

# North Eastern Regional Power Committee

## **MINUTES OF THE 48<sup>TH</sup> PROTECTION COORDINATION**

### **SUB-COMMITTEE MEETING OF NERPC**

Date of Meeting : 17/01/2018 (Wednesday)  
Time of Meeting : 10:30 hrs  
Venue : "Hotel Nandan", Guwahati.

The List of Participants in the 48<sup>th</sup> PCC Meeting is attached at **Annexure - I**.

Member Secretary, NERPC welcomed all participants and stressed the need for active participation of members from the constituents by emphasizing greater importance to the protection system problem in the region. He informed the forum that he attended the work shop on General Network Access organized by CERC on last week. He observed that there were active participation from states of other regions but no representative from states of NER were present. He observed that for technical issues which ultimately affects the States, the States are not much interested in providing feedback and comments.

He informed the forum that NERPC is trying very hard to provide all the latest developments to NER but the enthusiasm shown by NER states is very disheartening. He requested all the constituents of NER for adequate representation. He also requested SE(P), NERPC to write a letter to the head of department of all constituents to either review their membership to PCC sub-group or send proper representation to PCC sub-committee meeting. He then asked Shri L. B. Muanthang, SE(P), NERPC to take up the agenda for discussion.

#### **A. CONFIRMATION OF MINUTES**

#### **CONFIRMATION OF THE MINUTES OF 47<sup>TH</sup> MEETING OF PROTECTION SUB-COMMITTEE OF NERPC**

The minutes of 47<sup>th</sup> meeting of Protection Sub-committee held on 24<sup>th</sup> July 2017 at Guwahati were circulated vide letter No. NERPC/SE/PCC/2017/2565-589 dated 17<sup>th</sup> August 2017.

*As no comments/observations were received from any of the constituents, the Sub-Committee confirmed the minutes of 47<sup>th</sup> PCCM of NERPC*

#### **ITEMS FOR DISCUSSION**

##### **1. Third Party Protection audit of NER Sub-Stations**

In 47<sup>th</sup> PCC Meeting, after detailed deliberation, forum agreed to carry out 3rd party protection audit in substations and generating stations suggested by sub group. Considering the fact that minimum 3 days are required for audit of one station and 5 months required for completion of

1st phase of Audit. It was also decided to form different groups of nearby sub-stations/Power Stations which are to be audited to reduce travel time.

The audit will start from first week of August, 2017 and will cover 1/3rd of NER substation. NERLDC requested the forum that next phase of protection audit may be outsourced, for which funds may be arranged from PSDF. Member Secretary, NERPC informed the forum that getting fund from PSDF is a lengthy process. So the constituent may continue the present process of auditing by constituents.

**The 1st phase of 3rd Party Protection Audit of NER substations has been completed on 29.11.17. 69 Nos. of Substations has been audited in the 1st phase. Subgroup appreciated the support and commitment of all the utilities in making the 1st phase of the Protection Audit a success.**

In the subgroup meeting on 6th Dec'17, after detailed deliberation, it was decided to form a committee to study the protection audit findings and data collected from site. Members of the committee are as follows:

Sl. No	Name	Organization	Contact No
1	H. Talukdar (Team Leader)	POWERGRID	09436335237
2	S. K Singh	POWERGRID	09435706099
3	Bikram Bordoloi	AEGCL	09435558545
4	Abhishek Kalita	AEGCL	08486213068
5	Joypal Roy	NEEPCO	09435577726
6	Ashim Kr. Sarmah	NEEPCO	09435078860
7	Ban Nikhla	MePTCL	09436314163
8	A G Thum	MePTCL	09774664034
9	C B Thapa	POSOCO	07002018913
10	Jerin Jacob	POSOCO	09402120113
11	A. Agrawal	NERPC	08986666366
12	Sadiq Imam	NERPC	07424064484

Committee has to submit the final report by 15th Jan'18.

After detailed deliberation, substations to be audited in next phase were identified and referred to PCC Meeting. List of substations to be audited in the next phase is attached as Annexure B.1.A.

Under section 15.0.2 (ii) of draft standard for "Reliability Standards for Protection System", Periodic Protection Audit to be conducted once in a year for critical substations as listed by

RPC and once in four years for other substations according to schedule prepared by RPC.

After detailed deliberation, subgroup identified the critical substations of NER and referred to PCC forum. List of identified critical substations is attached as Annexure B.1.B.

1st meeting of committee for preparation of final report of 3rd Party Protection Audit was held on 8th Jan'18 at NERLDC, Shillong. The relay setting calculation as per Ramakrishna Task Force Recommendations was practiced for the following lines by members from different utilities:

- a) 132 kV Khliehriat - Leshka at Khliehriat
- b) 132 kV AGTCCPP - Kumarghat line at AGTCCPP
- c) 220 kV Tinsukia - AGBPP D/C at Tinsukia
- d) 220 kV Mariani(AS) - Samaguri at Mariani
- e) 132 kV NEHU - Mustem at NEHU

The task of relay settings calculation and preparation of report was divided among the members as follows:

- a) POWERGRID: POWERGRID and Tripura Substations
- b) MePTCL: Meghalaya and Mizoram Substations
- c) AEGCL: Assam and Arunachal Pradesh Substations
- d) NERLDC: Manipur and Nagaland Substations
- e) NEEPCO: All ISGS

Finally, all the reports will be compiled for the final Committee Report of 1st Phase of Third Party Protection Audit. The committee members decided to start the work and target date of completion of report will be intimated in the PCC Meeting.

### **Deliberation in the meeting:**

The Forum decided that Report of 1st Phase of 3rd Party Protection Audit of NER Substations has to be completed by the Committee formed during Subgroup Meeting held on 06.12.17 by 31.01.18, only after which the 2nd Phase of 3rd Party Protection Audit shall be started. DGM, NERLDC informed the Forum that the report shall comprise of both recommendations as well as action plans. Corrective actions that are taken by Power Utilities against observations of audit team may be monitored in the PCC Meeting.

The Forum discussed the audit procedures followed for +/- 800 kV Biswanath Chariali HVDC Station as it is different from other substations. NERLDC expressed that the DC protection part is complex and would need more than 1 day to audit the entire Substation.

Member Secretary, NERPC requested POWERGRID to find out the audit procedures of other HVDC stations outside NER like +/- 500 kV Rihand – Dadri, +/- 500 kV Talcher – Kolar HVDC Station etc, which can be practiced in NER as well.

Member Secretary informed the forum that proposal has been sent recently for obtaining Protection Database Management System(PDMS) from PSDF. PDMS will comprise of mainly 2 parts: i) Collection of data from all stations of NER and ii) Collection of Settings. This will make

the auditing practice easier as unavailability of Data and Settings is one of the common issue that has been observed during 1<sup>st</sup> phase of 3<sup>rd</sup> Party Protection Audit.

Also, NERLDC informed the forum that as per draft "Reliability Standard for Protection System", periodic protection audit has to be conducted once in year for critical substation and once in four years other substations. Subgroup had discussed to find out the list of critical substations in the Meeting held on 6th December, 2017. After detailed deliberation, forum finalized the **critical substations of NER** and are as follows:

- a. POWERGRID: 400/220/33 kV Balipara, 400/132 kV Biswanath Chariali, 400/220/33 kV Bongaigaon, 400/220/33 kV Misa, 400/132/33 kV Silchar, 220/132 kV Dimapur, 220 kV Mariani (PG), 220/132 kV Salakati
- b. NEEPCO: 400/132 kV Ranganadi, 220/132 kV AGBPP
- c. OTPC: 400/132 kV Palatana
- d. NTPC: 400/220 kV BgTPP
- e. AEGCL: 400/220 kV Azara, 220/132/66/33 kV Agia, 220/132/33 kV BTPS, 220/132/66/33 kV Mariani, 220/132/33 kV Samaguri, 220/132/33 kV Sarusajai, 220/132 kV Sonabil
- f. MePTCL: 400/220/132 kV Byrnihat (Killing)
- g. TSECL: 132/33/11 kV Agartala (79 Tilla), 132/33 kV Surajmani Nagar

*The Sub-committee noted as above.*

**Action: All constituents.**

## **2. Identification of short lines to install line differential protection**

In 47th PCC Meeting, after detailed deliberation, it was decided that all utilities shall identify the short lines for installation of Line Differential Protection by 31st Jul'17. Power Utilities may refer List of Important Grid Element document which is available at NERLDC website (url: <http://www.nerldc.org/IE.aspx>) for identification of short lines.

Utilities shall furnish the list of short lines identified for installation of Line Differential Protection to NERPC/NERLDC along with availability of OPGW in the identified short lines. Member Secretary, NERPC informed that funding for installation of Line Differential Protection & OPGW can be awarded from PSDF for state utilities and PSUs may include these expenses in PoC Charges.

NERLDC informed the forum that approval is to be taken by concerned utilities from the forum, in special cases where line length is more than the approved criterion and repeated tripping occurs in account of over reach like 132 kV AGTCCPP-Agartala D/C etc.

NERPC informed that Meghalaya has already made the DPR for PSDF funding. Other state utilities are also requested to do the same. The forum really appreciated the effort made by MePTCL in preparing DPR for PSDF funding.

Comments were received from only Khandong, MePTCL & AEGCL even after repeated email communications on 25th Jul'17, 18th Aug'17 and 4th Oct'17.

Power utilities are requested to intimate the identified short lines for installation of Line

Differential Protection and availability of OPGW in the identified short lines.

Members may please review the Criteria of short lines for implementation of differential protection.

**Deliberation in the meeting:**

After detailed deliberation, it was decided to change the criterion for installation of Line Differential Protection (LDP) in 132 kV lines from 5 kms. to 10 kms to cover important lines of NER like 132 kV AGTCCPP – Agatala D/C. POWERGRID informed the forum that due to +/- 10 % Accuracy class of Instrument Transformer, over-reach issue exists in short lines like 132 kV AGTCCPP – Agatala D/C and hence, differential relay may be installed.

MePTCL informed the forum that they have already sent the DPR considering 5 km for 132 kV Lines. The forum advised them to include the remaining lines during next phase.

Member Secretary, NERPC referred the matter in next OCCM for further discussion as most of the constituents will be present in OCC. He also requested all constituents make a list of following information.

1. List of all short lines.
2. List of lines where differential protection was commissioned.
3. List of all short lines where differential protection was installed but not commissioned.
4. List of all short lines where installation of differential protection is envisaged

The forum once again requested all states to make the above mentioned list and make DPR for PSDF funding for installation of differential protection.

***The Sub-committee noted as above.***

***Action: All constituents.***

**3. Finalization of Draft model maintenance procedures that are to be followed by utilities.**

In 47th PCC Meeting, after detailed deliberation, it was decided to circulate the draft maintenance procedure once again to all constituent for their comments. The forum requested all constituents to go through the draft model maintenance procedure and give their valuable feedback by 31st Jul'17. Member Secretary, NERPC requested subgroup to make necessary changes as per inputs from utilities and finalize model maintenance procedure. In case of no inputs/comments from utilities, the draft model maintenance procedure for transmission utilities may be considered as final. He also informed that finalized model maintenance procedure will be discussed in next RPC meeting. The forum also requested all ISGS to submit the maintenance procedure followed by them to NERLDC and NERPC by 20.08.17.

No comments/feedbacks were received from Power Utilities.

The draft model maintenance procedure for transmission utilities is considered as final and transmission utilities may please follow the maintenance procedure.

**Deliberation in the meeting:**

NERLDC informed the forum that the draft maintenance model for transmission system was circulated to all the utilities for comments as discussed on 47th PCC Meeting. However, no comment was received and the maintenance procedure may be considered as final.

Member Secretary, NERPC requested NERLDC that in future all such document which require comments from constituents must be put in NERLDC and NERPC website and also to send mails to all constituents. If no comment / observation is received within a month, the same may be considered as approved.

The forum also requested POWERGRID to prepare maintenance procedure for HVDC Station, FACTS Devices & GIS as per best practices. Maintenance procedure for GIS prepared by POWERGRID will be followed by GIS in state power system.

It was deliberated in the meeting that all the Generators will confirm to NERLDC and NERPC regarding the availability of maintenance procedures of each equipment of the Generating Stations and periodic maintenance of these equipment are being done as per these procedures. These procedures for each equipment should follow best practices.

***The Sub-committee noted as above.***

***Action: All constituents.***

**4. Calculation of Relay Setting as per recommendation of V. Ramakrishna Task Force**

Status as per 47<sup>th</sup> PCCM is given in the table below:

<b>Sl. No.</b>	<b>Constituent</b>	<b>Current Status of implementation</b>	<b>Completion Date</b>
1.	Assam	Started	By September, 2017
2.	Arunachal Pradesh	No representative present	By September, 2017
3.	Manipur	No representative present	By September, 2017
4.	Meghalaya	Started	By September, 2017
5.	Mizoram	No representative present	By September, 2017
6.	Nagaland	Not started	By September, 2017

7.	Tripura	Completed	Completed
8.	NERLDC	Completed	Completed
9.	NEEPCO	Started	By September, 2017
10.	NHPC	Completed	Completed
11.	NTPC	Started	By April, 2017
12.	OTPC	Completed	Completed

The committee requested all constituent to implement recommendation of V. Ramakrishna task Force by September, 2017 and sent report of the same to NERPC.

NERLDC requested all constituents to take approval from NERPC prior to changing of any protection settings other than recommendation of V. Ramakrishna task Force.

Members may please intimate the status of implementation of Relay Settings as per Ramakrishna task force.

Also, members may please intimate the availability of PLCC/OPGW for protection in the transmission lines in their system for the implementation of POR/PUR scheme.

**Deliberation in the meeting:**

The status is given in the table below:

Sl. No.	Constituent	Current Status of implementation	Completion Date
1.	Assam	Completed for all 400KV substations and interconnecting lines.	By March, 2018
2.	Arunachal Pradesh	No representative present	By March, 2018
3.	Manipur	No representative present	By March, 2018
4.	Meghalaya	Completed except for substation in Garo hills.	By March, 2018
5.	Mizoram	No representative present	By March, 2018
6.	Nagaland	Started	By March, 2018
7.	Tripura	Completed	Completed
8.	NERLDC	Completed	Completed
9.	NEEPCO	Will complete all station by next week.	By January, 2018.
10.	NHPC	Completed	Completed
11.	NTPC	Referred the recommended setting to corporate office for approval.	By January, 2017

12.	OTPC	Completed	Completed
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Sr. Executive, OTPC requested the forum to arrange some training program on implementation of Settings as per recommendation of Ramakrishna Task Force.

Member Secretary, NERPC agreed and requested NERTS, POWERGRID to organize the training program and POWERGRID agreed for the same.

DM, NEEPCO requested NERLDC to provide percentage impedance & MVA rating of transformers of NER. This information will be sent after getting the same from the utilities.

The committee requested all constituent to implement recommendation of V. Ramakrishna task Force by 31<sup>st</sup> March, 2018 and sent report of the same to NERPC.

***The Sub-committee noted as above.***

***Action: All constituents.***

**5. Review of Zone-II relay settings:**

In 47th PCCM, after detailed deliberation, it was decided that Zone –II setting to be completed for all important lines by 15th August, 2017. AEGCL will implement the zone –II settings for all critical lines by 15th August, 2017 and for the remaining lines by September, 2017. Forum requested all power utilities to inform latest status to NERPC/NERLDC by 31st Jul'17. NERLDC requested that all power utilities refer List of Important Grid Elements document for implementation of the scheme on priority basis.

**Deliberation in the meeting:**

NERTS, POWERGRID informed the forum that all the constituents are reviewing their relay settings as per V. Ramakrishna Task Force and thus it will take care of Zone –II relay settings. Hence, the agenda is not needed to be discussed separately.

The committee agreed and requested all constituent to implement recommendation of V. Ramakrishna task Force by 31<sup>st</sup> March, 2018.

***The Sub-committee noted as above.***

***Action: All constituents.***

**6. Review of relay settings- Substation wise (including downstream state substation):**

In 47th PCC Meeting, NERLDC informed the forum that frequent tripping of upstream elements is occurring due to improper relay coordination at downstream state-substations (33 kV & 11 kV) especially in Tripura, Mizoram & Nagaland power systems. DoP, Nagaland representative informed the forum that relay setting at Dimapur (DoP, Nagaland) has already been reviewed and implemented. He also informed that report of the same will be submitted to NERPC within 1 week. The forum requested DoP, Nagaland to check

whether breaker is operational in 33/11 kV substations, so that downstream fault is not propagated and to inform NERLDC/NERPC.

**Deliberation in the meeting:**

DoP, Nagaland informed the forum that if there is fault in any of the 3 outgoing 132 kV Lines emanating from Kohima, 132 kV Dimapur – Kohima line trips at Dimapur(PG) end. The settings of 132 kV Dimapur – Kohima line at Dimapur(PG) is kept low and hence, for coordination , the setting is almost instantaneous in downstream feeder. NERTS, POWERGRID informed the forum that Dimapur (PG) settings will be reviewed at the earliest.

Member Secretary , NERPC requested NERLDC to make a list of all ISTS lines that are affected due to fault in the distribution side feeders. He suggested that where ever ISTS lines are affected due to fault in downstream feeders, these distribution feeders should have breaker and relay at 33 kV level and a team would be formed to visit these downstream substations and correct the relay settings. DGM, NERLDC, suggested that even representative from Distribution side should be present in the meeting to resolve such issues more effectively. Member Secretary, NERPC agreed the same.

The forum also requested DoP, Nagaland to carry out intensive patrolling of their lines and vegetation clearance to be done.

***The Sub-committee noted as above.***

***Action: DoP Nagaland and PGCIL.***

**7. Details of PSS installed and activated in all Hydro stations:**

In 47th PCC Meeting, Sr. Manager, NEEPCO informed the forum that they have already provided the data available with them. DGM, NERLDC requested NEEPCO to obtain the remaining data from OEM as the data provided is not sufficient. Forum requested NEEPCO to take up issues with OEM and submit required data to NERLDC at the earliest.

Status of PSS in Gas Stations of NEEPCO:

AGBPP - No PSS

AGTCCPP GTGs - Under procurement process

AGTCCPP STGs - Enabled

**Deliberation in the meeting:**

NERLDC informed the forum that details of PSS is required for studying Low Frequency Oscillation in NER Grid.

NEEPCO informed the forum that they have submitted the details of PSS in terms of available

per unit value. They have requested the OEM to provide the details in terms of tuned frequency as desired for studying LFO but no response has been obtained so far.

The forum suggested NERLDC and NEEPCO to discuss and resolve the issue.

NTPC informed the forum that PSS is installed in their station. NTPC will be providing the details through mail to NERLDC by 15<sup>th</sup> February'18..

***The Sub-committee noted as above.***

***Action: NEEPCO.***

#### **8. Standardization of Disturbance Recorder Channels:**

In 47th PCC Meeting, AM, AEGCL informed the forum that they have implemented the standardization of DR channel in all substations wherever possible. But in some sub-stations, it is not possible to modify the DR channels in old numerical relays. It will be done once new panels are installed. NERLDC requested all power utilities to provide details of substation where standardization of DR channels is already completed and where ever it is not possible because of old relays by 31st July, 2017. AGM, NTPC informed the forum that they have standardized DR channels and will send a confirmation to NERLDC.

#### **Deliberation in the meeting:**

AEGCL informed the forum that they have implemented the standardization of DR channel in all lines connected to other utilities . AEGCL will intimate the updated status through mail.

MePTCL informed the forum that they have standardized DR channels for Micom relay. They are facing problem for ABB relay and referred to NERTS, POWERGRID for help. The Forum requested POWERGRID to assist on this matter.

NERLDC requested all power utilities to provide DR output (DAT and CFG file) of all the transmission elements for verification.

The forum decided that standardization of DR channels has to be done by all utilities by 7th February, 2018.

***The Sub-committee noted as above.***

***Action: All Constituents.***

#### **9. Implementation of SPAR**

In 46th PCCM, Forum requested subgroup to circulate list of important lines to get the latest information regarding implementation of 1-phase/3-phase Auto-Reclosure scheme. All

members to furnish the required information to NERLDC & NERPC by 30th April'17.

In 47th PCCM, the committee requested all constituent to furnish the status report of SPAR implementation to NERPC and NERLDC latest by 31st July, 2017.

**Deliberation in the meeting:**

NTPC informed the forum that they are having problem with implementation of the scheme due to coordination issue between differential and distance protection. POWERGRID informed that they will take up the issue.

NERLDC suggested to the forum that Single Phase/Three Phase Auto-reclosing scheme as applicable considering breaker mechanism has to be implemented in all the lines to ensure reliability. For Single pole breaker, Single Phase Auto reclosing scheme has to be enabled for maintaining synchronism through other healthy phases. Also, priority scheme is to be ensured in one and half breaker scheme.

The committee requested all constituent to furnish the status report of SPAR implementation to NERPC and NERLDC latest by 31st January, 2018.

***The Sub-committee noted as above.***

***Action: All Constituents.***

**10. Installation of Polymer Insulator and Transmission Line Surge Arrestor in Lightning Prone Areas**

In 47th PCC Meeting, after detailed deliberation, DGM NERTS suggested to the forum that installation of polymer insulator in existing line has huge cost implication and is not feasible. Also it is required in area where pollution level is very high. He recommended that it may be implemented for new lines. He also suggested that for installation of lightning arrester following steps may be followed.

1. It is to identify the lightning prone lines and lightning prone areas by using one year tripping data which may be collected from respective SLDCs.
2. Once the lines and areas are identified, the tower footing resistance of all the towers in that area needs to be measured.
3. Once the tower footing resistance value is available, the number of lightning arrester required and hence cost can be estimated. The constituent may then approach for PSDF.

**Deliberation in the meeting:**

The forum discussed that NERPC will write Letter to all utilities to identify lightning prone areas and measuring of tower footing resistance in these locations. Follow up action has to be taken to finalize the list before next Meeting. The details has to be furnished by all the utilities to NERPC and NERLDC within next 15 days.

POWERGRID informed the Forum that after installation of polymer insulator in 132 kV Aizawl – Kumarghat and 132 kV Aizawl – Jiribam line, insulator decapping issue has been resolved. POWERGRID also informed that through installation of TLSA, lightning related tripping has reduced by around 20%. POWERGRID is planning to install TLSA in 100 % of 132 kV Khandong – Khliehriat I line.

POWERGRID is also planning to install polymer insulator in all 132 kV Lines owned by them. POWERGRID also discussed that they are planning to replace porcelain with polymer insulators in 400 kV Silchar – Azara and Silchar – Byrnihat line for 10 locations near Byrnihat.

Member Secretary suggested that commercial aspect has also to be considered before installation of polymer insulators and TLSA.

***The Sub-committee noted as above.***

***Action: All Constituents.***

#### **11. Mock Testing of SPS related to Palatana**

In 47th PCCM, Sr. Executive, OTPC informed the forum that the Mock SPS Test planned on 24th July, 2017 was differed due to bad weather condition. It will be conducted as soon as the weather improves. The information for the said test will be intimated 24 Hr in advance. Forum requested POWERGRID and OTPC to submit a detailed mock test report immediately after mock test to NERPC & NERLDC.

In 139th OCCM, Sr. Engineer, NERTS presented the modus-operandi for Mock testing of SPS-2&3. The forum requested OTPC to append the sequences at Palatana GBPP to the modus-operandi and submit at the earliest. The date for mock testing would be decided after that and with prior notice of at least 3 days to all concerned utilities.

#### **Deliberation in the meeting:**

It was discussed in the forum that team comprising of representatives from NERLDC, POWERGRID & TSECL/NERPC had visited Palatana Generating Station and Silchar Substation respectively for Mock Test on 13th Jan'18 and found out that SPS-2 and SPS-3 is not ready.

The forum decided that the matter will be discussed in detail in OCC on 19.01.18.

***The Sub-committee noted as above.***

#### **12. Desynchronisation of AGTCCPP Machines due to Under Voltage issue**

In 136th OCCM, Sr. Manager, TSECL opined that AGTCCPP and Monarchak GBPP are not providing reactive power support as per capability curve. Sr. Manager, NEEPCO countered that

is not the case and generators are supplying reactive power according to grid conditions. DGM(MO), NERLDC stated that as a practice, generators are not supposed to provide reactive power support to beneficiaries, rather Tripura should have its own Capacitor banks in place to support the grid. He further opined that generators are rated to operate under normal circumstances at around 0.8/0.9 pf lag and inject accordingly. The forum requested TSECL to regulate Bangladesh MVAR drawal and conduct meeting at appropriate level in this regard. Member Secretary, NERPC concluded that Tripura should conduct studies and submit DPR of scheme for installation of Capacitor banks at the earliest.

In 137th OCCM, after detailed deliberation the forum requested SLDC Tripura & Mizoram to conduct detailed studies in association with respective distribution utilities at the earliest.

In 137th OCCM, Sr. Manager, TSECL informed that currently there are no low voltage problems in Tripura sub-system. After detailed deliberation the forum decided to drop the agenda item and review later on if required.

**Deliberation in the meeting:**

DGM, NERLDC, suggested that security of the grid is at stake due to Low Voltage issue in Tripura and Mizoram Power System. Also, losses are incurred to Generators due to tripping of machines on under voltage. Hence, proper planning has to be done from now by TSECL and P&ED, Mizoram for identification of nodes experiencing under – voltage issue for the installation of Capacitor banks.

The forum decided that due to the absence of representatives from TSECL and Mizoram, the matter may be reviewed in next Meeting.

***The Sub-committee noted as above.***

***Action: TSECL and P&ED, Mizoram.***

**13. Low Frequency Oscillations (LFOs) at 132 kV Agartala**

In 47th PCC Meeting, after detailed deliberation, the forum requested NEEPCO to take urgent steps to damp the oscillation as it is endangering the grid security. NERLDC requested NEEPCO to take up this matter with OEM at the earliest.

**Deliberation in the meeting:**

After detailed deliberation the forum requested NEEPCO to take urgent steps to damp the oscillation as it is endangering the grid security.

NEEPCO informed the forum that the AVR for all AGTPP units will be replaced and is under process.

***The Sub-committee noted as above.***

***Action: NEEPCO.***

**14. Analysis & Discussion on Events, Grid Incidences, Grid Disturbances which occurred in NER Grid w.e.f 1st July 2017 - 30th November 2017.**

The following numbers of Grid Disturbances (GD) & Grid Incidents (GI) occurred during the period w.e.f 1st July 2017 - 30th November 2017 and 1st January to 30th November 2017 :-

Sl. No.	Control Area	Grid Incidents in nos.	Grid Disturbance in nos.	Grid Incidents in nos.	Grid Disturbance in nos.
		Jul'17 to Nov'17	Jul'17 to Nov'17	Jan'17 to Nov'17	Jan'17 to Nov'17
1	Palatana	5	0	24	5
2	AGBPP	11	0	17	0
3	AGTPP	18	3	36	14
4	Ranganadi	0	0	0	0
5	Kopili	7	1	10	1
6	Khandong	7	2	14	2
7	Doyang	9	1	9	5
8	Loktak	1	0	2	5
9	BgTPP	12	0	19	0
10	Arunachal Pradesh	0	17	0	35
11	Assam	0	17	0	33
12	Manipur	0	15	0	38
13	Meghalaya	0	5	0	32
14	Mizoram	0	12	0	26
15	Nagaland	0	58	0	79
16	Tripura	0	27	0	54

Sl. No.	Category of GD/GI	Grid Disturbance in nos.	
		Jul'17 to Nov'17	Jan'17 to Nov'17
1	GI-I	35	61
2	GI-II	35	69
3	GD 1	133	257

4	GD 2	2	6
5	GD 3	0	1
6	GD 4	0	1
7	GD 5	0	0
8	Total GI	70	130
9	Total GD	135	265

This is for information to the members.

The root cause analysis and remedial measures to prevent the Grid Events for the period w.e.f 1st Jul'17 to 30th Nov'17 were discussed during Sub-group meeting of PCC held on 6th Dec'17. Tripping of few elements could not be concluded due to non-submission of DR output (For example: tripping related to Doyang ATS, Disturbance in Tripura Power System, etc.)

Events for the period July, 2017 to November, 2017 are categorized as listed below. Utilities may please take suggested remedial measures accordingly within stipulated time.

Tripping due to Vegetation

Tripping due to Lightning

Tripping due to improper relay coordination

Tripping due to mis-operation.

Tripping due to Equipment Failure.

The report of the GD, GI and Element Tripping along with root cause, remedial measures and action to be taken is attached at Annexure - B.14.

Tripping of many elements could not be concluded due to non-submission of DR output (For example: tripping related to 220/132 kV BTPS Substation, tripping in Tripura System , etc.)

In the subgroup meeting held on 17th Jul'17, Subgroup requested that installation of DR, EL output Software by Substation Owner is to be done at the earliest. The procedure for downloading the file is also to be shown to the operator of the station. DR/ EL output after each tripping has to be furnished by the owner of the station even if he is not the owner of the protection system.

Also, in the subgroup meeting on 17th Jul'17, DGM, NERLDC requested to the Subgroup that root cause analysis of the events should be done based on the weekly events report sent by NERLDC on weekly basis for identifying the root cause and take the remedial measures immediately and the report is to be sent to NERPC and NERLDC on weekly basis.

It is observed that only few generating stations like Khandong, OTPC etc. are furnishing this report.

It is requested to all Power Utilities to send this report on weekly basis to NERPC and NERLDC.

In the 47th PCCM, to resolve protection issues which need to be attended / rectified immediately, NERLDC requested NERPC to organize PCC meeting bi-monthly and subgroup meeting monthly. MS, NERPC agreed to consider holding PCC meeting bi-monthly and subgroup meeting monthly.

It is requested to hold subgroup meetings in every month to resolve protection issues which need to be attended / rectified immediately.

In Sub-group meeting of PCC held on 6th Dec'17, Subgroup once again requested to bay owner to provide necessary accessories for downloading DR & EL to substation owner where ever Sub-Station Owner & Bay Owner are of different Power Utilities.

**Deliberation of the sub-Committee:**

Engineer, NERLDC gave a presentation on the remedial measures for all the major events for the period w.e.f 1<sup>st</sup> Jul'17 to 31<sup>st</sup> Oct'17.

The Sub-committee requested all constituents to implement the remedial measures so as to reduce Grid Disturbances. Sub-committee also requested all constituents to intimate the implementation status of remedial measures as per format to NERPC and NERLDC. Format is attached as Annexure B.14.

***The Sub-committee noted as above.***

***Action: All constituents.***

<b>C. NEW ITEMS FOR DISCUSSION</b>
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**1. Draft Reliability Standards on Protection System -NRCE**

In the 5th meeting of Subgroup in respect of "preparation of reliability standards for Protection System and Communication System" held on 18.08.17 at New Delhi, it was decided that the complete draft standard would be circulated to all the members and RPCs for their final inputs/observation, if any. Accordingly, the completed draft w.r.t eleven (11) broad areas of "Reliability Standards for Protection System" is enclosed at Annexure C.1.

In subgroup meeting on 6th Dec'17, NERLDC gave a presentation on the draft standard for "Reliability Standards for Protection System". As all members were not present, forum suggested that Draft Standard for "Reliability Standards for Protection System" would also be discussed in detail in the next PCC Meeting. All constituents are requested to give their valuable feedback and inputs in the next PCC Meeting.

**Deliberation in the meeting:**

NERLDC gave a presentation on Draft "Reliability Standard on Protection System" under NRCE attached as Annexure explaining 11 Broad areas that have been finalized in the 5th meeting of

Subgroup held in New Delhi on 18.08.17.

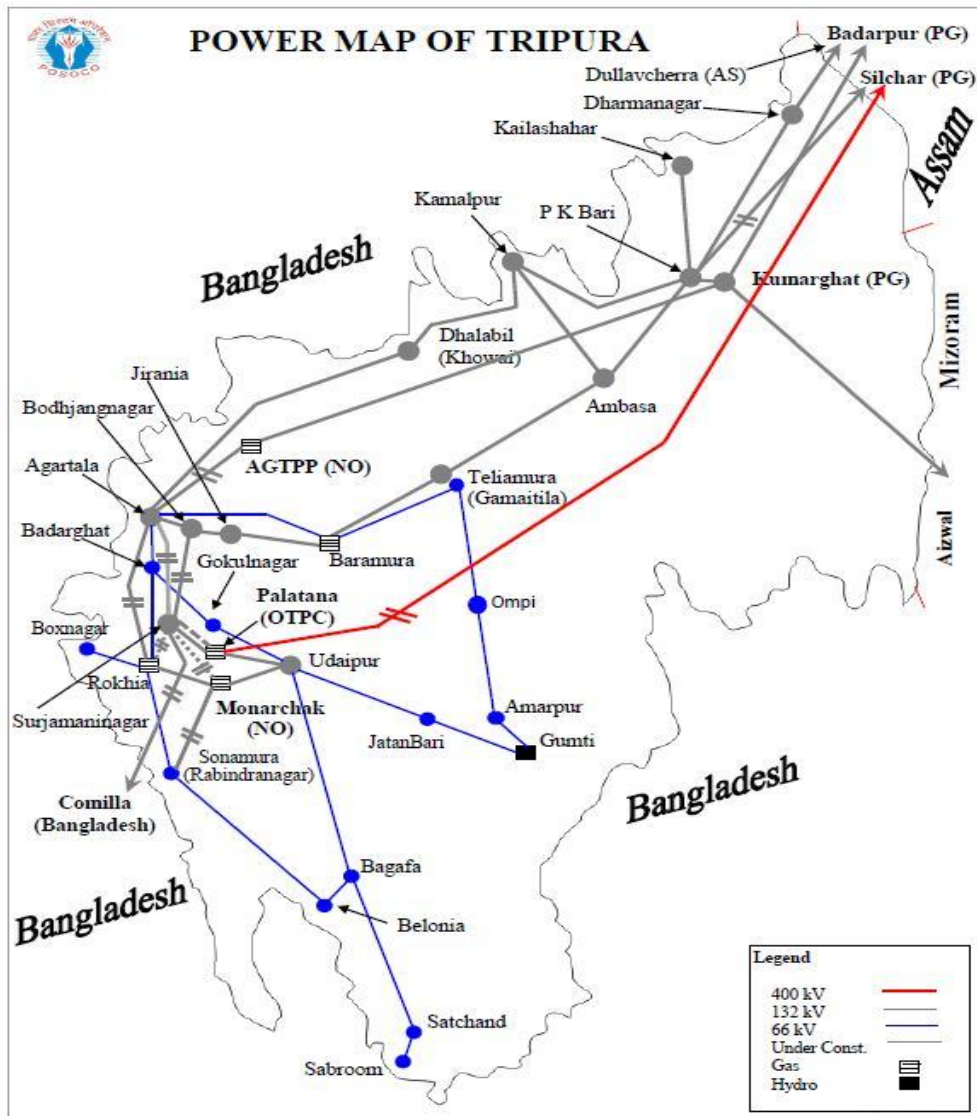
The forum discussed that all the definitions under this Standard are OK and no comments are noted on the same.

***The Sub-committee noted as above.***

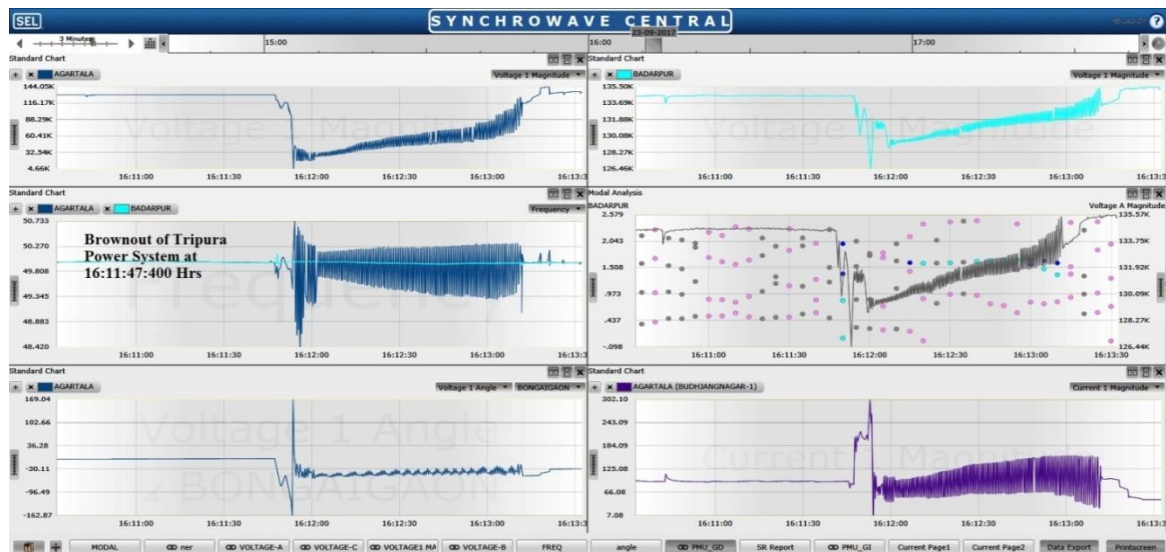
***Action: All constituents.***

**2. Voltage Collapse observed in Tripura Power System at 16:11 Hrs on 23rd Sep'17**

- a. While charging HVCB of ICT-I at Palatana, B-phase CB failed to close due to unhealthy operating mechanism, resulted unbalance neutral current in ICT-II at Palatana.
- b. Before tripping of HVCB of ICT-I in Pole Discrepancy (settings-1.5 sec), ICT-II tripped in Sensitive Earth fault Protection (HV side).
- c. Subsequently, voltage collapse observed in Tripura Power System. Agartala voltage touched 4 kV (from PMU).
- d. At 16:11:58 Hrs, 132 kV AGTCCPP - Kumarghat (PG) 1 Line tripped on DPR, Z-I, R-Y-B due to low system voltage.
- e. At 16:12 Hrs, 132 kV Agartala – AGTCCPP I and II lines was hand tripped due to low system voltage.
- f. At 16:13 Hrs, Monarchak (61 MW), Rokhia (36 MW), Baramura (21 MW) and Gumti (6 MW) Units were de-synchronized due to low voltage in power system of Tripura as informed by TSECL.
- g. Tripura Power System was connected to the power system of NER through 132 kV Agartala - Budhjangnagar – Jirania – Baramura – Gamaitilla – Ambassa – P K Bari - Kumarghat(PG) link. Due to Voltage instability problem, voltage dependent load was stalled in Tripura Power System and Bangladesh Power System.
- h. 132 kV Surajmani Nagar - South Comilla (Bangladesh) D/C was also hand tripped from Surajmani Nagar at 16:46 Hrs for Voltage Control in Tripura power system.
- i. Total Load Loss in Tripura Power System was around 163 MW and Generation Loss in Tripura power system was 124 MW (Monarchak – 61 MW, Rokhia - 36 MW, Baramura - 21 MW, Gumati - 6 MW). Central Sector Generation loss was 445 MW (AGTCCPP - 71 MW, Palatana - 374 MW)



Network diagram of affected area



PMU plots of brownout incident dated 23-Sep-17

In subgroup meeting on 6th Dec'17, after detailed deliberation, subgroup concluded that tripping of both ICTs at Palatana led to voltage collapse in Tripura Power System. OTPC

informed the subgroup that B-phase HVCB of ICT-I at Palatana was failed to close due to problem in spring mechanism.

Settings of Sensitive Earth Fault (MiCOM P127) Relay of ICT-II are as follows:

Characteristics: Definite Time, Non Directional

Pickup Current: 40 A

Time Delay: 1.4 Sec

Subgroup requested OTPC to review the Sensitive Earth Fault settings and this function should be made directional. Subgroup also requested OTPC to check the correctness of Isef input to DR as well as CT inputs to the Sensitive Earth Fault Relay as Isef component is greater than In component as seen from DR for an unbalance.

After detailed deliberation, subgroup requested POWERGRID to inform the standard PD setting of ICT / Transformer that is to be followed by all utilities, in the next PCCM.

**Deliberation in the meeting:**

OTPC informed the forum that Sensitive Earth Fault Settings of 400/132 kV ICT II at Palatana has been disabled.

NERTS, POWERGRID informed the forum that the PD setting for ICT is 500ms and for line is 2.5s. After detailed deliberation, it was decided that this is to be followed by all utilities at the earliest.

***The Sub-committee noted as above.***

***Action: All Constituents..***

**3. 132 kV Kumarghat(PG) black out on 28th Sep'17**

At 17:22 Hrs on 28.09.17, all lines emanating from Kumarghat(PG) & PK Bari tripped. Tripping details are as follows:

Sl. No.	Name of tripping element (End A - End B)	Date & Time of Event	Date & Time of Restoration	Relay indications	
				End A	End B
1	132 kV AGTPP - Kumarghat Line	28-09-2017 17:22:00	28-09-2017 17:44:00	DP, ZII, B-E	No tripping
2	132 kV Kumarghat - P K Bari Line	28-09-2017 17:22:00	29-09-2017 00:32:00	No tripping	Earth Fault
3	132 kV Badarpur - Kumarghat 1 Line	28-09-2017 17:22:00	28-09-2017 17:42:00	DP, ZII, Y-E	No tripping

4	132 kV Aizawl - Kumarghat Line	28-09-2017 17:22:00	28-09-2017 17:48:00	DP, ZII, Y-E	DP, Z-IV, Y-E
5	132 kV P K Bari - Kailashahar Line	28-09-2017 17:22:00	28-09-2017 17:28:00	Earth Fault	No tripping
6	132 kV P K Bari - Ambassa Line	28-09-2017 17:22:00	28-09-2017 17:28:00	No tripping	Earth Fault
7	132 kV Dhalabil - Kamalpur Line	28-09-2017 17:22:00	28-09-2017 17:26:00	Earth Fault	No tripping

And at 17:32 Hrs, following lines tripped while charging 132 kV P K Bari - Kumarghat from P K Bari end.

ID	Element Name	Outage Date	Outage Time	Revival Date	Revival Time	Reason End1	Reason End2	Len. (Km)
1	Aizawl - Kumarghat	18-Oct-17	15:15	18-Oct-17	15:30	R-B, Z1, 159.1 Kms.	R-B, Z1, 89.14 Kms.	131
2	Aizawl - Kumarghat	18-Oct-17	15:30	18-Oct-17	18:55	NOT TRIPPED	R PH, Z3, 87.37 Kms.	131
3	Aizawl - Jiribam	18-Oct-17	15:30	18-Oct-17	15:42	R-Y PH, Z1, 35.6 KM	R-Y PH, Z1, 132.8 Kms.	172
4	Aizawl - Kolasib	18-Oct-17	15:30	18-Oct-17	16:00	NOT TRIPPED	Earth Fault	66

DR output of PK Bari substation is not available. Non-Directional Electro mechanical Over Current & Earth Fault relays are only available at PK Bari for protection of 132 kV lines.

In subgroup meeting on 6th Dec'17, NERLDC informed that prima facie fault was in the 132 kV PK Bari – Kumarghat line. However, DR output from PK Bari is also required to confirm the fault in this line.

Subgroup requested TSECL to intimate the status of installation of Numerical Relays at 132 kV PK Bari in the next PCC Meeting. As length of this line is less than 5 Kms., installation of line differential protection is to be expedited by TSECL & POWERGRID.

Subgroup also requested TSECL to replace the Non-Directional Electro mechanical Over Current & Earth Fault relays at PK Bari for protection of 132 kV lines with Directional Over Current & Earth Fault relays.

**Deliberation in the meeting:**

The forum discussed that differential relay has to be installed in 132 kV Kumarghat – PK Bari

Line. The item could not be discussed in detail as Tripura representative were absent.

**The Sub-committee noted as above.**

**Action: TSECL.**

#### 4. Blackout of Aizawl(PG) at on Oct'17

At 15:15 Hrs on 18th Oct'17, 132 kV Aizwal - Kumarghat line tripped. While charging this line, all lines emanating from Aizwal(PG) tripped.

ID	Element Name	Outage Date	Outage Time	Revival Date	Revival Time	Reason End1	Reason End2	Len. (Km)
1	Aizawl - Kumarghat	18-Oct-17	15:15	18-Oct-17	15:30	R-B, Z1, 159.1 Kms.	R-B, Z1, 89.14 Kms.	131
2	Aizawl - Kumarghat	18-Oct-17	15:30	18-Oct-17	18:55	NOT TRIPPED	R PH, Z3, 87.37 Kms.	131
3	Aizawl - Jiribam	18-Oct-17	15:30	18-Oct-17	15:42	R-Y PH, Z1, 35.6 KM	R-Y PH, Z1, 132.8 Kms.	172
4	Aizawl - Kolasib	18-Oct-17	15:30	18-Oct-17	16:00	NOT TRIPPED	Earth Fault	66

a. Z-3, 87 Kms from Kumarghat and Z-1, 159.1 Kms from Aizwal of 132 kV Aizwal - Kumarghat line need investigation. Line Length: 131 Kms.

b. Tripping of 132 kV Aizwal - Kolasib line on Earth Fault.

In subgroup meeting on 6th Dec'17, POWERGRID informed that there were subsequent faults in 132 kV Aizwal – Jiribam line and 132 kV Aizwal – Kumarghat line at 15:30 Hrs on 18th Oct'17 resulted in blackout of 132 kV Aizwal (PG).

Vegetation fault in 132 kV Aizwal – Jiribam line. Y-E fault initially evolved in to R-Y-E fault and cleared in Z-I. R-Y-E fault persisted for 100 msec and fault was cleared from both ends.

Subsequently, high resistive fault likely due to vegetation infringement occurred in 132 kV Aizawl – Kumarghat line and was cleared in Z-III. Due to this delayed fault clearance, 132 kV Aizwal – Kolasib tripped at Kolasib on Earth Fault Protection. Earth Fault relay settings at Kolasib is to be reviewed by P&ED Mizoram considering the latest fault contribution.

Subgroup requested POWERGRID to clear the vegetation in vulnerable locations to avoid unwanted tripping of lines. Subgroup also requested POWERGRID to review the resistive reach of Distance Protection for those lines with high chance of resistive faults considering the fault clearing time of the recent events.

#### **Deliberation in the meeting:**

POWERGRID informed the forum that 132 kV Aizawl – Melriat line mal tripped on 18.10.17 due to incorrect relay operation and the same has been rectified.

POWERGRID also informed that they will review the Earth Fault Relay Settings at Kolasib for

tripping of 132 kV Aizawl – Kolasib line.

POWERGRID further informed that as there is no provision for setting load blinder angle for 132 kV Aizawl – Kumarghat and Aizawl – Jiribam line, POR scheme will be adopted to reduce the fault clearing time.

POWERGRID informed the forum that vegetation clearance work is going on to reduce vegetation faults.

**The Sub-committee noted as above.**

**Action: PGCIL.**

## 5. Tripping related to Palatana Generating System

- a. At 08:16 Hrs on 5<sup>th</sup> Sep'17, while taking shutdown of 132 kV Palatana - Surajmani Nagar line, due to wrong operation of earth switch (20589D isolator earth switch as informed by OTPC), following lines tripped:

ID	Name of tripping element (End A - End B)	Owner of the element	Date & Time of Event	Date & Time of Restoration	Relay indications	
					End A	End B
1	400 kV Palatana - Silchar 1 Line	NETCL	05-09-2017 08:16:00	05-09-2017; 13:04:00	DPR,Z-4, R-E	Direct Trip received
2	132 kV Palatana - Udaipur Line	TSECL	05-09-2017 08:16:00	05-09-2017; 09:16:00	Earth Fault	No tripping
3	132 kV Rokhia - Monarchak Line	TSECL	05-09-2017 08:16:00	05-09-2017 ;08:40:00	Earth Fault	No tripping
4	132 kV Monarchak - Udaipur Line	TSECL	05-09-2017 08:16:00	05-09-2017; 09:00:00	No tripping	Earth Fault

Due to tripping of these elements, Monarchak Power Station, Rabindranagar and Udaipur areas of Tripura Power System were separated from rest of NER Grid and subsequently collapsed due to load generation mismatch.

Following points may be discussed:

1. Z-4 tripping of 400 kV Palatana - Silchar 1 Line
  2. Tripping of 132 kV Rokhia - Monarchak Line & 132 kV Monarchak - Udaipur Line
- b. Tripping of 132 kV Palatana – Surajmani Nagar line (Jul'17-Oct'17)  
There were 3 instances of tripping of 132 kV Palatana – Surajmani Nagar line wherein, Tripura system collapsed in first two cases.

At 13:15 Hrs on 28<sup>th</sup> Sep'17 (Puja week), 132 kV Palatana – Surajmani Nagar & 132 kV Palatana - Udaipur line (Earth Fault, Z-1 at Palatana) tripped.

ID	Element Name	Outage Date & Time	Outage Date & Time	Reason End1	Reason End2	Length
1	Palatana - Surajmaninagar	09-Aug-17 5:17	09-Aug-17 5:40	DPR, Z-2, R-Ph, 65.5 km	No Tripping	35
2	Palatana - Surajmaninagar	13-Sep-17 15:20	13-Sep-17 15:38	DPR, Z2, 46.4 KM	No Tripping	35
3	Palatana - Surajmaninagar	28-Sep-17 13:15	28-Sep-17 13:31	Tripped on O/C	No Tripping	35

**c.** Tripping of Palatana GTG- I & II at 18:05 Hrs on 21<sup>st</sup> Sep'17

Palatana GTG- I & II at 18:05 Hrs on 21<sup>st</sup> Sep'17 due to suspected mal-operation of SPS-3. In the special meeting of NERPC held on 11<sup>th</sup> Oct'17 at Shillong, it was decided that spurious operation of SPS-3 on 21<sup>st</sup> Sep'17 will be investigated by POWERGRID and come out with report within 1 week.

Discussion in subgroup meeting on 6<sup>th</sup> Dec'17:

- a.** Z-4 time setting and PSL logic of 400 kV Silchar Palatana I line to be reviewed by OTPC. Also, Over Current & Earth Fault settings of ICTs at Palatana to be coordinated with lines to avoid unwanted tripping of 400 kV lines for fault in 132 kV system.

Subgroup requested TSECL to review the Over Current & Earth Fault settings of all lines emanating from Rokhia & Udaipur substations. Settings should be as per recommendations of Ramakrishna Task Force considering the latest fault contribution of each feeder for fault in next adjacent bus. Fault Contribution factor should cover all possible grid conditions and this should be reviewed half yearly basis.

- b.** Subgroup requested TSECL to intimate the root cause for the first two events and also for 132 kV Palatana – Uadipur line tripping at 13:15 Hrs on 28-Sep-17 which resulted in tripping of 132 kV Palatana – Surajmaninagar line.

Subgroup requested OTPC to check whether Over Current reverse setting is enabled for 132 kV Palatana – Surajmaninagar line.

Subgroup also requested OTPC to review the Over Current & Earth Fault settings of 132 kV Surajmani Nagar & Udaipur lines. Settings should be as per recommendations of Ramakrishna Task Force considering the latest fault contribution of each feeder for fault in next adjacent bus. Fault Contribution factor should cover all possible grid conditions and this should be reviewed half yearly basis.

- c. As seen from Event Logger Output from Silchar, time of operation of earth switch of 400 kV line reactors of Byrnihat & Azara lines at Silchar matches with the DT receipt at Palatana. POWERGRID may please check whether earth switch operation of 400 kV line reactors of Byrnihat & Azara lines at Silchar and spurious SPS-3 signal generation are related. Report of spurious operation of SPS-3 on 21st Sep'17 is to be submitted to NERPC/NERLDC by POWERGRID at the earliest.
- d. Tripping of ICT-II at Palatana and 132 kV Palatana – Udaipur line at 02:08 Hrs on 3<sup>rd</sup> Dec'17: Over Current Protection of 132 kV Bus Coupler at 132 kV Palatana is to be coordinated with 132 kV lines emanating from Palatana. Testing of Distance Protection of 132 kV Palatana – Udaipur line at Palatana is to be done by OTPC and test results to be submitted to NERPC.

**Deliberation in the meeting:**

- a. Sr. Engineer, OTPC informed the forum that under the given fault condition, operation of Z-4 is normal operation. NERLDC requested OTPC to provide station SOE, status of CB and isolators of all elements connected to 132 kV & 400 kV bus at Palatana at the time of event and status of Busbar protection for finalizing correctness of Z-4 operation. Tripura representative were absent.
- b. Palatana will review the Over current settings for tripping of 132 kV Palatana – Surajmaninagar line on 28.09.17 at 13:15 Hrs.
- c. Palatana GTG- I & II tripped at 18:05 Hrs on 21st Sep'17 due to suspected mal-operation of SPS-3. NERLDC asked POWERGRID to confirm if there was any operation of earth switch of 400 kV Line reactors of Byrnihat and Azara line (as observed from Event Logger provided) and whether spurious signals sent to Palatana is related with this. POWERGRID informed that PLCC is prone to spurious signal generation due to switching events. POWERGRID informed that Digital Protection Couplers will be installed after installation of OPGW link. POWERGRID suggested that this may also be used for SPS signal communication to avoid unwanted tripping due to spurious signal.

Palatana also informed that over –current settings of 132 kV Bus Coupler at Palatana has been reviewed. **OTPC informed the forum that 132 kV Bus bar protection operated on 3<sup>rd</sup> Dec'17 and OTPC is taking up this issue with OEM.** NERLDC asked Palatana to intimate NERLDC and NERPC before changing the setting. OTPC informed the forum that they do yearly testing of distance protections and will be providing details of previous year testing result for 132kV Palatana- Udaipur line.

***The Sub-committee noted as above.***

***Action: OTPC, TSECL & PGCIL.***

## **6. Grid Disturbances in Tripura Power System and Tripping of Monarchak Generation due to loss of evacuation path**

There were 26 no of Grid disturbances in Tripura Power System.

July: 4

August: 12

September: 7

October: 3

November: 0

24 No. of times, Monarchak generation tripped on Over Speed Protection (Reason: loss of evacuation path).

Due to unavailability of proper relay indication, details of downstream tripping (11/33/66 kV elements) and relevant DR&EL outputs, analysis of these disturbances could not be done.

Concerned utilities may furnish these details for proper analysis of all events in subgroup.

Details are attached as Annexure-6.

The issue could not be discussed in subgroup meeting on 6th Dec'17 as Tripura representatives were absent. The agenda item was referred to next PCC meeting. The forum requested NERPC to write to TSECL regarding the frequent tripping of the associated transmission lines of Monarchak Generation as well as unavailability of relay indications and relevant DR & EL outputs for analysis of grid events in Tripura power system.

### **Deliberation in the meeting:**

Tripura representative were absent.

***The Sub-committee noted as above.***

***Action: TSECL.***

## **7. Tripping of 132 kV Dimapur - Kohima line**

Number of tripping of 132 kV Dimapur - Kohima line in the last 4 months is as follows:

July: 19

August: 7

September: 13

October: 4

November: 1

Tripping Details is attached as Annexure C.7.A, Letter from EE, Transmission, DoP Nagaland is attached as Annexure-C.7.B and settings of Kohima SS is attached as Annexure C.7.C.

Capital area of Nagaland Power System is connected with rest of NER Grid through 132 kV Dimapur(PG) - Kohima line. 132 kV Karong - Kohima line kept idle charged from Kohima end, 132 kV Wokha - Kohima line was kept open (Cause: improper relay co-ordination of 132 kV

Dimapur-Kohima-Wokha link) & 66 kV Tuensang - Likhimro line kept open (Cause: construction activities).

Tripping of this element will result in collapse of this area due to load generation mismatch.

**Deliberation in the meeting:**

After detailed deliberation the forum requested DoP Nagaland to carry out vegetation clearance in the affected lines. The forum also requested NERTS, POWERGRID to review the earth fault and over current relay setting at Dimapur end.

The Sub-committee noted as above.

**Action: DoP Nagaland & PGCIL.**

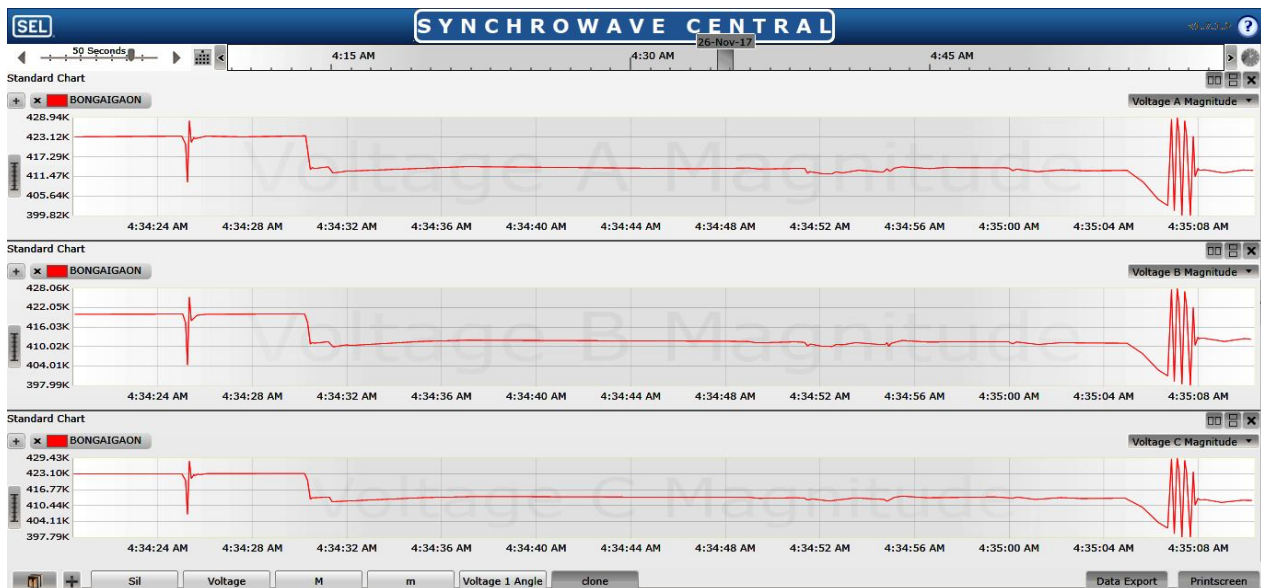
**8. Inter-Regional line tripping:**

It was observed that inter-regional lines of NER tripped many times in the last 5 months. Few occasions, tripping occurred without any relay indication at Bongaigaon / Salakati (tripping only at remote end) during testing.

List of tripping of for the period w.e.f Jul'17 to Nov'17 is attached as *Annexure C.8*. Apart from reliability issues, tripping of these lines may lead to curtailment of energy transactions in the power market.

Sl. No.	Details (w.e.f Jul'17 to Nov'17)	No. of Tripping
1	400 kV Bongaigaon - New Siliguri I	3 (2+0+1+0+0)
2	400 kV Bongaigaon - New Siliguri II	0
3	400 kV Bongaigaon - Alipurduar I	5 (0+0+3+1+1)
4	400 kV Bongaigaon - Alipurduar II	5 (2+1+0+2+0)
5	220 kV Salakati - Alipurduar I	3 (0+0+2+1+0)
6	220 kV Salakati - Alipurduar II	2 (0+1+0+1+0)
7	+/- 800 kV Biswanath Chariali - Agra Pole I HVDC	10 (1+2+5+1+1)
8	+/- 800 kV Biswanath Chariali - Agra Pole II HVDC	5 (1+1+1+1+1)

At 04:35 Hrs on 26<sup>th</sup> Nov'17, HVDC pole-I tripped at BNC due to disturbance in 400/220 kV Alipurduar substation. Oscillation in voltage for few cycles also observed during in this event.



Voltage Plot during the event at 04:34 Hrs on 26<sup>th</sup> Nov'17

In subgroup meeting on 6<sup>th</sup> Dec'17, NERTS representative informed that the line is maintained by Eastern Region and details are with ERTS. Subgroup requested NERTS, POWERGRID to collect details from ERTS and intimate the root cause of each event and actions taken against each event in the next PCC Meeting.

**Deliberation in the meeting:**

After detailed deliberation the forum requested NERTS, POWERGRID to collect DR and EL output and patrolling report from ERTS, POWERGRID for the inter-regional lines.

***The Sub-committee noted as above.***

**Action: PGCIL.**

**9. Tripping of Inter-national Lines: 132 kV Rangia - Motonga and 132 kV Salakati - Gelephu lines:**

Tripping details are attached as Annexure C.9

Sl. No	Details (w.e.f Jul'17 to Nov'17)	No of Tripping
1	132 kV Rangia - Motonga	21 (1+10+7+1+2)
2	132 kV Salakati - Gelephu	14 (2+5+6+1+0)

As informed by AEGCL, TMS of overcurrent and earth fault relay at Rangia of 132kV Rangia - Motonga line has been modified to 0.2 from 0.9 & 1.

Testing of Distance relay available at Rangia may be done by POWERGRID. Adopted CT ratio for protection of Motonga line may be intimated by POWERGRID. Over Current & Earth Fault

Relay settings have to be co-ordinated at Rangia with those of the remote ends of other lines connected to Rangia considering the latest fault contribution.

As informed by NERTS, POWERGRID; power flow in the line from Motonga to Rangia exceeds 60 MW, the line trips on over Current protection at Motonga. Therefore the CT ratio and relay settings at Motonga also need to be reviewed.

In subgroup meeting on 6<sup>th</sup> Dec'17, after detailed deliberation, it was decided that testing of Distance relay available at Rangia to be done by POWERGRID and testing results to be submitted to NERPC within 15 days from date of the meeting i.e 6<sup>th</sup> Dec'17. Adopted CT ratio for protection of Motonga line is to be intimated by POWERGRID. Over Current & Earth Fault Relay settings have to be co-ordinated at Rangia with those of the remote ends of other lines connected to Rangia considering the latest fault contribution.

**Deliberation in the meeting:**

As discussed in Subgroup meeting held on 6.12.17, the forum again requested POWERGRID to carry out testing of Distance relays at Rangia at the earliest. NERLDC requested POWERGRID to intimate adopted CT ratio for protection of Motonga line at Rangia.

Also, Over Current & Earth Fault Relay settings have to be co-ordinated at Rangia with those of the remote ends of other lines connected to Rangia considering the latest fault contribution.

***The Sub-committee noted as above.***

***Action:***

**10. Z-III tripping of 132 kV Kopili – Khandong - I line at Kopili:**

132 kV Kopili – Khandong – I line tripped on 24.09.17 at 23:45 Hrs with the following relay indications at Kopili:

Zone: 3, Phase: R-Y-B, Distance to Fault: 49.6 Km

The line did not trip at Khandong.

Simultaneously, the 132 kV Khandong – Khliehriat –I line tripped at both ends with the following relay indications:

At Khandong : Zone : 1, Phase : R-Y-B, Distance to Fault : 11.36 Km

At Khliehriat : Zone : 1, Phase : R-Y-B, Distance to Fault : 35.79 Km

Prima facie, a three phase fault occurred in the 132 kV Khandong – Kopili-I line , probably due to lightening, which was detected by the Distance Protection relay at Kopili for the 132 kV Kopili - Khandong-I line in Zone-3.

From the DR of Khandong end for the 132 kV Khandong – Khliehriat-I line, it is seen that the fault was cleared in 70 mS.

Therefore operation of the Distance Protection Relay at Kopili for 132 kV Kopili – Khandong Line – I seems to be erroneous. DPR settings at Kopili may be reviewed.

In subgroup meeting on 6th Dec'17, Kopili, NEEPCO informed that Z-3 timing in PSL was instantaneous for 132 kV Kopili – Khandong Line – I at Kopili and the same has been changed to 800 msec.

***This is for kind information of members please.***

#### **11. Review of DPR settings at 132 kV Khliehriat (PG) and Khliehriat (MePTCL)**

132 kV Khliehriat(PG) - Khliehriat(MePTCL) I line tripped at Khliehriat (MePTCL) several times for fault in other lines especially fault in 132 kV Khliehriat(PG) - Khandong D/C.

Tripping details is attached as Annexure C.11.

In subgroup meeting on 6th Dec'17, MePTCL informed that DPR settings were changed on 12th Oct'17. Distance Protection of 132 kV Khliehriat (PG) – Khliehriat (MePTCL) II line is kept out of service due to substation earthing issue. Subgroup requested to take this Distance Protection in service at the earliest.

#### **Deliberation in the meeting:**

Distance Protection of 132 kV Khliehriat (PG) – Khliehriat (MePTCL) II line was kept out of service due to substation earthing issue.

POWERGRID informed MePTCL that since the earthing issue is resolved, DPR of 132 kV Khliehriat (PG) – Khliehriat (MePTCL) II is to be kept in service.

***The Sub-committee noted as above.***

***Action : MePTCL & PGCIL***

#### **12. Tripping of 220 kV Balipara – Sonabil line at Balipara for faults outside line section:**

Few instances of tripping of 220 kV Balipara – Sonabil line from Balipara on Earth Fault Protection is observed for fault in other line sections especially in 220 kV Samaguri - Sonabil II line.

Before clearing of the fault by relays of the faulty section, 220 kV Balipara – Sonabil line tripped in earth fault at Balipara end.

Tripping details is attached as Annexure C.12.

In subgroup meeting on 6th Dec'17, Subgroup requested POWERGRID to review the earth fault settings of 220 kV Balipara – Sonabil line at Balipara at the earliest and inform the status in the next PCCM.

**Deliberation in the meeting:**

POWERGRID informed the forum that relay settings at Balipara(PG) will be reviewed at the earliest.

***The Sub-committee noted as above.***

***Action: PGCIL.***

**13. Implementation of R&M works of Protection System funded from PSDF:**

The status as informed in 139th OCC:

State	Protection System	Work Progress
Arunachal Pradesh	Tendering in process	
Nagaland	Work under execution. Completion by 31.12.17.	
Mizoram	Main Equipment and Diagnostic Tools LOA issued. Civil Works LOA by 14.12.17	
Manipur	By Dec'17 all LOAs' to be issued.	
Tripura	To submit UC by 31.01.18.	
Assam	Remaining tenders by Jan'18 and all LOAs' by Aug'18.	
Meghalaya	MePTCL& MePGCL -LOA completed.	

**Deliberation in the meeting:**

NERLDC informed the forum that despite of the progress being discussed in OCC Meeting, the status is not furnished in detail.

Format for details of work under PSDF was shown by NERLDC and the same was agreed to be circulated to all the utilities to furnish the work progress.

NERLDC also informed that MePTCL has given the status of work under PSDF.

***The Sub-committee noted as above.***

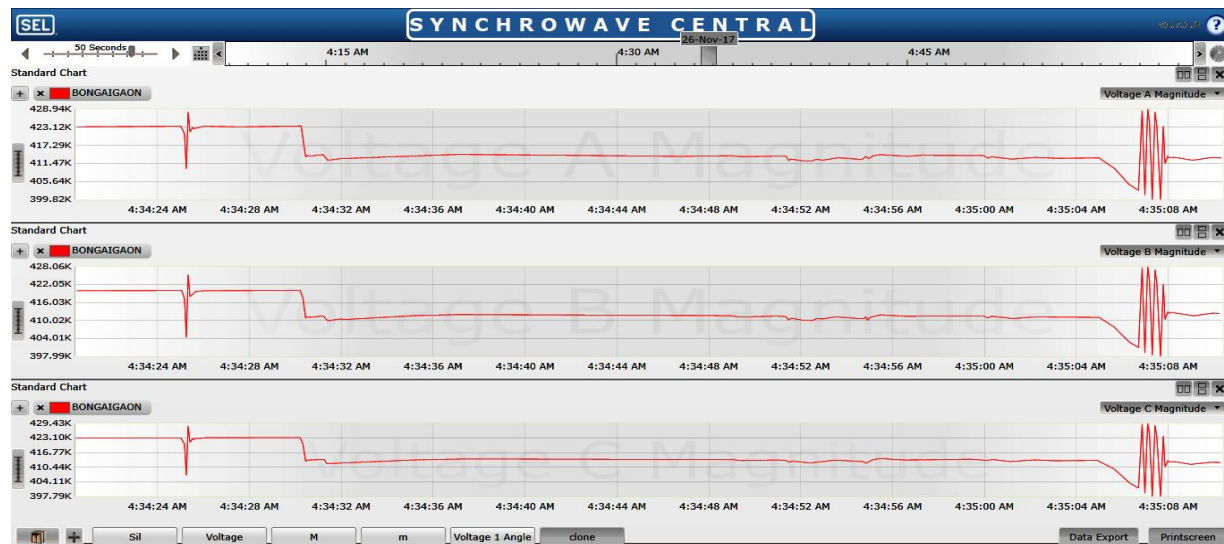
***Action: All Constituents.***

**14. Review of Over Voltage Settings of ISTS lines in NER:**

At around 04:34 Hrs on 26th Nov'17, 400/220 kV Alipurduar sub-station blacked out due to tripping of 400 KV Alipurduar- Bongaigaon ckt I, 400 KV Alipurduar-Binaguri double ckt, 220 KV Alipurduar - Birpara double ckt on account of over voltage at Alipurduar (220 kV Alipurduar-Salakati D/C was under planned shutdown and 400 KV Alipurduar -Bongaigaon ckt II was kept open to control over voltage).

Considering the criticality of 400 kV/220 kV substations of NER, to avoid unwanted tripping of

lines on account of over voltage, Over Voltage Settings of ISTS lines in NER may be reviewed.



Voltage Plot of Bongaigaon

**Deliberation in the meeting:**

NERLDC informed the forum that there are certain considerations that has to be followed for Over- Voltage settings of Transmission Lines. The same is not documented anywhere but is on the basis of study and experience. Time as well as Voltage grading may be done with proper coordination, though time grading is mostly preferred.

The forum requested NERLDC to make list of Over Voltage Settings of ISTS lines in NER and the same will be circulated to POWERGRID for comments.

***The Sub-committee noted as above.***

***Action: NERLDC.***

**15. Formation of Committee for periodic review of relay settings of grid elements:**

It is very much essential to review the relay settings of elements connected to grid periodically to ensure reliable operation of relays considering the drastic changes occurring in the grid. Also, review of relay settings of upcoming elements is also critical to ensure the safe and secure operation of NER Grid.

It is requested to form a committee to review relay settings.

Review of relay settings may be done half yearly for elements already connected to grid and review of relay settings of upcoming elements may be done at the earliest.

**Deliberation in the meeting:**

After detailed deliberation it was decided to form a committee to review the relay settings. The committee will consist of members from NERLDC, NERTS, NERPC and the affected constituents. The forum requested all constituents to send their nomination to the committee by 31st January, 2018.

*The Sub-committee noted as above.*

**Action: All constituents.**

**Any other item:**

- Member Secretary informed the forum that NPC Meeting will be organized by NERPC during the month of March'18 and any agenda which can be discussed on All India Basis is to be prepared.
- Status of remedial actions taken against grid events for the month of July-November 2017 could not be discussed in detail. Forum requested all the utilities to intimate the latest status of corrective actions taken to NERPC and NERLDC at the earliest.
- NERLDC gave a presentation for Grid Disturbance on 17.12.17 which is attached as Annexure. NERLDC also informed the forum that due to change in network configuration, the Islanding scheme has to be reviewed.

Member Secretary decided that a small committee will be formed to review SPS, UFR and Islanding schemes. Protection settings will also be reviewed.

- NTPC informed the forum that there is issue in 48 V Battery Bank resulting in sending of DT signals causing unwanted tripping of 400 kV BgTPP – Bongaigaon 1 line. Forum requested POWERGRID to take up the issue.
- The forum discussed that Bay owner has to install DR/ EL software and also demonstrate its working/procedure in all the substations where the same is not available for analysis of Events. Forum requested NERLDC to give list of all the bay owners and necessary action has to be taken accordingly by bay owners.

**Date and Venue of next PCC**

It is proposed to hold the 49<sup>th</sup> PCC meeting of NERPC on second week of March, 2018. The exact venue will be intimated in due course.

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**List of Participants in the 48<sup>th</sup> PCC Meetings held on 17/01/2018**

<b>SN</b>	<b>Name &amp; Designation</b>	<b>Organization</b>	<b>Contact No.</b>
1.	Sh. Abhishek Kalita, AM(Protection)	Assam	08486213068
2.	Sh. A. G. Thum, AEE, MePTCL	Meghalaya	09774664034
3.	Sh. Rokobeito Iralu, SDO(Trans)	Nagaland	09436832020
4.	Sh. Amaresh Mallick, DGM(SO-II)	NERLDC	09436302220
5.	Sh. Jerin Jacob, Engineer	NERLDC	09402120113
6.	Sh. Chitra Bahadur Thapa, Engineer	NERLDC	08135989964
7.	Sh. Ashim Kr. Sarmah, DM (E/M)	NEEPCO	09435078860
8.	Sh. H. Talukdar, CM-AM	PGCIL	09436335237
9.	Sh. Alokesh Hazarika, Sr. Executive	OTPC	07085060480
10.	Sh. Sanjeeb Kumar Sahoo	NHPC	09485211808
11.	Sh. K. P. Singh, DM	NTPC	09435720405
12.	Sh. P.K. Mishra, MS	NERPC	-
13.	Sh. L. B. Muanthang, SE	NERPC	09436731488
14.	Sh. Farooque Iqbal, EE	NERPC	09868172987
15.	Sh. Sadiq Imam, AD-I/AEE	NERPC	07004133772