



सत्यमेव जयते

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

सं: उ.क्षे.वि.स./प्रचालन/106/01/2019/10192-10233

दिनांक: 12/09/2019

विषय: प्रचालन समन्वय उप-समिति की 163^{वीं} बैठक का कार्यसूची ।

Subject: Agenda of 163rd OCC meeting.

प्रचालन समन्वय उप-समिति की 163^{वीं} बैठक दिनांक 17-09-2019 को 10:00 बजे से उ.क्षे.वि.स. सचिवालय, नई दिल्ली में आयोजित की जाएगी। उक्त बैठक की कार्यसूची उत्तर क्षेत्रीय विद्युत समिति की वेबसाइट <http://www.nrpc.gov.in> पर उपलब्ध है।

163rd meeting of the Operation Co-ordination sub-committee will be held on 17-09-2019 (10:00 AM onwards) at NRPC Secretariat, New Delhi. The agenda of this meeting has been uploaded on the NRPC web-site <http://www.nrpc.gov.in>.

It is requested that the updated status of various points under follow-up action points of previous OCC meeting may kindly be furnished prior to the meeting.

Kindly make it convenient to attend the meeting.

(सौमित्र मजूमदार)
अधीक्षण अभियंता (प्रचालन)

सेवा में : प्रचालन समन्वय उप समिति के सभी सदस्य।

To: All Members of OCC

1. Confirmation of Minutes

The minutes of the 162st OCC meeting which was held on 13.08.2019 and 14.08.2019 at NRPC Secretariat, New Delhi were issued vide letter of even number dated 30.08.2019.

No comment on the minutes has been received from any of the members till date.

The sub-committee may kindly confirm the Minutes.

2. Review of Grid operations of August 2019

2.1 Supply Position (Provisional) for August 2019

Anticipated Power Supply Position v/s Actual Power Supply Position (Provisional) of Northern Region during the month of August 2019 is as given below:

State	Req. / Avl.	(MU)			(MW)		
		Anticipated	Actual	Variation	Anticipated	Actual	Variation
Chandigarh	Avl.	225	203	-9.8%	410	370	-9.8%
	Req.	180	203	12.8%	355	370	4.2%
Delhi	Avl.	4010	3546	-11.6%	7200	6473	-10.1%
	Req.	3750	3547	-5.4%	6300	6473	2.7%
Haryana	Avl.	6750	5861	-13.2%	12010	10130	-15.7%
	Req.	5950	5861	-1.5%	10000	10130	1.3%
Himachal Pradesh	Avl.	980	932	-4.9%	1510	1565	3.6%
	Req.	910	936	2.9%	1490	1565	5.0%
Jammu & Kashmir	Avl.	1510	1238	-18.0%	2430	2523	3.8%
	Req.	1620	1238	-23.6%	2990	2523	-15.6%
Punjab	Avl.	7670	7173	-6.5%	11040	12006	8.8%
	Req.	7640	7173	-6.1%	12700	12006	-5.5%
Rajasthan	Avl.	9240	6283	-32.0%	15940	10699	-32.9%
	Req.	7540	6283	-16.7%	12200	10699	-12.3%
Uttar Pradesh	Avl.	12000	12283	2.4%	19400	21632	11.5%
	Req.	12100	12347	2.0%	21000	21812	3.9%
Uttarakhand	Avl.	1440	1254	-12.9%	2090	2077	-0.6%
	Req.	1400	1263	-9.8%	2160	2077	-3.8%
NR	Avl.	43825	38771	-11.5%	72030	61366	-14.8%
	Req.	41370	38850	-6.1%	62700	61733	-1.5%

As per above, it has been observed that there are higher variations (i.e. > 5.0%) in the Anticipated vis-à-vis Actual Power Supply Position (Provisional) for the month of August 2019 in terms of Energy Requirement for Chandigarh, Delhi, J&K, Punjab, Rajasthan & Uttarakhand and in terms of Peak Demand for J&K, Punjab and

Rajasthan. **These states are requested to submit reason for such variations so that the same can be deliberated in the meeting.**

All SLDCs are requested to furnish provisional and revised power supply position in prescribed formats on NRPC website portal by 2nd and 15th day of the month respectively for the compliance of Central Electricity Authority (Furnishing of Statistics, Returns and Information) Regulations, 2007.

2.2 Power Supply Position of NCR

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 August 2019 is placed on NRPC website. (<http://nrpc.gov.in/operation-category/power-supply-position/>).

3. Maintenance Programme of Generating Units and Transmission Lines

3.1. Maintenance Programme for Generating Units.

The meeting on proposed maintenance programme for Generating Units for the month of October 2019 is scheduled on 16.09.2019 at NRPC Secretariat, New Delhi.

3.2. Outage Programme for Transmission Elements.

The meeting on proposed outage programme of Transmission lines for the month of October 2019 is scheduled on 16.09.2019 at NRPC Secretariat, New Delhi.

4. Planning of Grid Operation

4.1. Anticipated Power Supply Position in Northern Region for October 2019

The Anticipated Power Supply Position in Northern Region for October 2019 is enclosed at **Annexure-A1**.

SLDCs are requested to update their estimated power supply position for October 2019 and measures proposed to be taken to bridge the gap between demand & availability, as well to dispose of the surplus, if any, in the prescribed format.

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

The variable charges detail for different generating units are available on the Merit Order Portal.

In the 160th OCC meeting, it was observed that some higher cost generating stations were scheduled before exhausting the available cheaper generating stations. In this regard SLDCs had informed regarding various operational constraints they had faced to schedule as such. OCC advised SLDCs to make such information (which lead to Deviation from MERIT order) available under the remarks section on the portal.

In the 161st OCC meeting, it was observed that some higher cost generating stations were scheduled before exhausting the available cheaper generating stations and

reason for the same was not mentioned in the portal. Haryana, Rajasthan and Uttarakhand were advised to ensure scheduling according to the MERIT order. It was also opined by the committee that while filling the data on the MERIT portal SLDCs shall specifically mention the reasons for any violation under the 'remarks' column.

Further, SLDCs were advised to deliberate the aforementioned issue in their internal OCC so as to optimize the scheduling and ensure timely filling of their data in the portal.

All SLDCs are requested to fill data on MERIT Order portal regularly and ascertain the correctness of the same.

6. Reactive compensation at 220 kV/400kV level

6.1 In the 38th TCC & 41st NRPC dt. 27th & 28th February 2018, following elements in NR were approved:

- a) 500 MVAR TCR at 400 kV bus at Kurukshetra S/S of POWERGRID.
- b) 30 nos. of 220 kV bus reactors and 18 nos. of 400 kV bus reactors, subject to availability of space.

6.2 POWERGRID:

500 MVAR TCR at Kurukshetra: Award placed in January 2019 with completion schedule of 22 months.

In 162nd OCC meeting, POWERGRID representative informed that for 11 Nos. of 400 kV Bus Reactor and 7 Nos. of 220 kV Bus Reactor, Price Bids could not be opened due to some internal issues in M/s TCIL, which is their e-procurement service provider. It was also informed that the due to the aforementioned issues, approximately 1200 tenders on TCIL portal are stuck, in which some of them are of POWERGRID also.

POWERGRID may update on any further progress made.

6.3 DTL:

The updated status of the reactors as received from DTL is placed below:

S.No.	Sub Station	Voltage level (kV)	Reactor (MVAR)	Updated Status (as on 05.08.19)
1	Peeragarhi	220	1x50	PR No 1100002017 Raised.
2	Mundka	400	1x125	PR No 1100002120 Raised.
		220	1x25	
3	Harsh Vihar	220	2x50	PR No 1100002162 Raised.
4	Electric Lane	220	1x50	Under financial concurrence
5	Bamnauli	220	2x25	PR under creation
6	Indraprastha	220	2x25	Under financial concurrence
TOTAL			450	

DTL may kindly update on any further progress made.

6.4 PSTCL:

Sanction order for PSDF funding has been issued to PSTCL and bid opening date for 400 kV bus reactor at Dhuri substation and 220 kV bus reactors at Dhuri & Nakodar substations has been extended till 19.08.2019 due to lack of representation from the bidders.

PSTCL may kindly update on any further progress made.

6.5 Uttarakhand:

125 MVAR reactors at Kashipur: Technical Bid for 125 MVAR reactor at Kashipur has been opened and is being evaluated.

PTCUL may kindly update.

6.6 Rajasthan:

The status as updated in the meeting is placed below:

Item	Background	Status
3 Nos. each of 25 MVAR (220 kV) reactors for Akal, Bikaner & Suratgarh.	-	PSDF funding sanctioned. Tendering under process.
1 No. of 25 MVAR (220 kV) reactor for Barmer & 125 MVAR (400 kV) reactor for Jodhpur, included in 450 MVAR (13x25 + 1x125 MVAR) proposal	Revised DPR for 450 MVAR approved Reactor after separating STATCOM was submitted vide letter dt. 12.10.2018 to POSOCO for approval.	TESG approval has not been obtained. Clarifications sought by TSEG have been already been responded.

Rajasthan may kindly update.

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

- 7.1 In the 38th TCC & 41st NRPC meeting dt. 27th & 28th February 2018, it was decided to conduct capacitor requirement study of NR at 11/33 kV level from CPRI so as to obtain the true requirement of capacitor for FY 2019-20. In the subsequent NRPC meeting, approval was given to the Techno-Commercial offer of CPRI of Rs. 32 Lakh (excluding taxes) for conducting the capacitor study and the format for data submission was shared amongst the members.
- 7.2 In the 150th OCC meeting dt. 21.08.2018, members expressed concerns on the nature of the format. Accordingly, CPRI made a detailed presentation in the 151st OCC meeting and format was revised based on the received inputs & sent to respective SLDCs on 24.09.2018.
- 7.3 Utilities had been regularly pursued for the submission of data; however, data received from the utilities were mostly not in line with the requirement of CPRI.
- 7.4 In the 42nd TCC and 45th NRPC, members expressed concerns over non-submission of even sample data by the states. In the meeting all member states were requested to submit the data in a time bound manner latest by **30.06.2019**.

- 7.5 States which would not be able to submit the data by 30.06.2019, CPRI would be approached for collection of data of their states (based on the acceptance of CPRI) and the expenditure would be booked to the respective states.
- 7.6 In 161st OCC meeting, it was informed that as per the request of UPPTCL representative in the 160th OCC meeting, a letter was sent to CPRI requesting them to take up the task of data collection in respect of UP (at additional cost to be borne by UP) citing UP's inability to collect the same in the prescribed format. However, in reply CPRI has expressed its inability to take up the task citing their other commitments which has been intimated to UPPTCL vide letter dated 26.07.2019.
- 7.7 Complete data has been submitted by Haryana, Delhi & Punjab. Sample data has been submitted by HP, UP and Rajasthan.

Uttarakhand and J&K may kindly update. HP, UP and Rajasthan may expedite the submission of final data.

8. Phase nomenclature mismatch issue with BBMB and interconnected stations

- 8.1. The issue of phase nomenclature mismatch of BBMB and interconnected stations was highlighted while discussing multiple elements tripping at 400/220/132kV Dehar HEP of BBMB in its 34th meeting held on 21.04.2017. Thereafter, it was decided that BBMB should modify phase sequencing at Dehar as Y-B-R instead of R-Y-B.
- 8.2. On the request of BBMB, a committee comprising of BBMB and its partner states, utilities with which BBMB has interconnection, NRPC Secretariat and POWERGRID was formed.
- 8.3. The committee had deliberated the draft action plan submitted by BBMB for the rectification of the phase nomenclature issue. POWERGRID had certain reservations on the action plan and stated that there might be some issues in the work such as **design constraint of tower, de-stringing and re-stringing of conductors etc.** for which it was proposed to conduct a site visit of the committee.
- 8.4. Accordingly, a site visit was held on 27.05.2019 and 28.05.2019 to resolve the issues at Bhiwani, Rajpura, Panchkula & Panipat S/s. The Minutes of the site visit was enclosed as Annexure-II of the Agenda of 160th OCC meeting.
- 8.5. However, in the **42nd TCC and 45th NRPC meeting**, POWERGRID representative informed that they were of the view that rather than going for the work as proposed by the committee in the Minutes of the site visit, the issue could be resolved by rewiring CT/PT at the secondary side. NRPC was of the view that if the quantum of work could be reduced by the action being proposed by POWERGRID, it could be thought of and advised POWERGRID to formulate the action plan involving all the concerned parties and submit the same by 30.06.2019 to NRPC Sectt. so that the same could be implemented in a time bound manner.
- 8.6. Accordingly, a meeting was held on 20.06.2019 between PGCIL and BBMB (Minutes attached at Annexure-III of 161st OCC agenda). BBMB and PGCIL in the meeting has brought out the technical issues in all the available solutions for rectification of phase nomenclature mismatch. As per the outcome of the meeting, BBMB and PGCIL has

proposed that the existing system shall be allowed to operate as such and the remedial measures as pointed out in the 142nd OCC meeting (Annexure-IV of 161st OCC agenda) shall be observed.

- 8.7. In 161st OCC meeting, NRLDC expressed serious concerns and termed solution as proposed by PGCIL and BBMB a regressive step wherein after almost 2 years of deliberation on how to solve the issue of phase nomenclature mismatch, a decision has been taken where nothing can be done to rectify the issue.
- 8.8. PGCIL representative stated that during the past 2 years all the possible options for resolving the issue were pondered and considering their infeasibility, it was proposed that the decision of 142nd OCC meeting can only be implemented.
- 8.9. A separate meeting was held in NRPC Sectt. on 13.08.2019 on the issue, in which it was highlighted that there might be such phase nomenclature mismatch issue in other utilities also. In view of the above it was decided that all the concerned STUs/SLDCs shall certify about phase nomenclature of their system considering PGCIL phase nomenclature as reference. Format in this regard was made available on NRPC website. All concerned utilities were advised to submit the above information in the prescribed format by 01.09.2019. Except BBMB, no information has been received from utilities/states till date.

Members may deliberate.

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

The updated status of Agenda items is enclosed at **Annexure-A2**.

All utilities are requested to update the status.

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

- 10.1 In the 160th OCC meeting, all the utilities were requested to submit the progress status as per format specified by CEA (attached at Annexure-V of the minutes). It was also requested that progress status may be submitted to NRPC Sectt. as excel file (template available at <http://164.100.60.165/Oper/2019-20/dataformat/FGD-status-format.xls>).

The status with NRPC as on date is attached at Annexure-VI of the agenda of 161st OCC meeting.

In continuation to the decision for allowing pass-through of the additional cost due to installation / up-gradation of various emission control systems and its operational cost to meet the new environmental norms, the Ministry of Power has now decided that the impact of operating costs incurred in the implementation of new Environmental Norms shall not be considered for Merit Order Despatch of Coal Based Thermal Power Stations till 31.12.2022 and in this regard a methodology of supplementary tariff determination shall be devised by the Commission.

The updated status in the specified format has only been received from UP and NTPC-NR (Annexure-A3). Other states/utilities are requested to submit the status at the earliest for its further submission to CEA.

11. System Protection Scheme (SPS) in NR

11.1. SPS for ICTs at 765 kV Unnao sub-station

- 11.1.1. In the 160th OCC meeting, it was informed that Mock testing was done on 17.06.2019. Some issues were observed and the same are being rectified after which another mock testing will be done. Report of the mock test were to be submitted to NRPC/ NRLDC by 21.06.2019.
- 11.1.2. In 161st OCC meeting, NRLDC advised as following:
 - a. Load shedding target in the new SPS logic shall be as per that proposed in the earlier SPS logic.
 - b. As per the logic submitted, in case of tripping of 2 ICT at 765 kV S/s Unnao when the real time flow on 765 kV Anpara Unnao line (X MW) prior to tripping is $1200 < X \leq 1350$, backing down of 200 MW each from Anpara C and D is to be achieved within 60 seconds. In this scenario, remaining 1 ICT shall also trip on overload protection (within 5-10 sec) before backing down at Anpara C and D could be achieved. In view of the above, it was suggested that tripping of any one unit shall also be wired.
- 11.1.3. In the 162nd OCC meeting, the Committee in generally agreed with the proposed logic of UP. Further, UP was advised to proceed for implementation of the logic at the earliest and look into the possibility of automatic load shedding rather than manual load shedding.

UPSLDC / UPRVUNL may kindly update regarding the timeline for implementation of the SPS logic.

11.2 SPS for Kawai – Kalisindh - Chhabra generation complex:

- 11.2.1. In the 156th OCC meeting, it was intimated that Rajasthan has requested to review the SPS scheme for Kawai-Kalisindh-Chhabra generation complex upon commissioning of 400kV CTPP-Anta feeder.
- 11.2.2. Thereafter, in the 157th OCC meeting, Rajasthan was advised to share the studies carried out by their Planning Division, so that revised scheme can be formulated at the earliest. NRLDC also requested to share the dynamic data for AVR, Governor, PSS for the generators so that detailed studies can be carried out.
- 11.2.3. In 161st OCC meeting, Rajasthan representative informed that it has been decided that the link between Chhabra – Chhabra Supercritical shall be closed during operation, however, the study was conducted by considering the link as open. In this regard Rajasthan was requested to submit the

revised study within 15 days to NRLDC/ NRPC.

- 11.2.4. The details of dynamic data as submitted by Rajasthan is as followed:
- i. Kawai: Most of the Generator, AVR, PSS data has been submitted; however, for governor only name plate details have been shared and no modelling data has been shared.
 - ii. Kalisindh: Generator data has been submitted. PSS parameters submitted but no information about model of PSS. Dynamic data of Governor and AVR not shared.
 - iii. Chhabra: Only Generator data submitted. AVR and PSS data for unit 1 to 4 submitted. (Not as per the standard PSS/E models). No data about Governor.
- 11.2.5. In the 162nd OCC meeting, Rajasthan was requested to discuss internally on NRLDC's comments regarding N-1-1/ N-2 of Chhabra SCTPS-Anta 1 & 2 contingencies and SPS operation for the condition N-1-1/N-2 of 765/400 kV Anta ICT and revert at the earliest. Further, Rajasthan was advised to take up the issue of Dynamic model with the OEM (BHEL) requesting them to provide generic PSS/E models.
- 11.2.6. Rajasthan has submitted its comment on the two conditions/contingencies on 06.09.2019 (**Annexure-A4**).

Rajasthan may kindly update.

12. Automatic Demand Management System

- 12.1. Clause 5.4.2 (d) of IEGC mandates for implementation of the state-of-the-art demand management schemes for automatic demand management to reduce over-drawal from the grid. The responsibility for the implementation of the same has been entrusted on SLDCs/SEB/DISCOMs. CERC in its order in petition No. 5/SM/2014 had granted time till 31.06.2016 to the concerned SLDCs/SEB/DISCOMs to implement ADMS, failing which action under Section 142 of the Act for non-compliance of the Regulation 5.4.2 (d) of the Grid Code and order of the Commission. RLDCs were also directed to submit the report in this regard to the commission by 31.08.2016. The issue of implementation of ADMS in NR is being deliberated regularly in the OCC meetings. The status of implementation of ADMS in states of NR is as under:

State/ Utility	Status
Punjab	<p>Not fully implemented.</p> <p>At SLDC level, 96 feeders of 66 kV are operational.</p> <p>At 11 kV feeder level, ADMS is to be implemented by Distribution Company. As per the information available with SLDC, for 50 feeders of 11 kV at Amritsar and Ludhiana, scheme was under finalization.</p>

State/ Utility	Status
Delhi	Fully implemented by TPDDL, BRPL and BYPL. NDMC will be implementing by December 2019.
Rajasthan	Under implementation. LoA placed on 12.12.2018 with an execution period of 18 months for ADMS at the level of 33 kV feeders at EHV Substation of RVPN under SCADA / EMS part of project. ADMS functionality at 11 kV feeders from 33/11 kV substation is under the jurisdiction of the DISCOMs and matter is being perused with DISCOMs authorities
UP	Not fully implemented. Remote operation of 50 feeders at 132 kV level being operated from SLDC. For the down below network, issue taken up with the DISCOMs.
Haryana	Not implemented.

- 12.2. In 161st OCC meeting, Uttarakhand representative informed that the matter for the implementation of ADMS was being pursued with the DISCOMs, however, no positive response in this regard has been obtained from their end. NRLDC requested all state utilities to submit the roadmap/ action plan for the implementation of ADMS before next OCC meeting. Accordingly, NRLDC would file reply to the Commission regarding the status of implementation of ADMS as per the requirement of CERC order in petition No. 5/SM/2014.
- 12.3. In the 162nd OCC meeting, it was decided that a presentation by any DISCOM of Delhi will be held in next OCC meeting for sensitising the members on the issue of implementation of ADMS.

Delhi DISCOM may kindly present.

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

- 13.1 Based on the recommendations of the Enquiry Committee on grid disturbances on 30th & 31st July 2012, utilities of NR were requested to take necessary action and submit compliance/status report to NRPC. In the 8th NPC meeting held on 30.11.2018, the non-submission of implementation status related information was highlighted and serious concern was shown. In the subsequent OCC meetings, utilities were requested to submit the requisite information regarding implementation of recommendations of Enquiry Committee. The status of information received in this regard is as under:

Submitted			Not Submitted
NTPC (NCR) (19.08.2018)	POSOCO	Uttar Pradesh	HVPNL
BBMB (24.07.2018)	NHPC (07.02.2018)		Himachal Pradesh
Punjab (16.07.2018)	HPGCL (Panipat TPS) (17.07.2018)		NTPC (NR-HQ)
Rajasthan (13.06.2018)	NPCIL (RAPS: 17.07.2018) (NAPS: 25.07.2018)		Jammu and Kashmir
THDC (18.07.2018) (19.07.2018)	POWERGRID (NR-1: 16.11.2018 NR-2: 13.07.2018 NR-3: 01.04.2019)		UT of Chandigarh
SJVNL (NJHPS: 01.05.2019 RHPS: 08.05.2019)	Delhi (01.04.2019)		Uttarakhand

HP and NTPC (NR-HQ), HVPNL, Chandigarh and J&K are requested to kindly update the status.

14. Cyber Security Preparedness Monitoring

14.1 Based on the detailed presentation given by Chief Information Security Officer (CISO), MoP in the 37th TCC and 40th NRPC meeting, all utilities were requested to monitor actions being taken in regard to the following points and report the status:

- a. Appointment of organization-wise CISO 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.

The status on aforementioned cyber security action points is as per **Annexure-IV(A)** of Agenda of 162nd OCC meeting.

All utilities are requested to confirm the enclosed status.

14.2 In the 156th OCC meeting, it was mentioned that inherent vulnerability in the ICT infrastructure or website or web applications shall be accessed and remedial action thereon shall be taken by all utilities by conducting Vulnerability Assessment &

Penetration Test (VAPT) of their respective ICT infrastructure, websites and web applications. The status of VAPT and cyber security audit is as per **Annexure-IV(B)** of Agenda of 162nd OCC meeting.

All utilities are requested to confirm the enclosed status of VAPT conducted in their respective organization and update VAPT plan for the future.

15. Expediting construction of 132kV supply for railway traction substation for railway electrification projects in states in NR region

15.1 Ministry of Railways has accorded high priority to railway electrification projects for reducing dependence on fuel based on crude oil and enhancing energy security of nation. However, progress of ongoing transmission line and substation works, being executed by SEBs, is not matching with the targets for railway sections planned to be commissioned on electric traction. State-wise detail in respect of NR is as under:

Sl. No.	State	Tr. Line to be expedited		Contract to be awarded		Estimate awaited	
		(original target)	(updated status)	(original target)	(updated status)	(original target)	(updated status)
1	UP	19	19	5	5	1	1
2	Haryana	5	given	2	given	-	-
3	Punjab	1	1	2	2	2	2
4	Rajasthan	5	4* completed	5	1** completed	7	***
5	J&K	1	-	-	-	-	-

* 1 no. railway end pending due to demarcation in Army area.

** 2 nos. proposals withdrawn by Railways, 1 No. under progress, 1 No. route to be revised by Railways.

*** 3 Nos. proposals withdrawn by Railways, 2 Nos. A&FS pending and 2 Nos. works under progress.

Members may deliberate.

16. Mapping of UFR, df/dt relay details in SCADA

16.1 As per CERC regulation, UFR and df/dt mapping is mandatory. In the 136th OCC meeting dt. 16.06.2017, it was decided that in addition to the SCADA mapping, states should provide the following information regarding the UFR, df/dt relays installed at their respective substations:

- Source of frequency measurement for UFR, df/dt relay viz. positive sequence, phase-to-neutral, phase-to-phase
- Computational time for measurement of frequency, rate of change of frequency in UFR, df/dt relays respectively.

16.2 In the 137th OCC meeting dt. 18.07.2017, NRPC reiterated that mapping of UFR has to be done in the SCADA of SLDC & NRLDC for better visibility of relay status and feeder load relief. In the subsequent OCC meetings, all state utilities were requested

to correct the SCADA UFR, df/dt displays as per the comments.

16.3 NRLDC representative in the 160th OCC meeting, sensitized the house about requirement of mapping of UFR and df/dt and how it is helpful during crisis / grid disturbance condition.

16.4 Following action points were decided in the 160th OCC meeting:

- All the feeders coming under UFR and df/dt scheme shall be mapped in the display despite of data availability, RTU availability. In case data is not available, alternate feeder details to be mapped. All the details (main feeder details and alternate feeder details) to be mapped before 30th June 2019. (**Action by:** All the state utilities of NR)
- All the state utilities shall check and monitor the UFR, df/dt display on monthly basis and submit the monthly progress report to NRPC / NRLDC. (**Action by:** All the state utilities of NR)
- All the suspected data in the mapping shall be monitored on daily basis and accordingly remedial measures shall be taken. (**Action by:** All the state utilities of NR)

16.5 In 161st OCC meeting, UP informed that all 132 kV feeders in respect of UFR and df/dt will be mapped by 30.09.2019 and the data shall be made available to NRLDC. States were requested to provide a consolidated list of the feeders under UFR and df/dt scheme based on which the mapping compliance may be ensured by them.

16.6 In 162nd OCC meeting, NRLDC presented the status of UFR and df/dt based feeder mapping with SCADA (Annexure-V of the Minutes of 162nd OCC meeting).

Utilities are requested to comply to the action points as decided above and provide a consolidated list of the feeders under UFR and df/dt scheme.

17. Requirement of certificate under CEA (Measures relating to Safety and Electric Supply) Amendment regulations-2015, clause-43 (Agenda by POWERGRID)

In the 161st OCC meeting, NRLDC has raised an issue seeking requirement of Certificate from Electrical Inspector, before issuing charging code to any existing bay after shutdown for replacement of its defective equipment under regular maintenance or upgradation work. The matter was discussed in relation with holding of charging clearance by NRLDC for one 400kv bay of UPPTCL, which was confirmed ready for charging after some equipment replacement.

Clause 43(3) says that: "Every electrical installation of voltage above the notified voltage....., shall be required to be inspected and tested by the EI before commencement of supply or recommencement after shutdown for six months and above for ensuring observance of safety measures specified under these regulations".

The constituents had raised their concern regarding practical applicability of the same, in regular operation maintenance activities of Grid elements, being insisted

upon by NRLDC, which may lead undue outage & grid security issue in keeping a healthy grid element out of service. It was decided that NRLDC shall seek clarification from appropriate authority for further update.

Same issue was raised recently by NRLDC before issuing charging code for one of our 220kv bay which was under planned S/D for a week or so to replace its breaker.

In the advancing world and fast changing era of technology, it has become very important to review and update our regulations considering their practical applicability and requirement. The said provision may be discussed among OCC members for further needful to avoid conflicts in real time operation coordination for smooth grid operation.

Part-B NRLDC

1. Winter Preparedness 2019-20

It is well known that Northern region experiences winter starting from mid-October to mid-February. Load of NR reduces substantially in these months and therefore low line loadings, high voltages etc. are common phenomenon. Moreover, most of the hydro stations of NR derive water from snow fed Himalayas range; therefore, generation of such hydro station is substantially reduced during this period. Apart from this, fog/smog/mist/snowfall during winter season pose challenges in grid operation. Some of the common & known challenges along with planned and approved actions in various OCC and other meetings are as follows:

Sl. No.	Common challenges during winter	Approved action points in various OCC & other meetings
1	Load generation balance in view of: (i) High variation in Peak and Off-peak demand (ii) Morning & evening peak steep ramp up (iii) Limited hydro resources	(i) Daily Load forecast based on weather information made available from IMD website: Status of load forecasting data shared with NRLDC for August 2019 is attached as Annexure-1 . <i>In general, it is observed that Uttarakhand and HP are not regularly sharing load forecast file.</i> (ii) Portfolio management (iii) Scheduling & Ramping of Hydro matching with ramping of peak load (iv) Hydro Optimization (v) Staggering of load in case of large chunk of load switch in & out: <i>It is observed that even after continuous efforts made by Rajasthan and Haryana, there are still certain instances where there is need of staggering of loads.</i>

Sl. No.	Common challenges during winter	Approved action points in various OCC & other meetings
2	High voltage during less demand period especially during night hours of winter <i>It is seen that even after reiterating need for reactive power absorption by generators during winter months in several OCC meetings; in general, generators (especially state owned) are not absorbing MVAR as per their capability curves. Co-ordinated efforts from all utilities are required to minimize high voltages during winter months.</i>	(i) Switch off capacitor & switch in all BR/LR wherein high voltage persists (ii) Generator reactive power absorption, SVC operations, Synchronous condenser operation especially of Hydro units (iii) Tap optimization at 400/220kV & below voltage levels by NRLDC and SLDCs respectively (iv) Opening of EHV lines based on studies considering reliability & security of system (v) STATCOM at Lucknow is out since 17.07.2019 due to failure of 3x173 MVA, 400/38.5kV Coupling Transformer. POWERGRID is requested to expedite revival of STATCOM at the earliest.
3	EHV line tripping during Fog/Smog	(i) Replacement to Polymer Insulators of lines and its monitoring. <i>Progress regarding same to be shared by respective utilities. Latest status available with NRLDC and format for sharing progress is attached as Annexure-2. Lines for which status is not available and any update on status may please be shared with NRPC/ NRLDC.</i> (ii) Washing of lines
4	Load crash during snowfall/Inclement weather	(i) Minimize generation to technical minimum based on the grid conditions as per CERC directions. (ii) Procurement of ERS tower to restore the line in case of tower collapses (iii) Avoid manual opening of feeder (iv) List feeder at 33/11kV that can remain connected during such eventualities. Progress regarding same to be shared by respective utilities.

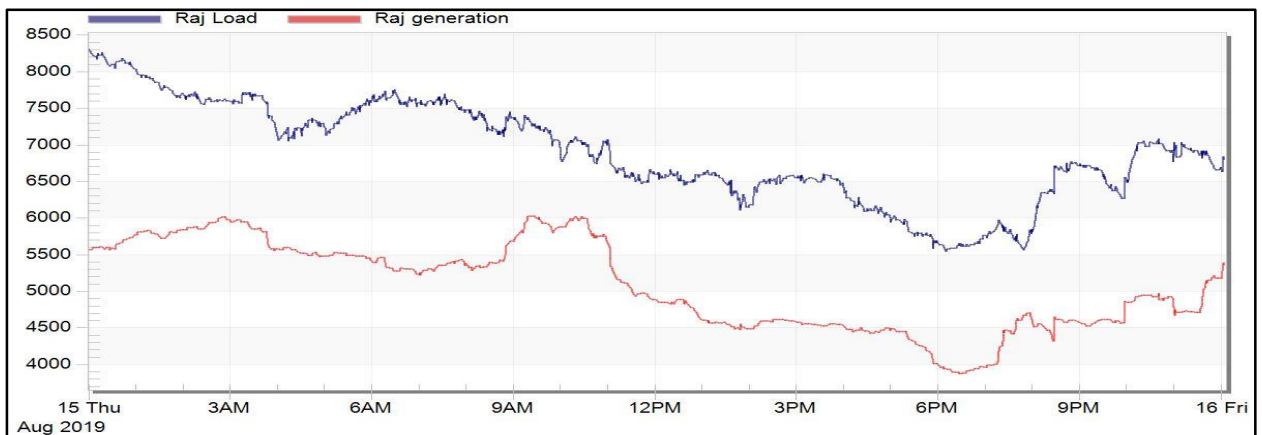
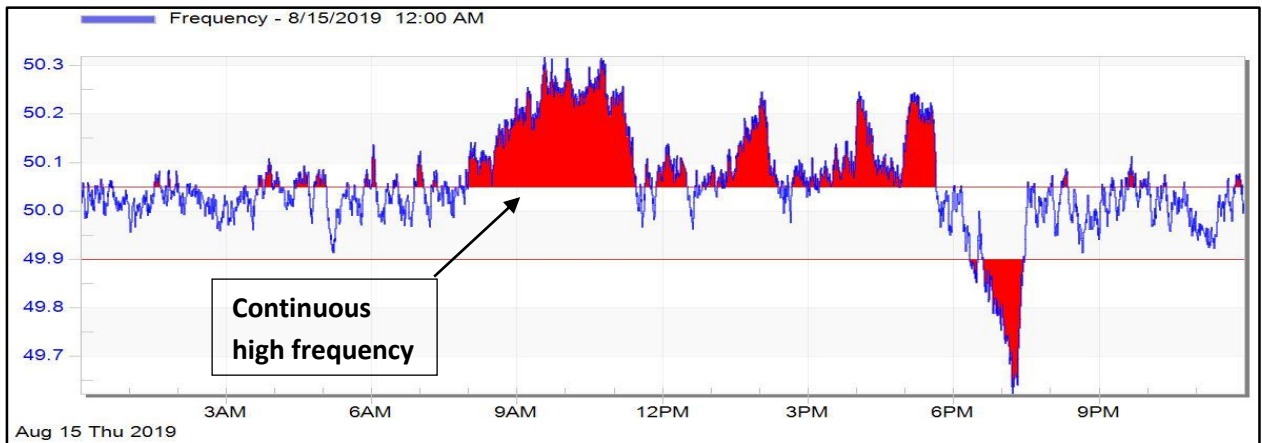
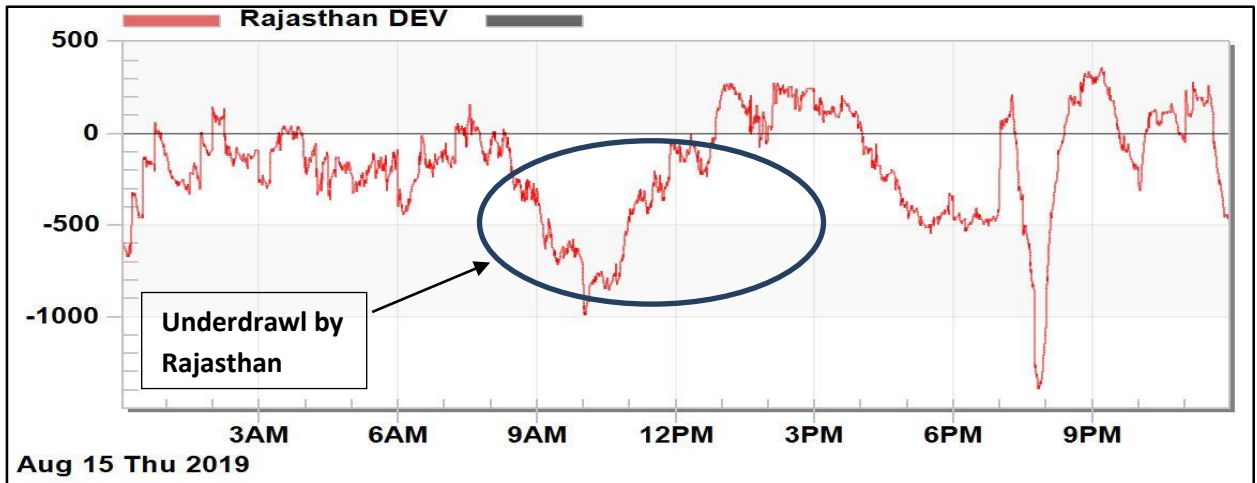
Apart from above, it needs to be made sure that defense mechanism is healthy i.e. ensuring all SPS healthy, protection system intact, monitoring of df/dt & UFR etc; and telemetry especially of MVAR of Generator, temperature & humidity (present status of temperature and humidity telemetry is attached as **Annexure-B3**) etc. is available and reliable.

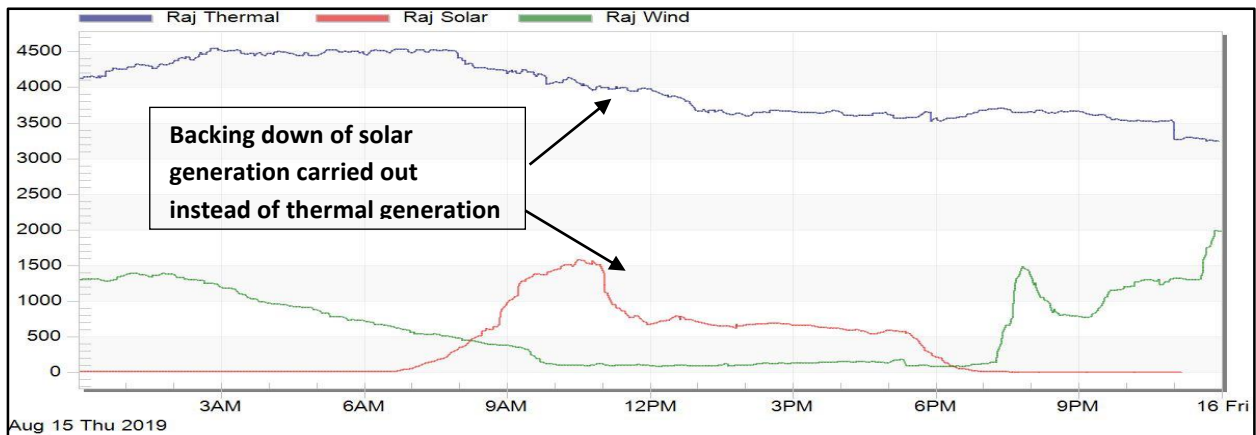
Utilities are requested to prepare plan for measures to be taken by them for carrying out pre-winter maintenance activities. Members may please discuss.

2. Issues related to grid operation:

a. Backing down by Rajasthan (15 Aug'2019): On 15th Aug 2019, there was continuous under drawl in Northern region and frequency continued to remain on the

higher side i.e. above 50.05Hz throughout the morning hours. NRLDC continuously asked Rajasthan to maintain their drawl as per schedule and back down internal generation. However, Rajasthan had carried out backing down of solar and wind (must-run) generation (details attached as **Annexure-B4**). NRLDC once again asked Rajasthan to back down thermal generation instead of solar and wind generation. *Rajasthan is requested to share the reasons for the same and provide reasons why renewable backing/curtailment was done whereas thermal generation backing was possible.*





- b. Charging of 400kV Kirori-Jind line:** On 29 Aug 2019, code for charging of 400kV Kirori-Jind # 2 was requested by Haryana. NRLDC subsequently issued charging code for 400kV Kirori-Jind #2; however, line was charged only from Kirori end and not from Jind (POWERGRID) end. POWERGRID had reported humming sound from CVT and defective fuses at Jind end which were replaced by HVPNL staff, however, line was still not being charged due to lack of coordination between HVPNL and POWERGRID staff.

CPCO NR-1 vide email at 11:36 pm reported that since Jind is remotely operated Substation so, subject line may not be charged during night without getting clearance from Jind maintenance staff and shall be taken up in morning. Line was subsequently charged on 30Aug 2019 at 14:57 hrs after obtaining written clearance from HVPNL officials.

Similar issues were encountered at 400/220kVMandola substation when emergency shutdown of 220kV lines at Mandola substation was to be availed by DTL. Such events of lack of coordination between utilities resulting in delayed charging of lines/ timely shutdown of transmission elements are big challenge to safe and secure grid operation. Utilities need to make sure that such events shall not happen in future.

NRLDC vide letter NRLDC/SO-1/151 dated 06.09.2019 (attached as **Annexure-B5**) has communicated regarding re-occurrence of such issues at unmanned POWERGRID substations and requested for actions in this direction.

POWERGRID and HVPNL are requested to provide reasons resulting in delayed charging of 400kV Kirori-Jind #2. POWERGRID may update regarding actions taken to avoid such instances at unmanned substations in future.

Members may kindly discuss.

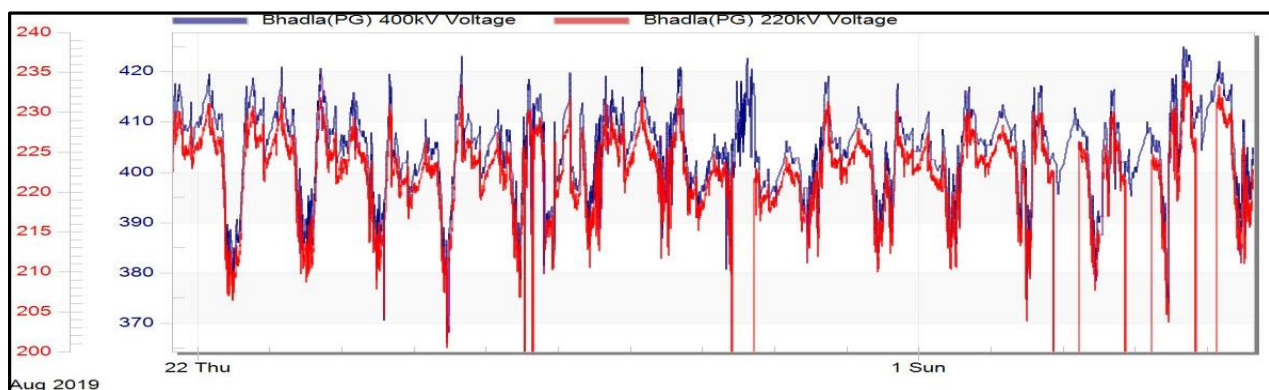
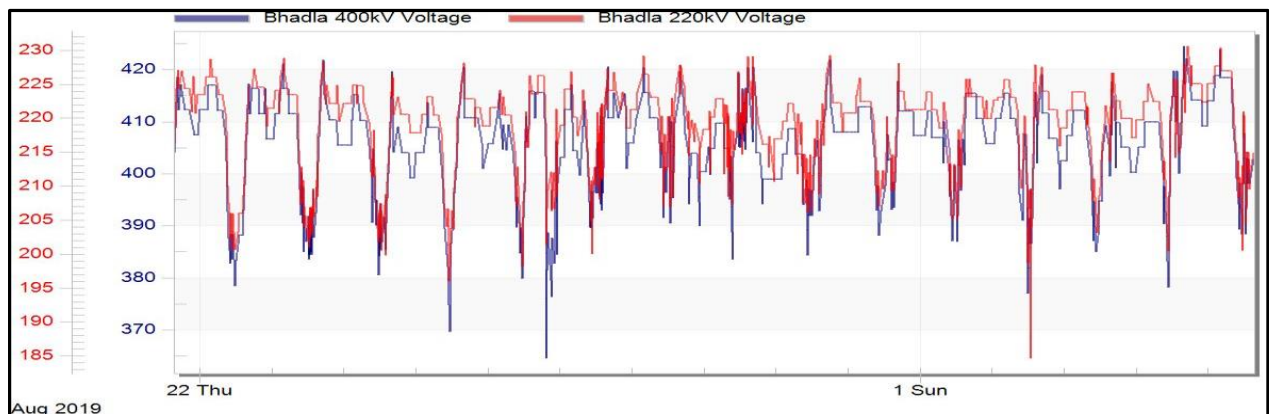
- c. Low voltages at Bhadla (high solar):** Large amount of solar generation has been/ is being commissioned near Bhadla area in Rajasthan. Evacuation of this solar generation is being facilitated by 400/220kV Bhadla (Rajasthan) and 765/400/220kV Bhadla (POWERGRID) substations. In real time, however, it is being observed that at time of high solar generation in this pocket, voltages at 400/220kV Bhadla (Rajasthan), 400/220kV Bhadla (POWERGRID), etc. are on lower side (even below 380kV at around 12:00hrs).

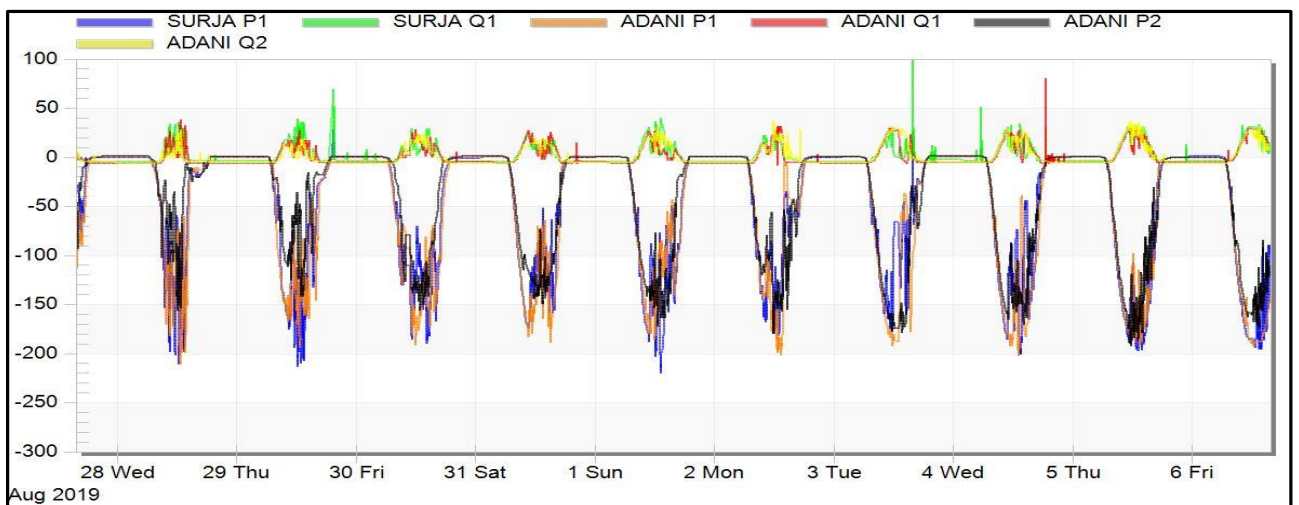
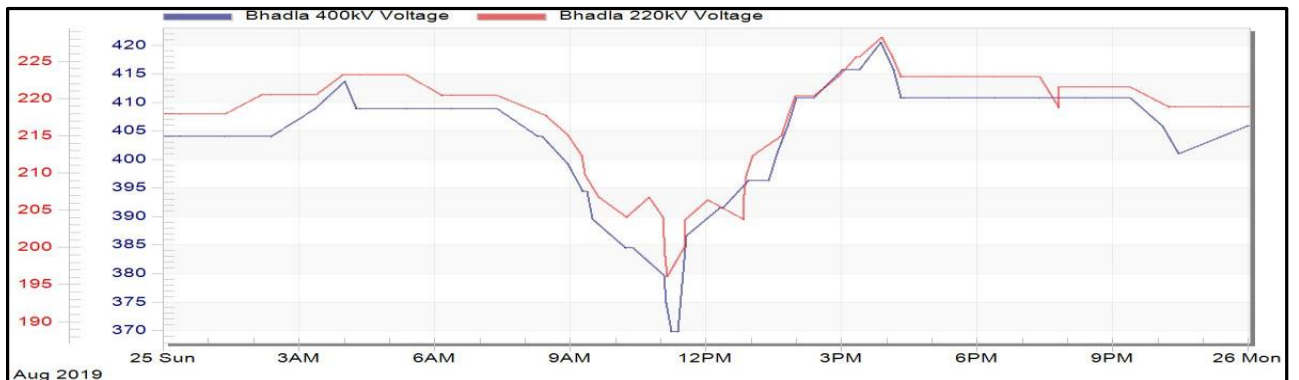
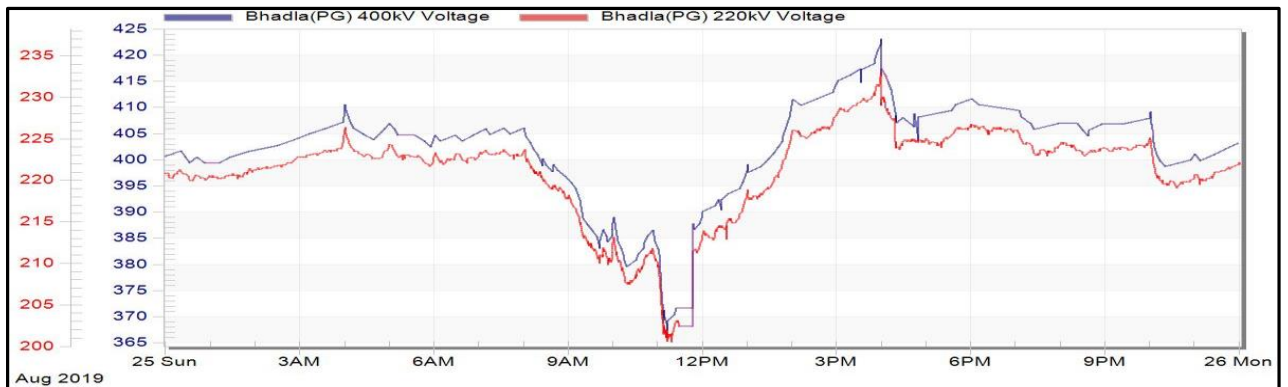
Amended Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) regulations, 2019 notified on 6th Feb 2019 states that:

“(i) The distribution licensee and bulk consumer shall provide adequate reactive compensation to compensate reactive power requirement in their system so that they do not depend upon the grid for reactive power support.

(ii) The power factor for distribution system and bulk consumer shall be within ± 0.95 ,”

However, it is being observed that solar generators in the area both stated owned and IPPs connected at Bhadla (Raj) and Bhadla (PG) are not absorbing/generating MVAR as per grid voltages. Similar situation is seen for wind generators near Akal area leading to non-compliance by solar and wind generators. *It is requested that concerned Rajasthan SLDC take up the matter with state owned renewable generators and NRLDC shall take up matter with IPPs connected at Bhadla (PG).*





From the plots shown below, it is clear that voltages at 400kV and 220kV Bhadla (Raj) and Bhadla (PG) are below 380kV and 210kV for considerable amount of time. Further, plots suggest that at Bhadla (PG) active power was being injected by solar developers, however, reactive power is being continuously drawn from the grid leading to low voltages at the time of high generation.

d. Prolonged outage of transmission elements

Details of transmission elements under prolonged outage is shown below:

Sl. No	Element Name	Voltage Level	Owner	Outage		Expected Date of Revival	Reason / Remarks
				Date	Time		
1	Jaisalmer_2-	400 kV	RRVPL	11/5/2019	21:34	NA	Tower

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Sl. No	Element Name	Voltage Level	Owner	Outage		Expected Date of Revival	Reason / Remarks
	Barmer(RS) Ckt-1						collapsed2 tower collapse in 11.05.2019 and 4 towers collapsed on 16.05.2019
2	Jaisalmer_2- Barmer Ckt-2	400 kV	RRVPLN	11/5/2019	21:34	NA	
3	Gorakhpur(PG)-Motihari(DMTCL) 1	400 kV	PGCIL	13/8/2019	22:04	NA	E/SD due to Soil erosion at tower no.132 near Gandak river bank
4	Gorakhpur(PG)-Motihari(DMTCL) 2	400 kV	PGCIL	13/8/2019	22:05	NA	
5	Bhilwara 315 MVA ICT-1	400/220 kV	RRVPLN	12/5/2019	23:42	NA	Oil leakage in Transformer
6	Agra(UPPTCL) 500 MVA ICT 2	400/220 kV	UPPTCL	5/8/2019	17:35	NA	DGA test failed. Transformer to be repaired.
7	FACT at BLB in Knp-BLB Line	400 kV	PGCIL	2/7/2016	10:20	NA	Y-Phase current imbalance
8	FSC of Balia-I at Lucknow	400 kV	PGCIL	29/11/2017	13:30	NA	E/SD due to Hot Spot on Isolator
9	FSC (40%) of Kanpur-II at Ballabgarh(PG)	400 kV	PGCIL	16/3/2019	14:39	NA	Fire in B-Ph FSC at Ballabgarh end.
10	400 kV 63 MVAR Line Reactor of Jaipur (S) line at RAPP C	400 kV	RAPPTCL	17/5/2019	9:30	NA	Emergency SD taken by RAPP C to attend oil leakage in Reactor.
11	+/- 150 MVAR STATCOM 1 at Lucknow II PG	400 kV	PGCIL	17/7/2019	15:03	Jan'20 as informed in 162nd OCC	Due to failure of 3x173 MVA, 400/38.5kV Coupling Transformer at LKO.
12	+/- 150 MVAR STATCOM 2 at Lucknow II PG	400 kV	PGCIL	17/7/2019	15:03		
13	400 kV Bus sectionalizer Bay/CB (4-3252) between Bus-2 & Bus-4 at Dadri TH	400 kV	NTPC	3/8/2019	19:28	NA	To attend bus bar protection alarm.
14	400 kV CB (352) of Mundka ckt-2 at Bawana	400 kV	DTL	7/9/2019	20:59	NA	E/S/D.To attend the CB Closing problem
15	Chamera	220 kV	PGCIL	14/5/2019	11:56	Nov'19 as	Rerouting

Sl. No	Element Name	Voltage Level	Owner	Outage		Expected Date of Revival	Reason / Remarks
	III(NHPC)- Chamera pool(PG) 2					informed in 162 nd OCC	of 5 towers under progress
16	Chamera 3 HEP 220kV Bus 1	220 kV	NHPC	14/5/2019	11:56	Jan'20 as informed in 162 nd OCC	During shifting of Chamera pool-2 line from 220 kV Bus-2 to BUS- 1 at Chamera 3 GIS. CB got damaged.

Member may kindly update the status of revival of transmission element.

Members may like to discuss.

3. Reliability issues in the grid:

Reliability issues observed during last one months' time are highlighted below:

- **Punjab:** ATC/TTC limits of Punjab state control area were revised to 6400/7000 MW based on simulation studies suggesting N-1 non-compliance at 400/220kV Amritsar, Rajpura, Muktsar ICTs. On managing loading at these ICTs, next severe contingency would be N-1 of 400/220kV Ludhiana, Nakodar and Makhu ICTs. New 500MVA ICT has been commissioned at Muktsar hence, removing constraint at Muktsar. With arrival of monsoon in Punjab, demand has not been extremely high. Loading at Amritsar and Rajpura ICTs is above N-1 contingency limits while that of Ludhiana and Nakodar ICTs is close to N-1 contingency limit. Punjab SLDC is requested to manage loading of ICTs below N-1 contingency limits.
- **Uttar Pradesh:** Demand of Uttar Pradesh continued to remain high (maximum being in range of 20000-22000MW) during last 30 days. N-1 non-compliance was observed at 400/220kV Sarnath ICTs. Apart from this, UP may confirm MVAR telemetry data from Bara and actions taken to correct telemetry of Bara Unit 3. 500MVA ICT-2 at Agra(UP) is out since 05.08.2019 resulting in N-1 non-compliance at Agra(UP).
- **Haryana:** TTC/ ATC limits were initially assessed by NRLDC as 7500MW/ 6900MW respectively with N-1 non-compliance at 400/220kV Dipalpur and Panipat ICTs. In real-time also under import of 6000-7000MW, loading of Sonipat, Kabulpur and Panipat (BBMB) ICTs are high (close to N-1 limits) while that of Dipalpur is even above N-1 contingency limits for considerable duration.
- **Delhi:** As per studies carried out by Delhi SLDC and NRLDC, TTC and ATC limit was assessed as 6800MW and 6500MW. Simulation studies suggested N-1 non-compliance at 400/220kV Mundka and Harsh vihar ICTs. In real time at time of high loadings, N-1 non-compliance was observed at Bamnauli and Mundka ICTs.

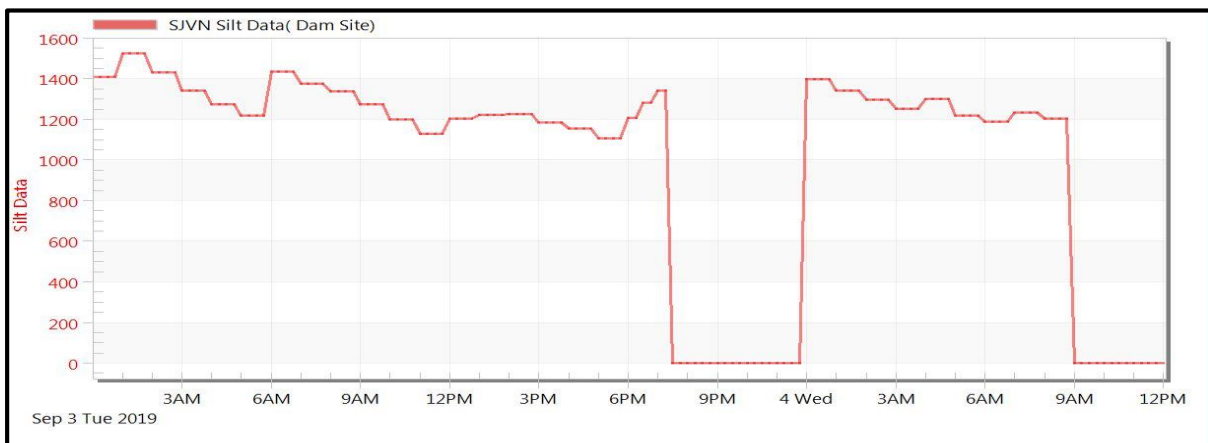
- Rajasthan:** N-1 non-compliance at Akal and Bhadla ICTs. Under N-1 contingency of ICT at Akal or Bhadla, there could be generation loss of the order of 1000-1300MW, which is severe contingency in grid resulting in large scale frequency excursions (dip). Thus, there is need for SPS design to trip some generation in case of tripping of one ICT at these stations and antecedent loading of ICTs being higher than N-1 contingency limit. Further, Rajasthan SLDC is requested to share latest ATC/TTC assessment carried out by them for 2019-20 winter.

These issues were also highlighted by NRLDC in 161st and 162nd OCC meeting and Rajasthan SLDC was requested to plan SPS for the same. Rajasthan SLDC may present actions being taken/ planned.

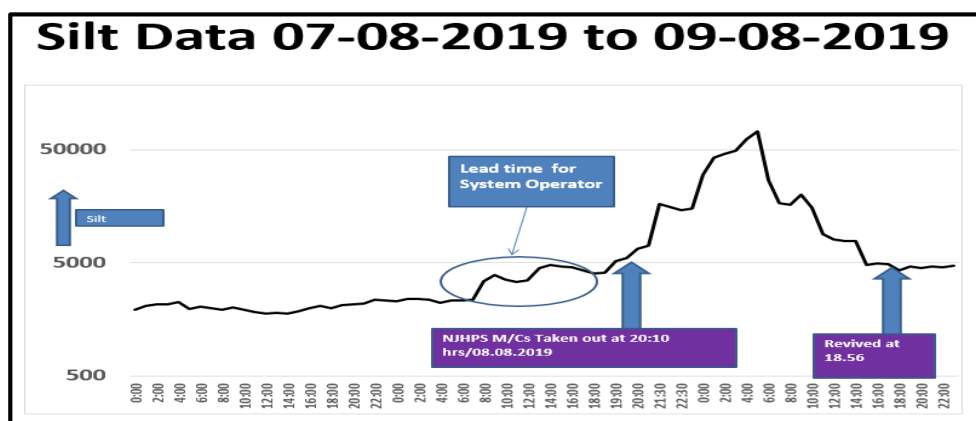
Members may kindly discuss.

4. Near Real-Time monitoring of silt data

It was decided in 160th OCC meeting that Nathpa Jhakri will submit the real time silt measurement data to NRLDC through FTP. This data will be helpful for real time system operation in view of frequent hydro generation outage due to silt. The PPM number is being punched directly from the site/control room at NRLDC server providing silt measurement at NRLDC control room. Trend of sample data available at NRLDC for 3rd Sep 2019 is shown below:



Sample data of 07-08-2019 to 09-08-2019 shown below suggests that there is some lead-time (varying from few hours to several hours) available with system operators to accommodate outage of hydro generators on account of high silt level.



If such data could be made available from Powari near Karcham Wangtoo generator, then this data could be useful for both Karcham as well as Nathpa Jhakri. It is requested that other hydro stations may also take actions to provide this near-real time silt measurement to control centers (RLDCs/SLDCs) as this would help them gain some lead-time for better tackling of hydro generator outage on silt.

Members may kindly discuss.

5. Station-wise list of Hot spares of Transformers and Reactors

As deliberated in 162nd OCC meeting, CERC vide their communication dated 6th July 2019, has advised POSOCO to collect details about availability of Hot Spare units installed in various stations on quarterly basis from all ISTS licensees. NLDC communication regarding above and station-wise list of hot spares submitted by POWERGRID as sample was attached in the Annexure of 162nd OCC agenda.

Even after deliberating the issue in 162nd OCC meeting, no information regarding above is received from any of the utilities after the meeting. It is once again requested that data as per enclosed format may please be shared with NRLDC, so that same may be forwarded to NLDC. The data was also requested vide email dated 19.07.2019; however, feedback has only been received from Adani Transmission. Other utilities are also requested to share the required data.

Members may please like to discuss.

6. Frequent forced outages of transmission elements

The following transmission elements were frequently under forced outages during the month of **Aug'19**:

Sl. No.	Element Name	No. of forced outages	Utility/SLDC
1	400kV Fatehabad(UP)-Mathura(UP) ckt-2	5	UP
2	220kV Gopalpur(DTL)-Mandola(PG) ckt-1	5	Delhi/POWERGRID
3	220kV Kishenpur(PG)-Ramban(JK)	4	J&K/POWERGRID
4	400kV Agra(UP)-Fatehabad(UP) ckt-1	3	UP

The complete details are attached at **Annexure-B6**. Frequent outages of such elements affect the reliability and security of the grid. Hence, utilities are requested to look into such frequent outages and share the remedial measures taken/being taken in this respect.

Members may like to discuss.

7. Multiple element tripping events in Northern region in the month of Aug'19:

A total of **14** grid events occurred in the month of Aug'19 of which **7** 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 05-Sep-19 is attached at **Annexure-B7**.

Further, despite persistent discussions/follow-up in various OCC/PCC meetings, the compliance of the regulations is still much below the desired level.

Maximum Fault Duration is **2760ms** in the event of tripping at Moradabad (UP) on 02nd Aug 2019 at 13:03hrs.

Delayed clearance of fault (more than 100ms for 400kV and 160ms for 220kV system) observed in total **4** events out of 13 grid events experiencing fault.

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

Members may like to discuss.

8. Details of tripping of Inter-Regional lines from Northern Region for Aug'19:

A total of **10** inter-regional lines tripping occurred in the month of Aug'19. The list is attached at **Annexure-B8**. Out of 10 number of trippings, 3 tripping incidents are related to HVDC system. 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.

Members may kindly note and advise the concerned for taking corrective action to avoid such trippings as well as timely submission of the information.

9. Frequency response characteristic:

One FRC based event has occurred in the month of **Aug'2019**. Description of the events is as given below:

Sl. No.	Event Date	Time (in hrs)	Event Description	Starting Frequency (in Hz)	End Frequency (in Hz)	Δf
1	21-Aug-19	00:02hrs	400kV Dikchu - Rangpo tripped from Rangpo end only. Consequently, 400kV Teesta III-Dikchu also tripped resulting in total black out at 400kV Dikchu and 400kV Teesta III,	49.930	49.843	0.087

			generation loss of 1364 MW of Teesta III-1260MW and Dikchu-104 MW.			
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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	PUNJAB	HARYANA	RAJASTHAN	DELHI	UTTAR PRADESH	UTTARAKHAND	CHANDIGARH	HIMACHAL PRADESH	JAMMU & KASHMIR	NR
FRC	29%	-114%	-3%	0%	47%	5%	6%	15%	46%	12%
Remarks		Demand inc. following inc. in schedule								

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

Generator	FRC	Comments	Generator	FRC	Comments
Singrauli TPS	1%	Delayed response observed	Uri-1 HEP	-1%	
Rihand-1 TPS	Suspect SCADA data		Uri-2 HEP	0%	
Rihand-2 TPS	Suspect SCADA data		Dhauliganga HEP	Suspect SCADA data	
Rihand-3 TPS	12%		Dulhasti HEP	0%	
Dadri-1 TPS	20%		Sewa-II HEP	Suspect SCADA data	
Dadri -2 TPS	25%		Parbati-3 HEP	11%	
Unchahar TPS	-6%		Kishnganga HEP	1%	
Unchahar stg-4 TPS	30%		Jhakri HEP	15%	
Jhajjar TPS	Inc. in schedule		Rampur HEP	0%	
Dadri GPS	-11%	Delayed response observed	Tehri HEP	-9%	
Anta GPS	No generation		Koteswar HEP	Dec. in schedule	
Auraiya GPS	Dec. in schedule		Karcham HEP	56%	
Narora APS	0%		Malana-2 HEP	0%	
RAPS-B	11%		Budhil HEP	Suspect SCADA data	Momentary inc. in gen. observed
RAPS-C	2%		Bhakra HEP	-3%	
Chamera-1 HEP	4%		Dehar HEP	2%	
Chamera-2 HEP	0%		Pong HEP	12%	
Chamera-3 HEP	13%		Koldam HEP	3%	
Bairasiul HEP	No generation		AD Hydro HEP	0%	
Salal HEP	-2%	Momentary inc. in gen. observed	Sainj HEP	-2%	
Tanakpur HEP	Suspect SCADA data				

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

Generator	FRC	Comment	Generator	FRC	Comment
PUNJAB			UP		
Ropar TPS	No generation		Obra TPS	12%	
L.Mohabbat TPS	No generation		Harduaganj TPS	4%	
Rajpura TPS	24%		Paricha TPS	10%	
T.Sabo TPS	15%		Rosa TPS	8%	
Goindwal Sahib TPS	No generation		Anpara TPS	-1%	
Ranjit Sagar HEP	24%		Anpara C TPS	seems dec. in schedule	
HARYANA			Anpara D TPS	16%	
Panipat TPS	No generation		Bara TPS	-11%	
Khedar TPS	No generation		Lalitpur TPS	6%	
Yamuna Nagar TPS	No generation		Meja TPS	seems dec. in schedule	
CLP Jhajjar TPS	15%		Vishnuprayag HEP	Suspect SCADA data	
Faridabad GPS	0%		Alaknanda HEP	-3%	
RAJASTHAN			Rihand HEP	No generation	
Kota TPS	7%		Obra HEP	No generation	
Suratgarh TPS	-7%		UTTARAKHAND		
Kalisindh TPS	Suspect SCADA data		Gamma Infra GPS	-3%	
Chhabra stg-2 TPS	-25%		Shravanti GPS	-8%	
Kawai TPS	seems dec. in schedule		Ramganga HEP	Suspect SCADA data	
Dholpur GPS	No generation		Chibra HEP	4%	
Mahi-1 HEP	3%		Khodri HEP	No generation	
Mahi-2 HEP	No generation		Chilla HEP	8%	
RPS HEP	No generation		HP		
JS HEP	18%		Baspa HEP	-5%	
DELHI			Malana HEP	Suspect SCADA data	
Bawana GPS	-11%	<i>Momentary inc. in gen. observed</i>	Larji HEP	Suspect SCADA data	
Pragati GPS	51%		Bhabha HEP	11%	
			Giri HEP	No generation	
			J&K		
			Baglihar-1&2 HEP	4%	
			Lower Jhelum HEP	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. Constituents may submit the FRC of their control areas for both the events and reason of poor response, if observed.

10. Mock black start exercises in NR:

As per Indian Electricity Grid Code (IEGC) clause 5.8(b) "Mock trial runs of the procedure for different sub-systems shall be carried out by the Users / CTU / STU at least **once every six months** under intimation to the RLDC".

Mock Black-start exercise of power stations therefore needs to be carried out in-order to ensure healthiness of black start facility. The winter months are off peak hydro period and therefore good time to carry out such exercises.

Therefore, the schedule of mock exercise dates for different hydro & Gas power station is proposed. The power stations may confirm and inform to all the concerned persons of control centre/ substations to facilitate the exercise.

The summary/schedule of mock black start exercise of ISGS hydro stations carried out in previous season is tabulated below:

Sl. No.	Proposed Date	Revised Date	Generating station	Remarks
1	24-Oct-18	NA	Malana-2	Exercise was not successful. It is proposed to carry out the exercise again with AD Hydro.
2	02-Nov-18	NA	Salal	Exercise carried out successfully. However, due to less load on account of bad weather, frequency kept on varying and island could not be synchronised with grid.
3	30-Nov-18	06-Dec-18	Sewa-2	NHPC confirmed. Date revised by J&K. Exercise was partially successful. Unit went under emergency stop twice.
4	03-Dec-18	NA	Chamera-1 & Chamera-2	Exercise was partially successful. Large variation in frequency observed in islanded operation with Chamera-1. Chamera-2 unit could not be able to synchronise to the island.
5	11-Dec-18	19-Dec-18	Parbati-3	Carried out successfully.
6	19-Dec-18	20-Dec-18	Koteshwar	Carried out successfully. 400kV Koteshwar-Koteshwar(PG)-1 tripped from Koteshwar(PG) end at first attempt during charging of Tehri ckt-1.
7	28-Dec-18	03-Jan-19	AD Hydro, Malana-2, Phojal (Kanchanjanga)	Exercise was partially successful. Island created and synchronized with AD Hydro. However, during blackstart, the AD Hydro running island collapsed while connecting Phojal (Kanchanjanga). Malana-2 couldn't be synchronized.
8	11-Jan-19	NA	Koldam	Exercise carried out successfully.
9	04-Jan-19	22-Feb-19	Tehri	Mock black start exercise was successful. Mock exercise started at 11:00AM with 250MW Unit-4 of Tehri HEP and load at Shatabadi nagar (UP). Mock exercise completed by 13:25hrs
Not carried out				
10	18-Oct-18	NA	Kishanganga (new plant)	NHPC reported to intimate date separately. It is proposed to carry out the exercise with Uri, L. Jhelum, Pampore and U. Sindh.
11	26-Oct-18	07-Feb-19	Dhauliganga	Revised date by NHPC
12	13-Nov-18	21-Jan-19	Nathpa Jhakri & Rampur	Revised date by SJVNL
13	16-Nov-18	-	*Uri-I, II HEP, Lower Jhelum HEP, Pampore GT's & Upper Sindh	To be carried out after 15-Dec-18 due to load management by J&K and shutdown of 400kV Amargarh-Uri 1 ckt-2.
14	19-Nov-18	-	Budhil	To be carried out after 15-Dec-18.
15	28-Nov-18	15-Mar-19	Chamera-3	Exercise was not successful as unit tripped three times during mock testing on different region. After multiple unsuccessful attempt mock exercise was differed for later date.
16	14-Dec-18	-	Bairasiul	As reported by NHPC, Power House shall be under complete shutdown since 01/10/2018 for R&M of power house.
17	08-Jan-19	-	Karcham Wangtoo &	Exercise deferred on request of Haryana due to load management.

Sl. No.	Proposed Date	Revised Date	Generating station	Remarks
			Baspa	

Out of the above planned exercises, 8 were carried out. In addition, there was change in scheduled date in 8 planned exercises. Thus, a large percentage of exercises were re-scheduled due to reasons like load not being available, plant personnel not ready, coordination problem among other reasons. **Constituents were being requested to adhere to the finalized schedule of mock exercises during the season.**

The proposed schedule for the Mock Black-start exercise is as follows:

Hydro Power Stations:

Date	Name of stations
15-Oct-19	*Budhil
22-Oct-19	*Dhauliganga
25-Oct-19	*N. Jhakri and Rampur
31-Oct-19	*Bairasiul
05-Nov-19	Sewa-2
08-Nov-19	*Karcham and Baspa
15-Nov-19	*Uri-I, II HEP, Lower Jhelum HEP, Pampore GT's, Upper Sindh and Kishanganga
19-Nov-19	Parbati-3 and *Sainj
21-Nov-19	Salal
26-Nov-19	*Chamera-3
28-Nov-19	Koteshwar
10-Dec-19	Chamera-1 and 2
12-Dec-19	Malana-2, AD Hydro and Phozal
27-Dec-19	Tehri
02-Jan-20	Koldam

* Mock Black start exercise not carried out during Year 2018-19.

Mock Black start procedure circulated during last exercise/ previous year may be used. The unit selection may be changed from the one taken during last year exercise.

Gas Power Stations:

Date	Name of stations
09-Oct-19	*Anta GPS
04-Dec-19	*Auraiya GPS
19-Dec-19	*Dadri GPS

* Mock Black start exercise not carried out during Year 2017-18, procedure to be developed.

As informed by Bawana GPS, it does not have black start capability.

SLDC's may also carryout mock black-start of station in their respective control area & inform the tentative dates to the OCC as well as outcome of these exercises. The proposed Hydro Power Stations to undergo the exercise are as follows:

Sl. No.	Utility	Hydro Power Station	Installed Capacity (MW)	
1	J&K	Baglihar	3x150	
2		Baglihar stage-2	3x150	
3		Lower Jhelum	3x35	
4		Upper Sindh	2x11+3x35	
5		Larji	3x42	
6		Bhabha	3x40	
7		Malana -I	2x43	
8		Baspa	3x100	
9	Punjab	Anandpur Sahib	4x33.5	
10		Ranjit Sagar	4x150	
11	Rajasthan	Mahi-I&II	2x25+2x45	
12		Rana Pratap Sagar	4x43	
13		Jawahar Sagar	3x33	
14		Gandhi Sagar	5x23	
15		Dholpur GPS	3x110	
16		Ramgarh GPS	1x35.5+2x37.5+1x110	
17		UP	Rihand	6x50
18			Obra	3x33
19	Vishnuprayag		4x100	
20	Srinagar (Alaknanda)			4x82.5
21				
22	Uttarakhand	Gamma Infra	2x76+1x73	
23		Shravanti	6x75	
24		Ramganga	3x66	
25		Chibro	4x60	
26		Khodri	4x30	
27		Chilla	4x36	
28		Maneri Bhali-I&II	3x30+4x76	
29	Delhi	IP Extn GTs	6x30+3x30	
30		Pragati GPS	2x104.6+1x121.2	
31		Rithala	3x36	
	Haryana	Faridabad GPS	2x137.75+1x156.07	

During last winter, SLDCs had been requested to carry out mock drills and share their experiences. However, the report of such exercises was not received. The information may please be shared by SLDCs and program for this year's mock black start exercises shall also be shared.

SLDCs shall submit the reports of black start exercise in their respective control area. SLDCs may also identify further generating stations/unit for black start exercise.

Members may kindly discuss.

Anticipated Power Supply Position in Northern Region for October 2019

State / UT		Oct-19 (MU)	Oct-19 (MW)
Chandigarh	Availability	140	385
	Requirement	125	280
	Surplus/Shortfall (MU)	15	105
	Surplus/Shortfall (%)	12.0%	37.5%
Delhi	Availability	3230	5970
	Requirement	2750	4850
	Surplus/Shortfall (MU)	480	1120
	Surplus/Shortfall (%)	17.5%	23.1%
Haryana	Availability	5280	9810
	Requirement	4450	7860
	Surplus/Shortfall (MU)	830	1950
	Surplus/Shortfall (%)	18.7%	24.8%
Himachal Pradesh	Availability	1000	1970
	Requirement	850	1500
	Surplus/Shortfall (MU)	150	470
	Surplus/Shortfall (%)	17.6%	31.3%
Jammu & Kashmir	Availability	910	1940
	Requirement	1530	3000
	Surplus/Shortfall (MU)	-620	-1060
	Surplus/Shortfall (%)	-40.5%	-35.3%
Punjab	Availability	5710	8870
	Requirement	5090	9910
	Surplus/Shortfall (MU)	620	-1040
	Surplus/Shortfall (%)	12.2%	-10.5%
Rajasthan	Availability	8560	14220
	Requirement	7300	11600
	Surplus/Shortfall (MU)	1260	2620
	Surplus/Shortfall (%)	17.3%	22.6%
Uttar Pradesh	Availability	14400	21800
	Requirement	11700	19500
	Surplus/Shortfall (MU)	2700	2300
	Surplus/Shortfall (%)	23.1%	11.8%
Uttarakhand	Availability	1140	2050
	Requirement	1100	1970
	Surplus/Shortfall (MU)	40	80
	Surplus/Shortfall (%)	3.6%	4.1%
Total NR	Availability	40370	67015
	Requirement	34895	54600
	Surplus/Shortfall (MU)	5475	12415
	Surplus/Shortfall (%)	15.7%	22.7%

Follow up issues from previous OCC meetings

Sl. No.	Agenda point	Details	Status
1	Monitoring of schemes funded from PSDF (<i>Agenda by NPC</i>)	The latest status of the schemes for which grant has been sanctioned from PSDF for the schemes in NR. 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 available status of schemes submitted by the entities for funding from PSDF was attached as Annexure-III/1 of the agenda of 160 th OCC meeting. The updated status from Rajasthan was received via email dated 13.08.2019. UP submitted status dated 05.08.2019. Delhi submitted updated data on 14.08.2019. All other states were requested to update the status of the schemes to be funded from PSDF.
2	Sub-stations likely to be commissioned in next six months.	All the concerned states were requested to submit the details of the downstream network associated specially with POWERGRID substations along with the action plan of their proposed/approved networks.	The updated details of the substations of POWERGRID and their required downstream network was placed at Annexure-V/2 of the agenda note. UP and Haryana submitted the updated information on 13.8.2019. Other utilities were requested to update the status.
3	Progress of installing new capacitors and repair of defective capacitors	Information regarding installation of new capacitors and repair of defective capacitors is to be submitted to NRPC Secretariat.	Information received from Uttarakhand (June 2019), Rajasthan (up to July 2019), UP (up to June 2019) & Haryana (up to June 2019). All other states were requested to update.
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 " <i>All the UFRs are checked and found functional</i> ".	The information of period ending March 2019 received from UP, Delhi and Rajasthan and for period ending June 2019 received from Haryana, UP and Delhi . All others are requested to submit information.

Developer	Name of Project	Sector (State / Central / Private)	State	Region	Unit No.	Unit Capacity (MW)	Date of Commissioning	Age in years	Whether FGD Installed (Y/N)	Whether FGD space available (Y/N)	Whether FGD planned (Y/N)	Feasibility Study Started (Y/N)	Feasibility Study Completed (Y/N)	Tender Specifications Made (Y/N)	NIT Issued (Y/N)	Bids Opened (Y/N)	Bid Opening Date (DD/MM/YYYY)	Bids Awarded (Y/N)	Regulated or Petition Cleared (Y/N)	% Progress of FGD Installation	FGD Commissioned (Y/N)	FGD working satisfactorily (Y/N)	FGD Phasing Plan for Implementation (DD/MM/YYYY)	Current Status & remarks	Last updated on
Rosa Power Supply Company Ltd.	ROSA TPP	Private	UP	NR	I	300	12-03-2010	9.51	N	Y	Y	Y	Y	Y	Y	Y	29-03-2019	Y	N	0	N	NA	NA	Pending in UPERC for in-principle approval of capital cost for installation of FGD.	04-06-2019
Rosa Power Supply Company Ltd.	ROSA TPP	Private	UP	NR	II	300	30-06-2010	9.21	N	Y	Y	Y	Y	Y	Y	Y	29-03-2019	Y	N	0	N	NA	NA	Pending in UPERC for in-principle approval of capital cost for installation of FGD.	04-06-2019
Rosa Power Supply Company Ltd.	ROSA TPP	Private	UP	NR	III	300	01-01-2012	7.70	N	Y	Y	Y	Y	Y	Y	Y	29-03-2019	Y	N	0	N	NA	NA	Pending in UPERC for in-principle approval of capital cost for installation of FGD.	04-06-2019
Rosa Power Supply Company Ltd.	ROSA TPP	Private	UP	NR	IV	300	01-04-2012	7.45	N	Y	Y	Y	Y	Y	Y	Y	29-03-2019	Y	N	0	N	NA	NA	Pending in UPERC for in-principle approval of capital cost for installation of FGD.	04-06-2019
Lalitpur Power Generation Company Ltd.	Lalitpur Super Thermal Power Project	Private	UP	NR	I	660	26-03-2016	3.46	N	Y	Y	Y	Y	N	N	N	NA	N	N	0	N	NA	NA	Petition was filed on 16.11.2017 with UPERC for approval for capital cost for installation of FGD and other associated system. UPERC vide their order dt. 18.12.2017 directed LPGCL to approach CEA to decide specific optimum technology, associated cost and major issues to be faced for installation of different system. CEA suggested technology & associated cost	04-06-2019
Lalitpur Power Generation Company Ltd.	Lalitpur Super Thermal Power Project	Private	UP	NR	II	660	08-01-2016	3.68	N	Y	Y	Y	Y	N	N	N	NA	N	N	0	N	NA	NA	Petition was filed on 16.11.2017 with UPERC for approval for capital cost for installation of FGD and other associated system. UPERC vide their order dt. 18.12.2017 directed LPGCL to approach CEA to decide specific optimum technology, associated cost and major issues to be faced for installation of different system. CEA suggested technology & associated cost	04-06-2019
Lalitpur Power Generation Company Ltd.	Lalitpur Super Thermal Power Project	Private	UP	NR	III	660	01-04-2016	3.45	N	Y	Y	Y	Y	N	N	N	NA	N	N	0	N	NA	NA	Petition was filed on 16.11.2017 with UPERC for approval for capital cost for installation of FGD and other associated system. UPERC vide their order dt. 18.12.2017 directed LPGCL to approach CEA to decide specific optimum technology, associated cost and major issues to be faced for installation of different system. CEA suggested technology & associated cost	04-06-2019
Meja Urja Nigam (P) Ltd. (JV of NTPC and URRVUNL)	Meja Thermal Power Project Stage-I	Central	UP	NR	I	660	30-04-2019	0.37	N	Y	Y	Y	Y	Y	Y	Y	20-07-2018	Y	N		N	NA	19-06-2021	Chimney - Excavation started on 30.05.2019	04-06-2019
Meja Urja Nigam (P) Ltd. (JV of NTPC and URRVUNL)	Meja Thermal Power Project Stage-I	Central	UP	NR	II	660	-	-	N	Y	Y	Y	Y	Y	Y	Y	20-07-2018	Y	N		N	NA	19-12-2021		04-06-2019
Prayagraj Power Generation Company Ltd.	Prayagraj Thermal Power Plant	Private	UP	NR	I	660	29-02-2016	3.53	N	Y	Y	Y	Y	N	N	N	-	N	N	0	N	NA	-	Feasibility report cleared by CEA, Tariff petition being filed to UPERC, Tender specification is under preparation by M/s TCE.	27-04-2019
Prayagraj Power Generation Company Ltd.	Prayagraj Thermal Power Plant	Private	UP	NR	II	660	10-09-2016	3.00	N	Y	Y	Y	Y	N	N	N	-	N	N	0	N	NA	-	Feasibility report cleared by CEA, Tariff petition being filed to UPERC, Tender specification is under preparation by M/s TCE.	28-04-2019
Prayagraj Power Generation Company Ltd.	Prayagraj Thermal Power Plant	Private	UP	NR	III	660	26-05-2017	2.30	N	Y	Y	Y	Y	N	N	N	-	N	N	0	N	NA	-	Feasibility report cleared by CEA, Tariff petition being filed to UPERC, Tender specification is under preparation by M/s TCE.	29-04-2019
Lanco Anpara Power Ltd.	Anpara C	Private	UP	NR	I	600	10-12-2011	7.76	N	Y	Y	Y	N	N	N	N	NA	N	N	0	N	NA	01-08-2022	UPERC seeking in-principle approval for capital cost to be incurred for the installation of FGD and SCR system. UPERC called for hearing in December 2017, in which LANPL requested the commission to consider the additional capital cost for installation of FGD and SCR be considered under 'change in law' as per the provisions of PPA. UPERC has given an order stating that LANPL to approach CEA to decide specific optimum technology, associated cost in installation of FGD & SCR. UPERC granted liberty to file petition by LANCO Anpara Power Ltd after obtaining approval of CEA on technology & cost related aspects of FGD & SCR. After meetings with Member(Th), LANPL was asked by CEA to submit feasibility report with options available in the market & technology selected along with cost. TO meet the above, LANPL appointed M/s Black & Veatch as consultant for Air Quality and Control System (AQCS) for preparing the feasibility report. With the present technologies available for reducing the	04-06-2019
Lanco Anpara Power Ltd.	Anpara C	Private	UP	NR	II	600	18-01-2012	7.65	N	Y	Y	Y	N	N	N	N	NA	N	N	0	N	NA	01-06-2022	UPERC seeking in-principle approval for capital cost to be incurred for the installation of FGD and SCR system. UPERC called for hearing in December 2017, in which LANPL requested the commission to consider the additional capital cost for installation of FGD and SCR be considered under 'change in law' as per the provisions of PPA. UPERC has given an order stating that LANPL to approach CEA to decide specific optimum technology, associated cost in installation of FGD & SCR. UPERC granted liberty to file petition by LANCO Anpara Power Ltd after obtaining approval of CEA on technology & cost related aspects of FGD & SCR. After meetings with Member(Th), LANPL was asked by CEA to submit feasibility report with options available in the market & technology selected along with cost. TO meet the above, LANPL appointed M/s Black & Veatch as consultant for Air Quality and Control System (AQCS) for preparing the feasibility report. With the present technologies available for reducing the	04-06-2019


RAJASTHAN RAJYA VIDYUT PRASARAN NIGAM LIMITED.

[Corporate Identity Number (CIN):U40109RJ2000SGC016485]

(Regd. Office: Vidyut Bhawan, Jan Path, Jyoti Nagar, Jaipur - 302 005)

OFFICE OF THE SUPERINTENDING ENGINEER (PROJECT & PLANNING)

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 An ISO 9001:2000
 Certified Company

 No. RVPN/SE(P&P)/XEN-2(P&P)/AE-2/F. /D **743** Jaipur, Dt. **6-9-2019**

 The Superintending Engineer (SOLD),
 RVPN, Heerapura, Jaipur

Sub: Study of revised SPS for Kawai-Kalisindh-Chhabra Complex.

 Ref: 1. MOM of 159th OCC meeting held on 15.05.2019

2. Email dated 28.05.2019 of NRPC received through SE(SO&LD), RVPN, Jaipur

3. This office letter no. 35 dated 10.04.2019, no. 371 dated 04.07.2019, no. 628 dated 09.08.2019

4. MOM of meeting held on 04.02.2019 in CEA

5. MOM of meeting held on 04.02.2019 in CEA

6. No. RVPN/SE(SOLD)/XEN-1/F. /D. 481 dated 17.07.2019

7. Email dated 19.08.2019 of the SE(SO&LD), RVPN, Jaipur.

8. Email dated 28.08.2019 of POSOCO, New Delhi, and SE (SOLD), RVPN, Jaipur

On the above captioned subject and referred emails/letters, it is intimated that as desired vide above referred email dated 28.08.2019, the reply of the comments raised by the NRLDC is detailed below.

S. No.	Contingency	Comments of NRLDC	Reply
8	N-1/N-2 of Chhabra SCTPS-Anta-1&2	In case of tripping of both 400 kV Chhabra SCTPS-Anta-1 & 2 lines. Whether the capacity of Chhabra bus has been considered or not?	The capacity of Chhabra bus has been considered in the study. A diagram showing the current flow on the CTPP bus is attached (Exhibity-1 & 2) which is based on the results of PSSE Study (Exhibit-3) and MiPower study (Exhibit-4). The capacity of each CTPP bus is 2000A (Annexure-1). Maximum current observed on a bus in the event of N-1/N-2 of Chhabra SCTPS-Anta-1&2 is 1006 A and 1049 A respectively, which is well below the rated capacity of CTPP bus.
10	N-1/N-2 of 765/400 kV Anta ICTS	In case of tripping of two 765/400 kV Anta ICTSs. The loading on third ICT may go beyond 1700 MW in different load scenarios (1531 MW taken in the given study). So, it would be better to trip one Chhabra SCTPS (660 MW) unit instead of one Chhabra TPS (250 MW).	We may agree with the opinion of NRLDC for tripping one Chhabra SCTPS (660 MW) unit instead of one Chhabra TPS (250 MW).

Therefore, it is requested to please discuss the matter with the NRLDC so that the SPS for Kawai-Kalisindh-Chhabra thermal complex may be finalized.

Encl: As above

Your's faithfully,

(S. K. Baswal)

CHIEF ENGINEER (PP&D)

Copy to the following for information and necessary action:-

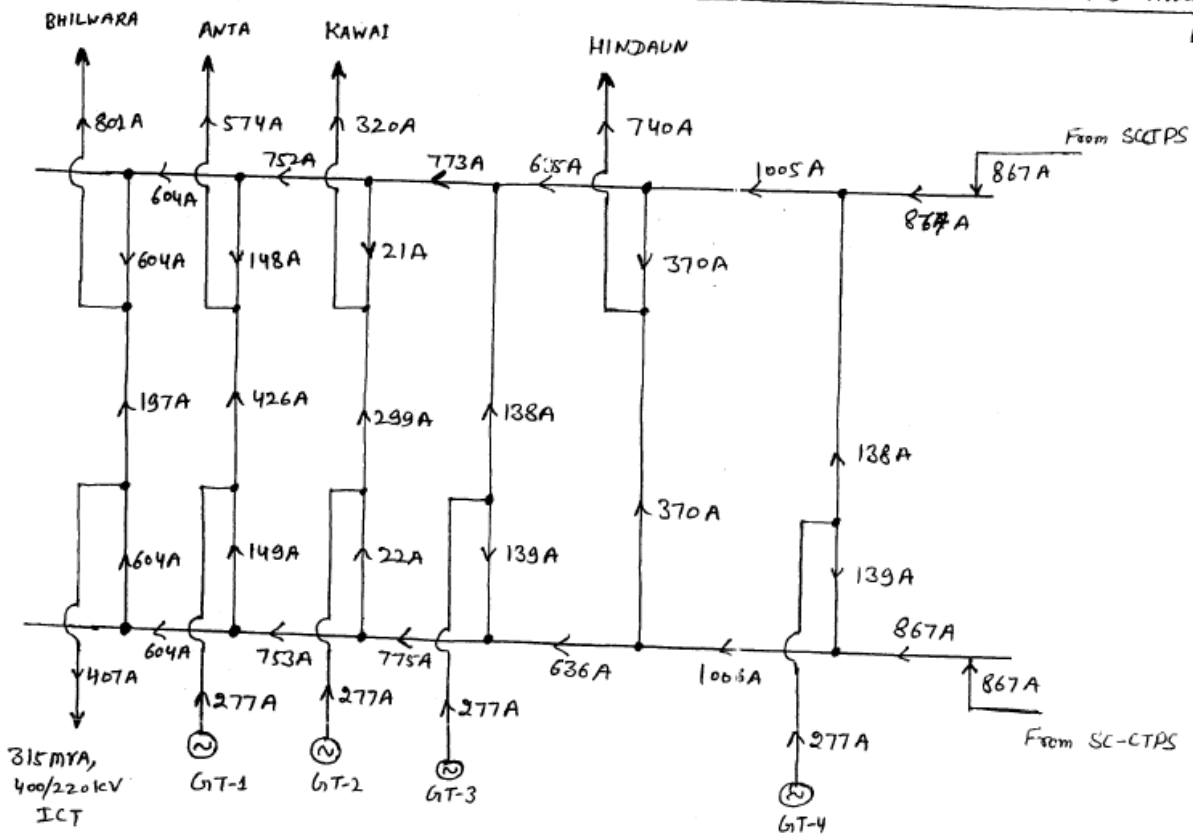
1. The Chief Engineer (LD), RVPN, Heerapura, Jaipur.

2. The Superintending Engineer (Operation) Northern Regional Power Committee 18-A, S. Jeet Singh Marg, Katwaria Sarai, New Delhi-110016.

Encl: As above

CHIEF ENGINEER (PP&D)

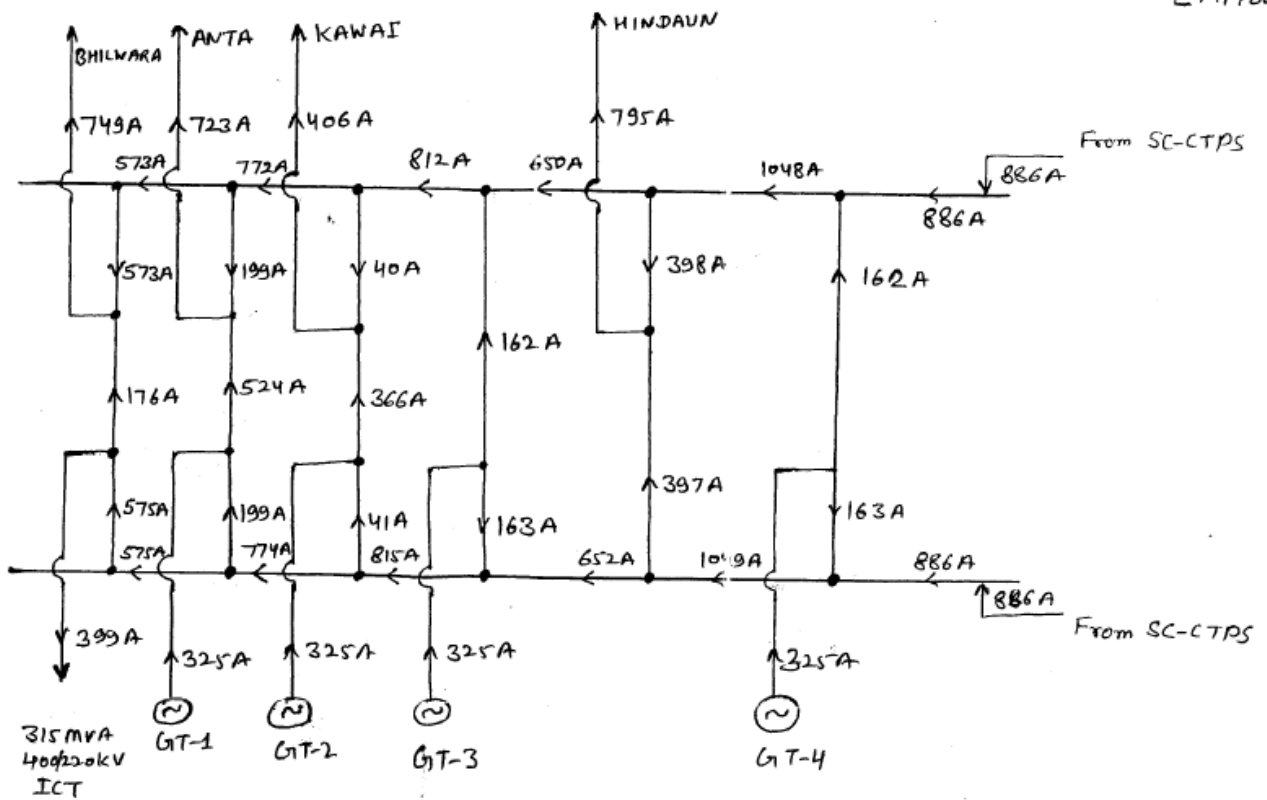
CURRENT FLOW ON CTPP400KV BUS IN CASE OF TRIPPING OF BOTH 400KV SC-CTPS - Area-1 & 2 (N-1/1/1/2) EXHIBIT -1
[PSS@E]



Annexure-A4

CURRENT FLOW ON CTPP 400KV BUS IN CASE OF TRIPPING OF BOTH 400KV SCTPS - Anta-1 & 2 (N-1/N-2) EXHIBIT-2

[Mi Power]

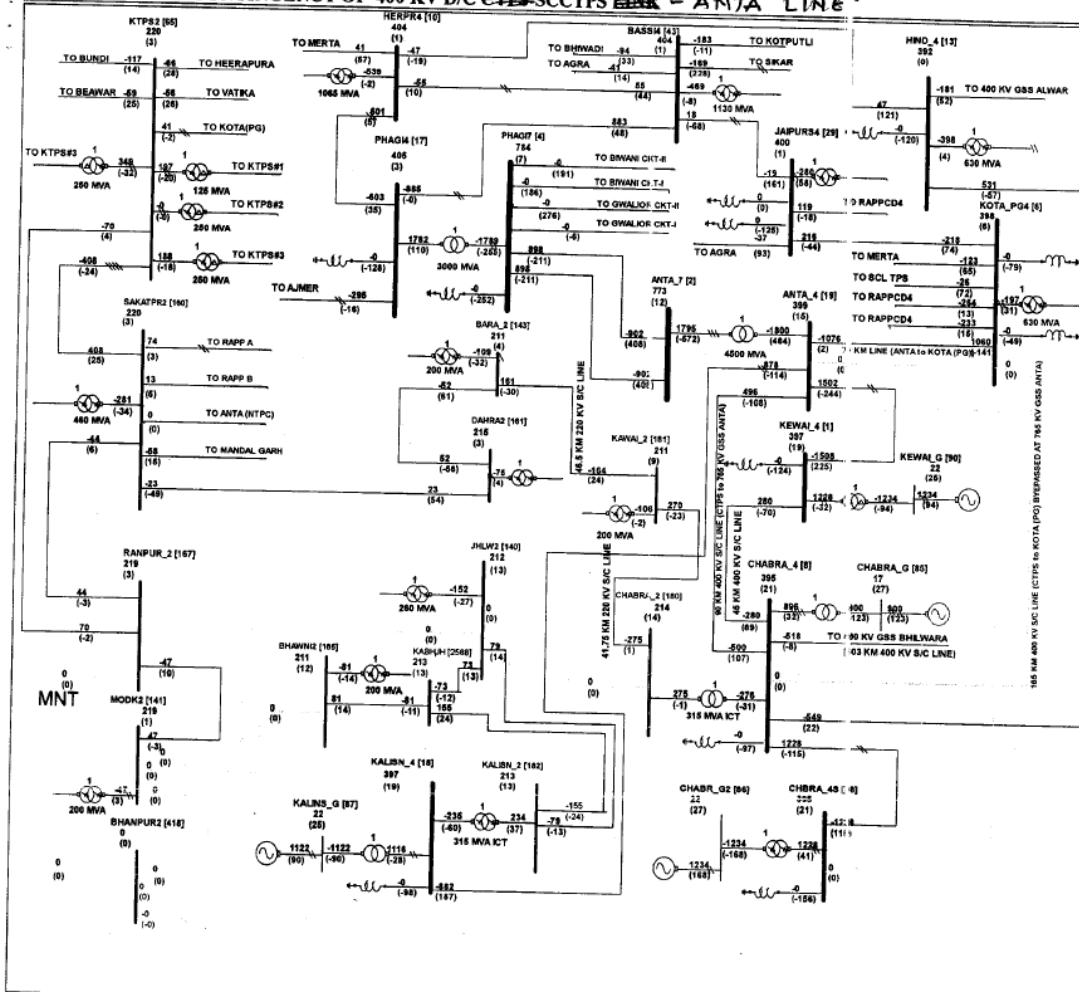


POWER FLOW ON TRANSMISSION SYSTEM TO DESIGN SPECIAL PROTECTION SYSTEM (SPS) OF CHHABRA-KEMWAL-KALUSINDH GENERATION COMPLEX

EXHIBIT-3

Case No.	Base Case	Outage of CTPS-BH1	Outage of CTPS-BH1		7.5 KV S/C Anta-Phagi Line		Kawal Anta D/C Line		Outage of Kalusindh Anta D/C Line	Outage of 765 KV S/C Anta-Phagi Lines	Outage of Chhabra S/CTPS-Anta D/C Line	Outage of 2 nos 765/400 KV ICTs at 765 KV GSS Anta	
			Without outage of Generation	With outage of two units at Chhabra TPS	Without outage of Generation	With outage of One unit at Kawal S/CTPS	Without outage of Generation	With outage of One unit at Kawal S/CTPS				Without outage of Generation	With outage of one unit at Chhabra TPS
400 KV Chhabra S/CTPS - Anta	275	Case-I	Case-IIA	Case-IIB	Case-IIIA	Case-IIIB	Case-IIVA	Case-IIVB	Case-IV	Case-VI	Case-VII	Case-VIII	Case-VIIIB
400 KV Chhabra S/CTPS - Anta	275	410	508	418	246	235	616	470	295	43	x	242	207
400 KV Chhabra TPS - Chhabra S/CTPS	325	410	508	418	246	235	616	470	295	43	x	242	207
400 KV Chhabra TPS - Chhabra S/CTPS	325	191	-94	-183	-356	-367	15	-33	-316	-256	-601	-359	-393
400 KV Chhabra TPS - Hindaun	478	538	x	x	1227	479	529	471	316	-256	-601	-359	-393
400 KV Chhabra TPS - Kawal	518	x	x	x	76	512	579	508	448	468	512	532	513
400 KV Chhabra TPS - Anta	213	322	401	328	89	84	489	-30	-30	-131	-131	-81	-120
1x1.5 MVA 400/220 KV Chhabra TPS	258	299	307	307	776	253	299	371	221	245	245	185	158
400 KV Kawal - Anta	561	581	695	643	43	333	x	x	567	225	693	541	521
400 KV Kawal - Anta	561	581	695	643	43	333	x	x	567	225	693	541	521
400 KV Kalusindh - Anta	403	399	395	398	394	402	415	416	x	143	411	393	395
400 KV Kalusindh - Anta	403	399	395	398	394	402	415	416	x	143	411	393	395
1x3.15 MVA 400/220 KV Kalusindh TPS	256	263	272	267	273	258	232	230	0	245	240	275	273
3x1500 MVA 765/400 KV ICT Anta	1860	2133	2493	2238	1572	1284	1758	1464	1299	0	1797	1461	1520
765 KV S/C Anta - Phagi CRT-I	928	1063	1242	1116	1567	1285	876	730	649	x	897	760	719
765 KV S/C Anta - Phagi CRT-II	832	1063	1242	1116	1567	1285	876	730	649	x	897	760	719
400 KV Anta - Kotal		960	1090	994	578	826	779	612	620	850	796	1090	952
2x1500 MVA 765/400 KV ICT Phagi	1696	1842	2042	1988	1154	1524	1644	1608	1518	1146	1662	1534	1520
765 KV Phagi - Gwalior dkt-I	366	-332	-298	-352	-406	-487	-379	462	-519	-762	-372	-412	-438
765 KV Phagi - Gwalior dkt-II	357	-325	-292	-352	-397	-475	-370	451	-508	-745	-365	-403	-428
765 KV Phagi - Bhawan dkt-I	438	465	508	472	403	359	425	380	352	181	384	398	384
765 KV Phagi - Bhawan dkt-II	438	465	508	472	403	359	425	380	352	181	384	398	384

PROPOSED CASE: CONTINGENCY OF 400 KV D/C CTPP-SCCTPS LINK - ANTA LINE



Total Gen.: 10565.236 (4-10: 207)
 Total Load: 10222.901 (3965.843)
 Total Loss: 342.257213 (-12872.316326)
 Display Notation
 Injection into the bus: +ve
 Drawn away from the bus: -ve
 Voltage Mag(Ang) in kV(degree)
 Flows in MW and (Mvar)

ANNEXURE-1

9/4/2019

Mail - se.pp@RVPN.CO.IN

Fw: Current Distribution on CTPP bus during the event of N-1-1/N-2 contingency of 400 kv D/C SC-CTPS to Anta lines 1 & 2

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Reply all |

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The 400 kv buses of CTPP are of 4.5 inch IPS Aluminium Tube. The clamps and connectors on the 400 kv buses of CTPP are of 2000A current rating.

State Forecast – File Status August -2019

संख्या	राज्य	Forecast File	
		Received	Not Received/ Remarks
1	पंजाब	Yes	Uploaded but some day after 09:00 Pm and 11:00 PM
2	हरियाणा	Yes	02 & 29 August 2019 not received and 13 and 27 august uploaded on same day
3	राजस्थान	Yes	-
4	दिल्ली	Yes	
5	उत्तर प्रदेश	Yes	
6	उत्तराखंड	Not regular	05 ,16,24 and 26.08.2019 uploaded on same day
7	हिमाचल प्रदेश	Not regular	13.08.2019 file not uploaded and 05,27, 29 and 30 uploaded on same day
8	जम्मू और कश्मीर	Yes	
9	चंडीगढ़	Yes	

All SLDC has to upload day ahead load Forecast File by 5:00 pm

Annexure-B2

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
1. HVDC lines										
A. POWERGRID										
± 800kV HVDC										
1	Agra-Bishwanath Chariali Pole-I	1	Bi-pole	1728	Hexagon Lapwing	POWERGRID	POWERGRID	POWERGRID	Partial (11%)	Interconnection between North East region & Northern Region
2	Agra-Bishwanath Chariali Pole-II	2	Bi-pole	1728	Hexagon Lapwing	POWERGRID	POWERGRID	POWERGRID	Partial (11%)	
3	Kurukshetra-Champa Pole-I	1	Bi-pole	1305	Hexagon Lapwing	POWERGRID	POWERGRID	POWERGRID	Partial (11%)	Interconnection between Western region & Northern Region
4	Kurukshetra-Champa Pole-II	2	Bi-pole	1305	Hexagon Lapwing	POWERGRID	POWERGRID	POWERGRID	Partial (11%)	Interconnection between Western region & Northern Region
± 500kV HVDC										
1	Balia-Bhiwadi Pole-I	1	Bi-pole	790	ACSR Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (15%)	
2	Balia-Bhiwadi Pole-II	2	Bi-pole	790		POWERGRID	POWERGRID	POWERGRID	Partial (15%)	
3	Rihand-Dadri Pole-I	1	Bi-pole	815	ACSR Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (62%)	
4	Rihand-Dadri Pole-II	2	Bi-pole	815		POWERGRID	POWERGRID	POWERGRID	Partial (43%)	
B. Adani Power Ltd (Adani Transmission India Ltd.)										
1	Adani Mundra - Mahindergarh Pole-I	1	Bi-pole	990	ACSR Quad Bersimis	ATIL	APL Mundra	APL	Partial (7%)	Interconnection between Western region & Northern Region
2	Adani Mundra - Mahindergarh Pole-II	2	Bi-pole	990		ATIL	APL Mundra	APL	Partial (7%)	
2. 765kV Transmission Line										
A. POWERGRID										
1	Agra-Fatehpur	1	S/C	335	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
2	Agra-Fatehpur	2	S/C	334	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
3	Agra-Aligarh	1	D/C	123	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	Check the status of LILO portion??
4	Aligarh-Gr.Noida	2	D/C	51	Quad Bersimis	POWERGRID	POWERGRID	WUPPTCL	Polymer Insulator	
5	Agra-Jhatikara	1	S/C	252	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
6	Ajmer-Chittorgarh	1	D/C	211	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Not Available	
7	Ajmer-Chittorgarh	2	D/C	211	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Not Available	
8	Balia - Lucknow765 (N)	1	S/C	319	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
9	Jhatikara-Bhiwani (PG)	1	S/C	85	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
10	Jhatikara-Aligarh	1	D/C	158	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	Check the status of LILO portion??
11	Kanpur(GIS)-Aligarh	1	D/C	322	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
12	Lucknow-Bareilly	1	S/C	252	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
13	Meerut-Bhiwani(PG)	1	S/C	174	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (99%)	
14	Meerut-Gr.Noida	1	S/C	119	Quad Bersimis	POWERGRID	POWERGRID	WUPPTCL	Polymer Insulator	LILO of Agra-Meerut (267 KM) line at Gr. Noida
15	Moga- Bhiwani (PG)	1	S/C	273	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (96%)	
16	Moga-Meerut	1	S/C	338	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
17	Orai-Aligarh	1	D/C	331	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Not Available	
18	Orai-Aligarh	2	D/C	331	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Not Available	
19	Phagi-Bhiwani(PG)	1	S/C	272	Quad Bersimis	POWERGRID	RRVNL	POWERGRID	Partial (18%)	
20	Phagi-Bhiwani(PG)	2	S/C	277	Quad Bersimis	POWERGRID	RRVNL	POWERGRID	Partial (16%)	
21	Varanasi-Balia	1	S/C	166	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	
22	Varanasi-Fatehpur	1	S/C	223	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Gaya (ER)-Fatehpur at Varanasi
23	Varanasi-Kanpur(GIS)	1	S/C	326	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
24	Varanasi-Kanpur(GIS)	2	S/C	326	Hexa Zebra	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks	
							End-I	End-II			
B. UPPTCL											
1	AnparaC-Unnao	1	S/C	409	Quad Bersimis	UPPTCL	LANCO	UPPTCL	Conventional	AnparaB-Unnao shifted to AnparaC and charged at 765kV	
2	AnparaC-AnparaD	1	S/C	3	Quad Bersimis	UPPTCL	LANCO	UPRVUNL	Not Available		
3	Agra(Fatehbad)-Lalitpur	1	S/C	337	Quad Bersimis	UPPTCL	UPPTCL	LPGL	Not Available		
4	Agra(Fatehbad)-Lalitpur	2	S/C	335	Quad Bersimis	UPPTCL	UPPTCL	LPGL	Not Available		
5	Bara-Mainpuri	1	S/C	377	Quad Bersimis	UPPTCL	UPPTCL	UPPTCL	Not Available		
6	Gr. Noida-Hapur	1	S/C	65	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available		
7	Gr. Noida-Mainpuri	1	S/C	181	Quad Bersimis	UPPTCL	UPPTCL	UPPTCL	Not Available		
C. RRVPNL											
1	Anta-Phagi	1	S/C	214	Quad Bersimis	RRVPNL	RRVPNL	RRVPNL	Not Available		
2	Anta-Phagi	2	S/C	212	Quad Bersimis	RRVPNL	RRVPNL	RRVPNL	Not Available		
3. 765kV Transmission Line charged at 400kV											
A. POWERGRID											
1	Kishenpur-Moga	1	S/C	275	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (1%)		
2	Kishenpur-Moga	2	S/C	287	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Partial (1%)		
3	Tehri-Tehri pooling	1	S/C	15	Quad Bersimis	POWERGRID	POWERGRID	THDC	Conventional	LILoed at Tehri Pooing, Tehri Pooling-Meerut is 50% series compensated line	
4	Tehri-Tehri pooling	2	S/C	17	Quad Bersimis	POWERGRID	POWERGRID	THDC	Conventional		
5	Tehri Pooling-Meerut	1	S/C	176	Quad Bersimis	POWERGRID	THDC	POWERGRID	Conventional		
6	Tehri Pooling-Meerut	2	S/C	179	Quad Bersimis	POWERGRID	THDC	POWERGRID	Conventional		
7	Rihand-Vindhyachal Pool	1	S/C	31	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Not Available		
8	Rihand-Vindhyachal Pool	2	S/C	31	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Not Available		
4. 400kV HVAC Transmission Line											
A. POWERGRID											
1	Abdullapur- Bawana	1	D/C	167	Triple Snowbird	POWERGRID	POWERGRID	DTL	Partial (99%)		
2	Abdullapur- Deepalpur	1	D/C	141	Triple Snowbird	POWERGRID	POWERGRID	KT Jhajar	Partial (99%)	LILo of Abdullapur-Bawana one ckt at Deepalpur	
3	Abdullapur-Kurukshetra	1	D/C	52	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILo of Abdullapur-Sonepat ckts at Kurukshetra	
4	Abdullapur-Kurukshetra	2	D/C	52	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator		
5	Agra-Agra(Fatehbad)	1	S/C	45	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator		
6	Agra(UP)-Agra(Fatehbad)	1	S/C	56	Twin Moose	POWERGRID	UPPTCL	UPPTCL	Polymer Insulator		
7	Agra-Agra(UP)	1	D/C	30	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator		
8	Agra-Ballabgarh	1	S/C	181	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator		
9	Agra-Bassi	1	S/C	211	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	Planned for insulator replacement in 321nos towers under NR3	
10	Agra-Bhiwadi	1	D/C	209	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator		
11	Agra-Bhiwadi	2	D/C	209	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator		
12	Agra-Jaipur South	1	D/C	254	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (4%)	LILo of Agra-Bassi D/C at Jaipur South	
13	Agra-Jaipur South	2	D/C	254	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (4%)		
14	Agra-Sikar	1	D/C	386	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (3%)		
15	Agra-Sikar	2	D/C	386	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (3%)		
16	Ajmer-Ajmer(PG)	1	D/C	66	Quad Moose	POWERGRID	RRVPNL	POWERGRID	Not Available		
17	Ajmer-Ajmer(PG)	2	D/C	66	Quad Moose	POWERGRID	RRVPNL	POWERGRID	Not Available		
18	Allahabad-Fatehpur	3	S/C	154	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILo of Allahabad-Kanpur one ckt at Fatehpur	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
19	Allahabad-Fatehpur	1	D/C	140	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Allahabad-Mainpuri (363 KM) D/C at Fatehpur
20	Allahabad-Fatehpur	2	D/C	140	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Allahabad-Mainpuri (363 KM) D/C at Fatehpur
21	Allahabad-Varanasi	1	D/C	99	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Sarnath-Allahabad (144 KM) at 765/400kV Varanasi
22	Allahabad-Kanpur	1	S/C	225	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
23	Allahabad-Kanpur(New 765)	1	D/C	240	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
24	Allahabad-Kanpur(New 765)	2	D/C	240	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
25	Allahabad-Meja(NTPC)	1	D/C	28	Twin Moose	POWERGRID	POWERGRID	MUNPL	Polymer Insulator	MUNPL is joint venture between NTPC and UPRVUN
26	Allahabad-Meja(NTPC)	2	D/C	28	Twin Moose	POWERGRID	POWERGRID	MUNPL	Polymer Insulator	
27	Amritsar-Jalandhar	1	S/C	60	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
28	Amritsar-Jalandhar	2	D/C	71	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of 400kV Amritsar-Hamirpur at Jalandhar
29	Amritsar-Parbati Pooling (Banala)	1	D/C	251	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (49%)	
30	Auraiya-Agra	1	D/C	166	Twin Moose	POWERGRID	NTPC	POWERGRID	Partial (86%)	
31	Auraiya-Agra	2	D/C	166	Twin Moose	POWERGRID	NTPC	POWERGRID	Partial (90%)	
32	Bagpat-Kaithal	1	D/C	154	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
33	Bagpat-Kaithal	2	D/C	154	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
34	Bagpat-Saharanpur	1	D/C	121	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Partial (41%)	
35	Bagpat-Dehradun	1	D/C	165	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Partial (40%)	
36	Bahadurgarh-Kabulpur	1	S/C	42	Twin Moose	POWERGRID	POWERGRID	HVPNL	Polymer Insulator	LILO of Bahadurgarh-Bhiwani at Kabulpur
37	Bahadurgarh-Sonepat	1	D/C	53	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
38	Bahadurgarh-Sonepat	2	D/C	53	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
39	Balia-Mau	1	D/C	9	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
40	Balia-Mau	2	D/C	9	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
41	Balia-Sohawal	1	D/C	229	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Balia-Lucknow (316 KM) D/C at Sohawal
42	Balia-Sohawal	2	D/C	229	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Balia-Lucknow (316 KM) D/C at Sohawal
43	Ballabgarh-Gurgaon	1	S/C	43	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
44	Ballabgarh-Maharanibagh	1	D/C	61	Quad Bersimis	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
45	Ballabgarh-Nawada	1	D/C	13	Quad Bersimis	POWERGRID	POWERGRID	HVPNL	Polymer Insulator	Ballabgarh-Gnoida LILOed at Nawada (Faridabad,Haryana)
46	Bareilly PG-Moradabad	1	S/C	93	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Partial (3%)	
47	Bareilly PG-Moradabad	2	S/C	92	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Partial (23%)	
48	Bareilly PG-Bareilly (765kV)	1	D/C	2	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
49	Bareilly PG-Bareilly (765kV)	2	D/C	2	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
50	Bareilly PG(765kV)-Kashipur	1	D/C	101	Quad Moose	POWERGRID	POWERGRID	PTCUL	Partial (90%)	
51	Bareilly PG(765kV)-Kashipur	2	D/C	101	Quad Moose	POWERGRID	POWERGRID	PTCUL	Partial (90%)	
52	Bassi-Bhiwadi	2	S/C	220	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
53	Bassi-Heerapura	1	S/C	48	Twin Moose	POWERGRID	POWERGRID	RRVNL	Polymer Insulator	
54	Bassi-Heerapura	2	S/C	49	Twin Moose	POWERGRID	POWERGRID	RRVNL	Polymer Insulator	
55	Bassi-Kotputli	1	S/C	106	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bassi-Bhiwadi-2 at Kotputli
56	Bassi-Phagi	1	D/C	48	Quad Moose	POWERGRID	POWERGRID	RRVNL	Partial (26%)	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
57	Bassi-Phagi	2	D/C	48	Quad Moose	POWERGRID	POWERGRID	RRVNL	Partial (26%)	
58	Bassi-Sikar	1	D/C	170	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (16%)	
59	Bassi-Sikar	2	D/C	170	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (17%)	
60	Bawana(CCGT)-Bahadurgarh	1	D/C	49	Twin Moose	POWERGRID	DTL/Pragati CCGT	POWERGRID	Polymer Insulator	
61	Bhinmal-Kankroli	1	D/C	202	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
62	Bhiwadi-Gurgaon	1	S/C	83	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
63	Bhiwadi-Hissar	1	S/C	212	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
64	Bhiwadi-Hisar	2	D/C	144	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bhiwadi-Moga both ckts at Hisar
65	Bhiwadi-Hisar	3	D/C	144	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
66	Bhiwadi-NeemranaPG	1	D/C	48	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
67	Bhiwadi-NeemranaPG	2	D/C	48	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
68	Bhiwani BBMB - Hisar	1	S/C	35	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
69	Bhiwani (PG) - Hisar	1	S/C	64	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bawana-Hisar (132KM) at Bhiwani PG
70	Bhiwani (PG) - Hisar	2	D/C	57	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
71	Bhiwani (PG) - Hisar	3	D/C	57	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
72	Bhiwani PG - Jind	1	D/C	82	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
73	Bhiwani PG - Jind	2	D/C	82	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
74	Bhiwani PG- BawanaCCGT	1	D/C	97	Twin Moose	POWERGRID	POWERGRID	DTL/Pragati CCGT	Polymer Insulator	LILO of Bawana-Hisar (132KM) at Bhiwani PG
75	Bhiwani PG- Bhiwani BBMB	1	S/C	34	Twin Moose	POWERGRID	POWERGRID	BBMB	Polymer Insulator	LILO of Bhiwani (BBMB)- Bahadurgarh (84km) at Bhiwani (PG)
76	Bhiwani PG-Kabulpur	1	S/C	48	Twin Moose	POWERGRID	POWERGRID	HVPNL	Polymer Insulator	LILO of Bahadurgarh-Bhiwani at Kabulpur
77	Chamba pool - Jalandhar	1	D/C	162	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (48%)	
78	Chamba pool - Jalandhar	2	D/C	162	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (48%)	
79	Chamera-II - Chamba Pool	1	S/C	0.38	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	Two tower is S/C and one tower is D/C
80	Chamera-II-Chamera-I	1	S/C	36	Twin Moose	POWERGRID	NHPC	NHPC	Conventional	
81	Chamera-II-Kishenpur	1	S/C	135	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	
82	Chamera-I-Jalandhar	1	D/C	152	Twin ACAR	POWERGRID	NHPC	POWERGRID	Partial (43%)	
83	Chamera-I-Jalandhar	2	D/C	152	Twin ACAR	POWERGRID	NHPC	POWERGRID	Partial (43%)	
84	Chittorgarh-Chittorgarh(PG)	1	D/C	49	Quad Moose	POWERGRID	RRVNL	POWERGRID	Not Available	
85	Chittorgarh-Chittorgarh(PG)	2	D/C	49	Quad Moose	POWERGRID	RRVNL	POWERGRID	Not Available	
86	Chittorgarh-Kankroli	1	D/C	71	Twin Moose	POWERGRID	RRVNL	POWERGRID	Polymer Insulator	LILO of 400 kV Rapp C-Kankroli at Chhitorgarh
87	Dadri NCTPP-G. Noida	1	D/C	13	Quad Bersimis	POWERGRID	NTPC	UPPCL	Polymer Insulator	
88	Dadri NCTPP-Maharanibagh	1	D/C	54	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Polymer Insulator	
89	Dadri NCTPP-Kaithal	1	S/C	213	Twin Moose	POWERGRID	NTPC	POWERGRID	Polymer Insulator	
90	Dadri NCTPP-Mandola	1	D/C	46	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Polymer Insulator	
91	Dadri NCTPP-Mandola	2	D/C	46	Quad Bersimis	POWERGRID	NTPC	POWERGRID	Polymer Insulator	
92	Dadri NCTPP-Muradnagar New	1	S/C	33	Twin Moose	POWERGRID	NTPC	UPPTCL	Polymer Insulator	Line shifted from Muradnagar to Muradnagar New (UPPTCL)

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
93	Dadri NCTPP-Panipat	1	S/C	112	Twin Moose	POWERGRID	NTPC	BBMB	Polymer Insulator	
94	Dadri NCTPP-Panipat	2	S/C	117	Twin Moose	POWERGRID	NTPC	BBMB	Polymer Insulator	
95	Deepalpur-Bawana	1	D/C	26	Triple Snowbird	POWERGRID	KT-Jhajjar	DTL	Polymer Insulator	LILO of Abdullapr-Bawana one ckt at Deepalpur
96	Dehradun-Abdullapur	1	D/C	89	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
97	Dehradun-Abdullapur	2	D/C	89	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
98	Dulhasti-Kishenpur	1	S/C	120	Quad Moose	POWERGRID	NHPC	POWERGRID	Conventional	
99	Dulhasti-Kishenpur	2	S/C	120	Quad Moose	POWERGRID	NHPC	POWERGRID	Conventional	
100	Fatehbad PG-Hissar	1	D/C	89	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
101	Fatehpur-Kanpur	1	S/C	100	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Singrauli-Kanpur at Fatehpur
102	Fatehpur-Kanpur	2	S/C	107	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (64%)	LILO of Allahabad-Kanpur one ckt at Fatehpur
103	Fatehpur-Mainpuri	1	D/C	260	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Allahabad-Mainpuri (363 KM)
104	Fatehpur-Mainpuri	2	D/C	260	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	D/C at Fatehpur Series
105	G.Noida-Nawada	1	D/C	30	Quad Bersimis	POWERGRID	UPPTCL	HVPNL	Polymer Insulator	Ballabgarh-Gnoida LILOed at Nawada (Faridabad,Haryana)
106	Gorakhpur PG-Gorakhpur UP	1	D/C	46	Twin Moose	POWERGRID	POWERGRID	UPPCL	Polymer Insulator	Partial Planning has been completed
107	Gorakhpur PG-Gorakhpur UP	2	D/C	46	Twin Moose	POWERGRID	POWERGRID	UPPCL	Polymer Insulator	Partial Planning has been completed
108	Gorakhpur PG-Lucknow PG	1	D/C	264	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (3%)	At crossing
109	Gorakhpur PG-Lucknow PG	2	D/C	264	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (3%)	At crossing
110	Gurgaon-Manesar	1	D/C	18	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
111	Gurgaon-Manesar	2	D/C	18	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
112	Hamirpur-Parbati Pooling (Banala)	1	D/C	77	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Amritsar-Banala-1 at Hamirpur
113	Jaipur South-Bassi	1	D/C	84	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Agra-Bassi D/C at Jaipur South
114	Jaipur South-Bassi	2	D/C	84	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
115	Jalandhar-Nakodar	1	D/C	42	Quad Moose	POWERGRID	POWERGRID	PSTCL	Polymer Insulator	
116	Jalandhar-Hamirpur	1	D/C	135	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (43%)	LILO of 400kV Amritsar-Hamirpur at Jalandhar
117	Kaithal-Hissar	1	D/C	113	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Patiala-Hissar at Kaithal
118	Kaithal-Hissar	2	D/C	113	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Patiala-Hissar at Kaithal
119	Kaithal-Malerkotla	1	S/C	135	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
120	Kankroli-Jodhpur	1	S/C	188	Twin Moose	POWERGRID	POWERGRID	RRVNL	Conventional	
121	Kanpur-Agra	1	S/C	240	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
122	Kanpur-Auraiya	1	D/C	73	Twin Moose	POWERGRID	POWERGRID	NTPC	Conventional	
123	Kanpur-Auraiya	2	D/C	73	Twin Moose	POWERGRID	POWERGRID	NTPC	Conventional	
124	Kanpur-Ballabgarh	1	S/C	386	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	*Series Compensated,Ckt 1- 35%, Ckt-2 & 3-40%
125	Kanpur-Ballabgarh	2	D/C	371	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	*Series Compensated,Ckt 1- 35%, Ckt-2 & 3-40%
126	Kanpur-Ballabgarh	3	D/C	371	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	*Series Compensated,Ckt 1- 35%, Ckt-2 & 3-40%
127	Kanpur-Panki	1	S/C	6	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
128	Kanpur-Panki	2	S/C	6	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator	
129	Kanpur-Kanpur(GIS)	1	D/C	21	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
130	Kanpur-Kanpur(GIS)	2	D/C	21	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
131	Kanpur(GIS)-Lucknow(765)	1	D/C	160	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
132	Kanpur(GIS)-Lucknow(765)	2	D/C	160	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
133	Kishenpur-NewWanpoh	1	D/C	130	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
134	Kishenpur-NewWanpoh	2	D/C	130	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
135	Kishenpur-NewWanpoh	3	D/C	135	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
136	Kishenpur-NewWanpoh	4	D/C	135	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
137	Kishenpur-Samba	1	D/C	35	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
138	Kishenpur-Samba	2	D/C	35	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
139	Kota-Merta	1	D/C	256	Twin Moose	POWERGRID	POWERGRID	RRVPL	Polymer Insulator	
140	Kotputli-Bhiwadi	1	S/C	132	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bassi-Bhiwadi-2 at Kotputli
141	Kurukshetra-Jind	1	D/C	103	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
142	Kurukshetra-Jind	2	D/C	103	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Not Available	
143	Kurukshetra-Sonipat	1	D/C	125	Triple Snowbird (Twin HTLS for LILOportion)	POWERGRID	POWERGRID	POWERGRID	Partial (99%)	LILO of Abdullapr-Sonepat ckts at Kurukshetra
144	Kurukshetra-Sonipat	2	D/C	125		POWERGRID	POWERGRID	POWERGRID	Partial (99%)	
145	Kurukshetra-Jalandhar	1	D/C	267	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
146	Kurukshetra-Nakodar	1	D/C	234	Quad Moose	POWERGRID	POWERGRID	PSTCL	Polymer Insulator	
147	Lucknow PG-Lucknow UP	1	S/C	63	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
148	Lucknow PG-Unnao	1	D/C	74	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
149	Lucknow PG-Unnao	2	D/C	74	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
150	Lucknow UP-Bareilly PG	1	S/C	279	Twin Moose	POWERGRID	UPPTCL	POWERGRID	Conventional	
151	765 Lucknow (PG) - Lucknow (PG)	1	D/C	3	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
152	765 Lucknow (PG) - Lucknow (PG)	2	D/C	3	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
153	LucknowPG-Sohawal	1	D/C	98	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	LILO of Balia-Lucknow (316 KM) D/C at Sohawal
154	LucknowPG-Sohawal	2	D/C	98	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
155	Lucknow PG-Shahjahanpur	1	D/C	170	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (10%)	
156	Lucknow PG-Shahjahanpur	2	D/C	170	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (10%)	
157	Ludhiana-Jalandhar	1	S/C	85	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
158	Ludhiana-Malerkotla	1	S/C	36	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
159	Ludhiana-Patiala	1	D/C	76	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
160	Ludhiana-Patiala	2	D/C	76	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
161	Mainpuri-Ballabgarh	1	D/C	236	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
162	Mainpuri-Ballabgarh	2	D/C	236	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
163	Malerkotla-Patiala	1	S/C	62	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
164	Meerut-Bagpat	1	D/C	71	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
165	Meerut-Bagpat	2	D/C	71	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
166	Meerut-Mandola	1	D/C	60	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
167	Meerut-Mandola	2	D/C	60	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
168	Meerut-MuzzaFarnagar	1	S/C	37	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Polymer Insulator	
169	Moga-Fatehabad	1	D/C	179	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
170	Moga-Hissar	1	D/C	209	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
171	Moga-Hissar	2	D/C	206	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Bhiwadi-Moga both ckts at
172	Moga-Hissar	3	D/C	206	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	Hisar

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
173	Moga-Jalandhar	1	D/C	85	Twin ACAR	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
174	Moga-Jalandhar	2	D/C	85	Twin ACAR	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
175	Moradabad-Muradnagar	1	S/C	133	Twin Moose	POWERGRID	UPPTCL	UPPTCL	Polymer Insulator	
176	Nallagarh-Koldam	1	D/C	46	Quad Moose	POWERGRID	POWERGRID	NTPC	Conventional	Koldam to Parbati pool section is of PKTCL & rest is of POWERGRID
177	Nallagarh-Patiala	1	D/C	94	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
178	Nallagarh-Patiala	2	D/C	94	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Nallagarh-Kaithal at Patiala
179	Nathpa Jhakri-Panchkula	1	D/C	165	Triple Snowbird	POWERGRID	SJVNL	POWERGRID	Partial (17%)	LILO of Jhakri-Abdullapur at Panchkula
180	Nathpa Jhakri-Panchkula	2	D/C	165	Triple Snowbird	POWERGRID	SJVNL	POWERGRID	Partial (17%)	
181	Nathpa Jhakri-RampurHEP	1	D/C	21	Triple Snowbird	POWERGRID	SJVNL	SJVNL	Conventional	LILO of Jhakri-Nallagarh-1 at RampurHEP
182	Nathpa Jhakri-RampurHEP	2	D/C	21	Triple Snowbird	POWERGRID	SJVNL	SJVNL	Conventional	
183	NeemranaPG-Manesar	1	D/C	67	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
184	NeemranaPG-Manesar	2	D/C	67	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
185	NeemranaPG-Babai	1	D/C	85	Twin Moose	POWERGRID	POWERGRID	RRVPNL	Not Available	LILO of 400kV Neemrana-Sikar at Babai by NRSSXXXVI (Essel group): Earlier 29% of Neemrana-Sikar PG
186	Sikar-Babai	1	D/C	95	Twin Moose	POWERGRID	POWERGRID	RRVPNL	Not Available	
187	NeemranaPG-Sikar	2	D/C	176	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Partial (29%)	
188	NewWanpoh-Wagoora	1	D/C	57	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
189	NewWanpoh-Wagoora	2	D/C	57	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
190	Orai(PG)-Orai	1	D/C	42	Quad Moose	POWERGRID	POWERGRID	UPPTCL	Not Available	
191	Orai(PG)-Orai	2	D/C	42	Quad Moose	POWERGRID	POWERGRID	UPPTCL	Not Available	
192	Panchkula -Abdullapur	1	D/C	63	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Jhakri-Abdullapur at Panchkula
193	Panchkula -Abdullapur	2	D/C	63	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of Jhakri-Abdullapur at Panchkula
194	Patiala-Panchkula	1	D/C	65	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
195	Patiala-Panchkula	2	D/C	65	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
196	Patiala-Patran	1	D/C	79	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	LILO of 400 kV Kaithal-Patiala-D/C at Patran. LILO portion is of Patran Transmission Company Limited
197	Patiala-Patran	2	D/C	79	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
198	Patran-Kaithal	1	D/C	47	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
199	Patran-Kaithal	2	D/C	47	Triple Snowbird	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
200	RampurHEP-Nallagarh	1	D/C	128	Triple Snowbird	POWERGRID	SJVNL	POWERGRID	Conventional	LILO of Jhakri-Nallagarh-1 at RampurHEP
201	RampurHEP-Nallagarh	2	D/C	128	Triple Snowbird	POWERGRID	SJVNL	POWERGRID	Conventional	
202	RAPS-C-Chittorgarh	1	D/C	155	Twin Moose	POWERGRID	NPCIL	RRVPNL	Partial (38%)	LILO of 400 kV Raps C-Kankroli at Chhitorgarh
203	RAPS-C-Kankroli	1	D/C	199	Twin Moose	POWERGRID	NPCIL	POWERGRID	Partial (51%)	
204	RAPS-C-Kota	1	S/C	51	Twin Moose	POWERGRID	NPCIL	POWERGRID	Partial (55%)	400kV RAPS-Jaipur line whose work was completed till Kota section is connected with 400kV Raps-Kota#2 (for antitheft purpose) and hence 400kV RapsC-Kota #2 is now two twin moose lines connected in parallel paths
205	RAPS-C-Kota	2	S/C	55	Twin Moose	POWERGRID	NPCIL	POWERGRID	Not Available	
206	Rihand-Allahabad	1	D/C	279	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
207	Rihand-Allahabad	2	D/C	279	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
208	Roorkee-Kashipur	1	D/C	151	Quad Moose	POWERGRID	POWERGRID	PTCUL	Partial (72%)	
209	Roorkee-Kashipur	2	D/C	151	Quad Moose	POWERGRID	POWERGRID	PTCUL	Partial (72%)	
210	Roorkee-Saharanpur	1	D/C	36	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Polymer Insulator	
211	Roorkee-Dehradun	1	D/C	80	Quad Moose	POWERGRID	POWERGRID	POWERGRID	Partial (50%)	
212	Sarnath-Varanasi	1	D/C	70	Quad Moose	POWERGRID	UPPTCL	POWERGRID	Partial (52%)	LILO of Sarnath-Allahabad (144 KM) at 765/400kV Varanasi
213	Sarnath-Varanasi	2	D/C	107	Quad Moose	POWERGRID	UPPTCL	POWERGRID	Partial (52%)	
214	Shahjahanpur-Bareilly PG	1	D/C	116	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
215	Shahjahanpur-Bareilly PG	2	D/C	116	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
216	Shahjahanpur-Rosa	1	D/C	8	Twin Moose	POWERGRID	POWERGRID	UPPCL	Not Available	
217	Shahjahanpur-Rosa	2	D/C	8	Twin Moose	POWERGRID	POWERGRID	UPPCL	Not Available	
218	Shree Cement-Kota	1	D/C	208	Twin Moose	POWERGRID	Sh. Cement	POWERGRID	Polymer Insulator	LILO portion is of Shree Cement
219	Shree Cement-Merta	2	D/C	103	Twin Moose	POWERGRID	Sh. Cement	RRVPNL	Polymer Insulator	LILO portion is of Shree Cement
220	Sikar-Ratangarh	1	D/C	76	Twin Moose	POWERGRID	POWERGRID	RRVPNL	Conventional	
221	Sikar-Ratangarh	2	D/C	76	Twin Moose	POWERGRID	POWERGRID	RRVPNL	Conventional	
222	Singrauli-Allahabd	1	S/C	224	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
223	Singrauli-Allahabd	2	S/C	202	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
224	Singrauli-Anpara	1	S/C	25	Twin Moose	POWERGRID	NTPC	UPPTCL	Partial (91%)	
225	Singrauli-Fatehpur	1	S/C	331	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	LILO of Singrauli-Kanpur at Fatehpur
226	Singrauli-LucknowUP	1	S/C	409	Twin Moose	POWERGRID	NTPC	UPPTCL	Conventional	
227	Singrauli-Rihand	1	S/C	42	Twin Moose	POWERGRID	NTPC	NTPC	Conventional	
228	Singrauli-Rihand	2	S/C	44	Twin Moose	POWERGRID	NTPC	NTPC	Conventional	
229	Singrauli-Vindhyachal	1	S/C	3	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
230	Singrauli-Vindhyachal	2	S/C	5	Twin Moose	POWERGRID	NTPC	POWERGRID	Conventional	
231	Tehri pooling-Koteswar	1	D/C	3	Twin Moose	POWERGRID	POWERGRID	THDC	Conventional	
232	Tehri pooling-Koteswar	2	D/C	3	Twin Moose	POWERGRID	POWERGRID	THDC	Conventional	
233	Uri-I - Amargarh	1	D/C	62	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	
234	Uri-I - Amargarh	2	D/C	62	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	LILO of 400kV Uri-I - Wagoora D/C at Amargarh
235	Amargarh - Wagoora	1	D/C	36	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
236	Amargarh - Wagoora	2	D/C	36	Twin Moose	POWERGRID	POWERGRID	POWERGRID	Conventional	
237	Uri-II - Uri-I	1	S/C	10	Twin Moose	POWERGRID	NHPC	NHPC	Conventional	
238	Uri-II - Wagoora	1	S/C	105	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	
B. POWERLINK Transmission Ltd										
1	Bareilly PG-Meerut	1	D/C	250	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	LILO of Bareilly PG-Mandola-1 (241 Km) at Meerut *Series compensated was (30%) at Bareilly
2	Bareilly PG-Meerut	2	D/C	250	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	
3	Bareilly UP-Bareilly PG	1	D/C	14	Twin Moose	POWERLINK	UPPTCL	POWERGRID	Polymer Insulator	
4	Bareilly UP-Bareilly PG	2	D/C	14	Twin Moose	POWERLINK	UPPTCL	POWERGRID	Polymer Insulator	
5	Gorakhpur PG-Lucknow PG	1	D/C	246	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	*Series compensated line (30%)
6	Gorakhpur PG-Lucknow PG	2	D/C	246	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	
7	Meerut-Mandola	3	D/C	102	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	LILO of Bareilly PG-Mandola-1&2 (241 Km) at Meerut(30%)
8	Meerut-Mandola	4	D/C	102	Twin Moose	POWERLINK	POWERGRID	POWERGRID	Conventional	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
C. Adani Power Ltd (Adani Transmission India Ltd.)										
1	Mahindergarh (APL)-Bhiwani PG	1	D/C	50	Twin Moose	APL/ATIL	APL	POWERGRID	Conventional	ISTS
2	Mahindergarh (APL)-Bhiwani PG	2	D/C	50	Twin Moose	APL/ATIL	APL	POWERGRID	Conventional	
3	MahindergarhHVDC-Dhanoda	1	D/C	5	Quad Moose	APL/ATIL	APL	HVPNL	Conventional	
4	MahindergarhHVDC-Dhanoda	2	D/C	5	Quad Moose	APL/ATIL	APL	HVPNL	Conventional	
D. APCPL (Aravali Power Corporation Pvt Ltd.)										
1	Jhajjar (IGSTPS)-Mundka	1	D/C	66	Twin Moose	APCPL	APCPL	DTL	Conventional	
2	Jhajjar (IGSTPS)-Mundka	2	D/C	66	Twin Moose	APCPL	APCPL	DTL	Conventional	
E. BBMB										
1	Dehar-Rajpura	1	S/C	129	Twin Morkulla in old line & Moose in LILO portion	BBMB	BBMB	PSTCL	Antifog	LILO of Dehar-Bhiwani at Rajpura
2	Bhiwani(BBMB)-Rajpura	1	S/C	213		BBMB	BBMB	PSTCL	Antifog	
3	Dehar-Panchkula	1	S/C	125	Twin Morkulla	BBMB	BBMB	POWERGRID	Antifog	LILO of Dehar-Panipat at Panchkula
4	Panchkula-Panipat	1	S/C	155	Twin Morkulla	BBMB	POWERGRID	BBMB	Antifog	
F. DTL										
1	Ballabgarh-Bamnoli	1	M/C Tower	53	Quad bersimis	DTL	POWERGRID	DTL	Polymer Insulator	Approx 1Km cable section at Bamnoli in each circuit. One ckt. is out and other is in service by means of ERS(Emergency restoration)
2	Ballabgarh-Bamnoli	2	M/C Tower	53	Quad bersimis	DTL	POWERGRID	DTL	Polymer Insulator	
3	Bamnoli-Jhatikara	1	D/C	12	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
4	Bamnoli-Jhatikara	2	D/C	12	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
5	Bawana-Mundka	1	D/C	18	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
6	Bawana-Mundka	2	D/C	18	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
7	Jhatikara-Mundka	1	D/C	17	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
8	Jhatikara-Mundka	2	D/C	17	Quad bersimis	DTL	DTL	DTL	Polymer Insulator	
9	Mandola-Bawana	1	D/C	24	Quad bersimis	DTL	POWERGRID	DTL	Polymer Insulator	
10	Mandola-Bawana	2	D/C	24	Quad bersimis	DTL	POWERGRID	DTL	Polymer Insulator	
G. HVPNL										
1	CLP Jhajjar -Dhanonda	1	D/C	20	Twin Moose	KT Jhajjar	CLP Jhajjar	HVPNL	Conventional	
2	CLP Jhajjar -Dhanonda	2	D/C	20	Twin Moose	KT Jhajjar	CLP Jhajjar	HVPNL	Conventional	
3	CLP Jhajjar- Kabulpur	1	D/C	35	Quad Moose	KT Jhajjar	CLP Jhajjar	HVPNL	Conventional	
4	CLP Jhajjar- Kabulpur	2	D/C	35	Quad Moose	KT Jhajjar	CLP Jhajjar	HVPNL	Conventional	
5	Deepalpur-Kabulpur	1	D/C	67	Quad Moose	KT Jhajjar	KT Jhajjar	HVPNL	Conventional	
6	Deepalpur-Kabulpur	2	D/C	67	Quad Moose	KT Jhajjar	KT Jhajjar	HVPNL	Conventional	
7	Dhanoda-Daultabad	1	D/C	73	Quad Moose	HVPNL	HVPNL	HVPNL	Conventional	
8	Dhanoda-Daultabad	2	D/C	73	Quad Moose	HVPNL	HVPNL	HVPNL	Conventional	
9	Gurgaon-Daultabad	1	D/C	21	Quad Moose	HVPNL	POWERGRID	HVPNL	Conventional	Six towers multi-circuit with Bamnoli-Ballabgarh.
10	Gurgaon-Daultabad	2	D/C	21	Quad Moose	HVPNL	POWERGRID	HVPNL	Conventional	
11	Jhajjar-Daulatabad	1	D/C	64	Twin Moose	HVPNL	APCPL	HVPNL	Conventional	
12	Jhajjar-Daulatabad	2	D/C	64	Twin Moose	HVPNL	APCPL	HVPNL	Conventional	
13	Khedar-Fatehabad	1	D/C	40	Twin Moose	HVPNL	HPGCL	POWERGRID	Conventional	
14	Khedar-Kirori	1	D/C	6	Twin Moose	HVPNL	HPGCL	HVPNL	Conventional	
15	Khedar-Kirori	2	D/C	6	Twin Moose	HVPNL	HPGCL	HVPNL	Conventional	
16	Khedar-Nuhiawali	1	D/C	114	Twin Moose	HVPNL	HPGCL	HVPNL	Polymer Insulator	
17	Nuhiawali-Fatehabad	1	D/C	78	Twin Moose	HVPNL	HVPNL	POWERGRID	Antifog	
H. JPVL/JSW (Jaigad Power Transco Limited.)										
1	Abdullapur-Kala Amb	1	D/C	39	Quad Moose	JPVL	POWERGRID	PKATL	Conventional	LILO of 400kV Abdullapur-Karcham Wangtoo D/C at Kala Amb by PKTCL
2	Abdullapur-Kala Amb	2	D/C	39	Quad Moose	JPVL	POWERGRID	PKATL	Conventional	
3	Kala Amb- Karcham Wangtoo	1	D/C	175	Quad Moose	JPVL	PKATL	JSW	Conventional	
4	Kala Amb- Karcham Wangtoo	2	D/C	175	Quad Moose	JPVL	PKATL	JSW	Conventional	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
5	Baspa-Karcham Wangtoo	1	D/C	22	Triple snowbird	JPTL/JSW	JPVL	JSW	Conventional	LILO of Baspa-Jhakri at karcham Wangtoo (LILo Portion is of JPVL)
6	Baspa-Karcham Wangtoo	2	D/C	22	Triple snowbird	JPTL/JSW	JPVL	JSW	Conventional	
7	Karcham Wangtoo-NJPC	1	D/C	34	Triple snowbird	JPTL/JSW	JSW	SJVNL	Conventional	
8	Karcham Wangtoo-NJPC	2	D/C	34	Triple snowbird	JPTL/JSW	JSW	SJVNL	Conventional	
I. PDD (Jammu & Kashmir)										
1	Baglihar(stage 1)-Kishenpur	1	D/C	68	Twin Moose	POWERGRID	JKSPDCL	POWERGRID	Conventional	
2	Baglihar(stage 2)-Kishenpur	2	D/C	68	Twin Moose	POWERGRID	JKSPDCL	POWERGRID	Conventional	
J. PSTCL										
1	Makhu-Amritsar	1	D/C	64	Twin Moose	PSTCL	PSTCL	PSTCL	Partial (10%)	
2	Makhu-Amritsar	2	D/C	64	Twin Moose	PSTCL	PSTCL	PSTCL	Partial (10%)	
3	Muktsar-Makhu	1	D/C	96	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	
4	Muktsar-Makhu	2	D/C	96	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	
5	Nakodar-Makhu	1	D/C	52	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	
6	Nakodar-Makhu	2	D/C	52	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	
7	Nakodar-Moga	1	S/C	78	Twin Moose	PSTCL	PSPCL	POWERGRID	Not Available	LILo of 400kV Talwandi sabo-Nakodar at Moga
8	Rajpura-Dhuri	1	D/C	86	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	Lilo of Rajpura th-Dhuri 1 at 400kV Rajpura
9	Rajpura TPS- Rajpura	1	D/C	9	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
10	Rajpura-Dhuri	2	D/C	86	Twin Moose	PSTCL	PSTCL	PSTCL	Conventional	Lilo of Rajpura th-Dhuri 2 at 400kV Rajpura
11	Rajpura TPS- Rajpura	2	D/C	9	Twin Moose	PSTCL	PSPCL	PSTCL	Not Available	
12	Rajpura TPS-Nakodar	1	D/C	139	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
13	Rajpura TPS-Nakodar	2	D/C	139	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
14	Talwandi Saboo- Dhuri	1	D/C	175	Twin Moose	PSTCL	PSPCL	PSTCL	Partial (22%)	
15	Talwandi Saboo- Dhuri	2	D/C	175	Twin Moose	PSTCL	PSPCL	PSTCL	Partial (22%)	
16	Talwandi Saboo- Moga	1	D/C	102	Twin Moose	PSTCL	PSPCL	PSTCL	Not Available	LILo of 400kV Talwandi sabo-Nakodar at Moga
17	Talwandi Saboo- Nakodar	1	D/C	180	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
18	Talwandi Saboo- Muktsar	1	D/C	100	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
19	Talwandi Saboo- Muktsar	2	D/C	100	Twin Moose	PSTCL	PSPCL	PSTCL	Conventional	
K. PTCUL										
1	Alaknanda(GVK)-Srinagar(PTCUL)	1	D/C	14	Twin Moose	PTCUL	UPPCL	PTCUL	Conventional	
2	Alaknanda(GVK)-Srinagar(PTCUL)	2	D/C	14	Twin Moose	PTCUL	UPPCL	PTCUL	Conventional	
3	Muradabad-Kashipur	1	S/C	108	Twin Moose	PTCUL	UPPTCL	PTCUL	Conventional	
4	Rishikesh-Nehtaur	1	D/C	124	Twin Moose	PTCUL	PTCUL	UPPTCL	Not Available	LILo of 400kV Rishikesh-Kashipur (LILo portion owned by UPPTCL)
5	Nehtaur-Kashipur	2	D/C	80	Twin Moose	PTCUL	UPPTCL	PTCUL	Not Available	
6	Roorkee-Rishikesh	1	S/C	50	Twin Moose	PTCUL	POWERGRID	PTCUL	Not Available	
L. RRVPNL										
1	Ajmer-Bhilwara	1	D/C	160	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
2	Ajmer-Bhilwara	2	D/C	160	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
3	Akal-Barmer	1	S/C	130	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
4	Akal-Jodhpur	1	S/C	245	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
5	Akal-Ramgarh	1	D/C	99	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
6	Akal-Ramgarh	2	D/C	99	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
7	Anta-Chhabra	1	D/C	90	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
8	Anta-Chhabra	2	D/C	90	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
9	Anta-Kalisindh	1	D/C	80	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
10	Anta-Kalisindh	2	D/C	80	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
11	Anta-Kawai	1	D/C	50	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
12	Anta-Kawai	2	D/C	50	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
13	Barmer-Rajwest	1	D/C	20	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
14	Bhilwara-Chhabra	1	S/C	285	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
15	Bikaner-Merta	1	S/C	172	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
16	Bikaner-Bhadla	1	D/C	180	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
17	Bikaner-Bhadla	2	D/C	180	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
18	Bikaner-Sikar	1	D/C	171	Twin Moose	RRVPNL	RRVPNL	POWERGRID	Not Available	
19	Bikaner-Sikar	2	D/C	171	Twin Moose	RRVPNL	RRVPNL	POWERGRID	Not Available	
20	Chhabra - Kawai SCTPS	1	S/C	45	Twin Moose	RRVPNL	RVUNL	APRL	Conventional	
21	Heerapura-Hindaun	1	S/C	192	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
22	Hindaun-Chhabra	1	S/C	305	Twin Moose	RRVPNL	RRVPNL	RVUNL	Conventional	
23	Merta-Heerapura	1	S/C	180	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
24	Merta-Ratangarh	1	S/C	180	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
25	Merta-Jodhpur	1	S/C	119	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
26	Merta-Jodhpur	2	S/C	120	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Conventional	
27	Phagi-Ajmer(RRVPNL)	1	D/C	109	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
28	Phagi-Ajmer(RRVPNL)	2	D/C	109	Twin Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
29	Phagi-Heerapura	1	D/C	52	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
30	Phagi-Heerapura	2	D/C	52	Quad Moose	RRVPNL	RRVPNL	RRVPNL	Not Available	
31	Rajwest-Jodhpur	1	D/C	220	Twin Moose	RRVPNL	RWPL	RRVPNL	Conventional	
32	Rajwest-Jodhpur	2	D/C	220	Twin Moose	RRVPNL	RWPL	RRVPNL	Conventional	
33	Suratgarh-Bikaner	1	S/C	162	Twin Moose	RRVPNL	RVUNL	RRVPNL	Conventional	
34	Suratgarh-Ratangarh	1	S/C	144	Twin Moose	RRVPNL	RVUNL	RRVPNL	Conventional	
35	Suratgarh-Ratangarh	2	S/C	144	Twin Moose	RRVPNL	RVUNL	RRVPNL	Conventional	
M. UPPTCL										
1	Agra (Fatehabad)-Agra South	1	D/C	70	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
2	Agra (Fatehabad)-Agra South	2	D/C	70	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
3	Agra (UP)-Agra(Fatehabad)	1	S/C	104	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400 kV Agra(UP)-Muradnagar(N) at Fatehabad(UP)
4	Agra UP-Unnao	1	S/C	279	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (25%)	
5	Agra(Fatehabad)-Mathura	1	S/C	142	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
6	Agra(Fatehabad)-Mathura	2	D/C	151	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura
7	Aligarh-Mainpuri	1	D/C	93	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
8	Aligarh-Mainpuri	2	D/C	93	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
9	Aligarh-Muradnagar	1	S/C	177	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	*Series Compensated line (40%). It would be shifted
10	Aligarh-Sikandrabad	1	D/C	95	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
11	Aligarh-Sikandrabad	2	D/C	95	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
12	AnparaB-AnparaC	1	D/C	0.05	Quad Moose	UPPTCL	UPRVUNL	LANCO	Conventional	
13	AnparaB-AnparaC	2	D/C	0.05	Quad Moose	UPPTCL	UPRVUNL	LANCO	Conventional	
14	AnparaB-AnparaD	1	D/C	5	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Not Available	
15	AnparaB-AnparaD	2	D/C	5	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Not Available	
16	AnparaB-Mau	1	S/C	262	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Partial (13%)	
17	AnparaB-Obra	1	S/C	40	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Partial	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
18	AnparaB-Sarnath	1	D/C	158	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Partial	
19	AnparaB-Sarnath	2	D/C	158	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Conventional	
20	Ataur-Hapur	1	D/C	52	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
21	Ataur-Hapur	2	D/C	52	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
22	Ataur-Indirapuram	1	D/C	15	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
23	Ataur-Indirapuram	2	D/C	15	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
24	Azamgarh-Mau	1	S/C	48	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (79%)	
25	Azamgarh-Sultanpur	1	S/C	126	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Conventional	
26	Banda-Rewa road	1	D/C	177	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
27	Banda-Rewa road	2	D/C	177	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
28	Bara-Meja	1	D/C	32	Quad Moose	UPPTCL	UPPTCL	MUNPL	Not Available	LILO of 400kV Bara-Rewa road D/C at Meja
29	Bara-Meja	2	D/C	32	Quad Moose	UPPTCL	UPPTCL	MUNPL	Not Available	
30	Bareilly UP-Unnao	1	D/C	271	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (15%)	*Series Compensated line (45%)
31	Bareilly UP-Unnao	2	D/C	271	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (15%)	*Series Compensated line (45%)
32	Gorakhpur UP-Azamgarh	1	S/C	90	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (76%)	
33	Gr. Noida(765)-Sector 148	1	D/C	47	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
34	Gr. Noida(765)-Sector 148	2	D/C	47	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
35	Gr. Noida-Gr. Noida (765)	1	D/C	45	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
36	Gr. Noida-Gr. Noida (765)	2	D/C	45	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
37	Gr.Noida-Sikandrabad	1	D/C	17	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
38	Gr.Noida-Sikandrabad	2	D/C	17	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
39	Hapur-Dasna	1	D/C	14	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
40	Hapur-Dasna	2	D/C	14	Quad Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
41	Mainpuri(UP)-Mainpuri(PG)	1	D/C	25	Twin Moose	UPPTCL	UPPTCL	POWERGRID	Not Available	LILO of 400kV Orai-Mainpuri(PG) at Mainpuri(UP)
42	Mainpuri(UP)-Mainpuri(PG)	2	D/C	26	Twin Moose	UPPTCL	UPPTCL	POWERGRID	Not Available	LILO of 400kV Paricha-Mainpuri(PG) at Mainpuri(UP)
43	Meja-Rewa road	1	D/C	34	Quad Moose	UPPTCL	MUNPL	UPPTCL	Not Available	LILO of 400kV Bara-Rewa road D/C at Meja
44	Meja-Rewa road	2	D/C	34	Quad Moose	UPPTCL	MUNPL	UPPTCL	Not Available	
45	Muradnagar New- Mathura	1	D/C	246	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400 kV Fatehabad(UP)-Muradnagar at Mathura
46	Muradnagar-Ataur	2	D/C	18	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400kV Muzaffarnagar-Muradnagar at Ataur (Earlier 95%)
47	Muzaffarnagar-Ataur	1	D/C	121	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
48	Muzaffarnagar-Srinagar	1	D/C	189	Twin Moose	UPPTCL	UPPTCL	GVKPII	Conventional	
49	Muzaffarnagar-Vishnuprayag	1	D/C	280	Twin Moose	UPPTCL	UPPTCL	JPVL	Conventional	
50	Obra-Rewa road	1	S/C	179	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	
51	Obra-Sultanpur	1	S/C	230	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Conventional	
52	Orai-Mainpuri(UP)	1	D/C	176	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of 400kV Orai-Mainpuri(PG) at Mainpuri(UP)
53	Orai-Paricha	1	D/C	111	Twin Moose	UPPTCL	UPPTCL	UPRVUNL	Not Available	
54	Panki-Aligarh	1	S/C	285	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (24%)	
55	Paricha-Mainpuri(UP)	1	D/C	240	Twin Moose	UPPTCL	UPRVUNL	UPPTCL	Conventional	LILO of 400kV Paricha-Mainpuri(PG) at Mainpuri(UP)
56	Rewa road -Panki	1	S/C	210	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Not Available	LILO of Bara-Panki at 400kV Rewa Road
57	Roorkee-Muzaffarnagar	1	S/C	71	Twin Moose	PTCUL	POWERGRID	UPPTCL	Not Available	

S.No.	Name of Line	Circuit ID	Tower Configuration (S/C or D/C)	Line Length (in km)	Type of conductor	O&M by	Agency at		Replaced with Polymer Insulator (As a % of Total Line Length)	Remarks
							End-I	End-II		
58	Sarnath-Azamgarh	1	S/C	97	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Conventional	
59	Srinagar-Vishnuprayag	1	D/C	109	Twin Moose	UPPTCL	GVKPIL	JPVL	Conventional	
60	Sultanpur-Lucknow PG	1	S/C	164	Twin Moose	UPPTCL	UPPTCL	POWERGRID	Conventional	
61	Unnao-Lucknow UP	1	S/C	39	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (13%)	
62	Unnao-Panki	1	S/C	49	Twin Moose	UPPTCL	UPPTCL	UPPTCL	Partial (41%)	
N. NTPC JV										
1	Dadri-Loni (Harsh Vihar)	1	D/C	54	Twin Moose	NTPC	NTPC	DTL	Polymer	
2	Dadri-Loni (Harsh Vihar)	2	D/C	54	Twin Moose	NTPC	NTPC	DTL	Polymer	
O. PKTCL (Parbati-Koldam Transmission)										
1	Koldam-Ludhiana	1	D/C	151	Triple Snowbird	PKTCL	NTPC	POWERGRID	Not Available	
2	Koldam-Ludhiana	2	D/C	151	Triple Snowbird	PKTCL	NTPC	POWERGRID	Not Available	
3	Koldam-Banala	1	D/C	62	Quad Moose	PKTCL	NTPC	POWERGRID	Not Available	
4	Nallagarh-Banala	1	D/C	121	Quad Moose	PKTCL	POWERGRID	POWERGRID	Not Available	Powergrid owned 46.38km
5	Parbati-II- Parbati Pooling (Banala)	1	D/C	13	Quad Moose	PKTCL	NHPC	POWERGRID	Not Available	Some portion is of Powergrid
6	Parbati-III- Parbati Pooling (Banala)	2	S/C	4	Quad Moose	PKTCL	NHPC	POWERGRID	Not Available	
7	Parbati II- Sainj	1	D/C	1	Quad Moose	PKTCL	NHPC	HPPCL	Not Available	LILO of 400kV Parbati II-Parbati III at Sainj
8	Parbati III- Sainj	1	D/C	12	Quad Moose	PKTCL	NHPC	HPPCL	Not Available	
P. Adani Transmission India Ltd.(partly with MTACL)										
1	Ajmer-Deedwana	1	S/C	110	Twin Moose	MTACL/ATIL	RRVUNL	MTACL	Not Available	
2	Bikaner-Deedwana	1	S/C	129	Twin Moose	MTACL/ATIL	RRVUNL	MTACL	Conventional	
3	Alwar-Hindaun	1	S/C	96	Twin Moose	ATSL/ATIL	ATSL	RRVUNL	Not Available	Partly owned by Aravali Transmission Services ILtd.
Q. SPTL (Sterlite Power Transmission Limited):NRSS-29 Transmission Company Limited										
1	Jalandhar-Samba	1	D/C	135	Twin Moose	SPTL	POWERGRID	POWERGRID	Not Available	
2	Jalandhar-Samba	2	D/C	135	Twin Moose	SPTL	POWERGRID	POWERGRID	Not Available	
R. Powergrid Unchahar Transmission Ltd.										
1	Fatehpur-Unchahar	1	D/C	54	Twin Moose	PUTL	POWERGRID	NBPPL	Not Available	
2	Fatehpur-Unchahar	2	D/C	54	Twin Moose	PUTL	POWERGRID	NBPPL	Not Available	
S. NRSSXXXI(B)										
1	Amritsar-Malerkotla	1	D/C	149	Twin Moose	NRSSXXXI(B)	POWERGRID	POWERGRID	Not Available	
2	Amritsar-Malerkotla	2	D/C	149	Twin Moose	NRSSXXXI(B)	POWERGRID	POWERGRID	Not Available	
3	Kurukshetra-Malerkotla	1	D/C	139	Twin Moose	NRSSXXXI(B)	POWERGRID	POWERGRID	Not Available	
4	Kurukshetra-Malerkotla	2	D/C	139	Twin Moose	NRSSXXXI(B)	POWERGRID	POWERGRID	Not Available	
5. 400kV Transmission Line charged at 220kV										
A. POWERGRID										
1	Dhauliganga-Bareilly(UP)	1	D/C	235	Twin Moose	POWERGRID	NHPC	UPPTCL	Conventional	
2	Dhauliganga-Pithoragarh	1	D/C	59	Twin Moose	POWERGRID	NHPC	POWERGRID	Conventional	
3	Pithoragarh-Bareilly(UP)	1	D/C	178	Twin Moose	POWERGRID	POWERGRID	UPPTCL	Conventional	
B. RRVUNL										
1	Dholpur-Hindaun	1	S/C	100	Twin Moose	RRVUNL	RRVUNL	RRVUNL	Conventional	
2	Kota-KTPS	1	D/C	7	Twin Moose	RRVUNL	POWERGRID	RRVUNL	Conventional	
3	Kota-KTPS	2	D/C	7	Twin Moose	RRVUNL	POWERGRID	RRVUNL	Conventional	

* - Fixed series capacitor (FSC) is owned by POWERGRID

Annexure-B3

STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
AGRA	29	60	2
ALLAHABAD	25	85	3
ANTA	24	88	4
AURIYA	12	69	6
BADARPUR	32	73	2
BALIA	34	74	2
BALLABGARH	25	102	4
BASSI	26	57	2
BHIWADI	34	67	2
DADRI HVDC	60	51	1
GORAKHPUR	32	80	2
KANPUR	20	70	3
LUCKNOW_PG	41	54	1
MAINPURI	104	69	1
MANDOLA	36	60	2
M'BAGH	25	51	2
MEERUT	32	68	2
RAIBAREILLY	0	89	2719
RIHAND (HVDC)	25	79	3
RIHAND_NT	25	72	3
SINGRAULI	25	69	3
VINDHYACHAL	24	83	3

Annexure-B3

STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
ABDULLAPUR	38	71	2
AMRITSAR	6	63	11
BAHADURGARH	36	0	0
FATEHABAD	40	515	13
HISSAR	41	52	1
JALLANDHAR	s 50	s 102	s 2
KAITHAL	25	68	3
KISHENPUR	28	61	2
MALERKOTLA	s 0	57	0
MOGA	28	60	2
NALAGARH	s 19	s 42	s 2
PATIALA_PG	26	71	3
WAGOORA	s 0	s 0	0
SONIPAT	38	49	

Annexure-B3

STATION	TEMP °C	HUMD %	RATIO HUMID/TEMP
PUNJAB			
ABLOWEL	35	31	
WADALA GRANT HIAN	37	69	
ASRON	36	76	
URBAN ESTATE	33	70	
BALLUANA	38	62	
HARYANA			
KAITHAL	35	57	
SIRSA	34	47	
PUNCHKULA	36	75	
SECTOR 56 GURGAON	38	32	
DADRI	39	***	
NARWANA	33	0	
PANIPAT	34	72	
UP			
LUCKNOW	0	7	0
MORADABAD	0	70	
RAJASTHAN			
HEERAPURA	26	27	
RATANGARH	11	0	
DELHI			
MINT OROAD	36	50	
BWANA	-30	0	0
HP			
BADDI	33	0	
JUTOGH	17	0	
JK			
GLADNI	0	0	
BBMB			
PANIPAT - BB	25	99	
BHIWANI	37	48	

Annexure-B4

SOLAR RENEWABLE ENERGY SCHEDULLING AND CURTAILMENT REPORT					
	Reporting Date:	08/16/2019		For Date:	08/15/2019
Name of the SLDC		RAJASTHAN STATE LOAD DISPATCH CENTER			
Block No.	Time -Block	Schedule before curtailment (MW)	Actual (MW) SCADA DATA	Curtaiment (MW)	Reason for Curtailment
1	00:00-00:15	1320.125	1309.340	0	
2	00:15-00:30	1307.932	1305.950	0	
3	00:30-00:45	1301.532	1286.070	0	
4	00:45-01:00	1285.487	1341.170	0	
5	01:00-01:15	1267.637	1384.740	0	
6	01:15-01:30	1274.131	1363.540	0	
7	01:30-01:45	1362.917	1361.989	0	
8	01:45-02:00	1359.609	1386.480	0	
9	02:00-02:15	1353.791	1336.210	0	
10	02:15-02:30	1353.017	1299.260	0	
11	02:30-02:45	1355.364	1273.150	0	
12	02:45-03:00	1357.917	1231.710	0	
13	03:00-03:15	1339.072	1178.040	0	
14	03:15-03:30	1283.869	1123.660	0	
15	03:30-03:45	1266.457	1035.900	0	
16	03:45-04:00	1212.124	988.710	0	
17	04:00-04:15	1196.426	956.690	0	
18	04:15-04:30	1144.129	940.710	0	
19	04:30-04:45	1049.818	916.300	0	
20	04:45-05:00	1033.119	898.860	0	
21	05:00-05:15	1010.514	838.070	0	
22	05:15-05:30	988.796	786.490	0	
23	05:30-05:45	941.810	752.550	0	
24	05:45-06:00	883.199	729.690	0	
25	06:00-06:15	864.259	700.660	0	
26	06:15-06:30	869.738	668.390	0	
27	06:30-06:45	899.662	640.100	0	
28	06:45-07:00	935.898	628.280	0	
29	07:00-07:15	978.642	627.190	0	
30	07:15-07:30	1025.551	676.860	0	
31	07:30-07:45	1079.528	712.665	0	
32	07:45-08:00	1138.922	784.830	0	
33	08:00-08:15	1215.705	847.621	0	
34	08:15-08:30	1290.587	944.094	0	
35	08:30-08:45	1376.891	1025.375	0	
36	08:45-09:00	1454.940	1212.112	0	
37	09:00-09:15	1571.625	1448.099	268	DUE TO SYSTEM CONT.
38	09:15-09:30	1667.886	1666.359	268	DUE TO SYSTEM CONT.
39	09:30-09:45	1818.429	1611.662	268	DUE TO SYSTEM CONT.
40	09:45-10:00	1899.549	1580.052	268	DUE TO SYSTEM CONT.
41	10:00-10:15	1999.567	1641.334	768	DUE TO SYSTEM CONT.
42	10:15-10:30	2087.014	1686.598	768	DUE TO SYSTEM CONT.
43	10:30-10:45	2155.290	1729.943	768	DUE TO SYSTEM CONT.
44	10:45-11:00	2228.850	1697.232	768	DUE TO SYSTEM CONT.
45	11:00-11:15	2295.433	1291.473	768	DUE TO SYSTEM CONT.
46	11:15-11:30	2331.775	1057.756	768	DUE TO SYSTEM CONT.
47	11:30-11:45	2382.124	968.168	768	DUE TO SYSTEM CONT.
48	11:45-12:00	2402.764	896.463	768	DUE TO SYSTEM CONT.
49	12:00-12:15	2331.449	867.452	768	DUE TO SYSTEM CONT.
50	12:15-12:30	1961.391	917.499	768	DUE TO SYSTEM CONT.
51	12:30-12:45	1826.191	955.070	768	DUE TO SYSTEM CONT.
52	12:45-13:00	1791.171	904.144	768	DUE TO SYSTEM CONT.
53	13:00-13:15	1736.712	856.322	768	DUE TO SYSTEM CONT.
54	13:15-13:30	1734.631	836.053	822	DUE TO SYSTEM CONT.
55	13:30-13:45	1549.829	825.882	822	DUE TO SYSTEM CONT.
56	13:45-14:00	1512.474	819.058	822	DUE TO SYSTEM CONT.
57	14:00-14:15	1484.513	851.238	822	DUE TO SYSTEM CONT.
58	14:15-14:30	1537.161	880.171	822	DUE TO SYSTEM CONT.
59	14:30-14:45	1589.307	880.472	0	
60	14:45-15:00	1568.315	867.485	0	
61	15:00-15:15	1590.602	847.933	0	
62	15:15-15:30	1527.128	834.653	0	
63	15:30-15:45	1441.525	815.366	0	
64	15:45-16:00	1381.481	795.495	0	
65	16:00-16:15	1328.049	775.080	0	
66	16:15-16:30	1263.577	762.842	0	
67	16:30-16:45	1223.896	715.975	0	
68	16:45-17:00	1149.327	722.396	0	
69	17:00-17:15	1097.931	756.494	0	
70	17:15-17:30	1033.990	695.404	0	
71	17:30-17:45	979.919	536.546	0	
72	17:45-18:00	934.092	357.699	0	
73	18:00-18:15	892.772	252.908	0	
74	18:15-18:30	845.059	160.150	0	
75	18:30-18:45	822.247	128.370	0	
76	18:45-19:00	803.837	126.880	0	
77	19:00-19:15	813.088	132.970	0	
78	19:15-19:30	824.799	435.800	0	
79	19:30-19:45	857.936	977.270	599	DUE TO SYSTEM CONT.
80	19:45-20:00	792.796	1430.300	599	DUE TO SYSTEM CONT.
81	20:00-20:15	824.586	1171.410	599	DUE TO SYSTEM CONT.
82	20:15-20:30	852.368	949.410	599	DUE TO SYSTEM CONT.
83	20:30-20:45	869.975	817.070	599	DUE TO SYSTEM CONT.
84	20:45-21:00	1157.394	798.060	599	DUE TO SYSTEM CONT.
85	21:00-21:15	1405.709	772.360	103	DUE TO SYSTEM CONT.
86	21:15-21:30	1704.775	861.350	103	DUE TO SYSTEM CONT.
87	21:30-21:45	1780.742	1091.150	103	DUE TO SYSTEM CONT.
88	21:45-22:00	1820.021	1169.390	103	DUE TO SYSTEM CONT.
89	22:00-22:15	1825.684	1219.040	103	DUE TO SYSTEM CONT.
90	22:15-22:30	1887.573	1291.750	103	DUE TO SYSTEM CONT.
91	22:30-22:45	1924.330	1275.040	103	DUE TO SYSTEM CONT.
92	22:45-23:00	1917.835	1279.370	103	DUE TO SYSTEM CONT.
93	23:00-23:15	1992.537	1318.350	103	DUE TO SYSTEM CONT.
94	23:15-23:30	2008.097	1301.250	0	
95	23:30-23:45	2022.363	1519.650	0	
96	23:45-24:00	2031.648	1928.21	0	
	TOTAL (MWh)	33868.06325	23813.2075	4921.75	0

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड

(भारत सरकार का उद्यम)

POWER SYSTEM OPERATION CORPORATION LIMITED

(A Govt. of India Enterprise)



उत्तरी क्षेत्रीय भार प्रेषण केन्द्र / NORTHERN REGIONAL LOAD DESPATCH CENTRE

कार्यालय : 18-ए, शहीद जीत सिंह सनसनवाल मार्ग, कटवारिया सराय, नई दिल्ली- 110016

OFFICE : 18-A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi- 110016

CIN : U40105DL2009GOI188682, Website : www.nrlcdc.org, www.nrlcdc.in, Tel.: 011- 26519406, 26523869, Fax : 011- 26852747

संदर्भ संख्या :NRLDC\SO-1\151\

दिनांक: 06 सितम्बर 2019

To,

1: **Executive Director, NR-I, POWERGRID B-9, Qutub institutional area, Katwaria Sarai, New Delhi-16**

2: **Executive Director, NR-II, POWERGRID Grid Bhawan, Rail Head Complex, Jammu- 180012.**

3: **Executive Director, NR-III, POWERGRID, 2,3,4 floors, 12- Rana Pratap Marg, Near DainikJ agran Chowk, Adjacent GannaSansthan office building, Lucknow(UP)- 226001**

Sub: Delayed switching operation at unmanned substations

Sir,

As we are aware that quick actions are the cornerstone of a resilient grid. Though, we understand the benefits of the unmanned substation control which have been increasing in numbers after the operationalisation of National Transmission Asset Management Centre (NTAMC) by POWERGRID but there is also increasing number of cases wherein revival of transmission elements or other switching requirements are getting delayed and thus having impact of the grid reliability and resiliency. Following are some of instances wherein these issues for reliability has cropped up:

1. Use of line reactor as bus reactor after opening of the line due to high voltage during winter nights.
2. Revival of lines for the hydro generating stations during morning high load ramping hours in the winter season.
3. Other switching requirements specially during odd hours. (Some of the such recent instances are attached as annexure-1 for perusal.

Such instances during the time of partial black out or other grid restoration requirements could result in delayed action and thus could prove to be catastrophic.

Therefore, it is important that POWERGRID devises long term methodologies/mechanism to avoid such delays in switching actions completely. Further, since, winter months are also around the corner, an immediate solution need to be found.

We would also like to draw your kind attention towards the Indian Electricity Grid Code (IEGC) provision which is self-explanatory and is extracted below:

"The control rooms of the NLDC, RLDC, all SLDCs, power plants, substation of 132 kV and above, and any other control centres of all regional entities shall be manned round the clock by qualified and adequately trained personnel. Training requirements may be notified by the Commission from time to time, by orders."

Therefore, you are kindly requested to take immediate action to ensure availability of qualified personnel at the control rooms for performing any switching instruction for safe, secure, reliable and resilient grid operation. A line of confirmation of the actions initiated may please be informed to NRLDC.

धन्यवाद,

भवदीय,

एस एस बड़पंडा
5/9/19
(एस एस बड़पंडा)
कार्यपालक निदेशक
उ०क्षेत्र०भा०प्रे०के०, नई दिल्ली

Copy for kind information:

1. Member Secretary, NRPC 18-A SJSSS Marg, Katwaria Sarai New Delhi-110016
2. Director (Operation), POWERGRID Soudamini, Plot No.2, Sector 29, Near IFFCO Chowk, Gurgaon (Haryana) - 122001, INDIA
3. Executive Director NLDC, POSOCO, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110016
4. Director (SO), POSOCO, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110016

Fwd: Difficulties faced during 220KV line s/d by DTL in non-working hours

1 message

cpcc nr1 <cpccnr1@powergrid.co.in>

Wed, Jul 24, 2019 at 11:05 AM

To: NRLDC C/R <nrldcso@gmail.com>, NRLDC SO <nrldcso@posoco.in>

Cc: "M M Hassan, एम एम हसने" <mm.hassan@posoco.in>, dtldata <dtldata@rediffmail.com>, DTL WEB <dtldata@yahoo.co.in>

Dear sir,

Pl. refer trailing mail for needful and necessary action at your end please.

Regards

SCE CPCC NR-1

From: "Abhishek Lahiri अभिषेक लहिर" <lahiri.abhishek@powergridindia.com>**To:** "CPCCNR1 C-Room" <cpccnr1@powergrid.co.in>, "DTL WEB" <dtldata@yahoo.co.in>**Cc:** "h h mahto" <h.h.mahto@powergridindia.com>, "Sumit Suman Harichandan Ray सुमित सुमन हरिचंदन र" <ssh.ray@powergridindia.com>, "NAVEEN KUMAR GUPTA {}"

<Naveengupta@powergridindia.com>, "M K Gokhru, {एम.के. गोखरू}"

<mkgokhru@powergridindia.com>

Sent: Wednesday, July 24, 2019 10:46:18 AM**Subject:** Difficulties faced during 220KV line s/d by DTL in non-working hours

Dear Sir,

This is to bring it to your kind information that POWERGRID Mandola S/S is an unmanned sub-station, meaning we do not have any shift operators at control room and operations are done remotely from NTAMC Manesar.

08 Nos. 220KV lines are connected to 220KV bus at mandola ss, all 220KV lines and switchyard belongs to DTL. It is understood that due to load constraints DTL repeatedly plans for line shutdowns for maintenance during early morning hours and late evenings (Non-working hours).

As the isolators and earth-switches have become old and do not operate remotely, the operations have to be done manually.

It is to re-iterate as there is no shift operators at mandola ss we have to immediately contact our maintenance personnel to do the operation. Such co-ordination in short notice and in non-working hours causes great difficulties for us.

The process of co-ordinating with maintenance person, arranging tools (if operation gets stuck), reaching site for operation etc. consumes lots of time and efforts and hampers with our daily maintenance processes.

In this regard it is critical that we are informed of any line shutdowns by DTL with the time of shutdown required one day before so that necessary arrangements could be done and time and efforts could be saved.

Thanks and Regards

Abhishek Lahiri

Manager
PowerGrid Corporation of India Ltd
400/220KV Mandola Sub-Station
Loni-Baghpat Road
Distt, Ghaziabad

e-mail: lahiri.abhishek@powergridindia.com
mob. +91-8750904546

*दावात्याग: यह ईमेल पावरग्रिड के दावात्याग नियम व शर्तों द्वारा शासित है जिसे <http://apps.powergridindia.com/Disclaimer.htm> पर देखा जा सकता है।
Disclaimer: This e-mail is governed by the Disclaimer Terms & Conditions of POWERGRID which may be viewed at <http://apps.powergridindia.com/Disclaimer.htm>*

Fwd: Charging code for 400 kv jind kirori ckt 2

cpcc nr1 <cpccnr1@powergrid.co.in>
To: nrldcso <nrldcso@gmail.com>

Thu, Aug 29, 2019 at 11:36 PM

Dear sir,

In reference to trailing mail, it is kindly informed that ,since Jind is remotely operated Substation so ,subject line may not be charged during night without getting clearance from Jind maintenance staff and shall be taken up in morning.

Regards
SCE CPCC NR-1

From: "nrldcso" <nrldcso@gmail.com>
To: "CPCCNR1 C-Room" <cpccnr1@powergrid.co.in>
Cc: "sldc haryanacr" <sldcharyanacr@gmail.com>, "M M Hassan, एम एम हसन" <mm.hassan@posoco.in>, "ssbarpanda" <ssbarpanda@posoco.in>
Sent: Thursday, August 29, 2019 11:22:09 PM
Subject: Re: Charging code for 400 kv jind kirori ckt 2

Dear Sir

NRLDC issued charging code 1974 at 21.43 hrs for charging of 400 kV Jind -Kirori line 2 from Jind end after obtaining clearance mail from SLDC haryana. It is now more than 1.30 hrs line not charged from end however line is charged from Kirori end. Due to delay in charging of line -2 system is in N-1 contingency condition as line-1 already carrying more than 400 MW. This delay is violation of IEGC grid code.

you are once again requested to charge the line as early as possible.

Thanks & Regards,

NRLDC SO Dept.

NRLDC, Power System Operation Corporation Ltd.
18-A, Saheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016
Ph. : 011-26519406, 46560411,40224601, 40224602
Orange : 20112012/14/15/ 20112151/52
M.: 08448167373
EPbax : 116

On Thu, Aug 29, 2019 at 10:57 PM cpcc nr1 <cpccnr1@powergrid.co.in> wrote:

Dear sir,

As already informed and confirmed from our site the officers who visited the Jind Sub station did not confirmed their clearance to our engineer at Jind Sub station.

Please advice HVPNL to ask the concerned officer for giving their clearance at Jind Sub station because coordination for charging is responsibility of location stations.

Charging may be done at our end only after confirmation of clearance at our Sub station.

Regards
SCE CPCC NR-1

----- Forwarded Message -----

From: "CPCCNR1 C-Room" <cpccnr1@powergrid.co.in>
To: "NRLDC C/R" <nrldcso@gmail.com>
Cc: "M M Hassan" <mm.hassan@posoco.in>
Sent: Thursday, August 29, 2019 9:39:36 PM
Subject: Fwd: Charging code for 400 kv jind kirori ckt 2

Dear sir,
Pl. refer trailing mail for kind information and needful please.

Regards
SCE CPCC NR-1

----- Forwarded Message -----

From: "Parmod Kumar Bhagat प्रमोद कुमार भगत" <parmodkumarbhagat@powergridindia.com>
To: "CPCCNR1 C-Room" <cpccnr1@powergrid.co.in>
Sent: Thursday, August 29, 2019 9:33:44 PM
Subject: RE: Charging code for 400 kv jind kirori ckt 2

R/sir
Yet written clearance for charging of bay at Jind end to Jind Substation from HVPNL Kirori is not yet received.

Written Clearance is awaited from HVPNL yet.

Thanks & Regards
Parmod Kumar Bhagat
Manager-SS
Jind (Haryana)-126115
Mob.-9729872372

From: cpcc nr1 [cpccnr1@powergrid.co.in]
Sent: Thursday, August 29, 2019 8:57 PM
To: Parmod Kumar Bhagat {प्रमोद कुमार भगत}
Subject: Fwd: Charging code for 400 kv jind kirori ckt 2

From: "CPCCNR1 C-Room" <cpccnr1@powergrid.co.in>
To: "pramodkumarbhagat" <pramodkumarbhagat@powergridindia.com>, "SS Jind" <pgnr1jind@powergrid.co.in>
Cc: "Hada Mgr-AM RHQ" <mshada@powergridindia.com>
Sent: Thursday, August 29, 2019 8:55:47 PM
Subject: Fwd: Charging code for 400 kv jind kirori ckt 2

Dear sir,
Pl. refer trailing mail for needful and kindly reply for further action.

Regards
SCE CPCC Nr-1

From: "NRLDC C/R" <nrldcso@gmail.com>
To: "CPCCNR1 C-Room" <cpccnr1@powergrid.co.in>
Sent: Thursday, August 29, 2019 8:51:55 PM
Subject: Fwd: Charging code

Thanks & Regards,

NRLDC SO Dept.

NRLDC, Power System Operation Corporation Ltd,
18-A, Saheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016
Ph. : 011-26519406, 46560411, 40224601, 40224602
Orange : 20112012/14/15/ 20112151/52
M.: 08448167373
EPbax : 116

----- Forwarded message -----

From: XEN/LD&PC <sldcharyanacr@gmail.com<mailto:sldcharyanacr@gmail.com>>
Date: Thu, Aug 29, 2019 at 8:51 PM
Subject: Fwd: Charging code
To: NRLDC Power Grid <nrldcso@gmail.com<mailto:nrldcso@gmail.com>>, cpcc nr1
<cpccnr1@powergrid.co.in<mailto:cpccnr1@powergrid.co.in>>

----- Forwarded message -----

From: Kumar Raj <kumarrajesh7581@gmail.com<mailto:kumarrajesh7581@gmail.com>>
Date: Thu, 29 Aug 2019 at 19:55
Subject: Charging code
To: <sldcharyanacr@gmail.com<mailto:sldcharyanacr@gmail.com>>

Plz issue the charging code for power grid end as the kirori end has already been charged for 400 kv jind kirori ckt 2. no humming sound from cvt and defective fuses were replaced. So please issue the charging code.

Regards
Xen kirori

--
Regards,

SCE (पाली प्रभारी अभियंता)
SLDC Control room
HVPNL Panipat
Contact No- 9053090722

Every 8333.3 sheets of paper costs us a tree.
Please don't print this e-mail unless you really need to.
Save Paper Save Trees

दावात्याग : यह ईमेल पावरग्रिड के दावात्याग नियम व शर्तों द्वारा शासित है जिसे
<http://apps.powergridindia.com/Disclaimer.htm> पर देखा जा सकता है।

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which may be viewed at <http://apps.powergridindia.com/Disclaimer.htm>

Annexure-B6

S. NO.	Element Name	Outage Date	Outage Time	Reason/Remarks
1	400kV Fatehabad(UP)-Mathura(UP) ckt-2	6-Aug-19	20.07	Y-N fault, 64.82km from Fatehabad(UP) end. As per PMU, Y-N fault and unsuccessful auto-reclosing observed.
		13-Aug-19	16.40	B-N fault. As per PMU, B-N fault and unsuccessful auto-reclosing observed.
		14-Aug-19	22.23	Y-N fault, 82.17km from Fatehabad(UP) end. As per PMU, Y-N fault and unsuccessful auto-reclosing observed.
		19-Aug-19	5.41	R-N fault. As per PMU, R-N fault and unsuccessful auto-reclosing observed.
		30-Aug-19	0.13	Y-N fault, 72.7km from Fatehabad(UP) end. As per PMU, Y-N fault and unsuccessful auto-reclosing observed.
2	220kV Gopalpur(DTL)-Mandola(PG) ckt-1	2-Aug-19	11.18	R-N fault. As per PMU, R-N fault occurred, no auto-reclosing observed.
		15-Aug-19	11.54	R-Y fault, 15.05km from Mandola(DTL) end. PMU data not available.
		15-Aug-19	16.18	R-Y fault, 20.49km from Mandola(DTL) end. As per PMU, R-Y fault is observed.
		15-Aug-19	18.54	R-N fault, 19.26km from Mandola(DTL) end. As per PMU, R-N fault occurred, no auto-reclosing observed.
		23-Aug-19	17.30	R-Y fault, 20.31km from Mandola(DTL) end. As per PMU, R-Y fault is observed.
3	220kV Kishenpur(PG)-Ramban(JK)	8-Aug-19	12.51	B-N fault. As per PMU, B-N fault occurred, no auto-reclosing observed.
		15-Aug-19	17.09	B-N fault. As per PMU, B-N fault occurred, no auto-reclosing observed.
		20-Aug-19	15.39	B-N fault, 50.52km from Kishenpur(PG) end. As per PMU, B-N fault occurred, no auto-reclosing observed.
		29-Aug-19	14.40	B-N fault, 11.88km from ramban(JK) end. As per PMU, B-N fault occurred, no auto-reclosing observed.
4	400kV Agra(UP)-Fatehabad(UP) ckt-1	18-Aug-19	19.48	Tripping details awaited. As per PMU, B-N fault and unsuccessful auto-reclosing observed.
		26-Aug-19	19.50	B-N fault, 68.30km from Fatehabad(UP) end. As per PMU, Y-N fault and unsuccessful auto-reclosing observed.
		29-Aug-19	5.41	B-N fault. As per PMU, Y-N fault and unsuccessful auto-reclosing observed.

S.No.	Region	Name of Elements (Tripped/Manually opened)	Owner/ Agency	Outage		Event (As reported)	Generation Loss(MW)	Load Loss(MW)	Category as per CEA Grid Standards	Energy Unreserved (in MU)	Preliminary Report receipt status			DR/EL receipt status			Detailed Report receipt status		Fault Clearance time (in ms)
				Date	Time						within 24hrs	after 24hrs	Not Received	within 24hrs	after 24hrs	Not Received	Received	Not Received	
1	NR	1) 500 MVA ICT 1 at 400/220kV Moradabad(UP) 2) 500 MVA ICT 2 at 400/220kV Moradabad(UP) 3) 240 MVA ICT 3 at 400/220kV Moradabad(UP) 4) 220kV Moradabad(UP)-Rampur(UP) 5) 220kV Moradabad(UP)-Amroha(UP) 6) 220kV Moradabad(UP)-Sambhal(UP) 7) 160 MVA ICT 1 at 220/132kV Moradabad(UP)	UP	2-Aug-19	13:03	500MVA ICT 1, 500MVA ICT 2 & 240MVA ICT 3 at 400/220kV Moradabad(UP) tripped due to wavetrip jumper snapped of 220kV Moradabad(UP)-Rampur(UP). As per PMU, R-N fault with delayed clearance is observed. In antecedent conditions, 500MVA ICT 1, 500MVA ICT 2 & 240MVA ICT 3 at 400/220kV Moradabad(UP) carrying 227MW, 232MW & 105MW respectively.		650	GD-1	0.52	Y(UP)			Y(UP)			Y(UP)	2760ms	
2	NR	1) 220kV Wagoor(AG)-Zainkote(JK) ckt-2 2) 220kV Amargarh(NRSS29)-Zainkote(JK)	J&K, NRSS29 & POWERGRID	6-Aug-19	17:26	220kV Wagoor(AG)-Zainkote(JK) ckt-2 & 220kV Amargarh(NRSS29)-Zainkote(JK) tripped on R-N fault. As per PMU, R-N fault is observed in the system. In antecedent conditions, 220kV Wagoor(AG)-Zainkote(JK) ckt-2 carrying 59MW.		270	GD-1	7.56		Y(PG), Y(JK), Y(NRSS29)		Y(PG), Y(JK), Y(NRSS29)		Y(JK)	80ms		
3	NR	1) 220kV Rookee(PG)-Roorkee(UTT) 2) 315MVA ICT 1 at 400/220kV Rookee(PG)	POWERGRID & Uttarakhnad	7-Aug-19	13:27	220kV Rookee(PG)-Roorkee(UTT) tripped on Y-N fault. At the same time, 315MVA ICT 1 at 400/220kV Rookee(PG) tripped due to operation of differential Protection in Y phase. As per PMU, Y-N fault with no auto-reclosing is observed. In antecedent conditions, 220kV Rookee(PG)-Roorkee(UTT) carrying 219MW.		200	GD-1	0.33		Y(PG), Y(UTT)	Y(PG)		Y(UTT)	Y(PG)	80ms		
4	NR	1) 220kV Bus 1 at 400/220kV Meerut(PG) 2) 315 MVA ICT 1 at 400/220kV Meerut(PG) 3) 315 MVA ICT 3 at 400/220kV Meerut(PG) 4) 220kV Meerut(PG)-Simbhal(UP) 5) 220kV Meerut(PG)-Nehtor(UP) 6) 220kV Meerut(PG)-Modipuram(UP) ckt-1	POWERGRID & UP	8-Aug-19	15:56	220kV Bus 1 at 400/220kV Meerut(PG) tripped due to suspected mal operation of LBB relay of 220kV Meerut(PG)-Nehtor(UP) line CB(211). As per PMU, No fault is observed in the system. In antecedent conditions, 220kV Meerut(PG)-Nehtor(UP), 315 MVA ICT 1 & ICT 3 at 400/220kV Meerut(PG) carrying 81MW, 119MW & 119MW respectively.			GI-2			Y(PG)	Y(UP)	Y(PG)	Y(UP)	Y(PG)	NA		
5	NR	1) 220kV Tanakpur(NHPC)-Sitarganj(PG) 2) 40MW Unit#1 at 220kV Tanakpur(NHPC) 3) 40MW Unit#2 at 220kV Tanakpur(NHPC) 4) 40MW Unit#3 at 220kV Tanakpur(NHPC)	NHPC & POWERGRID	9-Aug-19	10:19	220kV Tanakpur(NHPC)-Sitarganj(PG) tripped on earth fault. At the same time, 40MW Unit#1, #2 & #3 also tripped. Similar incident happen again at 12:09hrs, all three units were tripped immediately after charging of 220kV Tanakpur(NHPC)-Sitarganj(PG) due to Earth fault in Line. As per PMU, Fluctuations observed in the phase voltages.	40		GD-1		Y(NHPC)		Y(NHPC)	Y(PG)		Y(NHPC)	NA		
6	NR	1) 315MVA ICT 1 at 400/220kV Kishenpur(PG) 2) 315MVA ICT 2 at 400/220kV Kishenpur(PG)	POWERGRID	11-Aug-19	10:06	315MVA ICT 1 & ICT 2 at 400/220kV Kishenpur(PG) tripped on Backup over current Relay operation. As per PMU, R-N fault. In antecedent conditions, 315MVA ICT 1 & ICT 2 at 400/220kV Kishenpur(PG) carrying 207MW each.			GI-2		Y(PG)		Y(PG)			Y(PG)	80ms		
7	NR	1) 315MVA ICT 1 at 400/220kV Bassi(PG) 2) 315MVA ICT 2 at 400/220kV Bassi(PG)	POWERGRID	17-Aug-19	4:10	315MVA ICT 1 & ICT 2 at 400/220kV Bassi(PG) tripped on overfluxing. As per PMU, No fault is observed in the system. In antecedent conditions, 315MVA ICT 1 & ICT 2 at 400/220kV Bassi(PG) carrying 95MW each. 315MVA ICT 1 & ICT 2 again tripped on overfluxing at 05:18hrs & 05:19hrs of 18th August, 2019.			GI-2			Y(PG)	Y(PG)			Y(PG)	NA		
8	NR	1) 220kV Wazirabad(DTL)-Mandola(PG) ckt-1 2) 220kV Wazirabad(DTL)-Mandola(PG) ckt-3 3) 220kV Wazirabad(DTL)-Mandola(PG) ckt-4 4) 220kV Wazirabad(DTL)-Geeta Colony(DTL) ckt-1 5) 220kV Wazirabad(DTL)-Geeta Colony(DTL) ckt-2 6) 220kV Wazirabad(DTL)-Kashmiri Gate(DTL) ckt-1	Delhi & POWERGRID	17-Aug-19	9:51	220kV Wazirabad(DTL)-Mandola(PG) ckt-2 was under planned shutdown and 220kV Wazirabad(DTL)-Gopalpur(DTL) ckt-1 & It was already Opened at Gopalpur end. Kite thread fallen on 220 KV bus, causing busbar protection operation at Wazirabad sub-station, resulted into tripping of all 220 KV lines (07 Nos.) and due to loss of connectivity 180 MW (as per Delhi SLD) load loss occurred at 220kV Wazirabad & 220kV Kashmiri Gate Sub-Station. As per PMU, R-B fault is observed. In antecedent conditions, 220kV Wazirabad(DTL)-Mandola(PG) ckt-1, 3 & 4 carrying 85MW.		180	GD-1	0.10	Y(Delhi)		Y(PG)	Y(Delhi)	Y(PG)	Y(Delhi)	200ms		
9	NR	1) 400kV Azamgarh(UP)-Sarnath(UP) 2) 315MVA ICT 1 at 400/220kV Sarnath(UP)	UP	18-Aug-19	5:44	400kV Azamgarh(UP)-Sarnath(UP) tripped on Y-N fault, 82.3km from Azamgarh(UP) end. At the same time, 315MVA ICT 1 at 400/220kV Sarnath(UP) tripped due to operation of differential protection. As per PMU, Y-N fault is observed in the system. In antecedent conditions, 400kV Azamgarh(UP)-Sarnath(UP) & 315MVA ICT 1 at 400/220kV Sarnath(UP) carrying 471MW & 210MW respectively.			GI-2		Y(UP)		Y(UP)		Y(UP)	80ms.			
10	NR	1) 400kV Chamera1(NHPC)-Jalandhar(PG) ckt-2 2) 400kV Chamba(PG)-Jalandhar(PG) ckt-1	POWERGRID & NHPC	23-Aug-19	15:20	400kV Chamera1(NHPC)-Jalandhar(PG) ckt-2 & 400kV Chamba(PG)-Jalandhar(PG) ckt-1 tripped during time correction work of SSD relay of IR of 400kV Chamba(PG)-Jalandhar(PG) ckt-1. As per PMU, Y-B fault is observed in the system. In antecedent conditions, 400kV Chamera1(NHPC)-Jalandhar(PG) ckt-2 & 400kV Chamba(PG)-Jalandhar(PG) ckt-1 carrying 238MW & 205MW respectively.			GI-2		Y(PG)	Y(NHPC)	Y(PG)	Y(NHPC)	Y(PG)	80ms			

11	NR	1) 400kV Jind(PG)-Kironi(HVPNL) ckt-2 2) 315MVA ICT 3 at 400/220kV Kironi(HVPNL)	POWERGRID & Haryana	28-Aug-19	13:20	400kV Jind(PG)-Kironi(HVPNL) ckt-2 tripped on R-N fault, 19km from Jind end. At the same time, 315MVA ICT 3 at 400/220kV Kironi(HVPNL) also tripped. As per PMU, R-N fault with no auto-reclosing attempt is observed. In antecedent conditions, 400kV Jind(PG)-Kironi(HVPNL) ckt-2 & 315MVA ICT 3 at 400/220kV Kironi(HVPNL) carrying 325MW & 109MW respectively.			GI-2					Y(PG), Y(Har)			Y(PG), Y(Har)		Y(Har)	80ms
12	NR	1) 400kV Panchkula(PG)-Panipat(BBMB) 2) 450MVA ICT 1 at 400/220kV Panipat(BBMB) 3) 450MVA ICT 2 at 400/220kV Panipat(BBMB) 4) 400 kV Main BAY/CB (401) of Panchkula at Panipat	BBMB & POWERGRID	29-Aug-19	10:55	In antecedent conditions, (i) 400kV Dadri-Panipat-1 was under planned shutdown (X-3 & X-4 were out), (ii) 400kV Bus-1 main CB(X-6) of ICT-1 was under emergency outage due to Low SF6 gas in R-Phase CB Pole at BBMB Panipat. 400kV Panchkula(PG)-Panipat(BBMB) tripped due to snapping of R-Ph CT line side jumper of 400kV X1 main breaker at Panipat(BBMB). Due to outage of main breaker (X-4) of 400kV Panipat-Dadri-1 emergency outage 400 kV Bus-1 breaker (X-6) of ICT-1 and tripping of X-1 & X-7 CB (due to tripping		550	GD-1	0.33		Y(BBMB)		Y(PG)			Y(BBMB), Y(PG)		Y(BBMB)	1600ms
13	NR	1) 220kV Salal(NHPC)-Jammu(JK) ckt-2 2) 220kV Salal(NHPC)-Jammu(JK) ckt-1 3) 220kV Jammu(JK)-Samba(PG)	J&K, NHPC & POWERGRID	30-Aug-19	4:39	220kV Salal(NHPC)-Jammu(JK) ckt-2 tripped due to snapping of Jumper of R-Ph isolator at Jammu end. At the same time, 220kV Salal(NHPC)-Jammu(JK) ckt-1 and 220kV Jammu(JK)-Samba(PG) also tripped. As per PMU, R-Y fault is observed in the system. In antecedent conditions, 220kV Salal(NHPC)-Jammu(JK) ckt-1, 2 & 220kV Jammu(JK)-Samba(PG) carrying 88MW, 78MW & 56MW respectively.		100	GD-1	0.17			Y(JK), Y(NHPC), Y(PG)			Y(JK), Y(NHPC), Y(PG)		Y(JK)	240ms	
14	NR	1) 400 kV Bus 1 at 400/220kV Banda(UP) 2) 400kV Rewa Road(UP)-Banda(UP) ckt-1 3) 400kV Rewa Road(UP)-Banda(UP) ckt-2	UP	31-Aug-19	0:07	400 kV Bus 1 at 400/220kV Banda(UP), 400kV Rewa Road(UP)-Banda(UP) ckt-1 & 2 tripped on overvoltage. As per PMU, No fault is observed in the system.			GI-2				Y(UP)			Y(UP)		Y(UP)	NA (overvoltage)	

Inter-Regional Tripping for the month of Aug-2019

S. No.	Name of Transmission Element Tripped	Owner/ Utility	Outage		Load Loss/ Gen. Loss	Brief Reason (As reported)	Category as per CEA Grid standards	Restoration		# Fault Clearance Time (>100 ms for 400 kV and 160 ms for 220 kV)	*FIR Furnished (YES/NO)	DR/EL provided in 24 hrs (YES/NO)	Other Protection Issues and Non Compliance (inference from PMU, utility details)	Suggestive Remedial Measures	Remarks
			Date	Time				Date	Time						
1	220kV Auraiya(NTPC)-Malanpur(MPPTCL)	NTPC/MP	26-Aug-19	5.16	Nil	R-N fault, Fault distance 60.71km from Auraiya end.	NA	26-Aug-19	6.05	NO	NO	NO	No auto-reclosing observed.	Auto-reclosing feature of the line to be checked.	From PMU, R-N fault observed and auto-reclosing not observed.
2	220kV Modak(RRVPNL)-Bhanpura(MPPTCL)	Rajasthan/MP	3-Aug-19	13.54	Nil	Tripped from Modak end only.	NA	3-Aug-19	15.47	NA	YES (After 24hrs)	YES (After 24hrs)	Protection mal-operation	Protection setting of the line needs to be thoroughly checked.	Information received from NR end. From PMU, no fault observed.
3	220kV Modak(RRVPNL)-Bhanpura(MPPTCL)	Rajasthan/MP	10-Aug-19	13.25	Nil	Tripped from Modak end only.	NA	10-Aug-19	14.15	NA	YES	NO	Protection mal-operation	Protection setting of the line needs to be thoroughly checked.	Information received from NR end. From PMU, no fault observed.
4	220kV Modak(RRVPNL)-Bhanpura(MPPTCL)	Rajasthan/MP	11-Aug-19	18.43	Nil	Relay Mal-operation. Tripped from Modak end only.	NA	11-Aug-19	19.18	NA	YES	NO	Protection mal-operation	Protection setting of the line needs to be thoroughly checked.	Information received from NR end. From PMU, no fault observed.
5	220kV Ranpur(RRVPNL)-Bhanpura(MPPTCL)	Rajasthan/MP	3-Aug-19	13.36	Nil	B-N fault, Fault distance 76.70km from Ranpur end.	NA	3-Aug-19	15.53	NA	YES (After 24hrs)	YES (After 24hrs)	From DR, three phase trip after 160ms is observed. Reason of the same needs to be checked.	Line distance protection setting and A/R function needs to be checked and corrected.	Information received from NR end. From PMU, DR and details received from NR end, B-N fault observed with unsuccessful auto-reclosing.
6	220kV Ranpur(RRVPNL)-Bhanpura(MPPTCL)	Rajasthan/MP	15-Aug-19	16.03	Nil	Over voltage.	NA	15-Aug-19	20.44	NA	YES (After 24hrs)	YES (After 24hrs)	Overvoltage setting needs to be checked.	In 220 kV system equipment is designed for nominal 240 kv so over voltage setting can be set above 240 kV with reasonable margin.	Information received from NR end. From PMU, no fault observed.
7	400kV Varanasi(PG)-Biharshariff(PG) ckt-2	POWERGRID	17-Aug-19	5.50	Nil	Y-N fault. Fault distance 173.6 km from Varanasi(PG). Fault current 2.782 kA	NA	17-Aug-19	6.44	NO	NO	NO			Information received from NR end. From PMU, DR and details received from NR end, Y-N fault observed with unsuccessful auto-reclosing.
8	HVDC Champa-Kurukshetra Pole-2 at Champa	POWERGRID	16-Aug-19	11.36	Nil	Tripping of valve cooling system of pole 2.	NA	16-Aug-19	12.07	NA	YES	YES			Information received from NR end. From PMU, No AC system fault observed.
9	HVDC Champa-Kurukshetra Pole-2 at Kurukshetra	POWERGRID	20-Aug-19	9.11	Nil	Mal-operation of DC differential protection.	NA	20-Aug-19	9.38	NA	YES	YES	Protection mal-operation		Information received from NR end. From PMU, No AC system fault observed.
10	Vindhyachal HVDC BtB Block 2	POWERGRID	31-Aug-19	10.23	Nil	B2T12 Relief vent operated.	NA	31-Aug-19	13.03	NA	NO	NO			Information received from NR end. From PMU, No AC system fault observed.

Fault Clearance time has been computed using PMU Data from nearest node available and/or DR provided by respective utilities (Annexure- II)

*Yes, if written Preliminary report furnished by constituent(s)

R-Y-B phase sequencing (Red, Yellow, Blue) is used in the list content.All information is as per Northern Region unless specified.

^^ tripping seems to be in order as per PMU data, reported information. However, further details may be awaited.

Reporting of Violation of Regulation for various issues for above tripping

1	Fault Clearance time(>100ms for 400kV and >160ms for 220kV)	1. CEA Grid Standard-3.e 2. CEA Transmission Planning Criteria
2	DR/EL Not provided in 24hrs	1. IEGC 5.2(r) 2. CEA Grid Standard 15.3
3	FIR Not Furnished	1. IEGC 5.9.6.a 2. CEA Grid Standard 12.2 (Applicable for SLDC, ALDC only)
4	Protection System Mal/Non Operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.A 2. CEA (Technical Standards for connectivity to the Grid) Regulation, 2007: Schedule Part 1. (6.1, 6.2, 6.3)
5	A/R non operation	1. CEA Technical Standard of Electrical Plants and Electric Lines: 43.4.C 2. CEA Technical Planning Criteria