

ADDITIONAL AGENDA OF OCC 146th MEETING TO BE HELD ON 19.4.2018

AA.1 Report on Earth quake at 19:44hrs/10-Apr-18 with epicentre at SINGRAULI

Enclosed please find a report on Earth quake at 19:44hrs/10-Apr-18 with epicentre at SINGRAULI (**Annexure AA.1**) prepared by NRLDC & send to all constituents.

All members are requested to deliberate and comment on the report.

AA.2 Preliminary Report on tripping in Northern region during thunderstorm on 11-Apr-18

Enclosed please find a Preliminary Report on tripping in Northern region during thunderstorm on 11.4.2018 (**Annexure AA.2**) prepared by NRLDC & send to all constituents.

All members are requested to deliberate and comment on the report.

AA.3 Issues related to First Time charging of New Elements.

As per section 5.2 of the grid related to System Security Aspects, RLDC is required to maintain a list of important grid elements.

Generally, a list of important grid elements includes –

1. All transmission lines/elements of 400kV and above.
2. All intra-state and inter-regional lines irrespective of voltage level.
3. Transmission lines connected to other utility, generating stations.
4. Generating units

The above process starts with first time charging of new element and its integration in to the grid. A new transmission asset by any transmission licensee needs to be carefully integrated, observing all provision of CERC Regulations and CEA Standards.

Generally, Power grid and ISTS licensee are providing standing committee approval and charging instruction, while in SLDC/STU provided only standing committee approval in some cases.

This matter was also discussed in CEA meeting held on 04.04.2018 at Sewa Bhawan, R.K.Puram and it was deliberated that standing committee approval is required for new elements as mentioned above including LILO of lines/augmentations/change in network.

However, still we are facing the same problem.

All Transmission licensees is requested to provide the standing committee approval, charging instructions before seeking clearance from NRLDC for first time charging of new element.

Procedure for integration of new element also available at NRLDC website under document.

Further, Generating Company also needs to submit the following before synchronization of new unit in to the grid-

S.No	Description
1	Station SLD (Protection)
2	open circuit curve
3	Capability curve
4	Transfer function of AVR , PSS & Governor
5	Dynamic Data for Short circuit studies
6	Step response of AVR, Governor & PSS
7	Turbine type and ratings
8	Generator protection settings
9	Station Event Log at the time of Charging
10	SCADA Plots of Generating MW, Bus Volt, Freq & MVAR at the time of charging
11	DR & EL of protection relay at the time of charging

All members are requested to discuss.

Power System Operation Corporation Ltd.

Northern Regional Load Despatch Centre

Dated: 11-Apr-2018 -512-579

Report on Earth quake at 19:44hrs/10-Apr-18 with epicenter at Singrauli

An earthquake of 4.6 magnitude in Richter scale occurred in Madhya Pradesh and nearby area with epicenter at Singrauli, Madhya Pradesh. A Preliminary Earthquake Report issued by IMD is attached at Annexure-1.

The following elements reportedly tripped due to suspected effect of earthquake:

1. 765/400kV ICT-2 at Anpara-C tripped at 19:44hrs (ref. Annexure-3)
2. Unit #2 at Anpara-D tripped at 19:54hrs (ref. Annexure-3)

A few tripping incidents in Western Region viz. tripping of units at Vindhychal and Lara power plants were also reported. A sudden drop of around 0.075Hz in All-India frequency was observed (PMU plot attached at Annexure-1).

There was no report of load shedding based on forced outage of any element during the earthquake from Northern Region constituents. Also, no sudden load reduction observed from the load pattern of Northern Region. However, a change in import from western region was observed. (Annexure-2)

The following is requested to all the constituents of Northern Region:

1. To provide the information of any tripping or manual opening of line/element during the earthquake.
2. To analyse and provide the report, DR/EL of tripped elements including the protection on which the element tripped, if any. UP/Lanco to provide the same for tripping at Anpara-C & D.
3. To share the procedure available at substation/control center for tackling of such natural phenomenon and remedial measure to avoid tripping of elements in such events.

All constituents are requested to provide the above to NRLDC office at the earliest.

धन्यवाद,

भवदीय
महानिदेशक
(डी.के. जैन)
महाप्रबंधक

Annexure-1

INDIA METEOROLOGICAL DEPARTMENT
Ministry of Earth System Sciences

[About IMD](#) | [Hon'ble Ministers](#) | [Secretary MCEs](#) | [DGM IMD](#) | [Observational Network](#) | [IMD Services](#) | [IMD Publications](#) | [Others](#) | [Contact Us](#)

Preliminary Earthquake Report

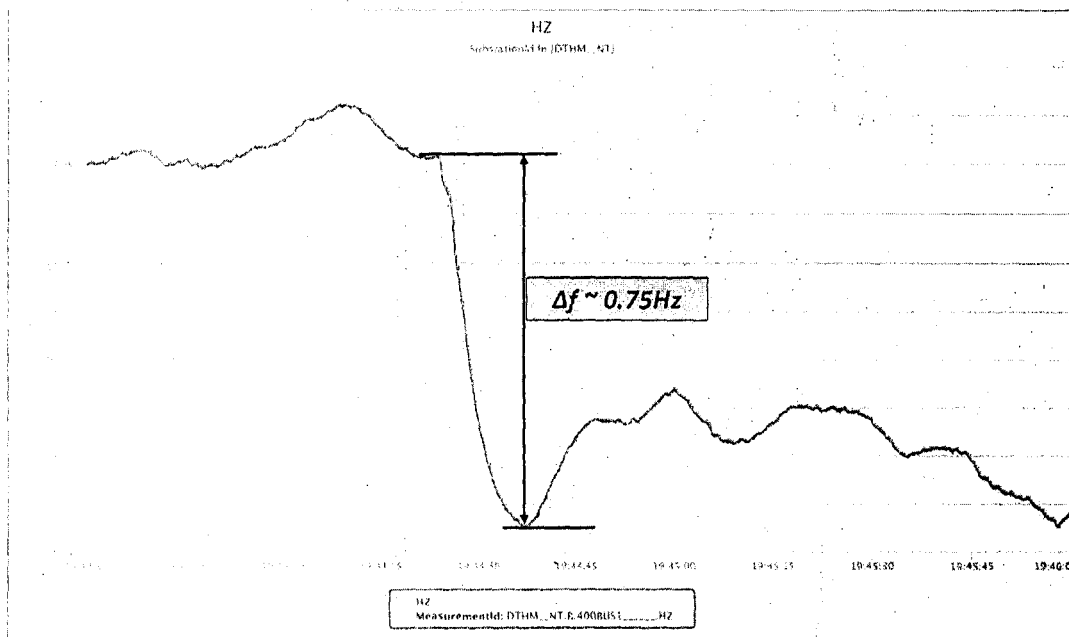
Date of Occurrence: 10/04/2018
 Time: 19:44:20 HRS(IST)
 Intensity: SLIGHT
 Magnitude: 4.6
 Depth: 10 KM
 Epicentre: Lat.24.2°N, Long.82.6°E
 Region: Singrauli, Madhya Pradesh

([Current Year](#) | [2017](#) | [2016](#) | [2015](#) | [2014](#) | [2013](#) | [2012](#))

Earthquakes during 2018

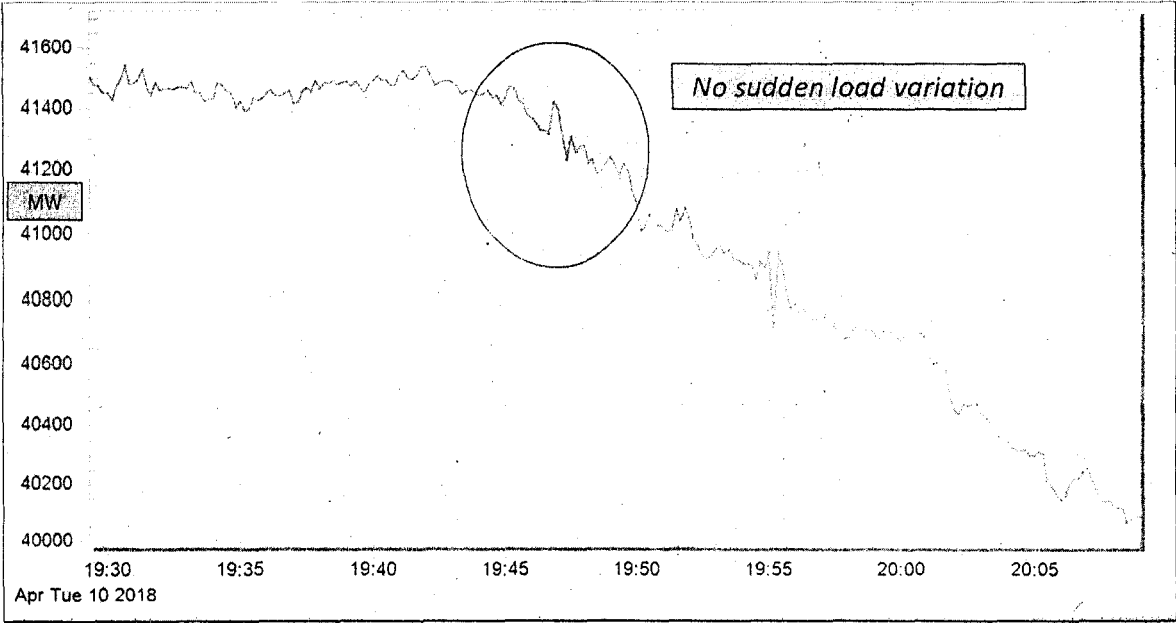
Date	Time (UTC)	Time (IST)	Lat	Long	Depth (KM)	Magnitude	Region
2018/04/10	14:14:20	19:44:20	24.2°N	82.6°E	10	4.6	Singrauli, Madhya Pradesh

IMD Preliminary Earthquake Report

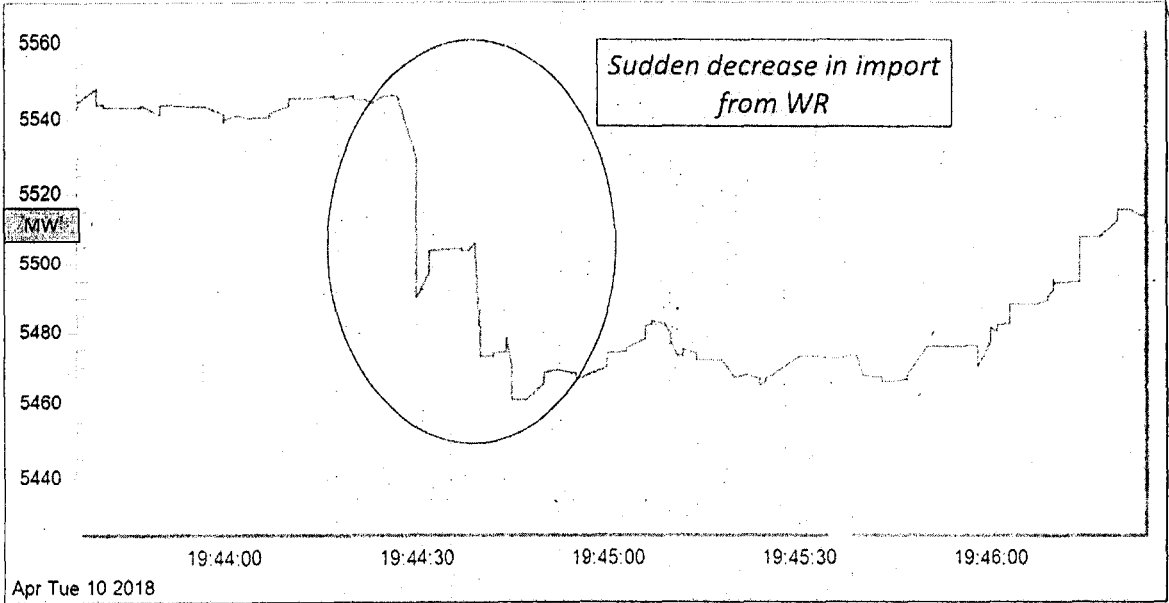


PMU plot of frequency during earthquake

Annexure-2

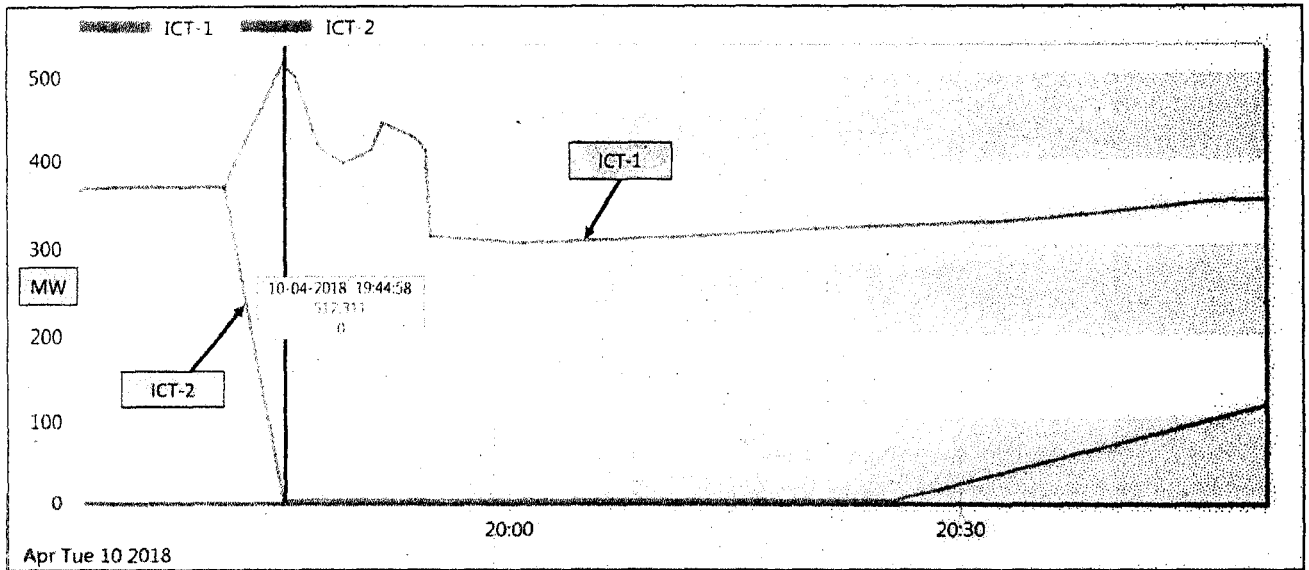


Plot of Northern Regional Load (Source: SCADA data)

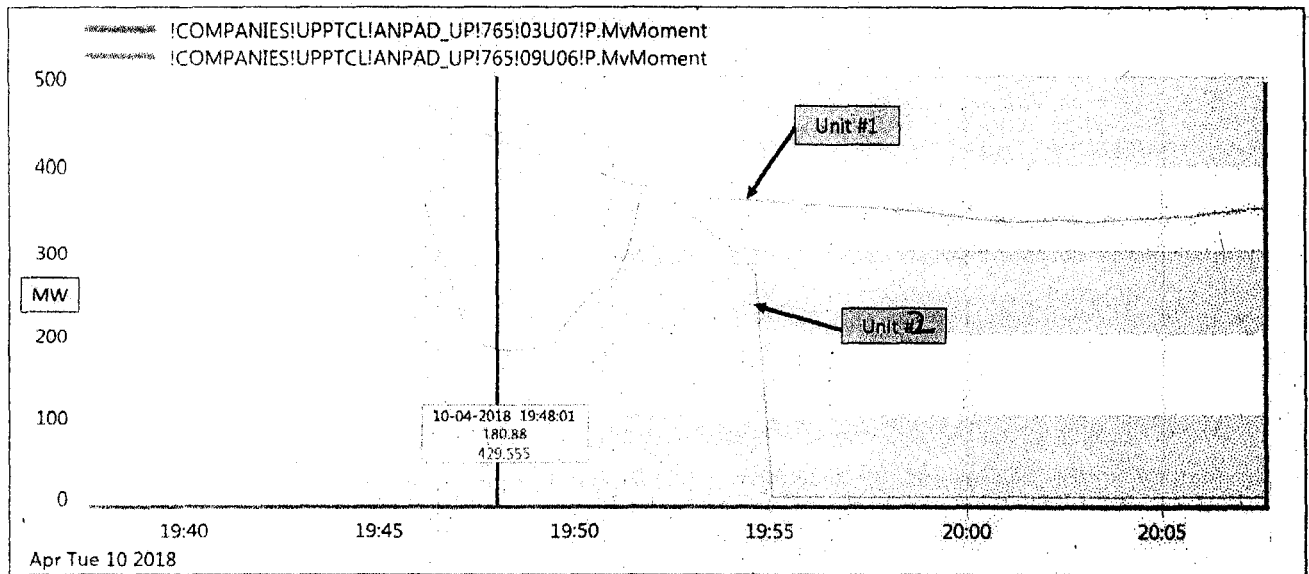


Plot of Import from Western Region (Source: SCADA data)

Annexure-3



Plot of MW flow on ICTs at Anpara-C (Source: SCADA data)



Plot of MW flow of units at Anpara-D (Source: SCADA data)

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



NORTHERN REGIONAL LOAD DESPATCH CENTRE

18/A, Shaheed Jeet Singh Sansanwal Marg, Katwaria Sarai, New Delhi - 110 016

Tel: 2685 4585, 2685 4015, Tele Fax: 011- 2685 2747, e-mail: nrdcso2@posoco.in

CIN: U40105DL2009GOI188682.

संदर्भ: NRLDC/ TS-11/660-747

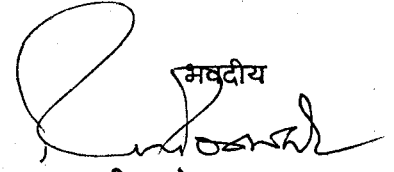
दिनांक: 12-04-2018

विषय: Preliminary Report on tripping in Northern region during thunderstorm on 11-Apr-18

महोदय,

On 11-Apr-18, multiple elements tripped around Agra area during thunderstorm. A Report based on the preliminary details is attached at Annexure-A.

The utilities are requested to forward the detailed report covering remedial measures taken / to be taken for the above tripping events along with the DR/EL of the lines tripped at their end. Further correlation and analysis of the incident could be carried out after receipt of details received as above.


महोदय
(राजीव पोरवाल)
उप महाप्रबंधक,

वितरण:

1. Head of SLDC-Punjab/Haryana/HP/Rajasthan/UP/Delhi/J&K/Uttarakhand/UT Chandigarh
2. Head of STUs- Punjab/Haryana/HP/Rajasthan/UP/Delhi/J&K/Uttarakhand/UT Chandigarh
3. Head of NLDC/WRLDC/NERLDC/SRLDC/ERLDC
4. Head of NTPC-Singrauli/Rihand/Unchahar/Dadri/Anta/Auraiya/NTPC NR Lucknow/NTPC-NCR Noida, Head of NHPC-Bairasuil/Chamera-I, II, III/Dulhasti/Dauliganaga/Salal/Sewa/Tanakpur/Uri/NHPC Faridabad, Head of THDC-Tehri/Koteshwar, Head of SJVNL-Nathpa Jhakri, BBMB Chandigarh, Head of NAPS/RAPS-B/RAPS-C, Head of Karcham Wangtoo, Head of shriCement TPS, Head of Budhil
5. ED(NR-I)/ED(NR-II)/ED(NR-III)/ED(OS), POWERGRID

प्रतिलिपि विनम सूचनार्थ:

1. Director(Operation), POWERGRID
2. CMD, POSOCO
3. Member Secretary NRPC/Member (Go&D), CEA
4. Director (OM), Ministry of Power, Govt. of India

Northern Regional Load Despatch Centre

Report on tripping in Northern Region on 11-Apr-2018 during thunderstorm

A. Event Summary:

On 11-Apr-18, from 18:29hrs onwards, multiple elements tripped especially around Agra area during thunderstorm. 800kV HVDC Champa-Kurukshetra bipole also tripped.

Event Category : GI-2
Load Loss : Nil (UP shall confirm)
Generation Loss : Nil (Constituents shall confirm)
Energy Unserved : Nil (Rajasthan shall confirm)

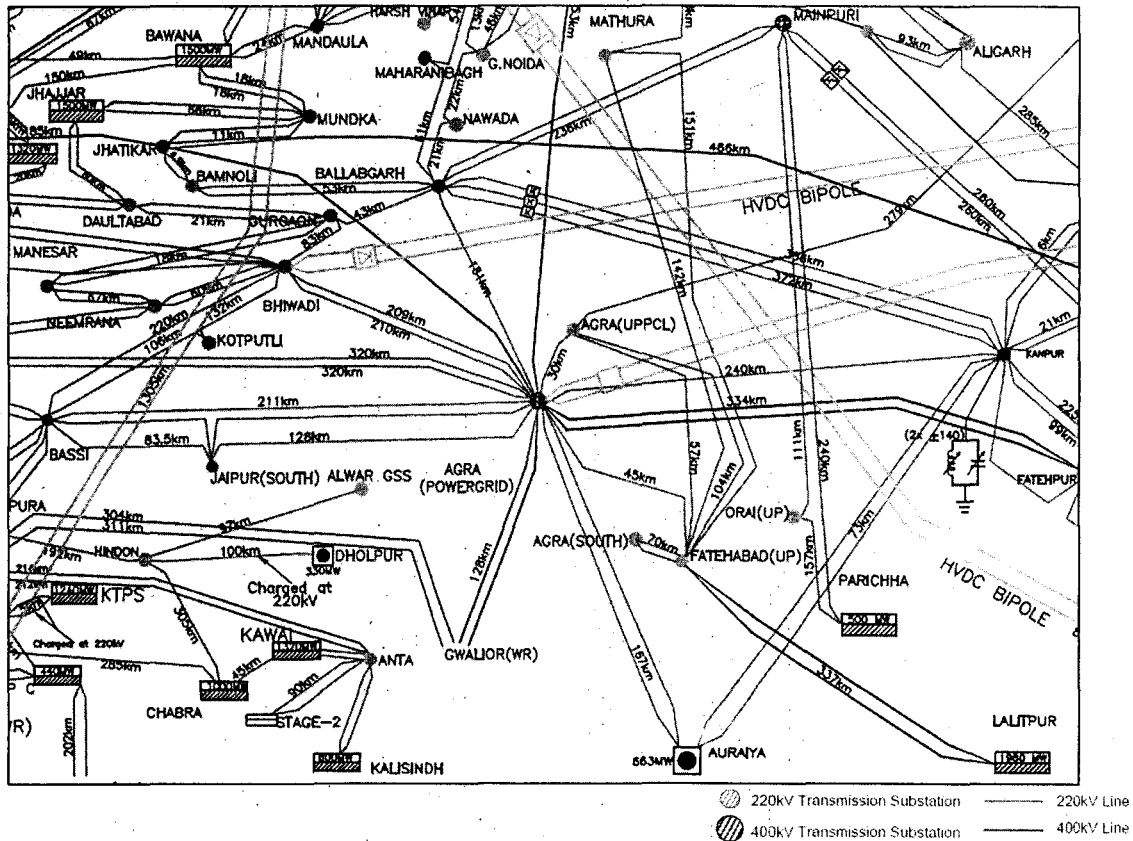
B. Antecedent conditions (at 18:20hrs):

- Grid Frequency : 49.97 Hz
- NR Demand Catered : 34154 MW
- Net Inter Regional Import : 3958 MW
- HVDC Rihand-Dadri Flow: 800 MW
- HVDC Balia-Bhiwadi Flow: 250 MW
- Vindhyachal BtB Flow : 50 MW (North to West)
- Weather : Thunderstorm

- 800kV Agra-BNC bipole was already under shutdown

- Following lines from Agra(PG) were under outage:
 - 765kV Agra-Gwalior-2 (Emergency S/D)
 - 765kV Agra-Fatehpur-2 (open on high voltage)
 - 400kV Agra-Auraiya-2 (Planned S/D)
 - 400kV Agra-Sikar-1 (open on high voltage)
 - 400kV Agra-Jaipur South-1 (open on high voltage)
 - 400kV Agra-Bhiwadi-2 (open on high voltage)

C. Connectivity Diagram:



D. Event Description:

The Indian Meteorological Department (IMD) had issued warnings for thunderstorm/squall in Northern Region. These warnings were apprised by NRLDC to NR constituents through e-mails dated 09th & 11th Apr, 2018 (Annexure-1).

In the evening hours of 11-Apr-18, thunderstorm swept around in South-Eastern Uttar Pradesh area with high wind speed reported.

The significant outages during this period having impact on grid security are as follows:

- 765kV and 400kV lines emanating from Agra(PG) station tripped.
- All the 400kV lines emanating from 765/400kV Fatehabad(UP) tripped except 400kV Fatehabad-Agra(UP)-1.
- 800kV HVDC Champa-Kurukshetra bipole, important inter-regional link, also tripped multiple times during the event. The detail is attached at Annexure-3.

The critical time during the event was:

- During 19:15-20:15hrs, there were only two ckts viz. 765kV Agra(PG)-Gwalior-1 and 765kV Agra(PG)-Fatehpur-1 present at 765kV level at Agra(PG).
- During 19:58-20:37hrs, tripping of all other lines from Fatehabad(UP) rendered 400kV Fatehabad(UP)-Agra(UP) as the major evacuating path for Lalitpur generation. As a result, 400kV Fatehabad(UP)-Agra(UP) became loaded to ~1000MW (near thermal loading of line).
- Apart from 400kV Fatehabad line at 400kV Agra(UP), only one other 400kV Unnao line was in service at Agra(UP). Therefore, tripping of either of any of the above ckts would have caused outage of entire Lalitpur TPS.
- Tripping of 800kV Champa-Kurukshetra multiple times resulted in less reliability for Inter regional exchange (Annexure-3).

E. Remedial actions taken:

- The situation was informed to all concerned to remain alert.
- Backing down of Lalitpur TPS even below 55% was carried out to reduce the loading of 400kV Fatehabad-Agra(UP)-1 and to avoid further tripping.
- Generation increased in Northern Region was carried out through Ancillary services in order to reduce import from other regions.
- Charging code was issued to charge tripped elements at the earliest. However, many of the attempts failed as lines couldn't hold.
- Power order on HVDC Balia-Bhiwadi and HVDC Rihand-Dadri was increased.

POWERGRID/UP/NTPC are requested to provide the DR/EL, Report of the tripped elements including remedial actions taken/to be taken and expedite the revival of tripped elements.

---X---X---X---X---X---

Annexure-1

From: Sunil Kanaujia <sunil.kn@nrl.com>
 Date: Mon, Apr 9, 2018 at 5:14 PM
 Subject: Weather Warning in Northern Region
 To: weather_power@googlegroups.com

Sr,

There is warning by IMD for Thunderstorm accompanied with squall and hail very likely at isolated places over Jammu and Kashmir, Himachal Pradesh and Uttarakhand. Thunderstorm accompanied with gusty winds very likely at isolated places over Punjab, Haryana, Chandigarh, Delhi and west Uttar Pradesh on dated 10.04.18 and 11.04.18. As per weather warning in Northern Region, there are chances on load crash which may result high frequency and high voltage condition throughout the Northern region.

Therefore following may kindly ensured :

- Alertness across all control centers/ substations/generating stations to be maintained.
- All the constituents and generators should maintain their drawl and injection respectively strictly as per schedule.
- Sufficient backing down may have to be restored to arrest grid frequency within IEGC band.
- There is likelihood high voltages in the system and therefore generating units shall absorb reactive power to control the high voltages. Other reactive absorbing power device like reactor etc. should be used. The capacitor bank switching off in State control area may please also be restored to, whenever required.

States	10/04/2018	11/04/2018
JAMMU & KASHMIR	WS	FWS
HIMACHAL PRADESH	WS	FWS
UTTARAKHAND	WS	WS
PUNJAB	FWS	FWS
HAR, CNG / DLH	SCT	FWS
WEST-U.P	ISOL	SCT
EAST-U.P	ISOL	ISOL
WEST-RAJ	ISOL	ISOL
EAST-RAJ	ISOL	ISOL

LEGEND: NO RAIN (DRY), VERY LIGHT RAIN / MAINLY DRY (M.D.), 1-25 ISOLATED (ISOL), 26-50 SCATTERED / A FEW PLACES (SCT), 51-75 FAIRLY WIDESPREAD / MANY PLACES (FWS), 76-100 WIDESPREAD / MOST PLACES (WS).

With Regards--

Sunil Kumar Kanaujia

e-mail alert dated 09-Apr-18 sent from NRLDC

From: Sunil Kanaujia <sunil.kn@nrl.com>
 Date: Wed, 11 Apr 2018, 16:05
 Subject: Weather Warning for Northern Region
 To: <weather_power@googlegroups.com>

Sr,

As per Weather Portal for power sector following warning is issued by IMD on dtd. 11.04.2018

Thunderstorm accompanied with squall/hail very likely at isolated places over Jammu & Kashmir, Himachal Pradesh and Uttarakhand. Thunderstorm accompanied with squall very likely at isolated places over East Uttar Pradesh. Thunderstorm accompanied with gusty winds very likely at isolated places over Punjab, Haryana, Chandigarh & Delhi, West Uttar Pradesh and East Rajasthan. Heat wave conditions very likely at isolated pockets of southwest Rajasthan.

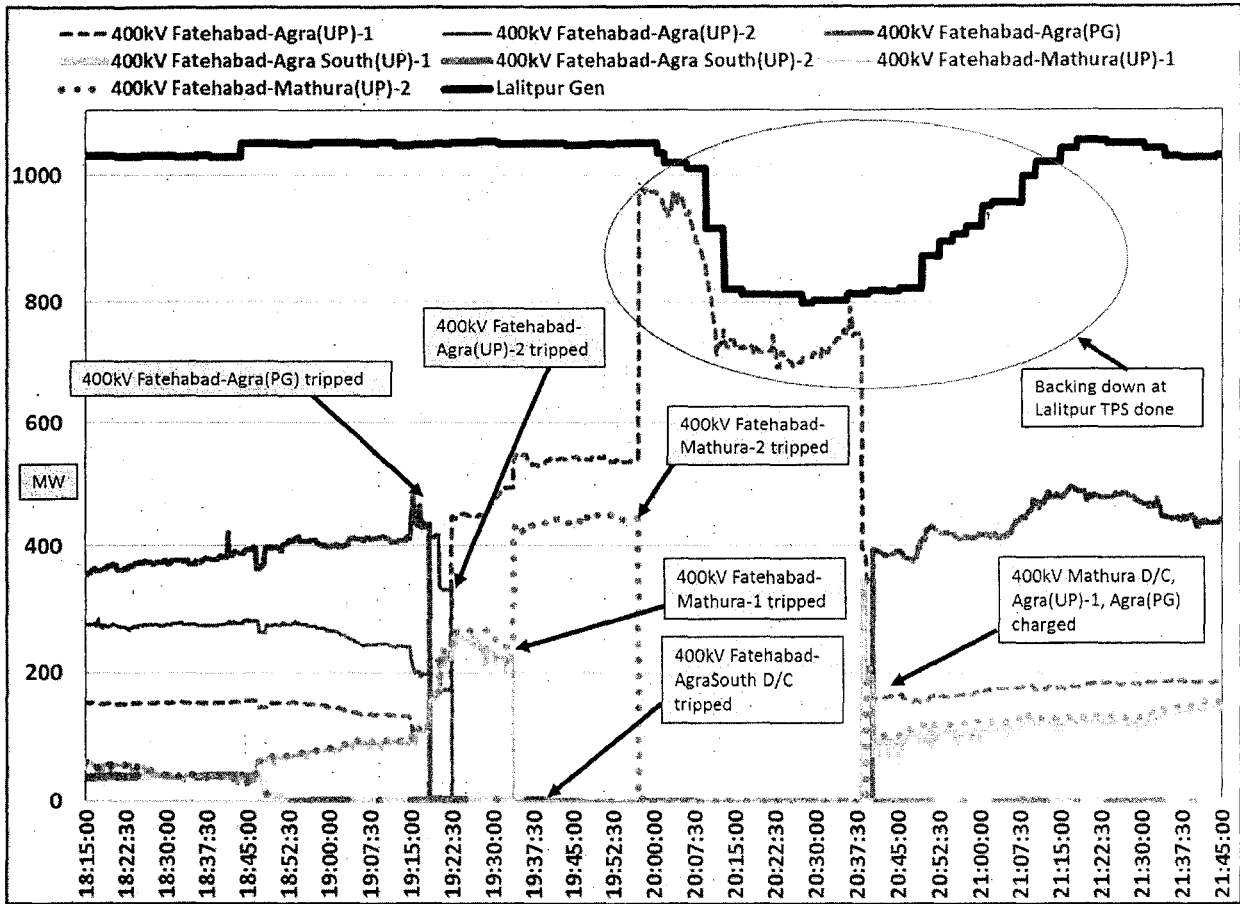
With Regards--

Sunil Kumar Kanaujia
 Sr. Engineer(SL-1)
 NRLDC

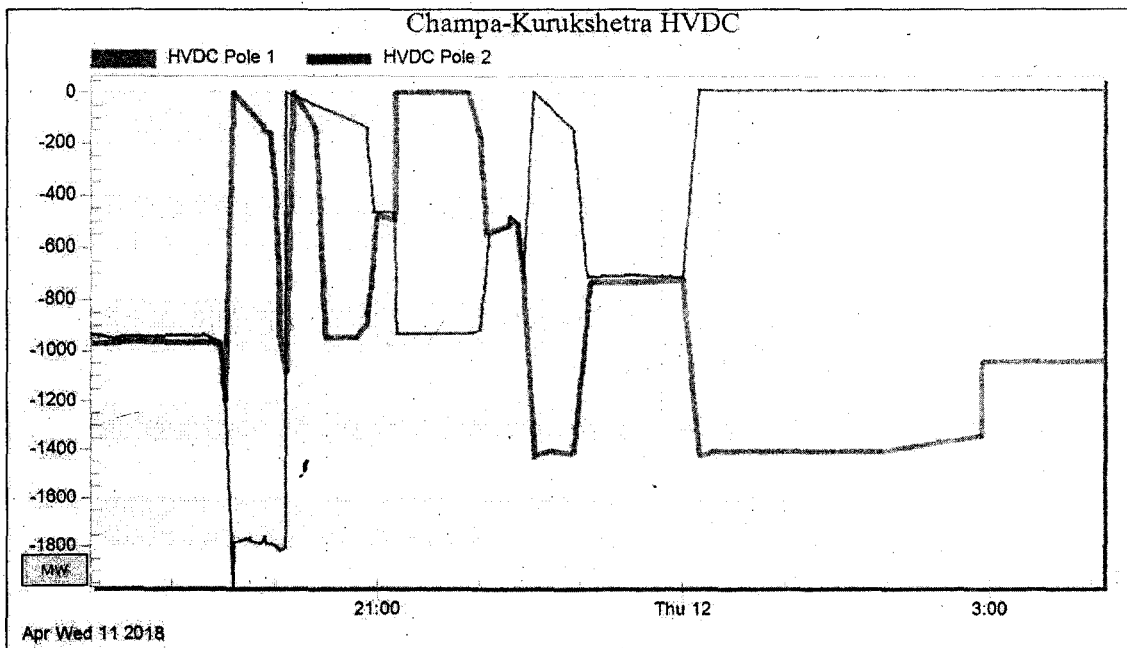
e-mail alert dated 11-Apr-18 sent from NRLDC

S.No.	Element	Utility	Outage Date	Outage Time	Revival Date	Revival Time	Remarks/Reason (as reported)	PMU inference
1	765 kV Agra(PG)-Jhatikara(PG)	POWERGRID	11-Apr-18	18:29			B-N fault. FD: Agra-64km, Jhatikara-182km. FC: Agra-8.2KA, Jhatikara-4KA.5 Nos Towers damaged at Location No. 173, 174, 175, 176 and 177 (4 nos. A Type one No. A+3, one tower damaged completely, one from waist level and three above waist level)	B-N Fault, A/R unsuccessful.
2	400 kV Agra(PG)-Sikar(PG) 2	POWERGRID	11-Apr-18	18:29			Tripped during thunderstorm in Agra area. Earth wire snapped and entangled with circuit 2 conductors in 5 spans from location no. 229 to 233	B-N Fault, unsuccessful autoreclosing observed.
3	765 kV Lalitpur TPS 330 MVAR Bus Reactor 1	LPGL	11-Apr-18	18:41	11-Apr-18	21:32	B-Phase differential protection operated	Y-N Fault. No auto-reclosing observed.
4	765 kV Agra(PG)-Aligarh 765(PG)	POWERGRID	11-Apr-18	19:15			B phase insulator string broken and conductor fallen on ground a Location No. 53	Multiple faults observed.
5	400 kV Agra(PG)-Agra(UP)	POWERGRID/UP	11-Apr-18	19:19			Four towers damaged location no. 37, 36D, 36C and 36B - one tower damaged completely, one from waist level and remaining two have cross arms and earthwire peak damage.	At 19:18:08hrs, B-N fault. It seems line tripped in reclaim time. At 19:19:35hrs, R-N fault observed followed by Y-N fault within a sec.
6	400 kV Agra(PG)-Fatehabad 765 (UP)	POWERGRID/UP	11-Apr-18	19:19	11-Apr-18	20:40	Four towers damaged location no. 37, 36D, 36C and 36B - one tower damaged completely, one from waist level and remaining two have cross arms and earthwire peak damage.	
7	400 kV Agra(UP)-Fatehabad 765 (UP) 2	POWERGRID/UP	11-Apr-18	19:22			Details awaited	Y-N Fault. No auto-reclosing observed.
8	400 kV Manesar-Neemrana 1	POWERGRID	11-Apr-18	19:28	11-Apr-18	20:27	Hand tripped due to fire at Backyard at Manesar.	
9	400 kV Manesar(PG)-Neemrana(PG) 2	POWERGRID	11-Apr-18	19:28	11-Apr-18	20:29	Hand tripped due to fire at Backyard at Manesar.	
10	400 kV Fatehabad 765(UP)-Mathura 400(UP) 1	UP	11-Apr-18	19:33	11-Apr-18	20:37	Details awaited	B-N fault. It seems line tripped in reclaim time.
11	800 kV HVDC Champa(WR) - Kurukshetra(NR) line -1	POWERGRID	11-Apr-18	19:36	11-Apr-18	19:52	Auxillary supply failure at Kurukshetra	No fault observed.
12	400 kV Agra South (UP)-Fatehabad 765 (UP) 1	UP	11-Apr-18	19:39	11-Apr-18	21:05	Details awaited	Multiple faults observed.
13	400 kV Agra South (UP)-Fatehabad 765 (UP) 2	UP	11-Apr-18	19:39	11-Apr-18	21:06	Details awaited	
14	400 kV Fatehabad 765(UP)-Mathura 400(UP) 2	UP	11-Apr-18	19:58	11-Apr-18	20:39	Details awaited	B-N Fault. No auto-reclosing observed.
15	800 kV HVDC Champa(WR) - Kurukshetra(NR) line -2	POWERGRID	11-Apr-18	20:06	11-Apr-18	20:50	Details awaited	No fault observed.
16	220 kV Auraiya(NTPC)-Malanpur(PG)	NTPC/POWERGRID	11-Apr-18	20:08	11-Apr-18	23:36	Details awaited	R-N Fault. No auto-reclosing observed.
17	800 kV HVDC Champa(WR) - Kurukshetra(NR) line -1	POWERGRID	11-Apr-18	20:10	11-Apr-18	20:24	Details awaited	No fault observed.
18	765 kV Jabalpur 765(PG)-Orai 765(PG) 2	POWERGRID	11-Apr-18	21:34	11-Apr-18	22:31	B-N fault. However, neither fault current nor fault location flagged in relay.	B-N Fault. No auto-reclosing observed.

Charging code were issued but many attempts failed as lines couldn't hold



Power flow of 400kV lines at Fatehabad(UP) along with Lalitpur generation (Source: SCADA data)



Power flow on HVDC Champa-Kurukshetra bipole (Source: SCADA data)