North Eastern Regional Power Committee

AGENDA OF THE 48TH PROTECTION COORDINATION SUB-COMMITTEE MEETING OF NERPC

Date of Meeting : **17/01/2018 (Wednesday)**

Time of Meeting : **10:00 Hrs**

Venue : **"Hotel Nandan", Guwahati.**

A. CONFIRMATION OF MINUTES

CONFIRMATION OF THE MINUTES OF 47th MEETING OF PROTECTION SUB-COMMITTEE OF NERPC

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

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

B. OLD ITEMS FOR DISCUSSION

1. Third Party Protection audit of NER Sub-Stations

It was discussed in the **subgroup meeting held on 23rd Jan'17** that the last 3rd party Protection audit was done 4 years back. As per recommendations of Enquiry Committee, thorough third party protection audit need to be carried out in time bound manner. This exercise should be repeated periodically and monitored by RPCs. Subgroup agreed that it was necessary to carry out 3rd party protection audit at the earliest and referred the matter to PCC forum.

In 46th PCCM, Sr. Executive, OTPC informed the forum that OTPC has already implemented the recommendations of audit committee and submitted the report to NERPC. Forum requested subgroup to review the relay settings submitted by OTPC. Sr. Manager, TSECL informed the forum that they have implemented the recommendations for distance protection and will be implementing for other relays at the earliest. Forum requested TSECL to submit report by 30th April, 2017 to NERPC.

After detailed deliberation, it was decided to carry out third party protection audit of 1/3rd of NER substation. Forum decided to form 8 teams with 2 members from NERPC, NERLDC, POWERGRID, NEEPCO, AEGCL, MePTCL & TSECL each and one member each from DoP, Nagaland, P&ED, Mizoram, MSPCL & all ISGS in NER. In POWERGRID substation audit, members from 2 states & NERLDC/NERPC shall be present. And in state substation audit, members from POWERGRID, NERPC/NERLDC and other state shall be present. All

constituents are requested to send their nominee(s) to SE(P), NERPC before 30th April, 2017. Formation of teams, identification of stations and utility wise coordinators & preparation of audit schedule are to be completed within 30th April'17 by subgroup. Forum requested hosting station to arrange logistics, food & accommodation facilities to the audit team. Audit will be starting from May 2017.

During Subgroup Meeting held on 17th July, 2017, NERPC requested DGM, NERLDC to brief the Subgroup about the strategy for conducting 3rd Party Protection Audit. NERLDC informed the subgroup that 3rd Party Protection Audit of one-third of the total substations and generating stations may be carried out in the 1st phase. In view of this, NERLDC highlighted the following **substations and generating stations of respective constituents to be carried out in 1st phase considering the most critical Substation and Generating Station and based on protection related issues**.

1. **POWERGRID**: **Substations** at +/- 800 kV HVDC Biswanath Chariali, 400/132 kV Silchar, 220/132 kV Mariani, 220/132 kV Mokokchung, 220/132 kV Dimapur, 132/33 kV Imphal **(Total 6 Substations).**
   Switching Stations at 132 kV Aizawl and 132 kV Khleihriat **(Total 2 Switching Stations).**
2. **NEEPCO**: Generating Stations at 220 kV AGBPP, 132 kV AGTCCPP, 132 kV Doyang HEP and 132 kV TGBPP, Monarchak **(Total 4 Generating Stations).**
3. **NHPC**: 132 kV Loktak HEP.
4. **NTPC**: 400 kV BgTPP.
5. **OTPC**: 400 kV Palatana GBPP.
6. **DoP, Arunachal Pradesh**: Substation at 132/33 kV Khupi, 132/33 kV Pasighat, 132/33 kV Chimpu and 132/33 kV Daporijo **(Total 4 Substations).**
7. **AEGCL**: Substations at 400/ 220 kV Azara, 220/132/33 kV BTPS, 220/132/33 kV Agia, 220/132/33 kV Samaguri, 220/132/66/33 kV Mariani, 220/132/66/33 kV Tinsukia, 220/132/33 kV Sonabil, 220/33 kV Jawaharnagar, 220/132/33 kV Boko, 132 kV/33 Gohpur, 132/33 kV Kahilipara, 132/33 kV Rangia, 132/33 kV Dhaligaon, 132/33 kV Panchgram, 132/33 kV Srikona, 132/33 kV Umrangsho, 132/33 kV Dibrugarh, 132/33 kV Depota, 132/33 kV Pailapool and 132/33 kV Bokajan Substation **(Total 20 Substations)**
   Generating Stations at 132 kV NTPS, 132 kV LTPS and 132 kV Karbi Langpi HEP **(Total 3 Generating Stations).**
8. **MSPCL**: Substations at 132/33 kV Imphal, 132/33 kV Ningthoukhong, 132/33 kV Karong and 132/33 kV Kakching **(Total 4 Substations).**
9. **MePTCL**: Substations at 132/33 kV Khliehriat, 132/33 kV Mawlai, 132/33 kV NEHU, 132/33 kV Nangalbibra and 132/33 kV EPIP-II **(Total 5 Substations)**
   Generating Stations at 132 kV Leska HEP and 132 kV Umiam Stage-III HEP **(Total 2 Generating Stations).**
10. **P & ED, Mizoram**: Substations at 132/33 kV Zuangtui, 132/33 kV Luangmual and 132/33 kV Kolasib **(Total 3 Substations).**

11. **DoP, Nagaland**: Substations at 132/66/33 kV Dimapur, 132/33 kV Kohima and 132/33 Mokokchung **(Total 3 Substations).**
12. **TSECL**: Substations at 132/66/33 kV Agartala, 132/66/33 kV Udaipur, 132/33 kV Surajmaninagar, 132/33 kV PK Bari, 132/33 kV Budhjangnagar and 132/33 kV Dharmanagar **(Total 6 Substations)**

Generating Stations at 132 Rokhia, 132 kV Baramura and 66 kV Gumti **(Total 3 Generating Station).**

It was discussed in the meeting that a group comprising of one member each of NERPC/NERLDC, NTPC/NHPC/NEEPCO/OTPC/POWERGRID and state constituent shall be nominated for carrying out the 3rd Party Protection Audit.

Data as per Ramakrishna Task Force format and NERPC format should be available prior to protection audit.

Subgroup concluded the discussion by stating that the above Substations and Generating Stations may be audited w.e.f. 1st week of August, 2017 and referred the matter to PCC forum.

In 47th 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**.

Members may please discuss. Format for self-audit may please be formulated.

2. Identification of short lines to install line differential protection

During Sub Group Committee Meeting of PCC held on 24th Oct'16, NERLDC informed the forum that for purpose of installation of line differential protection on Short lines, it is necessary to identify the list of lines for this purpose.

The identification exercise for installation of Differential Protection relays has to be completed for all Transmission Lines of NER Grid level on a priority basis.

As informed by BgTPP-NTPC & POWERGRID, the installation of Differential Protection on 400 kV BgTPP – Bongaigaon D/C has been completed. As the 1st stage, differential protection is to be installed on important short lines like 132 kV Silchar – Srikona D/C, 132 kV Imphal(PG) – Imphal(MSPCL) D/C etc.

In 45th PCC meeting, forum decided that in the absence of uniformity of specific length criteria for installation of differential protection installation on short lines (valid for both existing and new transmission lines), the criteria adopted by SRPC could be referred for North-Eastern Region. After detailed deliberation, the following criterion was decided for adoption for identification of short line for differential protection:-

a) All 132 kV transmission lines of length <5 Kms.
b) All 220 kV transmission lines of length <10 Kms
c) All 400 kV transmission lines of length <50 Kms
d) All 132 kV & above dedicated transmission lines of Generators with installed capacity > 50 MW

The short lines as identified would be considered on basis of importance for installation of Differential Protection relays. The process of installation may be started wherever no additional investments in terms of Communication links between two ends of the line are required. Constituents of NER are requested to identify the lines in which line differential protections are to be installed under above criteria.

In 46th PCCM, it was decided that all constituents should identify short lines (integrated) only and submit the list of such lines to NERPC & NERLDC by 30th April, 2017. Subgroup will compile and come out with complete list of all such short line where differential protection is required by 30th April 2017. MePTCL informed that they have already identified the short lines.

After detailed deliberation, it was decided to exclude short lines that are radially connected to NER Grid from installing differential protection.

AEGCL informed that they have placed order to ABB for differential protection in line between LV side of ICT-2 at BgTPP and 220 kV BTPS bus. NTPC informed that this link shall not be treated as line, as there is no 220 kV Bus at BgTPP end. Due to difference in opinion amongst AEGCL, NTPC, PGCIL and NERLDC it was decided that NERPC & NERLDC will arrange a separate meeting with AEGCL and NTPC to sort out this matter.

MePTCL & AEGCL have replied to NERLDC/NERPC with the list of lines for installation of line differential relay but the list submitted by AEGCL is not complete.

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.

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

During 46th PCC Meeting, it was decided that all constituent has to give suggestions and feedback on Draft model maintenance procedure for transmission system prepared by group comprising of NERLDC, PGCIL and AEGCL on or before 30th April, 2017. **After 30th April, 2017, the sub-committee will finalize the maintenance procedure**.

Also, Forum requested all members to furnish list of plant wise available diagnostic tools to NERPC & NERLDC by 30th April 2017. MePTCL informed that they submitted the list of diagnostic tools to NERPC.

Forum also requested power utilities of NER to assess the number of new kits for measurement of tower footing resistance without the need to disconnect earth shielding wire. Possibilities of funding from PSDF for this purpose may be explored.

However, no feedback has been received from constituents regarding draft model maintenance procedure for

transmission utilities.

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

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.

Document on model maintenance procedure may please be considered as final document.

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

The relay settings details as formulated by NERTS in line with recommendations of V. Ramakrishna Task Force on Power system contingencies, had been circulated by NERLDC to all constituents of NER for comments. During Sub Group Committee Meeting of PCC held on 24th Oct'16, it was agreed that the same can be implemented at the earliest for uniformity in protection systems.

In 45th PCC meeting, it was informed to the forum that MePTCL has started the exercise while AEGCL has started implementing but having problem in the Resistive Reach setting and will come up with detailed analysis of the issue in the next meeting. TSECL has assured that it will start the work at the earliest. NTPC told that they can start implementing as per NERTS formulation only after receiving comments from their Corporate Office and will communicate the same to NERPC at the earliest.

The status as per 47th PCCM is given in the table below:

Sl. No.	**Constituent**	**Status of implementation as per 47th PCCM**	**Completion Date**
1.	Assam	Implemented in 400 kV Silchar - Azara, 220 kV Tinsukia-AGBPP, 220 kV BTPS – Salakati lines.	By September, 2017
2.	Arunachal Pradesh	No representative present	By September, 2017
3.	Manipur	No representative present	By September, 2017
4.	Meghalaya	Completed except for substation in Garo hills.	By September, 2017
5.	Mizoram	No representative present	By September, 2017

6.	Nagaland	Started	By September, 2017
7.	Tripura	Completed	Completed
8.	NERTS	Completed	Completed
9.	NEEPCO	Started (RHEP & AGBPP Completed)	By September, 2017
10.	NHPC	Completed	Completed
11.	NTPC	Started	By September, 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.

5. Review of Zone-II relay settings:

During Sub Group Committee Meeting of PCC held on 24th Oct'16, the forum discussed the relay settings document finalized by NERTS, POWERGRID for adoption in NER, for fulfillment with recommendations of V. Ramakrishna Committee Task Force. The forum had agreed for implementation of Zone-II / Zone-III settings accordingly.

NERLDC has circulated the impedances of shortest and longest lines for review of the reach of Zone-II Relay Settings by the constituents. Till now NERLDC has received comments from Assam, Meghalaya, OTPC and Kopili (NEEPCO). Forum asked AEGCL to furnish the guidelines of Zone-2 timing followed by them at the earliest to NERPC & NERLDC.

In 46th PCCM, after detailed deliberation it was decided that Zone –II setting to be completed for all important lines by 30th April, 2017. Forum requested subgroup to circulate list of important lines where settings have to be implemented at the earliest. The list of important lines was circulated to all the utilities by subgroup. The same was discussed in subgroup meeting on 18th April'17.

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.

Members may please intimate the status of implementation.

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

During Sub Group Committee Meeting of PCC held on 24th Oct'16, it was informed that due to ill-coordination in relay settings between State systems and ISTS, frequent tripping of elements is occurring. Most of the Grid disturbances in NER Grid are due to this. **P&E Dept., Mizoram and DoP, Nagaland** were requested to co-ordinate their relay settings with ISTS systems and implement the same as suggested by NERTS.

NERPC may take up with P&E Dept., Mizoram and DoP, Nagaland in this regard for quick implementation.

Decision taken in sub group meeting held at Shillong on 24.10.16 are to be implemented at the earliest and status to be reported to NERPC&NERLDC.

In 46th PCCM, EE, DoP Nagaland informed the forum that they will discuss with POWERGRID and implement the required relay settings in downstream elements of DoP, Nagaland within 1 month to avoid unnecessary tripping of ISTS lines due to downstream fault.

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.

DoP Nagaland, TSECL & P&ED Mizoram may please intimate the status.

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

During Sub Group Committee Meeting of PCC held on 24th Oct'16, NERLDC requested all power stations to provide details where PSS is installed. It was also requested to activate existing PSS after tuning and inform the same through mail.

NEEPCO vide mail dated 27th Oct'16 informed that all hydro stations of NEEPCO have PSS installed and activated. NERLDC vide email dtd. 27th Oct'16 had requested NEEPCO for further details of PSS. NERLDC requested NEEPCO and NHPC to furnish details and settings of existing PSS (Time constant, PSS gain, PSS output limiter Max, Min etc.).

Only Palatana CCGT has provided the details of PSS installed and activated for damping oscillations to NERLDC, whereas the details provided by NEEPCO is not sufficient and to be submitted to NERPC/NERLDC. NEEPCO has given parameters of block diagram of some of their generators (Khandong, etc.), which do not convey any practical meaning in sense of damping of Low Frequency Oscillations. NERLDC requested NEEPCO to furnish the following details of PSS – Make, Date installed, Last date of tuning by OEM, Tuned frequency range.

In the 45th PCCM, NERLDC expressed concern in the matter of several cases of Poorly Damped/Negatively Damped Oscillations in Southern part of NER Grid, and requested NHPC to tune their PSS if it is already installed, and furnish details of PSS to NERPC&NERLDC.

In 46th PCCM, the committee requested NEEPCO to provide the necessary details to NERLDC at the earliest. Manager, NHPC informed that PSS is not installed in Loktak generating station. NERLDC requested NHPC to install PSS for the better system operation.

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

NEEPCO may intimate the status.

8. Standardization of Disturbance Recorder Channels:

Disturbance Recorders on Transmission elements are necessary for post disturbance analysis, and identification & rectification of any protection operation. As per CBIP's manual on Protection of Generators, GT, Transformers and Networks, it is recommended to have minimum 8(eight) analog signals and 16(sixteen) binary signals per bay or circuit. Also, it should have a minimum of 5 sec of total recording time, minimum pre-fault recording time of 100 msec and minimum post-fault recording time of 1000 msec.

POWERGRID had standardized Disturbance Recorder Channels for lines, transformers & reactors. The Sub-committee requested NERPC/NERLDC to circulate the above standardization to all constituents of NER for giving comments and suggestion by 24.07.15. NERLDC had sent this document to all constituents of NER for giving comments and suggestion by 24.07.15.

During 42nd PCC meeting, the forum requested NTPC to provide their standardized DR Channels for generator so that it may be standardized for all generating units of NER. NTPC representative readily agreed. S.E. (O) once again requested all the constituents to kindly furnish their comments so that the process may be completed.

During the 43rd PCCM, DGM (SO-II), NERLDC stated since no comments/observations were received from the constituents it may be assumed that the DR channels for line, transformer and reactor are finalized. After detailed deliberation, forum decided DR channels as finalized have to be implemented in all ISTS lines and intra-state lines with numerical relays, within 31.07.2016 and gradually for all 220kV and 132kV lines.

The forum agreed that since Assam power system is the largest state system of NER Grid, standardization of DR

channels in lines of Assam is felt necessary. It was decided that AEGCL may complete implementation of standardized DR channels by 31st August 2016, and take help from NERTS, if necessary.

NTPC agreed to submit standardized DR channels for generator by 20.07.2016, which can then be discussed for adoption by all generators of NER Grid.

In 44th PCCM, AEGCL representative informed the forum that the work of DR standardization will be completed by 30th November 2016.

In 46th PCCM, AGM, AEGCL informed that they have already standardized DR channels for all 200KV and above lines. NERLDC informed forum that after repeated request to OTPC, their DR digital channels are not standardized, so proper analysis of events related to Palatana could not be done. OPTC informed that they will look in to this matter at the earliest. TSECL informed that they have not done the DR standardization. The forum requested NERLDC to provide list of all lines where standardization of DR Channel is required. All members are requested to provide update of Standardization of channel to NERLDC at the earliest.

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.

Members may please intimate the latest status.

9. Implementation of SPAR

During Sub Group Committee Meeting of PCC held on 24th Oct'16, NERLDC indicated that SPAR (Single Phase Auto Reclosure) is not available in 132 kV AGTPP – Agartala D/C lines, which was resulting in multiple tripping of these lines on transient fault. NERTS was requested for changing of Auto-reclosure scheme to SPAR.

It was also decided that utilities should identify those transmission lines which have no SPAR scheme for implementation of the same. Implementation of SPAR is considered necessary in view of reliability of the power system.

In 45th PCCM, Forum requested all constituents to furnish status report of SPAR implementation to NERPC.

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.

Members may please intimate the latest status.

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

It was noted that most of tripping of transmission lines in NER Grid occur either on account of lightning strikes or due to vegetation infringement problem. It was decided that all utilities will identify the lightning prone areas and conduct checking of high tower footing resistance in transmission lines in these areas.

Since tripping of line on lightning occurs due to arcing, to prevent that it is required to either maintain low value of tower footing resistance or install of lightning arrester for the particular towers having consistent high tower footing resistance due to prevailing ground conditions.

In 45th PCCM, the forum requested all the constituents to complete the process of identification of lightning prone line sections, and initiate action in this regard.

Forum requested members to identify lightning prone areas and measure tower footing resistance in these locations. AEGCL & MePTCL informed that they don't have proper earth resistance measuring tool at present and they are planning to procure the same at the earliest.

POWERGRID informed that additional shield wire earthing and counterpoise earthing are not helping much to arrest lightning. Better way is to install TLSA as chemical earthing cost (around RS. 80,000) is double the cost of installation of TLSA (around RS. 40,0000).

In 46th PCC Meeting, forum requested members to identify lightning prone areas and measure tower footing resistance in these locations. AEGCL & MePTCL informed that they don't have proper earth resistance measuring tool at present and they are planning to procure the same at the earliest. POWERGRID had informed that additional shield wire earthing and counterpoise earthing are not helping much to arrest lightning. Better way is to install TLSA as chemical earthing cost (around RS. 80,000) is double the cost of installation of TLSA (around RS. 40,0000).

During Subgroup Meeting held on 17th July, 2017, DGM(NERLDC) suggested MePTCL and NETC to identify the lightning prone areas of all the lines of MePTCL and NETC respectively and install polymer insulators and line arrestors to those 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 arrestor required and hence cost

can be estimated. The constituent may then approach for PSDF.

Power Utilities may please intimate the progress status.

POWERGRID may please give a presentation on the performance of already installed TLSAs.

11. Mock Testing of SPS related to Palatana

During Sub Group Committee Meeting of PCC held on 17th July'17, members addressed the importance of mock testing of SPS related to Palatana at the earliest to avoid the disturbance in Southern part of NER Grid.

POWERGRID informed that there is time stamping issue of DT signal at Silchar. POWERGRID informed that the matter will be resolved in few days. **POWERGRID and Palatana agreed to do mock test of all SPS related to Palatana on 24th July, 2017 subject to good weather condition.** DGM, NERLDC further stated that time of both ends is to be synchronized with GPS before doing 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.

Members may please discuss.

12. Desynchronization of AGTCCPP Machines due to Under Voltage issue

During Sub Group Committee Meeting of PCC held on 17th July'17, NEEPCO informed the Subgroup that it is difficult to run their machines under under-voltage condition.

Subgroup decided that system study has to be done by TSECL to identify the nodes where under-voltage issue exists and plan for the installation of Capacitor Banks for improvement of voltage profile.

In 47th PCCM, Tripura representative were absent. The issue could not be discussed. It was referred to next OCC meeting.

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

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

In subgroup meeting held on 9th March 2017, NERLDC showed the PMU plots of several instances of oscillations observed at 132 kV Agartala PMU and raised concern on proper tuning of Automatic Voltage Regulator (AVR) of AGTPP units considering the oscillation in voltage and many of the cases involved switching of AGTPP units. He also requested NEEPCO to take this matter seriously as these localized oscillations can spread to other generating stations connected to grid.

Sr. Manager, NEEPCO informed that there was a change in control systems of AGTTP Units 3 & 4. OEM has informed them that oscillation may be due to change in control system as oscillations were observed only in these units. He also informed that control systems of AGTPP Units 1 & 2 will be replaced soon with new ones. If those machines also experience oscillation problem, OEM will install additional equipment to damp the oscillation.

DGM (SO-II), NERLDC asked NEEPCO to check and inform forum whether PSS is enabled and functioning properly. He also requested NEEPCO to carry out AVR tuning and take necessary actions to damp out oscillations at the earliest as these oscillations can lead to wide spread oscillations in grid.

In 46th PCCM, it was discussed that Sr. Manager, NEEPCO informed that the oscillation started after changing the control panel of units 1 and 2. NEEPCO also informed that matter is already reported to OEM and OEM is yet to provide any solution. The forum requested NEEPCO to pursue the matter very seriously with the OEM as low frequency oscillation endangers the stability of grid and come up with solution at the earliest.

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.

AGTCCPP, NEEPCO may intimate the status.

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.**

i. Tripping due to Vegetation
ii. Tripping due to Lightning
iii. Tripping due to improper relay coordination
iv. Tripping due to mis-operation.
v. 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.

C. NEW ITEMS FOR DISCUSSION

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**.

Members may please discuss.

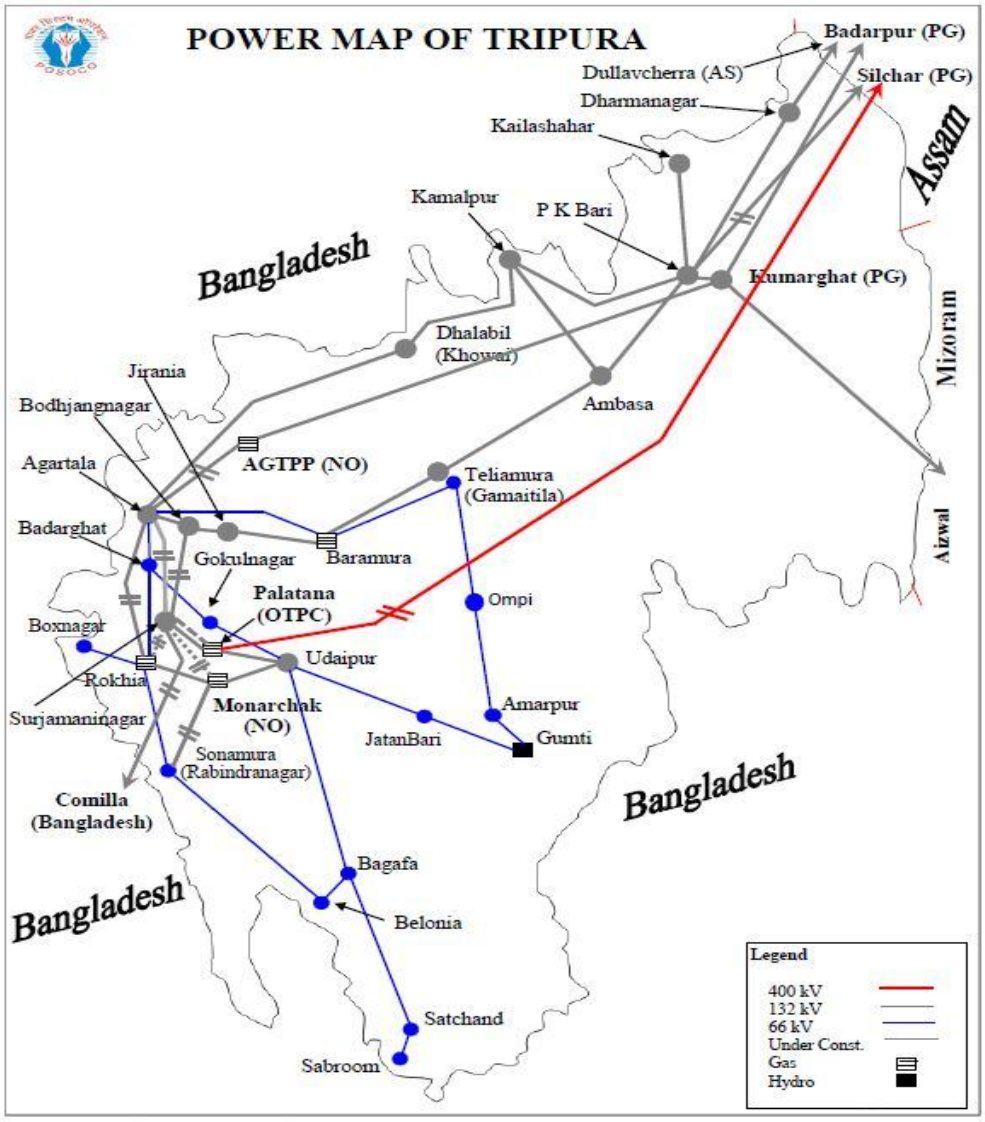
2. Voltage Collapse observed in Tripura Power System at 16:11 Hrs on 23rd Sep'17

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

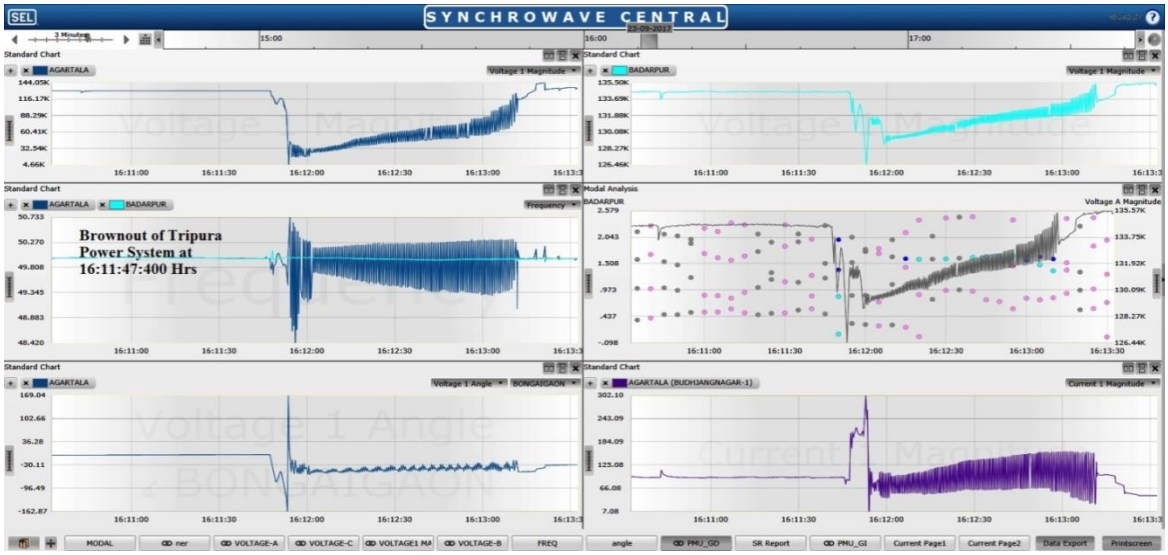
Power System.

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.

Members may please discuss.

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.

Sl.	**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 P K Bari - Ambassa Line	28-09-2017 17:32:00	28-09-2017 17:40:00	Earth Fault	No tripping
2	132 kV Dhalabil - Kamalpur Line	28-09-2017 17:32:00	28-09-2017 17:36:00	Earth Fault	No tripping
3	132 kV P K Bari - Dharmanagar Line	28-09-2017 17:32:00	28-09-2017 17:38:00	Earth Fault	No tripping
4	132 kV P K Bari - Kamalpur 1 Line	28-09-2017 17:32:00	28-09-2017 17:36:00	No tripping	Earth Fault

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.

Members may please discuss.

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).

a. 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.

b. 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.

Members may please discuss.

5. Tripping related to Palatana Generating System

a. At 08:16 Hrs on 5th 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 28th 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 -	13-Sep-17	13-Sep-17	DPR, Z2,	No	35

	Surajmaninagar	15:20	15:38	46.4 KM	Tripping	
3	Palatana - Surajmaninagar	28-Sep-17 13:15	28-Sep-17 13:31	Tripped on O/C	No Tripping	35

POWERGRID/OTPC/TSECL may please intimate the root cause.

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

Palatana GTG- I & II at 18:05 Hrs on 21st Sep'17 due to suspected mal-operation of SPS-3.

In the special meeting of NERPC held on 11th Oct'17 at Shillong, it was decided that spurious operation of SPS-3 on 21st Sep'17 will be investigated by POWERGRID and come out with report within 1 week.

Discussion in subgroup meeting on 6th 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. **POWEGRID**

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 3rd 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.

Members may please discuss.

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.

TSECL may intimate the status. Members may please discuss.

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.

Members may please discuss.

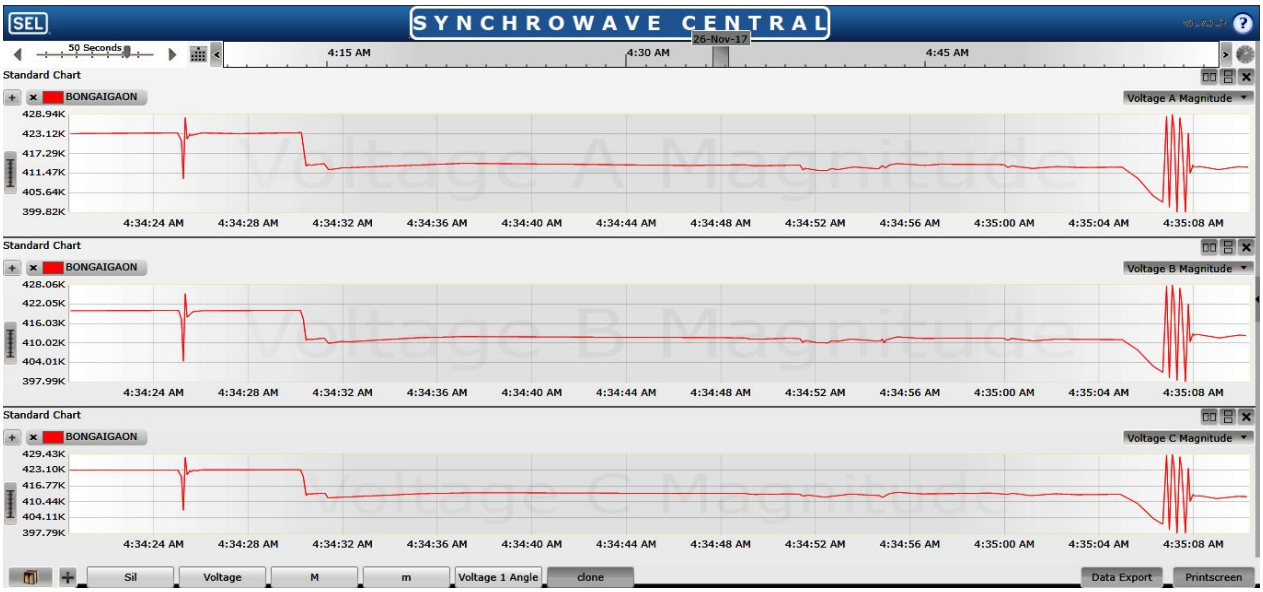
8. Inter-Regional line tripping:

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 26th 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 26th Nov'17

In subgroup meeting on 6th 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**.

POWERGRID may intimate the root cause of these events and remedial measures taken so far.

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 6th 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 6th 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**.

POWERGRID may intimate the status.

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 forthe 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 the 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.

Memebers may please discuss.

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.

POWERGRID may intimate the status

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

The status as informed in 139th OCC:

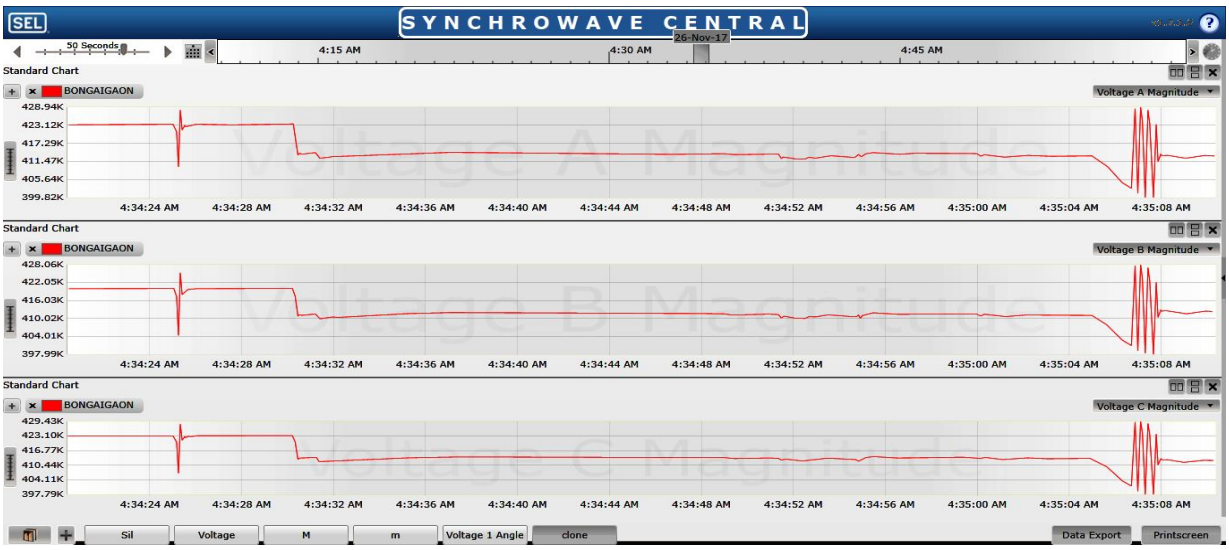
State	Protection System	Work Progress
Arunachal Pradesh	Tendering in process	
Nagaland	Work under execution. Completion by 31.12.17.	
Mizoram	Main Equipment and Diagnostic Tools LOA issued. Civil Works LOA by 14.12.17	
Manipur	By Dec'17 all LOAs' to be issued.	
Tripura	To submit UC by 31.01.18.	
Assam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

Members may please intimate the status.

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

Members may please discuss

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.

Members may please discuss.