- KAHALGAON(BSEB)- LALMATIA-1	28-04- 2020	10:22	O/C & E/F	28-04- 2020	10:55
132KV- KAHALGAON(BSEB)- LALMATIA-1	19-04- 2020	23:55	Distance protection zone 1 operated at gss Kahalgaon	20-04- 2020	01:00
132KV- KAHALGAON(BSEB)- LALMATIA-1	12-04- 2020	03:02	Y,B-Ph overcurrent @Kahalgaon	12-04- 2020	03:17

JUSNL and BSPTCL may explain.

ITEM NO. B.5.2: Disturbance at 220/132 kV Kalyaneswari S/s on 21-01-2021 at 16:06 hrs.

On 21-01-2021 at 16:06 hrs., 220 kV Main bus-2 of 220/132 kV Kalyaneshwari substation got tripped resulting in total power failure at 132 kV Kalyaneswari, Kalipahari, Maithon Hydrel, Panchet Hydrel, Kumardubi and Ramkanali S/S.

The report received from DVC is attached in the Annexure-B5.2.

DVC may explain.

ITEM NO. B.5.3: Disturbance at 132 kV Lakhisarai (BSPTCL) Substation on 27-01-2021 at 12:59 hrs

On 27-01-2021 at 12:59 Hrs. 132 kV Lakhisarai (POWERGRID) – Lakhisarai (BSPTCL) D/C tripped due to jumper dropping of Jamalpur bay at 132 kV Lakhisarai (BSPTCL). As a result, total power failure occurred at 132 kV Lakhisarai (BSPTCL) S/S.

BSPTCL may explain.

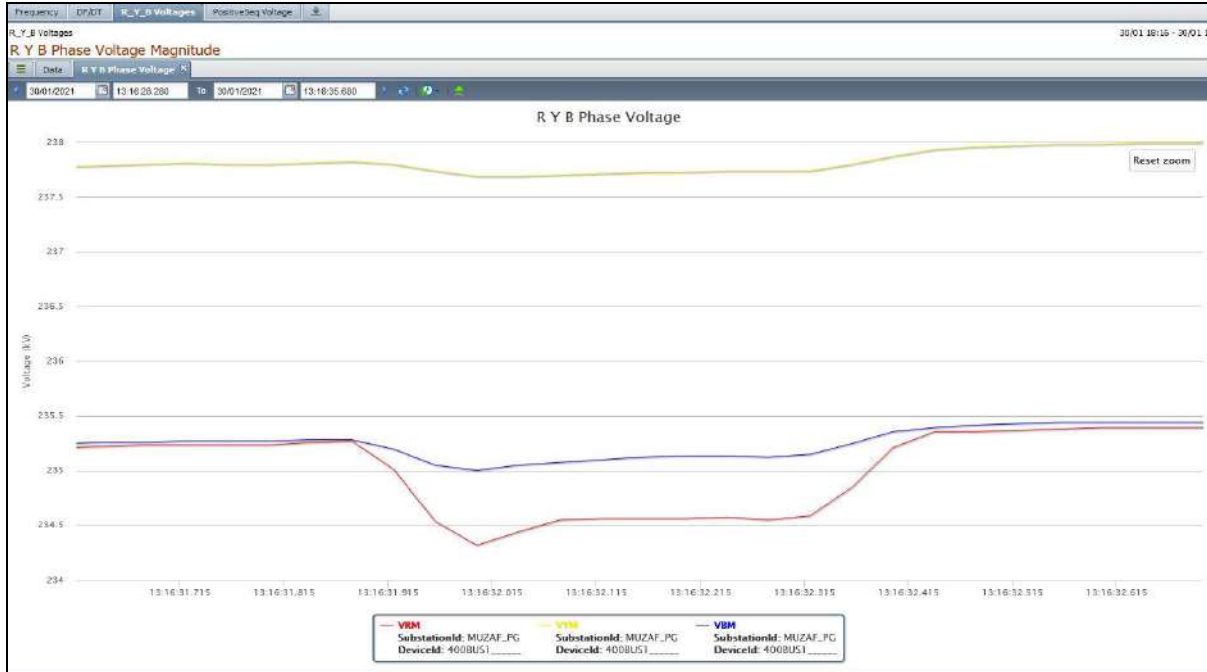
ITEM NO. B.5.4: Grid event at Motihari on 30-01-2021 at 13:16 hrs

On 30-01-2021 at 13:16 hrs, 132 kV Motihari – Batiah D/C tripped on R phase to earth fault.

Relay indication for both the circuits are shown below:

Line Name	Relay Indication End 1	Relay Indication End 2
132 kV Motihari Betiah - 1	R-N, Zone – 2, F/C 2.3 kA, 36.5 km from Motihari	Did not trip
132 kV Motihari Betiah - 2	Did not trip	Yet to be received

As per PMU data captured at Muzaffarpur, fault clearing time was around 450 ms.



As a result, 90 MW load loss occurred at Betiah, Narkatiyaganj, Ramnagar. Catering of power to Surajpura (Nepal) got interrupted due to this event. Both the circuits were restored by 14:09hrs.

The following points need to be explained by respective utilities:

- Location of fault.
- Reason for delayed clearance of fault
- Relay indication recorded at Betiah end for 132 kV Motihari Betiah – 2.

DMTCL and BSPTCL may explain.

ITEM NO. B.5.5: Bus tripping occurred in Eastern Region during January’ 2021.

B.5.5.1: ITEM NO. B.5.5.1: Tripping of 400 kV Bus-1 at Koderma TPS on 18-01-2021 at 04:42 hrs

On 18-01-2021 at 04:42 hrs, 400 kV Gaya – Koderma -1 tripped on Y phase to earth fault. At the same time, 400 kV bus-1 tripped at Koderma.

DVC may explain.

B.5.5.2: Tripping of 220 kV Bus-1 at 400/220 kV Jeerat S/s on 27-01-2021 at 18:57 hrs

On 27-01-2021 at 18:57 hrs 220 kV bus-1 at Jeerat tripped during its restoration of after shutdown work. 400/220 kV 315 MVA ICT-2 and 220/132 kV 160 MVA ICT -1 & 3 at Jeerat tripped at the same time.

WBSETCL/WBSLDC may explain.

B.5.5.3: Tripping of 220 kV Bus-1 at 400/220 kV Rourkela on 28-01-2021 at 10:49 hrs

On 28-01-2021 at 10:49 hrs, 220 kV bus 1 at Rourkela got tripped. As a result, 220 kV Rourkela-Tarkera D/C tripped from Rourkela end.

Powergrid may explain.

ITEM NO. B.6: Repeated tripping of 132 kV Chuzachen – Rangpo – 1 with same fault location

During January 2021, 132 kV Chuzachen Rangpo – 1 tripped repeatedly due to B phase to earth fault at the almost same fault location. ERLDC vide mail dated 15th January 2021 advised Sikkim STU and Sikkim SLDC to find the root cause of repeated tripping and take action to reduce the no of tripping. Tripping incident of 132 kV Chuzachen – Rangpo – 1 in the last 3 months is shown below.

Element Name	Tripping Date	Tripping Time	Reason	Revival Date	Revival Time
132KV-CHUZACHEN-RANGPO-1	27-01-2021	15:01	B_N, 12.28 KM, 1.362 kA (Chuzachen) B_N, 5.2 kA, 2.872 KM (Rangpo)		
132KV-CHUZACHEN-RANGPO-1	25-01-2021	14:21	B-N , 2.9KM , F/C-4.2KA FROM RANGPO	26-01-2021	18:56
132KV-CHUZACHEN-RANGPO-1	25-01-2021	13:42	B-N , 2.9KM , F/C-4.2KA FROM RANGPO B-N,FD 12.36KM,F/C 2.25KA FROM CHEP	25-01-2021	14:16
132KV-CHUZACHEN-RANGPO-1	22-01-2021	15:08	Rangpo: Z1, B-N, 2.925 KM, 4.479 KA	24-01-2021	14:53
132KV-CHUZACHEN-RANGPO-1	22-01-2021	14:04	B-N, Chuzachen: 12.43 KM, ; Rangpo: 2.92 km, Fc= 4.32 kA, Z-1	22-01-2021	14:54
132KV-CHUZACHEN-RANGPO-1	21-01-2021	13:50	B - N FAULT , FAULT 4.9 KA , Z1 2.9 KM (RANGPO)	21-01-2021	15:00
132KV-CHUZACHEN-RANGPO-1	15-01-2021	13:54	Rangpo: B-N, 3km, 1kA; Chuzachen: B-N, 12.7km, 0.8kA.	15-01-2021	14:56
132KV-CHUZACHEN-RANGPO-1	13-01-2021	14:53	Rangpo: B_N, 2.874 KM, 5.3 kA, Chuzachen: B_N, FD-12.25 Km	13-01-2021	15:41
132KV-CHUZACHEN-RANGPO-1	31-12-2020	09:47	B-N,Z1 3.01 KM 5.809 KA FROM RANGPO B-N,15.69 KM 2.452 KA FROM CHUZACHEN	31-12-2020	10:32
132KV-CHUZACHEN-RANGPO-1	27-12-2020	08:30	Rangpo-B-N FD-3.3km FC-6.37kA Chuzachen-B-N, FD-15km FC-2.9kA	27-12-2020	09:16
132KV-CHUZACHEN-RANGPO-1	05-11-2020	13:01	B-N , Z-1, 5.98KA, 2.77KM AT rangpo end	05-11-2020	14:34

The following may be clarified.

- Root cause of repeated tripping of 132 kV Chuzachen Rangpo – 1 on same fault indication and location
- Remedial action taken by utilities to reduce the no of tripping.

Sikkim & Chuzachen HEP may explain.

ITEM NO. B.7: Repeated tripping of Circuits from NTPC Barh and Associated protection Issues

In January 2021, repeated tripping has been observed for the lines emanating from 400 kV NTPC Barh generating station. During the analysis of the tripping incidents, discrepancies in Auto – reclose operation, protection system operation and extension of the direct trip signal have been observed and the same has been shown in the next table.

Sr. No	Element Name	Tripping Date	Tripping Time	Reason	DISCREPANCY	REMARKS
1	400KV-MOTIHARI-BARH-2	21-01-2021	11:20	B_N, 28.5 KM, 0.82 kA (Motihari) B_N, 175 KM, 2.6 kA (Barh)	A/R was successful from Motihari end. After 1 second, DT was sent from Barh end due to which line tripped from Motihari end only. From Barh end it was charged.	Tripping occurred as after successful A/R operation, spurious DT signal received at Motihari.
2	400KV-GORAKHPUR-BARH-1	21-01-2021	5:25	119,114 A,95.32 A B-N,DISTANCE NOT SHOWN FROM BARH END DT received at Gorakhpur	No fault in the line, tripped due to master trip relay operation at Barh end.	No fault, Mal-operation of the relay could have been avoided.
3	400KV-PATNA-BARH-1	21-01-2021	5:52	TRIPPED FROM PATNA END y-n,81 km,6.97 KA main 1 ,58.7 km ,3.85 KA in y -n Z1 A/R SUCCESSFUL FROM BARH Z1,Y-N,15.49 KA,22.4 KM	A/R Successful only from the Barh end .	Tripping could have been avoided if A/R operated at Patna end.
4	400KV-KHSTPP-BARH-2	19-01-2021	0:05	BARH : R-N,FD 26.9KM,FC 12.2 KA KHSTPP: Z1,R-N,187KM,FC 2.62KA		

5	400KV-PATNA-BARH-1	19-01-2021	0:24	PATNA: B-N,FC 7.2KA,FD 81KM BARH :Z1,B-N, 11.6KA,FD 30.6KM	At Barh end all 3 phase main CB opened and only B phase TCB opened, rest Y and B phase TCB were closed which also got opened after 900 ms. At patna end A/R was successful.	Tripping could have been avoided if A/R operated at Barh end.
6	400KV-MOTIHAR I-BARH-2	15-01-2021	5:36	Barh: R_B_N, Ir: 10.15 kA, Ib: 10.37 kA, 46 KM		
7	400KV-BARH-GORAKH PUR-1	12-1-2021	3:57	Barh: Z1, B-N, 2kA, 183km	A/R Unsuccessful.	
8	400KV-PATNA-BARH-2	12-1-2021	3:41	Patna: B-N, 7.2kA, 71km; Barh: B-N, Z1, 18.6kA, 21km	A/R unsuccessful. At Barh end Y-phase voltage became very low up to zero along with B phase and recovered fully. At the time of A/R also, Y phase voltage became zero while at Patna end it was normal. The reason for such dip at Barh end may please be explained.	

Report on the above tripping incidents is attached in Annexure-B7.

NTPC & Powergrid may explain.

ITEM NO. B.8: Islanding schemes of Eastern Region

1) Chandrapura Islanding Scheme:

The islanding scheme in DVC is under Chandrapura TPS considering unit 1, 2 and 3 having capacity of 3x130 MW (Namely CTPS-A plant) along with connected load of CTPS-A itself. However unit 1 and 2 were decommissioned.

In the OCC meeting, DVC informed that they are planning implement the islanding scheme with the new units (unit 7 and 8) of Chandrapura TPS having capacity of 2 x 250 MW (namely CTPS-B plant).

The detailed plan of islanding scheme is given at **Annexure B8**.

In 98th PCC, DVC explained the Chandrapura islanding scheme in detail with a presentation.

The scheme as explained by DVC in brief as follows:

- *The proposed islanding scheme would be implemented considering 2X 250 MW Generators of CTPS-B generating station along with loads of CTPS-A(120 MVA), Putki (180 MVA), Patherdih (141 MVA) and Nimiaghat (40 MVA).*
- *The islanding relay is to be placed at CTPS-B station with voltage & frequency of 220 kV CTPS-B as reference.*
- *On actuation of islanding relay at 220 kV CTPS-B, the trip commands will be extended further to 220 kV CTPS-A, 132 kV CTPS-A, 132 kV Putki, 132 kV Patherdih, and 132 kV Nimiaghata using OPGW communication network.*

They informed that the timeline for implementation of the islanding scheme would be 18 months from the date of finalization of the scheme.

They added that OPGW network is already present in order to extend trip signal of islanding relay to the related substations.

On a query from PCC regarding healthiness of the breakers at substations associated with this islanding scheme, they informed that circuit breakers are comparatively new in these substations and the breakers are being checked and maintained regularly during annual maintenance program.

During discussion, the frequency settings for islanding operation could not be discussed as representative from CTPS generating station was not present in the meeting.

ERLDC stated that DVC can conduct a dynamic study instead of steady state analysis which might help in finalizing the islanding frequency.

PCC advised DVC to conduct a dynamic study in coordination with ERLDC by January' 2021.

PCC decided that a separate meeting to be conducted between DVC, ERPC and ERLDC to finalize the islanding scheme.

DVC may update.

2) IB-TPS Islanding Scheme:

The islanding scheme was discussed in special meeting held on 12-12-2018

After detailed discussion the following were decided:

- The alarm for islanding scheme shall be initiated at 49.2 Hz at both Budhipadar and IB TPS to alert the operators
- Islanding of one unit (210 MW) of IBTPS with the selected loads of 149 MW connected through 132 kV level at Budhipadar substation will be initiated at 47.8 Hz of grid frequency with 250msec time delay.
- The islanding relay Micom P341 at Budhipadar will give trip command to all 220KV feeders connected to Bus-I and Bus II along with Bus coupler except Auto transformer- I & II and selected islanding IB TPS ckts either (IB -1 & 3) or (IB-2 & 4).
- Give trip command to circuit breakers of 132kV Budhipadar-Lapanga S/c line, 132kV Budhipadar-Jharsuguda D/C line and 132kV Budhipadar-Rajgangpur S/C lines at Budhipadar end.
- It will send carrier command to both Kalunga and Tarkera end to trip 132kV Kalunga-Tarkera S/c line from both the ends to make radial load at Kalunga.
- It will send carrier signal to IB TPS to start ramping and adjust IB TPS (one unit) generation to match the load.

Regarding implementation, OPTCL and OPGC informed the following:

- The islanding relay Micom P341 is already installed at bus coupler panel of 220kV Budhipadar S/s
- OPGW is available for 220 kV lines
- Installation of OPGW is in progress for 132kV lines
- Logic for generation control of islanding after receiving the command from Budhipadar is to be implemented at IB TPS.

In 98th PCC, OPGC informed that as per their recent communication with the OEM i.e. BHEL, high speed governing system is required for operating the unit in islanding mode of operation. As IB-TPS units are around more than 35 years old and having low speed governing system at present, it would be difficult to implement islanding scheme at IB-TPS.

PCC advised OPGC to place final observations from OEM regarding implementation of islanding scheme at IBTPS units in the PCC meeting.

OPGC and OPTCL may update.

3) MTPS, Kanti Islanding Scheme:

The islanding scheme was discussed in 68th PCC Meeting held on 18-06-2018.

After detailed deliberation, PCC in principle agreed with the following islanding scheme at Kanti TPS:

- Stage II units (2x195 MW) of Kanti TPS will be islanded with station load of 40 MW and radial load of 150 MW (approx.) of 220kV Kanti TPS-Gopalganj D/C line.
- Once the grid frequency falls to 48.2 Hz, the PLC at Kanti TPS would initiate the islanding process after 500 ms time delay.

In 97th PCC following deliberations were made

KBUNL informed that the islanding scheme would be implemented with Stage II units (2x195 MW) of Kanti TPS. The relevant data related to Stage II units (2x195 MW) of Kanti TPS were already shared to ERLDC. KBUNL added that at present MTPS is having two bus system and they are implementing bus sectionalizer in both the 220 kV buses to isolate the Stage II units (2x195 MW) and 220kV Kanti TPS-Gopalganj D/C lines from rest of the grid.

KBUNL explained that the construction work of relevant bays of bus sectionalizer is pending due to some contractual issues. The work has been awarded to a new contractor and it is expected to be completed by end of 2021.

KBUNL further informed that all the hardware related to islanding schemes have been procured and the islanding scheme is expected to be implemented by December 2021.

PCC opined that implementation of MTPS, Kanti Islanding Scheme is very important for restoration of Bihar system during major grid disturbances. PCC advised KBUNL to expedite the work and implement the islanding scheme by June 2021.

In 98th PCC Meeting, BSPTCL informed that details of the availability of PLCC for the lines associated with KBUNL islanding scheme had already been shared. PCC advised BSPTCL to ensure the healthiness of the PLCC in all the 220kV and 132kV lines connected to the Gopalganj Sub-station within the timeframe of implementation of Islanding scheme at KBUNL.

KBUNL and BSPTCL may update.

4) Review of FSTPS Islanding Scheme

In 175th OCC Meeting, JUSNL informed that 220 kV Lalmatia-Godda line has been charged and the islanding scheme will be reviewed based on this change in network configuration.

OCC advised JUSNL to submit the load details and change in network configuration after commissioning of 220 kV Lalmatia-Godda line to ERLDC at the earliest.

JUSNL may update. Members may discuss.

ITEM NO. B.9: Islanding Schemes for major cities of Eastern Region

A special Meeting on reviewing of Islanding Schemes was held on 28th Dec 2020 chaired by Hon'ble Minister of state (IC) for Power and New & Renewable Energy.

In this regard a letter from NPC division has been received to discuss the following action points.

- a) Islanding schemes must be designed for all major cities and if there is need to establish power plant in / around such city, the proposal may be submitted to Ministry.
- b) All strategic and essential loads need to be considered for Islanding Scheme and Ministry of Defence may also be consulted for finalizing strategic loads.
- c) Generators which are spatially nearby the strategic and essential load shall be given priority in designing islanding scheme.
- d) All concerned utilities to ensure functionality of AUFLS and df/dt relays at all points of time.

Members may discuss.

ITEM NO. B.10: Total Power Failure at 220 /132 k V Dehri Substation on 21.12.2020 at 06:21 hrs

On 21-12-2020 at 06:21 hrs, 220 KV Dehri - Gaya D/C and 220 kV Pusauli - Dehri S/C tripped from Gaya and Pusauli end respectively resulting in total power failure at Dehri end. Existence of Y phase to earth fault has been captured by PMU data as well as DR recorded at Gaya end. The fault clearing time as per Gaya PMU is around 800 ms.

In 98th PCC meeting,

BSPTCL was advised to review the settings of main protection of the 132 kV Dehri-Kochas S/C line and back up protection of all the 220/132 kV ICTs at Dehri immediately.

PCC further advised as follows:

- BSPTCL to review all the relay settings at 132 kV Dehri S/s where new relays have been installed and in case of any change in the settings, the same should be shared with ERPLDC/ERPC for updation in the protection database.
- Powergrid to review zone-3 settings of 220 kV Gaya-Dehri line and 220 kV Pushauli-Dehri line. The same should be coordinated with back up overcurrent protection of 220/132 kV ICTs at Dehri.
- BSPTCL to check the PT connections to the main relay as well as back up protection relay at Dehri end.

BSPTCL and Powergrid may update.

ITEM NO. B.11: Disturbance at 220 kV Meramundali Substation on 01.10.2020 at 04:07 hrs

On 30th September 2020 at 22:36 hrs, 220 kV Meramundali – NALCO - 1 was tripped on overcurrent protection. The line was charged at 00:05 hrs on 01st October 2020. At 01:35 hrs, sparking was noticed on this circuit at Meramundali end switchyard due to which GRIDCO SLDC advised NALCO to reduce the loading of the circuit.

At 04:07 hrs, line side pipe at Meramundali end of the above-mentioned circuit got broken and fell on the ground along with the breaker jumper causing line fault at Meramundali S/s. Bus jumper of 220 kV bus 1 at Meramundali also got damaged at several places which led to bus fault at 220 kV bus 1 at Meramundali. All the elements connected with 220 kV bus 1 along with the bus coupler tripped at Meramundali.

In 97th PCC following deliberations were made

- OPTCL to analyze the reason for rise in healthy phase voltage at Meramundali S/s during single phase to ground fault and send a report to ERPC and ERLDC.
- OPTCL to send latest status of OPGW work and implementation of carrier protection in 220 kV lines to ERPC and ERLDC.

In 98th PCC, SLDC Odisha informed that thorough checking of all earthing points are being carried at out at Meramundali S/s.

They further informed that the status of OPGW work and implementation of carrier protection in 220 kV lines would be submitted within a week.

OPTCL may update.

ITEM NO. B.12: Tripping of 400 kV Barh- Kahalgaon line at Barh end on 22.12.2020.

On 22 December 06:09 Hrs ,400 Kv Barh -Patna-I line tripped at Barh end due to Y phase fault and at the same time 400 kV Barh -Kahalgaon-I which is in same dia also tripped with the operation of TEED protection associated with the line.

ERLDC informed that on 09th July 2020 at 13:40 Hrs, Teed protection has also operated for section associated with BARH-Kahalgaon-I for through fault in 400 kV Patna -NPGC line.

In 98th PCC, NTPC representative was not present in the meeting.

PCC advised NTPC to submit a report regarding the disturbance to ERLDC/ERPC secretariat at the earliest.

NTPC may update.

ITEM NO. B.13: Backup Overcurrent Relay coordination of Sikkim Complex

In 97th PCC following deliberations were made

It was informed that IDMT characteristics were implemented at Jorethang and Tashiding.

It was informed that ERPC would share the revised settings as per the study carried out by PRDC to all concerned utilities.

In 98th PCC, PCC advised all concerned utilities to go through revised settings as per the study carried out by PRDC and provide their observations within one week.

Members may update.

ITEM NO. B.14: Resistive reach setting guidelines and model calculation for distance protection--ERLDC

1. Proposed Criteria for Phase-earth fault:

- a. Calculation of minimum load impedance should be as per Ramkrishna Committee Recommendation:
 - Maximum load current (I_{max}) may be considered as 1.5 times the thermal rating of the line or 1.5 times the associated bay equipment current rating (the minimum of the bay equipment individual rating) whichever is lower.
 - Minimum voltage (V_{min}) to be considered as 0.85pu (85%).
- b. Minimum setting for resistive reach should be such that it must cover fault resistance, arc resistance and the tower footing resistance.
- c. Generally Maximum reach setting should be 80% of the minimum load impedance.
- d. Resistive reach setting < 4.5 times the zone reactive reach setting.

Resistive reach should be the maximum of the value determined by the above three rules.

2. Proposed Criteria for Phase-Phase fault:

- a. Calculation of minimum load impedance as per the same method mentioned above.
- b. Minimum setting for resistive reach should be such that it must cover fault resistance and arc resistance.
- c. Generally, the resistive reach of zone-3 is set less than 80% of minimum load impedance. For power swing consideration, a margin of DR is given. Therefore, it is essential that load should not encroach this DR. In view of this, R3ph – R4ph is set 60% of minimum load impedance. R2ph and R1ph are set 80% of R3ph-R4ph respectively.
- d. Resistive reach setting < 3 times the zone reactive reach setting.

Resistive reach should be the maximum of the value determined by the above three rules.

Another important point is consideration of remote end in feed for zone-2 and 3 reach calculations.

In 98th PCC, ERLDC informed that thermal loading value would be considered based on the design loading value of the individual line. The design loading value (75° or 85°) has been decided during the design phase of the line as per CEA planning criteria.

Powergrid informed that the specifications in point d) may change with the OEM therefore this condition may be modified accordingly.

PRDC informed that in case of short lines, with the proposed guidelines related to resistive reach settings the relay may not be able to clear high resistive fault.

Powergrid informed that they would submit their views with respect to point d) after due consultation from their end.

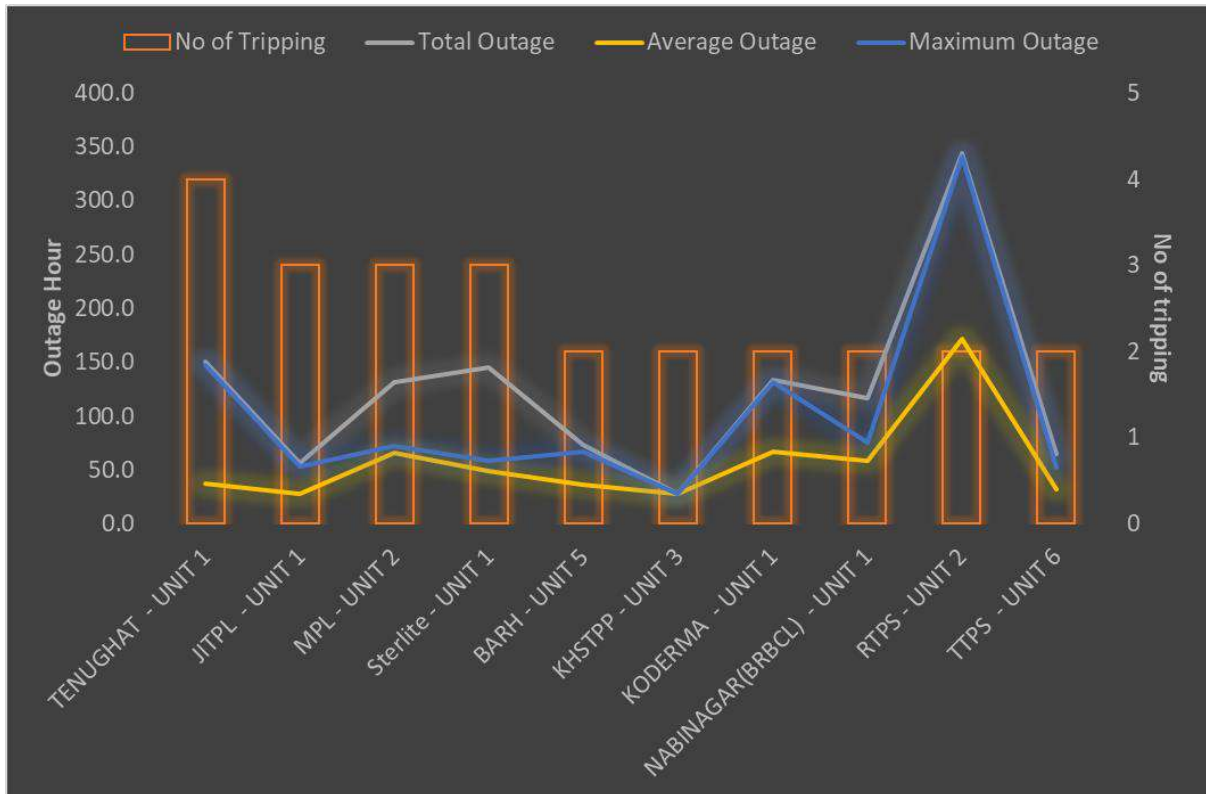
PCC viewed that these are general guidelines and modification can be done in resistive reach settings as per OEM specifications to solve the issue of clearing highly resistive faults.

It was decided that the guidelines would be finalized after receiving the comments from Powergrid.

Members may discuss.

ITEM NO. B.15: Repeated tripping of generating units in January 2021

During January 2021, repeated tripping has been observed for a few generating units. A list of such generating units along with the number of tripping and outage duration is shown in the below figure.



Reasons for tripping for units with multiple tripping events in January 2021 is given below:

Name of generating units	Reason for tripping	No of tripping	Utility to respond
Tenughat TPS Unit 1	Tripping of PA Fan, High Drum level, Low main steam temperature, Problem in Air Preheater	4	TVNL/Jharkhand SLDC
JITPL unit 1	Bottom Ash problem (2), Drum level protection operation	3	JITPL
MPL TPS Unit 2	Boiler tube leakage	3	MPL
STERLITE TPS Unit 1	ID Fan Problem, Ash Handling Problem (2)	3	SEL/Orissa SLDC

TVNL, JITPL, MPL , Jharkhand SLDC and Odisha SLDC may explain.

PART- C:: OTHER ITEMS

ITEM NO. C.1: Collection of substation data by PRDC

PRDC is collecting the substation data and maintaining the database for the Eastern Region. The data for following new substations are to be collected:

Sl No	SS Name	Data Collection	Owner	State
1	Bagmundi		WBSETCL	West Bengal
2	Dinahata		WBSETCL	West Bengal
3	Goghat		WBSETCL	West Bengal
4	Saltlake Stadium		WBSETCL	West Bengal
5	Mathabhanga		WBSETCL	West Bengal
6	Kashipur		OPTCL	Odisha
7	Betanati		OPTCL	Odisha
8	Aska New		OPTCL	Odisha
9	Udala		OPTCL	Odisha
10	Narashinghpur		OPTCL	Odisha
11	IBTPS		OPGC	Odisha
12	Mancheswar		OPTCL	Odisha
13	North Karanpura		NTPC	Jharkhand
14	TingTing		Sikkim
15	Lethang		Sikkim
16	Rongichu		Sikkim

Members may note.

ITEM NO. C.2: Submission of protection settings in PDMS

Relay settings of many transmission elements are not available in the protection database. The list has been prepared and forwarded to all the concerned utilities.

Relay settings had been received from CESC, Haldia Energy Limited and for few Substations from Powergrid ER-1. OPTCL, WBSETCL, JUSNL, BSPTCL, WBPDC, Powergrid ER-II, NTPC and other constituents are required to submit relay settings at earliest.

Concerned utilities are advised to upload the relay settings in PDMS or send the relay settings to erpcprotection@gmail.com.

In 98th PCC, PCC advised all concerned utilities to upload the pending relay settings in PDMS or send the relay settings to erpcprotection@gmail.com.

Members may note and comply.

ITEM NO. C.3: Schedule of Training Programme to be conducted by PRDC

PRDC is going to conduct training programme on PSCT & PDMS for the 4th year of support period in state utility premises of Eastern Region. The tentative schedule is given below:

Sl. No.	Venue	Date
1	Bihar	17/03/2021 to 19/03/2021
2	Jharkhand	21/04/2021 to 23/04/2021
3	ERPC Secretariat	13/05/2021 to 14/05/2021
4	West Bengal	09/06/2021 to 11/06/2021
5	Odisha	21/07/2021 to 23/07/2021
6	Sikkim	26/08/2021 to 27/08/2021

Members may discuss.

ITEM NO. C.4: Protection coordination of the new transmission elements to be charged in Eastern Region

ITEM NO. C.4.1: LILO of 220 kV Gaya Sonenagar D/C at Chandauti S/S

As per information received at ERLDC, 220 kV Gaya Sonenagar D/C will be LILOed at Chandauti S/S.

Details of the modified line after LILO (as received at ERLDC)

Name	Conductor type	Length
220 kV Gaya Chandauti D/C	Single ACSR Zebra	18 km
220 kV Sonenagar Chandauti D/C	Single ACSR Zebra	76 km

As per information available at ERLDC, protection coordination may be required as per the following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
LILO of 220 kV Gaya Sonenagar D/C at Chandauti S/S	Chandauti	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	PMTL/ POWERGRID	Protection coordination has been done as per ERPC's guideline
	Gaya	Protection setting may be revised for 220 kV Gaya – Chandauti D/C (Earlier it was 220 kV Gaya Sonenagar D/C). Longest line connected to Gaya S/S (Earlier it was 220 kV Gaya Sonenagar D/C as per details available at ERLDC) may get changed.	POWERGRID ER - 1	Yet to be received
	Sonenagar	Protection setting may be revised for 220 kV Sonenagar – Chandauti D/C (Earlier it was 220 kV Gaya Sonenagar D/C).	BSPTCL	Yet to be received
	S/S connected to Gaya: Bodgaya, Dehri, Khijesarai	Longest line connected to Gaya S/S (Earlier it was 220 kV Gaya Sonenagar D/C as per details available at ERLDC) may get changed.	BSPTCL	Yet to be received

Following Details to be shared:

- POWERGRID ERTS – 1 & BSPTCL may share whether revision of any existing protection setting at above mentioned S/S is required or not. In case of any revision, the revised setting may be shared with ERPC and ERLDC.
- The protection setting at Chandauti may be shared with ERPC and ERLDC.

- Status of carrier protection and PLCC channel in 220 kV Gaya, Chandauti and Sonenagar section may be shared.

Members may discuss.

ITEM NO. C.4.2 : Charging of 220/132100 MVA ICT - 4 at Rangpo Sub-station

As per the scheme agreed in ER Standing Committee, 220/132 100 MVA ICT - 4 is to be charged at Rangpo S/S. Protection coordination may be required as per the following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
Charging of 220/132 100 MVA ICT - 4 at Rangpo Sub-station	Rangpo	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	POWERGRID ER-2	Protection coordination would be done as per ERPC's guideline
	S/S connected to Rangpo: New Melli & Tashiding (at 220 kV level) Gangtok & Chujachen (at 132 kV level)	Protection coordination to be checked for change in impedance due to charging of new ICT	POWERGRID ER – 2, Tashiding HEP and Chujachen HEP	Yet to be received

Following may be shared:

- Concerned utilities may share whether revision of any existing protection setting is required or not. In case of any revision, the revised setting may be shared with ERPC and ERLDC.
- POWERGRID ER-2 may share the protection setting at Rangpo for newly charged ICT.

Members may discuss.

ITEM NO. C.4.3 : Charging of 400/220 KV 315 MVA ICT - 3 at Rourkela Sub-station

As per the scheme agreed in ER Standing Committee, 400/220 kV 315 MVA ICT - 4 was connected in parallel with existing 315 MVA ICT-2 without using any additional CBs for the new elements at Rourkela S/S. As per same scheme, 315 MVA ICT-3 will be connected in parallel with existing ICT-1 without any additional breaker. Protection coordination may be required as per following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
Charging of 400/220 KV 315 MVA ICT - 4 at Rourkela Sub-station (Two more 400/220 kV 315 MVA ICT is present at Rourkela)	Rourkela	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	POWERGRID Odisha	Protection coordination would be done as per ERPC's guideline
	S/S connected to Rourkela: Ranchi, Chaibasa, Talcher STPS, Jharsuguda (at 400 kV level) Tarkhera (at 220 kV level)	Protection coordination to be checked for change in impedance due to charging of new ICT	POWERGRID ER – 1, POWERGRID Odisha, NTPC Talcher STPS, OPTCL	No revision in existing protection setting is required for Ranchi, Chaibasa and Jharsughuda.

Talcher NTPC and OPTCL to share whether revision of any existing protection setting is required or not. In case of any revision, revised setting may be shared with ERPC and ERLDC.

Members may discuss.

ITEM NO. C.4.4: Charging of 220 kV Subhasgram (PG)- Baruipur D/C

As per information received at ERLDC, 220 kV Subhasgram (PG) - Baruipur D/C will be charged up to dead end tower of Baruipur.

Details of lines to be charged (as received at ERLDC)

Name	Conductor type	Length
220 kV Subhasgram (PG) - Baruipur D/C	Single ACSR Zebra	29 km

As per information available at ERLDC, protection coordination may be required before charging at both ends as per following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
Charging of 220 kV Subhasgram (PG) - Baruipur D/C	Subhasgram (PG)	Protection coordination to be done for all newly connected elements as per ERPC's guidelines.	POWERGRID ER- 2	
	Baruipur	Protection coordination to be done for all newly connected elements as per ERPC's guidelines.	WBSETCL	
	S/S connected to Subhasgram (PG): Subhasgram (WB), KLC, New Town A, EM Bypass	Longest and shortest line connected to Subhasgram (PG) S/S may be checked and protection coordination may be done for feeders connected to Subhasgram (PG) S/S in case of change in longest and shortest line connected to Subhasgram (PG) S/S.	WBSETCL & CESC	WBSETCL has confirmed protection coordination. CESC may confirm protection coordination at EM Bypass S/S.

Following may be shared:

- Protective relay setting at Subhasgram (PG) and Baruipur to be shared to ERLDC/ERPC for newly charged lines for update in ERPC protection database.
- In case of change in any existing protection relay setting, WBSETCL to share revised setting may be shared with ERPC and ERLDC for update in protection database.
- Status of carrier protection and PLCC channel of newly charged line to be shared.

Members may discuss.

ITEM NO. C.4.5: LILO of 400 kV Kharagpur New Chanditala D/C at Medinipur along with charging of 400 kV main bus 1 & 2 at Medinipur along with 2 x 125 MVar Bus reactor at Medinipur

As per information received at ERLDC following elements will be charged/LILOed in near future:

- 400 kV Main Bus 1 & 2 at Medinipur
 - Type of Conductor- QUAD AAC Bull
- 400 kV 125 MVar Bus reactor 1 & 2 at Medinipur
- LILO of 400 kV Kharagpur New Chanditala D/C at Medinipur. Details modified lines after LILO (as received at ERLDC) are provided in table below.

Details of modified line after LILO (as received at ERLDC)

Name	Conductor type	Length
400 kV Kharagpur - Medinipur D/C	Twin ACSR Moose	115 km
400 kV New Chanditala - Medinipur D/C	Twin ACSR Moose	96 km

As per information available at ERLDC, protection coordination may be required as per following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
LILO of 400 kV Kharagpur - New Chanditala D/C at Medinipur	Medinipur (New)	Protection coordination to be done for all newly connected elements as per ERPC's guidelines	PMJTL/ POWERGRID	Confirmed
	Kharagpur	Protection setting may be revised for 400 kV Kharagpur – Medinipur D/C (Earlier it was 400 kV Kharagpur - New Chanditala D/C).	WBSETCL	Confirmed
	New Chanditala	Protection setting may be revised for 400 kV New Chanditala – Medinipur D/C (Earlier it was 400 kV Kharagpur - New Chanditala D/C).	WBSETCL	Confirmed
	S/S connected to Kharagpur: Chaibasa, Kolaghat, Baripada	Longest and shortest line connected to Kharagpur S/S may be checked and protection coordination may be done for feeders connected to Kharagpur S/S in case of change in longest and shortest line connected to Kharagpur S/s.	POWERGRID ER-1, WBPDC, POWERGRID Odisha	Distance protection setting to be changed at Kolaghat end. * No modification of protective relay setting is required at Baripada and Chaibasa.
	S/S connected to New Chanditala: Kolaghat, Arambag, Bidhannagar, Jeerat	Longest and shortest line connected to New Chanditala S/S may be checked and protection coordination may be done for feeders connected to New Chanditala S/S in case of change in longest and shortest line connected to New Chanditala S/S.	WBPDC, WBSETCL	No change is required for Arambag, Jeerat and Kolaghat. Zone 3 setting is to be revised for Bidhannagar S/S.

Protection relay setting may be shared in pdf for all newly charged elements which are as follows:

Element Name	S/S Name	Utility to respond	Received for S/S
400 kV Kharagpur - Medinipur D/C	Kharagpur and Medinipur	PMJTL/ POWERGRID & WBSETCL	All
400 kV New Chanditala - Medinipur D/C	New Chanditala & Medinipur	PMJTL/ POWERGRID & WBSETCL	All
765 and 400 kV Main Bus 1 & 2 at Medinipur	Medinipur	PMJTL/ POWERGRID	All

765 and 400 kV bus reactor 1 & 2 at Medinipur	Medinipur	PMJTL/ POWERGRID	All
765/400 kV ICT 1 & 2 at Medinipur	Medinipur	PMJTL/ POWERGRID	All
400 kV Bidhannagar New Chanditala	Bidhannagar	WBSETCL	None
400 kV KTPP - Kharagpur	KTPP	WBPDCL	None

Members may discuss.

ITEM NO. C.4.6: Upgradation of 220 kV Tata Steel Kalinganagar – New Duburi D/C to 400 kV voltage level.

As per information received at ERLDC, 220 kV TATA steel Kalinganagar-New Duburi was charged at 400 kV voltage level. **Details of modified line after Charged at 400 kV (as received at ERLDC)**

Name	Conductor type	Length
400 kV New Duburi-TATA Steel D/C	Twin ACSR Moose	5 km

As per information available at ERLDC, protection coordination may be required as per following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
Charging of 220 kV New Duburi-TATA Steel D/C at 400 kV level	New Duburi	Protection setting may be revised for 400 kV level. shortest line connected to New Duburi S/S may get changed.	OPTCL	No change is required at New Duburi end
	TATA Steel, Kalinganagar	Protection setting may be revised as per ERPC philosophy	TATA Steel	Protection setting has been shared by Tata Steel.
	S/S connected to New Duburi: Pandiabili, Baripada, Meramundali	Shortest line connected to New Duburi S/S may get changed.	OPTCL, Powergrid Odisha	Protection coordination has been confirmed.

Following to be shared:

- Status of carrier protection and PLCC channel in 400 kV New-Duburi and TATA Steel, Kalinganagar section to be shared.

Members may discuss.

ITEM NO. C.4.7: First time charging of 220 kV Hatia new - Ranchi Smart City S/C.

As per information received at ERLDC, 220 kV Hatia new - Ranchi Smart City S/C will be charged for first time. **Details of newly charged cable are shown below (as received at ERLDC)**

Name	Conductor type/capacity	Length/Impedence
220 kV Hatia new - Ranchi Smart City S/C	800 sqmm XLPE Cable	6 km
220/34.5 kV ICT at Ranchi Smart City	65 MVA	12.17%

As per information available at ERLDC, protection coordination may be required as per following table.

Reason	S/S may be affected	Remarks	Utility to respond	Response received
Charging of 220 kV Hatia new - Ranchi Smart City S/C	Hatia New	Protection relay setting is to be coordinated for newly charged element	JUSNL	
	Ranchi Smart City	Protection relay setting is to be coordinated for newly charged element	JUSNL	
	S/S connected to Hatia: Ranchi & Patratu	Longest and Shortest line connected to Hatia may be checked. In case of any change, protective relay setting is to be revised accordingly.	POWERGRID ER-1 & JUSNL	

Following to be shared along with confirmation of protection coordination as per above table:

- Protection relay setting of 220/34.5 kV 65 MVA ICT at Ranchi Smart City.
- R, X and B value of the newly charged/to be charged cable
- Maximum power carrying capability of transmission cable.
- In case of any change in existing protection setting at Hatia and Patratu, revised protection relay setting may be shared with ERLDC and ERPC.

JUSNL may update.

ITEM NO. C.5: Any additional agenda – with permission of the Chair.

Incidence report on total power failure at HEL on 5th January, 2021.**Preconditions:**

1. Unit-2 was shut down for annual overhauling.
2. Line-1 was shut down for transmission tower maintenance job.
3. 400kV Main Bus-1 was shut down for isolator maintenance of Line-1 bay & MBC bay.
4. Relay maintenance of Line-1 was in progress with current injection kit.

Sequence of Events:

1. Current injection was done in P543 relay of Line-1. Before current injection, CB Fail protection was disabled in the relay setting file.
2. At 13:37:40:360541, in P543, R phase differential trip, Any Trip and the LBB output relay R13 operated.
3. The Zone-B trip bus got energized, resulting in the tripping of the Circuit Breakers of Line-2, GT-1, ST-1 & ST-2 which were connected to Main Bus-2.
4. Unit 1 came to house load (13 MW). But without Station transformers in service, it was not possible to keep the unit in operation. Therefore, unit-1 was tripped manually.

Observations and findings:

1. The CT switching relay of Line-1 for Main Bus-2 bus was found in operated condition, though the Main Bus-2 isolator was open and indication at SAS was showing open. The reset coil of the relay did not get energized due to loose connection of wiring. The same was rectified and CT switching operation was checked.
2. Before relay testing, the CB Fail protection was disabled in the relay setting file so that no LBB trip could be generated from the relay during current injection. However, it is apprehended that during relay testing, a wrong PSL file was uploaded in the relay by GE engineers on temporary basis to enable the testing functions. Thus, even though the Breaker Failure protection was disabled in the setting file, the wrong PSL triggered the operation of the LBB output.
3. Simultaneous failure of LBB inhibition and CT switching relay reset operation initiated Main Bus-2 Bus Zone protection.

Corrective and Preventive Actions:

1. Correct CT switching operation shall be ensured before relay testing.
2. The LBB output shall be physically isolated from the busbar protection scheme before starting relay testing and will be reconnected after completion of relay testing.
3. No modification of the existing PSL shall be done for testing purpose.

DAMODAR VALLEY CORPORATION



OFFICE OF THE SUPERINTENDING ENGINEER CENTRAL RELAY AND INSTRUMENT TESTING LABORATORY MAITHON

INVESTIGATION REPORT OF DISTURBANCES AT 220KV KALYANESWARI & AND OTHERS/SS AT 16:06 HRS ON 21-01-2021

BRIEF HISTORY:

At about 16:06 HRS on 21-01-2021, Main Bus #2 of 220kV Kalyaneswari S/S failed and subsequently TPF occurred at 132 kV Kalyaneswari , Kalipahari, Maithon Hydrel, Panchet Hydrel, Kumardubi and Ramkanali Substations due to tripping of all the three(03) ATRs at Kalyaneswari S/S, L#20 & 21(132kV DTPS Kalipahari D/C).

LINES OFF PRIOR TO INCIDENT:

1. L# 60 & 61 [132kV CTPS/Jamuria – Ramkanali].
2. L # 12 & 13 [132KV Putki Patherdih D/C].
3. All units of MHS & PHS were not in running condition.

BUS ARRANGEMENT PRIOR TO INCIDENT:

Main Bus 1 : L#201, L#229, L#237, L#239 and ATR#1

Main Bus 2 : L#202, L#228, L#238 , L#240, ATR#2, ATR#3

TRIPPING DETAILS:

Refer Annexure-1 for SLD of the disturbed system.

ANALYSIS OF THE EVENT:

1. As reported by Kalyaneswari S/S, the Bus side isolator of L#240 connected to MB#2 had opened by itself on load resulting in flashing and creating a bus fault. As the line was on Main Bus 2 Busbar Protection (both Main zone 2 and Check zone) operated correctly and tripped all CBs connected to this bus via operation of 96 relays.
2. Remote End Zone 2 and local Reverse Zone of all lines emanating from Kly 220KV had picked up correctly during the fault.
3. All the tripping in DVC 220KV system was correct expect for tripping of Line # 228 from MTPS which simultaneously tripped in Zone 1. It was found that the reach settings had been wrongly entered in distance relay at MTPS end.
4. Outage of Main Bus #2 lead to outage of ATR #2 & 3. As soon as all the Load was transferred to ATR#1, it tripped with HV O/C protection. Total load of three ATRs was around 360-380 MVA prior to the Bus failure.
5. With the outage of three ATRs all the load catered by these ATRs was started to be fed from various other source connected to the network. The increased loading of Line # 20 & 21 (

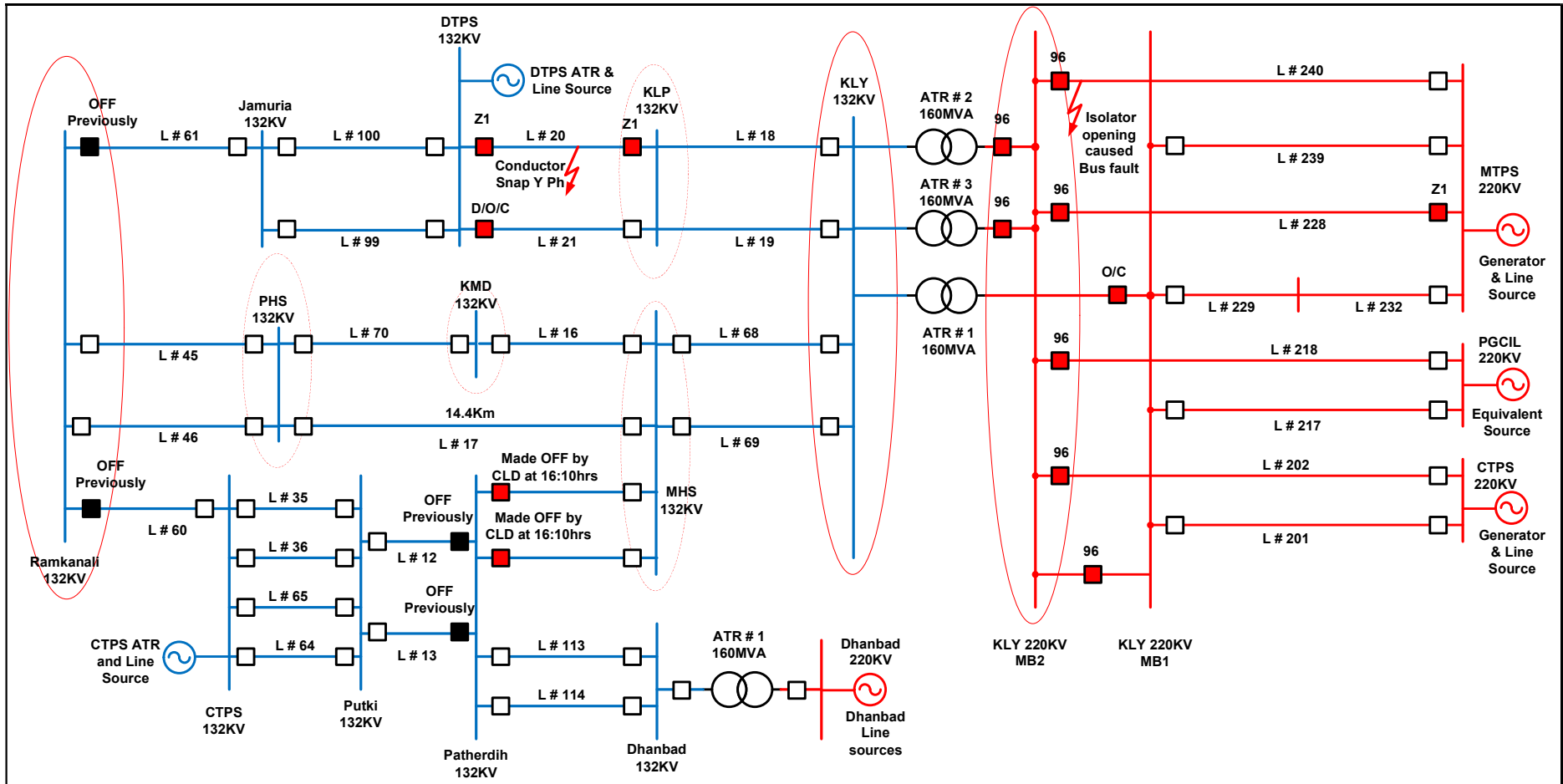
DTPS – Kalipahari 132 KV DC line) caused a conductor snapping in Y Phase in Line 20 at around 13Km from Kalipahari End. The distance relay at both ends of the line tripped correctly in their Zone 1 protection. Fault Distance displayed from Klp End was 13.09 Km and that from DTPS End 23.36 Km. The tripping of Line # 20 overloaded Line # 21 further leading to it's tripping through D/O/C protection from DTPS End causing TPF at 132 KV Kalipahari SS.

6. As L # 60 & 61 were OFF and Putki Patherdih loop (L 12 & 13) was OPEN previously, the tripping of both Line 20 & 21 led to increase of loading of the sole ATR at Dhanbad SS as well as that of Dhanbad Patherdih D/C lines. Patherdih MHS Lines (L # 14 & 15) were hand-tripped from Patherdih End under the instruction of CLD at 16:10hrs to save the ATR from overloading at Dhanbad SS.
7. Hand-trip of L # 14 & 15 at Patherdih End led to TPF at MHS, Kumardhubi, PHS & Ramkanali SS.

Corrective Action and Remedial Measures:

1. The reach settings of Line # 228 at MTPS End has been corrected.
2. The cause of inadvertent bus side isolator operation of Line # 240 is under investigation by GOMD II Maintenance Division.
3. Commissioning of 2nd ATR at Dhanbad may help to increase the system stability in the region.
4. Commissioning of two numbers of 80MVA 220/33KV Power Transformer at Kalyaneshwary SS would help to reduce the loading of Kalyaneshwary ATRs.
5. Commissioning of Remote access system of numerical Relays at CTC, DVC, Maithon for fast and effective root cause analysis in such widespread disturbance in the system.

ANNEXURE 1 – SLD OF DISTURBED SYSTEM AT 16:06 HRS ON 21-01-2021



DR Patna end:

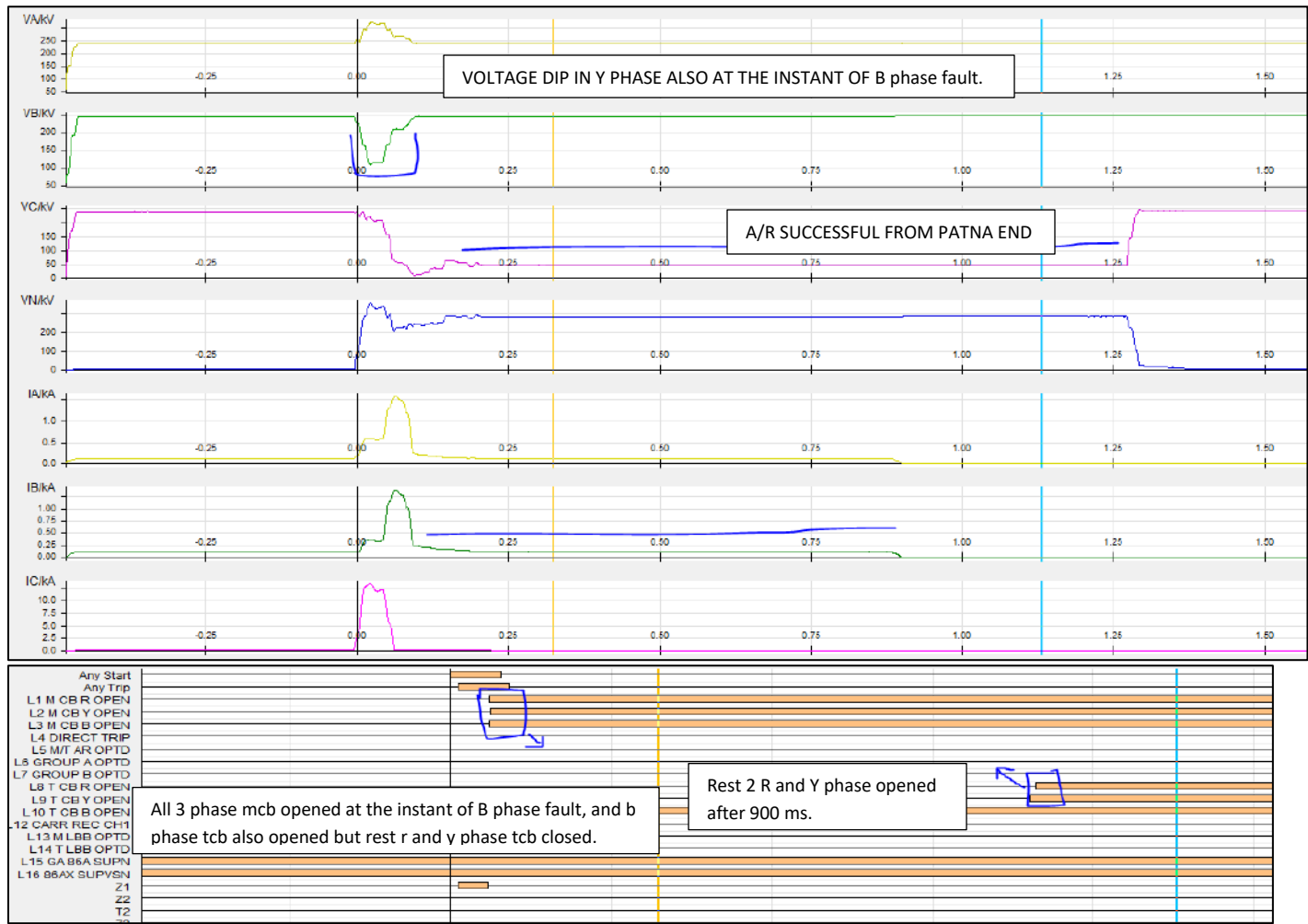


400 KV PATNA BARH-1	19/01/2021	0:24	PATNA: B-N,FC 7.2KA,FD 81KM BARH :Z1,B-N, 11.6KA,FD 30.6KM	At Barh end all 3 phase mcb opened and only B phase TCB opened , rest Y and B phase TCB were closed which also got opened after 900 ms.why this occurred and why A/R did not operated?while At patna end A/R was successful .	Tripping could have been avoided if A/R operated at Barh end.
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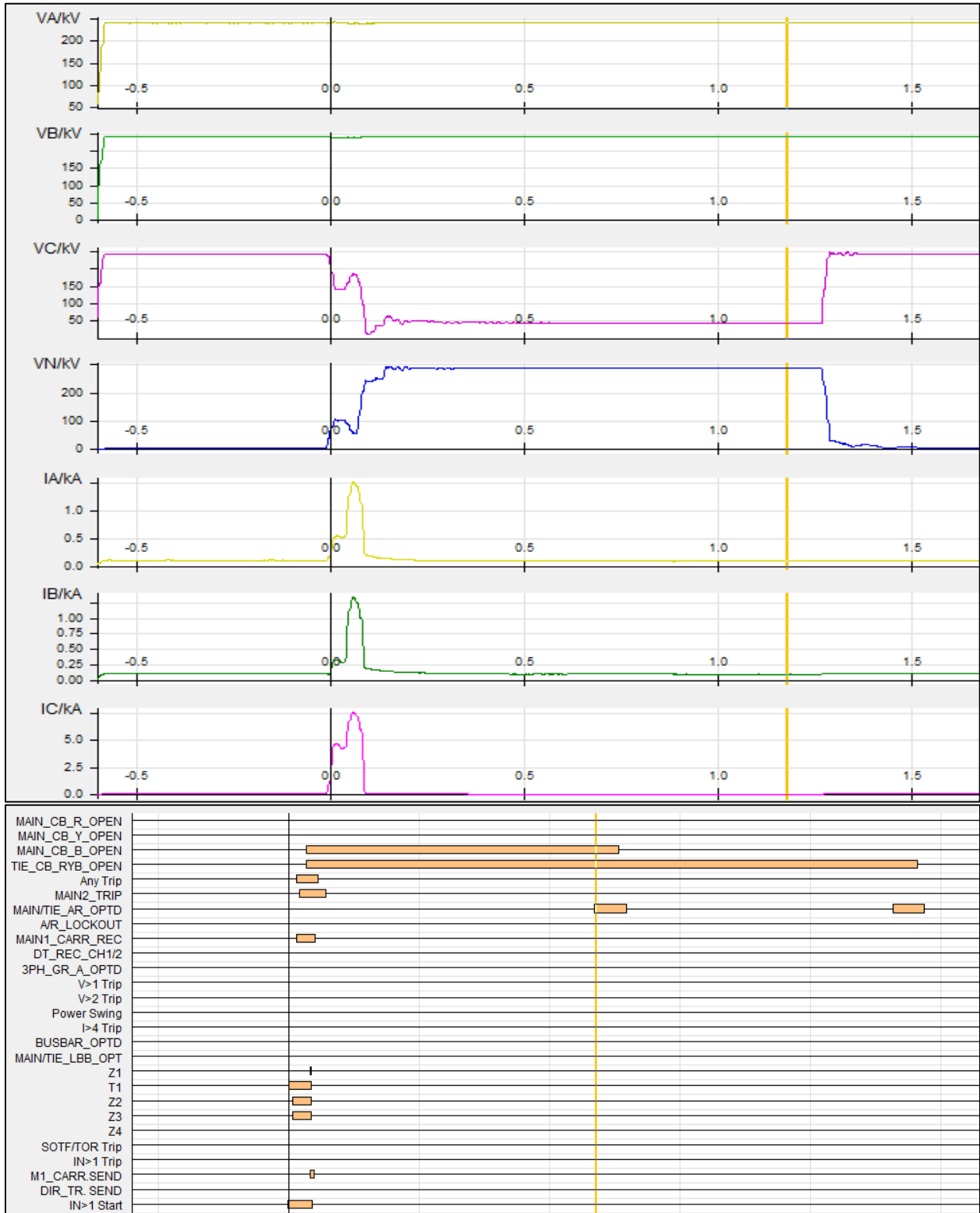
Similar event as previous ,There was B phase fault in the line and At Barh end , in Y phase huge dip observed and current in R &Y phase also increased upto 1.4ka, while R phase voltage increased momenterally upto 800 Kv.**While at Patna end no such voltage dip or increase observed** in any healthy phase. Earthing at BARh end may be checked properly . Reason for such phenomenon at Barh may be explained?

At Barh end all 3 phase mcb opened and only B phase TCB opened , rest Y and B phase TCB were closed which also got opened after 900 ms.why this occurred and why A/R did not operated? while At patna end A/R was successful .

BARH END DR:

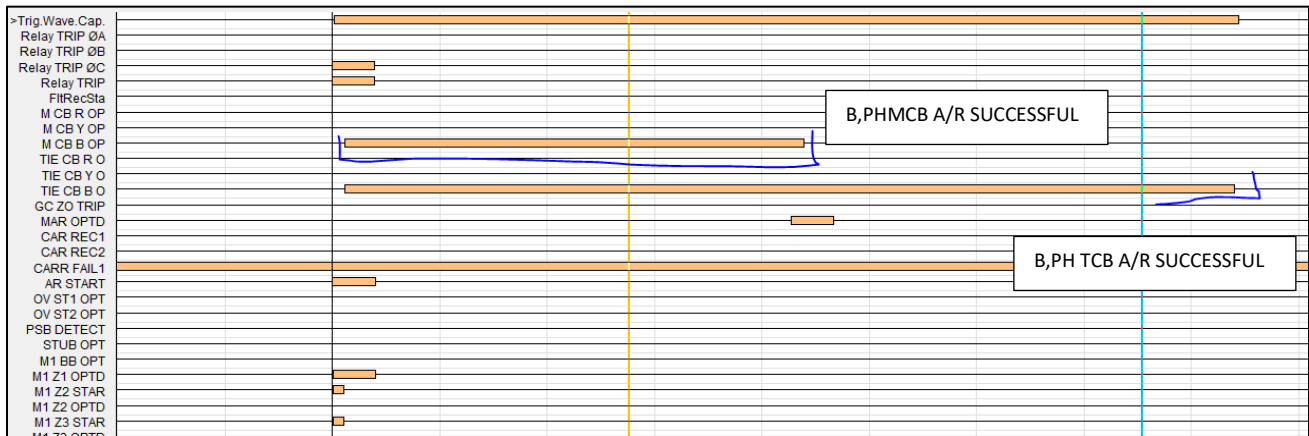
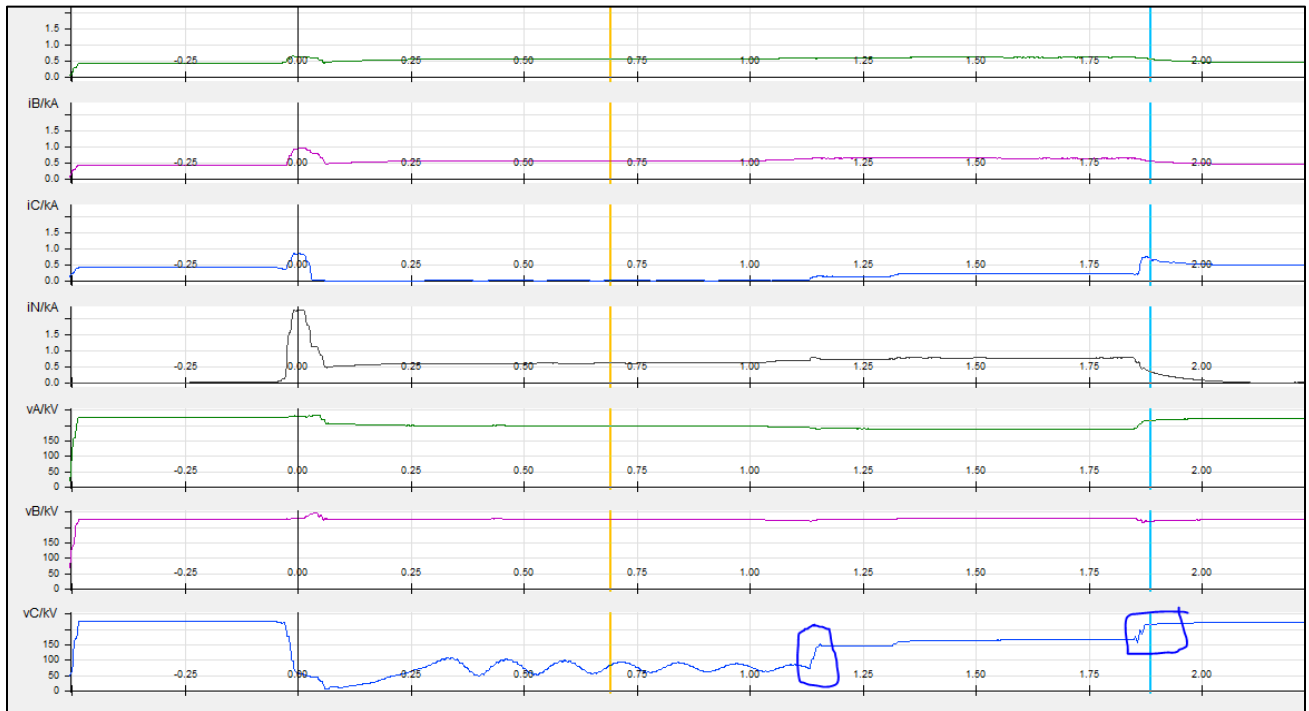


PATNE END:



400KV-MOTIHARI-BARH-2	21/01/2021	11:20	B_N, 28.5 KM, 0.82 kA (Motihari) B_N, 175 KM, 2.6 kA (Barh)	A/R was successful from Motihari end , which is evident from DR of motihari end ,after 1 second of which DT sent from BARh end due to which line tripped from only Motihari end and from BARh it was charged.	Tripping could have been avoided after successful A/R DT receipt.
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Dr at motihari end:



Philosophy towards formulation and implementation of Grid Islanding Scheme considering 2 x 250 MW units (U # 7 & 8) of Chandrapura TPS, DVC connected to 220KV Grid System

The present islanding scheme in DVC is under service at Chandrapura TPS considering Unit # 1, 2 & 3 having capacity of 3 x 130MW (namely, CTPS – A plant) along with connected load of CTPS – A itself. However, U # 1 & 2 were put out of bar.

Hence, a new suitable venue in DVC is felt to be identified towards formulation and implementation of a new Grid Islanding scheme. Accordingly, U # 7 & 8 of Chandrapura TPS having capacity of 2 x 250MW (namely, CTPS – B plant) has been considered after much thinking and threadbare discussions. These units are connected to 220KV grid. Single line connection diagram (DVC Grid) is shown in Annexure – I.

The Grid islanding scheme is proposed to be implemented in two stages namely,

stage I : Islanding from grid &

stage II : Load – Generation balance through sequential load shedding

considering the 2 x 250MW generators of CTPS – B plant along with connected loads of CTPS – A (120 MVA), BIADA (73 MVA), Putki (180 MVA), Patherdih (141 MVA) & Nimiaghat (40 MVA).

The feasibility of the scheme at this preliminary stage is elaborated as below:-

1. Minimum generation of a unit to be considered as 170MW.
2. Monitoring of Total Generation in MW to be implemented using feed from Ex-Bus MW transducers available at 220kV Switchyard of CTPS – B.
3. The Grid Islanding relay (R1) to be placed at CTPS – B end considering 220KV Bus voltage & frequency of CTPS – B as reference.

[Note :

- a. The old Islanding panel, placed at CTPS – A, may be used after shifting of the same from CTPS – A to CTPS – B. The OEM of this panel i.e. GE (erstwhile ALSTOM) confirmed that the existing panel could be suitably modified.
 - b. Entire scheme design including setting of different relays will be taken care of after freezing of the scheme outline.]
4. After actuation of R1 relay – R2, R3, R4, R5, and R6 Relays which will be connected to IEC-61850 compliant substation bus of CTPS – A (220KV), CTPS – A(132KV), Putki (132KV), Patherdih (132KV) & Nimiaghat (132KV) will get actuated through –
 - a. OPGW network with gateway & SDH (synchronous digital hierarchy) to be used for communication of inter-tripping logic through tele-protection GOOSE messaging after creation of VLAN.
 - b. Media converter (AC/DC operated) for Gateway-SDH link/connectivity to be incorporated, if required (where length between gateway-SDH is greater than 50mtr.).

and give trip command (stage – I tripping) as per following –

Substation Bus (IEC - 61850)	Relay	Trip command to -
CTPS_B	R1	CTPS – Dhanbad line (L # 203, 204) CTPS – BTPS line (L # 205, 206)
CTPS_A (220KV)	R2	CTPS – Kalyaneswari line (L # 201, 202) CTPS – BSL line (L # 253 & 254)
CTPS_A (132KV)	R3	CTPS – Gola (L # 6 & 7) CTPS – Purulia (L # 58 & 59) CTPS – Ramkanali/Jamuraia (L # 60, 61) CTPS - Rajabera (L # 62, 63)
Patherdih	R5	Patherdih - MHS line (L # 14 & 15) Patherdih - Sindri line (L # 49 & 50) 132/25KV Transformer (Traction Load)
Nimiaghat	R6	Nimiaghat – Giridih line (L # 86 & 87) 132/25KV Transformer (Traction Load)

All Railway feeders/Traction load connected to the above buses to be disconnected during stage 1 operation to avoid unbalance loading.

5. The islanded connection after stage – I tripping is shown in Annexure – II and connected loads (CD in MVA) will be as below having average value of 416 MVA –

CTPS_A	119.90	MVA
BIADA	73.05	MVA
Putki	180.45	MVA
Patherdih	141.40	MVA
Nimiaghat	40.00	MVA
Total Load	<u>554.80</u>	<u>MVA</u>
75% of load	416.10	MVA

Apparently there will be no problem in Load – Generation balance in normal condition –

Generation considered: 225 x 2 MW = 450 MW

Average Load connected: 416 MVA or 400 MW

Considering droop of the TG is 5%,

$$(450 - 400) \text{ MW} = 50 \text{ MW corresponds to } \frac{5}{450} \times 50 = 0.56 \%$$

If occurrence freq. is 50 Hz, then it may shoot up to $50 + 50 \times 0.56 \% = 50.28 \text{ Hz}$.

It will be easily taken care of.

6. However, if

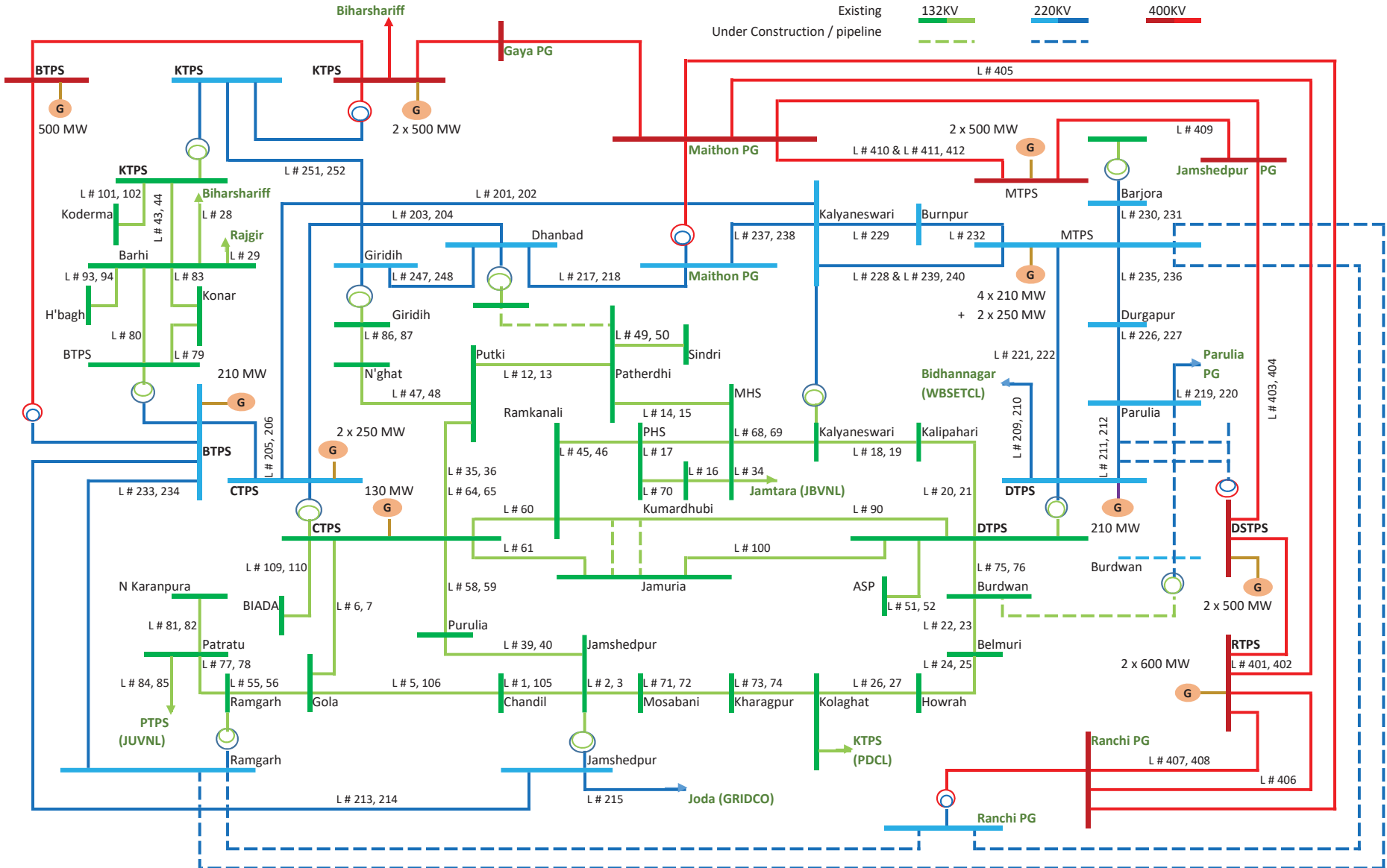
- a. Gen.>>Load demand or freq. would exceed a given set point, then one unit (lowest MW) will get tripped and
- b. Only one unit is in service then

subsequent Load – Generation balancing is to be made by sequential load shedding (stage – II) at different substations as furnished below through protection telemetry (as discussed above) –

Phase - II :: Sequential Load shedding		
1	JBVNL, Ganeshpur	35.00 Putki
	JBVNL, Digwadih	<u>17.00 Patherdih</u>
		<u>52.00</u>
2	JUVNL, Godhore	35.00 Putki
	JBVNL, Mukunda	<u>15.00 Patherdih</u>
		<u>50.00</u>
3	JSEB, Dumri Banaso	40.00 Nimiaghat
4	JBVNL, Dugda	25.00 CTPS
5	JSEB, Jainamore	22.00 CTPS

Annexure - I

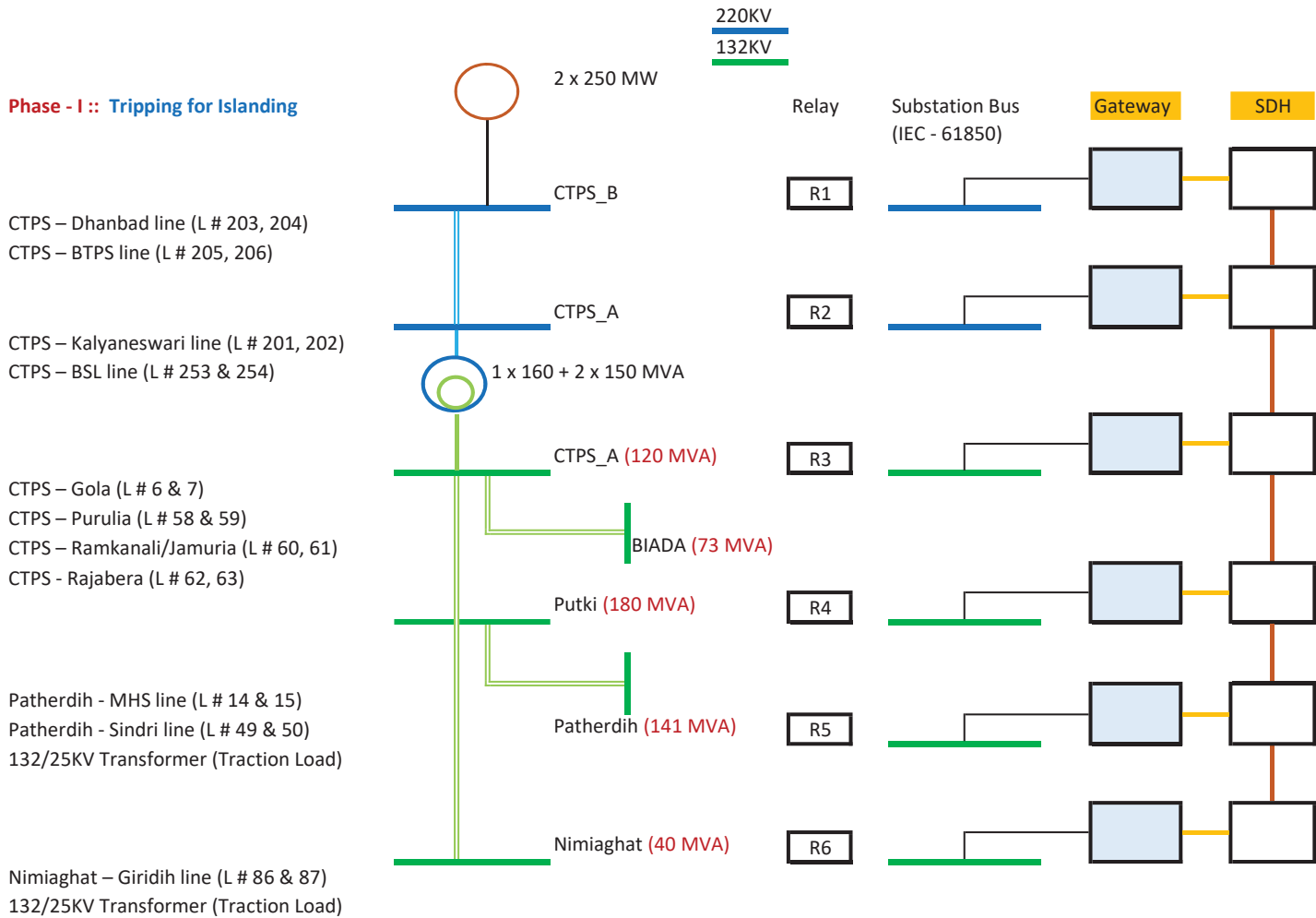
DAMODAR VALLEY CORPORATION - GRID CONNECTIVITY



Islanding Scheme at CTPS

Annexure - II

Phase - I :: Tripping for Islanding



After Phase - I tripping
Load in MVA

CTPS_A	119.90
BIADA	73.05
Putki	180.45
Patherdih	141.40
Nimiaghat	40.00
Total Load	554.80
75% of load	416.10

Phase - II :: Sequential Load shedding

1	JBVNL, Ganeshpur	35.00	Putki
	JBVNL, Digwadih	17.00	Patherdih
		<u>52.00</u>	
2	JUVNL, Godhore	35.00	Putki
	JBVNL, Mukunda	15.00	Patherdih
		<u>50.00</u>	
3	JSEB, Dumri Banaso	40.00	Nimiaghat
4	JBVNL, Dugda	25.00	CTPS
5	JSEB, Jainamore	22.00	CTPS