सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

No: NRPC/OPR/106/01/2018/10113-154 **Dated:31.08.2018**

विषय: - उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 150 वीं बैठक का कार्यवृत।
Minutes of 150th OCC meeting of NRPC.

उत्तर क्षेत्रीय विद्युत समिति की प्रचालन समन्वय उप-समिति की 150 वीं बैठक 21.8.2018 को आयोजित की गयी थी। उक्त बैठक का कार्यवृत्त उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट http://www.nrpc.gov.in पर उपलब्ध है। यदि कार्यवृत पर कोई टिप्पणी हो तो कार्यवृत जारी करने के एक सप्ताह के अन्दर दे सकते हैं I

150th meeting of the Operation Co-ordination Sub-Committee of NRPC was held on 21.08.2018. The Minutes of this meeting have been up-loaded on the NRPC web-site http://www.nrpc.gov.in. Any comments on the minutes may kindly be submitted within a week of issuance of the minutes.

संलग्न: उपर्यक्त / Enclosures : As above.

-sd-

(उपेन्द्र कुमार)
अधीक्षण अभियंता(प्रचालन)

सेवा में,
प्रचालन समन्वय उप-समिति के सभी सदस्य

81 ए, शहीद जीत सिंह मार्गकटवारिया सराय ,, नई दिल्ली880081 - फोन:011-26513265 फेक्स: 011-26865206 ई-मेल: ms-nrpc@nic.in वेबसाईट: www.nrpc.gov.in
18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016 Phone: 011-26513265 Fax: 011-26865206 e- mail: ms-nrpc@nic.in Website: www.nrpc.gov.in

INDEX

NRLDC AGENDA POINTS

Minutes of the 150th Meeting of the Operation Coordination Sub-Committee (OCC) of NRPC held on 21.8.2018 at NRPC Secretariat, New Delhi.

150th meeting of OCC of NRPC was held on 21.8.2018 at NRPC Secretariat, New Delhi. The list of participants of the meeting is attached at **Annexure-A**

MS, NRPC welcomed all the participants of the 150th OCC meeting. He congratulated all members of OCC on the 150th milestone & requested each one to put in efforts to work towards grid stability. In his opening remarks he stated that:

- All stake holders must discuss & find solutions to meet the challenges of large scale RE integration into grid & the need to work towards flattening load curves.
- PSS tuning is the need of the hour as low frequency oscillations are occurring with each transients. During transients lack of damping torque results in low frequency oscillations. A sincere concern was expressed over the low frequency oscillations (0.1-0.2Hz) observed in the grid on 25.7.2018& 29.7.2018 due to tripping of one of the evacuation line from 220kV Dhauliganga HEP. Massive grid failures he added have occurred worldwide caused by such oscillations. POWER GRID & POSOCO were requested to analyze the same in detail &come out with recommendations to resolve the issue. All constituents were requested to submit latest status of PSS tuning.
- The delay in commissioning of Tuglakabad sub-station is a matter of concern for the system of Delhi.He informed that the LILO of both circuits of Bamnauli-Samaypur 400kv Line at Tuglakabad & LILO of 220Kv d/C BTPS-Mehrauli at TuglakabadS/s is delayed on account of Forest clearance approval. He requested POWERGRID to look into the issue.
- Generators should absorb VARs to their capability.
- He added that some transmission assets are kept off for about 5 months and are deemed available, this fact needs to be known at the planning stage only He added NRLDC/ NLDC were requested to develop IT enabled interface which can monitor line outages & their restoration in real time. Also the optimum utilization of each asset would be ensured thereby.
- Honorable Supreme court it was highlighted has taken a serious view on the slow implementation of environmental norms related measures by utilities. He requested all stake holders to ensure implementation of FGD within given time frame as FGD /environmental norms complaint stations will be scheduled on priority and are likely to be given incentive for early completion of FGD implementation. He apprised the Sub-Committee that the SC has asked Union OF India to file an affidavit indicating very clearly the number and location of coal based thermal plants that have 500MW of installed capacity and where the population density is more than 400per square km. He informed that on 28.8.2018 a meeting has been called by Member Thermal.
- POWER GRID has submitted details of current rating of terminal equipment for all high capacity 400kv lines of POWERGRID.POSOCO is requested to carry out the ambient temperature adjusted TTC for all the transmission corridors of all the country based on the terminal .equipment rating furnished by POWERGRID.

- He added that concerned STU who had requested for provision of downstream line bays in the various meetings of Standing Committee /RPCV should bear the transmission charges till completion of downstream network.
- The frequent reduced voltage mode of operation of 500Kv HVDC Mundra-Mohendargarh bipole during June 2018 is also a matter of grave concern. The DC line faults have been reported since commissioning of this HVDC link .Recently he added there has been an increase in RVO of this link owing to DC line faults thereby reducing availability, reduction in power number, stress on other WR-NR inter regional link.M/s Adani was requested to look into the issue. Similarly the Champa – Kurekshetra line was also running on low voltage mode due to frequent line faults reducing in reduced load transfer capability .POWERGRID was also requested to look into & resolve the problems
- 2 shift operations is the need of the hour. All utilities will have to prepare themselves for managing the transition. He added that market forces and other related factors are leading to a change in the operating mode , going from base load to flexible operation at the cost of stresses on a plant and its staff resulting in increased compensation. It is need that before implementation trial run should be planned on this kind of operation. A trial run at DADRI gas plant has been planned he added which will be discussed and deliberated at length in the meeting.

  M/S c& s Electric Limited made a presentation on "EV-an integrated perspective on future of mobility" throwing light on future of EV-buses for public transportation. Typically 5 to 50MW can be consumed from grid for charging of 100EV buses during off peak hours. Various charging options available in commercial market were presented by the vendor.

1. Confirmation of Minutes:

1.1. Minutes of the 149th OCC meeting held on 18.7.2018 at New Delhi were issued vide letter of even number dated 10.8.2018.

1.2. POWERGRID has submitted their comment vide letter No. NR-1/RHQ/AM/CPCC dated 17.08.2018 (enclosed as **Annexure-1-A**) wherein they have requested to delete in item No. AA2 the following as it was not as per discussion deliberation regarding the subject item.

"However, Members of the sub-committee were of the view that no such amendment was required as no such decision in the OCC was taken."

Sub –Committee clarified that POWERGRID comments referred to the Minutes of 148th OCCM which was recorded under para 1.2 of the 149th OCCM Minutes along with the views of the Sub-Committee on it and as such no amendment in 149th OCCM minutes is required.

Sub –Committee confirmed the minutes of the 149th OCC meeting.

2. Review of Grid operations of July 2018

2.1. Anticipated vis-à-vis Actual Power Supply Position (Provisional) July 2018.

State	Req/ Avl	Anticipated (MW)	Actual (MW)	%age Variation	Anticipated (MU)	Actual (MU)	%age Variation
Chandigarh	Req	390	368	-5.64	205	177	-13.65
	Avl	355	-		108	-	
	Demand Met	-	368		-	177	
Delhi	Req	6760	7016	3.78	3600	3691	2.52
	Avl	7110	-		4590	-	
	Demand Met	-	7016		-	3688	
Haryana	Req	9940	10270	3.31	6050	5935	-1.90
	Avl	10560			6910	-	
	Demand Met	-	10270		-	5935	
H.P.	Req	1460	1471	0.75	870	856	-1.60
	Avl	1530	-		930	-	
	Demand Met	-	1290		-	794	

J&K	Req	2760	2750	-0.36	1660	1536	-7.46
	Avl	2520	-		1540	-	
	Demand Met	-	2200		-	1232	
Punjab	Req	12860	12556	-2.36	7570	7048	-6.89
	Avl	10290	-		7010	-	
	Demand Met	-	12556		-	7048	
Rajasthan	Req	10260	11057	7.76	5400	6094	12.85
	Avl	12460	-		7640	-	
	Demand Met	-	11057		-	6084	
U.P.	Req	18900	19880	5.18	11550	11627	0.66
	Avl	16550	-		11600	-	
	Demand Met	-	19353		-	11525	
Uttarakhand	Req	2090	2143	2.53	1250	1301	4.08
	Avl	2160	-		1370	-	
	Demand Met	-	2143		-	1287	

2.1.1. Sub Committee was informed that there was more than 5.0% variation in the Anticipated Vis-à-vis Actual requirement during the month of July, 2018 in terms of Peak demand for Chandigarh, Rajasthan & UP and in terms of Energy requirement for Chandigarh, J&K, Punjab & Rajasthan.

- **Rajasthan:**
  Variation in Rajasthan was mainly due to the rise in temperature during day and night. It was also clarified that Renewable generation accounting has also improved.
- **Punjab:**
  The variation in energy was due to good rain which resulted in less demand of Agriculture sector.
- **UP:**
  Approximately 2000 MW power was arranged through STOA, on account of which availability of power was higher than anticipated.

The Sub-Committee requested all SLDCs to furnish the provisional and final power supply position in prescribed formats by 2nd and 15th day of the month respectively in compliance to the provision 5.3 of IEGC.

2.2. Power Supply Position for NCR:

2.2.1. The Sub-Committee was informed that the NCR Planning Board (NCRPB) is closely monitoring the power supply position of National Capital Region. Monthly power supply position for NCR till the month of 6/2018 is placed on NRPC website (www.nrpc.gov.in/meetings/occ.html).

2.3. The highlights of grid operation during July, 2018 are as follows: -

- Frequency remained within the IEGC band for 78.13% of the time during July 2018, which is more than that of last year during same month (July, 2017) when frequency (within IEGC band) remained 76.15% of the time. The maximum and minimum frequencies recorded were 50.18 Hz (21.07.2018 at 13:00 hrs) and 49.64 Hz (19.07.2018 at 19:25 hrs) respectively.
- Utilities were requested to take necessary action to further improve the frequency regime viz., by not changing abruptly the loads at block boundaries and assuring primary response from the generators.
- Maximum and minimum load for the region during July, 2018 were 61653 MW (10.07.2018 at 24:00 hrs) and 37054 MW (27.07.2018 at 6:00 hrs). It was highlighted that Chandigarh, Rajasthan & UP faced the maximum change in demand & energy consumption in the region vis-à-vis last year.
- The average consumption, of the Northern Region for July, 2018 increased by 5.48% (63 MU per day) with respect to the corresponding month in previous year. The reason for the same was the increased temperature in the month of June, 2018 with respect to the last year.
- The average Thermal generation in July, 2018 showed an increase of 1.34 % (8 MU/Day) with respect to the corresponding month in previous year. The details are enclosed at **Annexure II (A).**
- The average Hydro generation in July, 2018 decreased by 30.48 MU/day with respect to the corresponding month in previous year. The reason for low hydro generation was less water on account of less snowfall.
- The average Renewable generation in July, 2018 increased by 20.64 MU/Day with respect to the corresponding month in previous year. The reason for the increase was highlighted as capacity addition, better sunshine & wind and improved telemetry of renewable.

  All utilities were requested to send the data for renewable generation regularly.
- The average nuclear generation in July, 2018 decreased by 3.5 MU/day as compared to corresponding month in previous year**.**
- The net Average Inter-Regional import showed an increase by 77.04 MU/day during the month of July, 2018 as compared to the corresponding month in previous year.
- The net Average Import from WR increased by 59.95 MU/day during July, 2018 as compared to corresponding month in previous year.
- The net Average Import from ER increased by approximately 11.24 MU/day during July, 2018 as compared to corresponding month in previous year.

- Net Average Import from NER was 15.10 MU/day during July 2018.
- The major reasons for increase in the import, from other regions were the decreased Hydro generation & the enhanced demand in power on account of the weather conditions.
- The transmission losses are depicted at **Annexure II (B)**
- The STOA summary for July, 2018 is placed at **Annexure II (C)**
- The outages of generating Units were discussed in detail and the same is placed at **Annexure II (D).**
- Long outages of transmission lines were discussed & all constituents were requested to revive the elements under long outages at the earliest **(Annexure II E).**
- The new elements charged were discussed and the list is attached at **Annexure II (F).**
- Total outages during July, 2018 were 501 including Planned S/D (204) and Forced S/D (Trippings-128+Emergency S/D-169).

3. Maintenance Programme of Generating Units and Transmission Lines

3.1. Maintenance Programme for Generating Units.

3.1.1. The maintenance programme for Generating Units for the month of September, 2018 was discussed on 20.08.2018 at NRPC Secretariat, New Delhi. The approved outages of generating units as per deliberations held in OCC has been issued vide letter of even no dated 30.8.2018.

3.2. Outage Programme for Transmission Elements.

3.2.1. The Outage programme of transmission elements for the month of September, 2018 was discussed on 20.8.2018 at NRPC Secretariat, New Delhi. The approved outages of transmission elements as per deliberations in OCC has been issued vide letter of even no dated 30.8.2018.

4. Planning of Grid Operation

4.1. Anticipated Power Supply Position in Northern Region during September, 2018 as per LGBR for 2018-19:

Anticipated Power Supply Position in Northern Region during September, 2018 was discussed. It was stated that the updated figures as per the review meeting held in July, 2018 have already been considered.

5. Information about variable charges of all the generating units in the Region

5.1. Sub-Committee was informed that the information of variable charges for different generating units is available on the Merit Order Portal. All utilities were requested to ensure that the process of Scheduling was done as per Merit Order Dispatch and in case of variations the same should be informed along with the reasons for the same**.**

6. Reactive compensation at 220 kV/400kV level

38th TCC & 41st NRPC approved following elements in NR:

a) TCR of capacity 500 MVAr at Kurukshetra 400 kV bus.

b) Bus Reactors at 30 no. 220 kV sub-stations and 18 no 400 kV level sub-stations subject to the availability of space.

Status:

6.1. POWERGRID:

Representative of POWERGRID informed that bids for 500 MVAr TCR at Kurukshetra have been opened and is under Technical evaluation and the LOA is expected to be placed by October 2018 with commissioning schedule of 2 years from the issue of LOA.

POWERGRID representative informed that the reactor of 125 MVAr is being installed at Kurukshetra which will be commissioned by **31.08.2018**.

MoP has decided that the installation of the reactors at 400 kV ISTS substations would be done through TBCB route and a Gazette Notification dated 08.05.2018 has been issued in this regard (Copy enclosed at Annexure 6 of the Agenda of the 148th OCC meeting).

Power grid representative was requested to update regarding the installation of the reactors at 400 kV ISTS substations through TBCB route.

6.2. DTL:

Six 25 MVAR, 220 kV reactors at Mundka, Harsh Vihar, Peeragarhi, Electric lane, Bamnauli, Indraprastha substation and one 125 MVAR, 400 kV reactor at Mundka substation shall be commissioned by **December 2019**. Out of the above, scheme for five reactors at 220 kV level are under approval.

MS NRPC expressed concern that at remaining 12 substations also, the reactor installation be planned. DTL representative intimated that the space constraints issues are there at remaining 12 locations. MS, NRPC added that the intimation regarding the same should be submitted by the DTL authorities to NRPC.

NRLDC representative expressed concern on the non-availability of the above reactors in the coming winter months.

MS, NRPC proposed that a committee would be formed at the NRPC level including an officer of CEA for reviewing the problem of space constraint at remaining 12 substations.

It was also proposed that the use of the BTPS plant for absorption of reactive power may also be looked into.

6.3. PSTCL:

Tender for 400 kV level reactor has been opened (technical bid) and is in the evaluation stage. Price bid is likely to be opened within a month. As regards 220 kV level reactors, tender has been opened on 15-06-2018 (technical bid) & is under evaluation. DPR for installation of 400 kV & 220 kV reactors has been submitted for PSDF funding.

MS, NRPC requested PSTCL to expedite the issue of PSDF funding & he added

that the approval of PSDF funding should be ensured before the issue of LOA as after the issue of LOA, PSDF fund would not be granted.

6.4. <u>Uttarakhand</u>:

PTCUL representative informed that for 125 MVAR reactors at Kashipur retendering is being done. 80 MVAR reactor at Srinagar has been received at site and shall be commissioned by 30.09.2018.

6.5. <u>Rajasthan</u>:

148th OCC meeting & 149th OCC meeting:

525 MVAR (450 MVAR + 75 MVAR) has been approved by WTD of RVPN and being proposed for PSDF funding. 3x25 MVAR (at 220 kV level) reactors one each at Suratgarh, Akal & Bikaner are to be funded by PSDF. As per the PSDF requirement, the DPR along with formats has been re-submitted to PSDF.

The reactive elements as per discussion in Techno-economic group of PSDF have been examined again through complete power system study. The study recommends size, rating & location suitable for providing reactive elements (Shunt reactors & STATCOMS) across various voltage levels i.e. 400 kV & 220 kV as per various level of " Renewable Energy Integration – Reactive Compensation Elements/ Equipments for Reactive Power Management and Voltage Control for Transmission Grid under Smart Transmission Network and Asset Management System''. Therefore, DPR has been submitted for consideration & approval of standing committee / CEA vide letter dated 18.06.2018 (letter enclosed at Annexure 6B of the minutes of the 148th OCC meeting)

MS, NRPC asked Rajasthan to submit their plan for installation of reactors as per the decision of the SCPSPNR meeting and subsequent approval of NRPC. The above reactor finalized based on the plan are exclusive of the reactor plan study done by Power grid, also needs to be clarified. The updated information received from Rajasthan is placed at Annexure 6C of the minutes of the 148th OCC meeting.

MS, NRPC requested Rajasthan representative to clarify the issue of installation of the reactors. He added that non installation of reactors will lead to high voltage of the system due to which lines have to be opened compromising reliability of the system. He added that 450 MVAR agreed in the standing committee should have been got installed even if the locations had changed. MS NRPC requested Rajasthan representative to take up the new proposal in the next standing committee meeting but the reactors already agreed and approved in NRPC meeting should be commissioned at the earliest. The Sub–Committee decided to write letter to Rajasthan for expediting commissioning of 25 MVAR Reactors at Suratgarh, Akal & Bikaner each.

150th OCC meeting:

Rajasthan representative stated that the clarifications sought by PSDF in respect of revised DPR for 3x25 MVAR (at 220 kV level) reactors one each at Suratgarh, Akal & Bikaner was submitted to PSDF on 28.07.2018.

Rajasthan representative was requested to give the detailed status of 150 MVAR (25 MVAR at Barmer S/s and 125 MVAR at Jodhpur S/s) in writing regarding the installation of reactors as per the decision of the 39th SCPSPNR meeting and subsequent approval of NRPC.

Regarding the WTD of RVPN approved 450 MVAR reactors, Rajasthan was requested to submit the status.

7. System Study for Capacitor Requirement in NR for the year 2019-20

7.1. 38th TCC & 41st NRPC meeting: NRPC approved that the capacitor requirement study of NR shall be conducted at 11/33 kV level from CPRI so as to obtain the true requirement of capacitor for FY 2018-19 and advised NRPC Secretariat to negotiate on the Techno Commercial offer submitted by CPRI, Benguluru.

Techno Commercial revised offer submitted by CPRI for System studies for assessment of capacitor requirements in Northern region for year 2019-20 for a peak and off peak load condition was enclosed at Annexure-VII of the Agenda of the 147th OCC meeting.

7.2. 147th OCC meeting: MS, NRPC informed the Sub-Committee that CPRI has given a final Techno Commercial offer of Rs. 32 lakhs (Rs. 20 lakhs for previous study and Rs. 12 lakhs for additional assignment) exluding taxes. The offer is being in principal accepted and will be placed for approval of NRPC. He requested all utilities to furnish the requested data as per the requirements of CPRI expeditiously.

All members agreed that NRPC should inform CPRI to go ahead with the study and also assured of timely submission of the data as seeked by CPRI.

The offer given by CPRI was accepted by NRPC Secretariat subject to rectification (if any) in the NRPC meeting scheduled to be held on 28th June, 2018.

7.3. 148th OCC meeting: In the meeting, members were apprised of the discussions held with CPRI at Bengaluru regarding the study, based on which a format for submission of data by the utilities has been finalized **(Available at NRPC website).**

All the utilities were informed that the data (load/ voltage) by each state were to be collected for their entire network in the State, for a date (to be specified later) along with their peak demand details. Based on the data furnished by the States, capacitor requirement for that particular state would be finalized. NRLDC has also agreed to finalize data of the regional peak of NR.

Stressing upon the huge data quantity to be collected, DISCOMs and SLDCs were requested to take up this matter proactively so as to ensure timely

submission of data i.e. a month from the date of issue of the MOM**.**

Utilities were also informed that they may directly contact Dr. Manohar Singh, CPRI (manoharsingh@cpri.in, +91-96329 40855) regarding any clarification for the formats proposed for their States and if any additional data is required by CPRI.

It was also informed that after the submission of data by the state, each state was required to depute one of their officers to CPRI, Benguluru for 2-3 days so that they may validate the data captured by CPRI for the capacitor requirement study. Any assumption if made due to missing data is to be certified by the concerned state officer and same shall form the part of the Study Report.

7.4. 149th OCC meeting: In the meeting members were informed about the methodology proposed by CPRI for conducting the study *(*Annexure-7 attached with the MOM of the 149th OCC meeting*.)* which provided with three options. Of the three options, members agreed to go with the third option of working separately for each state utility(s) for its peak loading time & date to figure out the capacitor requirement for the state. After having obtained the capacitor requirement for each state individually, the study will be carried out for the complete region so as to reduce the reactive power flow on ISTS lines (considering the capacitors which have been identified for each state).

All the utilities were advised to submit the data for their States in the prescribed format corresponding to date they have met peak requirement for their States. Utilities were requested to submit the data within a month so as to complete the study in time.

In case of any clarification at the time of data collection utilities were advised to directly contact Dr. Manohar Singh, CPRI (manoharsingh@cpri.in, +91-96329 40855).

7.5. 150th OCC meeting: **All the utilities expressed concern on the nature of the format. It was observed in general by all constituents that the format is very lengthy & will require some time for understanding the same and providing data accordingly.**

MS, NRPC proposed that all utilities should highlight the problems being faced by them by the second week of September & thereafter a separate meeting will be held with CPRI representative for better understanding of the format and to resolve the issues.

8. Phase nomenclature mismatch issue with BBMB and interconnected stations

8.1. The action plan proposed by BBMB was duly deliberated in the first meeting held on 04.06.18. BBMB was advised to submit the detailed breakup of the work activity wise along with the team of officers responsible for execution location wise. The note submitted by BBMB was enclosed at Annexure 8 of the Agenda of the 148th OCC meeting. Further BBMB was directed to get the action plan approved in their Power Sub –Committee meeting as well as the Board meeting so that concern of all partner States is addressed. If required any clarification representative from NRPC/NRLDC/CTU may be invited by BBMB during their meeting of power Sub-Committee.

8.2. BBMB representative stated that they have submitted the proposed action plan to their partner States for early comments and assessment. The execution is tentatively planned during month of November –December, 2018.

8.3. In 149th OCC meeting all stakeholders were requested to kindly submit their comments on the proposed action plan at the earliest so that the outages for the lean period can be planned. The comments has been received from NTPC, PSTCL & POWERGRID (placed at Annexure 8 of the MOM of the 149th OCC meeting).

8.4. BBMB representative intimated that the issue will be taken up in their next Power Sub-Committee meeting. Sub-Committee requested BBMB to finalize the plan at the earliest and submit the activity chart to NRPC.

8.5. 150th OCC meeting: BBMB representative stated that the clarifications on the comments received from POWERGRID has been issued (*Annexure 8*). POWERGRID representative assured that the issues raised by BBMB will be resolved by them at the earliest.

Comments from HPSEB have also been received and the action plan proposed by BBMB is agreeable to them.

MS NRPC requested BBMB to finalize the issue in their Power Sub-Committee meeting.

BBMB representative requested that a second meeting of the group formed by NRPC may be called to form a consensus so that they can take the action plan to the Power Sub-Committee meeting for finalization.

9. Follow up of issues from previous OCC Meetings – Status update

9.1. The detail of the updated status of Agenda items is enclosed at **Annexure 9.**

10. Status of FGD installation vis-à-vis installation plan at identified TPS.

10.1. The list of FGDs to be installed as finalized in the 37th TCC (Special) meeting was enclosed as Annexure 13 with the Agenda of the 144th OCC meeting. All SLDCs are regularly being requested to take up with the concerned generating units where FGDs is to be installed and regularly submit the progress to NRPC. The format in which the status is to be given has already been uploaded on the NRPC website.

10.2. 148th OCC Meeting: All SLDCs were requested to coordinate and update the status of FGD commissioning at the generating units in their State & submit the same regularly in each OCC as it is being monitored by Supreme Court.

CEA representative added that it is likely that the Merit Order dispatch preference / priority will be given to those units which are environment norms complaint.

MS, NRPC stressed that efforts should be made to commission FGD units as per the time frame finalized in the special TCC meeting and it is not sure that these units will be scheduled if they fail to meet the time line. He also requested all concerned to submit the status in soft copy so that the report can be compiled

and timely forwarded to CEA, as the commissioning of FGDs is being monitored by Supreme Court. MS, NRPC requested Director GM Division, CEA to take up with MoP/ CERC the matter of recovery of cost of FGD installation of the generating companies.

10.3. 149th OCC Meeting: MS, NRPC requested all utilities to expedite the process of installation of FGD as per the timeline fixed. He added that issue of giving an incentive is under finalization. Also he added that levying of penalty on the generating stations who do not install FGD is also being reviewed. He added that if the generators who do not install FGD within time line may be placed low in the Merit order. Regulatory commissions has given direction that the increase in the variable charges will be absorbed as it is due to change in the law. NTPC was requested to o give an approximate idea of the cost of FGD installation. NTPC representative intimated that they have pre-poned their schedule by one year**.**

MS, NRPC further requested all constituents to give the desired information in soft copy in excel format. He also added that the contact details of the officer who is concerned with FGD installation may also be intimated so that the information can be expeditiously collected directly from him/her

10.4. 150th OCC meeting: MS, NRPC stated that a meeting is scheduled on 28.08.2018 by CEA at NRPC to review the progress of FGD installation. He stated that all generators should attend the meeting. The issue of preponement of timeline for FGD installation will also be discussed in the meeting.

Rajasthan representative intimated that the consultant has given the DPR. He informed that the cost of the project has been approved by the Board of Directors and has been sent to the Government for final approval.

MS, NRPC stated that 2022 is the target date which is very crucial.

UPRVUNL has submitted that forAnpara D the tender has been floated.

All constituents were requested again to regularly update the information in soft copy in excel format. Also, contact details of the officer concerned with FGD installation may also be intimated so that the information can be expeditiously taken up directly.

11. LVRT compliance by wind generators.

11.1. As per the CERC order dated 05.01.2016 issued in Petition No. 420/MP/2014, CERC has directed that LVRT should be implemented in all wind turbines (except Stall Types) commissioned before 15.04.2014 having installed capacity equal to or more than 500 KW. Further, as per the CEA Technical Standard for connectivity to the Grid (Amend.) Reg.2013 (sub clause (3) of Clause B 2) of the station connected to the grid 06 months after publication of these regulations (i.e.15.04.2014) should have the LVRT capability as depicted in the sub-clause.

As LVRT are not installed in many of the wind turbines in State of Rajasthan, the issue is being regularly raised in the various meetings of NRPC so far without any result.

11.2. 38th TCC/41st NRPC meeting: LVRT compliance was a pre-requisite according to CEA connectivity standards and these wind generators should not have been provided the connectivity in the first place itself. NRPC directed Rajasthan to issue a notice to all the LVRT non-compliant wind generators specifying a time period within which they need to get the LVRT compliance beyond which they would be constrained to deny scheduling to these generators.

NRPC also advised other States to ensure compliance to the CEA connectivity standards and to not allow in future, connectivity to any LVRT non-compliant wind generators.

11.3. 145th OCC meeting: RRVPNL submitted the letter from the Ministry of New & Renewable Energy in this regard in which the following is stated regarding LVRT compliance:

"*A Concerned WTG manufactures may apply for LVRT testing to any internationally accredited testing body or NTWE by 15.3.2018, which should include the following:*

i An affidavit that the manufacturer would comply with CEA Technical standards for connectivity to the grid.

ii A bank guarantee of Rs 1 crore per model, which would be returned on producing the compliance certificate for LVRT and other technical standards as stipulated by CEA."

11.4. 147th OCC meeting: MS, NRPC stated that all the wind generators shall be LVRT complaint for which retro fitment needs to be done & it shall be responsibility of Rajasthan SLDC to get it enforced. Rajasthan should comply with the decision of 38th TCC/41st NRPC meeting & write letters to wind generators communicating the decision of NRPC.

11.5. 148th OCC meeting: MS, NRPC apprised the Committee that the above reference order facilitates WTG manufactures to obtain statement of compliance/confirmation standard for demonstrating the compliance to applicable CEA Technical standards for connecting to the Grid for their WTG models which were unable to get LVRT compliance certificate from accredited testing agencies. He further stated that the time period for applying for LVRT testing to any internationally accredited testing body or NIWE stands expired on 15.3.2018. He added that notice should be issued to all Wind generators who have not done the needful. Rajasthan SLDC representative has intimated the same has been issued (Copy of the letter was placed at Annexure 11 of the MoM of the 148th OCC meeting).

MS, NRPC added that as per 38th TCC and 41st NRPC decision, SLDC should not schedule the wind generators who are not LVRT complaint. Also he added that due to LVRT non compliance on part of the wind generators has lead to a near voltage collapse instances but luckily the grid survived. NRLDC representative also added that the compliance of the wind generators is

mandatory for the safety of the grid as 2-3 incidents have already occurred in the grid which could have resulted in the catastrophe.

11.6. 149th OCC meeting: Rajasthan representative intimated that a meeting of wind turbine manufacturers was held on 05.07.2018 to sort out the issue of LVRT and to get its compliance expeditiously. Further, the assessment of manufacturer wise non complied WTG has been identified and enclosed at Annex- XI of the MOM of the 149th OCC meeting. He informed the Sub-Committee that 638 generators are LVRT complaint & 106 do not require as per regulation. He further added that 2641 generators need to be LVRT complaint. The capacity of generators that are non – complaint is 3019 MW. He also informed that the cost of installing LVRT was 25-40 lakh per generator for which the generators will have to make arrangements. MS, NRPC stated that the cheaper solutions are available and they should be explored cost needs to be reviewed

MS NRPC requested that Rajasthan should submit these details to their SERC. He informed additionally that the wind generators had requested for scheduling of power till they review the time line for getting work done.

Rajasthan representative also informed that the next meeting with WTG manufacturers is scheduled for 23.7.2108 for further deliberating the actions in this regard.

Director, GM division, CEA representative added that LVRT compliance is mandatory as per connectivity regulation requirement of CEA. He added that a single LVRT solution can be used on the plant which will be cheaper.

11.7. 150th OCC meeting: Rajasthan representative intimated that in line with the discussions in the last OCC meeting the WTG manufacturers in the meeting on 23.07.2018 has been advised to review the possibility of having a single LVRT for a plant.

MS, NRPC requested that the MOM of the meeting may be shared so that the progress in this regard can be monitored.

12. System Protection Scheme (SPS) in NR

12.1. Revised System Protection Scheme (SPS) for 765 kV Agra-Gwalior line:

In the **37th TCC and 40th NRPC meeting** recommended for convening a separate meeting comprising members from NRLDC, NRPC Secretariat and POWERGRID for reviewing revised logic of the scheme presented by POWERGRID in 140th OCC meeting. A meeting for reviewing the logic of the scheme was held on 07th November 2017 and scheme was revised and finalized.

Since OPGW has now been laid, POWERGRID agreed for utilizing the signals from circuit breaker (CB Open/ CB close) of both the ends for SPS logic so as to negate the chances of mis-operation/ mal-operation of the SPS.

POWERGRID had informed that the circuit breaker (ON/ OFF) signal was being utilized from Agra end in the logic. However, that from Gwalior end was not being utilized as the purpose of the scheme was being served by utilizing the CB signal from one end.

Representative of NRLDC stated that even if the scheme was functioning properly in normal circumstances there are chances that the scheme may not operate in case of breaker lockout from Agra end and the line getting tripped from Agra end.

NLDC also stressed on utilizing CB signals from both the ends as Agra-Gwalior is an important inter-regional transmission line and its implementation will make the scheme even more reliable.

POWERGRID agreed to implement the logic utilizing the CB signal from both the ends as per the decision of TCC. NRPC had concurred with the deliberations of TCC.

POWERGRID had informed that the work at Agra end was in progress but for the implementation at Gwalior end the issue needs to be taken up and highlighted with WRPC also

147th OCC Meeting: POWERGRID representative stated that their management has enquired about the recovery of cost that will be incurred on implementation of the scheme.
Representative of POWERGRID was informed that a decision regarding the same has already been taken in 129th OCC meeting and thereafter ratified in the 35th TCC and 39th NRPC meeting to book the cost of the implementation of revised SPS in some other ongoing project/work.
POWERGRID was advised that the decision of NRPC to be implemented at the earliest as this is an important IR line between NR & WR.
NRLDC informed that average load now prevailing on the feeders approved for SPS might have changed and these feeders might not have remained radial and as such the list of feeders needs to be reviewed.
NRPC Secretariat has written a letter dated 28.5.18 regarding this issue to ED/ NR-III, POWERGRID (was placed at Annexure 12A of the minutes of the 148th OCC meeting). This issue has also been taken up with WRPC for implementation at Gwalior end by deliberating in their OCC/ RPC meetings. A letter in this regard had been written to WRPC & the reply received thereof was placed at Annexure 12A of the minutes of the 148th OCC meeting.

148th OCC Meeting: POWERGRID representative intimated the Sub-Committee that for implementation of the scheme due coordination with the concerned States was required.
MS, NRPC requested each SLDCs to extend cooperation & provide all required support to Power Grid for early execution of the work.

39th TCC and 42nd NRPC meeting: MS, NRPC informed that there were 2 issues involved which needed to be discussed. One was for the utilization of CB signal from both the ends (Gwalior and Agra) in the logic and the other was for incorporating additional 1000 MW load for load shedding in the already approved scheme.
Regarding the additional 1000 MW load, MS stated that the same has been

identified and were now pending at POWERGRID's end for wiring with the logic.

POWERGRID representative informed that the material has been received at the site and for 2 locations viz. Dadri and Bhiwadi the scheme was almost completed. Regarding other locations under the ownership of other utility, POWERGRID requested to provide the details of nodal officers with whom they may coordinate. He further stated that, once the details of the nodal officers were received, additional load of 1000 MW shall be wired within 02 months (tentatively by end of August 2018).

MS, NRPC assured POWERGRID of all possible support by the utilities and to provide them with the list of nodal officers for each substation location identified for additional load shedding.

Regarding the issue of utilizing CB from both the ends (Gwalior & Agra) in the logic of SPS, MS, NRPC stated that even though the decision was already taken in NRPC/TCC forum, the issue of booking the cost of the scheme was again raised in the OCC forum. To this, Members expressed concerns and stated that once a decision has already been taken at NRPC/TCC forum, the issue shall not be raised again in any sub-committee of NRPC.

MS, NRPC requested POWERGRID to go ahead with the decision of 41st NRPC to utilize the CB signals from both the end in the logic of SPS so as to ensure more robust and reliable operation of the scheme. He further requested POWERGRID to not to cause any further delay in the implementation of the scheme as such delay may lead to some unforeseen catastrophic incident for the grid.

Representative of POWERGRID stated that the changed logic for utilizing CB signal from Gwalior end shall be provided to them so that the same may be incorporated in the SPS logic. Representative of NRLDC informed the committee that the logic had already been provided to POWERGRID and there was no need of again discussing the same.

POWERGRID was advised to go ahead as per the decision of NRPC and complete the scheme in time.

149th OCC meeting: MS NRPC stated that in the last OCC meeting the Name of the nodal officers for coordinating with Power grid was requested which have not been received till date. He added that as per directions of CERC a report has to be submitted within 15 days on the status of implementation of the scheme. Power grid stated that in the last week of July the mock testing can be done. Further, on it was added by MSNRPC that representative of CERC should also be called.SE(O) NRPC stated that the actual testing on the revised scheme be planned in the month of November in coordination with WRPC.

150th OCC meeting: MS, NRPC apprised the committee that mock testing for the Revised 765 kV Agra- Gwalior SPS is to be carried out after integration of additional 1000 MW load shedding and Hon'ble CERC has been intimated accordingly. He asked POWERGRID to complete the work at the earliest.

Representative of POWERGRID again requested for the Nodal Officers from the states as problems were being faced while working at the substation of state utilities.

It was informed that names of nodal officers have been requested again and again from the states but only U.P. has intimated the coordinator. MS, NRPC further asked representative of the concerned states present in the OCC to be coordinator for resolving any problems encountered by POWERGRID at substations of respective utilities. Accordingly, the following officers were nominated as Nodal officer:

Haryana – Shri. N. K. Makkar, EE, HVPNL
Punjab- Shri. Akshay Garg, ASE, PSTCL
Rajasthan – Shri. Kamal Patidar, EE, Rajasthan (SLDC)
Delhi – Shri. Loveleen Singh, GM, DTL

12.2. SPS for ICTs at 765 kV Unnao sub-station:

144th & 145th OCC meeting: UPRVUNL update: "Offer to incorporate the logic of SPS at Anpara "D" is pending with BHEL. The efforts are underway to get the offer from BHEL. The work is expected to be completed by 31.03.2018. The cost of the logic of SPS at Anpara "D" is to be indemnified by UPPTCL".
150th OCC meeting: It was informed that on continuous pursuance of matter with BHEL, negotiated offer for SPS has been received from BHEL on 16.08.2018 (ANNEXURE 12) and the order for the same shall be placed within a week with completion target of September, 2018.

12.3. SPS for Kawai – Kalisindh - Chhabra generation complex:

146th OCC meeting: RRVPNL updated as under:

"The communication scheme is being reviewed on PLCC/Optical fiber in place of earlier GPS scheme as tripping time on GPS scheme was higher. Tender is likely to be floated by 5/2018."

147th OCC meeting: RRVPNL representative intimated that feeder identification has been done & tendering will be done shortly. He added that further communication scheme is being reviewed on PLCC/Optical fiber in place of earlier GPS scheme as tripping time on GPS scheme was higher. Tender is likely to be floated by May-18.

148th OCC meeting: RRVPNL representative intimated that the Technical specification is under preparation & communication link are under review. Tender is likely to be floated in July 2018.

MS NRPC expressed concern over inordinate delay & requested RRVPNL to take up the issue with the communication wing expeditiously or else NRPC Secretariat will take up the matter with higher management**.**

149th OCC meeting: RRVPNL representative intimated that the details from the communication wing stand received. & the tender will be floated positively by next month. He explained that the details of the OPGW involved have been accounted for in the details received from the communication wing**.**

150th OCC meeting: RRVPNL representative intimated that the Technical Committee has rejected the proposal on the basis that the reliability of the PLCC system proposed for the load shedding at the time of outage of

Kawai-Kalisindh units along with Anta–Phagi line is not present. It was added by the Committee that till March 2019 the OPGW will be laid in the entire network (12000 Kms) & the same can be used for the purpose.

MS NRPC requested RRVPNL to submit the written communication from their STU in this regard.

12.4. SPS for Lalitpur Generating station

141st OCC meeting: UPPTCL updated as under

The Sub-committee was informed that the scheme has been commissioned at LPGCL end. If any 765 kV Lalitpur-Agra line trips, SPS would operate for their complex. At present the signal at Fatehabad end are not being received. The issue is being looked into, so that work can be completed by 31.12.17.

147th OCC meeting: UPPTCL representative intimated in this regard that the signal is being received from Fatehabad at their end whereas Lalitpur representative intimated that they were not receiving any signal.

MS NRPC proposed that UPSLDC should organize a meeting to resolve the long pending issue and make the SPS operational at the earliest.

148th OCC meeting: UPPTCL representative intimated that as desired in the last OCC a joint meeting has been organized on 6.6.18 with the officers of Lalitpur & Fatehabad. In the meeting it has been agreed that the SPS will be made operational by end of the June 2018.The final agreed scheme as intimated was placed at Annexure 12C of the MOM of the 148th OCC meeting**.**

149th OCC Meeting: UPPTCL representative intimated that the signal from Fatehabad to Lalitpur is not being received presently but the matter will be resolved within a week. The SPS will be commissioned within a week**.**

150th OCC Meeting: UPPTCL representative stated that the status of the SPS implementation will be sent through SLDC.

13. Review of Targets fixed for Load Relief from operation of df/dt & UFR relays in NR region & Automatic under frequency Load shedding (AUFLS)

13.1. The targets fixed for Load Relief from operation of df/dt & UFR relays in NR region needs to be reviewed in light of the integration of RES & new developments in NR power system. It was decided to form a Committee to look into the issue of reviewing the load relief and the slabs at which it operates under the chairmanship of MS, NRPC.

The first meeting of the Committee was held on 06.06.2018. Nominated members of PTCUL, UP & HPSEBL did not attend the meeting. Following was conclusively decided in the meeting:

- The data of each state/UTs for maximum / minimum & average load to be given for each month. (Action: NR State/UTs)
- The details of existing UFR, df/dt relays to be submitted in the format attached with the MOM issued
- The comments on the letter of NPC attached with the MOM.
- The analysis of frequency profile by NRLDC

- The feeder's details review / updating to be done, of the data already available on the website (Action: All NR States (Except Punjab) /UTs)

- The issue of mapping of UFR relays on SCADA to be looked into by all utilities so that the healthiness of relays cam be known.

13.2. 148th OCC meeting: All members were requested to take action as per the MOM issued and submit the data as desired expeditiously by end of June, 2018. All were requested to submit data timely as it is a very crucial issue.

As on date information from Punjab & Delhi stands received.

13.3. 149th OCC meeting: SE(O), NRPC requested the representative of Haryana, Rajasthan, UP & Uttarakhand to submit the data at the earliest.

Haryana representative stated that the nodal officer who had attended the First meeting is already on the work & the complete data will be submitted at the earliest.

Rajasthan & Uttarakhand representative were requested to submit the data in line with the MOM issued of the meeting held on 6.6.2018.

HP representative stated that their internal meeting has already taken place in this regard & the data will be submitted after reviewing the need of any additional feeders also.

All SLDC's representative of Haryana, Rajasthan, UP & Uttarakhand were requested to coordinate and ensure timely submission of the data.

13.4. 150th OCC meeting: The data from Rajasthan, Delhi, Punjab, Haryana, HP as received was discussed in the 2nd meeting of the committee. The information from UP was received after the meeting & is under review.

SE(O), NRPC stated that following recommendations of the committee will be intimated to NPC.

- **Regarding additional slabs of frequency as well as raising the set of frequency, it was agreed that frequency setting of the stage I shall be increased to 49.4 Hz with subsequent margin of 0.2 Hz for each stage with stage IV at 48.8 Hz.**

Proposed stages:

AUFLS	Existing Frequency (Hz)	Proposed Frequency (Hz)
Stage-I	49.2	49.4
Stage-II	49.0	49.2
Stage-III	48.8	49.0
Stage-IV	48.6	48.8

However, Haryana was of view that "Introducing of additional slabs of frequency as well as raising the said frequency of UFR operation may not be required presently."

- **With reference to NPC letter No. 4/MTGS/NPC/CEA/2018/475-481 dated 30.05.2018 committee has recommended that required load relief calculations should be revised considering increased power number around 15000 and calculated in MW rather than MW/Hz i.e. load relief calculated for each stage shall be multiplied by corresponding frequency deviation from 50 Hz.**
- **It was recommended to calculate the load relief on pan India basis but for region and its states, seasonal variations in the demand of the states may be considered.**
- **Committee was of the view that methodology for calculating load relief according the Zalte Committee report may be reviewed mainly with respect to Voltage Correction factor and Daily load fluctuation factor, if deemed necessary by the states.**

14. Automatic Demand Management System

14.1. 147th OCC meeting: All utilities were once again requested to submit update on the action plan & status of implementation of the ADMS in their utility as it is mandatory requirement of IEGC.

Delhi, Haryana, Uttarakhand, & UP (SLDC) representative were requested to take up the matter expeditiously with their distribution companies. SE NPC stated that the problems if any in implementing the same may also be brought to the notice of the sub –committee as it is now 10 years, since the regulations were issued by CERC.

Punjab representative intimated that at SLDC level they were doing remote tripping for 96 locations. He added that the ADMS at 11 kV feeder level is to be implemented by Distribution Company. He added that the Tender specification had finalized and it has been targeted to be complete by 2020. The information was submitted by HP. MS, NRPC requested all SLDCs to plan and get the ADMS implemented soon in their States.

14.2. 148th OCC meeting: TDDPL representative stated that the ADMS system is working well in their organization as per the latest regulations since last more than 5 years. He added that the scheme is also working in Rajadhani & Yamuna Power distribution companies.

Punjab SLDC representative stated that 26 locations remote tripping from SLDC has been tested. Around 10 percent of the running load can be disconnected through these locations. The latest status regarding implementation of ADMS by PSPCL is as under:

The matter of engaging a consultant for preparation of DPR of ADMS at balance location is under consideration with the higher authorities and work of ADMS would be implemented within stipulated time.

MS, NRPC stated that the all States should review their system demand and Automatic Demand Management System should be planned and implemented at the earliest for grid security.

14.3. 149th OCC meeting: MS NRPC stated that the issue is lingering since many years & it is very important for the grid security. He stated that the States should submit a detailed scheme which they want to execute. Further Rajasthan representative stated as under:

That approval of PSDF for STNAMS (Smart Transmission Network & Assets Management System) project which is consisting of Automatic Demand Management System (ADMS) functionality at the level of 33 feeders at EHV Substation of RVPN under SCADA / EMS part of project has been received. Bid documents prepared and under final approval with the CMD, RVPN. Bidding process will be initiated immediately on approval as above. Tentative timeline is as under:-

1. Issue of NIT – June, 2018
2. Finalization of Tender / Purchase order issued – August, 2018
3. Proposed timeline to complete the work – 18 months from date of issue of LOI/NOA

Further, the Automatic Demand Management System (ADMS) functionality at 11 kV feeders from 33/11 kV substation are under the jurisdiction of the Discoms and matter is being perused with discoms authorities.

NRLDC representative added that the updated list of the feeders of the state that can directly be made available to NRLDC, and should also be shared by all states as it is required in line with CERC guidelines.

PTCUL representative added that the issue is being taken up with the DISCOMs but no update has been received.

UP representative stated that they had submitted the details of the remote operation of 132KV feeders under ADMS.

MS, NRPC advised UP to have a detailed study on their complete system. He also stated that this issue will be discussed in the meeting on 30.7.18 wherein issues related to DISCOMs will be highlighted.

14.4. 150th OCC meeting:

Concerned states (UP, Haryana and PTCUL) were requested to update.

MS, NRPC stated that the responsibility lies with the SLDC & STU to get the data from the DISCOMs.

15. Status of implementation of recommendations of Enquiry Committee on grid disturbances on 30 & 31.7.2012

15.1. 147th OCC meeting: All utilities were requested to update the information as per the letter enclosed at Annexure 18 with the Agenda of the 146th OCC meeting. Compliance report from POSOCO & NHPC has been received.

15.2. 148th OCC meeting: SE(O) stated that it is regretted to state that no information has been received from any quarters till date in spite of repeated requests/ reminders. He added that the matter is viewed very seriously by CERC and would be taken up with higher authorities of each state utilities.

MS, NRPC emphasized that it is very essential to get the protection audit done & it is for the betterment of the system of the State & the region as a whole.

15.3. 149th OCC meeting: BBMB. PSTCL, Rajasthan, Koteshwar (THDC), HPGCL, NPCIL, POWRGRID (NR-2) have submitted the data. (Annexure 15 of the MOM of the 149th OCC meeting.)

15.4. 150th OCC meeting:

NTPC submitted the information for NCR (Annexure 15).

All other utilities were requested to update the status as per the prescribed Formats

16. Planning, procurement and the deployment of Emergency Restoration System.

16.1. The updated status in the 150th OCC meeting is as under:

DTL, PSTCL & UPPTCL - 02 nos. of ERS procured.

RRVPNL: - RRVPNL management has decided to go ahead with the procurement of ERS & tender is expected to be floated in the month of August 2018.

HVPNL: - BOQ finalization it's under process.

MS NRPC stated that the deadline for finalization should be intimated as the matter is pending since long.

PTCUL: - 147th OCC: NIT was placed but due to no response same has been extended

148th OCC: PTCUL representative stated that no such action has been taken. He has been asked to clarify the matter with the management.

149th OCC: PTCUL representative stated that in light of tower being damaged issue is being discussed again and by September further progress will be intimated.

150th OCC: PTCUL representative stated that issue is under discussion.

HPSEBL: – The process of arranging funds for procurement of ERS has been initiated. HPSEBL representative intimated that they were coordinating with PTCUL. He was advised to coordinate with J&K, citing the status of PTCUL

149th OCC: The process of arranging funds is being looked into.

150th OCC: The process of arranging funds is being looked into.

J&K: - Order has been placed for 2 nos. ERS. No further update.

BBMB: - BBMB representative stated that the issue will be taken up in the Power Sub –Committee meeting of BBMB.

149th OCC: BBMB representative stated that the issue will be taken up in the Power Sub –Committee meeting of BBMB

CEA representative stated that being a transmission licensee they can go ahead with the procurement of their own ERS. He also added that instructions for procurement of ERS were issued from the Ministry. ERS are very essential for the safety of the nation also in case of any attack.

SE(O) NRPC stated that guidelines have been issued vide which the Ministry of Power has directed that for 500 ckt kms minimum 2 numbers of ERS are required (Annexure 16). All utilities were requested to review accordingly.

BBMB was stressed in view of above to review their decision as two of their beneficiaries Haryana & Rajasthan have also not procured ERS yet.

17. Cleaning and Replacement of porcelain insulators

17.1. All utilities were requested to plan insulator replacement work from September 2018 onwards. All utilities were requested to submit the insulator replacement targets set for the year 2018-19 so as proper planning of outages can be done.

17.2. 148th OCC meeting: SE(O) NRPC requested all utilities to submit the plan positively by the last week of July as the outages of transmission elements for replacement of insulators will be planned with effect from the OCC for the month of August, 2018. He added that in the absence of the said action, outage will not be allowed on this account.

17.3. 149th OCC meeting: BBMB & Power grid (NR 1) have submitted the data .MS NRPC requested all other utilities to update so that better outage planning could be done as from September onwards outages for replacement of porcelain insulators will be allowed.

17.4. 150th OCC meeting:

PSTCL submitted the data.

SE (O) NRPC requested all utilities to submit the plan meticulously & submit the data.

MS, NRPC added that cleaning & replacement work be planned in such a way that before the onset of fog the requisite action is taken.

18. Cyber Security Preparedness Monitoring

18.1. In the **37th TCC and 40th NRPC meeting** held on 27th and 28th October, Chief Engineer IT, CEA and Chief Information Security Officer, MoP, Sh. Vijay Menghani, gave a detailed presentation on potential cyber threats for power sector, the agencies working on this aspect, recent incidents of cyber attacks on and the action points to prevent the cyber threat. It was stated that in view of

increasing incidents of cyber-attacks and threat to the integrated grid operation, all utilities need to monitor action being taken in regard to the following points and report the status to respective Computer Emergency Response Teams (CERTs):

a. Appointment of organization-wise Chief Information Security Officers and its status.

b. Identification of organization-wise Critical Infrastructure and its status.

c. Preparation of organization-wise Crisis Management Plan and its status.

d. Status of Cyber Security Mock Drill activity in coordination with CERT-In.

e. Status of Training / Workshops on Cyber Security organized / participated by power sector entities.

f. Status of action taken on CERT-In / NCIIPC advisories.

All the utilities were again requested to furnish the above information, however, except from TATA Power – DDL the information has not been received from any of the utilities. The report as submitted by TATA Power- DDL was attached at Annexure-21 with the Agenda of the 146th OCC meeting. NHPC have also submitted the status. All the other utilities were once again requested to furnish the information in the format as submitted by TATA Power**.**

18.2. 147th OCC meeting: NTPC updated the information. All utilities (except NTPC, NHPC & TATA Power) to kindly update the status. Some of the members enquired about the training to be imparted by NRPC/CEA on cyber security. They were asked to contact CE (IT), CEA in this regard as they are organizing training on cyber security and other related issues.

18.3. 148th OCC meeting: THDCIL submitted the information in the meeting. All other utilities (except NTPC, NHPC & TATA Power) were again requested to update the status. Rajasthan representative intimated that the issue is being taken up with their IT wing and information would be submitted shortly. Tata Power representative stated that they welcome any utility to visit their station for seeing the implementation of Cyber security done at their end.

18.4. 149th OCC meeting: The information from NAPS & PSTCL stands received. All utilities except NTPC, NHPC, Tata Power, THDCIL, NAPS & PSTCL were requested to update. SE(O) stated that it is a long pending issue and the information in the desired format should be submitted by all utilities. Rajasthan representative stated that they had forwarded the information to CEA.

18.5. 150th OCC meeting:

All utilities except NTPC, NHPC, Tata Power, THDCIL, NAPS & PSTCL were again requested to update

19. Requirement of Data for the GIS based Energy map being developed by Energy division of NITI Aayog.

19.1. The Sub –Committee was informed that a copy of a letter from the Chief Engineer (DP&T) was placed at Annexure 22 of the Agenda of the 147th OCC meeting.

19.2. 148th OCC meeting: MS, NRPC requested all DISCOMs /Power Departments to furnish the information regarding the name, voltage level, capacity, longitude & latitude of 33 kV & 66 kV Substations and lines as detailed in the letter. He informed that RPCs have been given the work of collecting the data from States and forwarding to CEA.

Except NHPC, the data has not been received from any of the utilities**.**

UPPTCL representative intimated that the data needs to be collected from the DISCOMs and if a communication from the NRPC secretariat is sent to the DISCOMs the matter could be expedited**.**

Rajasthan representative intimated that they are also taking up the issue with their distribution companies.

SE (O) stated that SLDC being the nodal agency for the state, matter should take up by them with their DISCOMs for early submission of the data. All agreed for the same**.**

19.3. 149th OCC meeting: All utilities were again requested to submit the desired information. Rajasthan representative sated that they are taking up matter with distribution companies.MS NRPC added that the issue will also be discussed in the meeting to be held on 30.7.2018 with the DISCOMs

19.4. 150th OCC Meeting: All utilities were again requested to make all out efforts and submit the desired information by taking up expeditiously with the DISCOMs.

20. Problem of excessive vibrations in GTs of Rihand Stage – III and Vindhyachal Stage-IV during operation of Rihand - Dadri HVDC, on monopole mode with ground return.

20.1. 148th OCC meeting:

NTPC representative highlighted as under:

- Shifting of 2x500MW Rihand Stage-III units (Unit# 5&6) from NR Grid to WR Grid through Vindhyachal Pooling Station was successfully done on 28th Nov' 17 with coordination in real time between POSOCO, NTPC and POWERGRID (WRTS-II).
- With Rihand stage-III units connected to Vindhyachal Pooling Station, problem of excessive vibrations in GTs of Rihand stage III (and Vindhyachal Stage-IV also) has been observed whenever Rh- Dadri HVDC is run on single pole in ground return mode. The observations during the period 27th Nov'17 to 5th March'18 at Rihand is enclosed in the attached sheet (ANNEXURE AA of the Additional Agenda OCC 148th Meeting).

- The issue was briefly discussed in the 142nd OCC Meeting against agenda point no 18 and where it was decided that system study was required to be done to further deal with this problem. Previous experience of NTPC in this regard was also sought which was subsequently provided to NRLDC by Rihand station.
- It is apparent that DC current passes through these GTs during above situation which is detrimental for the GTs and which may lead to their failure.
- It is therefore requested that a solution may kindly be arrived to deal with the above situation at the earliest.

The issue was deliberated in light of the discussions held earlier in the 142nd OCC meeting NTPC was requested to check transducer at Vindhyachal end as there was huge mismatch in MVAr and also get assessment of earthing system at Rihand done. Further it was decided that as per decision in the 38th TCC & 41st NRPC meeting the committee will look into resolving the issue. Nominations for committee has been sought from the utilities concerned vide this office letter dated 22.6.2018. MS NRPC requested that the nominations from CTU. POSOCO, CEA and NTPC may be submitted at the earliest so that the meeting can be called at an early date

20.2. 149th OCC meeting: Nomination from CTU and NTPC stands submitted.CEA & POSOCO were requested to send their nomination.

MS, NRPC proposed that the meeting should be held at Rihand. It was also stated that the nominations from BHEL & UPPTCL were also awaited. Also it was proposed that an expert in the field from it may also be included in the forum. In addition, he highlighted that the nominations from Vindhyachal & Rihand HVDC may also be included.

20.3. 150th OCC meeting:

CEA, POSOCO, POWERGRID, CTU, UPPTCL & CG Power and Industrial Solutions Limited were requested to send their nomination so that further necessary action can be taken.

21. Certification of Non-ISTS line for inclusion in PoC Charges

21.1. 149th OCC meeting:

Central Electricity Regulatory Commission (Sharing of Inter State Transmission Charges and Losses) (Third Amendment) Regulations, 2015 provides as under:

"Certification of non-ISTS lines carrying inter-State power, which were not approved by the RPCs on the date of notification of the Central Electricity Regulatory Commission (Sharing of Transmission Charges and Losses) Regulations, 2009, shall be done on the basis of load flow studies. For this purpose, STU shall put up proposal to the respective RPC Secretariat for approval. RPC Secretariat, in consultation with RLDC, using WebNet Software would examine the proposal. The results of the load flow studies and participation factor indicating flow of Inter State power on these lines shall be used to

compute the percentage of usage of these lines as inter State transmission. The software in the considered scenario will give percentage of usage of these lines by home State and other than home State. For testing the usage, tariff of similar ISTS line may be used. The tariff of the line will also be allocated by software to the home State and other than home State. Based on percentage usage of ISTS in base case, RPC will approve whether the particular State line is being used as ISTS or not. Concerned STU will submit asset-wise tariff. If asset wise tariff is not available, STU will file petition before the Commission for approval of tariff of such lines. The tariff in respect of these lines shall be computed based on Approved ARR and it shall be allocated to lines of different voltage levels and configurations on the basis of methodology which is being done for ISTS lines."

Accordingly, a group was constituted to recommend a methodology for the study to be conducted by NRPC Secretariat, in consultation with RLDC. Based on the methodology suggested by the group, study shall be conducted for certification of non-ISTS line for inclusion PoC charges for the year **2018-19**. The format for submission of data was enclosed.

All utilities were requested to submit information in the prescribed format latest by 31st July 2018. Rajasthan, which has already submitted the data were requested to again furnish the same again as per the format**.**

21.2. 150th OCC meeting: In the meeting it was highlighted that inspite of repeated follow up & communication, details of transmission lines as required has been submitted only by Rajasthan & HP.
SE(C) added that this certification is done only for the given financial year & needs to be recertified every year. Therefore, the lines which were certified for the previous (2017-18 FY) financial year needs to be resubmitted for conducting the study and accordingly the same shall be certified.

Sub–Committee decided that if no further information is received by 31.08.2018, the NRPC Secretariat will go forward with the data received so far for 2018-19.

22. Flexibilisation of Thermal Power plants

22.1. The 7th meeting of the committee was held on 9.07.2018. The copy of the MOM is enclosed at Annexure 22 of the Agenda of the 150th OCC meeting**.**
All members were requested to take note.

23. Commissioning work of BHEL supplied ICTs in Delhi

23.1. A meeting was held on Commissioning work of BHEL supplied ICTs in Delhi in CEA on 12.4.2018. The copy of the MOM is enclosed at Annexure 23 of the Agenda of the 150th OCC meeting**.**
All members were requested to take note.

24. Islanding Scheme in NCR

24.1. Islanding scheme is prepared to save a small portion of the grid in the event of grid disturbance so as to maintain continuity of supply to critical load and also to restore grid. While designing the islanding scheme special attention is to be given to maintain supply to critical area.

24.2. SE (O) intimated that Islanding scheme for NCT-Delhi has been prepared and the same is under implementation, as discussed in the latest NCR Planning Board meeting. He stated that islanding scheme for sub regions of Haryana, Rajasthan & UP in the NCR should be prepared by the concerned states.

24.3. MS, NRPC stated that a special meeting would be called to review the Islanding scheme. He further stated that at the first instance, areas and its source of generation in case of islanding should be identified and then the islanding scheme for the area could be developed. All concerned states Haryana, Rajasthan & UP were requested to take a note. The possibility of considering renewable energy generation as a source in the islanding scheme may be explored if conventional generation source in the area is absent.

NRLDC representative stated that nearest possible source of generation should be considered for the place where the Islanding scheme is to be proposed.

TPDDL representative stated that commercial elements need to be taken into account while preparing the Islanding scheme.

Delhi representative intimated that the Islanding scheme in Delhi will be reviewed in line with the BTPS thermal plant going out of the system.

25. Distribution automation and development of smart grid in NCR

25.1. Smart grid will enable optimization of energy generation, transmission, distribution and consumption. It provides an opportunity for energy companies to make power delivery more efficient, whether by minimizing the visits of personnel to transmission and distribution locations or by enabling better decisions through timely information. Automation is the key to development of smart grid. The implementation of automation may be take up in the selected towns initially which would be the first step towards implementation of smart grid in the NCR.

25.2. SE(O) stated that at present, the level of preparedness of distribution sector to adopt smart grid is in a very preliminary stage and every DISCOM has to prepare a clear road map for implementing automation and smart grid in their area of operation along with the financial requirement and sources for all funding to roll out the plan in coming years.

MS, NRPC stated that Delhi DISCOMs are proactive in this case. He requested that the concerned (Haryana, Rajasthan & UP) STUs & SLDCs to coordinate with the respective DISCOM & take active action for

upgradation of automation by deploying smart grid. All states to take note and intimate the progress in this regard in each OCC.

26. Demand Side Management (DSM)

26.1. In view if the growing demands and shortage of power in the NCR, it is the need of the time to adopt DSM by the constituent stages.

26.2. SE (O) stated that DISCOMs in NCT-Delhi are already taking various measures in this regard and the DISCOMs in Uttar Pradesh, Haryana & Rajasthan serving the NCR area have to take the necessary steps to implement DSM. To promote DSM, energy efficiency and conservation, NCR constituent's states/ DISCOMs/SERCs need to create an appropriate set of incentives through pricing and other policy measures.

Barriers to the adoption of efficient technologies have to be removed through appropriate government policies and regulations and by careful design of DSM program. Public policy can set the pace for such development by offering attractive rewards to the utilities and consumers.

26.3. Following key initiatives, he added, may be taken up as a part of Regulatory framework to encourage distribution utilities to undertake DSM initiatives in NCR area:

1. **Concerned State Electricity Regulatory Commission may take suitable provisions in the Tariff Regulations to include DSM related expenditure as a part of the Annual Revenue Requirement and develop simple mechanism to allow recovery of DSM related costs through tariffs.**
2. **State Electricity Regulatory Commission may develop suitable incentive mechanism for utilities to allow them to adopt DSM program.**
3. **Utilities may be encouraged to develop peak load management programs so that overall power purchase cost decreases and the utilities may be allowed to retain percentage of such saving.**
4. **The Regulatory Commission may make resources available for design, development and implementation of DSM programmes which may be socially acceptable.**

All states were requested take a note.

27. Problem of continuous coal shortage leading to generation Loss at TSPL Plant

27.1. TSPL representative intimated that they are facing continuous coal shortage to meet the demand of PSPCL and not able to generate at full capacity because of the same. As per bidding documents, PSPCL has assured to supply 7.70 MMTPA (up to 5.00 MMT during 2011-12 and 7.70 MMT from 2012-13) Grade E coal with GCV in the range of 4500 - 4600 kCal/kg and ash content in the range of 33% - 34%. However, FSA has been signed for 7.72 MMTPA for E/F and the linkage coal being supplied by MCL is around 3000 kCal/Kg with average ash content between 40%-45%. With the given coal, TSPL can only achieve 53% PLF.

27.2. At present FSA is for 7.72 MMTPA with MCL. Since Oct-2017 till Jun-2018, TSPL has been allocated 95% of linkage coal i.e. 5.7 MMT but it has received

only 4.5 MMT of coal. This can only produce energy at 47% PLF. The loss would have been higher, but since TSPL procured around 8 Lakh Tonnes of Imported/Alternate coal so that the loss could be reduced. The loss in generation is around 21% of contracted capacity and around 2503 Million Units from October'17 till 30 June'18.

27.3. In order to fulfill the power requirement of Punjab TSPL is forced to go for alternate coal arrangement. PSPCL has approved to procure only 3 Lakh Tonne of coal in peak paddy season 2018 which is not sufficient to meet the power requirement of PSPCL.

27.4. It is therefore requested that a solution may kindly be arrived at, to deal with the above situation at the earliest, by providing extra coal from MCL/CIL and other alternate imported sources.

27.5. MS, NRPC stated that TSPL should contact CE, Fuel Management Division, CEA for taking up the issue in the weekly meeting held every Wednesday in the Ministry of Coal. He added that this issue is being faced at present by all IPPs & NTPC.

28. Non-Availability of proper Phone/ Mobile nos at State owned Sub-station C/rooms.

28.1. POWERGRID representative stated that presently most of the POWERGRID stations in Northern region are being remotely operated from our RTAMC c/rooms situated at Jammu & Manesar.

28.2. He highlighted that it has been observed that official at many of the state owned sub-stations are coordinating through their personal mobile numbers for communication and authentication of the switching operations related to their lines. In such cases it is very difficult to ensure that person at other end is really authorized for the job or not. This may also result into insecure grid operation, being an easy target for security breach during operation coordination by concerned stations for real time switching operations.

28.3. He requested that all the Grid sub-station control rooms connected with POWERGRID network must be equipped with identified telephone/ mobile nos and same should be confirmed/ communicated to our RTAMC control room for maintaining safe and smooth grid operation.

28.4. MS, NRPC stated that this is very important in view of the safety of grid operation. POWERGRID representative stated that the contact number of person responsible for switching operation/ Control Room number at substation should be duly authenticated by SLDC and should be made available to RTAMC Control room of POWERGRID. He added that in the absence of the details of authenticated numbers of such person/control room, POWERGRID is facing security risks in doing real time switching operations.

Haryana representative assured that they are already on the job and the details duly authenticated, will be supplied to RTAMC control room.

29. Approval of Emergency Outages

29.1. SE (O) NRPC stated that as per the Procedure for Transmission Elements Outage planning for Northern Region, all outages which are not approved in the OCC meeting but having impact on human and equipment safety and/or to meet any other emergency requirement or special conditions shall be considered

under Emergency Outage category**.** NRLDC would bring to the notice of OCC the emergency shut downs approved by NRLDC in the previous month.

The request for emergency outage shall be submitted along with the details like nature of emergency, impacts due to emergency situation, reasons and associated facts for not considering the outage planning process.

Emergency outages shall be allowed subject to system conditions and its severity. In this case, if required, planned outages may be deferred, if possible. Emergency outages shall be allowed immediately or within the short possible time, based on the severity of the emergency and system condition on instance to instance basis.

29.2. MS, NRPC stated that it is very important to follow procedure that has been approved. He requested NRLDC to share the list of all the emergency outages given by NRLDC in a particular month in the forthcoming OCC meeting. He requested that all utilities should plan the outages meticulously & efforts should be made to get outages approved in the OCC meeting itself.

29.3. Representative of NRLDC stated that they were already showing the total number of Emergency outages vis-à-vis planned outages under the highlights of Grid operation during the meeting, however, details of the same will be shared from the next OCC.

30. Mock test for two shift operation at Dadri Gas Based Power Plant

30.1. As a result of the changing energy mix of the power sector in India, most notably the expansion of renewables, "conventional" power plants will increasingly be required to take on additional tasks, particularly in the absence of large-scale energy storage systems. One key area of focus is switching these conventional power plants from baseload to intermediate load operation, and thus the need for fast load ramps, shorter low-load and start-up times, and grid stabilisation. In addition, the demand for ancillary services such as provision of control reserves and frequency support, as well as tertiary control reserves and load-follow operation, has increased significantly. As a result, new operating requirements have emerged, such as two shift operation, load-follow operation, island operation, black start capability, frequency support and very high start-up and operating reliability, in order to stabilise power grid dynamics and hence ensure secure and economic electricity supply

30.2. In the coming few months, the pattern of dispatch of CCGT plants is expected to change comprehensively. This change involves a general shift for CCGT plants from base load to flexible operation. Flexible operation is broadly defined as any mode of operation other than base load like two-shift operation, load following, etc. With the planned increase in penetration of RE in the grid, and limited gas availability, CCGTs will have to be operated under two shift operation in the future.

30.3. Two shift operations is starting up and shutting down a plant each day to meet load demand during periods of high demand. At present, NTPC has 4 gas based generating stations in the Northern region, namely Anta, Auraiya, Dadri and

Faridabad. GAIL was contacted with regards to supply of gas to check the feasibility of two shift operation in these stations. GAIL initially had some reservations as two shift operations would lead fluctuations in pipeline pressure which would affect the other utilities connected to their supply system. However, GAIL has now agreed for the same in 3 out of the 4 gas based generating stations, namely Anta, Dadri and Faridabad.

30.4. A mock test is proposed to be carried out at Dadri GPP/Faridabad GPP on 27th or 28th August wherein the unit would be scheduled for 2-3 hours during the evening peak to examine the level of pressure fluctuations in the gas pipelines of GAIL. To carry out the test, gas from Auraiya GPP is proposed to be diverted to Dadri GPP/Faridabad GPP, if required, for those 2-3 hours. On successful completion of the trial, the proposed two shift operation would be implemented. The energy generated during this mock test will be scheduled to the beneficiaries of the respective generating stations. SLDCs are requested to coordinate with state entities and send their views so that the same may be discussed and a decision may be taken in the meeting.

30.5. 150th OCC meeting:

- **MS NRPC informed the Sub-Committee that NTPC has agreed for trial run for 2 shift operations at Dadri CCGT wherein Gas Station would be put on bar to meet morning & evening peak demand and will be ramped up as per the requirement. This need has come up on account of the reduced availability of APM gas and to meet the rising load demand in morning & evening peak.**
- **During the trial run the gas turbine will be operated in the combined cycle and STs will be warm start up for which the steam parameters have to be maintained.**
- **NTPC representative assured that they are ready with the exercise at Dadri. He added that the modalities need to be decided for operating the 6 machines (4GT & 2ST). The start up procedure of CCGT for two shift operations will be shared.**
- **MS, NRPC explained that in 2 shift operation machines have to operate in combined cycle and should be able to support Grid with full supply for required duration. For this in morning if machine is operated and then stopped and again started in evening as the demand comes up form warm start up of STs. He clarified that both modules have to be operated in parallel. He added that in one module, one GT & ST will be coupled and the second module will be operated parallel in the same way.**
- **MS, NRPC requested NTPC to arrange Gas for the operation. NTPC representative stated that at present 0.9 APM Gas is available & 0.5 APM have been tied up with WR for running Auriya. It was decided that NTPC Auriya station will be stopped before 6:00 hours of 27.08.2018 and domestic gas will be diverted to Dadri-gas for the day. He added that they will have to borrow gas from GAIL and will arrange**

RLNG. NTPC representative added that in the past also they have operated the Gas turbines with RLNG, LF as per requirement of Grid. All beneficiaries agreed to the use of RLNG if required in the trial.

- **NTPC representative added that they will plan to operate 2 GT & 2 STs in morning and will stop them by 11 AM and will start the process again timely as per requirement of evening peak, as 2 Hours would be required to start in warm condition also.**
- **MS, NRPC informed that the trial run will be done at DADRI on 27.08.2018. All beneficiaries of DADRI Gas will be scheduled accordingly. All beneficiaries agreed for the trial run and will draw as per the schedule finalized by NRLDC and also agreed to avail RLNG power if there should be any shortage of Gas.**
- **The amount of gas pressure fluctuation in GAIL pipeline will be monitored by Chairperson, CEA from GAIL control room. This is being done in view of the effect it would have on the supply of gas pressure to nearby fertilizer plants.**
- **NRLDC representative assured that the schedule will be given to all beneficiaries timely.**
- **MS, NRPC was of the view that the 2-shift operations of Gas turbines in NR would be implemented after taking all the commercial and technical parameters into account.**
- **NRLDC representative added that the 2-shift operation is essential in view of the integration of renewable in the system.**

  Sub–Committee approved the trail run of Dadri CCGT for 2 shift operations on 27.08.2018.

31. Low generation at Kishanganga HEP during high hydro season

31.1. NRLDC has observed that through all the three units (110 MW each) of Kishanganga HEP have been commissioned and declared under commercial operation since last two months, the generation at the plant is very low (mostly in the range of 2-4 MU per day) despite of the monsoon season time. The trend of day wise energy and generation in MW of the plant for last two months is attached at Annexure-31 of the Agenda of the 150th OCC meeting for perusal. Since, demand of Northern Region is also very high in monsoon season therefore, it is beneficial to have high internal generation of Northern Region during this period. Apart from the above, large hydro complexes in Northern Region go under outage due to high silt conditions, thus the generation at Kishanganga HEP could be of immense help during such times.

31.2. MS NRPC requested NHPC to intimate the reason for the low generation at the plant along with the action plan for resolving all such issues. The increased generation at Kishanganaga would also be helpful in meeting higher peaking demand in NR.

31.3. NHPC representative stated that the Kishanganga Power station has been commissioned during August 2018 &since commissioning the generation at Kishenganga HEP is very low due to various Teething problems of auxiliary system in all three units. He further told that Unit # 1 is under outage since 02.08.2018 due to damage of one runner bucket & Nozzle cover of Nozzle NO 3. The restoration was under process.

31.4. Further, he added that other units are also frequently getting breakdown due to problem in cooling water systems & associated sub–systems. The detailed report and the action plan will be submitted in due course.

Additional Agenda: **Modification in NAPS Islanding Scheme after latest network development at Simbholi S/S.**

NAPS representative stated that NAPS (2X220 MWe) is connected with western UP grid of Northern Regional grid. To safeguard NAPS Units as well as having pockets of generation on event of regional grid failure, a dedicated islanding scheme has been devised for NAPS and it is functioning well.

Brief about NAPS islanding scheme:

At Grid frequency 47.9 Hz, NAPS Islanding initiates and NAPS forms Island with Simbholi and Khurja S/S, the UFR relay (47.9 Hz)trips 220 KV Matore(PG) and 220KV Shatabdi nagar lines to isolate Simbholi from rest of the Grid. Further, backup UFR (47.9 Hz) relays are installed at Matore S/S and Shatbadi Nagar S/S for tripping of respective Simbholi line for full proof isolation OF Simbholi S/S for NAPS Islanding.

Similarly at Khurja S/S too, all 220 KV lines except Narora & Debai/Narora feeders tripped at 47.9 Hz through dedicated UFR, installed for the purpose. With this, NAPS forms Island with Simbholi and Khurja loads at 47.9 Hz.

These UFR relays are supplied by NAPS and further installation & annual testing are being done jointly by NAPS & UPPCL – respective T&C division.

Latest Network development at Simbholi S/S:

Recently, following network development have taken place at 220 KV Simbholi S/S and adjourning grid substation:

1. Existing 220 KV Simbholi –Shadbtdinagar line got LILO at 400 KV S/S Hapur and hence Shatabdi Nagar S/S has no relevance for NAPS Islanding purpose.
2. One new line elements 220 KV Simbholi –Hapur (400 KV) has been commissioned and now in operation.
3. One more new line elements 220 KV Simbholi – Hapur (220 KV S/S UPPCL) has been commissioned and now in operation.

With the above, NAPS Islanding scheme is to be modified at the earliest.

Proposed Modification in NAPS Islanding: Based on above network development at Simbholi and adjourning S/S, following modification is to be implemented:

1. **At Simbholi S/S:** U/F trip is to be wired for 220 KV Simbholi – Hapur(220 KV S/S) and 220 KV Simbholi – Hapur (220 KV UPPCL S/S) lines through existing UFR of NAPS Islanding scheme.-

   -UPPCL/NAPS
2. **At Hapur 400 KV S/S:** One dedicated UFR relays set at 47.9 Hz is to be installed & commissioned for NAPS Islanding function and U/F trip is to be provided for tripping of 220 KV Hapur – Simbholi CKT-I & II. The relays are to be provided by NAPS.

   -UPPCL/NAPS
3. **At Hapur 220 KV S/S:** One dedicated UFR relays set at 47.9 Hz is to be installed & commissioned for NAPS Islanding function and U/F trip is to be provided for tripping of 220 KV Hapur – Simbholi line. The relay is to be provided by NAPS.

   -UPPCL/NAPS
4. **At Shatabdi Nagar 220 KV S/S:** As existing line 220 KV Simbholi-Shatabdinagar got LILO at Hapur 400 KV S/S; existing NAPS Islanding UFR has no relevance.

   Hence, the UFR relay (NAPS islanding), installed at Shatbadi Nagar is to be removed and its trip circuit is to be deleted. Same relay will be utilization at Hapur S/S.

   -UPPCL/NAPS

Existing and proposed modified NAPS islanding scheme (due to network development at Simbholi) is attached at **Annexure AA**.

Development of LILO of 220 KV Simbholi – Shatabdi Nagar line at Hapur 400 KV S/S was also discussed in 148th OCC and 35th PCC meeting of NRPC, held in June 2018. NRPC has recommended to shift and commissioned the relay accordingly. As an interim measure, NAPS & UPPCL-T&C have discussed the above development and are in process of implementation.

He concluded that the above network development at Simbholi S/S which has affected NAPS islanding scheme, needs to be reviewed for implementation of the above proposed modifications at UPPCL S/S to ensure healthiness and effectiveness of the Islanding Scheme.

NPCIL representative stated that additional relays are to be provided by them in view of the addition in the system.

MS NRPC stated that revision in schemes & load pattern needs to be studies in light of the change in the system. NRLDC representative added that the load pattern needs to be looked into before any decision can be made. He added that a special meeting will be called separately.

NPCIL representative was advised that the extra relays required as detailed above may be installed.

NRLDC representative requested UPPCL to also coordinated and look into the issue.

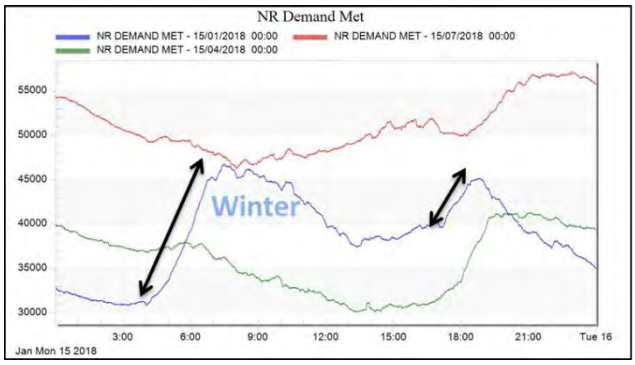
PRESENTATION ON CERC DSM 4TH AMENDMENT IS ATTACHED AT ANNEXURE BB

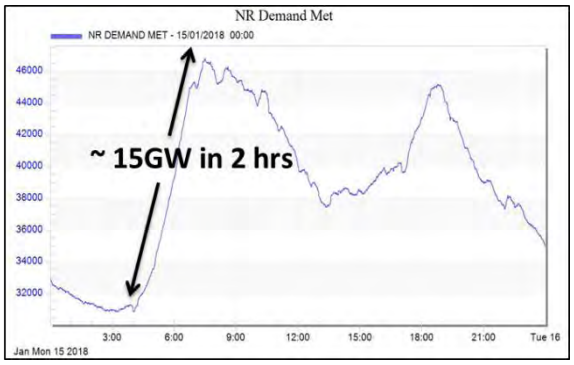
Minutes of NRLDC Agenda Points

1. Winter Preparedness

Winter starts from Mid Oct to Mid Feb for the year in Northern region and to prepare in advance, NRLDC presented the challenges experienced during winter and agreed preparatory actions in previous OCC/TCC meeting to sensitize the required planned actions.

Demand of Northern region and its states was shown for a typical day in Winter, Summer & Monsoon. It was clearly visible that demand of NR during winter is less by ~ 15GW than Summer/Monsoon and, ratio off peak hr to peak hr load is also very less. For Northern region the ratio is in range of 60% while for some of the states e.g. Punjab & Delhi, this ratio remain in range of ~ 45-50 %. Apart from less demand, morning & evening peak hr load has been witnessing high ramp ratio. It was observed from the typical day in winter (Jan 2018) that ramping of ~15GW is required within ~2 hrs during peak hours.





Due to less demand especially during night hours of winter, persistent high voltages have also been experiencing throughout the Northern Grid. In addition, trippings of EHV lines during Fog/Smog have been experienced during winter. Moreover, load crash on account of rain/bad weather/Snowfall poses major challenges to grid operation during this time.

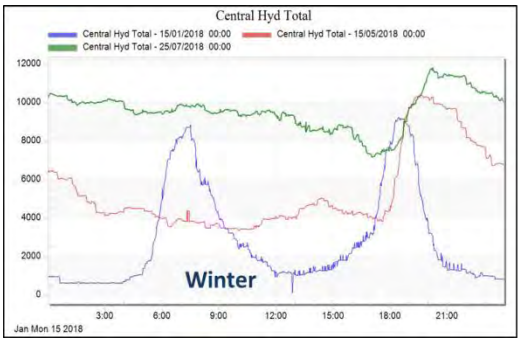
In Northern region, most of Hydro stations are snow fed, and therefore during winter water reserves remain limited. Hence, hydro generation of NR reduces significantly during this period. Renewable generation i.e. Solar & wind which is more dominated in Rajasthan area in NR also reduces.

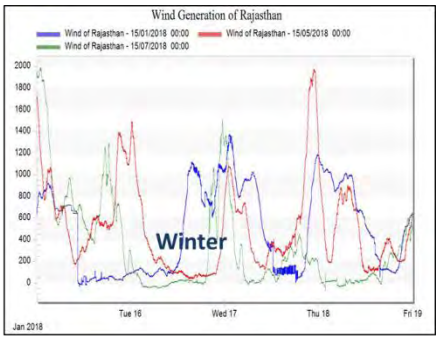
In order to combat the above situation, following has already been agreed in various OCC/TCC/Winter preparedness meeting and suggested again for awareness of the members to take appropriate action in these directions:

a. Load Generation balance & Ramping during Peak hours
   - Portfolio management
   - Ramping of Hydro generation with ramping of Peak hr load
   - Load forecast precisely based on weather information made available by IMD and Temp & Humidity transducer at various locations
   - Minimize generation to technical minimum as per CERC directions.

- Staggering of large load in case of switch in or out.

b. Limited generation of Hydro & Renewable
   - Hydro Optimization
   - Forecast of renewable generation and accordingly manage the load generation balance





c. High Voltage
   - Ensure switch off capacitor and switch on reactor in all high voltage pocket.
   - Update & Monitoring online static VAR resources i.e. Bus reactor, Line reactor, Tertiary reactor, Line reactor that can be use as BR in case line is not in service, SVC, TCSC support etc.
   - Monitoring & ensuring the dynamic support of MVAr from Generating station as per their capability curve. Telemetry of MVAr of units may also check for reliable and correct data.
   - Ensure synchronous condenser mode of generating station especially Hydro which have trial tested in last years and explore more hydro station which can provide reactive power support especially during nigh hours when demand is less and voltage are very high. Tehri Unit-1 & 2, Chamera-II unit-I, Larji unit#3 have been trial tested last year and can be used as synchronous condenser mode as per Grid conditions. Punjab SLDC last year reported that OEM of RSD is exploring possibilities for its units for trial testing and it is requested to SLDC, Punjab to please inform the progress on above.
   - Delhi NCR also observed high voltage during night hours due to less demand & cable transmission line. It was discussed in previous meetings that Delhi may explore Delhi GTs to operate as synchronous condenser mode. Any progress or information in this line is yet to come from Delhi SLDC.
   - Tap optimization based on scatter plots of HV and LV side of ICTs, last year data, offline simulation studies, NRPC reactive power account etc. At 400kV & above, tap optimization & studies is being done by respective RLDC. It was requested and emphasized in various previous OCC/TCC meetings that tap optimization at 220/132kV should also be studied and done by respective SLDC. However, SLDC is yet to start such exercise.
   - Opening of EHV line based on studies considering reliability & security of Grid.

d. EHV line tripping during Fog/Smog
    - Washing of lines on priorities basis (Based on previous year tripping and polluted area)
    - Progress & Monitoring of replacement of polymer insulator
        i. Last year nos of EHV lines tripped in Punjab/Haryana area causing whole Talwandi Saboo station trip in two stances.

e. Load Crash
    - Avoid manual opening of feeder
    - Reduce the generation to technical minimum as per CERC directions
    - Procurement of ERS to handle tower collapse during such thunderstorm/eventualities

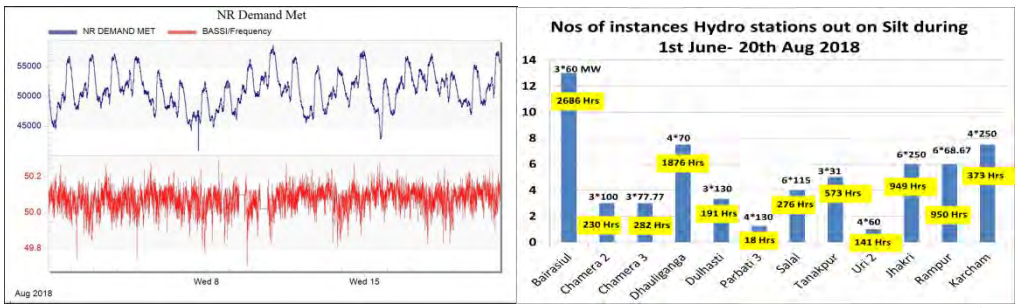
    Last year two instances of load crash occurred causing nos of EHV line tripped and many EHV lines were manually opened to contain the High voltages

f. Defense Mechanism
    - Ensure all UFR, df/dt, SPS & other protections are in working condition.

MS, NRPC sensitized the winter preparedness issue and requested all stakeholder to submit the progress of action plans as discussed. All stakeholders agreed to take preparatory action and update & share the requisite details to NRLDC/NRPC. Further, it was decided that a separate meeting would be conducted for monitoring of Polymer insulator replacement and other related issues.

2. Challenges faced during Monsoon

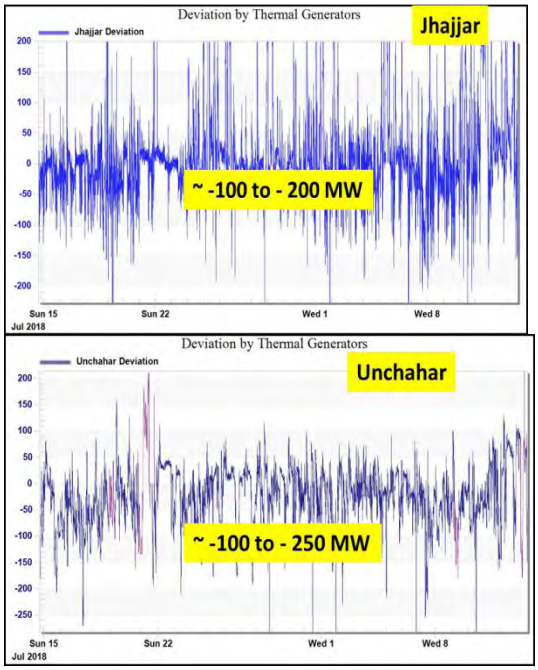
Northern region met its highest demand during monsoon period and energy consumption is also high during this period. The demand & frequency for the Aug'18 month was shown that showed demand is in range of ~ 55-58 GW. Challenges and necessary action has already been discussed in previous OCC/ Monsoon preparedness meeting. The major issues during this period are outage of large hydro on silt during this high demand.



NRLDC presented the outage of units (hrs) of hydro stations since 1st Jun to 20th Aug 2018. It was informed that during silt flushing, ~ 4-5 GW hydro generations get out at a time and therefore it is necessary to keep the equivalent reserves to maintain the load generation balance and hence frequency & power quality of the electricity.

MS, NRPC expressed the concern to combat such high hydro outage during monsoon period and strongly agree that reserves are must to counteract such situation in future. He suggested all stakeholders to work out on maintaining reserves to balance the load generation during such eventualities.

Further it was observed that during such high demand some of the thermal station were generating less than their schedule. For example, Jhajjar & Unchahar generation deviations were shown.



It was discussed that Jhajjar was scheduled in RRAS and even the station was not generating within their schedule. Jhajjar TPS informed that it may be due to fast ramping issues in short interval of time (in a time block). It was observed from the data that ~ 100 MW ramping up/down required in some of the time block during the period shown in above plot.

MS, NRPC take this matter as important and decided that the issues would be shared to Hon'ble commission for further directions. Further, OCC take a view and advised all the generating station that they should not deviate from its schedule and co-operate in maintaining the grid discipline.

3. Deviation by NR entities

NRLDC/NRPC has been advocating continuously to state utilities of NR for portfolio management in advance so that deviations remain within permissible limits in real time. It has been discussed in number of previous meeting that load forecast should be carry out precisely and subsequently plan their load generation balance. Deviation of NR utilities has been shown in every OCC meeting to sensitize the issues on regular basis still it has been observed that NR utilities are over/Under drawing from the Grid on various instances. Deviation Graph for Jul-Aug'18 (20 Jul-20 Aug'18) was enclosed in **Annex-I.**

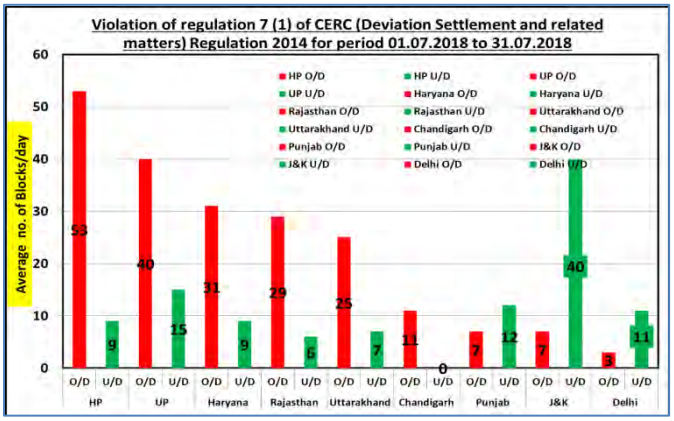
Major observations discussed are as:

I. **Himachal Pradesh was continuously overdrawing in the range of 200 to 400 MW. It was under drawing for some of the instances in range of 300 MW.**

II. **Uttar Pradesh, Rajasthan & Haryana were deviating in range of +500 to – 500 MW.**

III. **Uttarakhand and J&K deviations are in range of +200 to – 200 MW**

IV. **Punjab & Delhi deviations are in range of +200 to -400 MW.**



OCC directed the state utilities to plan their portfolio firmly and avoid such impermissible deviations from the Grid for safe & secure Grid operation.

4. Demand and Generation projections of Q3 2018-19 for POC charges calculation

In line with CERC sharing of ISTS charges and losses regulation 2010 and subsequent amendments thereof, NRLDC vide its letter dated 13.07.2018 had requested utilities to furnish Technical and commercial data for Oct'18-Dec'18 Q3 (2018-2019). The format for data submission is available on NLDC website at https://posoco.in/transmission-pricing/formats-for-data-submission/. Details have been received only from NTPC, Rajasthan, HP and SJVN. Other utilities were also requested to submit data as early as possible.

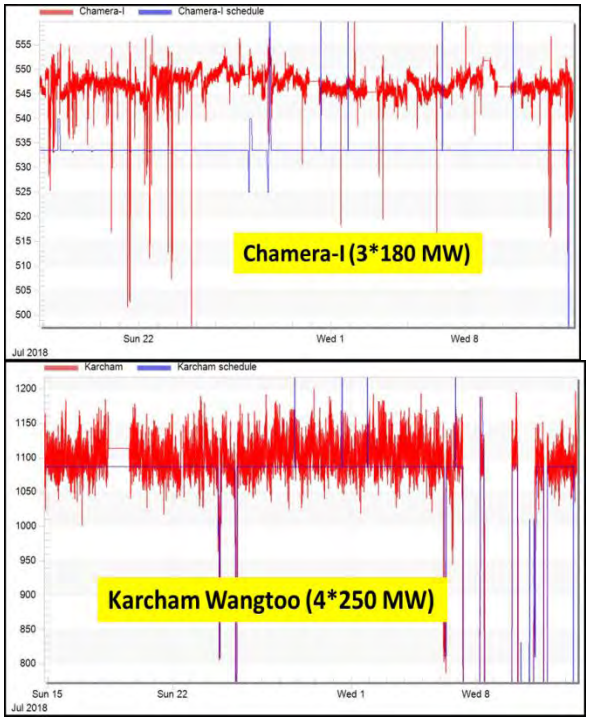
Further, generation and load projection has been done by NLDC/RLDCs based on monthly maximum injection/demand met in the last 3 years from actual metered data and accordingly projections have been made and was attached at NRLDC Annexure-IV of the Agenda of 150th OCC meeting. Utilities are requested to kindly check the data and correct anomalies, if any with valid justification.

OCC suggested all the users/DICs to check the data and submit the respective details as soon as possible to avoid the correction proposed at last hours. It was further requested to check the base case (Network detail, Node wise load etc.) for accurate presentation of scenario wise All India model for computation of PoC Charges & losses.

5. Over Generation of Hydro station

IEGC 5th amendment & its SoR has been discussed in previous OCC meetings wherein it was explained that schedule of generator would be limited to IC-Normative auxiliary consumption. In case of Hydro, it has been explained that in case Hydro station are over generating, they need to furnish the reasons for such high injection.

It has been observed that generation at some hydro generators for example Chamera-1 and Karcham Wangtoo was very high. Graph of above hydro stations is shown below:



In case of even full schedule (upto 110% of DC), they have been generating more than (110%) overload capacity. This higher generation does not seem to be due to primary response.

Chamera-I representative shared the meter data of a day during this period and stated that based on this data, Chamera-I was not over generating. He concluded that it may be due to discrepancy in SCADA data.

MS, NRPC suggested Chamera-I to check the data with SCADA & SEM and ensure that the telemetry is correct & reliable as soon as possible for real time operation & monitoring. It was decided that all generating station including hydro should keep margin for primary response and in case of spillage, hydro station should get schedule within 10% of over-generating capacity.

6. Reliability issues in the grid:

As per off-line simulation studies and real time monitoring, reliability issues observed in states of NR was presented as shown below:

State	Constraints as per import capability (System studies)	Actual Constraints observed (Real-time)
Punjab	TTC: 7000 MW ATC: 6400 MW N-1 contingency of Amritsar, Rajpura, Ludhiana and Makhu ICTs	• N-1 non-compliance issues at Dhuri, Rajpura and Amritsar. • High loading of Underlying network of Amritsar, Ludhiana, Dhuri & Jalandhar • ICT at Dhuri (out since Aug'17) need to be revived at the earliest. ***Punjab informed that Dhuri ICT-3 would be revived in next three month.***
Haryana	TTC: 7500 MW ATC: 6900 MW N-1 contingency of Fatehabad, Abdullapur and Panipat & 220kV connectivity of Hissar	• N-1 non-compliance at Panipat TPS • 220kV Hisar(PG)-Hisar(IA), 220kV lines from Lula ahir, 220kV Abdullapur-Jorian and other 132kV lines are heavily loaded and need to be strictly monitored. • In real time, constraints at Panipat ICTs were observed.
Rajasthan	(Generation : 4890MW) TTC: 6200 ATC: 5600 (Generation : 6390MW) TTC: 5000 ATC: 4400 N-1 contingency of Phagi, Jodhpur & Merta ICTs	• As wind injection increases, voltage becomes extremely low at Akal and Barmer. • N-1 non-compliance at Akal under high wind generation scenario. • Wide voltage variation at Suratgarh, Akal & Jodhpur area. • N-1-1 non-compliance of Kawai-Kalisindh-Chhabra complex evacuation.
Delhi	TTC: 5100 MW ATC: 4800 MW N-1 contingency of Bamnoli, Mundka & Harsh Vihar & N-1 contingency of 220kV Badarpur-Ballabhgarh D/C	• N-1 non-compliance was observed at Mundka, Bamnoli and Maharanibagh when ATC was violated. • High loading of 220 kV Ballabhgarh-BTPS, 220 kV Mandola-Burari, 220 kV Mundka-Peeragarhi, 220 kV BTPS-Sarita Vihar.

<table>
<tr>
<td>Uttar Pradesh</td>
<td>
<table>
<tr><th>UP Own Gen. (MW)</th><th>TTC (MW)</th><th>ATC (MW)</th></tr>
<tr><td>10000</td><td>10700</td><td>10100</td></tr>
<tr><td>9350</td><td>11300</td><td>10700</td></tr>
<tr><td>9000</td><td>11600</td><td>11000</td></tr>
<tr><td>8000</td><td>11800</td><td>11200</td></tr>
</table>
N-1 contingency of 400/220 kV ICTs at Azamgarh, Lucknow (PG), Meerut, Obra, Gorakhpur(PG)
</td>
<td>

N-1 non-compliance has been observed at 400/220kV ICTs of Azamgarh, Obra, Lucknow (PG), Unnao etc.
Evacuation constraints of Anpara-D, Lalitpur TPS, Paricha TPS and Bara TPS under N-1/N-1-1 compliance are still persisting.
Interconnection facility between 400 kV Muradnagar old and 400 kV Muradnagar New may also be explored.
Upgradation of switchgear at Greater Noida/Nawada needs to be expedited.

</td>
</tr>
<tr>
<td>Jammu & Kashmir</td>
<td>TTC:1800 MW
ATC:1500 MW

(To be reassessed with commissioning of Network around Amargarh and Kishenganga)</td>
<td>

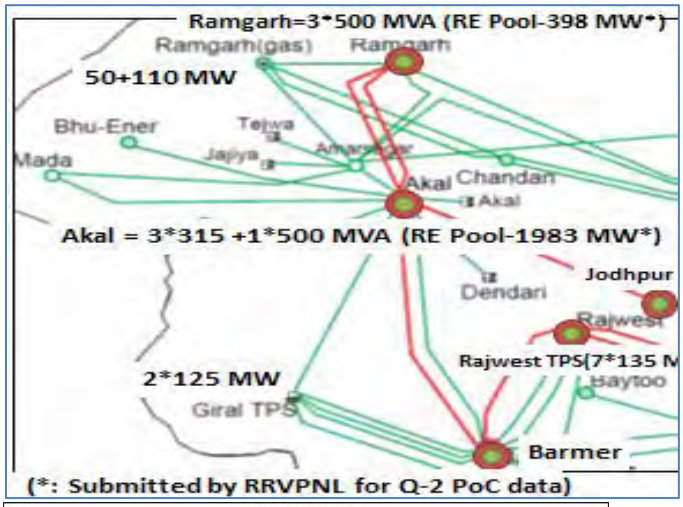
Amargarh and Kishenganga stations have been commissioned in recent past. Loading of Wagoora ICTs and 220kV Wagoora-Zainkote has reduced but loading of 220kV Wagoora-Pampore is still high. Shifting of load from Pampore to Zainkote may be expedited.
Commissioning of underlying network at New Wanpoh to be expedited.

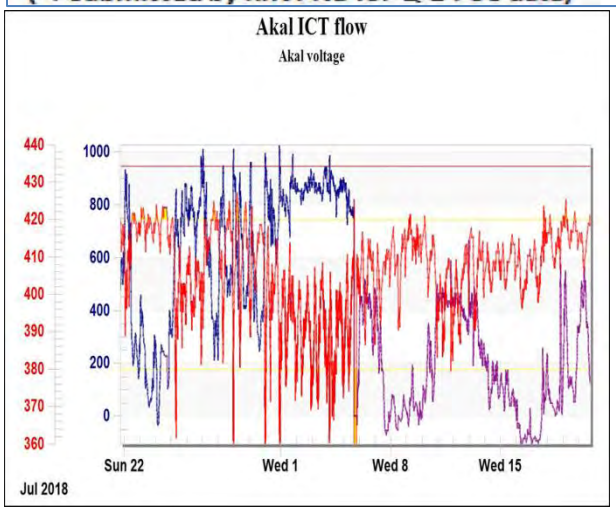
</td>
</tr>
</table>

MS, NRPC requested to state utilities to take note of TTC/ATC and share action plan for the respective constraints observed in studies & real time. It was further suggested that state should start its TTC/ATC computation in co-ordination with NRLDC.

7. Wind generation evacuation issues at Akal

N-1 non-compliance of Akal ICTs during high wind generation has been informed in various OCC/TCC/Operational feedback & others meetings. Connectivity of 400/220kV Akal (3*315+1*500MVA = 1445 MVA wherein RE pool is ~ 1983 MW) is shown below:





On 5th Aug 2018, 315MVA ICT-2 is under outage from 04.08.2018 to 14.08.2018 for hotspot work (revived on 16th Aug 2018). One more ICT-4 of 500MVA at Akal tripped due to fire, all remaining elements from 400kV Akal were manually tripped from safety point of view resulting in generation loss of 1145MW. At that time, there were only two 315MVA ICTs available for evacuation of power from Akal aggravating the constraints at 400/220kV Akal S/s.

NRLDC vide its letter NRLDC/TS-03/1905-1908 dated 09.08.18 has already been requested RVPNL that possibilities shall be explored for evacuating more power through 220/400 kV Ramgarh and Bhadla S/s by network rearrangement so as to avoid N-1 issues at Akal as well as renewable curtailments. Revival of ICT-4 (out due to fire) shall also be put on priority so that ICTs remain available especially during high wind season.

RVPNL representative stated that they are monitoring the situation and would take appropriate action so that renewable generation loss can be minimize due to such transmission constraints. It was further informed that ICT-4 may be revived in next three months.

NRPC requested to share the action plan to evacuate RE generation from 400/220kV Akal pooling station.

In addition to N-1 non-compliance, wide voltage variations have also been observed at Akal as shown in above plot. It can be seen that loading of ICTs (3*315+1*500MVA) remained above N-1 contingency limit (950MW) and voltages remained outside IEGC band (380-420kV) for considerable time.

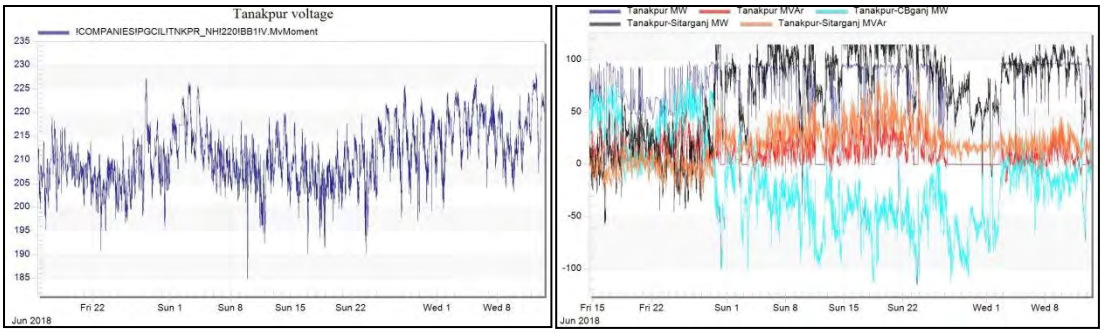
NRLDC shared that similar voltage issues are being faced by Southern region. SRLDC along with various stakeholders have successfully tested the reactive power support capability of Solar Generators at Pavagada Solar Plant in Karnataka (600MW/ 2000MW commissioned) and wind generators at 400/220kV Uravakonda S/s (1770MW wind capacity). Different developers have used different makes of Inverters namely Hitachi (including string type), Sungrow, TBEA, Huawei etc. It was informed that all the Inverters of various makes mentioned above have technical capabilities to support Reactive power control, Active power support by giving external DC reference for Maximum power point tracking (MPPT), LVRT/HVRT etc. which are configurable.

The area near Akal has been experiencing wide voltage variations, therefore RVPNL was requested to explore reactive power support capability of solar/wind generators in Rajasthan (especially Akal/Bhadla area). All other utilities are also requested to explore reactive power support capability of solar/wind generators.

MS, NRPC suggested that a presentation shall be arranged on reactive power support capability & testing for Renewable Generators.

8. Low voltage issue at Tanakpur

The voltage profile at Tanakpur (bus 1 voltage) along with line flows and generation at Tanakpur was shown and it was clearly observed that low voltage was continoulsy experiencing at Tanakpur HEP



The voltage remained below 210kV (even reached at 190-195kV) for significant time in the month of July. During low voltage period, Tanakpur has also reported tripping of units on overcurrent protection (However, sensitive seting was reportedly revised thereafter). As per capability curve of Tanakpur available at NRLDC, it can generate upto 40-45 MVAR running at 90MW of generation. It was advised that Tanakpur HEP should maximise VARs injection into the grid at the time of low voltage.

Tanakpur HEP was also requested to look into the revision of setting and share the AVR detail and other dynamic data for further study.

In addition, it was observed that during low voltages, flow on 220kV Tanakpur-CBganj reversed (flowing from CBganj to Tanakpur) which lead to increased MW & MVAr loading of 220kV Tanakpur-Sitarganj contributing to low voltages at Tanakpur. It seems that Bus coupler at CB Ganj was open

UPPTCL informed that bus coupler is open at CB ganj to manage the loading of line flows. It was suggested to share the feeder distribution on each bus. NRLDC

requested that Tanakpur HEP feeders should be connected to the same bus to avoid such MW loop flows. UPPTCL informed that they will check and inform subsequently.

For improvement of voltage profile at Tanakpur following measures were suggested:

I. **UP and Uttarakhand shall try and reduce VAr drawls by adeqaute compensation.**
II. **UP shall ensure that if Bus coupler is open, tanakpur feeder should be on one bus to avoid MW lop flow.**
III. **Tankpur HEP shall also help in improving voltage by injecting VARs into the grid.**

MS, NRPC directed Tanakpur HEP, UP & Uttarakhand to take note of issus and expedite the necessary action to curb the voltage at Tanakpur.

9. Non- availability of telemetry of FSC/TCSC

Telemetry status of FSC/ TCSC was shown as given below for following locations.

S. No.	Station	Line	FSC Data Status
1	Ballabgarh	Kanpur	Not reporting
2	Bareilly	Meerut	Not reporting
3	Lucknow	Gorakhpur	Not reporting
4	Mainpuri	Fatehpur	Not reporting
5	Meerut	Koteshwar	Not reporting
6	Gorakhpur	Muzaffarpur	Not reporting
7	Unnao	Bareilly (UP)	Not reporting

POWERGRID & state utilities was requested to arrange for integration of telemetry of FSC/TCSC at the earliest.

In addition to this, telemetry of additional data of HVDC has to be provide by POWERGRID as agreed in a meeting held at Kurukshetra on 12.07.2018. However, following data is yet to be integrated:

S.No.	Description	Clause in MoM dated 12-07-2018
1	Extinction angle *(inverter and rectifier stations, 15 min duration)* and Firing angle *(inverter and rectifier stations, 15 min duration)* shall be provided to NLDC.	17
2	Telemetry of "real-time mode *(bi-polar with both DMR, bi-polar with one DMR, etc.)* of operation" and "instance of changeover" shall be provided to NLDC.	20
3	Information requested by NLDC from PGCIL - * Overload settings (MW and Time) * No. of attempts of auto re-start * Power order variation during RVO * Setting curve	21
4	The offline/historical data of harmonics to be provided by POWERGRID and monitored at NLDC/RLDC.	29

POWERGRID informed that telemetry of FSC/TCSC and integration of addition data of HVDC would be expedited.

10. Integration of Forecast in SLDCs SCADA

It is for the information to the members that at present load forecast as calculated by respective SLDC is being sent through FTP to NRLDC. It was discussed and agreed that SLDC should share the forecast value in their SCADA along with FTP. From SCADA system, it can be shared to other control centres through ICCP. It would increase the visibility of forecast in real time to all the states control centres along with NRLDC.

OCC advised to state utilities to share the forecast through SCADA along with FTP as soon as possible. State may take help from NRLDC for any assistance in this direction.

11. Frequent forced outages of transmission elements

NRLDC representative highlighted that the following transmission elements were under frequent forced outages during the month of **Jul'18**:

S. NO.	Element Name	No. of forced outages	Utility/SLDC
1	400kV Anpara(UP)-Obra(UP)	6	UP
2	400kV Kanpur(PG)-Panki(UP) ckt-1	4	POWERGRID/UP
13	400kV Balia(PG)-Mau(UP) ckt-1	3	POWERGRID/UP
13	*400 kV Ballabhgarh(PG)-Mainpuri(PG) ckt-1	3	POWERGRID

** Elements also present in last month's list.*

The complete details were attached at NRLDC Annexure VII of the Agenda of 150th OCC meeting. The forum appreciated the less number of outages in Jul'18 as compared to the Jun'18 wherein 16 number of frequent forced outages were present.

The following were the discussion on the tripping:

- **400kV Anpara(UP)-Obra(UP): UP representative stated that due to some protection problem at Obra end and rectified. NRLDC representative requested UP representative to provide the details of problem identified and share with the forum for improvement of the system. He further asked for details as when the problem has been retifed.**

- **400kV Kanpur(PG)-Panki(UP) ckt-1: POWERGRID representative stated that due to DC earth fault at Panki, line tripped.. UP representative also stated that tripping occurred due to DC earth fault at Panki which has been rectified later. In view of 4 incidents of tripping on successive days, NRLDC representative requested UP to take remedial measures immediately to avoid further tripping.**

- **400kV Balia(PG)-Mau(UP) ckt-1: UP representative stated that line tripped due to malfunctioning of channel-1 of PLCC panel.**

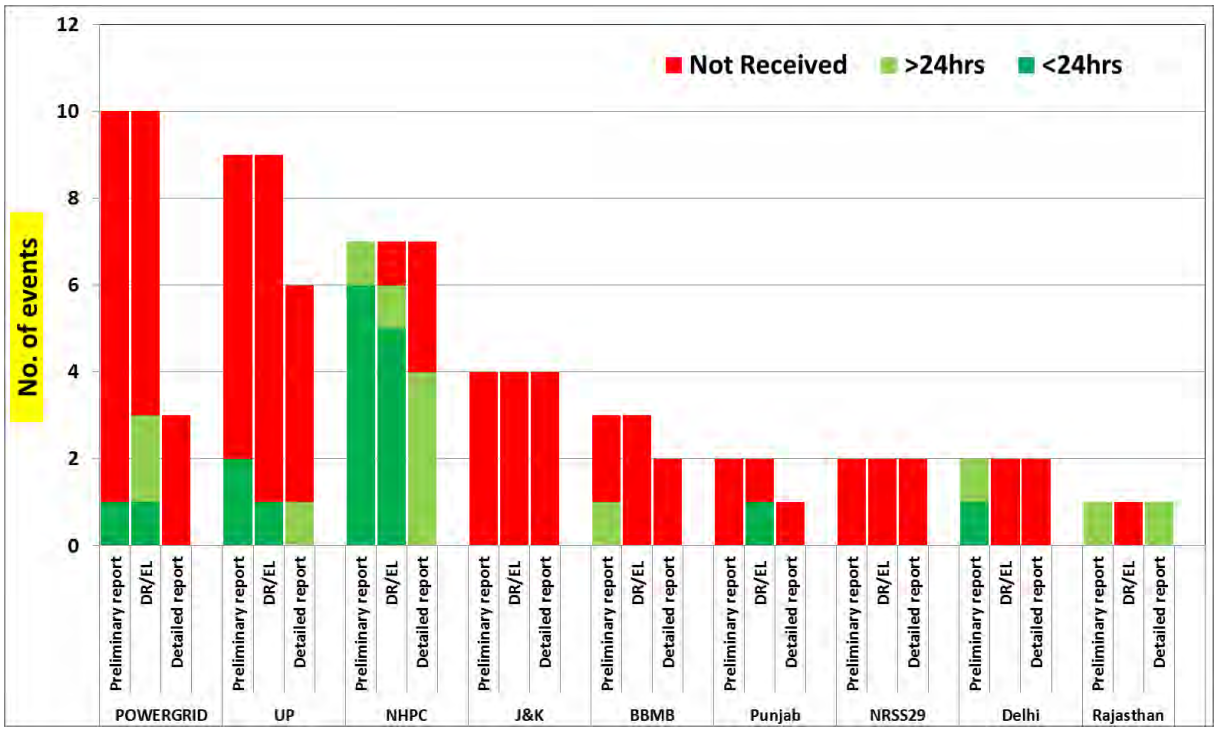
- **400 kV Ballabhgarh(PG)-Mainpuri(PG) ckt-1: POWERGRID representative stated that during thunderstorm while OPGW stringing was going on, pilot wire came down and burnt. Since line was in non-auto mode, no auto-reclosing occurred. All trippings occurred in similar fashion.**

The frequent outages of such elements affect the reliability and security of the grid. Hence, Utilities were requested to look into such frequent outages and take remedial measures to avoid such trippings in future. Utilties were also requested to provide the aforementioned details of the tripping of inter-regional lines.

12. Multiple element tripping events in Northern region in the month of Jul'18:

NRLDC representative stated that a total of **21** grid events occurred in the month of Jul-2018 of which **14** are of GD-1 category. The preliminary report of all the events have been issued from NRLDC. A list of all these events along with the status of details received by 02-Aug-18 was attached at NRLDC Annexure VIII of the Agenda of 150th OCC meeting**.**

Further, despite persistent discussions/follow-up in various OCC/PCC meetings, the compliance of the regulations is still much below to the desired level. In **6** out of 21 events, no detail has been received at all till 02-Aug-18.



Maximum Fault Duration is **10680ms** in the event of multiple element tipping at Modipuram(UP) on 30th Jul 2018 at 09:40hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **7** events out of 21 events in the month.

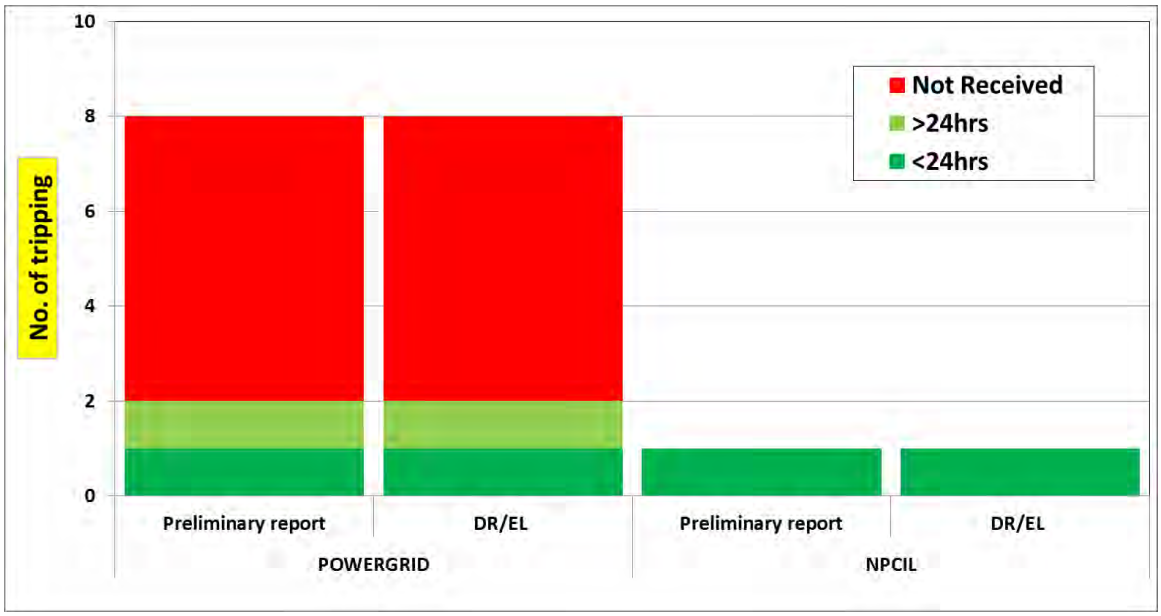
MS, NRPC also opined upon the importance of timely submission of details by constituents in addition to regulatory compliance.

Members were requested to take expeditious actions to avoid such tripping in future. Moreover, utilities were requested to impress upon all concerned for providing the Preliminary Report, DR/EL & Detailed Report of the events in line with the regulations.

13. Details of tripping of Inter-Regional lines from Northern Region for Jul'18:

NRLDC represetnaive highlighted that a total of 9 inter-regional lines tripping occurred in the month of Jul'18. The list was attached at NRLDC Annexure IX of the Agenda of 150th OCC meeting. The status of receipt of preliminary reports, DR/EL within 24hrs of the event and fault clearing time as per PMU data has also been mentioned in the table. The non-receipt of DR/EL & preliminary report within 24hrs of the event is in violation of various regulations. As per regulations, all the utilities shall furnish the DR/EL, flag details & preliminary report to RLDC/RPC within 24hrs of the event. They shall also furnish the detailed investigation report within 7 days of the event if fault clearance time is higher than mandated by CEA (Grid Standard) Regulations.

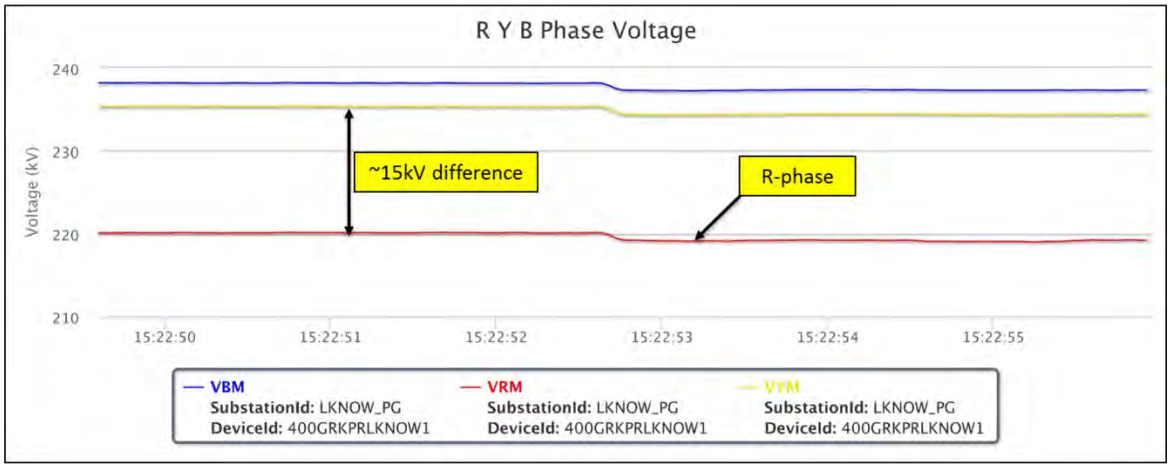
It could be observed from attached table and plot below that not all information regarding the tripping is received from the utilities.



NRLDC representative stated that during the analysis of tripping around Gorakhpur, it was observed that the R-phase voltage magnitude of 400kV Lucknow(PG)-

Gorakhpur(PG)-1 at Lucknow(PG) end is around 15kV shifted from other two phases as shown below:

18-Jul-18/15:23hrs, 400kV Gorakhpur(PG)-Muzaffarpur(PG)-1

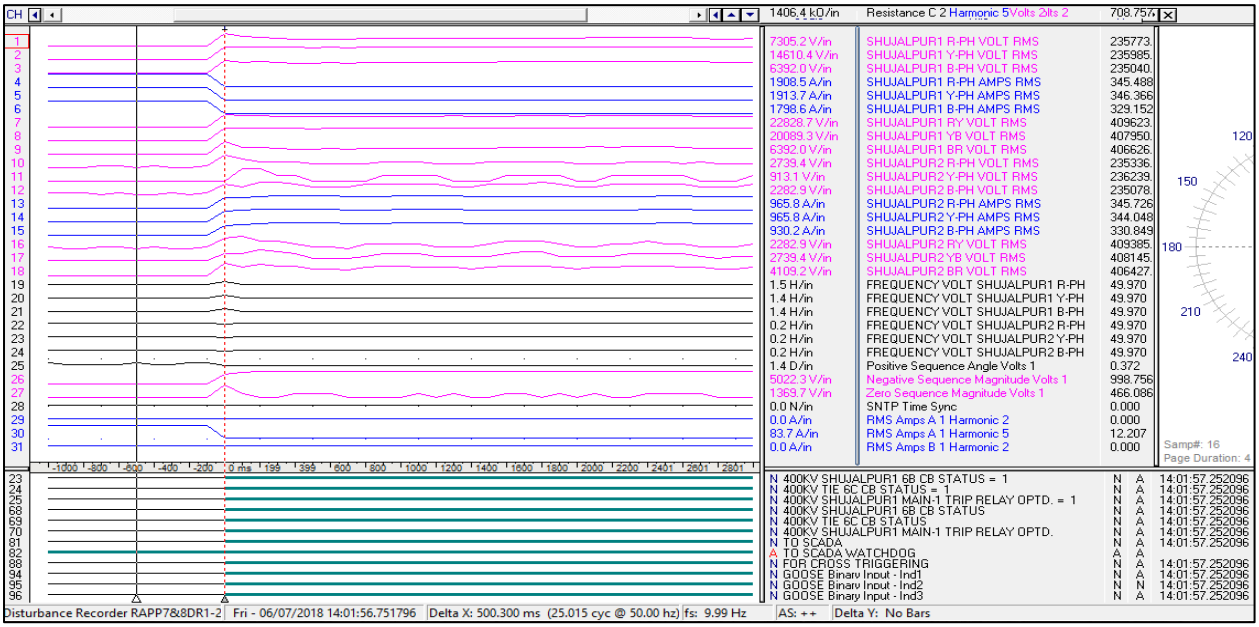


As per PMU data:

- *No fault observed.*
- *R-phase voltage of 400kV Lucknow(end)-Gorakhpur-1 is ~15kV less than other phases.*

A letter dated 02-Apr-2018 has also been issued by NRLDC contaiting the locations where such CVT error is suspected as observed from PMU. POWERGRID representative stated that the CVT at Lucknow(PG) for the aforesaid ckt would be checked.

NRLDC representative further stated that as discussed in 149th OCC meeting as well, the DR submitted by RAPS end for 400kV RAPS-Shujalpur is not having proper channels configured in DR as shown below:



It was requested to modify the DR to include the channels as mentioned in the annexure.

Concerned members were requested to provide the tripping details timely and take remedial measures to avoid such trippings in future.

14. Frequency response characteristic:

Two FRC based event has occurred in the month of Jul-2018. Description of the events is as given below:

Table:

S. No.	Event Date	Time (in hrs)	Event Description	Starting Frequency (in Hz)	End Frequency (in Hz)	*Δf*
1	10-Jul-18	08:14hrs	400kV Rangpo – Binaguri I tripped on R-B phase fault & SPS –I operated resulting into tripping of one unit each at Dikchu, Chuzachen, Jorethang, Tashiding and bus Coupler at Teesta III. At the same time 400KV Teesta 3-Rangpo line also tripped due to SPS-2 operation and then all units at Teesta III & Dikchu tripped due to loss of evacuation path. Total generation loss was 1025MW.	50.027	49.96	-0.06

2	30-Jul-18	20:48hrs	400kV Binaguri-Rangpo-2 tripped due to Y-B phase fault. Then SPS II operated which led to tripping of 400kV Teesta III-Rangpo and all running units of Teesta-III and Dikchu tripped due to loss of evacuation and one unit in each plant of Tashding, Jorethang, Chujachen tripped due to SPS-I operation as reported. Total generation loss was 1024MW.	49.94	49.85	-0.09

The Hon'ble CERC approved procedure has already been shared with all concerned during previous OCC meetings. FRC observed for each state control area for the events is tabulated below:

States	10-Jul-18 Event		30-Jul-18 Event	
	FRC	Remarks	FRC	Remarks
PUNJAB	17%		26%	
HARYANA	-40%		-15%	
RAJASTHAN	45%		-11%	
DELHI	-76%		-57%	Increase in Schedule
UTTAR PRADESH	25%		4%	
UTTARAKHAND	83%	Reduction in schedule	42%	
CHANDIGARH	-674%	Small Control Area	-16%	Small Control Area
HIMACHAL PRADESH	26%		4%	
JAMMU & KASHMIR	15%		3%	
NR	8%		10%	

FRC calculation of ISGS stations based on NRLDC SCADA data is tabulated below:

Generator	FRC (10-Jul-18 event)	FRC (30-Jul-18 event)	Generator	FRC (10-Jul-18 event)	FRC (30-Jul-18 event)
Singrauli TPS	13%	-1%	Salal HEP	8%	5%
Rihand-1 TPS	-9%	0%	Tanakpur HEP	-10%	No generation
Rihand-2 TPS	4%	1%	Uri-1 HEP	0%	0%
Rihand-3 TPS	21%	3%	Uri-2 HEP	34%	Suspect SCADA data
Dadri-1 TPS	25%	3%	Dhauliganga HEP	28%	19%
Dadri -2 TPS	25%	5%	Dulhasti HEP	2%	9%
Unchahar TPS	-5%	6%	Sewa-II HEP	No generation	Suspect SCADA data
Unchahar stg-4 TPS	No generation	No generation	Parbati-3 HEP	Change in schedule	21%
Jhajjar TPS	56%	9%	Jhakri HEP	18%	10%
Dadri GPS	0%	No generation	Rampur HEP	9%	-6%
Anta GPS	No generation	No generation	Tehri HEP	No generation	-3%
Auraiya GPS	No generation	Suspect SCADA data	Koteswar HEP	186%	0%
Narora APS	Suspect SCADA data	Suspect SCADA data	Karcham HEP	Suspect SCADA data	67%
RAPS-B	12%	0%	Malana-2 HEP	Suspect SCADA data	Suspect SCADA data
RAPS-C	-6%	16%	Budhil HEP	3%	0%
Chamera-1 HEP	No generation	-1%	Bhakra HEP	1%	0%
Chamera-2 HEP	0%	Suspect SCADA data	Dehar HEP	2%	2%
Chamera-3 HEP	Suspect SCADA data	23%	Pong HEP	9%	-1%
Bairasiul HEP	No generation	2%	Koldam HEP	-126%	6%
			AD Hydro HEP	0%	0%

FRC calculation of major state generators based on NRLDC SCADA data is tabulated below:

Generator	FRC (10-Jul-18 event)	FRC (30-Jul-18 event)	Generator	FRC (10-Jul-18 event)	FRC (30-Jul-18 event)
PUNJAB			**UP**		
Ropar TPS	32%	-10%	Obra TPS	-23%	5%
L.Mohabbat TPS	66%	No generation	Harduaganj TPS	21%	-4%
Rajpura TPS	34%	44%	Paricha TPS	-7%	-13%
T.Sabo TPS	Suspect SCADA data	Suspect SCADA data	Rosa TPS	24%	No generation
Goindwal Sahib TPS	106%	52%	Anpara TPS	-7%	0%
Ranjit Sagar HEP	5%	-17%	Anpara C TPS	58%	Suspect SCADA data
Anandpur Sahib HEP	-6%	-6%	Anpara D TPS	-21%	0%
HARYANA			Bara TPS	4%	24%
Panipat TPS	-13%	3%	Lalitpur TPS	-1%	Suspect SCADA data
Khedar TPS	14%	No generation	Meja TPS	No generation	No generation
Yamuna Nagar TPS	No generation	No generation	Vishnuprayag HEP	Suspect SCADA data	Suspect SCADA data
CLP Jhajjar TPS	2%	-8%	Alaknanda HEP	-6%	-1%
Faridabad GPS	No generation	No generation	Rihand HEP	No generation	12%
RAJASTHAN			Obra HEP	Suspect SCADA data	3%
Kota TPS	2%	48%	**UTTARAKHAND**		
Suratgarh TPS	-8%	0%	Gamma Infra GPS	10%	No generation
Kalisindh TPS	Suspect SCADA data	Suspect SCADA data	Shravanti GPS	-13%	No generation
Chhabra TPS	No generation	No generation	Ramganga HEP	Suspect SCADA data	Suspect SCADA data
Chhabra stg-2 TPS	-4%	-11%	Chibra HEP	0%	20%
Kawai TPS	45%	56%	Khodri HEP	No generation	No generation
Dholpur GPS	No generation	No generation	Chilla HEP	3%	4%
Mahi-1 HEP	No generation	No generation	**HP**		
Mahi-2 HEP	No generation	No generation	Baspa HEP	Suspect SCADA data	2%
RPS HEP	No generation	No generation	Malana HEP	-1%	9%
JS HEP	Suspect SCADA data	No generation	Sainj HEP	12%	7%
DELHI			Larji HEP	7%	-2%
Badarpur TPS	6%	16%	Bhabha HEP	27%	8%
Bawana GPS	0%	No generation	Giri HEP	Suspect SCADA data	Suspect SCADA data
Pragati GPS	38%	0%	**J&K**		
			Baglihar-1&2 HEP	4%	-5%
			Lower Jhelum HEP	No generation	No generation

In line with the decisions taken during various OCC meetings, the time and date of the FRC events were e-mailed to respective utilities.

NRLDC representative stated that FRC calculations for any or both of the above events have been received from UP, NHPC, Punjab, Adani (Kawai), Delhi (for

10-Jul event), Delhi (for 10-Jul event), Rajasthan (for 30-Jul event), THDC (Tehri, for 30-Jul event). He further stated showed few good responses observed in case of Jhajjar TPS (56%), L. Mohabbat TPS (66%), Goindwal Sahib TPS (106%) and Kawai TPS (45%). He stated that good response has been observed in case of especially Punjab state generators in recently.

NRLDC representative further stated that in case of Rosa TPS response, RGMO ramp rate of 3MW/min was mentioned as the reason for poor response. Since, as per IEGC, generator should not limit the response by any means, the ramp rate may hinder the response of generator and requested that the same needs to be reviewed such that it should not hinder the governor response.

In case of Sewa-II HEP response, NHPC mentioned that due to low freuquency operation machine was already running at higher load i.e. 131MW (109% of 120MW). However, as seen from the SCADA data frequency, the frequency was around 50.00Hz at the time of event. Moreover, the schedule of Sewa-II HEP was also 118MW. Hence, NRLDC representative requested that the machines would be run as per schedule and adequate margin shall be assured for primary response unless the case of spillage occur as mentioned in the 5th amendment of IEGC.

Constituents were requested to submit the FRC of their control areas for both the events and reason of poor response, if observed.

15. RGMO/FGMO status

It was discussed and decided in 138thOCC meeting that all the utilities shall map RGMO/FGMO status in the SCADA system and do the cabling and other work on their own expense. Further RGMO/FGMO status mapping in SCADA was also approved in 37thTCC/40thNRPC meeting.

NRLDC representative informed that the RGMO status is **yet to be mapped** in SCADA for following plants:

- NHPC: Bairasiul, Salal, Tanakpur, Chamera-2, Uri-1, 2, Dulhasti, Parbati-3
- BBMB: All BBMB plants
- THDC: Koteshwar
- S.Cement
- JSW: Karcham
- Greenko: Budhil
- Everest Power: Malana-2
- AD Hydro
- Among the states Punjab, Rajasthan, Haryana and UP have mapped the RGMO/FGMO status for most of their control area generating stations.

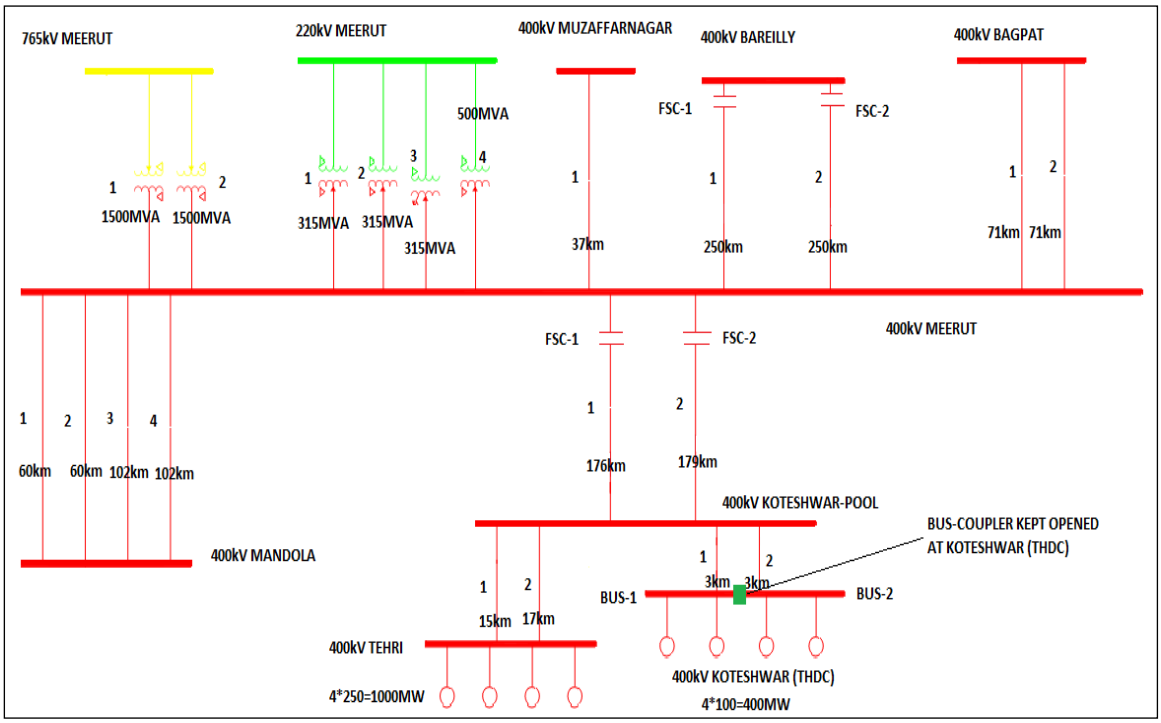
Koteshwar HEP representative stated that presently data transmission to NRLDC is being done through GPRS & OPGW. M/s IPCOMM, Germany make protocol converter has been installed for conversion of plant data from Modbus to IEC 101 protocol for data transmission. Configured data points in protocol converter has already been utilized for data transmission and few additional spare data points left have also been utilized for transmitting data pertaining to bus reactor at Koteshwar HEP. With this no more spare data points are available in protocol converter therefore additional data points are required to be configured in protocol converter for transmitting RGMO status to NRLDC. Assistance in this regard was sought from OEM of EM equipments of Koteshwar HEP i.e. BHEL & its vendor M/s Symmetric, however they have expressed their inability in modifying the existing data point configuration of protocol converter. Therefore matter is being taken up with OEM i.e. M/s IPCOMM Germany for assistance in this regard and after configuration of additional data points, RGMO status would be sent to NRLDC.

Constituents were requested to expedite the availability of RGMO/FGMO SCADA status to respective SLDCs and NRLDC.

16. Observance of Oscillations in the grid on 08th Aug 2018 due to tripping of one of the evacuation line from 400kV Tehri-Koteshwar complex (N-1 contingency of line outage):

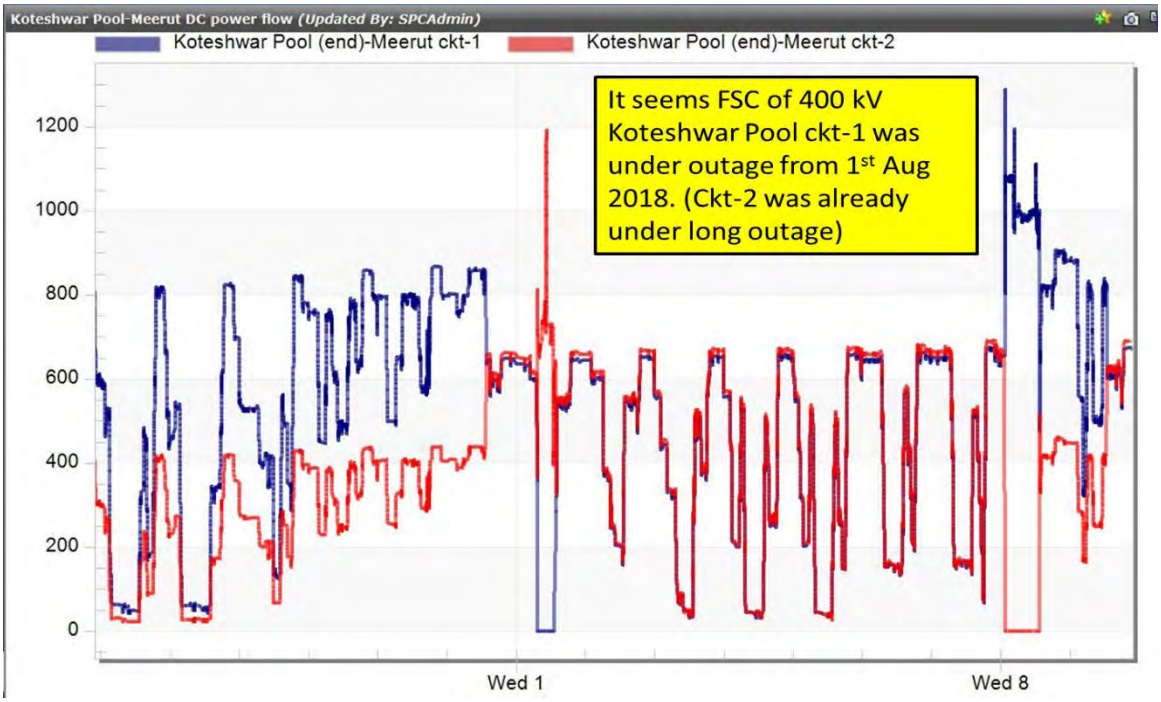
NRLDC representative stated the following:

Tehri HEP is the major hydro generating station with 1000MW (4*250MW) capacity and in its downtail Koteshwar (THDC) HEP with capacity of 400MW (4* 100MW). The main evacuation line from the Tehri-Koteshwar HEP complex is 176 kM long 400 kV Koteshwar Pool to Meerut D/C line with 50% series compensation of each circuit at Meerut end. Connectivity Diagram is as below:



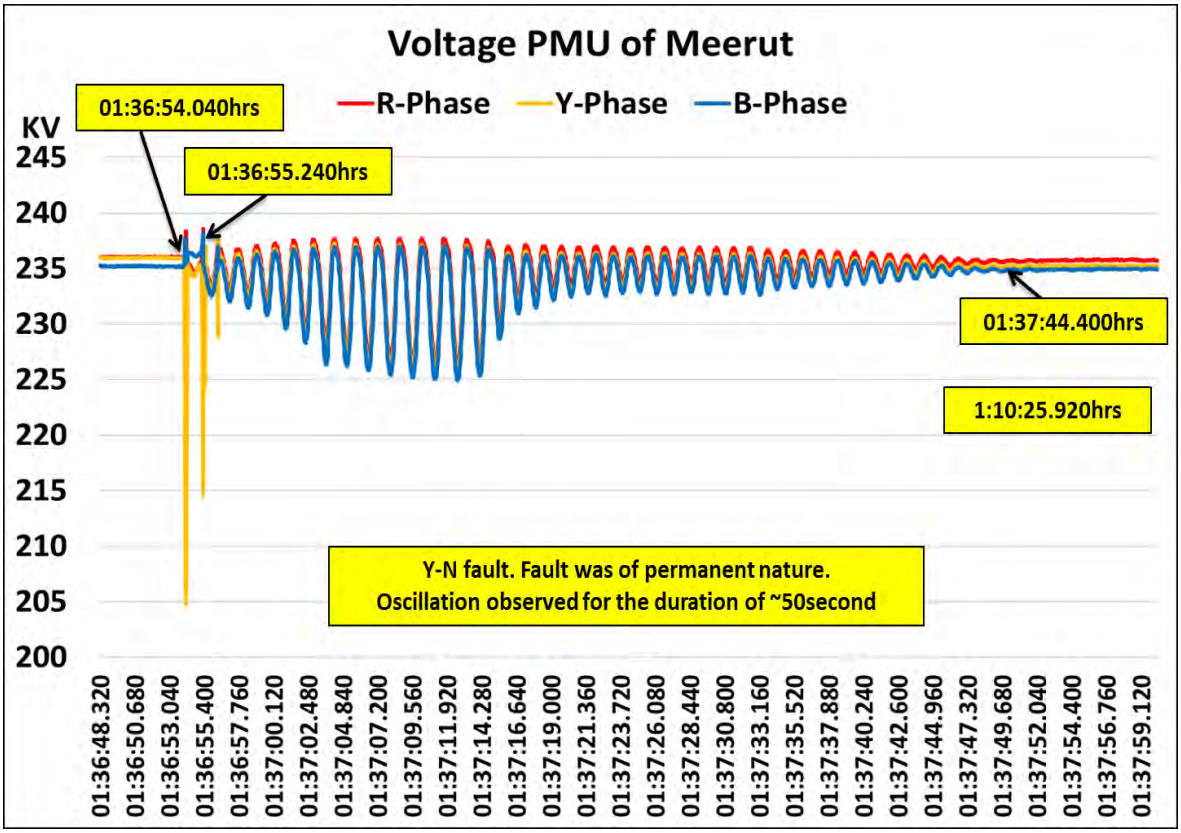
The antecedent generation of 1000 MW from Tehri HEP and 360 MW from Koteshwar HEP was being evacuated through on 400 kV Koteshwar Pool -Meerut ckt-1 & 2.

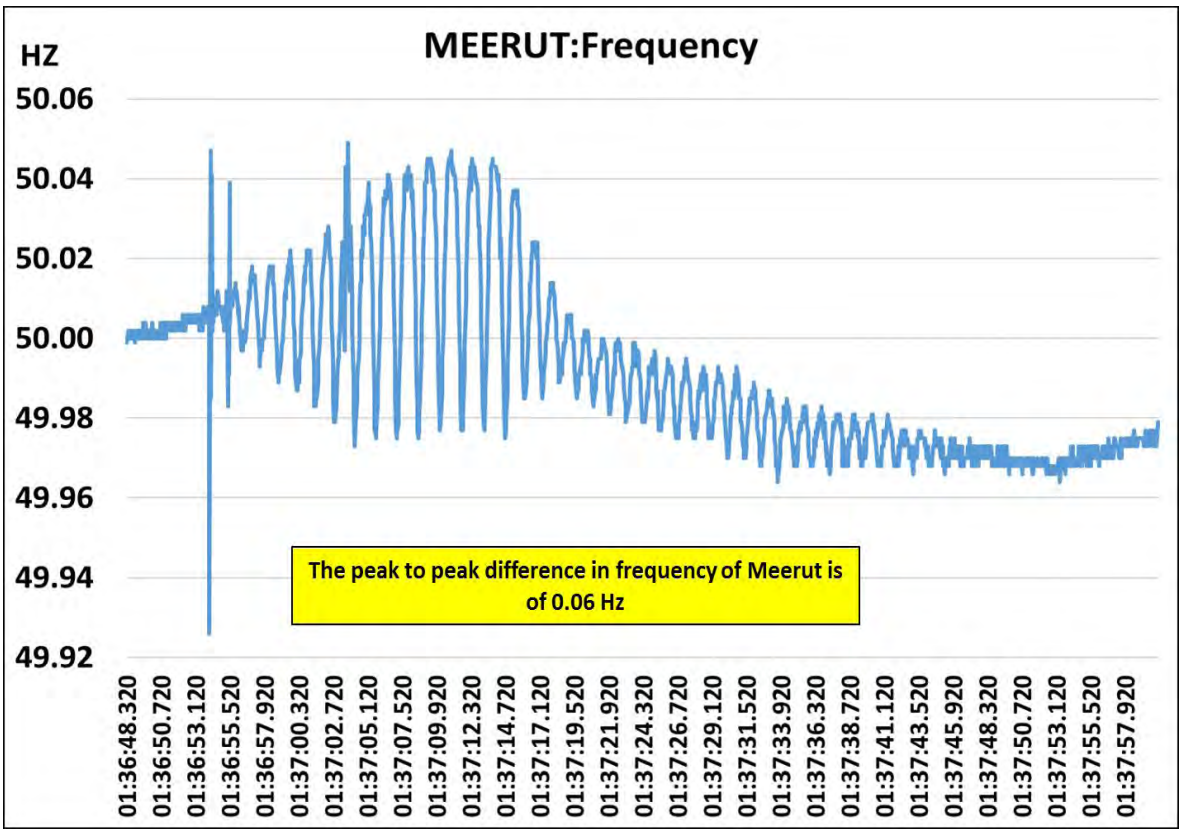
Fixed Series Compensation (FSC) of 400 kV Koteshwar Pool- Meerut- ckt-2 is out of service since 16th July 2015 except for brief period during July 2017 (01-13 Jul 2017). FSC of 400kV Koteshwar Pool -Meerut ckt-1 also went under outage on 1st Aug 2018. Thus at the incident time both the FSCs were out of service. SCADA plot of power flow of 400 kV Koteshwar Pool-Meerut ckt-1 & 2 is as below:

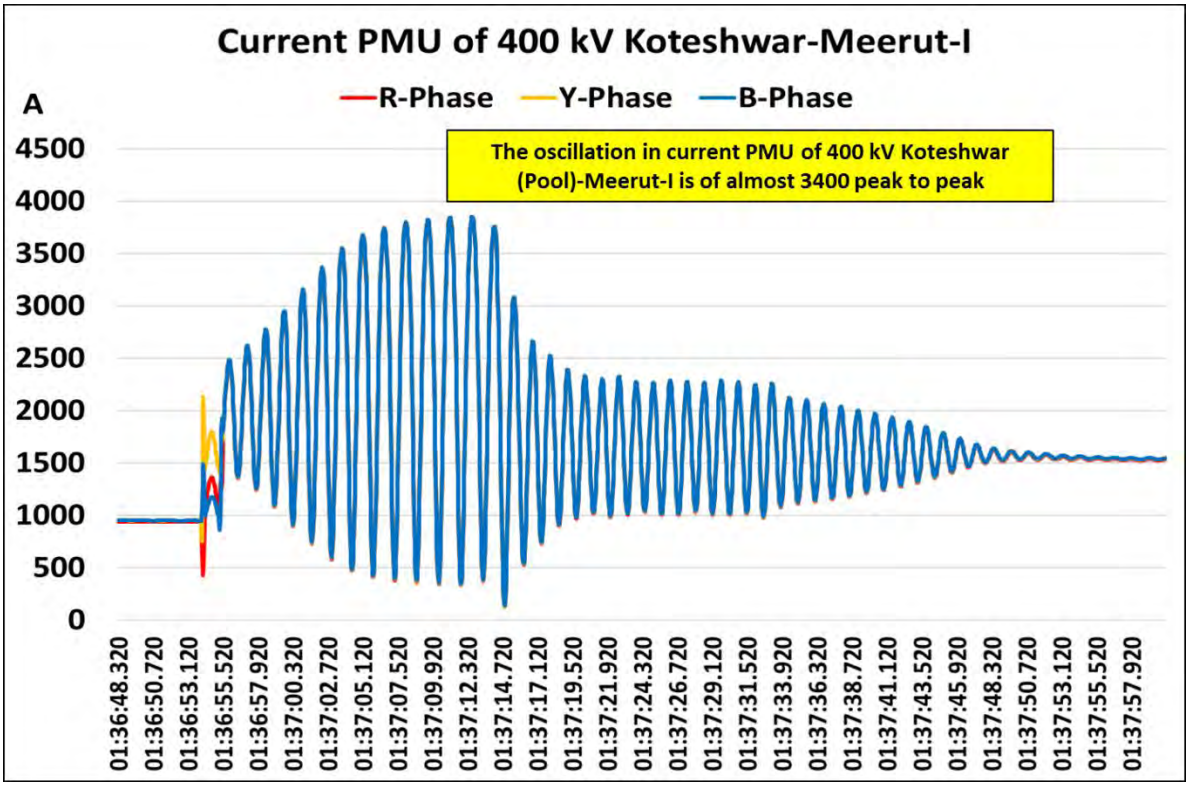


At 01:36hrs, 400 kV Koteshwar Pool –Meerut ckt-2 tripped on Y-N fault after unsuccessful auto reclosing. Line tripped on permanent nature of fault after auto reclosing of the line. After tripping of 400 kV Meerut-Koteshwar Pool ckt-2, power flow on ckt-1 reached more than 1200MW.

The outage of 400 kV Tehri-Koteshwar (Pool) ckt-2 caused severe oscillations of growing nature in the grid. The voltage & Frequency of Meerut PMU is given below:


Voltage PMU of Meerut
R-Phase
Y-Phase
B-Phase
KV
245
240
235
230
225
220
215
210
205
200
01:36:54.040hrs
01:36:55.240hrs
01:37:44.400hrs
1:10:25.920hrs
Y-N fault. Fault was of permanent nature.
Oscillation observed for the duration of ~50second
01:36:48.320
01:36:50.680
01:36:53.040
01:36:55.400
01:36:57.760
01:37:00.120
01:37:02.480
01:37:04.840
01:37:07.200
01:37:09.560
01:37:11.920
01:37:14.280
01:37:16.640
01:37:19.000
01:37:21.360
01:37:23.720
01:37:26.080
01:37:28.440
01:37:30.800
01:37:33.160
01:37:35.520
01:37:37.880
01:37:40.240
01:37:42.600
01:37:44.960
01:37:47.320
01:37:49.680
01:37:52.040
01:37:54.400
01:37:56.760
01:37:59.120


MEERUT:Frequency
HZ
50.06
50.04
50.02
50.00
49.98
49.96
49.94
49.92
The peak to peak difference in frequency of Meerut is of 0.06 Hz
01:36:48.320
01:36:50.720
01:36:53.120
01:36:55.520
01:36:57.920
01:37:00.320
01:37:02.720
01:37:05.120
01:37:07.520
01:37:09.920
01:37:12.320
01:37:14.720
01:37:17.120
01:37:19.520
01:37:21.920
01:37:24.320
01:37:26.720
01:37:29.120
01:37:31.520
01:37:33.920
01:37:36.320
01:37:38.720
01:37:41.120
01:37:43.520
01:37:45.920
01:37:48.320
01:37:50.720
01:37:53.120
01:37:55.520
01:37:57.920



The oscillations seems to damp only after tripping of one unit at Tehri HEP after 21 second on some protection.

765 kV Raichur-Sholapur I oscillations is of almost 65 MW peak to peak. Power flow of 765 kV Raichur-Sholapur-I is given below:-

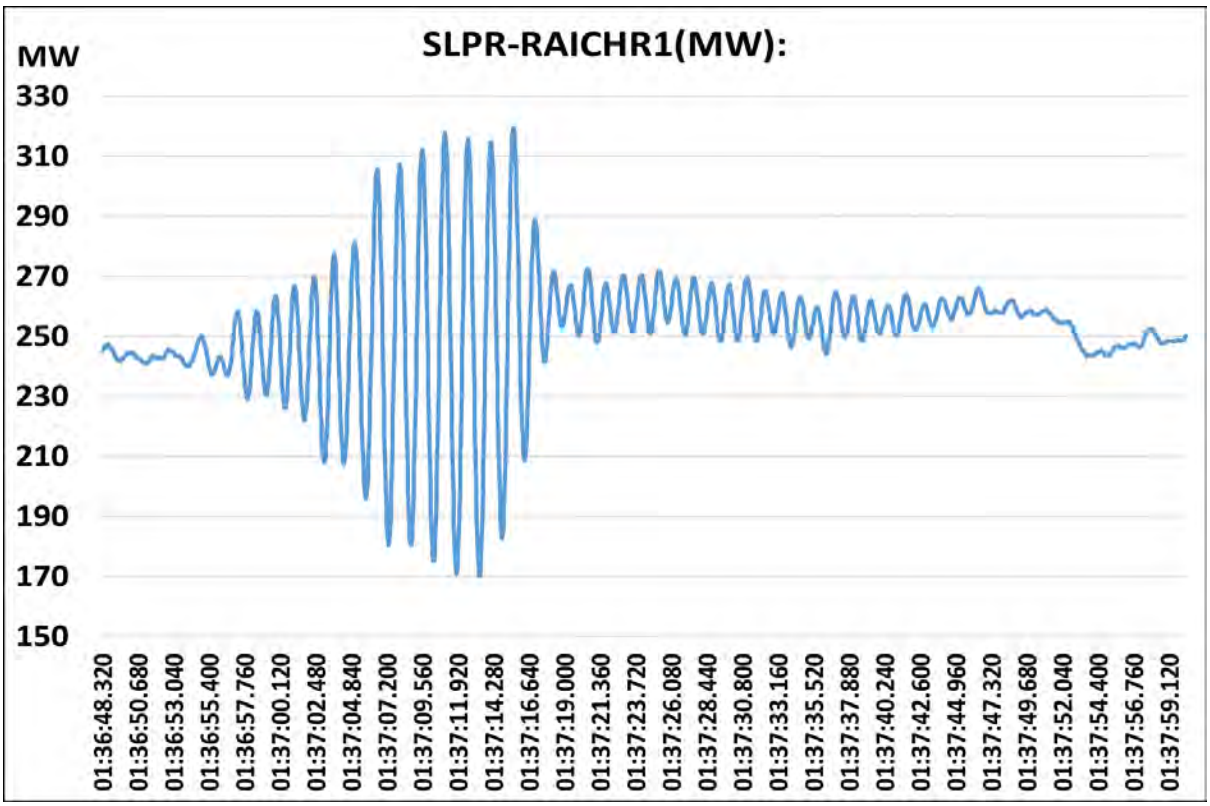


Fig:- Flow of 765 kV Raichur-Sholapur-I

The modal analysis carried out on few of the frequency signal from PMUs of Northern Region stations indicate negative damping for dominant mode of **0.675Hz**.

Although SPS was implemented at Koteshwar (Pool) with following logic:
"*If any one of the 400 kV Koteshwar-Meerut circuit trips and sum of antecedent power flow on both the circuit is more than 1200MW, one unit of 250 MW of Tehri HPS should be tripped instantaneously*"

However, during this event this SPS did not operate despite conditions for operation of SPS being prevalent.

In 141th OCC meeting, after incident of 09th Nov 2017 in which widespread oscillation observed for 50 second, it was decided to change the setting of 1200MW to 1100MW in SPS logic of Tehri Koteshwar complex.

Oscillations were very severe and could have impacted the safety and security of grid as well as that of units.

Tehri HEP representatives informed that during oscillation unit #1 tripped on dead fault protection (Settings: V < 70%, I > 100%). Other units didn't trip. The current was also high in unit #1 only among all the machines. They also raised concern about frequent tripping of 400kV Koteshwar-Meerut ckt in recent past due to which machines get subjected to severe oscillations.

NRLDC representative also stated that similar oscillation event also occurred at 06:33hrs of 20-Aug-18. During the event, df/dt relay also operated in Punjab. However, it was observed from PMU plot that the window for favorable condition of operation of df/dt was not more than 100ms.

The following action points were finalized:

- **At Tehri HEP, the setting of unit #1 dead fault to be checked. Further, the sensitivity of Unit #1 as compared to other units also needs to be checked.**
- **Full SPS including the functional logic needs to be checked at Koteshwar(PG)/Tehri HEP.**
- **In SPS logic, tripping of two units at Tehri HEP could also be thought of.**
- **In view of several fault incidents in recent past, strengthening of 400kV Tehri-Koteshwar-Meerut transmission lines to be looked into.**
- **Setting of df/dt realy operated in Punjab to be checked and shared.**
- **Any UFR, df/dt relay operation in any other state to be cheked and confirmed.**
- **Long outage of FSC of 400 kV Meerut-Koteshwar ckt-2 to be looked into and revival of FSC shall be expedited.**

- **AVR/ PSS tuning needs to be looked into for better tuning at Tehri and Koteshwar HEP.**
- **Reason of outage of FSC of 400 kV Meerut-Koteshwar ckt-1 (01 Aug to 08 Aug 2018) without informing to NRLDC to be informed and such future cases to be avoided.**
- **Auto reclosure issue of tie CB of 400 kV Meerut (end)-Koteshwar Pool ckt-2 to be checked and corrected.**

OCC requested respective utilities for affirmative action's on above points.

17. Oscillations observed in the grid on 25th & 29th July 2018 due to tripping of one of the evacuation line from 220 kV Dhauliganga HEP:

NRLDC representative stated the following:

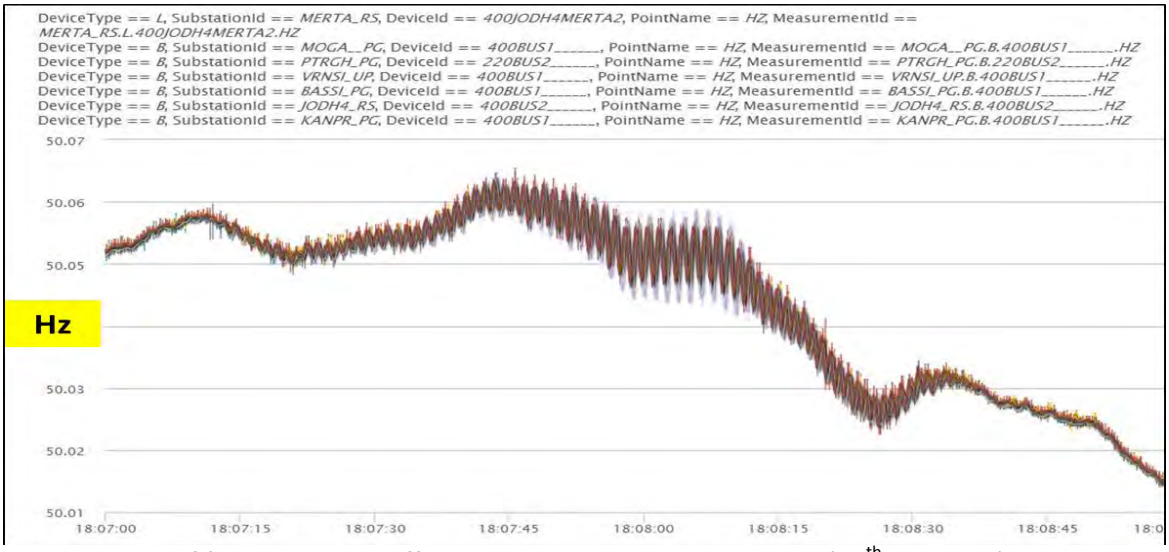
220 kV Dhauliganga station is connected with 220 kV Bareilly (UP) through two twin moose (400 kV charged at 220 kV) D/C line, in which one circuit has LILOed at 220 kV Pithoragarh (PG) (59km from Dhauliganga).

In last three months, three incident of growing nature of oscillations have been observed in the grid. Consolidated summary of these incident of growing nature of oscillation is tabulated below:

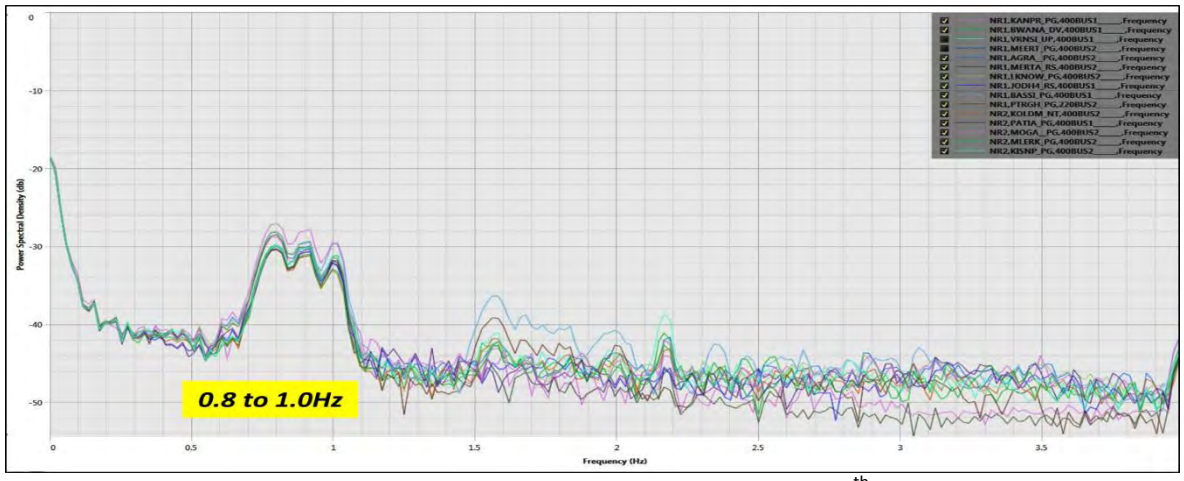
Particulars	**Event at 18:07hrs of 18.04.2018**	**Event at 14:49 hrs of 25.07.2018**	**Event at 16:56 hrs of 29.07.2018**
Antecedent Generation at Dhauliganga HEP	280MW	285MW	285MW
Event Brief	At Dhauliganga HEP, testing was underway from 17:00hrs of 18-Apr-18 to address the issue of oscillation observed at Dhauliganga HEP in the past. During this, as reported, full generation (280MW) at Dhauliganga was made to evacuate through one 220kV Pithoragarh ckt only. The testing also included different scenarios of PSS ON and OFF on different number of units (two units PSS ON and two units PSS off). Initiation of oscillations in the grid and resulted in tripping of unit number-1 at Dhauliganga. Immediate backing down (10MW from 70MW) was done at other units which resulted in	Tripping of 220 kV Dhauliganga-Pithoragarh ckt on B-N fault resulted into 285MW loading on Bareilly ckt. It further initiated the growing nature of oscillation in the system	Tripping of 220 kV Dhauliganga-Pithoragarh ckt on R-N fault resulted into 285MW loading on Bareilly ckt. It further initiated the growing nature of oscillation in the system

	damping of oscillations		
Faulted phase and duration	No fault, testing was underway	B-N fault & 100ms	R-N fault & 100ms
Dominant mode of oscillation (in Hz)	0.8Hz	0.8Hz	0.87Hz
Damping	Negative	Negative	Negative
Duration of Oscillation	2 minutes	24 second	13 second
Generation Loss (in MW)	70	285	285
Oscillation continued till	Tripping of one unit and manual generation backing down (how much MW)	Tripping of remaining circuit (220 kV Dhauliganga-Bareilly (UP)) in Z-1 and all the running units of Dhauliganga HEP	Tripping of remaining circuit (220 kV Dhauliganga-Bareilly (UP)) on out of step (OOS) protection and all the running units of Dhauliganga HEP

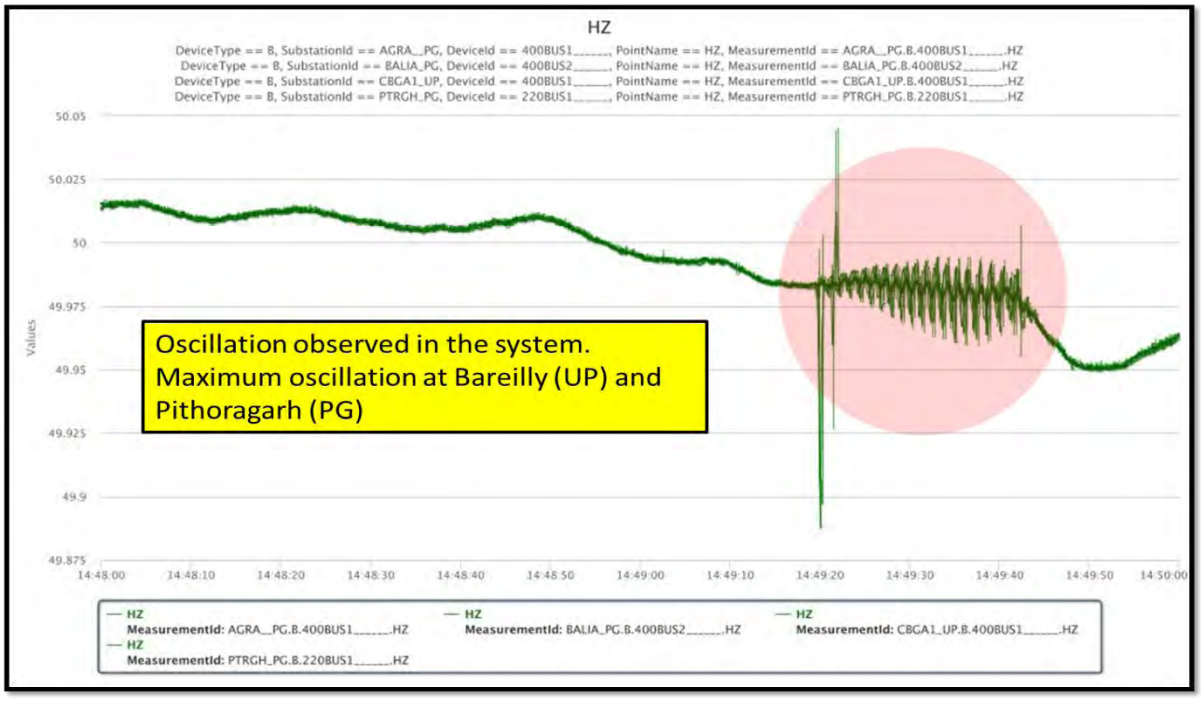
The impact of oscillation was widespread in the grid and oscillation also observed on Inter Regional lines from NR. PMU plot of frequency and voltage during oscillation is given below:



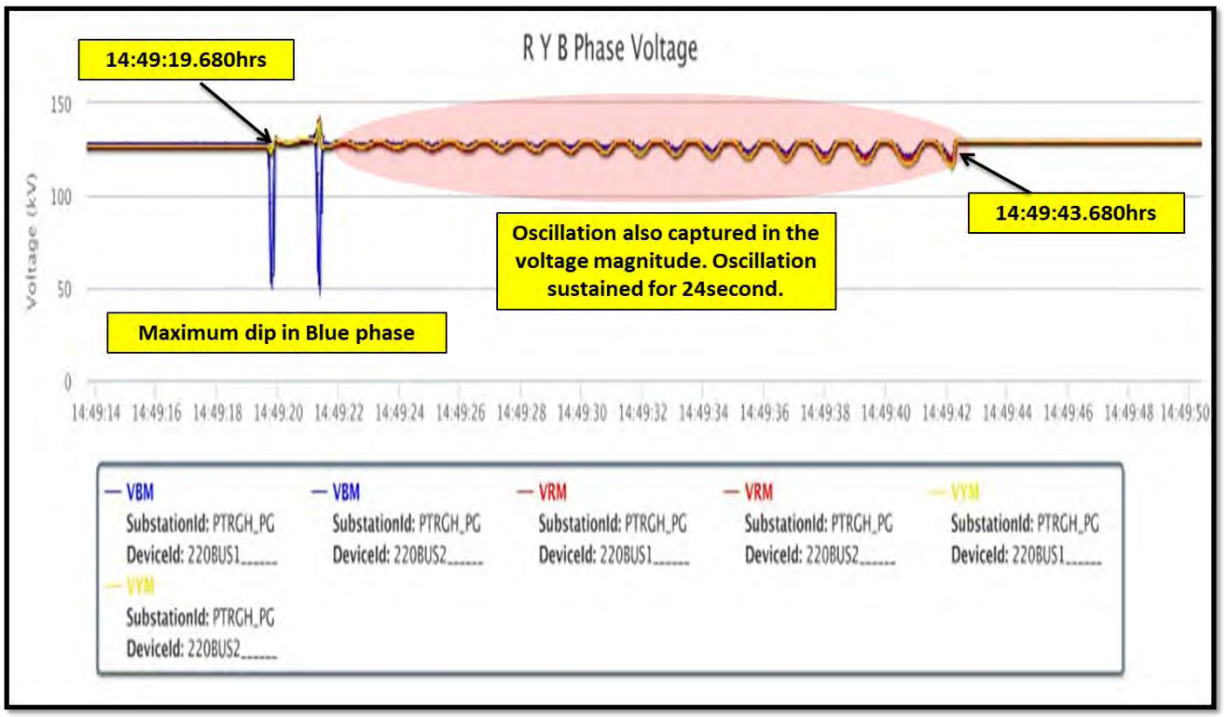
PMU plot of frequencies at different stations showing oscillation (18th Apr 2018)



Power Spectral Density showing dominant mode of oscillation (18th Apr 2018)

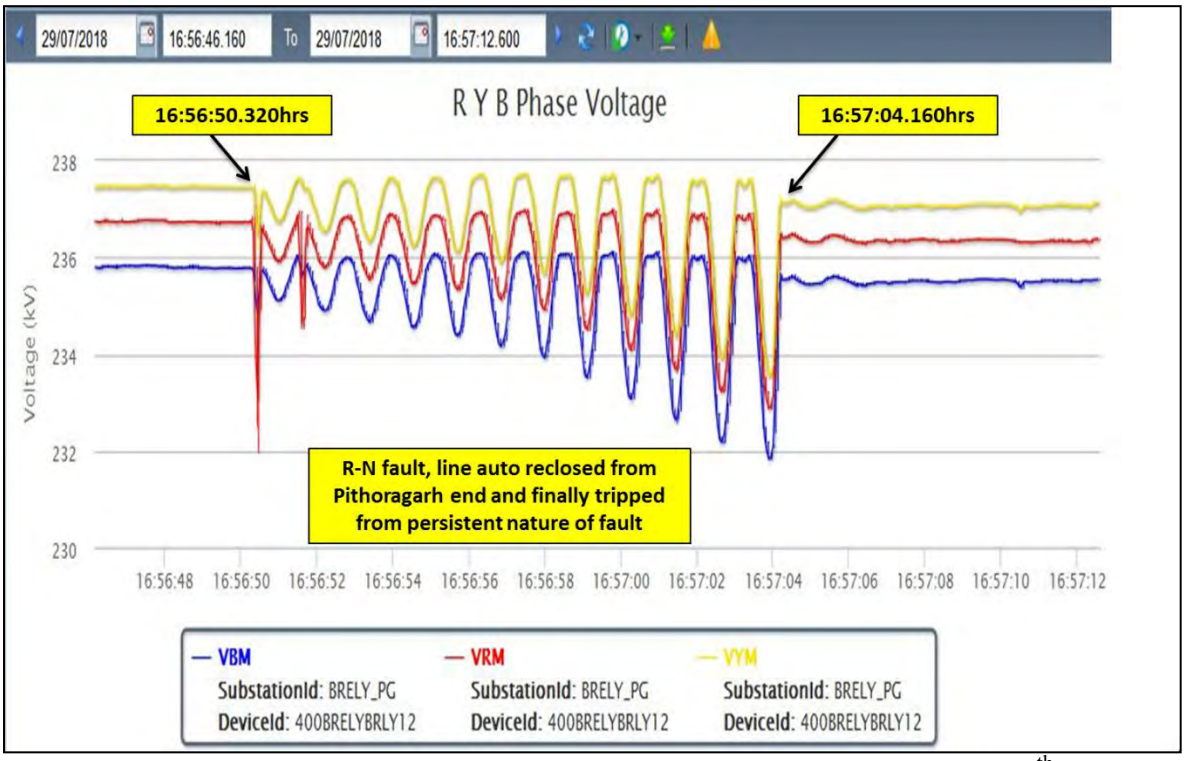


PMU plot of frequencies at different stations showing oscillation (25th July 2018)



PMU plot of Voltages at different stations showing oscillation and B-N fault (25th July 2018)

PMU plot of frequencies at different stations showing oscillation (29th July 2018)



PMU plot of Voltages at different stations showing oscillation and R-N fault (29th July 2018)

In this reference, letter dated 24th Apr 2018 and 30th July 2018 was already written, in which following were suggested to NHPC:

- Proper tuning/ retuning of PSS/AVR of the units at 220 kV Dhauliganga HEP
- SPS (System Protection scheme). With the following logic shall be implemented at 220 kV Dhauliganga HEP.
    - Probable logic of SPS could be: ***Trip two units at Dhauliganga HEP in case of tripping of one of the 220 kV outgoing lines from Dhauliganga HEP or power flow on any of the outgoing line become zero***

NHPC representative stated that SPS logic has been prepared on the basis of power flow on lines and would be shared and approved in upcoming PSC meeting.

NRLDC representative requested that PSS tuning shall be extensively carrired out and report to be shared. Further, the dynamic machine parameters are important to assess the dynamic behavior of the system and shall be shared by NHPC and other constituents as well.

OCC requested constituents to provide the respective details.

18. Observance of high shaft vibration in units of Dadri stage-2 during fault in near vicinity of the plant:

NRLDC representative stated that as discussed in 149th OCC meeting, on 28th June 2018, at 01:17 Hrs, Y-B phase to phase fault occurred in 400 kV Dadri-G. Noida line. All three phase of the line tripped and cleared the fault within 100ms. 400 kV Dadri-Panipat ckt-1 also tripped immediately during the fault from Panipat (BBMB) end only. 490MW unit-5 & 6 also tripped within 10second of the incident on mechanical shaft vibration. Location of fault is very near to gantry of the Dadri end of 400 kV Dadri-G. Noida line.

On 09th Aug 2018, one special meeting was called in between POSOCO and NTPC officials on request of NTPC. The MoM are attached at **Annexure-II**. In this meeting, NTPC representative informed that on 25th July 2018 and 03rd Aug 2018, again vibration observed in the machine of Dadri stage-2 (unit-4 & 5). On these days also fault was very near to Dadri station in Harsh Vihar ckt-1 and G. Noida line respectively. Ferro resonance phenomena was suspected due to FSC installed at 400 kV Ballabhgarh (PG) end of 400 kV Ballabhgarh-Kanpur ckts.

Considering the view of generators the FSC of 400 kV Ballabhgarh-Kanpur ckts were taken out of service to check if it has any relevance with vibration of Dadri stage-2 units.

It was for the information of all the members.

List of participants in the 150th OCC meeting held on 21st August 2018, New Delhi

BBMB

Name	Designation	Contact No.	Email
ANIL GAUTAM	DIR. Power Regulatio	9417216047	dirpr@bbmb.nic.in
Amandeep Singh	Power Controller	9478200223	powerc@bbmb.nic.in

NHPC

Name	Designation	Contact No.	Email
Vijay Kumar	Manager (E)	9818696821	nhpcgmcheef@gmail.com
S.K. Das	Mgr (E)	9717788724	sdas_nhpc@yahoo.co.in.

NPCIL/NAPS/RAPS

Name	Designation	Contact No.	Email
Sanjay Kumar	STE (E&I)	9412768003	Sanjay_kumar@npcil.co.in
ALOK SARASWAT	STE (E&I) RAPS 5&6	9413356589	aloksaraswat@npcil.co.in

NRLDC

Name	Designation	Contact No.	Email
राजीव पोरवाल	उ० स० प्र०	9871581133	rk.porwal@posoco.in
H.K. Chawla	DGM	9650074803	hkchawla12@gmail.com
कमालदीप	उ० प्रबंधक	9971700422	Kamaldeep@posoco.in
Alok Kumar	Chief Mgr	9999039321	alok.kumar@posoco.in
PAIRES1	Manager	9599225707	pawan.khandelwal@posoco.in

NTPC

Name	Designation	Contact No.	Email
SANDEEP GUPTA	AGM (OS) CC	9650994688	sandeepgupta@ntpc.co.in
SHAILESH DHEMAN	DGM (OS) RCC	9650990166	shaileshdhemana@ntpc.co.in
SMUKHOPADHYAY	GM (OS/CenPEEP), NR	9453008341	smukhopadhyay@ntpc.co.in
S.P. Kanawaria	DGM(OS) Comml	9650996953	SPKESARWANI@NTPC.CO.IN

PGCIL

Name	Designation	Contact No.	Email
H.C.CHAUDHARY	Dy. G M	9001890337	hcchaudhary@powergridindia.com
BIMAL KUMAR	C M	6393542588	bimalkumar@Powergridindia.com
S.C. Sharma	C M	9873918528	sc.sharma@powergridindia.com
R.K. Raman	C M	9971399089	rkraman2@powergridindia.com
Praveen Kumar	Manager, NR-II	9906546606	mr.praveenkumar@powergridindia.com

SJVNL

Name	Designation	Contact No.	Email
RAJEEV AGARWAL	DGM(C&SO)	9418045426	rajeev_sjvnl@rediffmail.com

THDC

Name	Designation	Contact No.	Email
1. Bhagat Singh	Sr. Manager (E&MD)	9456165750	bsnapalchiyal@gmail.com
2. Ganesh Mishra	Manager (O&M), KHEP	8126821766	gpmishra14@gmail.com
3. Anil Raghuwanshi	Manager (OS&D), Tehri	8755900785	anilraghuwanshi1982@gmail.com
4. Sachin Vayas	Dy. Mgr (O&M), Tehri	8191000550	sachinvayas.12@gmail.com

DTL

Name	Designation	Contact No.	Email
Naveen Goel	Manager, SLDC, Delhi	9999533950	naveengoel06@gmail.com
Lovleen Singh	GM (T) DTL	9999533659	gm.pmdms@dtl.gov.in
S. K. Sinha	DGM (T) SLDC	9999533673	sinha.surendra@yahoo.com
Paritosh Joshi	Mgr (T) Protection	9999533533	paritoshjoshi2013@gmail.com

HVPNL-HPGCL-HPPC

Name	Designation-Org.	Contact No.	Email
Munish Satija	XEN/SLDC HVPNL	93150-16211	xen.shift@gmail.com
N.C. MAGGAR	PCL SLDC	9466219042	sldchayaner@gmail.com

~~HPSEBL~~ PSTCL-PSPCL

Name	Designation	Contact No.	Email
Er. Manjit Singh	DYC.E/SLDC (op.)	96461-18004	se-sldcop@Pstcl.org
Er. Akshy Garg	ASE/SLDC	96461-18014	~~PCPseb@gmail.com~~
Er. Iqbal Singh	ASE/PSPCL	96461-22263	PcPseb@gmail.com
Er. Nikhil Garg	AEE/SLDC (op.)	96461-55394	ase-sldcop@Pstcl.org

~~PSTCL-PSPCL~~ HPSEBL

Name	Designation	Contact No.	Email
Er. Rohit Kashyap	AEE, HPSLDC Totu Shimla	9418004910	ksrohitss@gmail.com
Er. Deepak Uppal	DY. CE, PR/HPSLDC Shimla	9418109169	pcshimla2003@gmail.com
Er Ravinder Kumar	SR. XEN, HPSLDC	94187-74042	sehpsldc@gmail.com

RVPNL-RRVUNL-RDPPC

Name	Designation-Org.	Contact No.	Email
A.K. ARYA	SE (SOLD), RVPNL, Jaipur	9414061066	se.ldrvpnl@gmail.com
Kamal Patidar	XEN (SOLD), RVPN, Jaipur	9413382632	—do—
Mohana Kumar. M.B	XE(PP), RRVUNL, Jaipur	9413349628	pp.rvun@gmail.com
R. N. Vasudeva	SE (SLM) RVUNL	9660560601	sppcstn@gmail.com

UPPCL-UPPTCL-UPRVUNL

Name	Designation-Org.	Contact No.	Email
Pankaj Saxena	EE- UPPTCL	9415902780	smart.saxena@gmail.com
Brijesh Kr. Singh	EE, UPRVUNL	9415901993	com-to@uprvunl.org
Sanjay Jaiswal	AE, UPSLDC	9891738624	shaileyjaiswal0907195@gmail.com
Chandra Prakash	EE, UPSLDC	9415233474	—
Sunil Kr. Maurya	AE, UPSLDC	9794301969	Mauryasunilkumar372@gmail.com

PTCUL

Name	Designation-Org.	Contact No.	Email
VINAYAK SHAILY	Executive Engineer	7088179454	Vinayak-shailye@ptcul.org

APCPL

Name	Designation-Org.	Contact No.	Email
Amit Hooda	Manager	9416212595	amit.hooda01@gmail.com

V. K. Gupta — AE (SOLD), RVPNL Jaipur — 9413383201 — s.e.ldrvpnl@gmail.com

Adani Power Ltd.

Name	Designation-Org.	Contact No.	Email
Manoj Taunk	GM/Adani Power Ltd	9099005517	manoj.taunk@adani.com
Nitesh Ranjan	AGM (ATL)	9050009692	nitesh.ranjan@adani.com

AD Hydro Power Ltd.

Name	Designation-Org.	Contact No.	Email

Jaiprakash Power Ventures Ltd.

Name	Designation-Org.	Contact No.	Email

NRPC

Name	Designation	Contact No.	Email

TSPL (Talwandi Sabo Power Ltd.) – Vedanta

Name	Designation	Contact No.	Email
Amit Mittel	GM – Power Sales, Strategy & Corporate Affairs	8146628263	(amit.mittal@vedanta.co.in.)

TPDDL

Name	Desgn.		
P. Devanand	Addl. GM (PSC & COS)	9871800506	p.devanand@tatapower-ddl.com

Manikaran Power Ltd.

Amresh Khosla (Director) 9971288477 amresh@manikaranpowerltd.in

Navjeet Singh Kalsi (Managing Director) 9999886231

NSK@MANIKARANPOWERLTD.IN

CEA

Shubhender Singh (Asst. Director) 9555450627

Shubhender.singh@gov.in

List of participants in the 150th OCC meeting held on 20th August 2018, New Delhi

Name	Designation	Contact No.	E-mail
SHAILESH DHEMAN	DGM(OS) RCC, NTPC	9650990166	shaileshdheman@ntpc.co.in
C.B. OJHA	AGM(EMD) NTPC DADRI	9650900709	Chandrabhushanojha@ntpc.co.in
TABISH ADEEL	DGM (Opn), NTPC	7458012490	tabishadeel@ntpc.co.in
ALOK SARASWAT	Sr. Tech. Engg., NPCIL	9413356589	aloksaraswat@npcil.co.in
Vijay Kumar	Manager (OSM)	9818696821	vijay.kumar239@gmail.com
KAMAL PATIDAR	XEN(SOLD), RVPN, JP	9413382632	se.ldrvpnl@gmail.com.
A.K. ARYA	SE(SOLD), RVPN, JP	9414061066	se.ldrvpnl@gmail.com
V.K. Gupta	AEn(SOLD) RVPN	9413383201	se.ldrvpnl@gmail.com
Sunil Kumar Maurya	AE, UPSLDC Lucknow	9794301969	mauryasunilkumar372@gmail.com
Chandra Prakash	EE, UPSLDC Lucknow	9415233474	———
BIMAL KUMAR	CM, Powergrid, NRJ	6393592588	bimalkumar@powergridindia.com
H.C. CHAUDHARY	DGM, Powergrid, NR-I	9001890337	hcchaudhary@powergridindia.com
Sudheer Tallur	Dy. Manager, NLDC	9599113682	sudheer@posoco.in
ASHOK KUMAR	Chief Manager	9971089954	ashokekr@posoco.in
RK Raman	Chief Manager	9971399089	rkraman@powergridindia.com
G. Mishra	Chief Manager	9910953988	gmishra60@yahoo.com
H. K Chawla	DGM	9650074801	hk.chawla12@gmail.com
AKbar Ali	Engineer, NLDC	9599335212	Akbar Ali. akbar5788@gmail.com
KAMALDEEP	Dy. Manager, NRLDC	9971050422	Kamaldeep Kmaldeep@posoco.in
Praveen Kumar	Manager, PG, NR-II	9906546606	mr.praveenkumar@powergridindia.com
Dipak Kumar,	SE(S-3) CPCC NRLDC	9971114822	dipakkumar@powergridindia.com
Nitesh Ranjan	AGM (TRANS)	9050009692	nitesh.ranjan@adani.com

ANNEXURE 1A

पावर ग्रिड कारपोरेशन ऑफ इंडिया लि0
उ. क्षे. 1 मुख्यालय, नई दिल्ली

Ref: NR-1/RHQ/AM/CPCC/18 Date: 17.08.2018

To,

The S.E. (Operation),

Northern Regional Power Committee

18-A, Shaheed Jeet Singh Marg

Katwaria Sarai, New Delhi-110016

REF: Record of minutes of 149th OCC meeting held on 18/07/18.

SUB Correction in "Confirmation of minutes" (149th OCC)

Dear Sir,

In subject reference to the minutes of 149th OCC held on18/07/18, the confirmation of the record of the minutes, our comments are as:

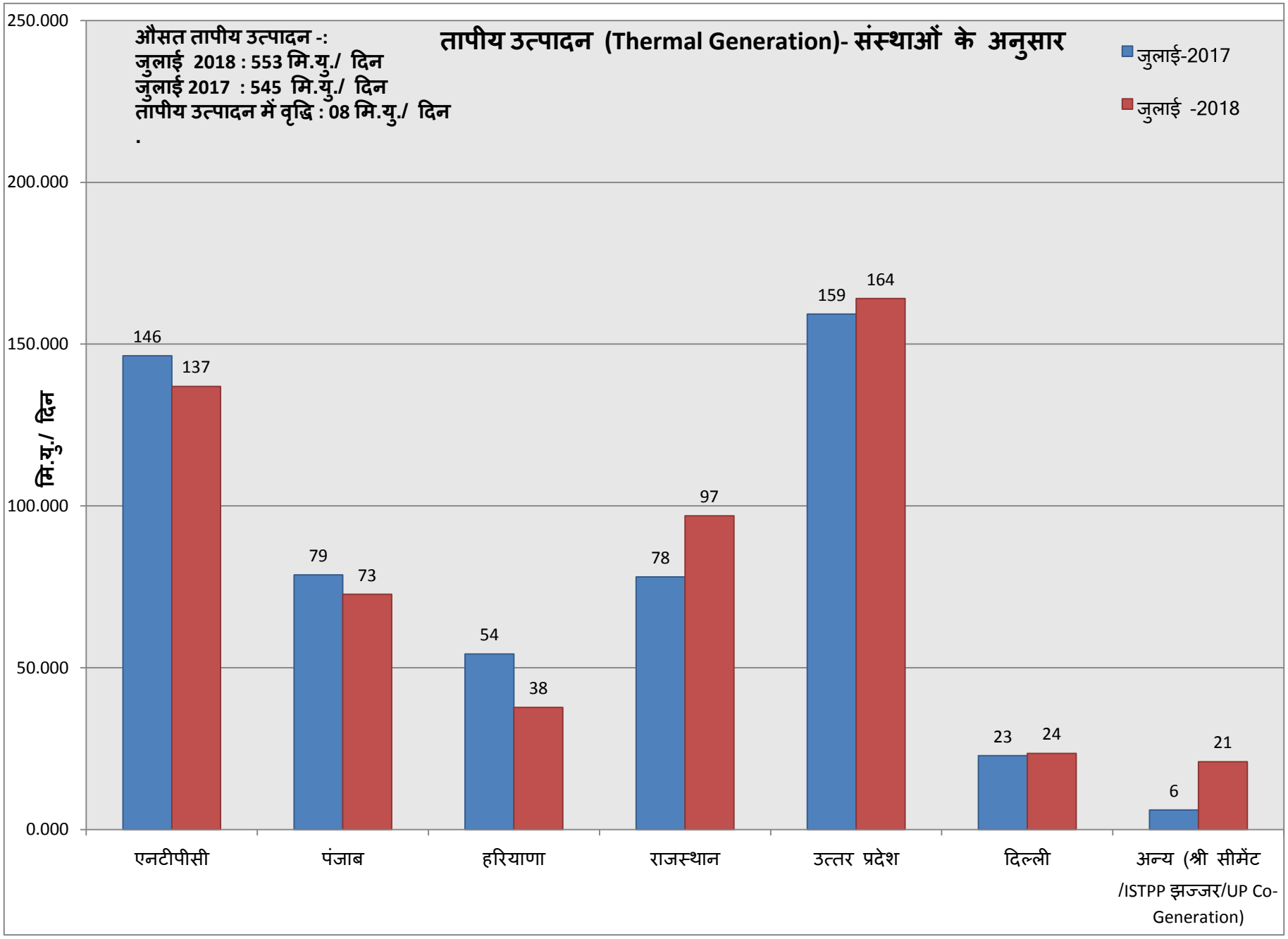
The first line of Item-Para AA2 of said record, the first line **"However, Members of the sub-committee were of the view that no such amendment was required as no such decision in the OCC was taken"** may kindly be deleted as the same was not as per discussion/deliberation regarding the subject item.

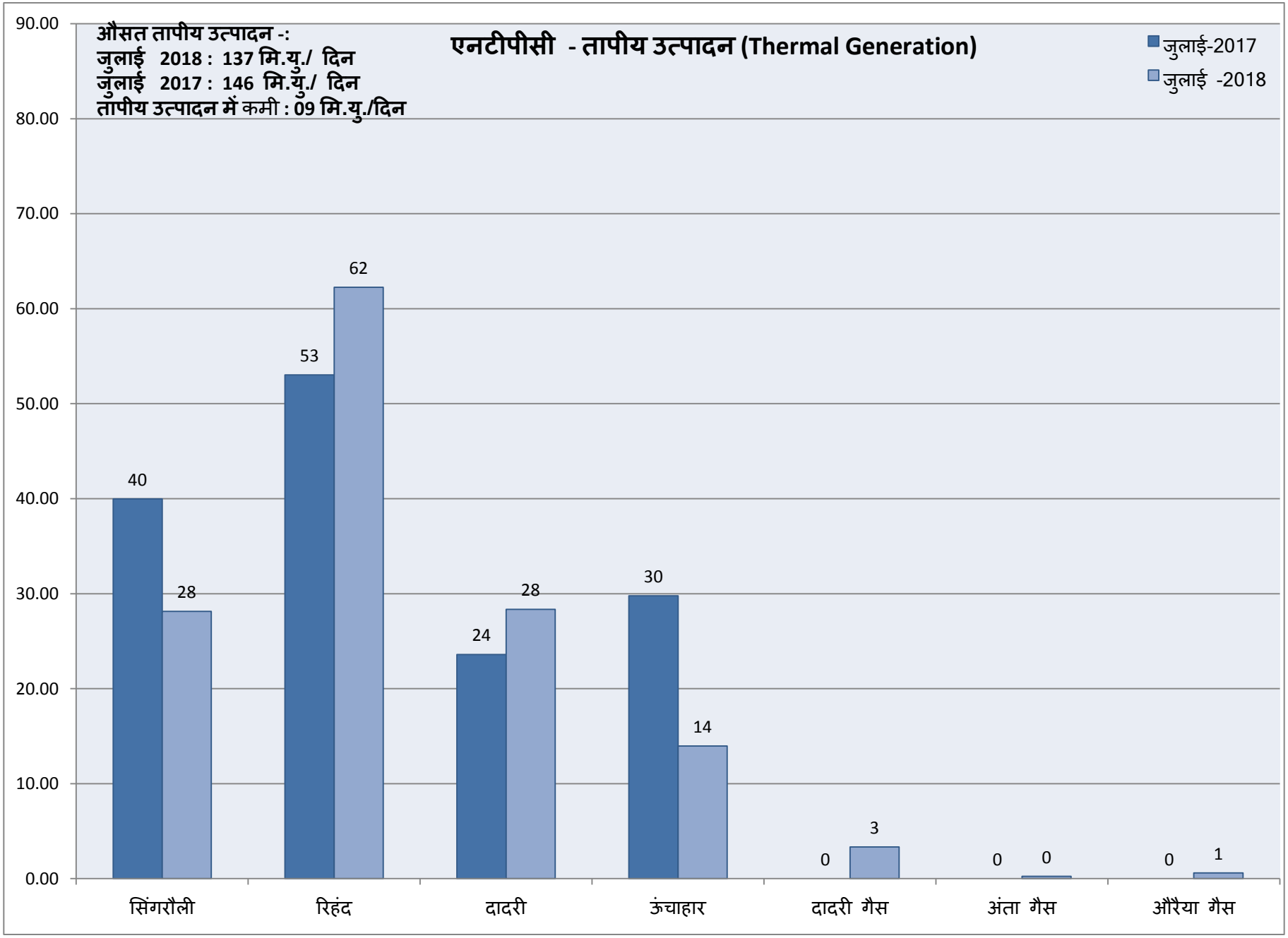
Thanking you

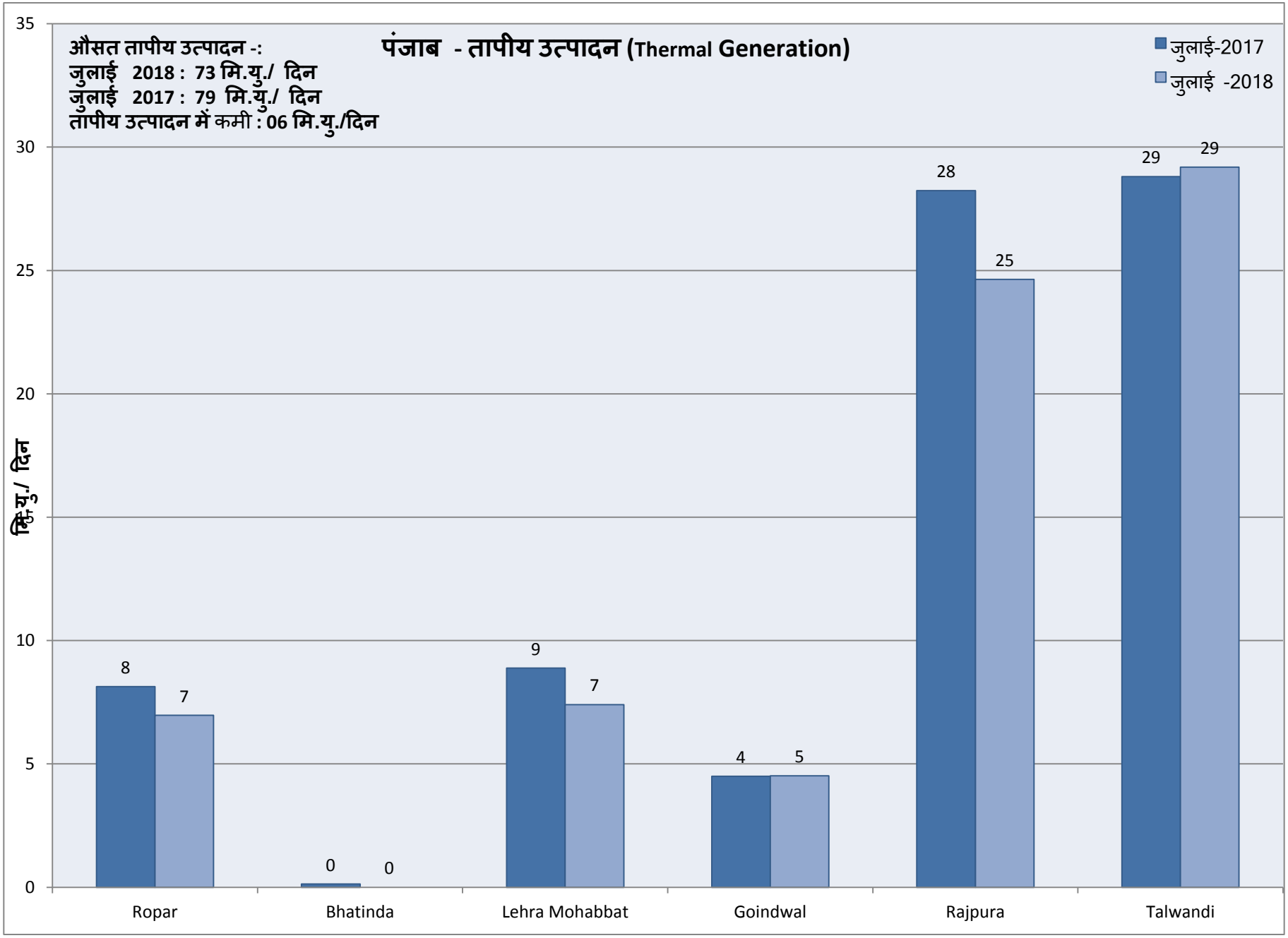
17/08/2018

(R. N. Gupta)
DGM (AM), NR-I

ANNEXURE IIA

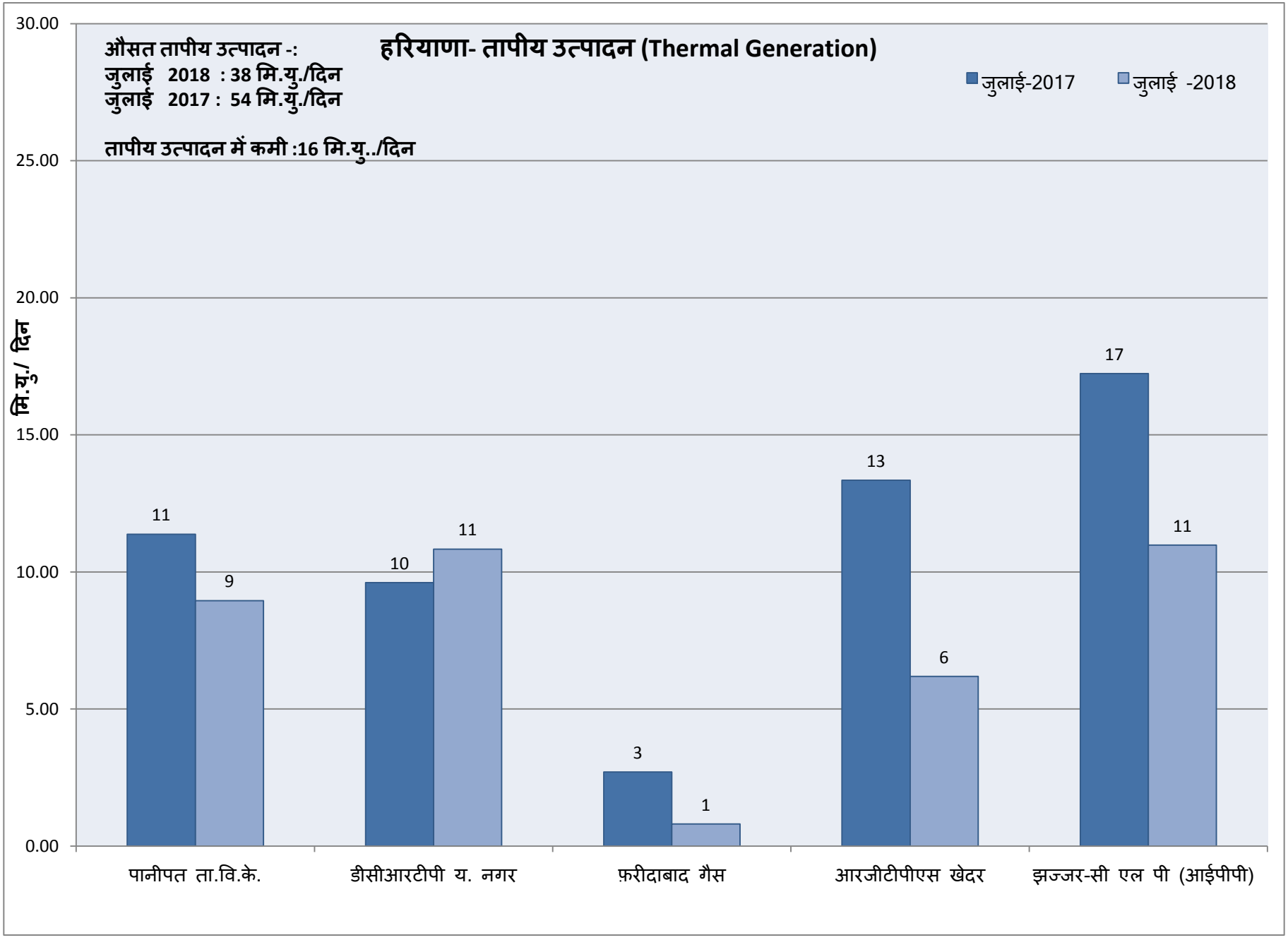



औसत तापीय उत्पादन -:
जुलाई 2018 : 137 मि.यु./ दिन
जुलाई 2017 : 146 मि.यु./ दिन
तापीय उत्पादन में कमी : 09 मि.यु./दिन
एनटीपीसी - तापीय उत्पादन (Thermal Generation)
जुलाई-2017
जुलाई -2018
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
40
28
53
62
24
28
30
14
0
3
0
0
0
1
सिंगरौली
रिहंद
दादरी
ऊंचाहार
दादरी गैस
अंता गैस
औरैया गैस

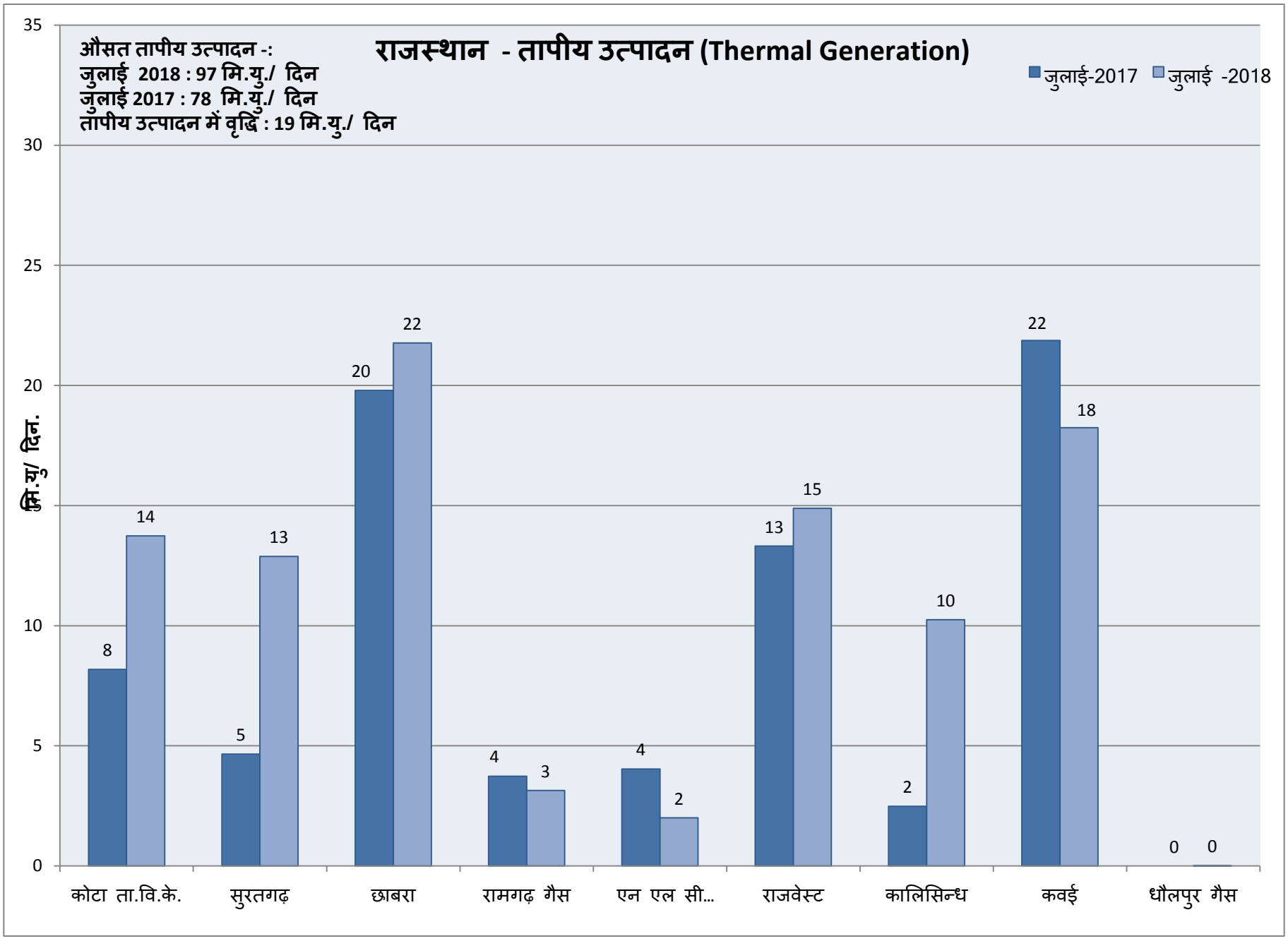

औसत तापीय उत्पादन -:
जुलाई 2018 : 73 मि.यु./ दिन
जुलाई 2017 : 79 मि.यु./ दिन
तापीय उत्पादन में कमी : 06 मि.यु./दिन
पंजाब - तापीय उत्पादन (Thermal Generation)
जुलाई-2017
जुलाई -2018
मि.यु./ दिन
35
30
25
20
10
5
0
8
7
0
0
9
7
4
5
28
25
29
29
Ropar
Bhatinda
Lehra Mohabbat
Goindwal
Rajpura
Talwandi

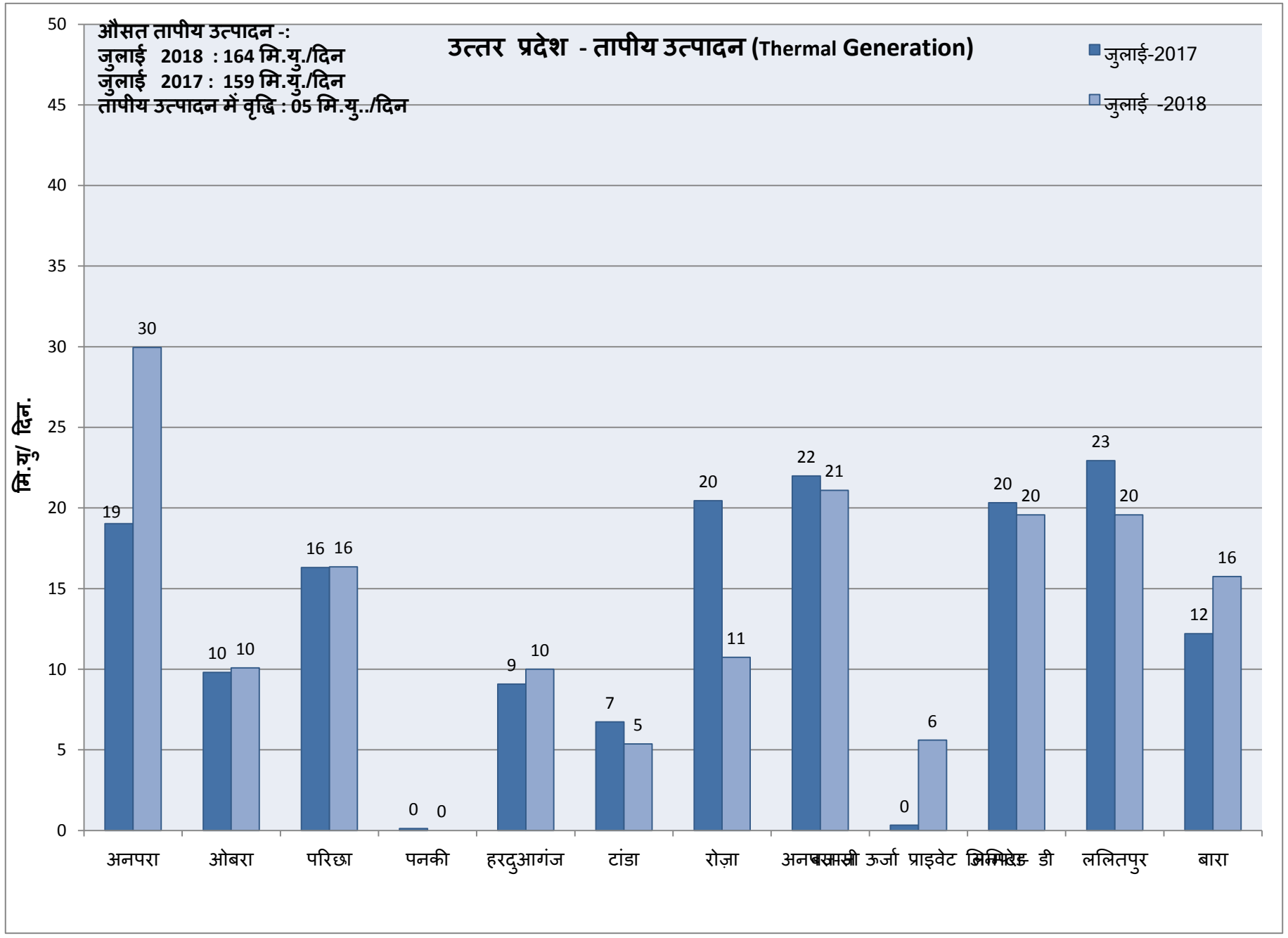
औसत तापीय उत्पादन -:
जुलाई 2018 : 38 मि.यु./दिन
जुलाई 2017 : 54 मि.यु./दिन

तापीय उत्पादन में कमी :16 मि.यु../दिन



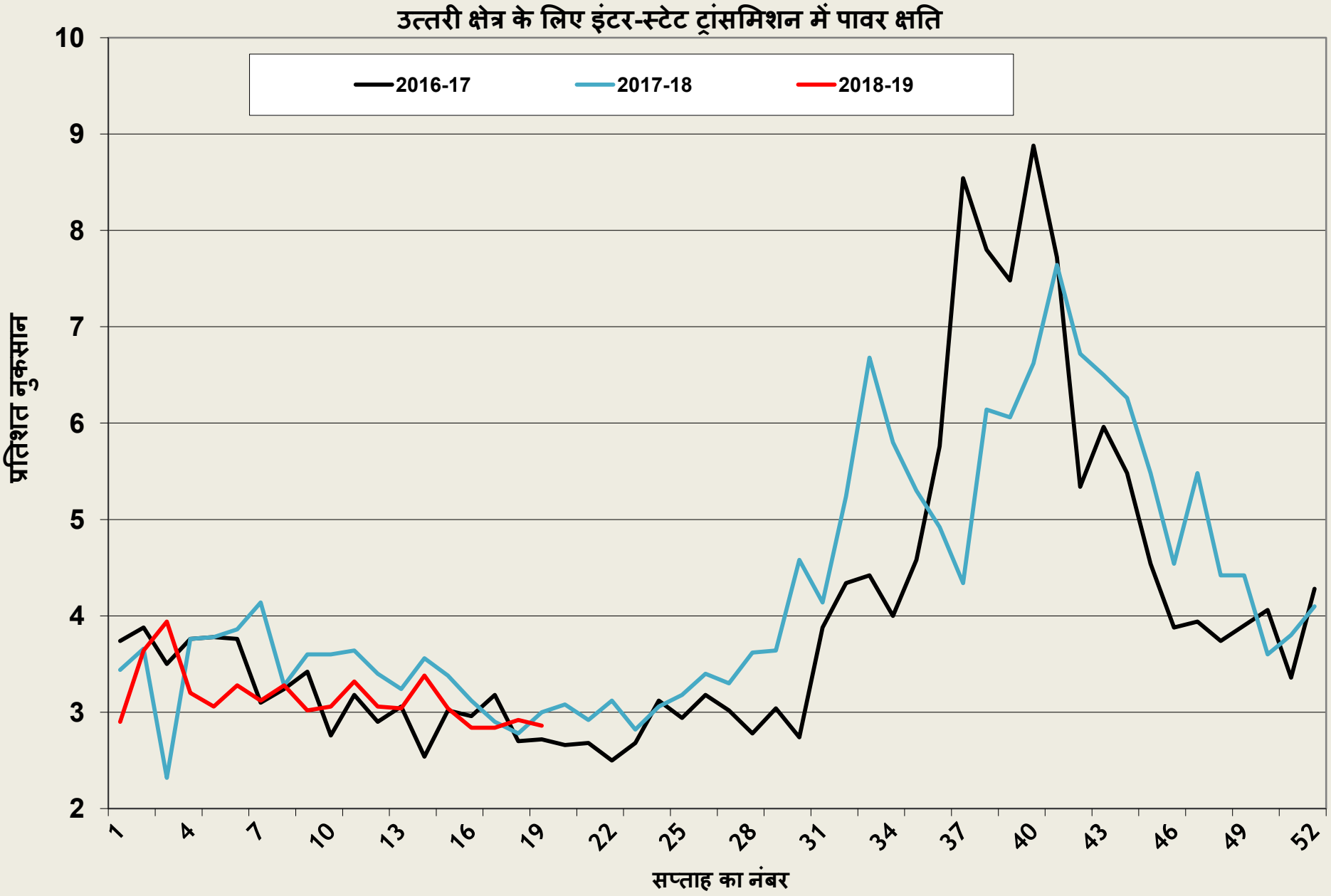
औसत तापीय उत्पादन -:
जुलाई 2018 : 97 मि.यु./ दिन
जुलाई 2017 : 78 मि.यु./ दिन
तापीय उत्पादन में वृद्धि : 19 मि.यु./ दिन




औसत तापीय उत्पादन -:
जुलाई 2018 : 164 मि.यु./दिन
जुलाई 2017 : 159 मि.यु./दिन
तापीय उत्पादन में वृद्धि : 05 मि.यु../दिन
उत्तर प्रदेश - तापीय उत्पादन (Thermal Generation)
जुलाई-2017
जुलाई -2018
मि.यु/ दिन.
50
45
40
35
30
25
20
15
10
5
0
19
30
10
10
16
16
0
0
9
10
7
5
20
11
22
21
0
6
20
20
23
20
12
16
अनपरा
ओबरा
परिछा
पनकी
हरदुआगंज
टांडा
रोज़ा
ऊर्जा
प्राइवेट
डी
ललितपुर
बारा

ANNEXURE II B

ट्रांसमिशन में पावर क्षति



एस.टी.ओ.ए (STOA) का सारांश– जुलाई 2017 vs जुलाई -2018

'ट्रांसेक्शन टाइप' के आधार पर वर्गीकृत

अनुमोदनों की संख्या			
		जुलाई-17	जुलाई -18
अगले दिन का (DA)	अंतः क्षेत्रीय	124	286
	अंतर क्षेत्रीय	560	564
आकस्मिक (Contingency)	अंतः क्षेत्रीय	117	153
	अंतर क्षेत्रीय	404	166
पहले आओ पहले पाओ (FCFS)	अंतः क्षेत्रीय	20	32
	अंतर क्षेत्रीय	12	10
अग्रिम (AD)	अंतः क्षेत्रीय	16	28
	अंतर क्षेत्रीय	32	40
कुल		1285	1279
ऊर्जा स्वीकृत (एम.यू.)			
अगले दिन का (DA)	अंतः क्षेत्रीय	73.63	381.99
	अंतर क्षेत्रीय	304.58	330.52
आकस्मिक (Contingency)	अंतः क्षेत्रीय	77.17	99.77
	अंतर क्षेत्रीय।	90.58	64.04
पहले आओ पहले पाओ (FCFS)	अंतः क्षेत्रीय	786.23	186.02
	अंतर क्षेत्रीय।	5.03	161.00
अग्रिम (AD)	अंतः क्षेत्रीय	1260.43	1862.77
	अंतर क्षेत्रीय	681.99	2375.8
कुल		3279.63	5461.9

अंतः/अंतर-क्षेत्रीय लेन-देन के आधार पर वर्गीकृत

अनुमोदनों की संख्या		
	जुलाई-17	जुलाई-18
अंतः क्षेत्रीय	277	499
अंतर क्षेत्रीय	1008	780
कुल	1285	1279
ऊर्जा स्वीकृत (एम.यू.)		
अंतः क्षेत्रीय	2197.46	2530.55
अंतर क्षेत्रीय	1082.17	2931.36
कुल	3279.63	5461.91

ANNEXURE II E

SL. No	Element Name	Type	Voltage Level	Owner	Outage		Expected Revival Date	Reason / Remarks
					Date	Time		
1	Agra-Bharatpur	Line	220 kV	RRVPNL	6/6/2018	11:05		For Replacement ofEarth Wire of 220KVAgra-Bharatpur S/CInter-State Line at220KV GSS RVPN,Bharatpur
2	FSC of Pampore-2 at Kishnpr	FSC	220 kV	PGCIL	30-10-2012	12:00		Line length has reduced after LILO work completion
3	FSC of Pampore-1 at Kishnpr	FSC	220 kV	PGCIL	30-10-2012	12:00		Line length has reduced after LILO work completion
4	Vindhyachal HVDC BtB Block 2	HVDV Station	500 kV HVDC	PGCIL	26-11-2017	14:55		Differential protection operated.
5	Panki 240 MVA ICT 2	ICT	400/220 kV	UPPTCL	17-06-2018	18:13		ICT-2 blast.
6	FACT at BLB in Knp-BLB Line	FACTS	400 kV	PGCIL	2/7/2016	10:20		Y-Phase current imbalance
7	FSC of Balia-I at Lucknow	FSC	400 kV	PGCIL	29-11-2017	13:30		E/S/D due to Hot Spot at Isolator

SL. No	Station	Location	Owner	Unit No	Capacity	Reason(s)	Outage		Expected Revival Date
							Date	Time	
1	RAPS-A	RAJASTHAN	NPC	1	100	Subject to regulatory clearance	9/10/2004	22:58	-
2	Badarpur TPS	DELHI	NTPC	2	100	Order of NGT for Environmental protection	24-09-2015	19:29	-
3	Badarpur TPS	DELHI	NTPC	3	100	Order of NGT for Environmental protection	9/10/2015	1:00	-
4	Badarpur TPS	DELHI	NTPC	1	100	Order of NGT for Environmental protection	30-10-2015	15:30	-
5	Obra TPS	UP	UPRVUNL	7	100	R & M work	1/7/2010	13:44	-
6	Paricha TPS	UP	UPRVUNL	1	110	R & M Work	2/7/2016	17:30	21-08-2018
7	Unchahar TPS	UP	NTPC	6	500	Furnace pressure high	1/11/2017	15:40	
8	Pong HPS	HP	BBMB	2	66	Repair and Replacement of draft tube gates.	28-03-2018	16:20	
9	Pong HPS	HP	BBMB	1	66	Replacement of digital governer	2/5/2018	22:42	
10	RAPS-A	RAJASTHAN	NPC	2	200	Bi-Annual Maintenance	30-06-2018	19:38	
11	Barsingsar (IPP) LTPS	RAJASTHAN	NLC	2	125	Boiler tube leakage	28-07-2018	1:31	
12	Giral (IPP) LTPS	RAJASTHAN	RRVUNL	1	125	Bad materials leakage.	11/7/2014	8:20	
13	Giral (IPP) LTPS	RAJASTHAN	RRVUNL	2	125	Boiler tube leakage	27-01-2016	15:27	
14	Obra TPS	UP	UPRVUNL	13	200	ID Fan problem	23-02-2018	7:00	
15	Kalisindh TPS	RAJASTHAN	RRVUNL	2	600	Generator transformer tripped.	7/4/2018	17:21	
16	Kota TPS	RAJASTHAN	RRVUNL	1	110	Economiser tube leakage	31-05-2018	17:25	
17	Chhabra TPS	RAJASTHAN	RRVUNL	2	250	Boiler tube leakage	10/7/2018	4:53	
18	Suratgarh TPS	RAJASTHAN	RRVUNL	2	250	Generator Transformer protection operated	10/7/2018	5:44	

Central Sector reserve shutdown (2333 MW)

SL. No	Station	Location	Owner	Unit No	Capacity	Reason(s)	Outage		Expected Revival Date
							Date	Time	
1	Faridabad GPS	HARYANA	NTPC	3	156	Reserve Shutdown	8/5/2018	0:17	-
2	Faridabad GPS	HARYANA	NTPC	1	137.75	Reserve Shutdown	8/5/2018	0:24	-
3	Anta GPS	RAJASTHAN	NTPC	2	88.71	Reserve Shutdown	27-06-2018	10:24	-
4	Faridabad GPS	HARYANA	NTPC	2	137.75	Reserve Shutdown	6/7/2018	22:51	-
5	Anta GPS	RAJASTHAN	NTPC	3	88.71	Reserve Shutdown	7/7/2018	12:10	-
6	Anta GPS	RAJASTHAN	NTPC	4	153.2	Reserve Shutdown	7/7/2018	12:16	-
7	Anta GPS	RAJASTHAN	NTPC	1	88.71	Reserve Shutdown	7/7/2018	12:46	-
8	Dadri GPS	UP	NTPC	6	154.51	Reserve Shutdown	10/7/2018	0:20	-
9	Dadri GPS	UP	NTPC	3	130.19	Reserve Shutdown	10/7/2018	0:28	-
10	Dadri GPS	UP	NTPC	4	130.19	Reserve Shutdown	10/7/2018	0:30	-
11	Dadri GPS	UP	NTPC	1	130.19	Reserve Shutdown	14-07-2018	11:05	-
12	Dadri GPS	UP	NTPC	5	154.51	Reserve Shutdown	23-07-2018	20:30	-
13	Dadri GPS	UP	NTPC	2	130.19	Reserve Shutdown	23-07-2018	20:44	-
14	Auraiya GPS	UP	NTPC	1	111.19	Reserve Shutdown	10/8/2018	6:08	-
15	Auraiya GPS	UP	NTPC	5	109.3	Reserve Shutdown	10/8/2018	12:08	-
16	Auraiya GPS	UP	NTPC	2	111.19	Reserve Shutdown	10/8/2018	12:14	-
17	Auraiya GPS	UP	NTPC	4	111.19	Reserve Shutdown	12/8/2018	8:06	-
18	Unchahar TPS	UP	NTPC	2	210	Fuel Shortage	19-08-2018	2:09	-

State Sector reserve shutdown/Coal shortage (4795 MW)

SL. No	Station	Location	Owner	Unit No	Capacity	Reason(s)	Outage		Expected Revival Date
							Date	Time	
1	Panipat TPS	HARYANA	HPGCL	5	210	Reserve Shutdown	13-07-2018	16:55	-
2	RGTPP(Khedar)	HARYANA	HPGCL	1	600	Reserve Shutdown	21-07-2018	16:53	-
3	Harduaganj-C TPS	UP	UPRVUNL	7	105	Reserve Shutdown Harduaganj Unit 7 105 MW.	26-07-2018	10:45	-
4	Lalitpur TPS	UP	LPGCL	1	660	Reserve Shutdown	26-07-2018	12:32	-
5	Panipat TPS	HARYANA	HPGCL	6	210	Reserve Shutdown	4/8/2018	20:26	-
6	RGTPP(Khedar)	HARYANA	HPGCL	2	600	Reserve Shutdown	6/8/2018	12:34	-
7	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSEB	1	210	Reserve Shutdown	15-08-2018	8:33	-
8	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSEB	4	210	Reserve Shutdown	15-08-2018	8:35	-
9	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSEB	3	250	Reserve Shutdown	17-08-2018	14:30	-
10	Guru Gobind Singh TPS (Ropar)	PUNJAB	PSEB	6	210	Reserve Shutdown	18-08-2018	7:55	-
11	Guru Hargobind Singh TPS (Lehra Mohabbat)	PUNJAB	PSEB	2	210	Reserve Shutdown	18-08-2018	20:44	-
12	Bara PPGCL TPS	UP	Jaypee	3	660	coal shortage	24-06-2018	15:35	-
13	Kawai TPS	RAJASTHAN	ADANI	2	660	Low Bunker Level. Coal shortage w.e.f. 10:46Hrs of 14.08.2018.	14-08-2018	0:57	-

ANNEXURE IIF

Transmission Lines
(400kV- 371 ckt. km)

S. No.	Name of element	Voltage Level (in kV)	Line Length (In kM)	Conductor Type	Owner	Remarks	Actual date & time of charging(Synchronized)	
							Date	Time
1	400kN Anta(RRVPNL)-Kota(PG)-SC bays no 402C,402T and 413(main),414(tie)	400	91.476	ACSR Twin Moose	Rajasthan		09.07.2018	12:33
2	400kV Bikaner-SSCTPP-DC line-1 and associated bays 406A & 406T at Bikaner end	400	139.65	ACSR Twin Moose	Rajasthan	From Bikaner end only	28.07.2018	18:06
3	400kV Bikaner-SSCTPP-DC line-1 and associated bays 405A & 405T at Bikaner end	400	139.65	ACSR Twin Moose	Rajasthan	From Bikaner end only	28.07.2018	18:07

LILO of Transmission Lines
(220kV- 54 ckt. km)

S. No.	Name of element	Voltage Level (in kV)	Line Length (In kM)	Conductor Type	LILO Length (In Km)	Owner	Remarks	Actual date & time of charging (Synchronized)	
								Date	Time
1	220kV Madanpur(Panchkula)-Pinjore-2 { LILO of 220kV Madanpur-Kunihar(HP) at Pinjore}	220	27	Single Zebra	5.5	HVPNL		14.07.2018	23:03
2	220kV Kunihar(Panchkula)-Pinjore-2 { LILO of 220kV Madanpur-Kunihar(HP) at Pinjore}	220	27	Single Zebra	5.5	HVPNL		14.07.2018	23:03

Follow up issues from previous OCCMs **ANNEXURE 9**

SNO	Description of Agenda point	Details	STATUS Updated
1	**Monitoring of schemes funded from PSDF (Agenda by NPC)**	The latest status of the schemes for which grant has been sanctioned from PSDF for the schemes in Northern Region. Utilities are requested to expedite implementation of the schemes and submit information of physical as well as financial progress in the prescribed format by first week of every month on regular basis to Member Convener, PSDF Project Monitoring Group (AGM, NLDC and POSOCO) with a copy to NPC Division	**The updated status available was attached as Annexure 9/1 of the Agenda of the 150th OCC meeting.** **All states were requested to update regularly.** **DTL, PSTCL, HP & UP the updated information in the meeting that stands forwarded to CE NPC.**
2	**Sub-stations likely to be commissioned in next 6 months.**	All the concerned states were requested to submit the details of the downstream network associated SPECIFICALLY with THESE POWERGRID substations along with the action plan of their proposed/approved networks.	**The details of the substations of Power Grid and their required downstream network as updated in the meeting are enclosed *as Annexure 9/2.*** **All concerned utilities were requested to ensure proper utilization of the available bays on the POWERGRID SUBSTATION.**
3	**Progress of installing new capacitors and repair of defective capacitors**	. The available up to date status of installation of new capacitors and revival of defective capacitor by the State constituents is enclosed as ***ANNEXURE 10/3OF THE AGENDA OF THE 146TH OCC MEETING.***	**UPPTCL submitted the information as per the required format (Annexure 9/3) All other utilities were requested to update similarly. It was stated that in the similar format all utilities should submit the information in the similar format.**
4.	**Healthiness of defence mechanism: Self- certification**	Report of Mock exercise for healthiness of UFRs carried out by utilities themselves on quarterly basis is to be submitted to NRPC Secretariat and NRLDC. All utilities were advised to certify specifically, in the report that "***All the UFRs are checked and***	**All utilities were requested to submit reports of testing in every quarter. The reports stands submitted for period ending June 2018 by all the states .** **MS NRPC stated that the information should be submitted**

		found functional". Reports ending march 2018 stands received from all states.	**regularly. The soft copy may please be submitted.**
5.	**UFR REPLACEMENT** . In PTCUL the static type UFRs were still installed on Transformers/feeders emanating from 132KV Majra and Jwalapur Substations and 220KV Ramnagar, Roorkee and Rishikesh Substations	PTCUL representative intimated that the order for numeric relays procurement has been placed and he assured that efforts would be made to get the relays replaced by 31.12.2017	**PTCUL representative stated that all UFR relays are numeric in their state. MS NRPC stated that a confirmation regarding that the requested to update that the static relays have been changed on the Substations mentioned.**
6.	**Strengthening of Intra-State transmission system**	Also all SLDCs are requested to give half yearly feedback ending 6/2018 in the month of 7/2018 to STU regarding bottlenecks, constraints and overloading in the State transmission network for proper transmission planning .	**Information from Punjab along with the comments of Planning wing stands submitted.** **Also information from Rajasthan vide which SLDC has intimated the bottlenecks, constraints and overloading in the State transmission network to their planning wing stands submitted .** **MS NRPC stated that this information should be submitted regularly as it is very important for future panning & grid of the system.** **All states were requested by SE(O) to update regularly as this information is end to the planning wing of CEA for discussion in the Standing Committee.**
7	**Mapping of Feeders in SCADA**	In the 141st OCC meeting members were informed about the "Compendium of SPS in NR" (*Annexure-_9 of the MOM_)* which was released in the 40th NRPC meeting. All the utilities were requested to go through the compendium and identify feeders concerning their state and map the same in SCADA.	**PSTCL submitted information all other** **MS NRPC stated that as per the Compendium of SPS in NR" which was released in the 40th NRPC meeting. All the utilities are requested to go through the compendium and identify feeders concerning their state and map the same in SCADA. This document is available on NRLDC & NRPC website. NRLDC representative added that it is very important that the feeders should be mapped in SCADA. It was stated that this issue will be discussed in the Test committee meeting also.**

ANNEXURE 9/2				
S. No.	**Substation**	**Downstream network requirement**	**Schedule**	**Planned system and Implementation Status**
1	400/220 kV, 3x315 MVA Samba	2 nos. bays utilized under ISTS. Balance 4 Nos to be utilized	Commissioned	LILO of 220kV Bishnha – Hiranagar D/c line : under tendering (PMDP) (status as available with CEA) Status as updated by J&KPDD in 38th TCC/ 41st NRPC: LoA has been issued and Material has reached the site. Anticipated – Nov'19 **Targeted Completion to be updated by J&KPDD**
2	400/220kV, 2x315 MVA New Wanpoh	6 Nos. of 220 kV bays to be utilized	Commissioned	220kV New Wanpoh –Mirbazar D/c line: under tendering (PMDP) 220 kV Alusteng- New Wanpoh line Anticipated – Nov'19 **Targeted Completion to be updated by J&KPDD**
3	400/220kV, 2x315 MVA Parbati Pooling Station	2 Nos. of 220 kV bays to be utilized.	Commissioned	220kV Charor- Banala D/c line (18km) : under construction **Target completion -October 2018**
4	400/220kV, 2x500 MVA Kurukshetra (GIS)	8 nos. of 220 kV bays to be utilized	Commissioned	**LILO of one circuit of Kaul-Pehowa 220kV D/c line** **LILO of one circuit of Kaul-Bastara 220kV D/c line** **Work awarded.** **Contactual Completion period upto 31.10.2019**
5	400/220kV, 2x500 MVA Bagpat GIS	3 nos. of 220 kV d/s lines to Shamli, Muradnagar and Bagpat commissioned. Balance 5 Nos. of bays to be utilized	Commissioned	**Bagpat- Baraut - energised(D/C)** **Bhagpat-Shamli- energised(S/C)** **LILO of 220kV Muradnagar II - Baghpat (PG) at Baghpat UP** **Bagpat(PG)-Modipuram New 220kV D/c-is planned.**
6	400/220 kV, 2x315 MVA Saharanpur	2 nos. 220 kV downstream lines commissioned. (Saharanpur (UP) and Nanauta) Balance 4 Nos. of 220 kV bays to be utilized	Commissioned	**Sharanpur-saharanpur(UP) energised.(S/C)** **Saharanpur-Nanauta-energised(S/C)** **Saharanpur-Sarsawan new line - energised(D/C)** **Sharanpur-Khara- energised(S/C)** **Saharanpur-Shamli- energised(S/C)**
7	400/220kV, 2x315 MVA Dehradun	Out of 6 bays, only two bays used. Balance 4 bays to be utilised.	Commissioned	02 bays for Yamuna Basin (Mori substation) 2 bays for proposed S/s at Selakui **PTCUL TO UPDATE**.
8	400/220 kV, 2x315 MVA Sohawal	6 Nos 220 kV bays to be utilized.	Commissioned	**2 nos of bays utilized for Sohawal 220kV UP.-LINE ENERGISED** **2 nos for Barabanki 220 kV s/s - LINE**

ANNEXURE 9/2				
S. No.	**Substation**	**Downstream network requirement**	**Schedule**	**Planned system and Implementation Status**
				ENERGISED **2 nos of bay of utilized for 220kV New Tanda-Sohawal line .There is a litigation process on & expected to be completed within 2 months.**
9	Shahjahanpur, 2x315 MVA 400/220 kV	Partially utilized. Balance 5 Nos. of 220 kV bays to be utilized.	Commissioned	**One bay used for 220 kV Shahjahnpur-Hardoi line commissioned**. **220kV Shahjahnpur - Azimpur D/c line is planned land of substation identified**.
10	Moga	Partially utilized. Balance 2 nos. of 220kV bays to be utilized.	Commissioned	Moga–Mehalkalan 220kV D/c line **Work completed. Approval from NGT for tree cutting is awaited for balance work to commission line.** **7.8.2018 next hearing**
11	Hamirpur 400/220 kV 2x 315 MVA Sub-station (Augmentation by 3x105 MVA ICT)	04 nos. 220 kV downstream lines commissioned under ISTS. Balance two bays to be utilised by HPSEBL	**August 2020**	2x220 kV bays to be utilized for connecting 220/132kV Kangoo substation of HPSEBL by 220 kV Kangoo-Hamirpur D/c line.
12	Kaithal 400/220 kV 1x 315 MVA Sub-station	July 2017 (Shifting of Transformer from Ballabhgarh).	Commissioned	**220kV Kaithal(PG)- Neemwala D/c line - Work awarded on 13.7.2018. Tentative completion date 31.12.2019.** **220kV S/s Neemwala-Tenders opened on 30.3.2018 & awarded on 13.7.2018.** **Tentative completion date 31.12.2019**
13	400/220kV Kota Sub-station (1 No. of 400 kV Bay)		Commissioned for Anta-Kota 400 kV S/c line of RRVPNL	Work order has been awarded to M/s GE and expected to be completed by March-18 **RRVPNL updated that the line stands charged on 9.7.2018.**

Annexure 9/3

UPPTCL

Progresss of Installation of HT Shunt Capacitors (rated 33 KV and above) in Northern Region **As on 01.07.18**

State	HT Shunt Capacitors (rated 11 KV level and above) installed upto till 31.03.18 (MVAR)	New capacitors required during 2018-19	Capacitors added during June-18	Capacitor added in Year 18-19	Balance capacitors to be added during 2017-18	Total Capacitors installed in the state as on 01.07.18
	A	B	C	D = C+D(Previous)	E = B D	F = A+D
UPPTCL	7984	4531	**240**	**490**	3163	8474

Progresss of revival of defective HT Shunt Capacitors (rated 33 KV and above) in Northern Region **As on 01.07.18**

State	Defective Capacitors as on 31.03.18 (MVAR)	Defective during June-2018	Defective Capacitors as on 01.06.2018	Defective Capacitors revived during June.-2018	Net Defective Capacitors at the end of June-2018
	A	B	C=E (Previous)	D	E=C+B-D
UPPTCL	2166	70	***1949***	***75***	***1944***

OFFICE OF THE EXECUTIVE ENGINEER
CONTROL & INSTRUMENTATION CONSTRUCTION DIVISION- VI
ANPARA 'D' THERML POWER PROJECT
U.P.RAJYA VIDYUT UTPADAN NIGAM LIMITED
P.O. - ANPARA, DIST. – SONEBHADRA

No: 310 /C&ICD-VI /DTPP/T-1 Dated 20.08.2018

Subject: LOI for the work of Design ,Engineer, Testing & Implementation of SPS Logics in MAX-DNA based EHTC & CMC controls at Anpara 'D' station.

M/s BHEL,
Power sector-Spares and Services Business Group,
B-2,PIC-UP Bhavan,1st floor,
Vibhuti Khand, Gomti Nagar ,Lucknow-226010

With reference to your offer reference no.-SB318A76010CED054 dated 18.07.18 & email consisting final revised rate dated:16.08.18 for implementation of SPS logic in 2x500MW, DTPP, Anpara, we are pleased to intimate you that your offer has been accepted by Project Tender Committee and subsequently an order is hereby placed on approved rates, terms and conditions as per given below:-

Sl. No.	Description of work	Unit	Qty.	Negotiated Rate in INR without Taxes
1	Design and engineering charges for implementation of SPS logics in Max-DNA based EHTC &CMC controls at Anpara 'D' station for each unit.	Per unit	02	1650000.00
2	Deputation of expert service engineer for SPS scheme implementation	Per man day	10	76000.00
3	Mobilization/ de- mobilization charges -Lump sum	Per visit	03	9800.00
4	Accommodation, To and fro travel charges	At actual		At actual

Quantities at sl.no. 2&3 are tentative & subject to change as per site requirement.

The work shall be carried out as per Bill of Quantity, Scope of Work(Annexure-1) and other terms and conditions(annexure-2) as per the tender specifications. However a copy of the documents may be obtained from the office at the time of start of work .

Kindly acknowledge the receipt of this Letter of Intent.
Thanking you,

20/08/18
(Rinkesh Kumar)
Executive Engineer

No: /C&ICD-VI /DTPP/T-1 Dated

Copy forwarded to the following for information and necessary action:

1. Superintending Engineer,C&ICC,DTPP Anpara.
2. DGM(F), CFA&BO,2X500MW,DTPP,Anpara
3. Case file.

(Rinkesh Kumar)
Executive Engineer

Annexure-1

1. Design, Engineering, Testing and implementation of SPS logics as per approved document (vide approved document from Executive Engineer/765KV Substation Electricity Transmission division, M/s UPPTCL, Anpara) in CMC Controls & EHTC controls At Anpara 'D' Station.

2. Implementation of logic at site by BHEL engineer in Max DNA controls, when the unit is available on/off load as per requirement of the system.

3. Testing by simulation and real time implementation / commissioning of implemented schemes by BHEL Engineer's, when the unit shall be available on load. Necessary approvals/ Prior permission for complete testing from M/S UPPTCL is to be coordinated by M/s UPRVUNL.

4. UPRVUNL shall provide necessary drawing /manuals/existing control logics/technical literature of the EHTC & CMC schemes for incorporating SPS Scheme.

5. BHEL to Supply of newly designed logics in CD/DVD. Hard copies of revised drawing sheets only after complete testing of the scheme (1set).

6. Supervision of necessary hardware change, cable termination as required for implementation of SPS scheme.

BILL OF QUANTITY

Sl. No.	Description of work	Unit	Qty.	Negotiated Rate in INR without Taxes
1	Design and engineering charges for implementation of SPS logics in Max-DNA based EHTC &CMC controls at Anpara'D' station for each unit.	Per unit	02	1650000.00
2	Deputation of expert service engineer for SPS scheme implementation	Per man day	10	76000.00
3	Mobilization/ de- mobilization charges -Lump sum	Per visit	03	9800.00
4	Accommodation, To and fro travel charges	At actual		At actual

Quantity at sl.no. 2&3 is tentative & subject to change as per site requirement

20/2/18

(Rinkesh Kumar)
Executive Engineer

Annexure-2

Terms and Conditions of the offer are as follows:-

1. **VALIDITY FOR AWARD:**

   This offer shall remain valid for award **of work** by you up to **31.07.2019** unless withdrawn earlier or extended subsequently by BHEL.

2. **VALIDITY FOR EXECUTION:**

   The rates & prices quoted in this offer shall remain valid for **execution of work** by M/s BHEL up to **31.03.2019.**

3. **Job Completion Period: Ten** days expected may be less or more as per site requirement for mandatory works only from start of works.
4. **Additional time for job completion:** No additional time will be given if site is available for the work.
5. **Time Extension:** Completion Period shall be extended **at actual** by UPRVUNL for delay in completion due to: Force Majeure, Delay in availability of customer inputs & facilities, and Additional Time required for execution of extra/optional works, if any.
6. **Tax and Duties:** Taxes & Duties shall be **extra** as applicable at the time of actual execution of work. G.S.T. and any other statutory taxes & duties shall be payable extra by customer as applicable. Except for income tax which shall be deducted by customer as per rule; no other taxes & duties are to be deducted by UPRVUNL.
7. **Terms of Payment :**

a) 10% advance + applicable IGST@18% is payable along with order against sl no. 1 of bill of quantity.
b) 90% engineering charges + applicable IGST@18% is payable along with order against dispatch, received of CD/DVD for sl. no.1 of bill of quantity.
c) 100% deputation charges + applicable IGST@18% shall be made to the contractor within 30 days on presentation of invoice.
d) Applicable TDS will be deducted on the basic value of the invoice.

8. **Mode of Payments:** Payment shall be made through EFT
9. **Statuary Act & rules:** Relevant provisions of statutory acts, rules & regulations as applicable for execution of the work shall be duly complied by us.
10. **Insurance:** Insurance of customer's properties viz, personnel, equipment, etc., against loss, destruction, damage or theft during the performance of work shall be arranged by UPRVUNL at their own cost and no liability, whatsoever, will be borne by BHEL on this account.
11. **Security at site:** All security arrangements at site and protection against fire and other hazards while equipments are in storage or under performance of work under present offer will be provided by UPRVUNL at his cost.
12. **Access to site:** The work site shall be made available from all types of obstructions to enable us to proceed with the work unhampered and in a continuous manner.
13. Travel expenses extra at actual by AIR up to the nearest Airport and by train/Road to the place of work as actually performed. Proof of travel shall be furnished for travelling by train/road. A copy of Air ticket shall be produced as proof of travel by air along with invoice. Photo copy of boarding pass, hotels bill/s etc to be submitted along with invoice.
14. **Accommodation :**
    a. Accommodation will be arranged by UPRVUNL free of cost. Standard /Air conditioned and well maintained bachelor room will be provided.

b. If Accommodation not provided due to any reason or in case accommodation provided by UPRVUNL is not found suitable as per BHEL requirement , BHEL engineer reserves the right to stay in hotel in that case charges will be payable at actual for hotel stay at site.
c. Transit stay en route in case of necessity due to train/air timings shall also be paid at actual.

15. **Completion certificate:** After availing the services as required by the UPRVUNL, the UPRVUNL will issue a completion certificate to the contractor personnel for the activities completed as per the scope of work mutually agreed in the contract. This shall be in the form of joint inspection report or records notes of discussion.
16. **Notice Period:** The UPRVUNL will give minimum advance notice of 15 days. However in exceptional cases contractor shall agree to depute the service engineer within 48 hours subject to availability.
17. **Contract Agreement:** The nature of work being of short duration deputation, it is not feasible/practical for entering into agreement hence it will not be executed.
18. Working hours on a normal day would be of 8 hours. Overtime charges will be twice the normal rate applicable on pro-rata basis beyond normal working hour. Working on Sunday and holiday are considered as overtime.
19. The decision of Engineer-In- Charge regarding completion of jobs is final.
20. Details of Paying Authority: Dy. CAO (CFA & BO), DTPS, Anpara. Mob: 9415900583

27.8.18

(RINKESH KUMAR)
EXECUTIVE ENGINEER

Indicative Format ***Annexure-15***

Status of Implementation in NCR Region

Recommendation		Fully completed / Partially Completed / Not Completed	Remarks
No.	**Content of recommendation**	**NTPC Status**	
1	**Review of Protection System**		
1.1	Third party protection audit	FC	
1.2	Review of zone-3 philosophy	Fully complied except power swing blocking for zone-3	**NTPC stations followed up NRPC protection philosophy in totality** except for power swing blocking philosophy for zone-3 to avoid overreach or underreach issue(undesired tripping) which is already a part of PSC meetings delibrations. To address this issue it has been decided by PSC during 35th PSC meeing as follows (Para A2.2 on page no. 6)- quote "***PSC was of the view that there is a need to carry out the protection coordination studies for proper Zone-III setting and it was suggested that a third party may be hired to carry out the study. 34th PSC meeting on 4th August, 2017—PSC informed that these studies will be part of the project for maintaining database of protection setting database."*** *unquote* ***Further necessary correction will be carriedout based on recommendation, after study by third party.***
1.3	Synchro phasor measurements /PMUs & deploy of SPSs	---	Not Applicable.
1.4	Time synchronization of DRs/ELs/PMUs	FC	
2	**Frequency control generation reserve/ancillary services**	---	Not Applicable.
3	**Defense mechanism - f_{min} and df/dt - load shedding schemes**	---	Not Applicable.
4	**Ensuring primary frequency response from generators**	FC	
5	**Revising TTC based on change in system conditions**	---	Not Applicable.
5.2	Real-time security desk caring TTC calculations	---	Not Applicable.
6	**Coordinated outage planning of transmission elements**	---	Not Applicable.
7	**Reactive power planning -**	FC	
9	**Optimum utilization of availability assets**		

Recommendation		Fully completed / Partially Completed / Not Completed	Remarks
No.	**Content of recommendation**	**NTPC Status**	
9.1	Regulatory provision - absorption of reactive power by generators	FC	One Unit of Chamera-II Power Station is ready for Synchronous Condenser mode of operation.
9.2	Audit of HVDC, TCSC, SVA and PSS	FC (PSS)	PSS Tuning done and report submitted to NRPC.
9.3	Functioning of existing PMU and availability of their output to RLDC	---	Not Applicable.
10	**Deployments of WAMS**		
10.1	Synchro phasor based WASM employing PMUs	---	Not Applicable.
10.2	Possible of voltage collapse prediction	---	Not Applicable.
11	**Dynamic security assessment and review of state estimation**	---	Not Applicable.
12	**Implementation of islanding schemes**	---	Not Applicable.
13	**Autonomy to Load Dispatch Centers**		
13.1	Organization of the Load Dispatch Centers reviewed and entrusted to ISO	---	Not Applicable.
13.2	Training and certification of system operators need to be given focused attention	---	Not Applicable.
14	**Development of Intra-state transmission system**	---	Not Applicable.
15	**Network visualization**		
15.2	Fiber optic communication system	---	Not Applicable.
15.3	RTUs and communication equipment should have uninterruptible power supply with proper battery back up	FC	
15.4	Telemetry facilities will be install for all generation station and transmission element without these	FC	
16	**Reduction in Start-up time Generators**	FC	
18	**Strengthening of system study groups in various power sector organization**	FC	
20	**Improved telecom infrastructure for cyber security**	FC	

ANNEXURE 16

2/10

प्रदीप कुमार सिन्हा
सचिव
भारत सरकार
PRADEEP K. SINHA
Secretary
Government of India

सत्यमेव जयते

Ministry of Power
Shram Shakti Bhawan
New Delhi - 110001

विद्युत मंत्रालय
श्रम शक्ति भवन
नई दिल्ली-110001
Tele : 23710271/23711316
Fax : 23721487
E-mail : secy-power@nic.in

D.O. No.20/6/2014-OM

05.12.2014

Dear Shri Negi,

As you are aware, India has one of the largest A.C. Synchronous Transmission Grids in the world with more than 3 lakhs circuit kms of 220kV and above lines which form the backbone of the Indian Power System.

2. However, this huge network needs to be operated in a sustained and secure manner, particularly, during the time of natural disasters. Failure to do so leads to severe constraints not only in meeting the power demand but also poses serious problems in maintaining safety and security of the Grid. Difficult situations came to light in the wake of recent natural disasters, such as, floods in J&K and Phailin as well as Hud-Hud cyclone in Odisha and Andhra Pradesh. These disasters caused extensive damage to transmission networks resulting in wide spread disruption of many important transmission links and substations affecting power supply for long periods due to the time taken in restoration.

3. You would appreciate that under such adverse situations, the availability of an effective mechanism for emergent restoration of transmission lines in the shortest possible time is of utmost importance. Immediate and temporary restoration of transmission networks is possible by deploying the "Emergency Restoration Systems (ERS)." Grid Standards notified by the Central Electricity Authority(CEA) stipulate that every Transmission Licensee shall have an arrangement for restoration of transmission lines of at least 220kV and above through the use of ERS. However, presently the States do not possess such ERS infrastructure. Consequently, POWERGRID becomes the last resort whose ERS infrastructure is also limited.

4. Therefore, deployment of adequate ERS infrastructure with the States is necessary. In this connection, CEA had recently convened a meeting of the representatives from State Utilities, CTUs and RPCs to deliberate and review their preparedness to effectively restore transmission networks in times of emergency. Based on the inputs received, an Indicative requirement of ERS for States has been assessed which is at Annex-I. Further, CEA has also formulated guidelines for planning, deployment and procurement of such ERS infrastructure (Annex-II).

5. I would, therefore, request you to please issue necessary directives to Transmission Utilities/ Transmission licensees operating in your State to take stock, procure appropriate number of ERS infrastructure and place them at strategic locations. Action taken by the Utilities in this regard may be informed to the CEA and the Ministry of Power, at the earliest.

With regards,

Yours sincerely,

Encl : as above

(Pradeep K. Sinha)

Shri Ramesh Negi
Chief Secretary
Govt of Arunachal Pradesh
Itanagar

Dist:- As per list attached.

RIGHT TO INFORMATION

एक कदम स्वच्छता की ओर

ANNEX-I

Availability and Proposed Plan for deployment of ERS

Sl. No.	Region	State Utilities / PGCIL	Availability of ERS sets	Additional ERS set to be procured	Remark
I	Northern Region				
	PGCIL	NR1	3	1	
		NR2	1		
	1	Haryana	-	1	
	2	HP	-	1	Hilly terrain
	3	J&K	-	1	-do-
	4	Punjab	-	2	
	5	Rajsthan	-	3	
	6	Uttar Pradesh	-	3	
	7	Uttarakhand	-	1	
	8	Chandigarh	-	-	
	9	Delhi	-	1	DTL is procuring 2 ERS sets
	10	POWERLINKS	2		1 set each is located in NR and ER; each setting having 14 towers of 400 kV
	Total		6	14	
II	Western Region				
	PGCIL	WR1	2	1	
		WR2	2		
	10	Gujarat	-	3	

	11	MP	1	2	
	12	Chhattisgarh	-		
	13	Maharashtra	2	2	
	14	Goa	-	1	
	15	D&NH	-	-	
	16	Daman& Diu	-	-	
	Total		7	9	
III	Southern Region				
	PGCIL	SR1	1	2	
		SR2	1		
	17	AP	-	3	(To be located at Vishakahapatnam, Vijawada, Nellore)
	18	Telengana	-	1	
	19	Karnataka	-	2	
	20	Kerala	-	1	
	21	Tamil Nadu	-	2	
	22	Lakshadweep	-	-	
	23	Puducherry	-	-	
	Total		2	11	
IV	Eastern Region	PGCIL			
	PGCIL	ER1	1	-	
		ER2	2		
	24	Bihar	2	2	
	25	Jharkhand	-	1	
	26	Orissa	3	2(comprising of 12 nos. of 400kV towers which is in the process of procurement)	Existing ERS located at Bhubaneswar, Chatrapur and Budhipada (each with 14 ERS towers)
	27	West Bengal	-	2	
	28	DVC	-	1	

	29	A&N Island	-	-	
	30	Sikkim	-	-	
	Total		8	8	
V	North Eastern Region		-		
	PGCIL	NER	1		
	31	Assam	4		
	32	Manipur	-	2	
	33	Meghalaya	-		
	34	Nagaland	-		
	35	Tripura	-		
	36	Ar. Pradesh	-		
	37	Mizoram	-		
	Total		5	2	
	Total All India		28	44	

Note: POWERGRID has informed that they are procuring 6 additional sets of ERS for different regions.

Strategy adopted

1. The primary criterion for deciding number of ERS to be arranged by a transmission utility has to be the length of transmission line (ckt-kms) at different voltage levels (e.g 220 kV, 400 kV, 765 kV and +/- 500kV HVDC). Other factors to be taken into account while deciding the number of ERS are

   - Importance of the line considering security of Grid
   - Areas prone to tower failure and failure pattern in different areas
   - Command area of the transmission utility and transportability across the command area

2. For any transmission utility, one set of ERS has been planned to cater to failure of towers for transmission line lengths of up to 5000 Ckt. Kms.. Accordingly, two (2) sets of ERS have been planned for transmission line lengths of about 5000 to 10,000 Ckt. Kms. and three (3) sets for more than 10,000 Ckt. Kms and so on.

3. The transmission Utility with line length less than 500 ckt kms (of 400kV lines) may be given option either to procure ERS or have agreement with other transmission utilities for providing ERS on mutually agreed terms, when need arises.

ANNEX-II

GUIDELINES FOR PLANNING, PROCUREMENT AND DEPLOYMENT OF EMERGENCY RESTORATION SYSTEM (ERS)

1. One set of ERS should include all accessories [structures (Aluminum Alloy), polymer insulators & hardware, anchor assembly, guy wires, foundation plates, guy plate, other equipment & fittings, special Tools & Plants required for erection & stringing of ERS and trailer mounted detachable containers (without engine) for storage & transportation of ERS hardware / material etc.] and associated software.

2. One set of ERS shall be capable of restoring few numbers of suspension towers and tension towers of the transmission line corresponding to the highest transmission voltage in operation in the utility with required type of conductors. The same ERS can be used for lower voltage lines as well. The number of suspension, tension towers, insulators and associated hardware etc., to be included under one set of ERS, may be decided by the utilities at the time of procurement depending on their requirement.

3. Proper management of ERS and training of personnel for erection of towers on ERS and use of associated software is essential. A dedicated and specialized erection & commissioning gang, which is properly trained to execute such work, would be required.

4. ERS should be utilized only for emergency purposes and the line should be restored on normal towers as early as possible. It should not be a practice to run transmission line on ERS for a long time instead of shifting to normal towers. Moreover, ERS should not be used in new lines under construction. Otherwise, the very purpose of ERS will be defeated.

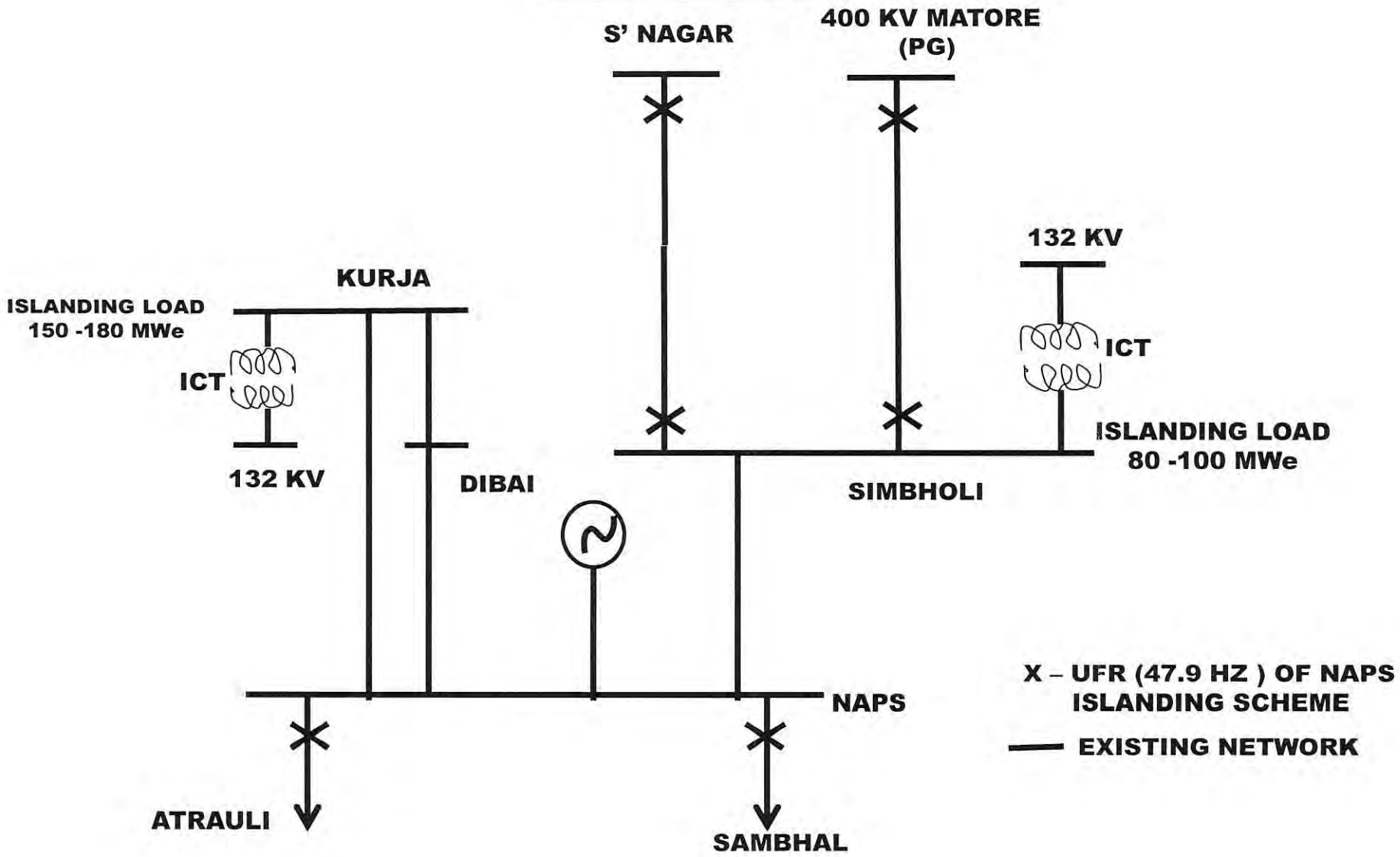
5. The deployment of ERS by any transmission utility / licensee should be reported to concerned RLDC and RPC.

6. The transmission utilities may approach Appropriate Commission for approval and initiate procurement process on urgent basis to comply with Grid Standards. Utilities may also approach State Disaster Management Authorities for funding.

7. The funding for procurement of ERS could be considered from PSDF for North Eastern States and a proposal be submitted by Member Secretary, NERPC.

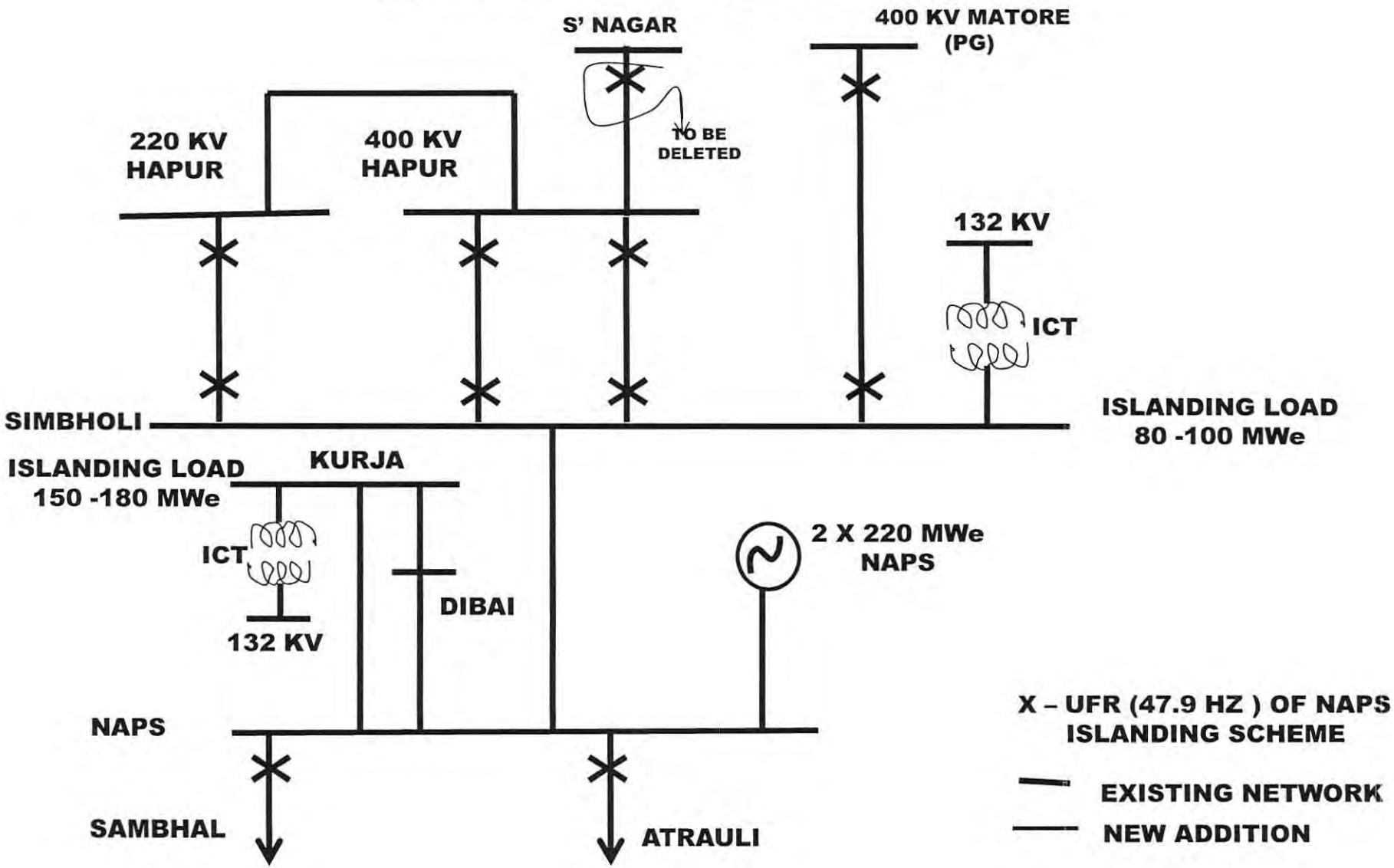
ANNEXURE AA

EXISTING NAPS ISLANDING SCHEME & 220 KV SIMBHOLI S/S



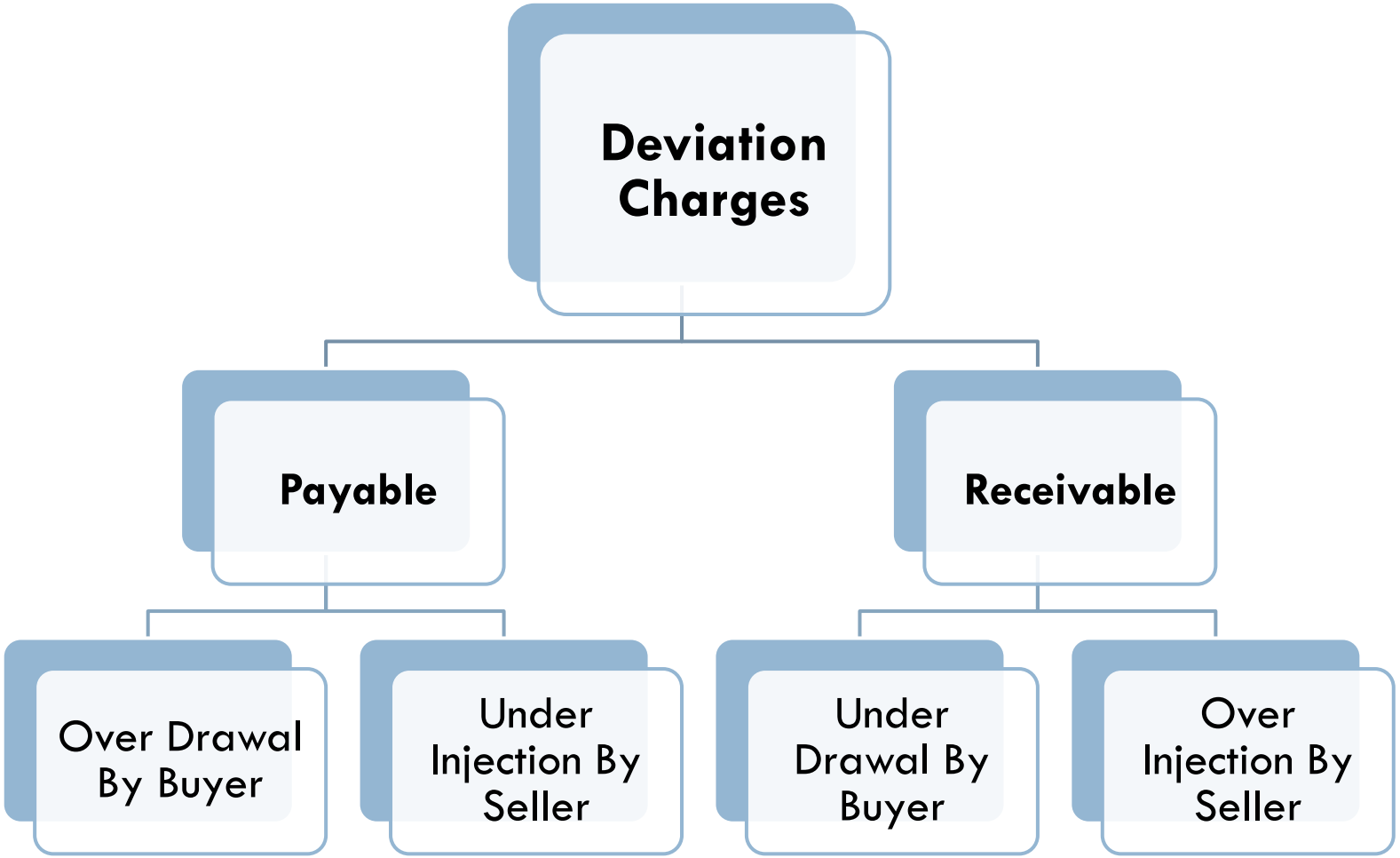
NAPS ISLANDING SCHEME AFTER DEVELOPMENT

AT 220 KV SIMBHOLI S/S



NORTHERN REGIONAL POWER COMMITTEE

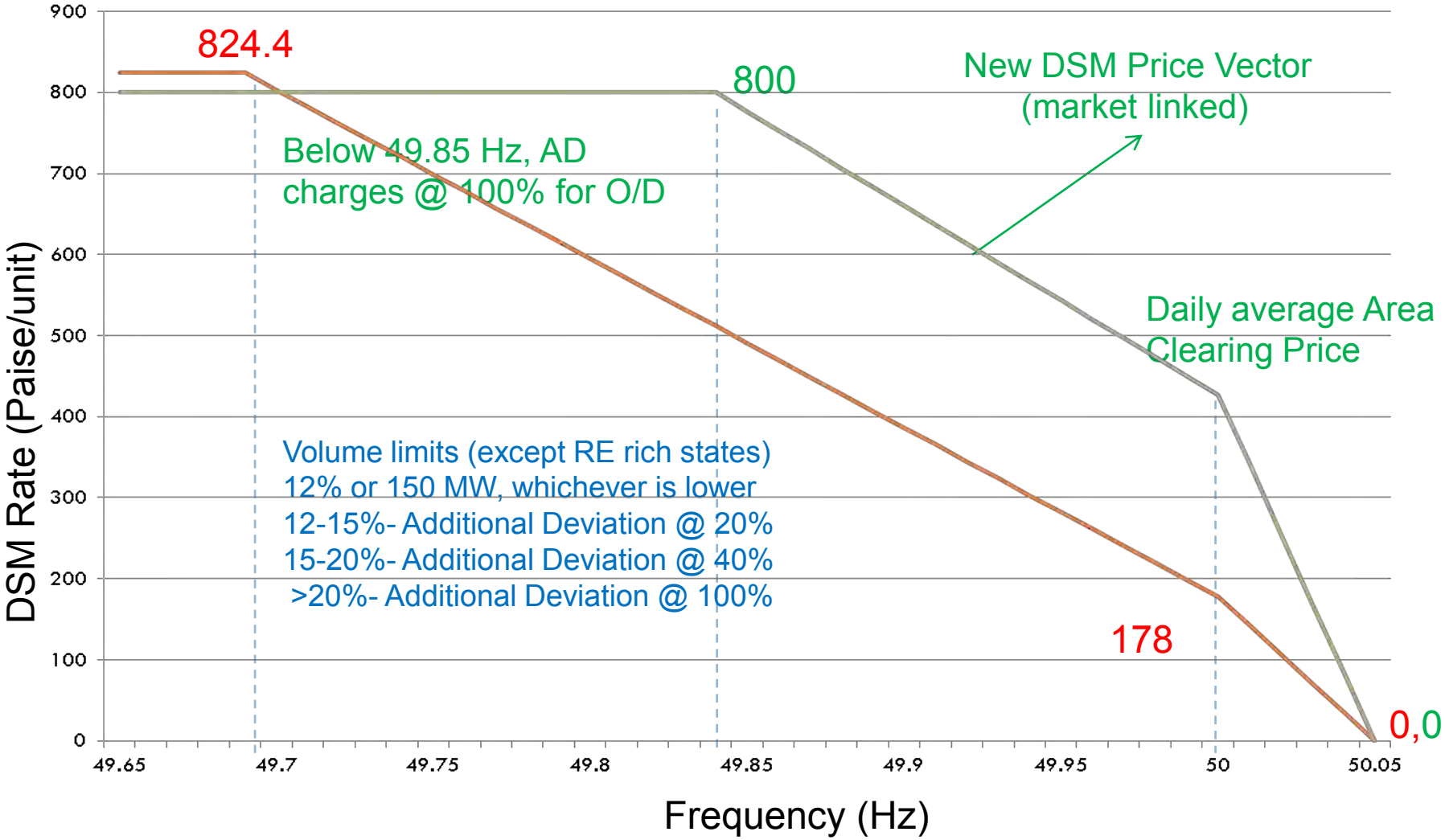
Deviation Settlement Mechanism



CERC DSM 4th Amendment (Draft)

- Issued on 29th June 2018
- To come into force on date as notified by CERC
- Major Changes:
  - Frequency band narrowed down to 49.85-50.05
  - DSM price vector to be linked to price discovered from energy market
  - Additional charge when total deviation in a day > 3% of schedule for drawee entities or 1% for injecting entities
  - Additional surcharge in case in the event of sustained deviation in one direction for more than 6 time blocks

Frequency band



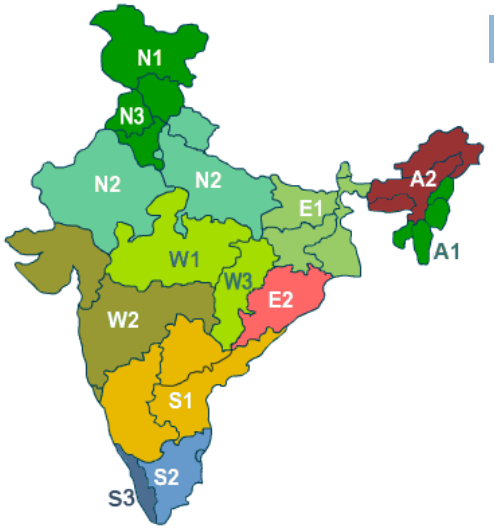
DSM Price Vector

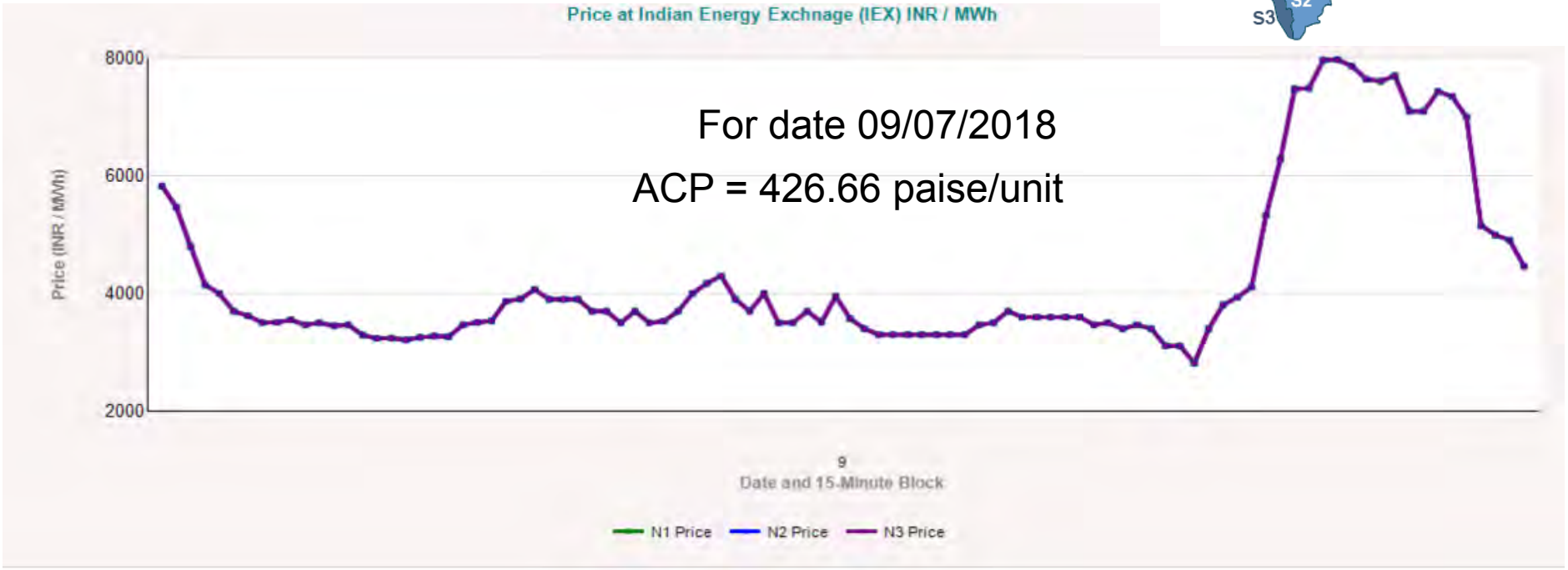
- The DSM rate vector will have a dynamic slope.
- Daily average Area Clearing Prices (ACP) in the day-ahead market shall be used as the basis for market linked DSM price at 50 Hz.
- Day-ahead market price of Power Exchange having a market share > 80% in energy terms on a daily basis.
- If there is no single Power Exchange having a market share 80% or more, the weighted average day-ahead price shall be used for determining the DSM price.
- Deviation price shall be rounded off to nearest two decimal places.

DSM Price Vector-Illustration

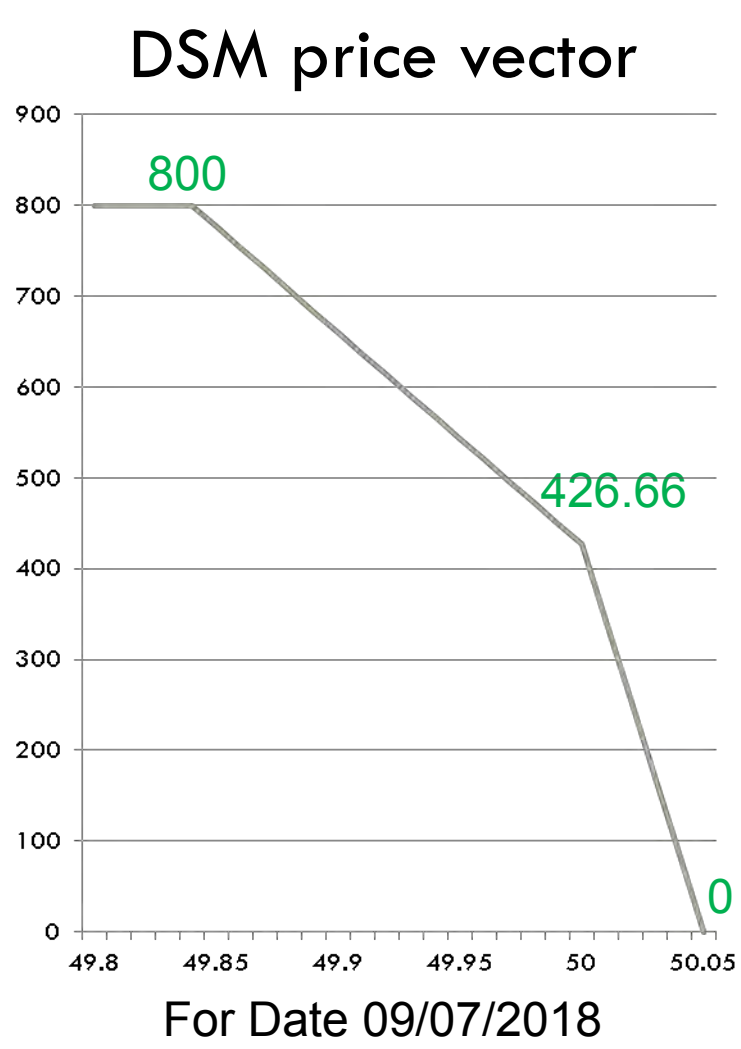
- NR is divided into 3 bid areas

Bid Area	States
N1	J&K, HP, Chandigarh, Haryana
N2	UP, Rajasthan, Uttarakhand, Delhi
N3	Punjab





DSM Price Vector-Illustration



Frequency	Old Rate	New Rate	Frequency	Old Rate	New Rate
49.65	824.4	800	49.86	469.76	753.33
49.66	824.4	800	49.87	448.92	730
49.67	824.4	800	49.88	428.08	706.67
49.68	824.4	800	49.89	407.24	683.33
49.69	824.4	800	49.9	386.4	660
49.7	803.02	800	49.91	365.56	636.66
49.71	782.36	800	49.92	344.72	613.33
49.72	761.52	800	49.93	323.88	590
49.73	740.68	800	49.94	303.04	566.66
49.74	719.84	800	49.95	282.2	543.33
49.75	699	800	49.96	261.36	520
49.76	678.16	800	49.97	240.52	496.66
49.77	657.32	800	49.98	219.68	473.33
49.78	636.48	800	49.99	198.84	449.99
49.79	615.64	800	50	178	426.66
49.8	594.8	800	50.01	142.4	341.33
49.81	573.96	800	50.02	106.8	256
49.82	553.12	800	50.03	71.2	170.66
49.83	532.28	800	50.04	35.6	85.33
49.84	511.44	800	50.05	0	0
49.85	490.6	776.67			

DSM Price Vector- Illustration

Rajasthan (09/07/2018)	Present DSM	Draft 4th Amendment
Schedule (LUs)	721.50454	
Actual (LUs)	748.11328	
Capped Deviation (Lakh)	67.03231	131.02764
Additional Deviation (Lakh)	14.87196	29.76801

- For FY 2017-18, avg DSM rate would've increased from Rs 2.4/unit to Rs 4.03/unit.

NET DEVIATION CHARGES

=ADJUSTED DEVIATION AMOUNT + CAPPED DEVIATION AMOUNT + ADDITIONAL DEVIATION AMOUNT + ADDITIONAL CHARGE + ADDITIONAL SURCHARGE

Additional Charge

- Clause 1 of Regulation 7

  "*The total deviation from schedule in energy terms during a day shall not be in excess of 3% of the total schedule for the drawee entities and 1% for the generators and additional charge of 20% of the daily base DSM payable / receivable shall be applicable in case of said violation.*"

- No definition of "Daily Base DSM". May be interpreted as Capped Deviation Charges for an entity for the day

- Additional Charge = Capped Deviation × 0.2

  = Rs 26.2 Lakh (in previous illustration)

  (Total Deviation ~ 3.75%)

Additional Charge

Suggestion by NRPC Sectt

- 20% additional charge would be applicable once the entity exceeds 3% or 1%, regardless of volume
- Additional charge does not distinguish between entities based on the quantum of deviation above the threshold.
- Slabbing may be provided.
- Additional charge me be charged only on the amount of deviation in excess of 3% or 1%

DRAWEE UTILITY		
% daily deviation Below	% daily deviation Not Below	% additional charge of daily base DSM
3.01	0	0%
5	3.01	10%
7	5.01	20%
9	7.01	40%
11	9.01	80%
	11.01	100%
INJECTING UTILIY		
1.01	0	0%
3	1.01	10%
5	3.01	20%
7	5.01	40%
9	7.01	80%
	9.01	100%

Additional Charge
= Rs 2.11 lakh

Additional Surcharge

- In the event of sustained deviation from schedule in one direction (positive or negative) by any regional entity, such regional entity (buyer or seller) shall have to make sign of their deviation from schedule changed, at least once, after every 6 time blocks.
- Similar provision for 12 time blocks in existing regulation, but no provision of penalty.
- Violation of the requirement under this clause shall attract an additional surcharge of 20% on the daily base DSM payable / receivable as the case may be.
- No illustrations for calculation provided.

Additional Surcharge

Interpretation 1

OD/UD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	UD	UD	OD	UD
Successive OD/UD counts	1	2	3	4	5	6	7											
Violations							V											

- Non reversal of sign in 7th time block to be considered as a 'violation'.
- Regardless of number of such violations,

  Additional Surcharge = Capped Deviation × 0.2
- Does not distinguish between entities committing single violation or multiple violations.

Additional Surcharge

Interpretation 2

OD/UD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	UD	UD	OD	UD
Successive OD/UD counts	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	1	1
Violations							V							V				

- Non reversal of sign in 7th time block to be considered as a 'violation'.
- After such violation, reset successive violation count to 1.
- Additional Surcharge

  = {Capped Deviation × 0.2} × No. of such violations
- May lead to high Additional Surcharge.
- No Additional Surcharge in case Capped deviation is zero for the day.

Additional Surcharge

Suggestion by NRPC Sectt

OD/UD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	OD	UD	UD	OD	UD
Deviation Energy	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18
Successive OD/UD counts	1	2	3	4	5	6	7	8	9	10	11	12	13	14	6	7	1	1
Violations							V	V	V	V	V	V	V	V				
DSM rates	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18

- After 6th time block every non-reversal of sign should be considered as a 'violation'.
- Additional surcharge should continue to be levied for all the time blocks till sign reversal is achieved.
- Additional Surcharge = $(|D7|\times R7+|D8|\times R8+|D9|\times R9+|D10|\times R10+|D11|\times R11+|D12|\times R12+|D13|\times R13+|D14|\times R14)\times 0.2$

NET DEVIATION CHARGES

Rajasthan (09/07/2018)	Present DSM	Draft 4th Amendment Interpretation 1	Draft 4th Amendment Interpretation 2 (6 violations)	Draft 4th Amendment Suggestions by NRPC Sectt. (29 violations)
Schedule (LUs)	721.50454			
Actual (LUs)	748.11328			
Capped Deviation (Rs Lakh)	67.03231	131.02764	131.02764	131.02764
Additional Deviation (Rs Lakh)	14.87196	29.76801	29.76801	29.76801
Additional Charge (Rs Lakh)	Nil	26.20553	26.20553	2.11777
Additional Surcharge (Rs Lakh)	Nil	26.20553	157.2332	13.56657
Total*	**81.90427**	**213.20671**	**344.23438**	**176.47999**

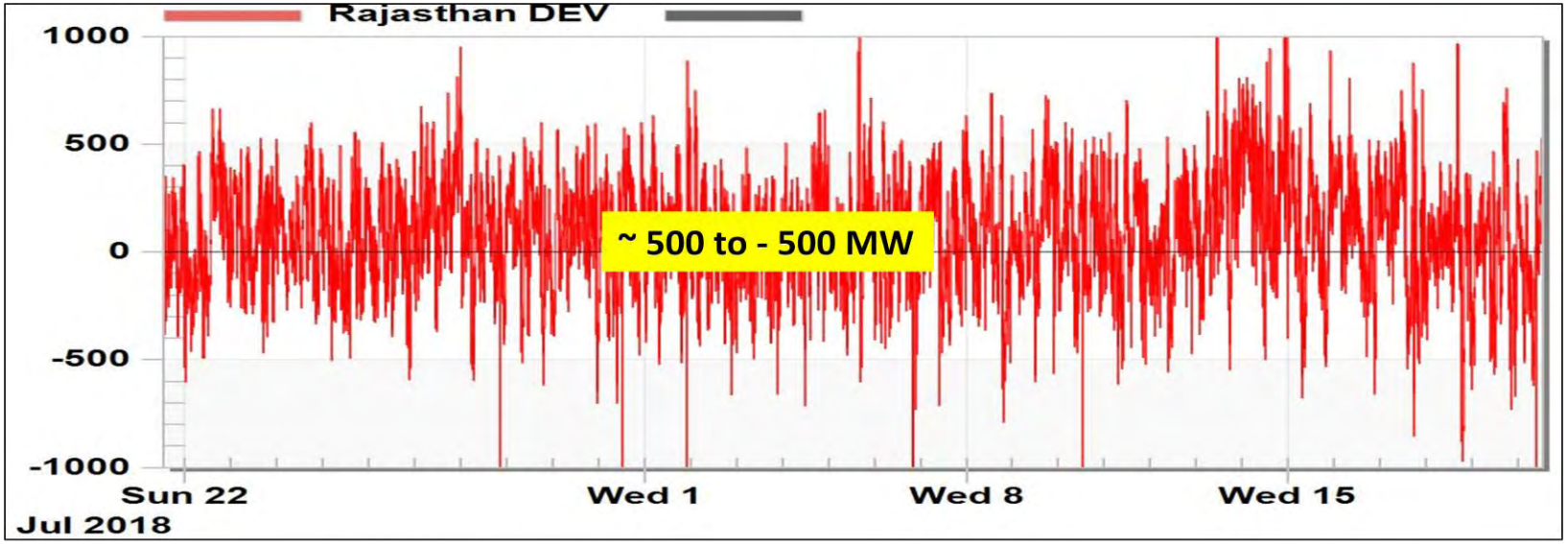
*Excluding Adjusted Deviation Amount from Nuclear Plants

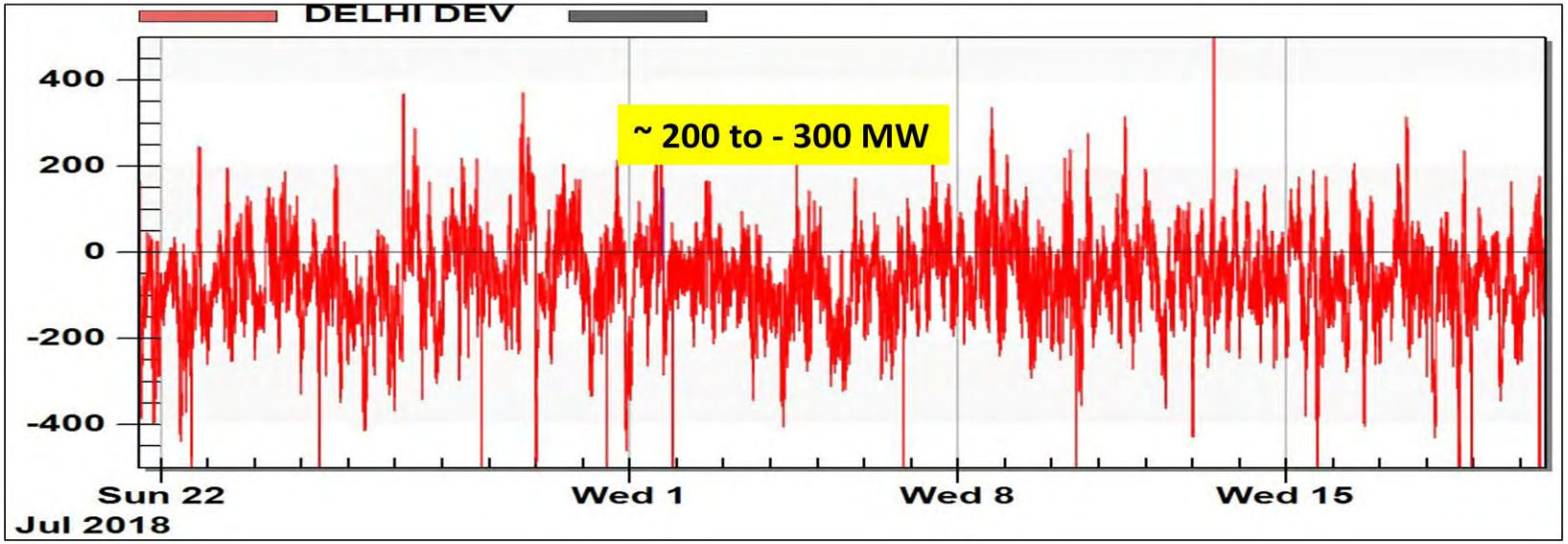
Future Developments

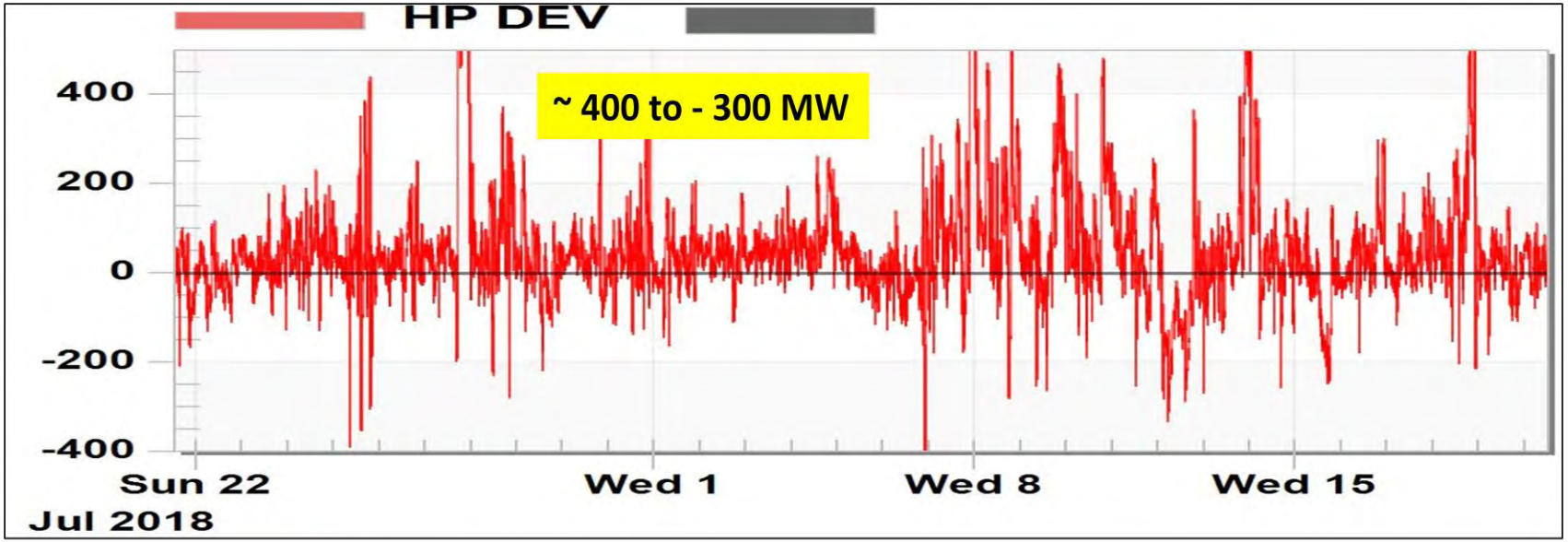
- Frequency band to be further narrowed to 49.90-50.05
- Different Deviation Price Vector for each time block
- 5 minute scheduling

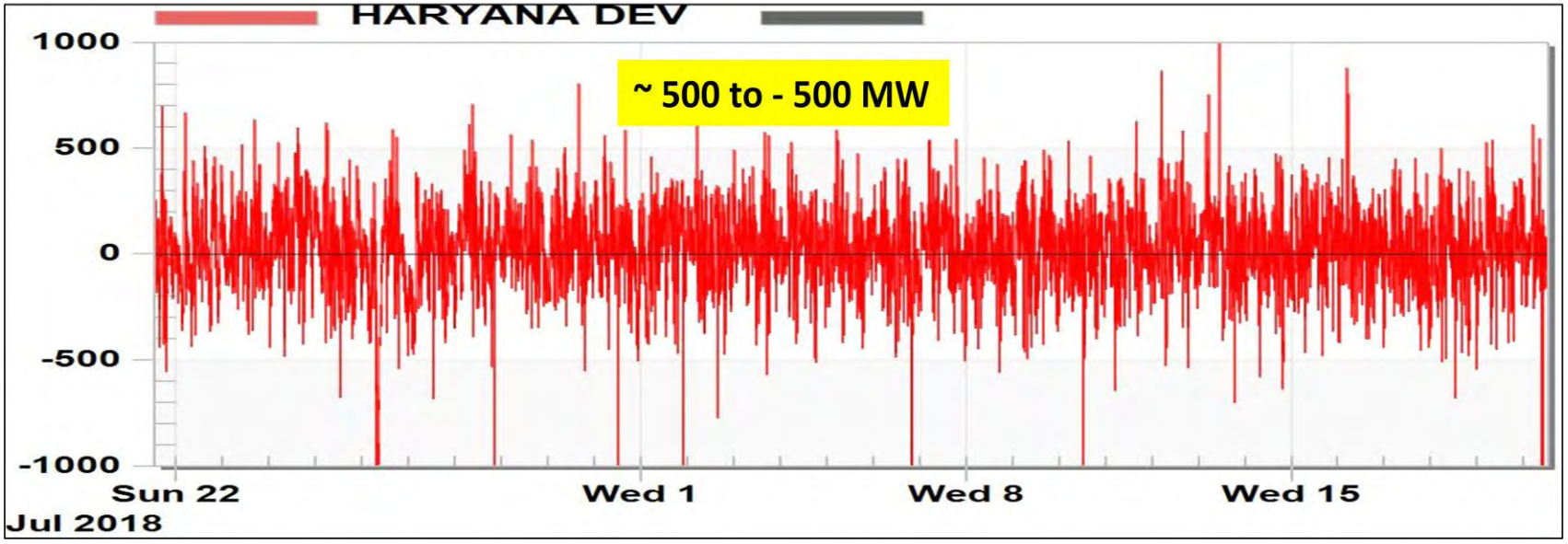
THANK YOU.!!!

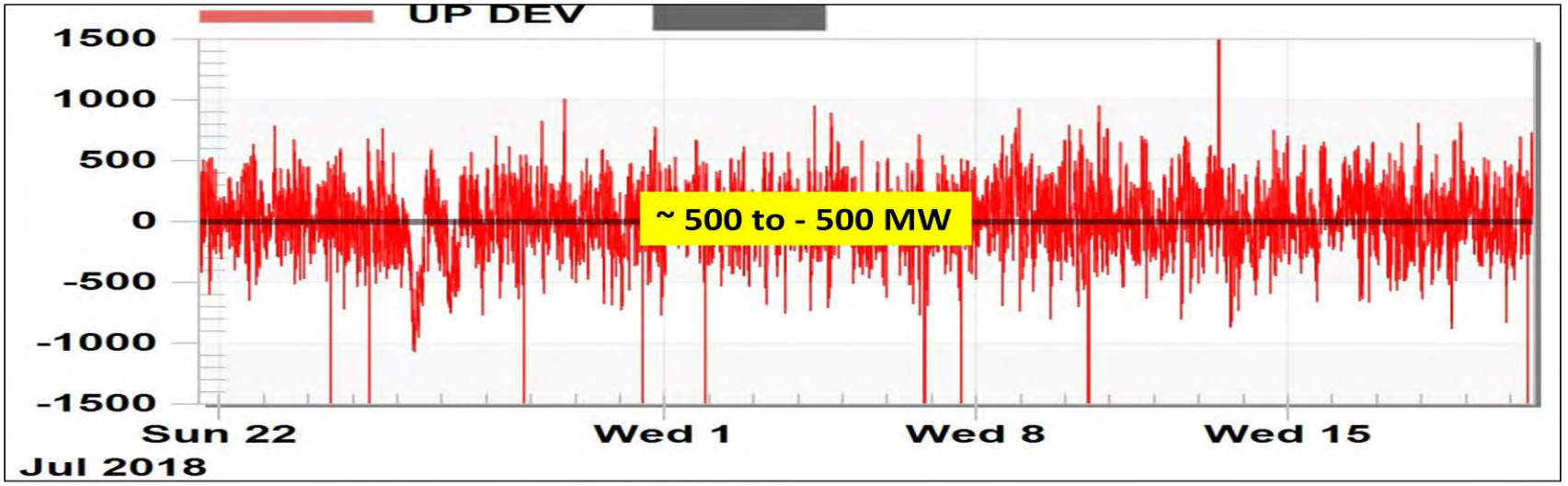
Annexure-1

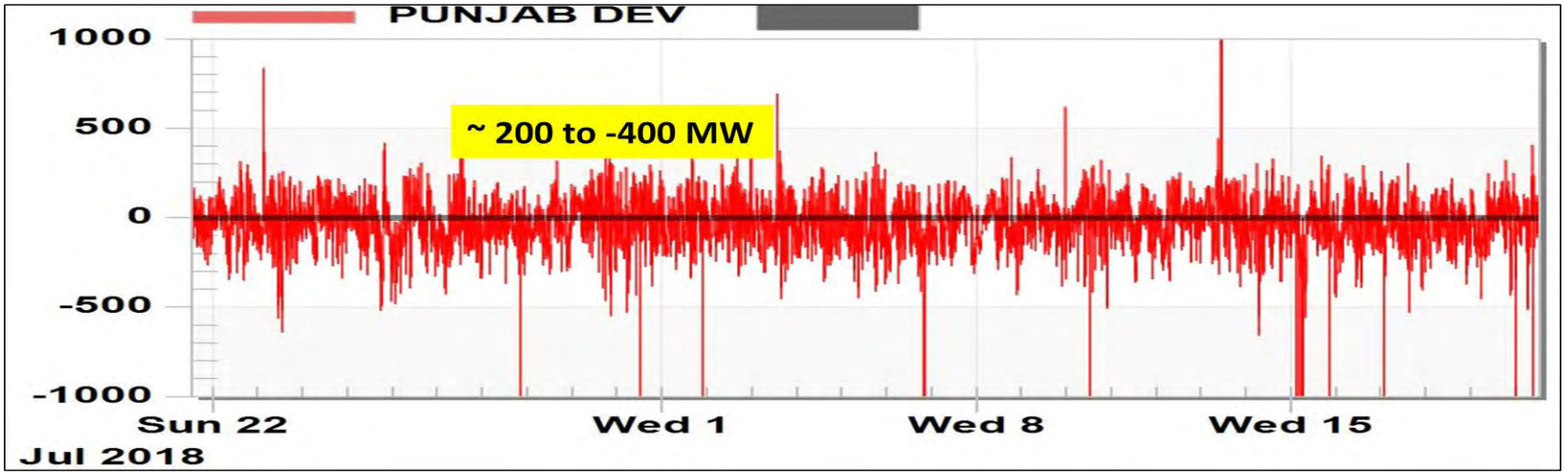

Rajasthan DEV
1000
500
0
-500
-1000
~ 500 to - 500 MW
Sun 22
Jul 2018
Wed 1
Wed 8
Wed 15

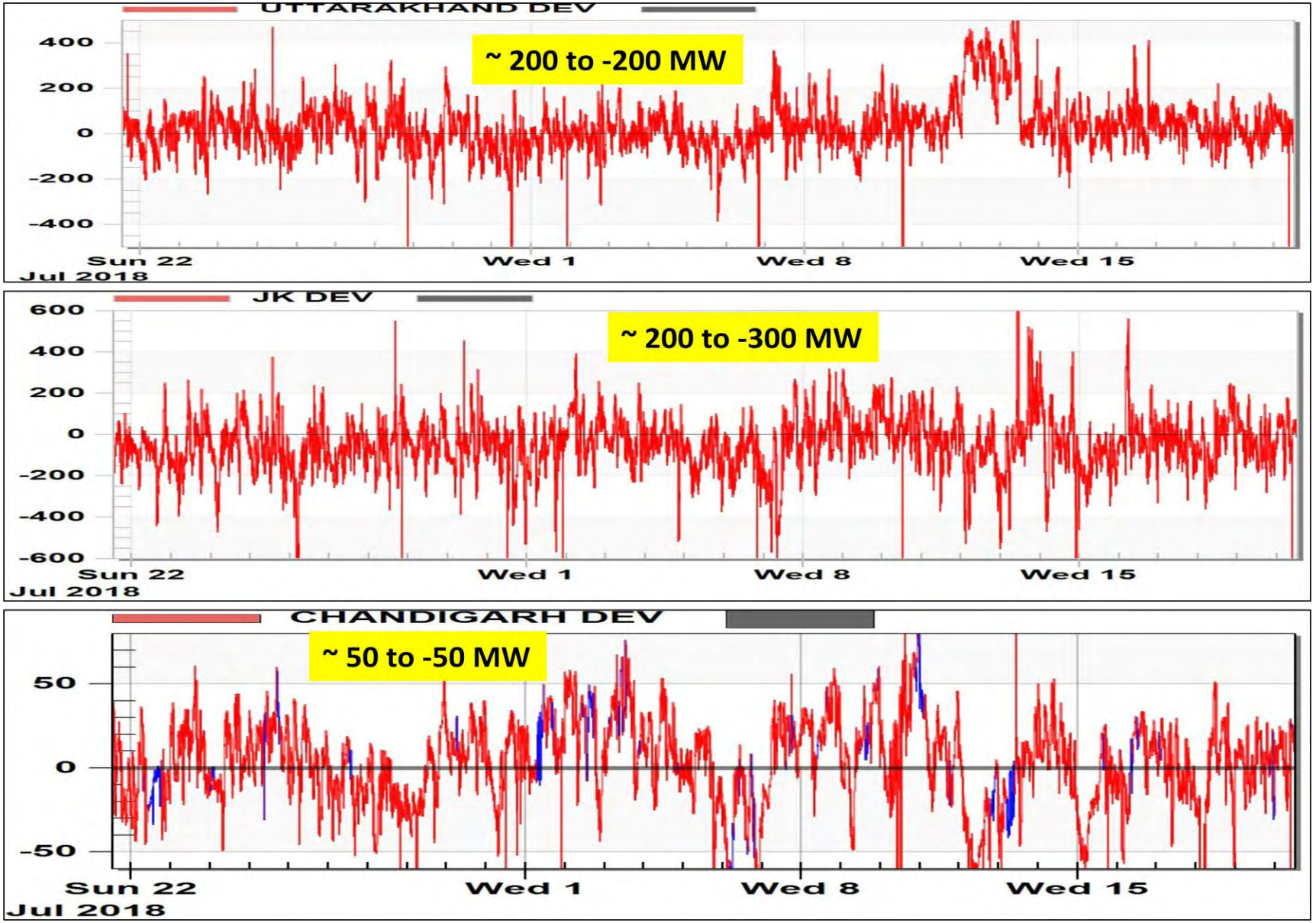

DELHI DEV
400
200
0
-200
-400
~ 200 to - 300 MW
Sun 22
Jul 2018
Wed 1
Wed 8
Wed 15

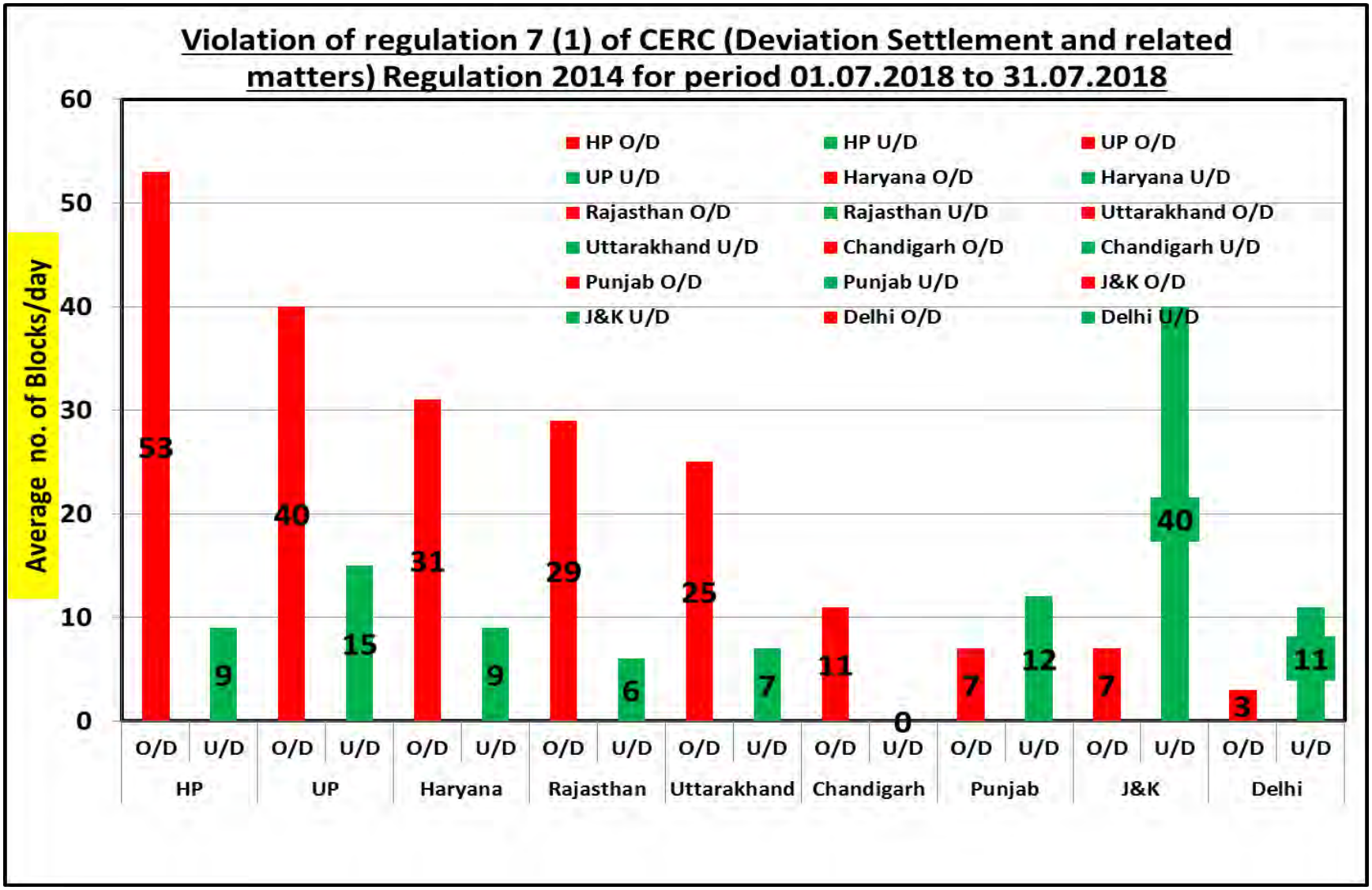

HP DEV
~ 400 to - 300 MW
400
200
0
-200
-400
Sun 22
Jul 2018
Wed 1
Wed 8
Wed 15

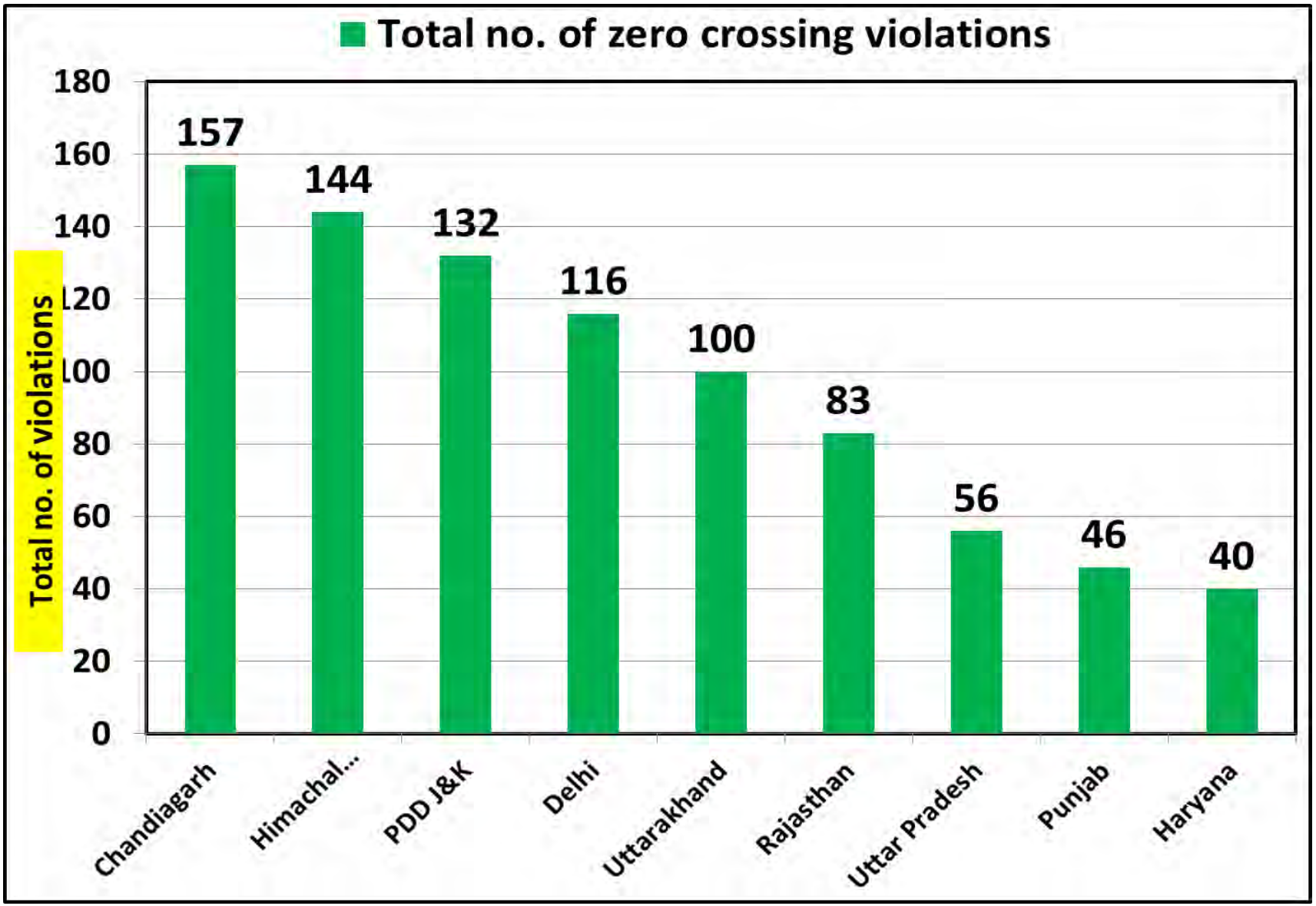

HARYANA DEV
~ 500 to - 500 MW
1000
500
0
-500
-1000
Sun 22
Jul 2018
Wed 1
Wed 8
Wed 15


UP DEV
1500
1000
500
0
-500
-1000
-1500
~ 500 to - 500 MW
Sun 22
Jul 2018
Wed 1
Wed 8
Wed 15


PUNJAB DEV
1000
500
0
-500
-1000
~ 200 to -400 MW
Sun 22
Jul 2018
Wed 1
Wed 8
Wed 15


UTTARAKHAND DEV
~ 200 to -200 MW
400
200
0
-200
-400
Sun 22
Jul 2018
Wed 1
Wed 8
Wed 15
JK DEV
~ 200 to -300 MW
600
400
200
0
-200
-400
-600
Sun 22
Jul 2018
Wed 1
Wed 8
Wed 15
CHANDIGARH DEV
~ 50 to -50 MW
50
0
-50
Sun 22
Jul 2018
Wed 1
Wed 8
Wed 15


Violation of regulation 7 (1) of CERC (Deviation Settlement and related matters) Regulation 2014 for period 01.07.2018 to 31.07.2018
Average no. of Blocks/day
60
50
40
30
20
10
0
HP O/D
HP U/D
UP O/D
UP U/D
Haryana O/D
Haryana U/D
Rajasthan O/D
Rajasthan U/D
Uttarakhand O/D
Uttarakhand U/D
Chandigarh O/D
Chandigarh U/D
Punjab O/D
Punjab U/D
J&K O/D
J&K U/D
Delhi O/D
Delhi U/D
53
9
40
15
31
9
29
6
25
7
11
0
7
12
7
40
3
11
O/D
U/D
HP
UP
Haryana
Rajasthan
Uttarakhand
Chandigarh
Punjab
J&K
Delhi


Total no. of zero crossing violations
Total no. of violations
180
160
140
120
100
80
60
40
20
0
157
144
132
116
100
83
56
46
40
Chandiagarh
Himachal...
PDD J&K
Delhi
Uttarakhand
Rajasthan
Uttar Pradesh
Punjab
Haryana

Minutes of Meeting between NTPC & POSOCO on 09th August 2018 regarding observance of high vibration in Dadri Stg-II

- GM NLDC welcomed the officials from NTPC and other participants.
- POSOCO gave the presentation (attached in Annexure-I) & explained the event of 28th June 2018, in which Dadri stg-2 unit# 5 and unit #6 tripped on high generator bearing vibration.
- In presentation, Network details, SCADA SOE, DR/EL and PMU plots were discussed. It was noted that there was LLG fault on 400 kV Dadri-G.Noida at a distance of 0.1 km from Dadri end. Fault current observed from DR was 51 kA.
- The data available with POSOCO (DR, PMU etc) didn't reveal any oscillation in electrical parameters. Also as per information from POWERGRID no switching/tripping occurred at HVDC Dadri during the entire incident.
- NTPC representatives shared data observed from vibration monitoring system which showed generator shaft vibration which reached more than 500 micron.
- NTPC also informed about the vibration observed in the machines on below given incidences:-
    - On 28th June 2018, at 01:17 hrs unit# 5 and unit #6 tripped during fault in 400 kV Dadri-Greater Noida line.
    - On 25th July 2018, at 15:11 hrs unit# 5 and unit #6 observed high vibration during auto reclosure of 400 kV Dadri-Harsh Vihar ckt-I on Phase to earth fault.
    - On 03rd August 2018, at 17:13 hrs unit# 5 and unit #6 observed high vibration during tripping of 400 kV Dadri-G.Noida line on LLG fault.
- Based on discussion following action points were decided: -
    i. FSC of 400 kV Kanpur-Ballabhgarh would be bypassed on test basis to check if it has any relevance with the vibration of Dadri units.
    ii. NTPC would share details (including vibration trend, .csv files of DR of units and lines) of earlier cases of vibration in the unit# 5 and unit #6. POSOCO would further investigate whether there were any switching/tripping during those cases of vibration based on data received from NTPC.
    iii. POSOCO would do modal analysis on the high frequency data provided by NTPC to identify modes of oscillation.
    iv. NTPC would check local data storage of PMU installed in Unit#6 at Dadri stg-II and if available, this data may give insights the frequency of oscillations. If not available then NTPC would explore the possibility to store the data with sampling rate of 8 kHZ.
    v. POSOCO would take up with POWERGRID for early implementation of PMU at Dadri under URTDSM project including the current on 400kV Dadri-G.Noida.
    vi. NTPC may also share this concern to CTU & CEA so that necessary action may be taken in the planning phase.
    vii. NTPC would check time synchronisation of recording instruments (units DR and vibration trend of the m/c) at Dadri end.
    viii. NTPC would also ensure the availability of SCADA SoE of unit-6 tripping.

- Against action point (i), this has already been done wef from 13:20 hrs of 9th august 2018.
- Against action point (ii), NTPC has shared the dates and trends (1 seconds resolution) of the vibration.
- Meeting closed with vote of thanks to chair.

9/8/18
B.K.Singh
GM(NT)

9/8/18

09/8/18
CRN Pandey
GM(OS)NTPC

Annexure-I

Multiple element tripping at 400kV Dadri TPS

28.06.2018 at 01:17hrs

Antecedent Condition and Tripped Elements

- **Antecedent Condition:**
  - ±500kV 1500MW Rihand –Dadri Bipole power order : 1200MW (Bipolar mode)
  - All required filters were in service before the incident.
  - FSC of 400 kV Meerut-Koteshwar Pool ckt-1 was in service (176kM line length and 50% compensation)
  - FSC of 400 kV Ballabhgarh-Kanpur ckt-II & III was in service (372kM line length and 40% compensation)
  - 400 kV G. Noida-Nawada line was also in service
  - Bus splitting at 400 kV G. Noida (UP) station (01.06.2018 to 28.06.2018)- 400 kV Bus coupler isolator was damaged
  - 220 kV Harsh Vihar is connected radially from 400 kV Dadri through 400/220 kV ICTs. 400 kV Muradnagar New is connected with Mathura also.

FSC of 400 kV Koteshwar-Meerut-II (Meerut end)	19:22/14.07.17	50%	Fire in Y-ph Capacitor.
FSC of 400 kV Kanpur-I at Ballabgarh	10.58/14.03.17	35%	B-phase Signal column blast.

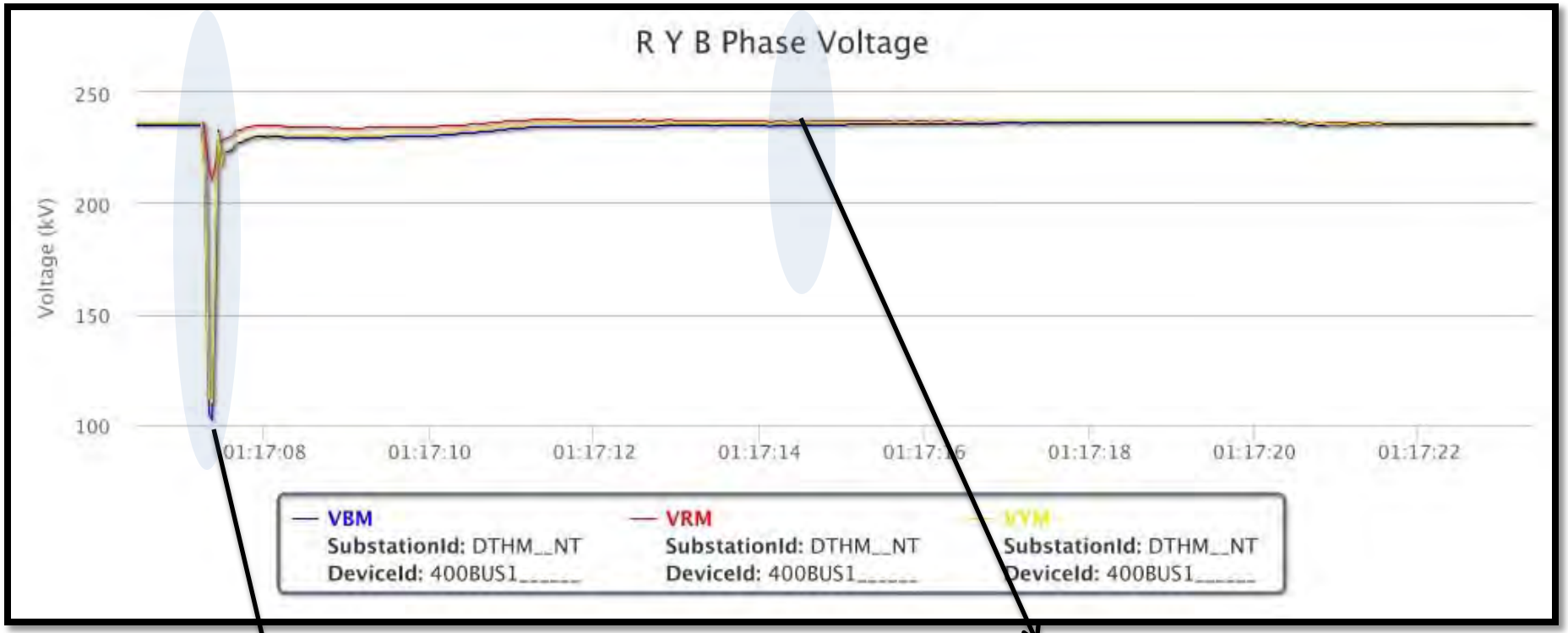
- **Tripped Element:**
  - 400 kV Dadri-G . Noida
  - 400 kV Dadri-Panipat (BBMB) ckt-1
  - 400 kV Unit-5 & 6 of 490MW

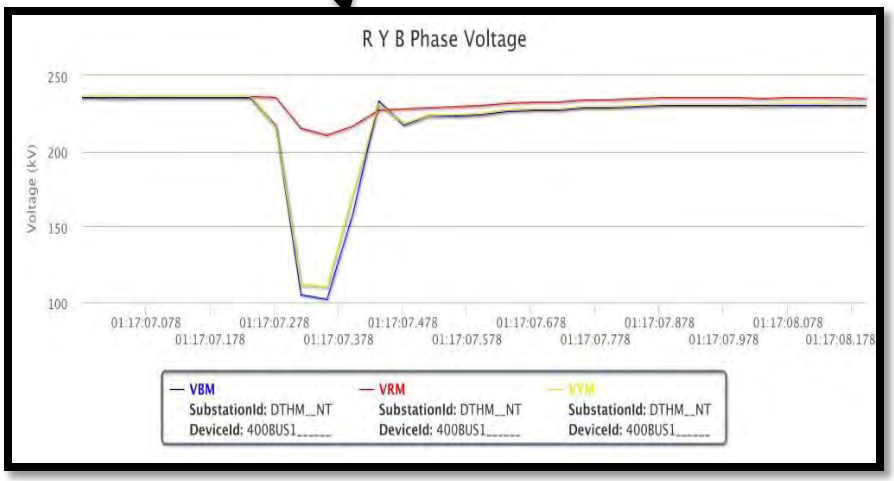
PMU Plot of frequency at Dadri(NTPC)

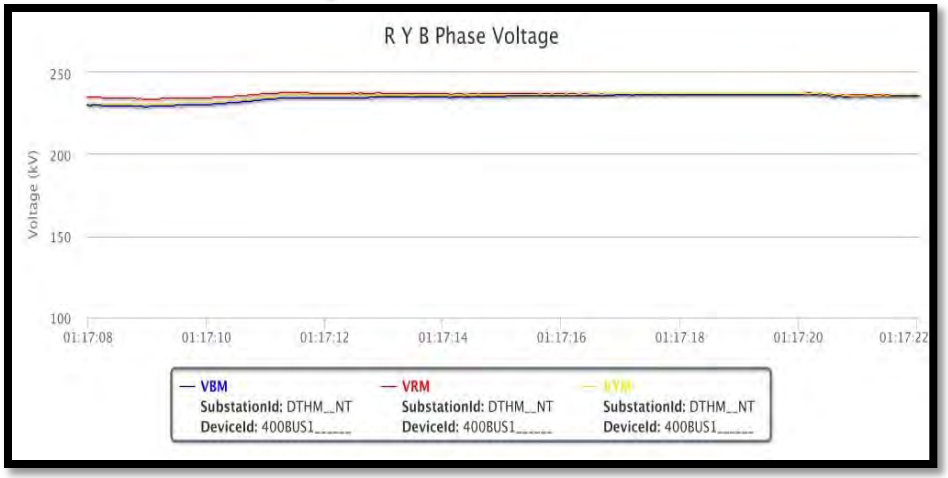
01:17hrs/28-June-18

PMU Plot of phase voltage magnitude at Dadri(NTPC)

01:17hrs/28-June-18

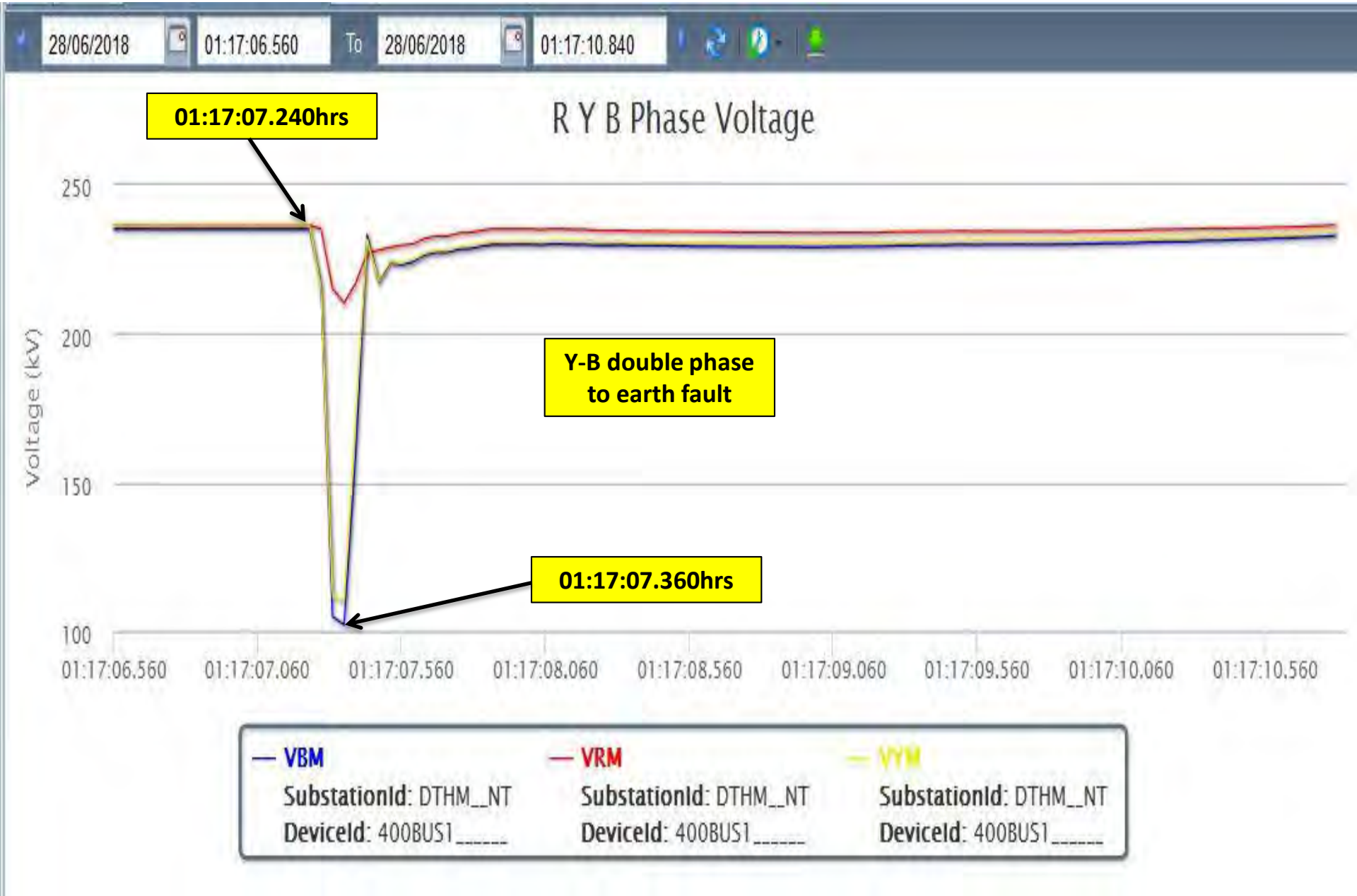






PMU Plot of phase voltage magnitude at Dadri(NTPC)

01:17hrs/28-June-18

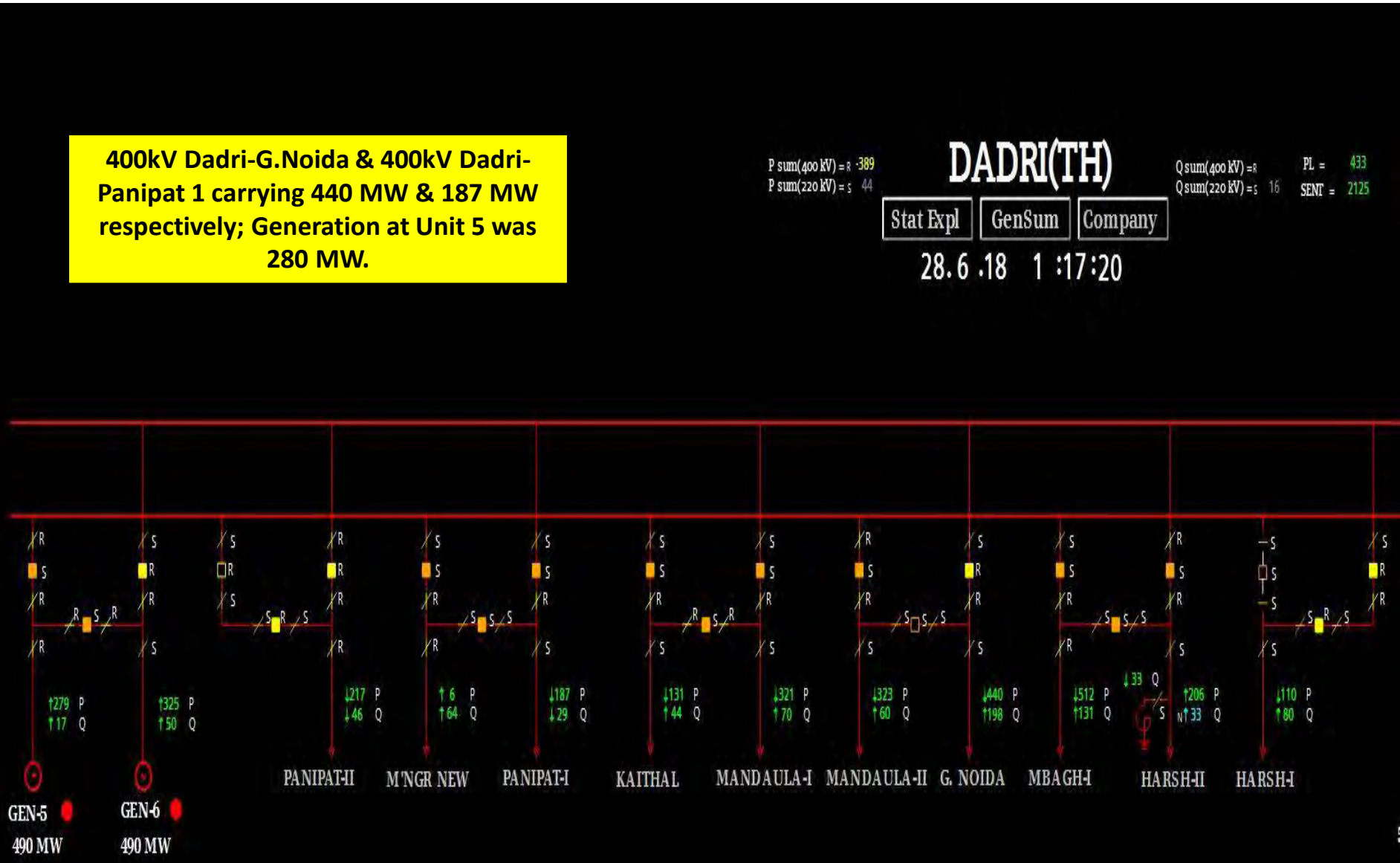


Modal Analysis of Dadri PMU

SLD of 400kV Dadri(NTPC) before the incident

01:17hrs/28-June-18

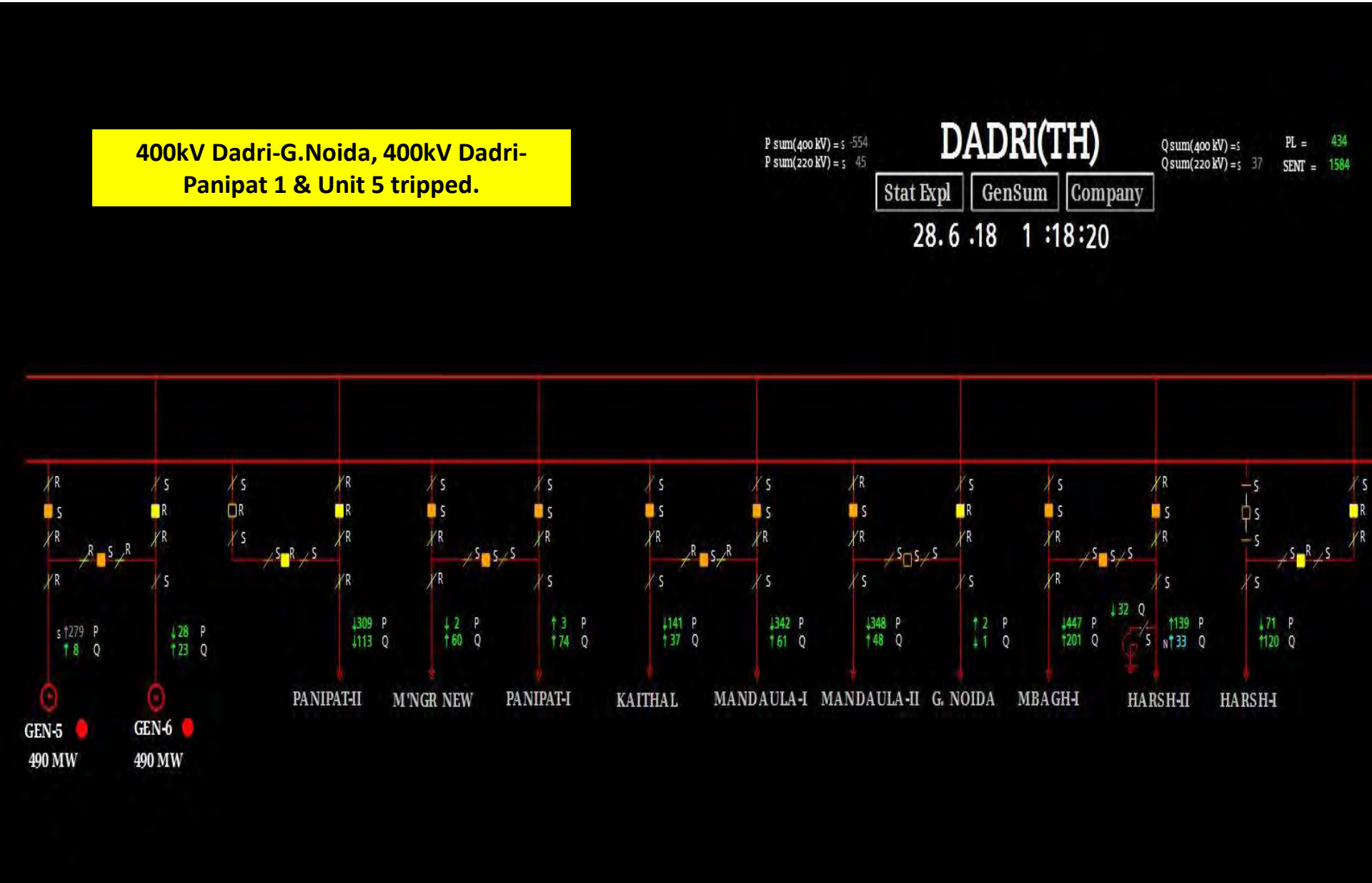
400kV Dadri-G.Noida & 400kV Dadri-Panipat 1 carrying 440 MW & 187 MW respectively; Generation at Unit 5 was 280 MW.



SLD of 400kV Dadri(NTPC) after the incident

01:18hrs/28-June-18

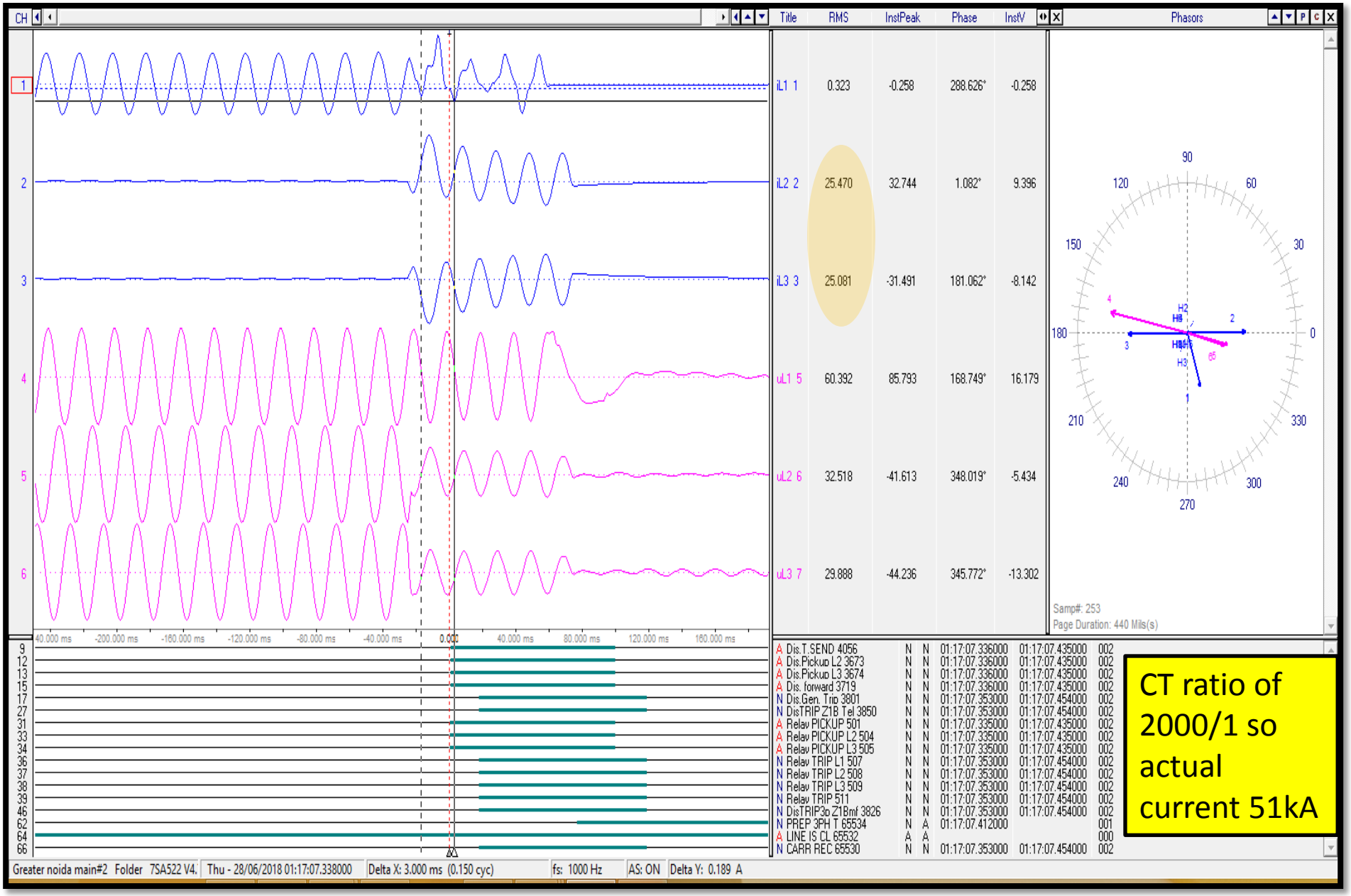
400kV Dadri-G.Noida, 400kV Dadri-Panipat 1 & Unit 5 tripped.



As per UP Report

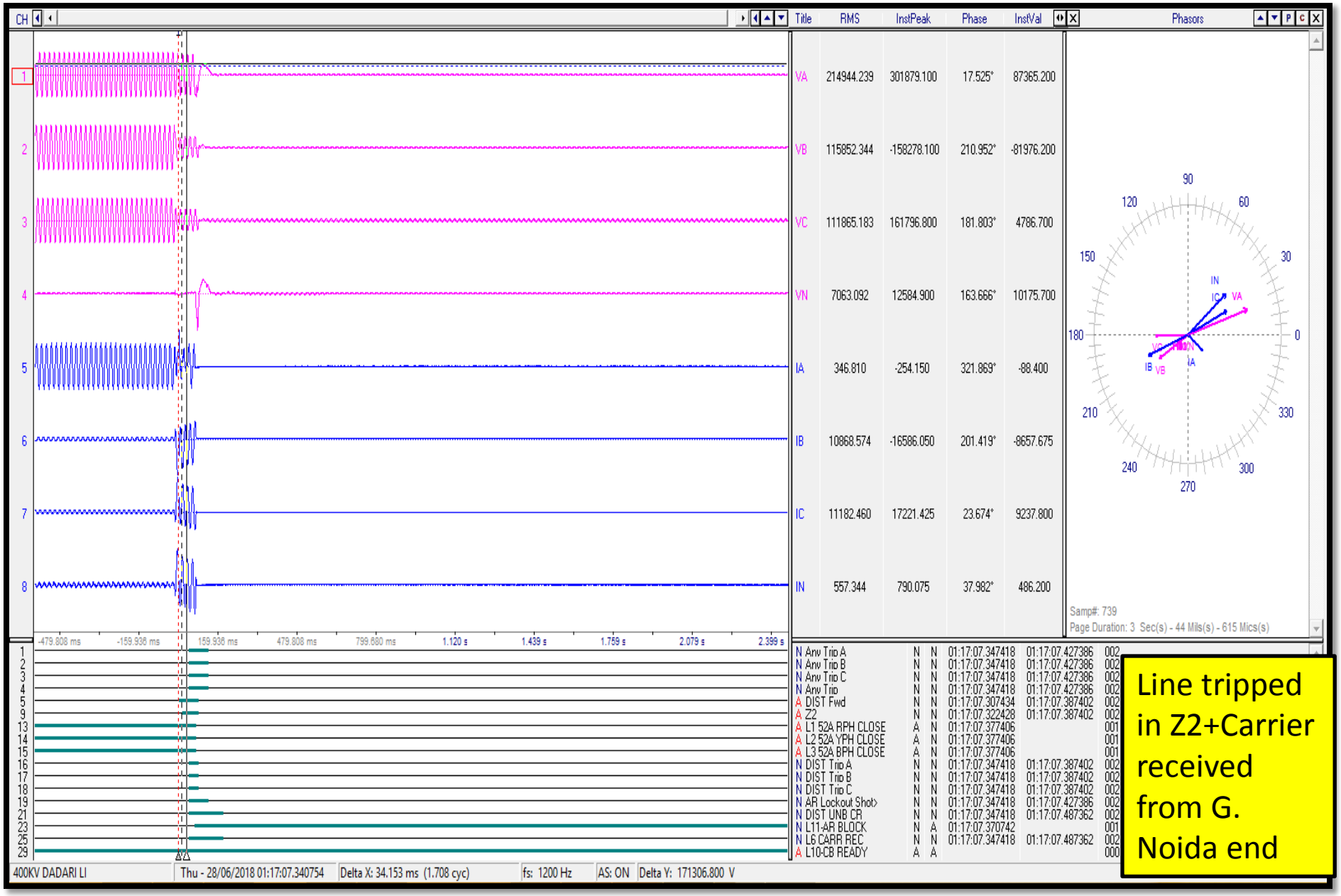
Sr. No	Tripping date/ time	Closing date/ time	Name of Substation	C.B.NO. with direction code	Type of relay scheme	Flags and Indication observed	F/L [KM]	Analysis with discripency in flag if any
1	28.06.18 01:17hrs	28.06.18 14.48 hrs.	400KV Gr.Noida	T-91 400KV Gr.Noida-Dadri	P-444 REL-670	CP-M1/M2 prot trip, Grp A/B prot trip, M1/M2 CR, M1/M2 CS RP-M1-Y, B ph trip, Z-2 , A/R lockout, M2-R,Y,B ph trip, Z-2 ,186R1/2, 186Y1/2,186B1/2, 86GA/GB, CS, CR	11.97	Wave trap damage at Dadri end as reported by Dadri. Encl. DR/EL.
	28.06.18 01:17hrs	28.06.18 14.48 hrs.	400kv Dadri	T-2152 400KV Dadri-Gr.Noida	Siemens	C/P-Distance prot trip,CS R/P/-Y,B ph trip,Z-1 Trip	0.1	

DR of 400 kV Dadri (end)-G Noida



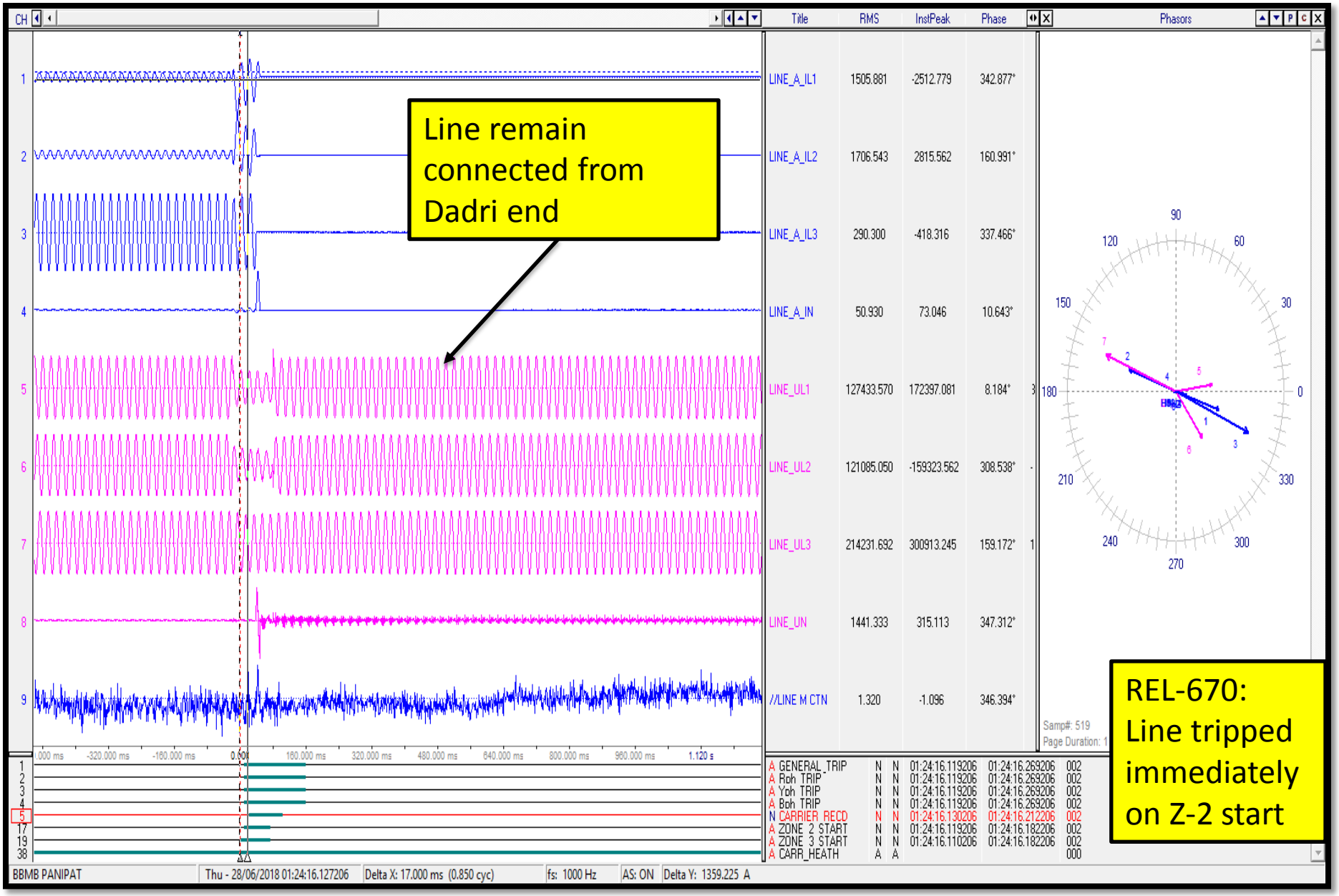
CT ratio of 2000/1 so actual current 51kA

DR of 400 kV Dadri-G Noida (end)

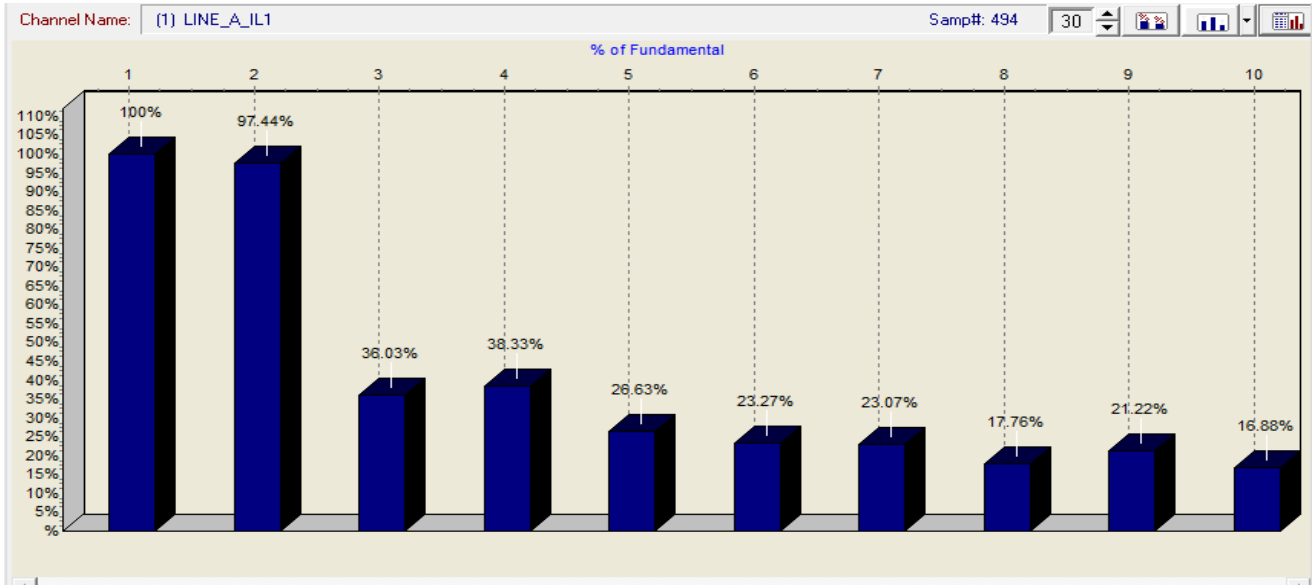


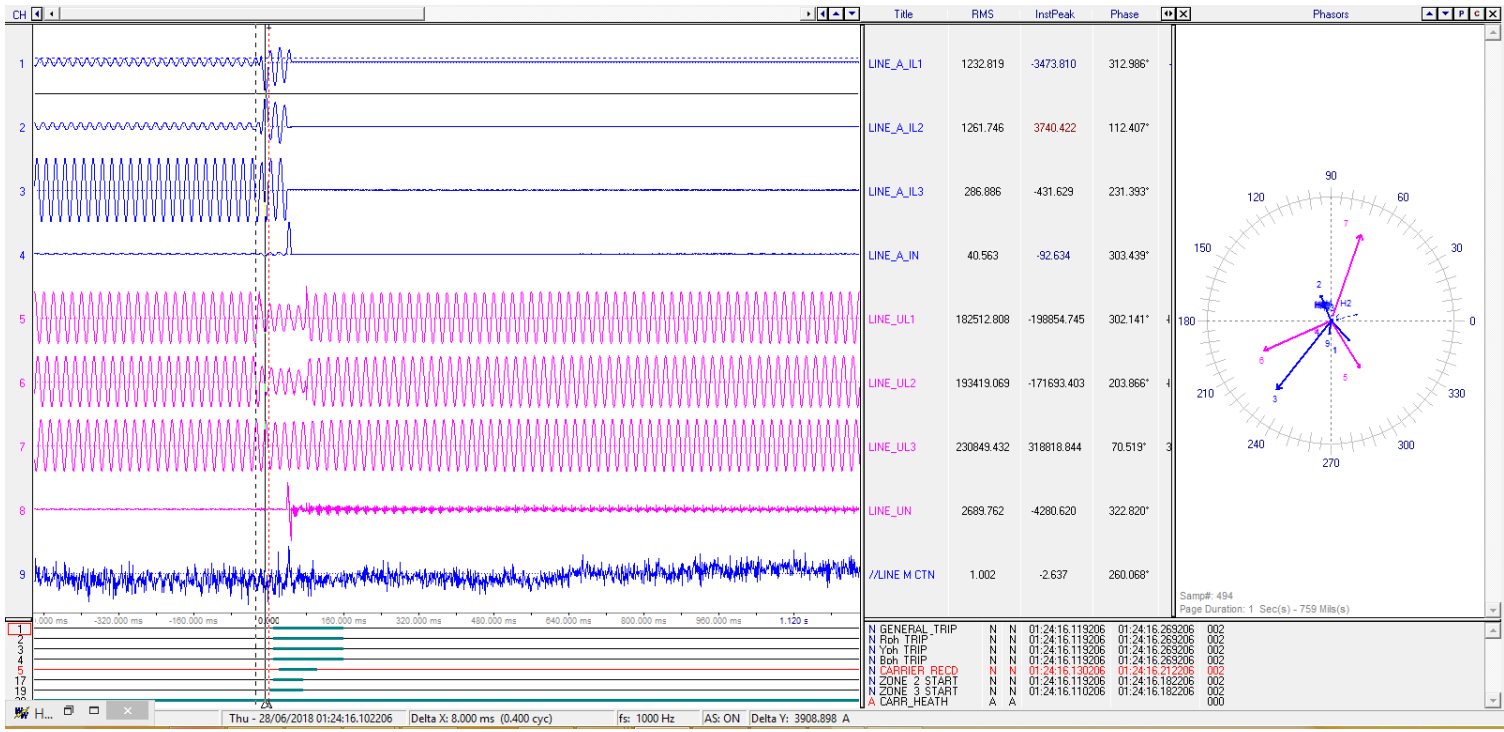
Line tripped in Z2+Carrier received from G. Noida end

DR of 400 kV Dadri-Panipat BBMB (end)

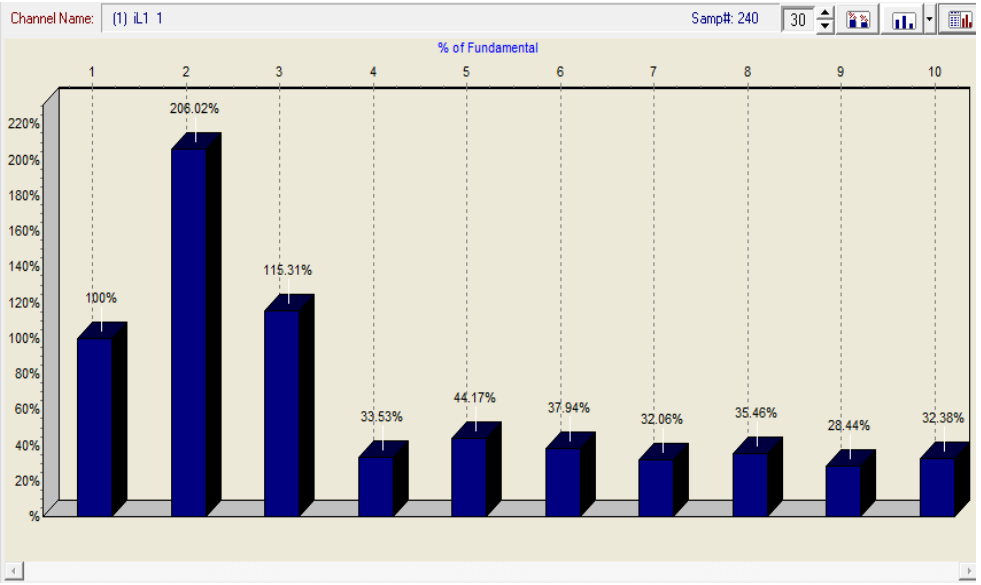


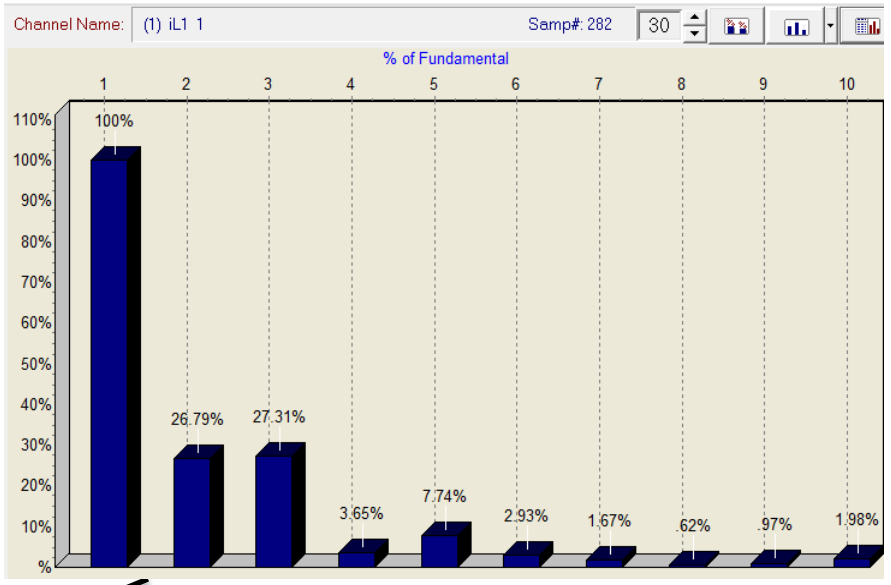
Harmonic table of 400 kV Dadri-Panipat BBMB (end)

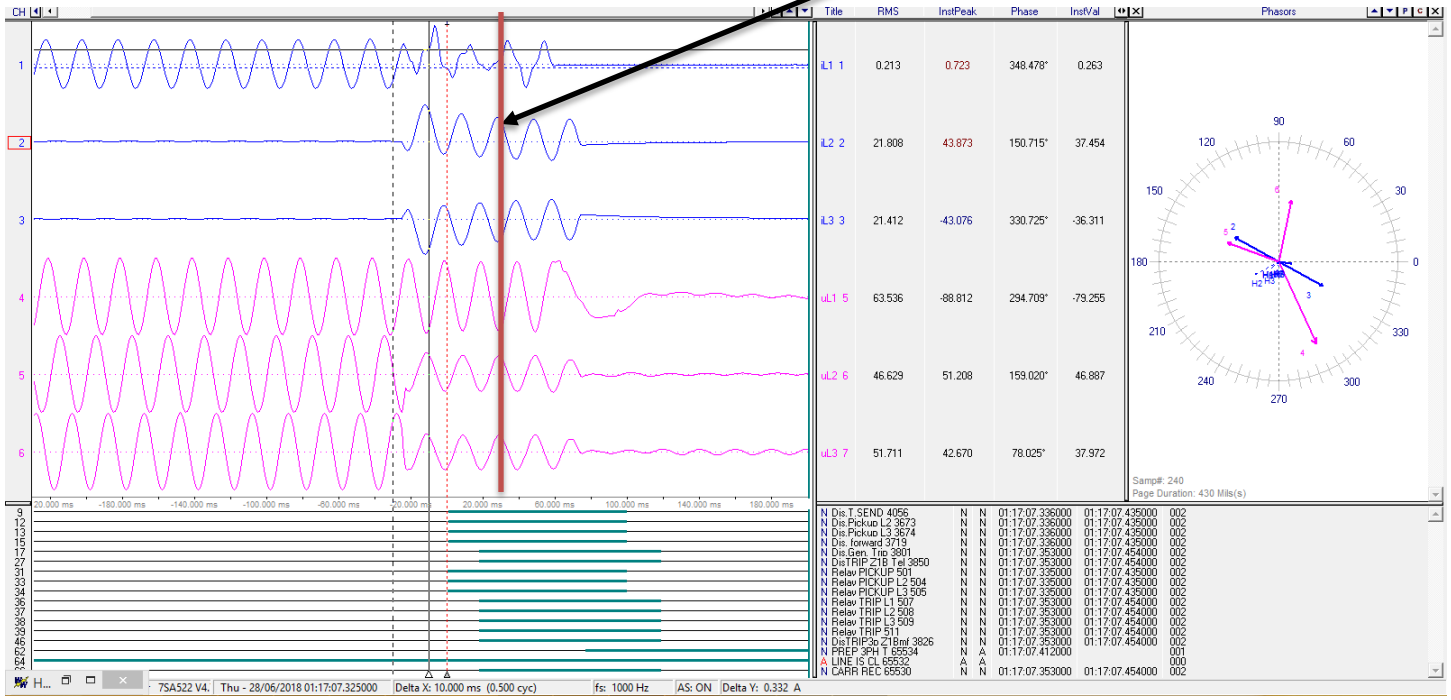




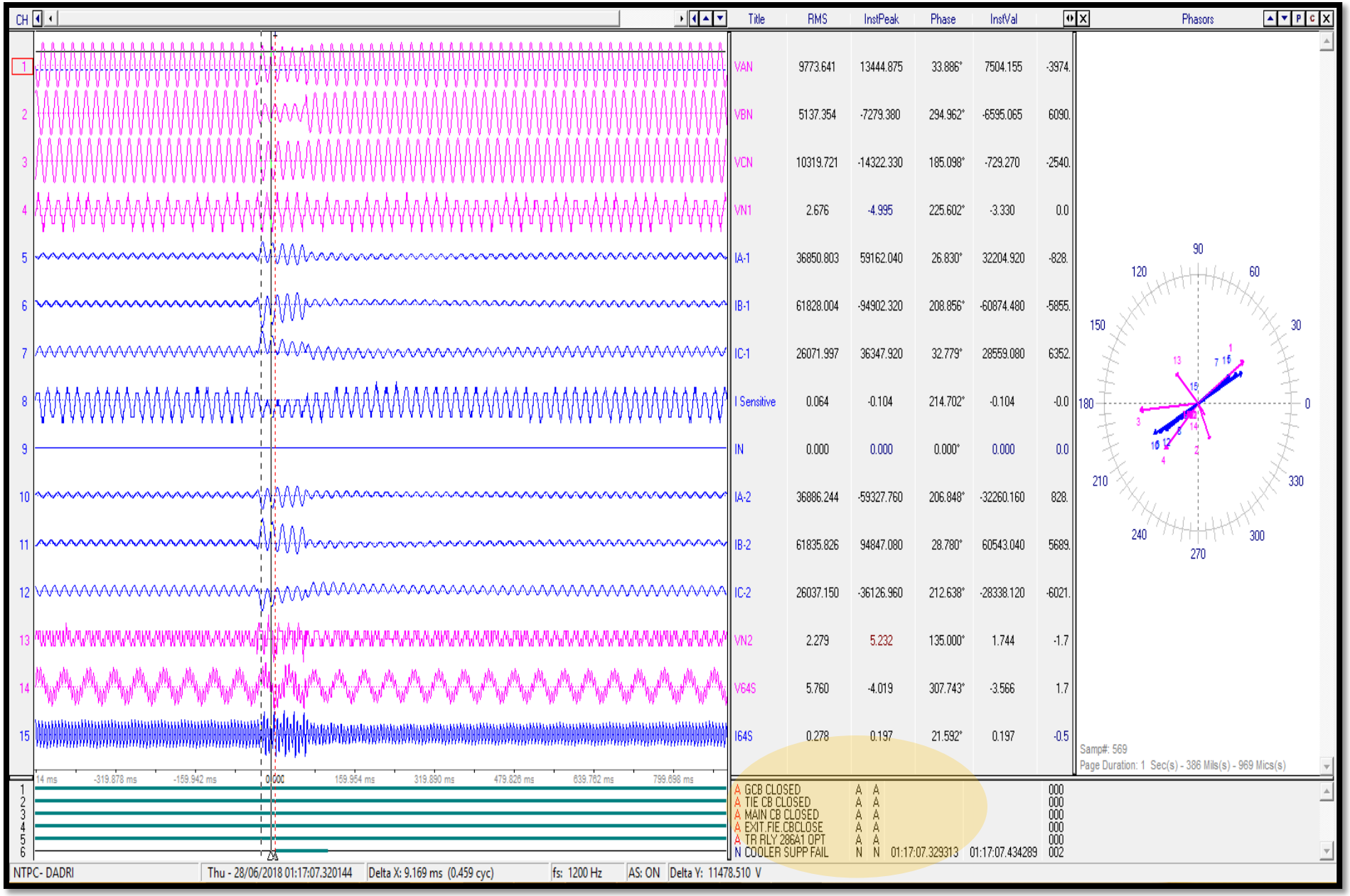
Harmonic table of 400 kV Dadri-G Noida (end)



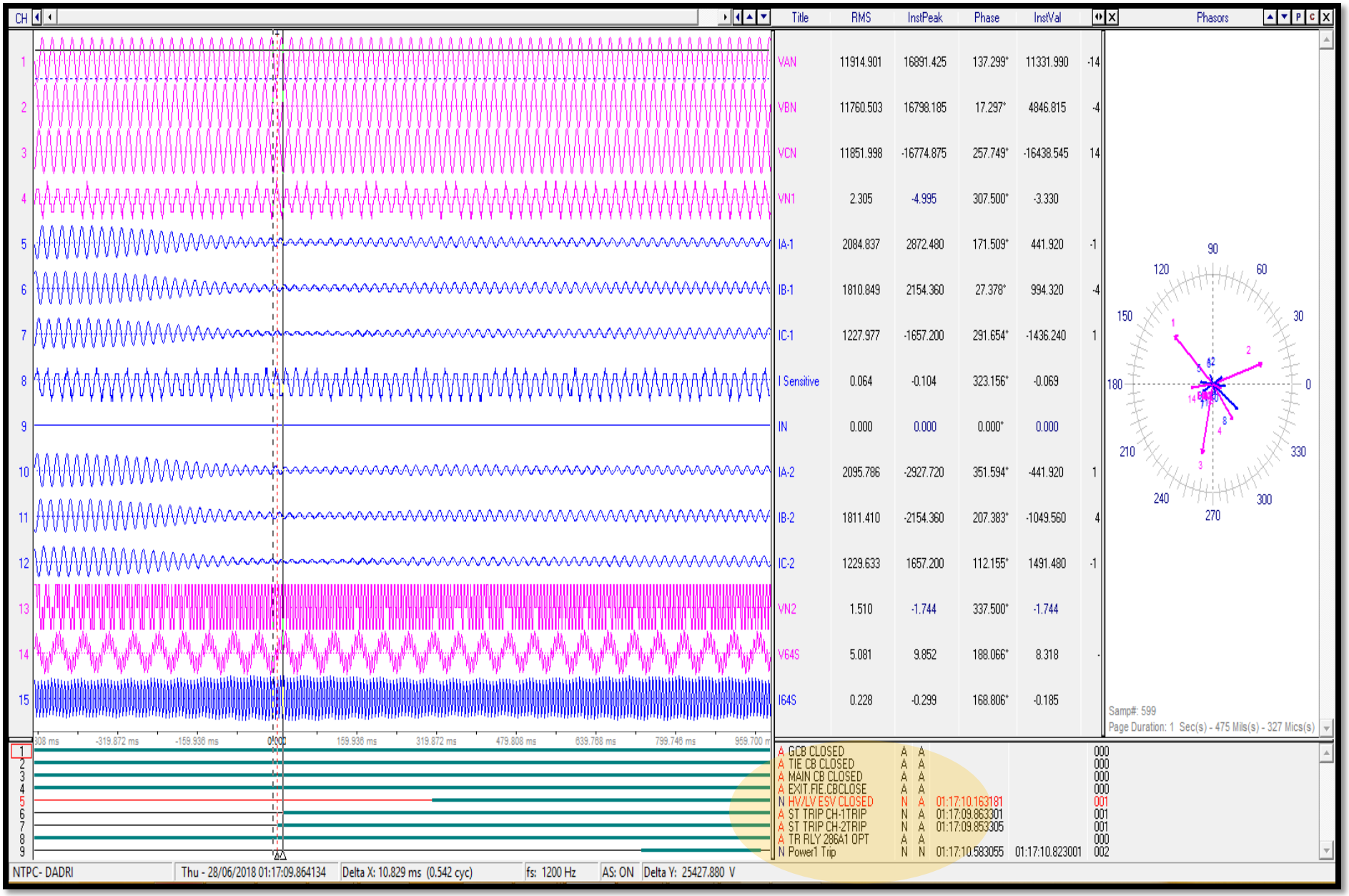




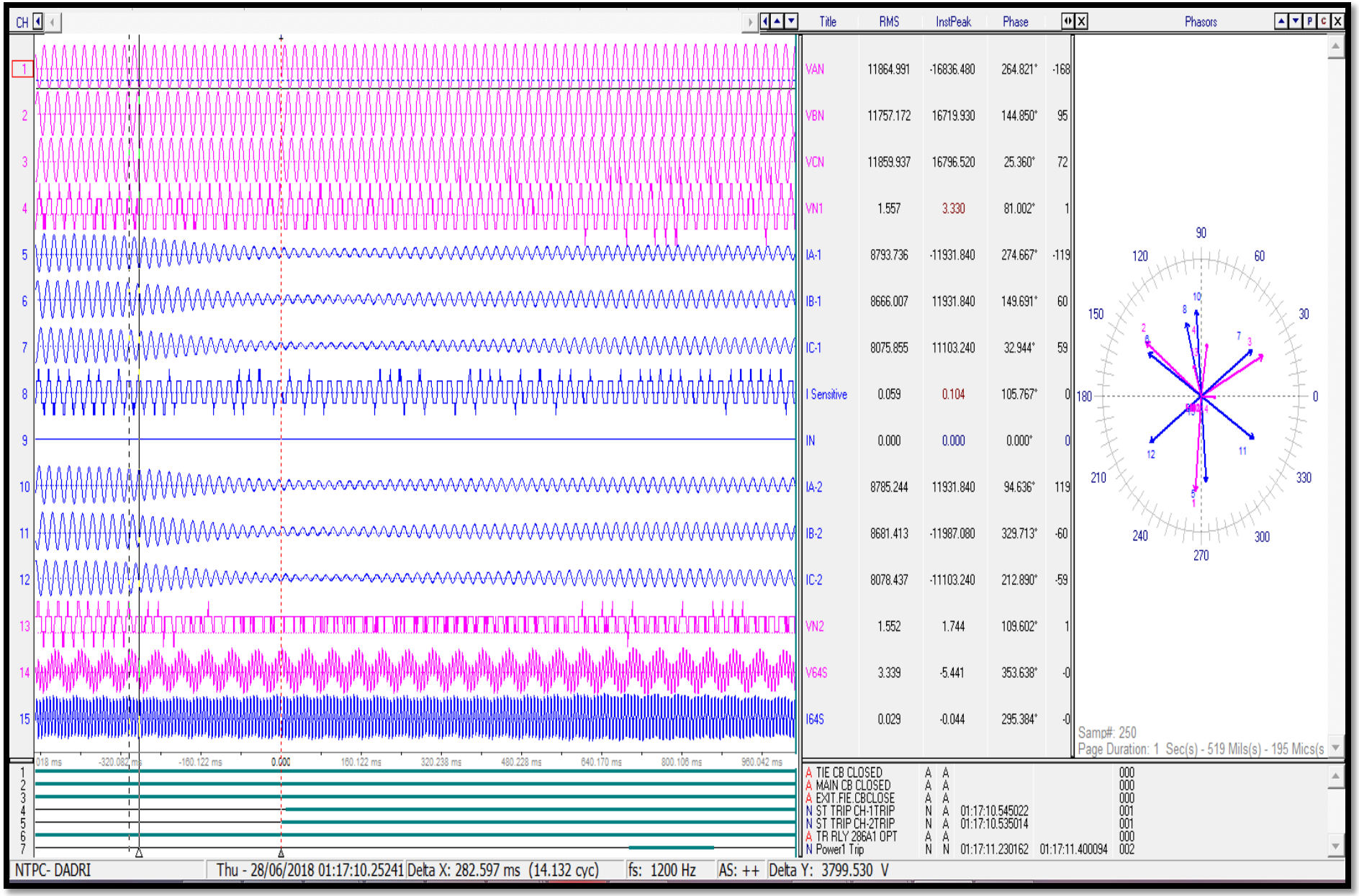
DR of 400 kV Dadri (end)- Unit-5



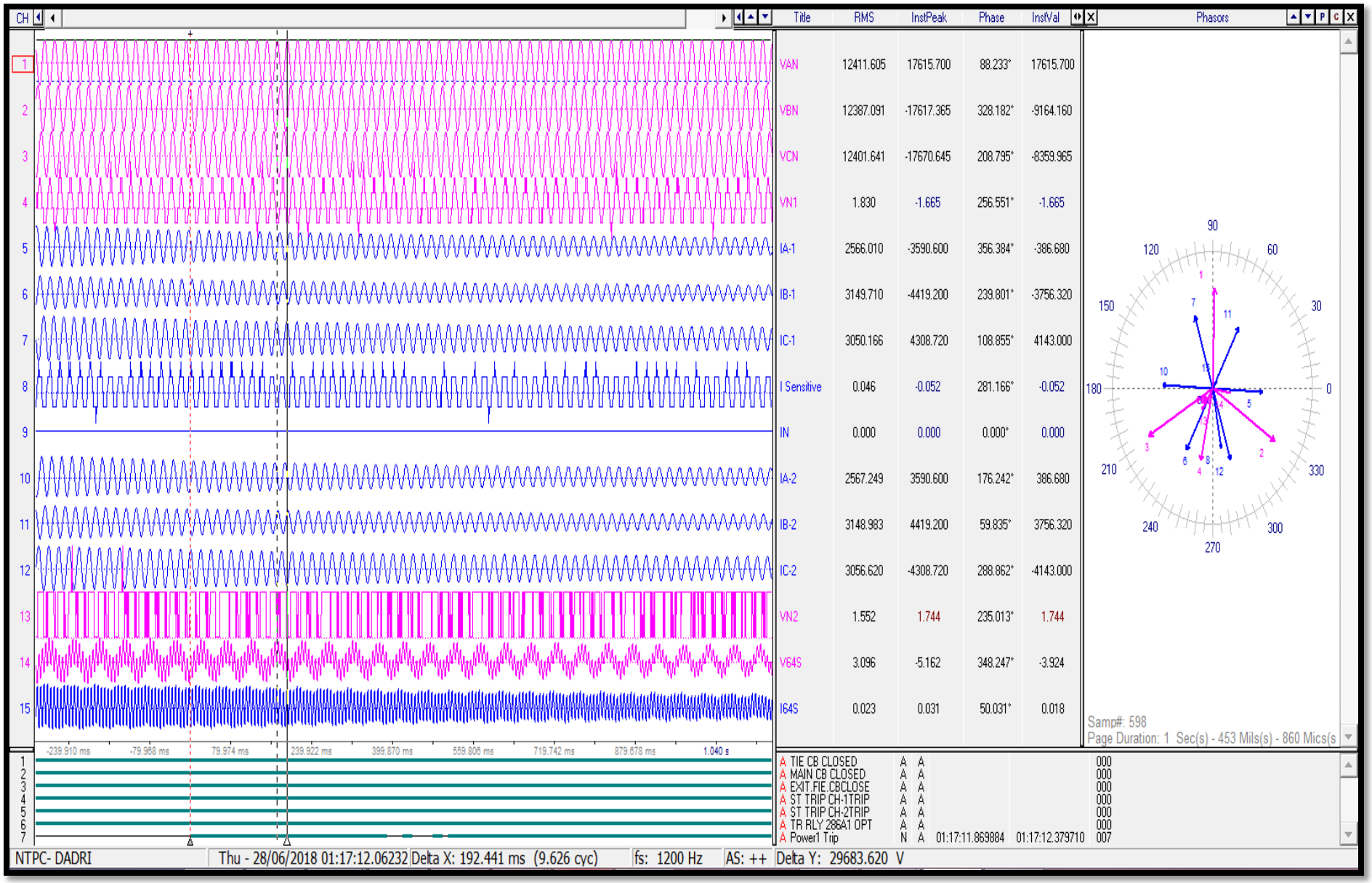
DR of 400 kV Dadri (end)- Unit-5



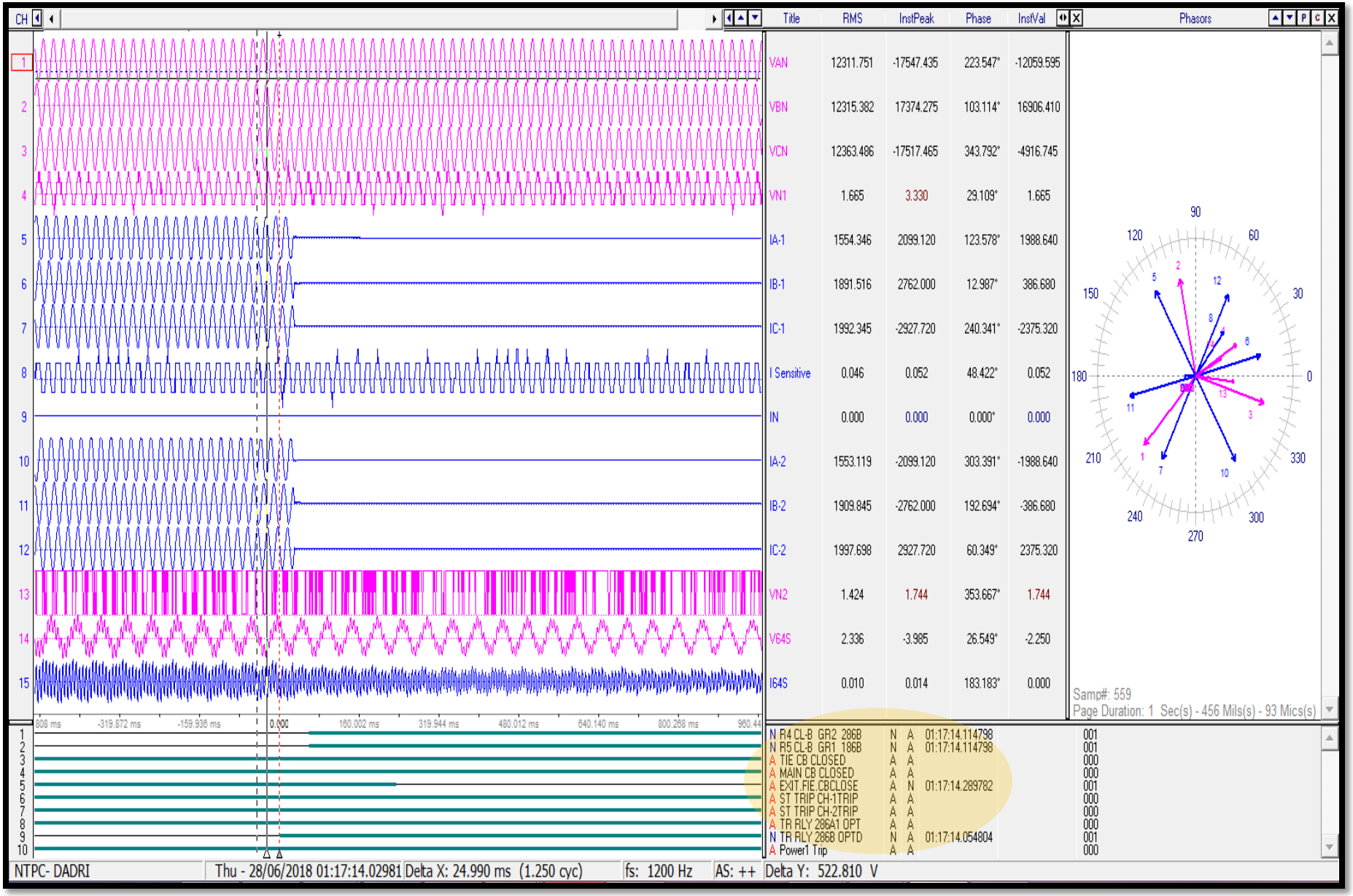
DR of 400 kV Dadri (end)- Unit-6



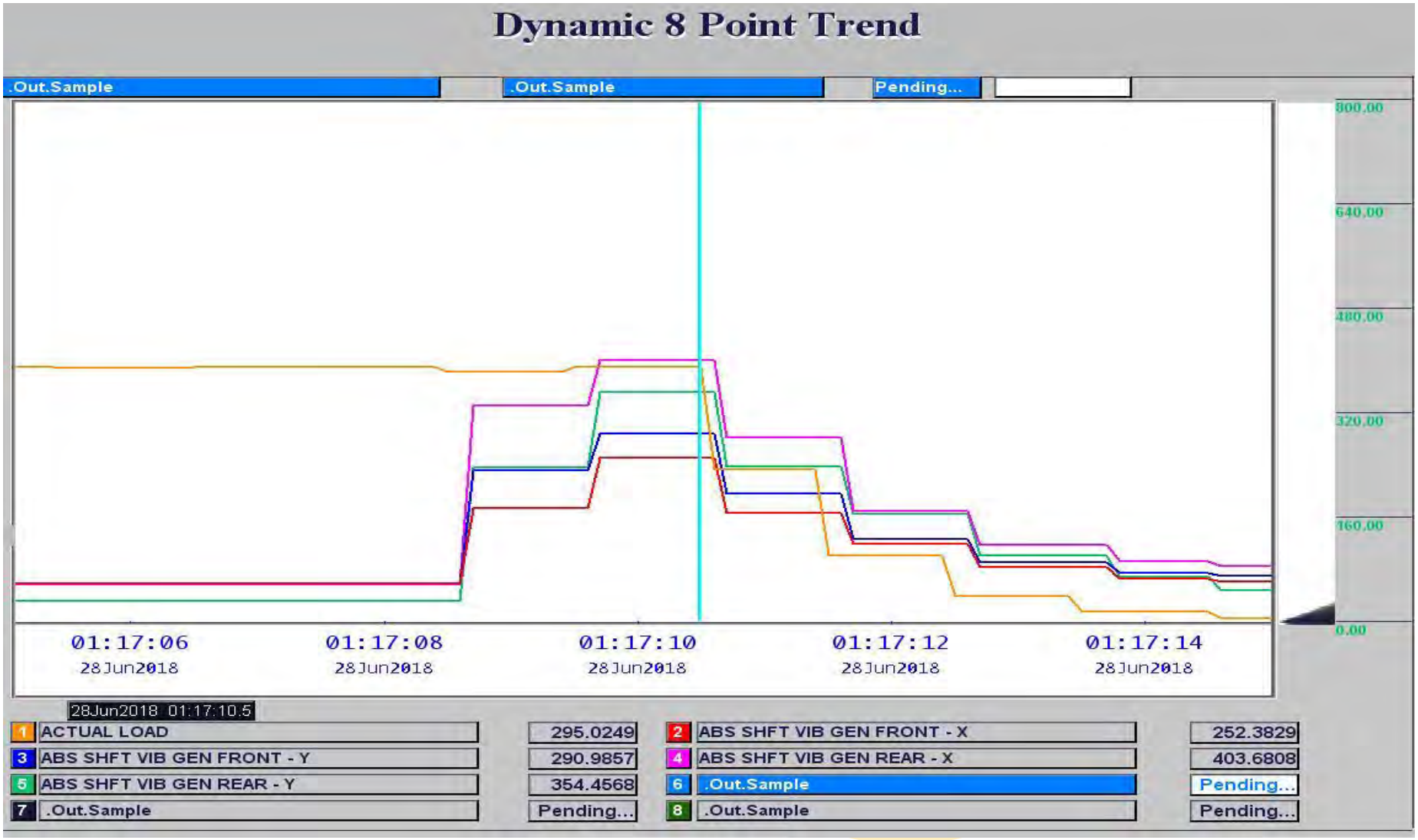
DR of 400 kV Dadri (end)- Unit-6



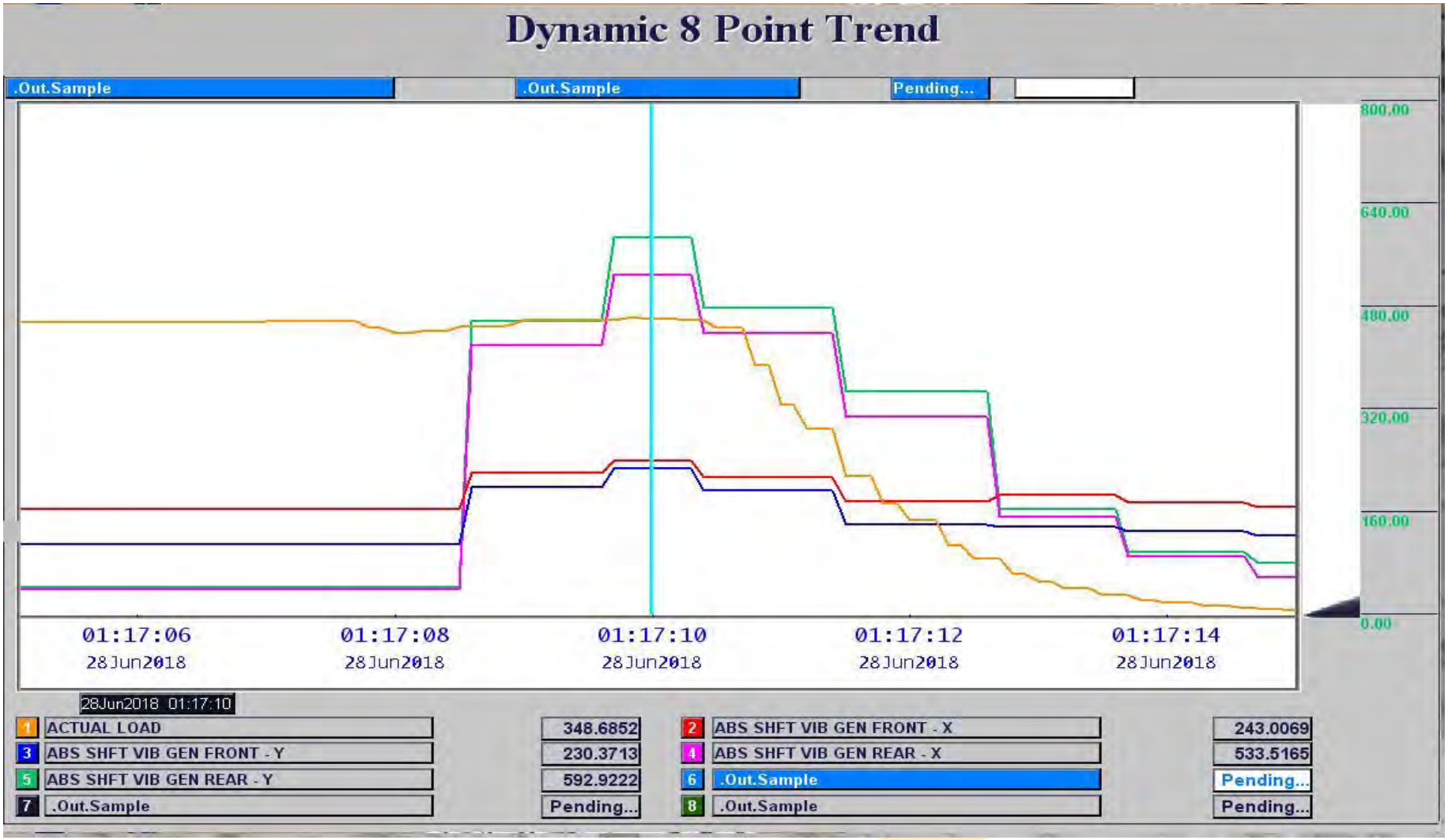
DR of 400 kV Dadri (end)- Unit-6



Shaft Vibration trend of 400 kV Dadri (end)- Unit-5



Shaft Vibration trend of 400 kV Dadri (end)- Unit-6



NRLDC SCADA SOE

Time	Time Duration (in ms)	S/S Name	Voltage Level (in kV)	Element Name	Element Type	Status	Remarks
01:17:07,240	0ms	PMU data					Reference Time
01:17:06,868		GNODA_UP	400kV	F_L1(D_THM-1)	Circuit Breaker	Open	
01:17:07,127		DADRI (TH)	400kV	20GN1MA2	Circuit Breaker	disturbe	
01:17:07,199	0ms	DADRI (TH)	400kV	20GN1MA2	Circuit Breaker	Open	400kV Dadri-G.Noida opens
01:17:07,256	15ms	PANIPAT	400kV	F_3(D_THM-1 ICT-2	Circuit Breaker	disturbe	
01:17:07,287	45ms	PANIPAT	400kV	F_4(D_THM-1 BUS-1)	Circuit Breaker	Open	400kV Dadri-Panipat 1 opens
01:17:14,435	7195ms	DADRI (TH)	11kV	U1G5	Protection Trip	Disp	Protection trip of Unit 5 at 400kV Dadri
01:17:16,365		DADRI (TH)	400kV	BB2	Loss Of Voltage	Disp	

As per NTPC details

SUBJECT: Absolute Shaft Vibration tripping limit for 500MW KWU design subcritical steam turbines.

The absolute shaft vibration tripping limit for 500 MW KWU design subcritical steam turbine were under deliberation with BHEL. It has been decided to trip the machines on logic when the absolute shaft vibration reaches a value of 300µm Pk to Pk in any 2 out of the 14 probes. A time delay of 1 second for Tripping on vibration values is to be kept.

However during startup / coasting down up to 2700 rpm tripping value may be kept up to 1.5 times of the trip limit during normal operation, tripping under critical band of speed is advisory only.

This IOM supersedes all the earlier communications related to tripping of 500 MW KWU design subcritical steam turbines.

As per NTPC report

Description	Unit-5	Unit-6
Unit-load (MW)	294 MW	350 MW
ID Fan	A & B	A & B
FD Fan	A & B	A & B
PA Fan	A & B	A & B
CEP	A & B	A & B
BFP/TDBFP	TDBFP# A and B	TDBFP# A and B
Mills	D, E, F, G and H	C, D, E F and H
No of guns in service	Nil	Nil
Tripping time	01:17:09:067 hrs.	01:17:09:552 hrs.
First Up Protection	Turbine tripped on shaft vibration high (tripping value>320 micron). Generator tripped on turbine trip. Boiler tripped on Re-heater protection.	Turbine tripped on shaft vibration high (tripping value>320 micron). Generator tripped on turbine trip. Boiler tripped on Re-heater protection.
Barring gear status	Came on barring gear	Came on Barring gear. However, leakage developed in main oil pump suction line due to rupture of gasket of ejector located inside oil canal. Subsequently machine taken out of barring and AOP stopped. Intermittently EOP started to control TG bearing temperature. All LOPs were kept stopped for around one hour to attend oil leakage.
LPT diaphragm	OK	OK

Observations

- **Event Category:** GD-1
- **Generation Loss:** 645MW
- **Load Loss:** Nil
- **Energy Unserved :** Nil
- **Event Brief as reported**:

- 400 kV Dadri is connected with Harsh Vihar D/C, Panipat D/C, Mandola D/C, Kaithal S/C, Maharani Bagh S/C, G. Noida S/C, Muradnagar (New) and three 5*500MVA 400/220 kV ICT's. It has one and half breaker scheme. HVDC Rihand-Dadri of 1500MW capacity
- R-Y double phase to earth fault occurred in 400 kV Dadri-G. Noida line, very near to Dadri end .
- OPGW (Optical Fiber Ground Wire) of Dadri Greater Noida line got snapped between Tower Number 1 i.e. dead Tower and 2 (near to tower Number 1) and shorted B and Y phase. fault is within 100 meter from Dadri Switchyard
- 400 kV Dadri-G. Noida Line tripped within 100ms from both end of the line.
- Very high fault current (51kA) observed through DR data.
- 400 kV Dadri-Panipat (BBMB) ckt-1 also tripped from Panipat (BBMB) end due to problem in zone-2 timer. Fault sensed in Z-2 but tripped immediately within 100ms.
- 490MW unit-5 & 6 of Dadri TPS tripped on high shaft vibration.
- As per details received from Powergrid, operation/ switching of filter was not observed at HVDC Dadri end.

Observations

As per PMU & SCADA data:

- Maximum dip in R&Y phase
- Oscillations were not observed in electrical parameter (V, I & F parameter from PMU data). Similarly through DR output, oscillations were not captured.
- As per SCADA SoE, Unit-5 tripped after ~7second of the fault occurrence.
- As per DR details, Unit-6 also tripped after ~7second of the fault occurrence.

Action Taken:

- Z-2 Timer issue at Panipat (BBMB) end has been resolved.

Points for discussion:

- Reason of shaft vibration ?
- Earlier incident of shaft vibration and action taken?
- Observance of shaft vibration during bus fault at Dadri on 10.11.2016 & 09.12.2017 ?
- SCADA SoE of unit-6 tripping not reported?
- Time difference in SCADA SoE and NTPC reporting time for unit-5

Paper Extract:

➢ Effects of Types of Faults on Generator Vibration Signatures

- The effect of 3-phase fault (3PF), line-to-line fault (LLF), line-to-ground fault (LLGF) and line-to-ground fault (LGF) on the 5KVA model generator vibration signature is evidently seen particularly on the time and XY plots. LGF appears to have caused the strongest magnitude gain followed by LLF. However, 3PF has the highest average gain. This reveals that although LGF and LLF could produce the strongest vibration magnitudes, a 3PF will most likely generate strong vibration responses.
- Random motion is associated with severe mechanical or structural looseness. This is due to the fact that the generator has no foundation, situated on a second floor and lay only on concrete floor slab. Without foundation, there is a tendency that the generator motion could interact with the floor's, nothing restricts the generator movement, there is no damping and the floor could act as a cushion when the machine abnormally vibrates such as during a fault

➢ Points for Discussion:

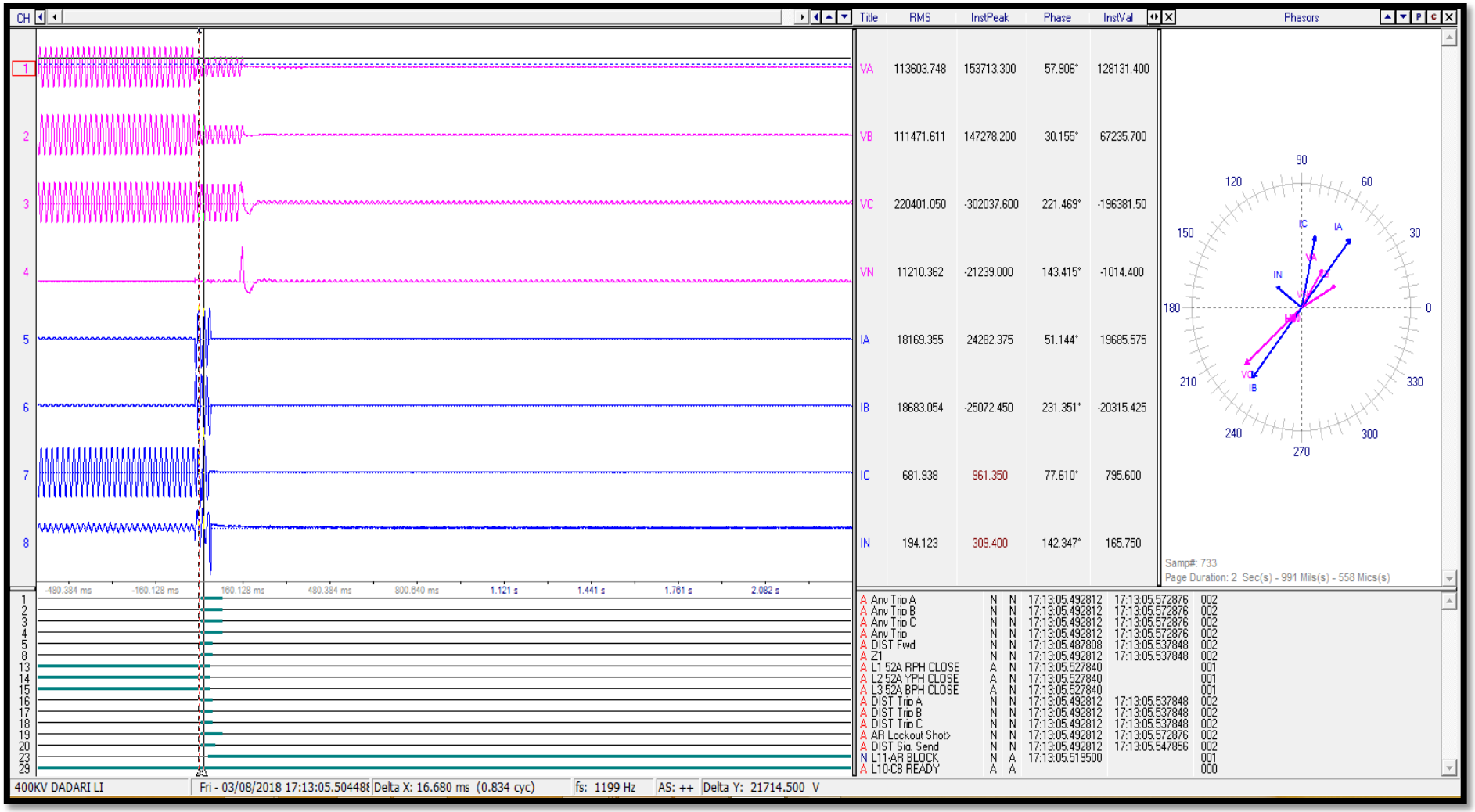
- Large machine have more inertia so why less vibration in 210MW.
- Impact of line to ground fault is more than double line to earth fault. Is vibration (tripping level) also captured in previous incident of single phase to earth fault.

EXTRA

Charging status of different elements

Name of the element	Charging data	Remarks
400 kV Dadri-Harsh Vihar ckt-1	31.07.2014	
400 kV Dadri-Harsh Vihar ckt-2	26.08.2014	
400 kV Agra-Muradnagar Line LILOed at Muradnagar (New)	24.09.2015	
400 kV G Noida-G Noida (765kV) ckt-1	07.10.2017	
400 kV G Noida-G Noida (765kV) ckt-2	21.12.2017	
Bus Splitting at 400 kV G. Noida station	01.06.2018 to 28.06.2018	Bus Coupler isolator damaged during dust storm

Tripping of 400 kV Dadri-G Noida (end) ckt on 03.08.2018



R-Y double phase to earth fault in the line. Fault cleared within 100ms

Attendance Sheet

Meeting between NTPC & POSOCO on 09.08.18 regarding observance of high vibration in Dadri Stage-II

S.No.	Name	Organization	Designation	Contact no.	E-mail id	Signature
1	Sh B K Singh	NTPC	GM (OS)	9650996249	bksingh04@ntpc.co.in	
2	R N Pandey	NTPC	GM (OS)	9650025572	rnpandey02@ntpc.co.in	
3	M L Yadav	NTPC	DGM (TMD)	9650058147	mlyadav@ntpc.co.in	
4	Sh S. K. Sen	NTPC	GM (EMD)	9650991254	skSen01@ntpc.co.in	
5	L. K. SINGH	NTPC DADRI	AGM (OM)	9650983330	lksingh01@ntpc.co.in	
6	B. L. Yadav	NTPC	AGM (OS)	9650993044	blyadav@ntpc.co.in	
7	नितिन यादव	NRLDC	उप प्रबंधक	9560050257	nitinyadav@posoco.in	
8	Rahul Chakrabarti	NLDC	Dy. Manager	9599449975	rahulchakrabarti@posoco.in	
9	Aman Gautam	NLDC	Sr. Engg			
10	Rahul Shukla	NLDC	Dy. Manager			
11	S.R. Narasimhan	NLDC	GM.			
12	H. K Chawla	NRLDC	DGM	9650074803	hk.chawla12@gmail.com	
13	राजीव पोरवाल	NRLDC	उ० मु० प्र०	9871581133	rk.porwal@posoco.in	
14	एस० एस० बड़पंडा	NRLDC	महा प्रबंधक	9717296928	ssbarpanda@posoco.in	
15						

Adani PL.	(i) Sh. Nirmal Sharma, VP (O&M), Fax- 0141-2292065 (ii) Sh. Sameer Ganju, Head-Northern Region, Fax No. 011-24115560
APCPL	(i) AGM (O&M)-I, IGSTPP, Fax No. 01251-266326 (ii) AGM (EEMG), 01251-266326
BBMB	(i) Director (PR) Fax- 0172-2652820 (ii) Power Controller, Fax- 0172-2653297.
HVPNL	(i) Chief Engineer (Comm.); SE (SO & SLDC): 0181-2664440 Fax-0172-2560622
NHPC	(i) Sh. Janardan Choudhary, E.D., Faridabad – Fax-0129-2272413 (ii) Sh.V.K.Sinha,Chief Engineer (O&M), Faridabad – Fax-0129-2272413
POWERGRID	(i) Sh. Prabhakar singh, ED (NR-I), Fax No. 011-26853488 (ii) Sh. A.K. Arora, General Manager (O&M), NR-I, (iii) Sh. R.V.S Kushwaha, General Manager (O&M), Jammu; Fax- 0191-2471187 (iv) Sh.Rajeev Sudan Dy, General Manager (OS), Fax- 0191-2471187
RRVUNL	(i) Sh. P.S Arya, Chief Engineer (PPMC & IT),) Fax- 0141-2740006
NTPC	(i) Head of OS/ Head of RCC, Fax No. 0120-2410082 (ii) Sh. Praveen Chaturvedi, GM (OS), NRHQ Lucknow; Fax-0522-2305849. (iii) DP Singh AGM –OS NRHQ NTPC LIMITED Lucknow
HPSEBL	(i) Sh Suneel Grover, Chief Engineer (SO &P), Fax No. 0177-2653656 (ii) Sh. Deepak Uppal, SE (PR& ALDC): Fax-0177-2837143 (iii) Sh. Joginder Singh. Power Controller, Fax No. 0177-2837143.
NRLDC	General Manager - 26854861, 4051, 26569504 Fax- 26852747
NLDC	General Manager, NLDC, Fax: 011-26853488/26601079
Lanco APTL	Sh. Raj Kumar Roy, Director, Fax: 0124-2341627/4741024
SJVNL/NJHPS	General Manager (C&SO), Fax- 0177-2673283
PTCUL/UPCL	(i) Sh. Anupam Sharma, SE (SLDC), Fax- 0135-2451160, 0135-2763570
UPPTCL	(i) Director (Op), Fax- 0522-2286476 (ii) Chief Engineer (SLDC), Fax- 0522-2287880, 2288736
HPLDS	(i) Sh. N.P.sharma, SE, SLDC, Fax: 0177-2837649 (ii) Sh. Lokesh Thakur, Executive engineer, Fax: 0177-2837649
DTL	General Manager (SLDC)/ General Manager (Protection) Fax-23236462, 23221069
THDCIL	Sh. GM (EM - Design), Rishikesh
PSTCL	(i) Chief Engineer (SLDC) Fax – 0175-2365340 (ii) Dy.Chief Engineer (SLDC) Fax – 0175-2365340
CHANDIGARH	Sh. M.P.Singh, SE (Elect. Op.Circle) – Fax-0172-2740505
IPGCL/PPCL	(i) Sh. Y.P.Arora,GM (T), IPGCL, New Delhi, Fax- 23370884 (ii) Sh. R.K.Yadav, DGM (T), IPGCL, New Delhi, Fax- 23370884
BRPL	Sh. Satinder Sondhi, VP & Head System Operations, Fax No. 011-39996549
Everest PPL	Sh. Yogendra Kumar, Chief Operating Officer, Fax No. 011-45823862/ 43852507
RPSCL	Sh. Niranjan Jena, Addl.VP/ Sh. Suvendu Dey, Asst. VP-O&M, Fax: 05842-300003
HPGCL	Sh. S.K. Wadhwa SE/Technical(HQ), Fax: 0172-5022436
CEA	(i) Sh.Vikram Singh, Director; Fax-26170385,26108834 (ii) Chief Engineer, NPC, New Delhi
TPDDL	(i) Sh. Sanjay Banga, VP, Tata power-DDL, New Delhi (Fax: 011-27468042) (ii) Sh. Praveen Verma, Addl. GM, Tata Power-DDL, New Delhi (Fax: 011-27468042)
PTC India Ltd.	Sh. Ajit Kumar, Director (Commercial & Operations), PTC India Ltd., New Delhi (Fax- 011-41659144,41659145)
AD Hydro	Sh. Anil Kumar Garg, General Manager(BD), AD Hydro Power Ltd., Noida-201301, (Fax: 0120-4323271/4278772)
DISCOM UP	Sh. Rakesh Kumar, Director (T), Dakshinanchal VVNL, Agra-282007 (Fax- 0562-2605465)

NPL Mr. Rajesh Kumar, Head Operations- 08427183924, Email id: Kumar.Rajesh@larsentoubro.com
Address: Nabha Power Limited, PO box 28, Near Village Nalash, Rajpura, Punjab 140401.

Mr. Ravinder Singh Lall, Head O&M – 09815355411, Email : Ravindersingh.lall@larsentoubro.com
Mr. Pinaki Mukherjee, Sr. DGM, Commercial – 09871391388, Email id: Pinaki.mukhejee@larsentoubro.com

HPPTCL	Director (Planning & Contracts), Fax: 0177-2626284
J&K (PDD)	Chief Engineer (Survey & Commercial) Fax-0191-2476213
J&K SPDCL	GM, Fax: 0194-2500145
PSPCL	Engineer-in- Chief (PPRR), Fax- 0175-2308698.
RRVPNL	Chief Engineer (LD); SE (SO&LD) – Fax- 0141-2740920
UPRVUNL	DGM (TOM), 0522-2287861
UJVNL	General Manager Engineering: 0135-2761485, fax- 0135-2761549
NPCIL	(i) Station Director, NAPS; Fax. 05734-222177.(ii) Sr. Manager (Transmission), NPCILFax.-022-25563350
JPPVL	Sh. Suresh Chandra, Director, Fax- 0120-4516201/4609464/4609496
Jhajjar PL	Sh. Goutam Biswas, GM (Production), 01251-270155.
	Nabha Power Ltd (Rajpura)
LPGCL	Sh. A. N. Sar, Unit Head And Exec. Director, Fax- 91-22-22048681

Talwandi saboo Pvt ltd	Amit Mittal,GM- Power Sales, Strategy & Corporate Affairs,Talwandi Saboo