



भारत सरकार  
Government of India  
विद्युत मंत्रालय  
Ministry of Power  
पूर्वी क्षेत्रीय विद्युत समिति



**Eastern Regional Power Committee**  
14, गोल्फ क्लब रोड, टॉलीगंज, कोलकाता-700033  
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ISO : 9001-2015

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NO. ERPC/ COM-I/TA/2019/ 1104-1110

DATE: 30.04.2019

To,

1. Shri Chinmay Halder, ACE, WBSLDC, WBSETCL, Howrah.
2. Shri Sudhansu Sekhar Nanda, DGM (E& MR), OPTCL, Burla Division
3. Shri S.K.Singh, GM(AM), Powergrid (ER-I), Power Grid Corporation of India Ltd, Board Colony, Shastri Nagar, Patna-800023
4. Dr. Deepak Lakhapati, Head-Design, Sterlite Power, A (Tulip) – 634, New Minal Residency, J.K.Road, Near Ayodha Bypass Road, Bhopal – 462023

**Sub: Minutes of 1<sup>st</sup> meeting of the Committee constituted for Analysing the major outages of ISTS elements of Eastern Region-regarding.**

Sir,

Please find herewith enclosed the minutes of the 1<sup>st</sup> Meeting of the Committee constituted for analysing the major outages of ISTS elements of Eastern Region held on 13<sup>th</sup> February, 2019 (Wednesday) at 11:00 hrs at ERPC Conference Hall, Kolkata. The same is also available at ERPC website (<http://www.erpc.gov.in/>).

Observations, if any, may please be forwarded to this office at the earliest.

Yours faithfully,

(D. K. Bauri)

Executive Engineer & Convenor

Copy to:

1. Executive Director, ERLDC, POSOCO, 14 Golf Club Road, Kolkata –700 033
2. Executive Director (ER-I), Power Grid Corporation of India Ltd, Board Colony, Shastri Nagar, Patna-800023.
3. Project Director (O&M), Sterlite Power, A (Tulip) – 634, New Minal Residency, J.K.Road, Near Ayodha Bypass Road, Bhopal – 462023.

## **Eastern Regional Power Committee, Kolkata**

### **Minutes of the 1<sup>st</sup> meeting of the Committee for Analysing the major outages of ISTS elements of Eastern Region held on 13.02.2019 at ERPC Kolkata.**

The list of the participants are enclosed in **Annexure-I**

Shri D. K. Bauri, Convenor & Executive Engineer, ERPC welcomed all the members of the committee, ERLC the special invitee and participants from ENICL in the meeting. He highlighted the brief background about the constitution of the Committee for Analysing the major outages of ISTS elements of Eastern Region and its tasks. He informed that the above committee has been constituted to look into the identified outages of various ISTS elements and identify the category of outage and reasonable restoration time based on the analysis of the all the facts. The committee would function as per the following guidelines:

- i) The Committee shall meet from time to time to analyse the various outages as referred by Member Secretary, ERPC.
- ii) The Convenor of the committee shall coordinate with all the members to organize meetings.
- iii) The Committee shall look into the various details of causes for outage of transmission elements and suggest the category of outage and reasonable restoration time period for of the transmission element.
- iv) The committee in its report/minute shall indicate the category and reasonable time period to be considered for each category for all outages as per the prevailing CERC regulations and CERC/CEA/CTU standards.
- v) ERLDC may be invited on case to case basis as and when felt by the committee members for verifying the outage time, log, record etc. as available with ERLDC.
- vi) The other concerned transmission licensee may be invited on case to case basis for explaining the details of outages of their respective elements.
- vii) If required, the committee shall undertake site visit for assessing the actual position in case of major failure of transmission elements which require higher restoration time beyond the standard allowable restoration period.

He then took up the agenda item for discussion.

#### **Item No. 1. Outage of 400kV D/C Purnia-Biharsharif line of ENICL.**

400kV Purnia-Biharsharif D/C line was out of service from 10/08/18 due to the change of course of the river Ganges and heavy velocity of flow of water which leads to tower collapse. ENICL informed that restoration of the line is in progress using a temporary arrangement and the restoration of the line would take 50 days approximately.

Further, in 149th OCC, ENCIL informed that one more tower of 400 kV Purnea-Biharsharif D/C line had collapsed and restoration of the line using interim arrangement is also not possible. They are planning for permanent restoration of the line, which would be restored by June 2019. ENICL requested to consider the restoration period as force majeure condition

149<sup>th</sup> OCC in principle agreed to consider the restoration period as force majeure condition. However, the period of forced majeure condition is to be decided judiciously.

### **Deliberation in the meeting**

ENICL gave a detail presentation on outage of 400 kV Purnia-Biharshariff D/C line highlighting the change of course of the river Ganges and heavy velocity of flow of water which leads to tower collapse. The salient points emerged during the presentation of ENICL are as follows (Presentation is enclosed at **Annexure-II**):

- On 10.08.2018 at 10:28 the tower no 47/0 of 400kV D/C Purnia-Biharsharif was collapsed due to change in course of river Ganga & water flow with high velocity near the tower location which was a pile foundation tower (DD+18).
- Further, more soil erosion occurred due to change in course of river Ganga and the high velocity & heavy water flow lead to collapse of one more tower location no 46/9 (open cast type) on 21.08.2018 which was earlier situated on land.
- The possibility of line restoration using ERS towers got set back due to increase in the span (due to collapse of 2<sup>nd</sup> tower) and enhancement of water level and soil conditions.
- In view of too much erosion of the river bank due to change of course of river Ganges, the nine towers from location no 46 to location no 47 were under threat of collapse in the next few years. So the total restoration plan had to be changed considering the continuous erosion due to change of course of Ganges.
- Therefore, the transmission line has to be diverted from the present river crossing to avoid the above threat which requires extra four (4) number pile foundation (3 number on ground and 1 number in water) and five (5) number open cast foundation to prevent it from the endanger of further soil erosion.
- The area was under flooding conditions and receding of water started from 22.09.2018. Further, due to muddy and mire soil, it was difficult to start the restoration work. The restoration works has started from 14.10.2018 and temporary approach road to site location was constructed by 15.12.2018 and the final approach road for carrying the construction material and equipment was completed on 13.01.2019.
- Since, the main work started from 14<sup>th</sup> January, 2019 only after the completion of approach road, the same may be considered as zero date for restoration work.
- As per the restoration schedule given by ENICL, the line would be restored permanently by **July'2019**.

The committee members analyzed the details of the cause and based on the facts provided the committee unanimously decided that the above outage may be considered under the category of acts of God and force majeure events beyond the control of the transmission licensee.. After in-depth analysis of the restoration plan the committee concluded that the reasonable time for restoration of above line should not exceed six months starting from the date of completion of main approach road.

It was pointed out that as per CERC (Terms and Conditions of Tariff) Regulations, 2014, the restoration time shall be considered in accordance with the CERC (Standard of performance of inter- state transmission licensee) regulations, 2012. Accordingly, the restoration time for tower after collapse in the river bed shall be 50 (Fifty) days and for any further relaxation in restoration period, the transmission licensee should approach to CERC.

The ENCIL clarified that the above 400 kV Purnea-Biharhariff D/C line had come under the TBCB project and its certification is basically guided in accordance with the CERC (Terms and Conditions of Tariff) Regulations, 2009. As per Tariff Regulations 2009-14 the onus for certifying the restoration time lies with Member Secretary and he may consult the transmission licensee or any expert for estimation of reasonable restoration time.

After detailed deliberations the Committee recommended the followings:

- i) Based on the facts provided by ENICL the above outage may be considered under the category of acts of God and force majeure events beyond the control of the transmission licensee.
- ii) Considering the continuous erosion due to change of course of river Ganges since last few years, the transmission line needs to be diverted from the present river crossing to avoid the above threat.
- iii) Keeping in view of all the facts, the zero date for commencement of the restoration work may be considered as the completion of approach road for carrying the construction material & equipments i.e. 14.01.2019.
- iv) The reasonable restoration time allowable should not exceed six months from the zero date of the restoration work.

## **Item No. 2. Outage of 400kV D/C Patna – Kishanganj line of PGCIL.**

400 KV Patna – Kishanganj - D/C Line was out of service from 01/09/18 due to tower collapse as Ganga River has changed its course.Powergrid informed that they would put all the efforts to bring the line by March 2019.

Powergrid further Informed that they were planning for erection of twin moose conductor instead of quadmoose as a temporary arrangement for early restoration of the line with reduced capacity. Powergrid agreed to place the details after detailed study.

In 39th TCC, Powergrid informed that temporary arrangement for restoration of the line with reduced capacity is expected to be completed by Dec 2018 and the permanent restoration of the line is expected to be completed by June, 2019.

## **Delibation in the meeting**

Powergrid gave a brief presentation regarding the outage of 400 kV D/C Patna-Kishanganj line due to change of course of the river Ganges which leads to tower collapse. A detailed report on the incident as submitted by Powergrid is enclosed at **Annexure-III**. It was informed that the said line is crossing the river Ganges parallel to 400 kV D/C Purnia-Biharshariff line of ENICL and forced to changes of course of river as discussed above. The following points were emerged during the discussion:

- 400 kV D/C (Quad) Patna-Kishanganj transmission line tripped at 0:32 Hrs. on 02-09-2018 due to collapse of one no. tower at pile foundation location no. 129/0 (DD+9) due to soil erosion by river Ganga during the heavy flood.
- The nearby location at loc no.-129A/0(DD+0) which is on normal open cast foundation has also come almost in the main course of river.
- From the analysis of Google map over the last five years, it is clear that there is continuous river bank erosion towards Patna side bank and the distance of river course from bank location no. 129/0(tower no. 568) has reduced from 576m in Feb-2013 to 105m in Dec-2017.
- The tower failure location is still in the heavy current of river and is fully submerged under water. The location is in main course of the high speed river flow.
- An expert committee has been advised to divert the line on at least on 4 nos pile foundation on right bank. For permanent restoration of the line, the four (4) no piles is being re-casted including one no pile in midstream in Ganga River.
- POWERGRID has also informed that the duration of receding of water is delayed as the collapsed towers are located in the up stream of Ganga river. Finally water completely receded by 25.12.2018 but due to muddy and mire soil, the work started in the first week of January'19.
- POWERGRID has given priority for restoration of one circuit as per advice of OCC meeting and same has been restored on war footing basis on 16.01.2019. Afterwards, the construction of approach road started which completed on 25.02.2019.
- Due to difficulty of approaching the location of muddy and mire soil, it was difficult to start the restoration work so the final restoration works started from 28<sup>th</sup> February, 2019 which may be considered as zero date for restoration work.
- As per the restoration schedule of POWERGRID, the line would be restored permanently by **August'2019**

Based on the above facts the committee unanimously decided that the above outage may be considered under the category of acts of God and force majeure events beyond the control of the transmission licensee. After in-depth analysis of the restoration plan the committee concluded that the reasonable time for restoration of above line should not exceed six months starting from the zero date for restoration work.

It was pointed out that as per CERC (Terms and Conditions of Tariff) Regulations, 2014, the restoration time shall be considered in accordance with the CERC (Standard of performance of inter- state transmission licensee) regulations, 2012. Accordingly, the restoration time for tower after collapse in the river bed shall be 50 (Fifty) days and for any further relaxation in restoration period, the transmission licensee should approach to CERC.

After detailed deliberations the Committee recommended the followings:

- i) Based on the facts provided by Powergrid, the above outage may be considered under the category of acts of God and force majeure events beyond the control of the transmission licensee.
- ii) The Circuit-2 of 400 kV D/C (Quad) Patna-Kishanganj line with reduced loading capacity may be considered as available w.e.f. 16.01.2019.
- iii) Considering the continuous erosion due to change of course of river Ganges since last few years, the transmission line needs to be diverted from the present river crossing to avoid the above threat.
- iv) Keeping in view of all the facts, the zero date for commencement of the final restoration work may be considered as one month from the date of restoration of 2<sup>nd</sup> Circuit for completion of approach road and arrangement of other logistics etc. for initiating the final restoration work i.e. 15.02.2019.
- v) The reasonable restoration time allowable should not exceed six months from the zero date for restoration work.

### **Item No. 3. Outage of 400 kV D/C New Ranchi- Chandwa T/L—Powergrid**

On 08.01.2019, New Ranchi -ChandwaCkt-1 tripped at 22:33 hrs on R-N fault. The fault distance was approximately 20 kms from New Ranchi end. Upon patrolling on early morning of 09.01.2019, it was found that miscreants had attempted theft of conductor by cutting the hanger of Ckt-1 bottom phase at loc. No. 46 of said T/L. It was ascertained that the hanger of the bottom conductor was cut by the miscreants on charged line condition and fall of the same had caused the said tripping. The above was also informed to the local Police department.

Power flow in the 400 kV New Ranchi- Chandwa Ckt-1 could be restored on 14.01.2019, 02:39hrs after restoration of the line. Total outage period of the said line due to the afore mentioned sabotage and restoration thereof is 124 Hrs and 6 mins which same may be considered as force majeure, for the purpose of calculation of Availability.

### **Deliberation in the meeting**

Powergrid gave a detail presentation regarding the cutting of the hanger of Ckt-1 bottom phase at loc. No. 46 of 400 kV D/C Ranchi-Chandwa line. The Presentation is enclosed at **Annexure-IV**.

After detailed discussion the committee members felt that the above outage may be considered under the category of force majeure events beyond the control of the transmission licensee. However, the allowable restoration time in accordance with the CERC (Standard of performance of inter- state transmission licensee) regulations, 2012 shall be three (3) days.

**Item No. 4: Outages of the transmission elements due to fault in Substation or bays owned by transmission licensees**

In the event of fault in Substation or bays owned by transmission licensees causing outages of the transmission licensee's elements, Treatment of such outages of the transmission licensee's elements.

**Deliberation in the meeting**

After detailed deliberation, it was decided the outages period in the event of fault in Substation or bays owned by transmission licensees causing outages of the same transmission licensee's elements, shall be attributed to transmission licensee because it is the duty of transmission licensee to maintain the Substation or bays in healthy condition. However, if the fault is in the sub-station or bays owned by other transmission licensee, the outage shall be treated under the category of outage due to others.

**Item No. 5. Outage due to Miscreants**

The failure of insulators due to damage by miscreants has given at **Annexure-V**.

**Deliberation in the meeting**

It was decided the outages caused due to negligence in maintenance by the licensee shall be attributed to transmission licensee since it is the duty of transmission licensee to maintain the Substation, bays and lines in healthy condition. However, in cases of areas where the licensee could not approach due to administrative/security reasons, the committee felt that such outages may be considered force majeure events beyond the control of the transmission licensee. But, the onus of satisfying that the area where the aforesaid events occurred was not administratively approachable shall rest with the transmission licensee.

The allowable restoration time shall be considered in accordance with the CERC (Standard of performance of inter- state transmission licensee) regulations, 2012.

The meeting ended with thanks to Chair.

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Participants in the 1st Meeting of the Committee for Analysing Major Transmission element Outages

Venue: ERPC Conference Hall, Kolkata

Time: 11:00 Hrs.

Date: 13.02.2019 (Wednesday)

Sl. No.	Name	Designation & Organisation	Contact No.	E-mail Id	Signature
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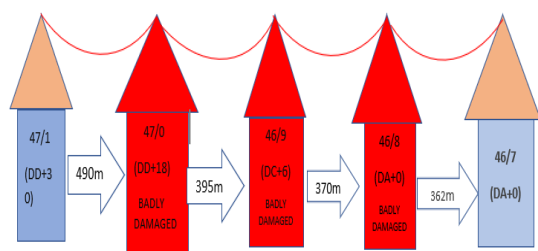




### ENICL Incident report: - 10-Aug-2018

**Sterlite Power**

- ENICL 400kV D/C Purnia-Biharsharif line tower collapse on dated 10.08.2018 at 10:28 due to change in course of river Ganga & water flow with high velocity near the tower location which lead to collapse of tower 47/0 tower type is DD+18



PB LINE 400KV D/C TOWER WISE DRAWING



## Photos & News paper cutting



होम बिहार बेगूसराय

### शाम्हो दियारा के खेतों में फैला गंगा का पानी

हिन्दुस्तान टिम, बेगूसराय

Last updated: Fri, 10 Aug 2018 08:32 PM IST

Google द्वारा विज्ञापन बंद कर दिया गया

यह विज्ञापन देखना बंद करें

Google द्वारा विज्ञापन ①

प्रखंड के दियारा क्षेत्रों में गंगा नदी के जलस्तर में तेजी से वृद्धि हो रही है। वहीं दूसरी ओर किउल नदी का जलस्तर भी बढ़कर खेतों तक पहुंच गया है। गंगा और किउल नदी के बढ़ने की वजह से परबल, मक्का समेत कई फसल बर्बाद होने लगी है। इस वजह से किसानों की सैकड़ों एकड़ फसल डूबने से लाखों रुपये की लागत पूंजी भी डूब गई है। गंगा नदी किनारे में तेजी से कटाव की वजह से किसानों की जमीन गंगा नदी में बिलीन हो रही है।

किसान बिट्टू कुमार, गुड्डू कुमार, फुलचु बिंद, सुखो बिन्द आदि ने बताया कि जलस्तर बढ़ने से परबल गंगा नदी में समा गया है। इस बार किसानों को लागत पूंजी भी नहीं मिल पायी। किसानों ने प्रखंड के अधिकारियों से मुआवजा की मांग की है।

*New paper cutting*

4

## Photos before Tower collapse



5

### Photos of Collapsed/Missing Tower

10/08/2018



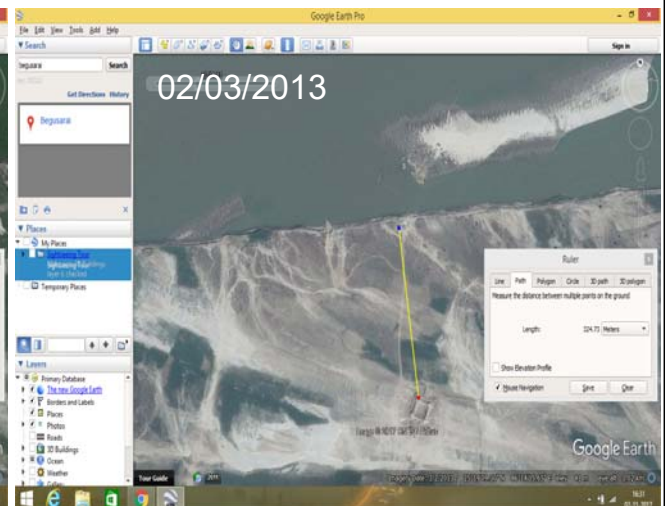
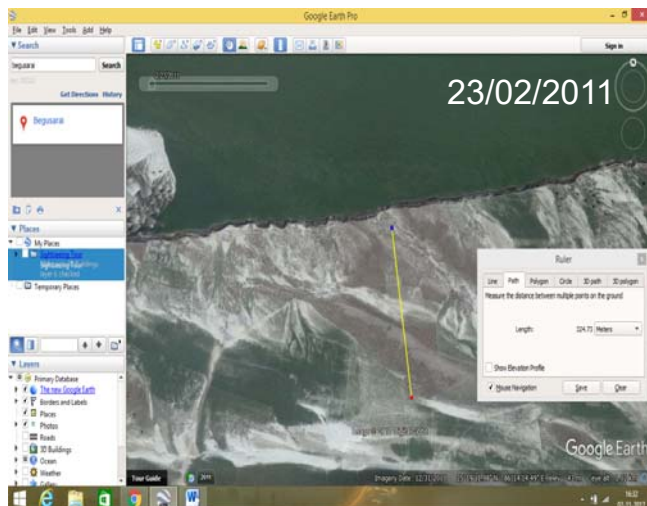
10/08/2018



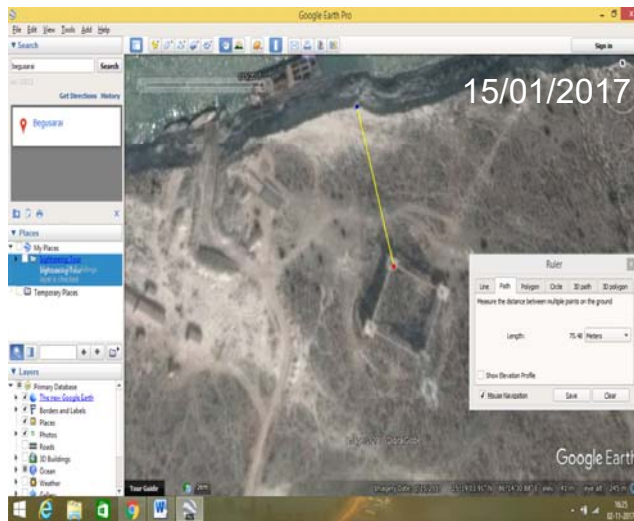
12/08/2018



### Change in River Course google earth data



## Change in River Course google earth data



### Distance between Tower (47/0) & River Bank

23/02/2010 distance is 324Mtr

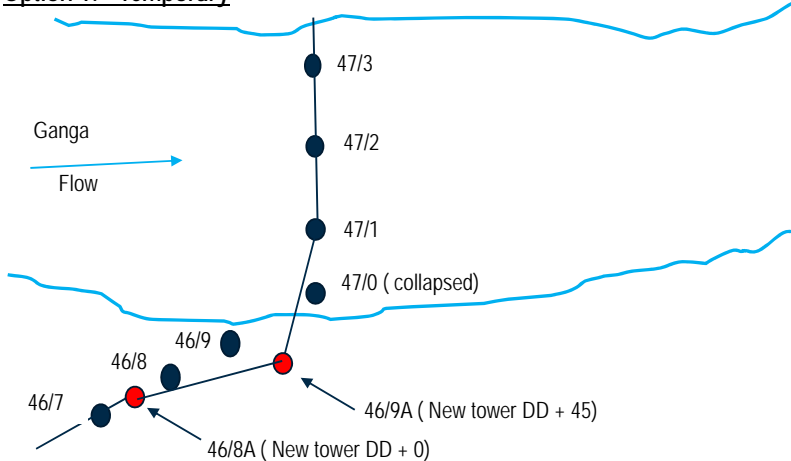
02/03/2013 distance is 324Mtr

15/01/2017 distance is 75Mtr

10/08/2018 distance is comes inside main river Bed

## Restoration Option

### Option 1: - Temporary



- De-string from 46/9 and dismantle 46/9 as the tower is very unstable.
- Install a DD+45 tower (46/9A) between 46/9 and 46/8 in alignment with 46/7.
- Install a new tower in line with between 46/7 and 46/8 in line with 46/7
- Connect from 47/1 to 46/9A ( new), 46/9A to 46/8A and 46/7 to 46/8A (new)
- Only twin HTLS conductor is proposed as it is only temporary arrangement. Twin HTLS is capable of carrying the same load equivalent to Quad AAAC.

### Situation at site for 46/9 & 46/8 on 20/08/2018



47/0 on 06/08/2018

- Span Between 47/0 & 46/9 is 395Mtr as per Tower Schedule.
- On dated 06.08.2018 distance between 46/9 to River bank is 395Mtr.
- On dated 19.08.2018, distance between 46/9 to River bank is 0.0Mtr.



46/9 on 19/08/2018;  
14:00



46/9 on 19/08/2018  
13:00



### 46/9 Tower collapse on 21.08.2018



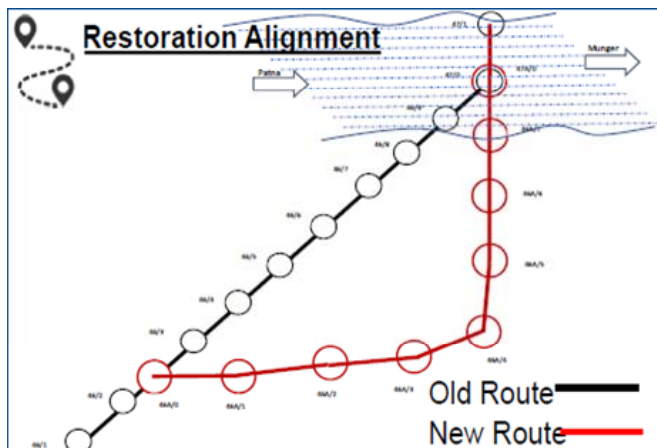
Due to further change in course of river Ganga, with high velocity & heavy water flow further more soil erosion occurred which lead to collapse of one more tower which was earlier situated on land and distance from river bank is 395Mtr on dated 06.08.2018

In view of the fact that there is too much erosion of the river bank due to change of course of river Ganga, the nine towers from 46 to 47 are under threat of collapse in the next few years. To mitigate the same, the Option: -2 scheme is proposed:



## Permanent Restoration Plan due to 46/9 Collapse

### Option 2: - Permanent restoration

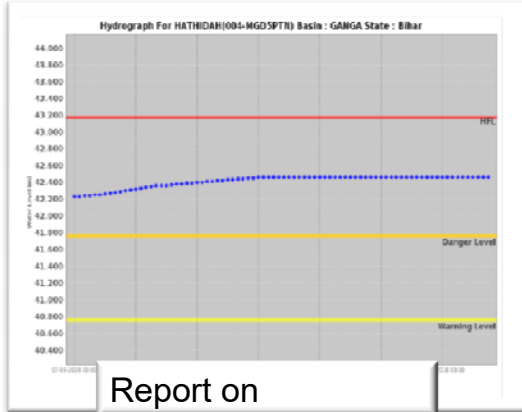


- Dismantle 46/9 & 46/8 (collapse Tower) due to further change in course of river
- New River crossing width considered : 4750 Mtr earlier it was considered as 3250Mtr
- Installing Four more new tower in Pile foundation(47/0A , 46/9A , 46/8A and 46/7A) to prevent it from same incident because of soil erosion.
- Further more installation of five more new tower in open cast foundation will be aligned to existing line on the right bank along with pile foundation.
- Restoration & construction of the same will take more than 9 month.
- Also we have to dismantle the existing tower from 46/3 to 46/7.

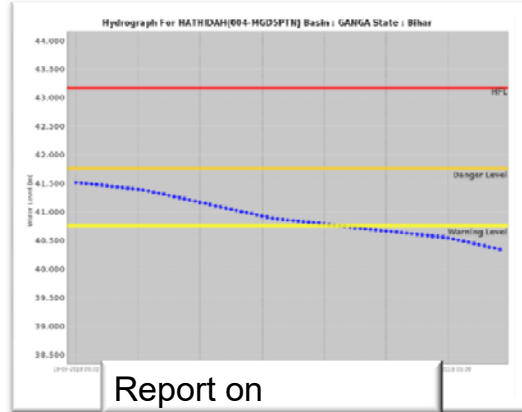
## Progress Till Date

- Approach to site location could be possible only after the water receded from the site location.
- Receding of water from site location started on dated 22-09-2018, but still the site was full of mud and water logging due to rainfall, in that situation approach to site was difficult.
- Rectification of approach road was started from 14-10-2018, temporary approach road to site location was completed on 15-12-2018, Strengthen of approach road completed on 13-01-2019.
- Parallel activities started Opening of spacers, De-stringing, De-erection of damaged tower started from 15-10-2018.
- Total number of days hampered due unfavorable condition (Heavy water flow) at site is 127 days,(from 10.8.18 to 15.12.18).
- MAIT machine mobilized at site for pile foundation on dated 01-01-2019.
- Second MAIT machine mobilized at site for pile foundation on 10-01-2019
- Check survey for 4 Pile & 5 open cast foundation for re-routing of line completed on 19-01-2019.
- First Open cast tower excavation work started on 16-01-2019.
- Foundation work for First open cast started on 22-01-2019 and completed on 09-02-2019.
- Second Open cast tower excavation work started on 30-01-2019.
- Pile foundation work (Liner driving) started on 23-01-2019
- Excavation work for second Pile started on 02-02-2019.

### Hydrograph Report



Report on  
10.09.2018



Report on  
22.09.2018



### Site condition photo's



11.10.2018



Location No- 16/B

24.09.2018



13.10.2018



**Photograph of restoration activity:-**



**Plie foundation & Open Cast foundation status :-**





## Permanent restoration schedule

S.No	Activity	Start Date	End Date	Remarks
1	Tower Dismantling & Conductor De-Stringing (Water Logging @ site)	10.08.2018	15.10.2018	Tower Collapse Date, Tower Dismantling & De-stringing
2	Detail Survey ,Profiling , Tower Spotting, Bathymetry, River Velocity & Soil Investigation	06.11.2018	31.12.2018	Completed
3	Approach Road Construction work	16.10.2018	13.01.2019	Completed
4	Site Mobilization of Construction Manpower + Heavy Machines	14.01.2019	22.01.2019	M/c (MAIT, Crane, Vibro etc.) reached at site
5	Open Cast Foundation 46/6A	23.01.2019	09.02.2019	Completed
6	Open Cast Foundation 46/6B	30.01.2019	17.02.2019	
7	Open Cast Foundation 46/5A	13.02.2019	05.03.2019	
8	Open Cast Foundation 46/4A	15.02.2019	07.03.2019	
9	Open Cast Foundation 46/3A	17.02.2019	10.03.2019	
10	Erection + Stringing (46/3A,46/4A,46/5A,46/6A,46/6B)	11.03.2019	10.04.2019	
11	Pile Foundation 46/9A (Land)	23.01.2019	15.03.2019	
12	Pile Foundation46/8A (Land)	16.03.2019	15.04.2019	
13	Pile Foundation46/7A (Land)	16.04.2019	15.05.2019	
14	Land Towers : Erection + Stringing (46/9A,8A & 7A)	16.05.2019	15.06.2019	
15	Pile Foundation 47/0A (River)	05.02.2019	30.06.2019	WIP (Modification of Barges->Mobilization of Barges->Liner Driving->Boring->Cage Lowering->Casting)
16	River Tower : Erection + Stringing (47/0A)	01.07.2019	29.07.2019	
17	Signature analysis	29.07.2019	30.07.2019	
18	Charging	31.07.2019	31.07.2019	

Thank you

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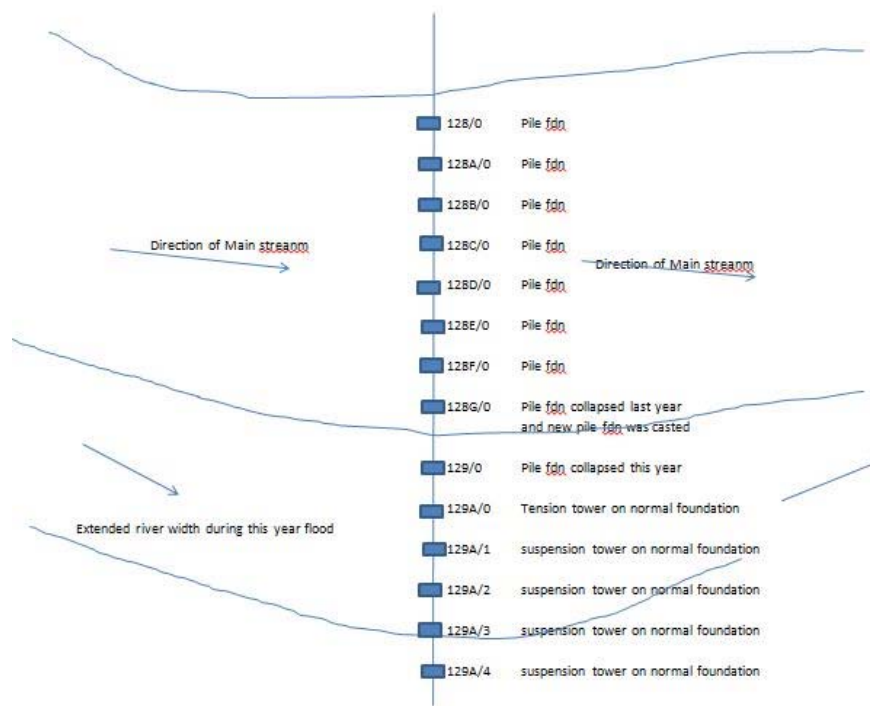
## TOWER COLLAPSE/ FAILURES IN 400 KV D/C (Quad) PATNA-KISHANGANJ TRANSMISSION LINE OF POWERGRID

### 1.0 BACKGROUND

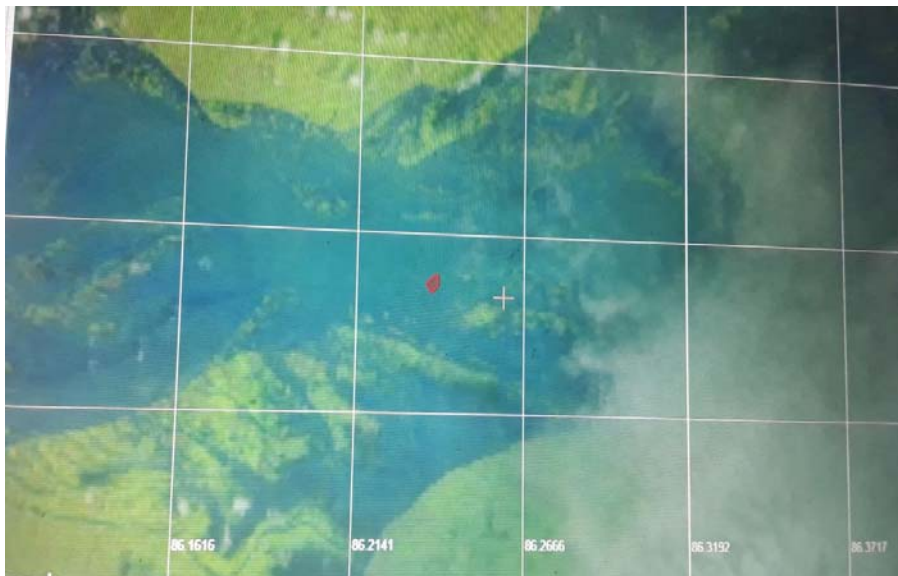
- 1.1 400 kV D/C (Quad) Patna-Kishanganj transmission line tripped at 0:32 Hrs. on 02-09-2018 due to collapse of one no. tower at pile foundation location no. 129/0 (DD+9) due to soil erosion by river Ganga during the heavy flood. The nearby location at loc no.-129A/0(DD+0) which is on normal open cast foundation has also come almost in the main course of river.

### 2.0 Brief History

- 2.1 400 kV D/C (Quad) Patna-Kishanganj transmission line constructed by M/s. EMC Ltd. was commissioned in Feb-2016. There are nine (9) nos. of pile foundations in Ganga River Crossing stretch in this line. Failed tower location no. 129/0 (DD+9) is the last pile foundation location towards Patna side. The pile foundation works for the line was executed by M/s Simplex Ltd. A schematic representation of plan indicating affected location on piles and normal foundation is shown below.



- 2.2 During heavy flood in Sept-2016, five nos. towers on pile foundations collapsed/damaged including the present affected location no. 129/0. It is be mentioned here that during 2016 flood, pile foundation at location no.-128G/0 was also damaged and tower was shifted at new location on pile foundation. Further, in view of continuous bank erosion towards Patna side and imminent threat to location no-129/0 which was at that time approximately 300m away from river bank, a regional committee was constituted in May'18 to review the tower foundation and suggest remedial measures if any required for protection of this location. Based on the recommendation of regional committee and as pile foundation for location no-129/0 was designed considering required river parameters, no action was taken for protection of foundation.
- 2.3 Analysis of Google Map for the change in river course during last five years at the crossing locations has also been done. From the analysis, it is clear that there is continuous river bank erosion towards Patna side bank and the distance of river course from bank location no. 129/0(tower no. 568) has reduced from 576m in Feb-2013 to 105m in Dec-2017. Further, satellite map of 10<sup>th</sup> Sept-2018 shown below also highlights the heavy soil erosion towards the collapsed tower location (marked as red dot).



### 3.0 Observations:

#### 3.1 General observations:

- a. Affected locations are on the river bank towards Patna. The locations are about 10km north of Suryagraha(Lakhisarai) and can be approached by travelling on road for 3-4km and beyond that by boat. It was observed that river flow has been channelized around

location no. 129A/0, 129A/2, 129A/3 & 129A/4 also in addition to main river course. Other nearby locations (129A/5 and beyond) were partly/fully submerged in flood water (approx. 0.5 to 1 m). However, there was no flowing river around these locations. The normal approach road towards loc. no.-130/0 was also submerged and only a portion of fly-over above flood water on the road is visible. At present, the nearby area is completely flooded and crops/trees could be seen submerged in water. After discussion with the local people in the nearby villages, it was gathered that every year the river course is changing towards right bank (towards Patna). Photographs indicating flood affected nearby areas is attached at **Annex-I**.

- b. 400kV D/C Quad Biharsarif-Purnia TL constructed by M/s Sterlite is running almost parallel to POWERGRID line (at a distance of about 400m). It was informed that two towers, one on pile foundation and other on normal open cast foundation of this line have also collapsed during this flood.

**3.2 Tower Spotting Details: The details of tower spotting in the relevant affected portion are as follows:**

Sl. No.	Loc. No.	Type of Tower	Forward Span (m)	Angle of Dev.	Foundation Type	Remarks
1	128F/0	DD+25	600	0° 0' 0"	Pile fdn	Old pile Fdn in the main river course
2	<b>128G/0</b>	<b>DD+25</b>	<b>270</b>	--	<b>Pile fdn</b>	<b>New pile Fdn in the main river course</b>
3	<b>129/0</b>	<b>DD+9</b>	<b>398</b>	17°44'27"RT	<b>Pile fdn</b>	<b>Collapsed tower loc.</b>
4	<b>129A/0</b>	<b>DD+0</b>	<b>395</b>	05°06'36"RT	<b>Open cast fdn</b>	<b>Loc. is on the island within extended river course. Tower is submerged approx. 1m in water</b>
5	<b>129A/1</b>	<b>DA+3</b>	<b>395</b>	--	<b>Open cast fdn</b>	<b>Loc. is on the island within extended river course. Tower is submerged approx. 1m in water</b>
6	<b>129A/2</b>	<b>DA+0</b>	<b>395</b>	--	<b>Open cast fdn</b>	<b>Loc. is on the island within extended river course</b>
7	<b>129A/3</b>	<b>DA+3</b>	<b>395</b>	--	<b>Open cast fdn</b>	<b>Loc. is on the island within extended river course</b>

8	129A/4	DA+0	395	--	Open cast fdn	River is flowing near edge of water
9	129A/5	DA+3	395	--	Open cast fdn	submerged area
10	129A/6	DA+0	398	--	Open cast fdn	submerged area
11	130/0	DD+09		44°42'52"LT	Open cast fdn	submerged area

### 3.3 Location Specific Observations:

**Loc. no.128G/0(DD+25):** This tower is in mid-stream on newly constructed pile foundation. The earthwire peak and one side of bottom cross arm has been damaged. The damage is because of pulling of conductor/earthwire due to tower collapse at loc no. 129/0.

**Loc. no.129/0(DD+9):** This tower was erected on pile foundation and it was the last pile foundation out of total nine pile foundations casted in this river stretch. The tower has collapsed completely and is fully submerged under water. The location is in main course of the high speed river flow. The deposition of debris from flowing water over tower peak could be seen. This location couldn't be reached during committee visit due to heavy current in the river and the observations were made from approx. 300 meter away from location no. 129/0.

**Loc. no.129A/0(DD+0):**Tower at Location no. 129A/0 is constructed on normal open cast foundation. One side of bottom cross arm has been damaged due of pull of conductor towards collapsed tower loc no. 129/0. At present the location is almost on the edge of an island towards the main river course. Bottom about 1m portion of the tower is under flood water. The foundation at this location has also become susceptible to failure due to eminent soil erosion by the main river course.

**Loc. no.129A/1(DA+3), 129A/2(DA+0), 129A/3(DA+3) & 129A/4(DA+0):** Bottom portion of towers (about 1m) at location no.-129A/1, A/2 & A/3 is submerged in flood water. Location no-129A/4 has also come perilously close to river flow. The river has formed flow channels around these locations and all the above foundations have become vulnerable to failure.

**Loc. no. 129A/5 and beyond:** All the towers from 129A/5 and beyond (Approx. ten numbers)were submerged in standing flood water (from 0.5 m to 1.0 m). There was no flow of river water around these locations and there seems to be no threat from flood to these locations.

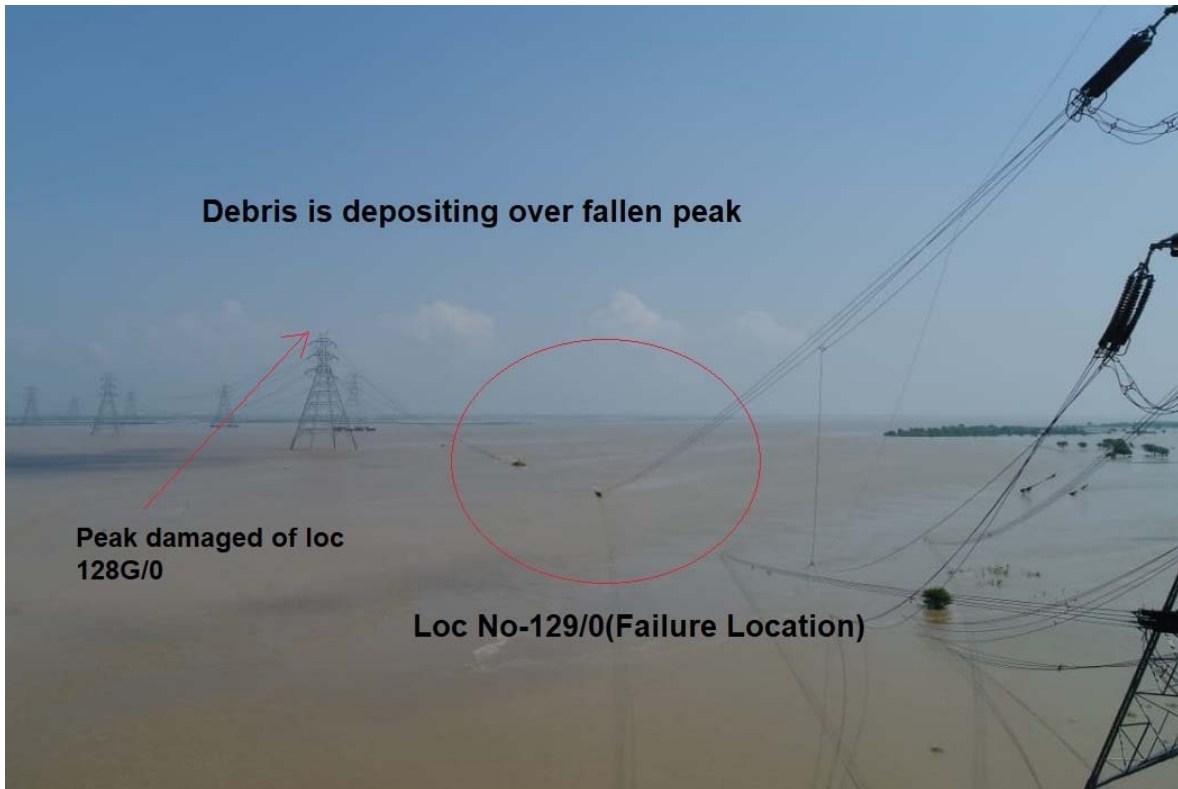
### **3.4 Damage to other infrastructure in the vicinity:**

- a. During committee visit, it was observed that lot of trees and houses in the areas near tower locations were submerged in flood water.
- b. Flood and its impact has also been reported in newspaper (paper clipping attached)

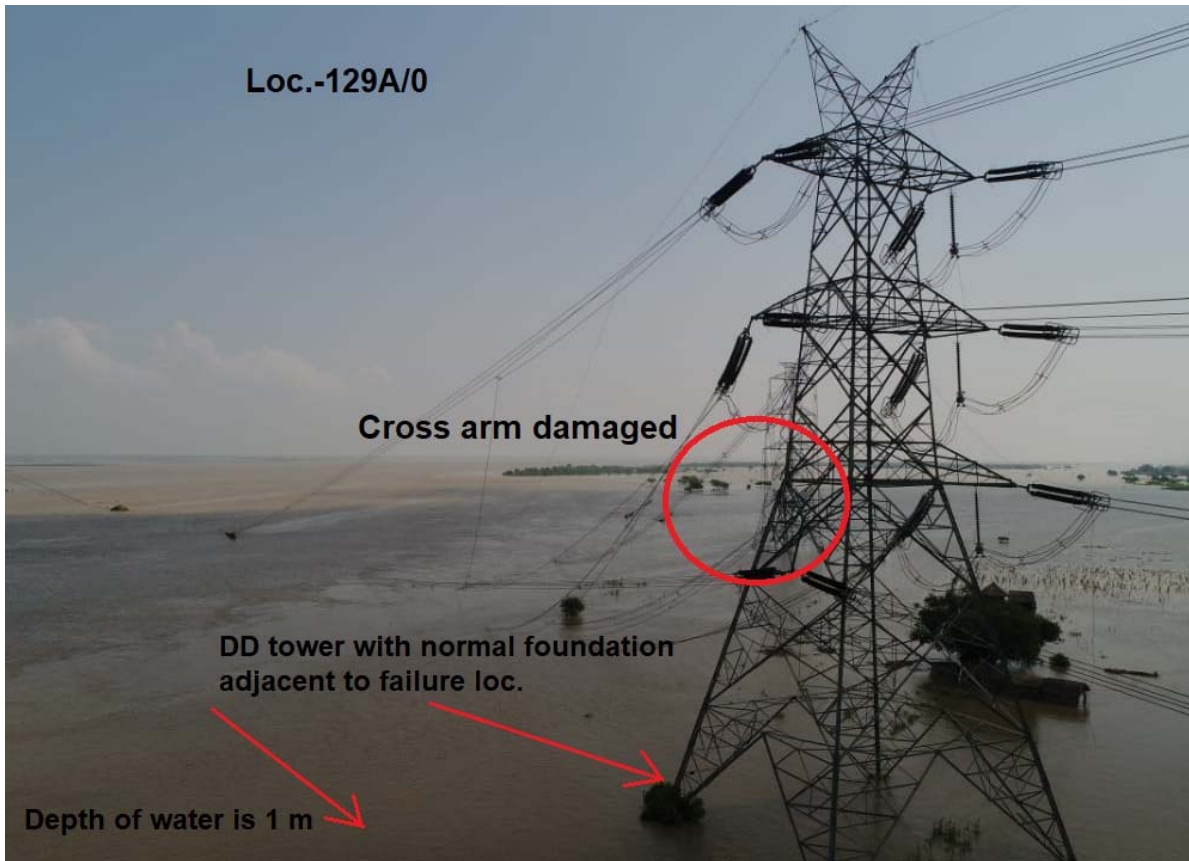
**3.5** Photographs of collapsed towers, damage to trees and newspaper clips are enclosed at annexure –I.

### **4.0 Restoration Plan**

The tower failure location is still in the heavy current of river. The actual damage has been assessed. The entire pile has been damaged and required to be re-casted new pile foundation. In addition to safeguard the line seeing the tendency of change of course of river Ganga and encroaching the right bank, an expert committee has been advised to divert the line on at least on four nos on pile foundation on right bank. For permanent restoration of the line, the 04no piles is being re-casted including one no pile in midstream in Ganga River. The minimum time period for casting the 04 no piles and the restoration of the line may take one year and even more.



Tower at Loc. No. 128G/0 & 129/0

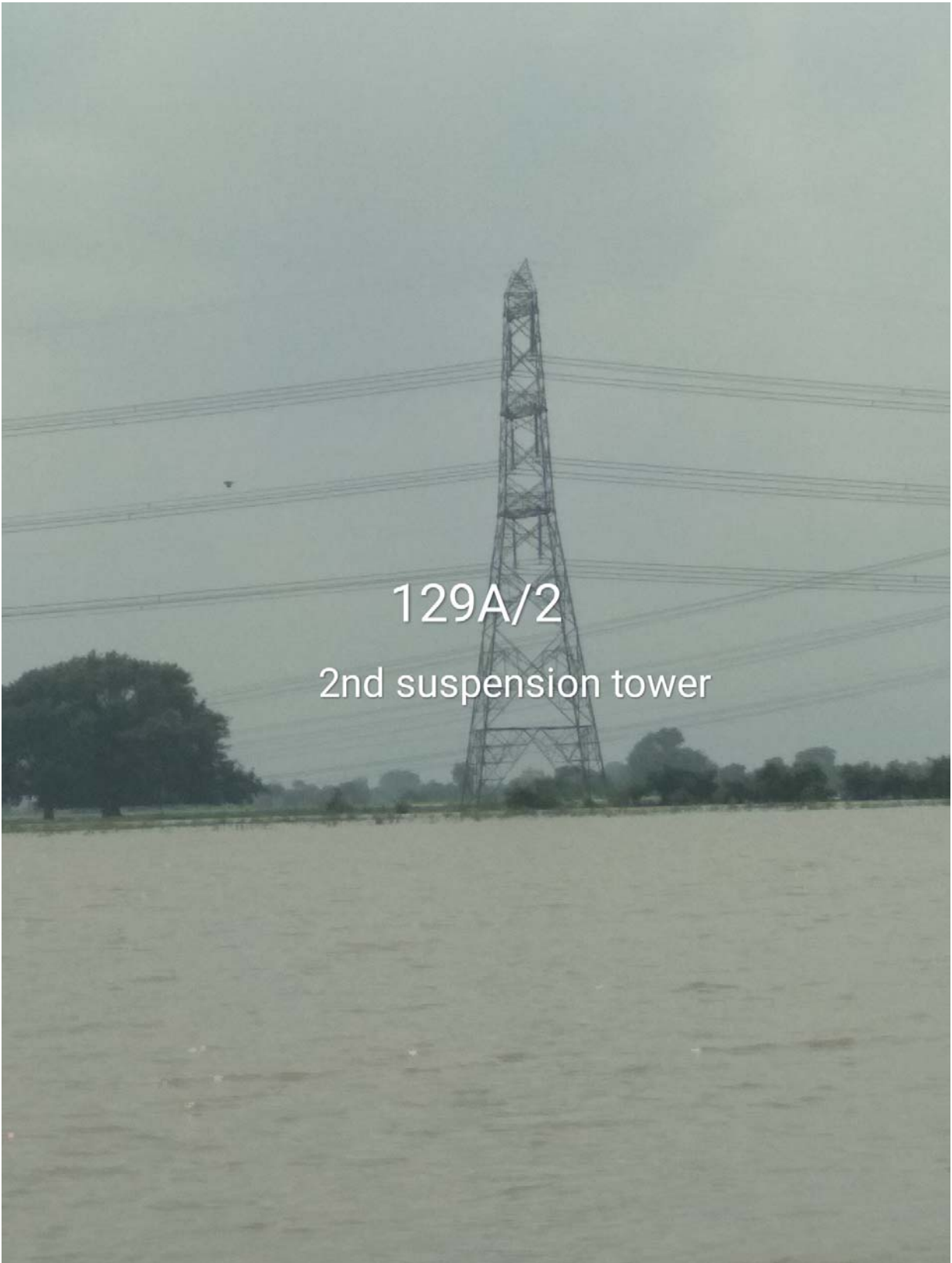


Tower at Loc. No -129A/0



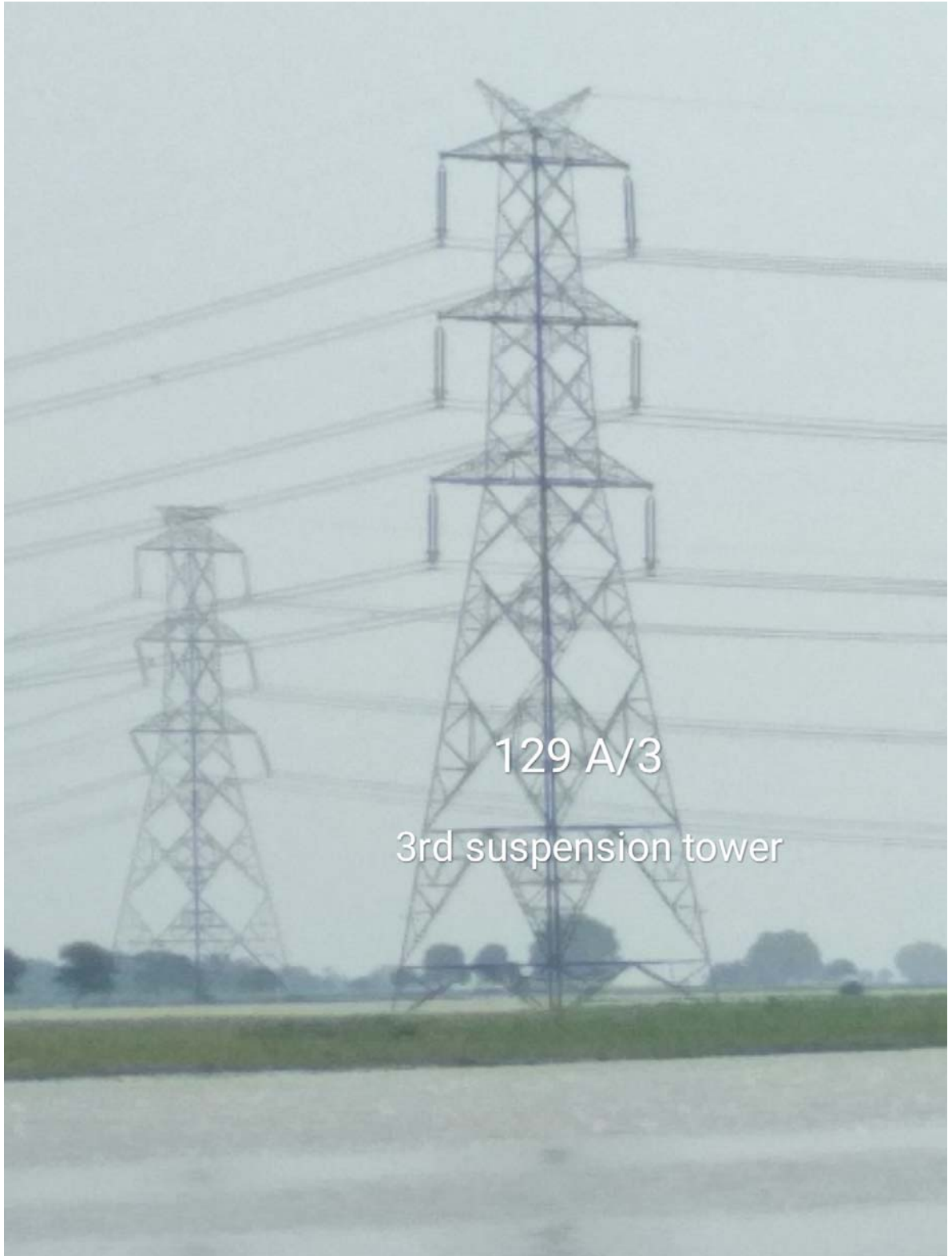


**Tower at Loc. No. 129A/1**

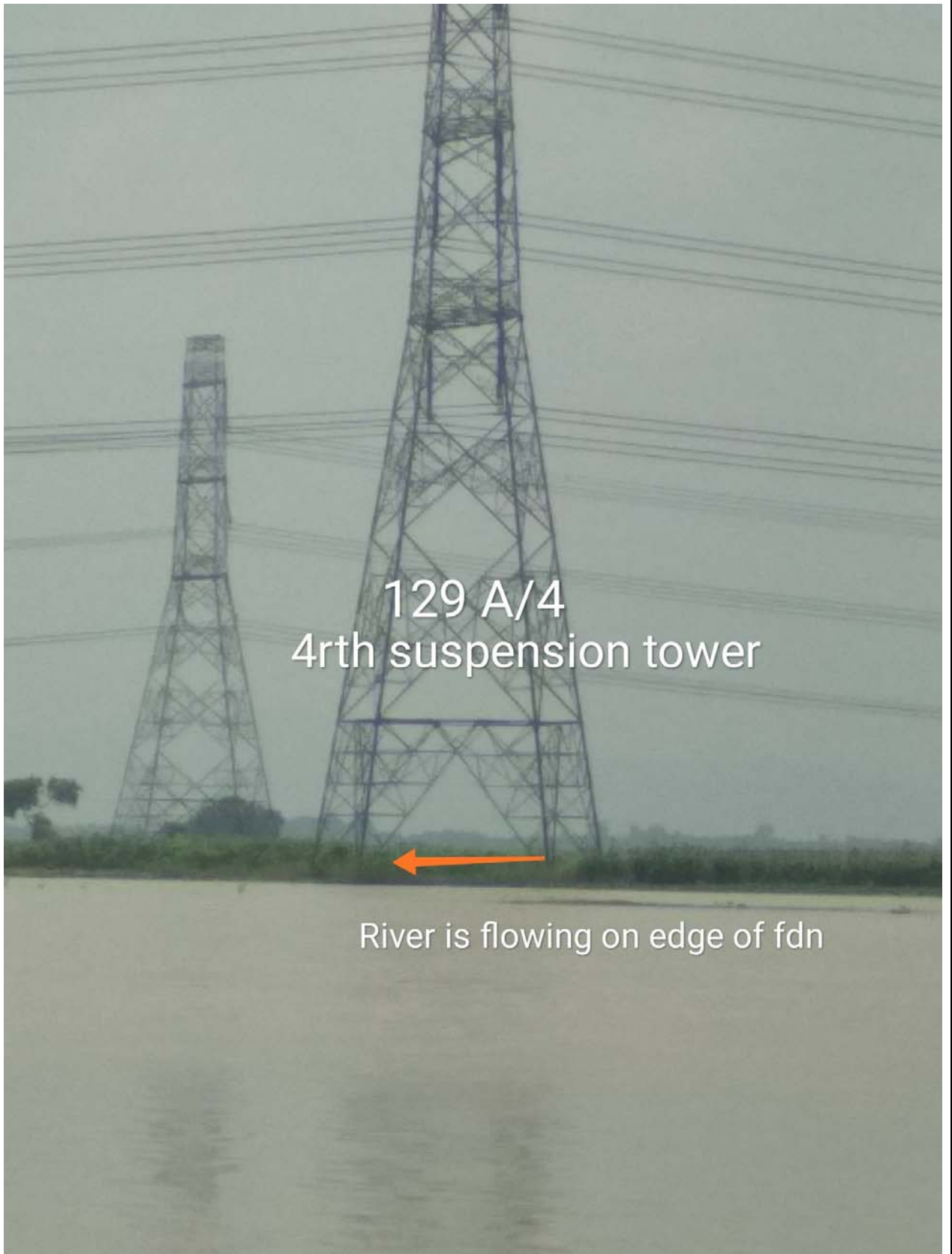


129A/2  
2nd suspension tower

**Tower at Loc. No. 129A/2**



**Tower at Loc. No. 129A/3**



**Tower at Loc. No. 129A/4**



News paper dated 08.09.18

# Sabotage of 400 kV D/C New Ranchi- Chandwa T/L

Presentation by-  
POWERGRID/ERTS-I

## Sabotage of 400 kV D/C New Ranchi- Chandwa T/L : Incident Cronology

- On 08.01.2019, New Ranchi-Chandwa Ckt-1 tripped at 22:33 hrs on R-N fault. The fault distance was approximately 20 kms from New Ranchi end.
- Upon patrolling on early morning of 09.01.2019, it was found that miscreants had attempted theft of conductor by cutting the hanger of Ckt-1 bottom phase at lo. No. 46 of said T/L.



## Sabotage of 400 kV D/C New Ranchi- Chandwa T/L : Incident Cronology (contd..)

- It was ascertained that the hanger of the bottom conductor was cut by the miscreants on charged line condition and fall of the same had caused the said tripping.

- The bottom phase insulator string got completely damaged and snapping of the conductors of the bottom phase also happened subsequently.



## Sabotage of 400 kV D/C New Ranchi- Chandwa T/L : Incident Cronology (contd..)



### Sabotage of 400 kV D/C New Ranchi- Chandwa T/L : Incident Cronology (contd..)

- The snapping of the bottom phase conductor resulted in causing consequential damage to 10 spans of the bottom phase of the said line.

- However, as the patrolling team reached the site early in the morning, the miscreants could not cause any further damage to the line and fled away.



### Sabotage of 400 kV D/C New Ranchi- Chandwa T/L : Incident Cronology (contd..)

- The sabotage was caused at loc. no. 46 situated at Village-Sukhra, PS- Narkopi, Bedo.

- 
- A FIR regarding the sabotage caused by miscreants in the said line was lodged with the Bedo Police Station on 09.01.2019.





### **Sabotage of 400 kV D/C New Ranchi- Chandwa T/L : Action Taken**

- The restoration of the said line was taken up immediately on War footing.
- All Hardware Fittings in between location no. 40 to 49 was damaged due to the sudden jerk of conductor.
- Accordingly, T & Ps were arranged at site on immediate basis and the Bottom Conductor at location no. 46 was repaired including replacement of all hardware fittings and spacers in between location no. 40 to 49 in the 400 kV New Ranchi- Chandwa Ckt-1.

### **Sabotage of 400 kV D/C New Ranchi- Chandwa T/L : Action Taken (contd..)**

- Power flow in the 400 kV New Ranchi- Chandwa Ckt-1 could be restored on 14.01.2019, 02:39 hrs.
- Total outage period of the said line due to the aforementioned sabotage and restoration thereof is 124 Hrs and 6 mins (i.e from 08.01.19; 22:33 hrs to 14.01.2019; 02:39 hrs).

## **Sabotage of 400 kV D/C New Ranchi- Chandwa T/L : Submission**

- Plea:
  - As the breakdown/ tripping of the 400 kV New Ranchi- Chandwa Ckt-1 and consequential damage to the transmission line was caused by the miscreants, the outage period from 08.01.2019; 22:33 hrs to 14.01.2019; 02:39 hrs necessitated for restoration of the same may be considered as force majeure, for the purpose of calculation of Availability.

**Thank You**

## Annexure-V

### various Outages due to Miscreants

October'18								
400KV KODERMA BOKARO-1	10/10/18 09:12:00	10/10/18 18:52:00	0:00:00	0:00:00	9:40:00	0:00:00	LMAC	S/D TAKEN FOR REPLACEMENT OF INSULATOR DAMAGED BY MISCREANTS. THE LINE PASSING THROUGH THE DENSED FOREST AND NAXAL PRONE AREA.
400KV KODERMA BOKARO-2	11/10/18 09:07:00	11/10/18 16:44:00	0:00:00	0:00:00	7:37:00	0:00:00	LMAC	S/D TAKEN FOR REPLACEMENT OF INSULATOR DAMAGED BY MISCREANTS THE LINE PASSING THROUGH THROUGH THE DENSED FOREST AND NAXAL PRONE AREA.
400KV KODERMA GAYA-1	31/10/18 09:37:00	31/10/18 19:58:00	0:00:00	0:00:00	10:21:00	0:00:00	LMAC	S/D TAKEN FOR REPLACEMENT OF INSULTAORS DAMAGED BY MISCREANTS.THE LINE PASSING THROUGH THROUGH THE DENSED FOREST AND NAXAL PRONE AREA.

November'18								
400KV-DURGAPUR -JAMSHEDPUR-1	22-11-2018 10:02	22-11-2018 16:31	0:00:00	0:00:00	6:29:00	0:00:00	LMAC	Shutdown taken for attending insulator replacement work at Loc. No: 274 which was damaged by miscreants.
400KV GAYA MAITHON-2	20/11/18 09:45:00	20/11/18 20:40:00	0:00:00	0:00:00	10:55:00	0:00:00	LMAC	S/D TAKEN FOR REPLACEMENT OF INSULTAORS DAMAGED BY MISCREANTS.
400KV GAYA MAITHON-2	02/11/18 09:07:00	02/11/18 19:05:00	0:00:00	0:00:00	9:58:00	0:00:00	LMAC	S/D TAKEN FOR REPLACEMENT OF INSULAOTRS DAMAGED BY MISCREANTS.
400KV KHALGAON LAKHISARAI-1	22/11/18 09:28:00	22/11/18 19:07:00	0:00:00	0:00:00	9:39:00	0:00:00	LMAC	S/D TAKEN FOR REPLACEMENT OF INSULATOR BROKEN BY MISCRIENTS.
400KV KODERMA GAYA-1	20/11/18 09:48:00	20/11/18 20:29:00	0:00:00	0:00:00	10:41:00	0:00:00	LMAC	S/D TAKEN FOR REPLACEMENT OF INSULTAORS DAMAGED BY MISCREANTS.
400KV LAKHISARAI BIHARSARIF-1	21/11/18 09:15:00	21/11/18 18:03:00	0:00:00	0:00:00	8:48:00	0:00:00	LMAC	S/D TAKEN FOR REPLACEMENT OF INSULATOR B INSULATOR BROKEN BY MISCRIENTS.