भारत सरकार Government of India
विद्युत मंत्रालय Ministry of Power
उत्तर पूर्वी क्षेत्रीय विद्युत समिति
North Eastern Regional Power Committee
एन ई आर पी सी कॉम्प्लेक्स, डोंग पारमाओ, लापालाङ, शिल्लोंग-७९३००६, मेघालय
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No. NERPC/SE (O)/PCC/2014/***2918-53*** Dated: November 19, 2014

To,

1. Managing Director, AEGCL, Bijuli Bhawan, Guwahati – 781 001
2. Managing Director, APDCL, Bijuli Bhawan, Guwahati – 781 001
3. Managing Director, APGCL, Bijuli Bhawan, Guwahati – 781 001
4. Director (Generation), Me. PGCL, Lumjingshai, Short Round Road, Shillong – 793 001
5. Director (Distribution), Me. ECL, Lumjingshai, Short Round Road, Shillong – 793 001
6. Director(Transmission), Me. PTCL, Lumjingshai, Short Round Road, Shillong – 793 001
7. Managing Director, MSPDCL, Electricity Complex, Keishampat, Imphal – 795 001
8. Managing Director, MSPCL, Electricity Complex, Keishampat, Imphal – 795 001
9. CGM, (LDC), SLDC Complex, AEGCL, Kahilipara, Guwahati-781 019
10. Chief Engineer (WE Zone),Department of Power ,Govt. of Arunachal Pradesh, Itanagar- 791111
11. Chief Engineer (EE Zone),Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
12. Chief Engineer (TP&MZ),Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
13. Engineer-in-Chief (P&E), Department of Power, Govt. of Mizoram, Aizawl – 796 001
14. Chief Engineer (P), Department of Power, Govt. of Nagaland, Kohima – 797 001
15. General Manager, TSECL, Agartala – 799 001
16. Group General Manager, NTPC, Bongaigoan Thermal Power Project, P.O. Salakati, Kokrajhar- 783369
17. ED, NERTS, PGCIL, Dongtieh-Lower Nongrah, Lapalang, Shillong -793 006
18. ED (O&M), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
19. ED (Commercial), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
20. ED (O&M), NHPC, NHPC Office Complex, Sector-33, Faridabad,Haryana-121003
21. GM (Plant), OTPC, Badarghat Complex, Agartala, Tripura - 799014
22. GM, NERLDC, Dongtieh, Lower Nongrah, Lapalang, Shillong -793 006
23. Member Secretary, ERPC, 14 Golf Club Road, Tollygunge, Kolkata-700033
24. Chief Engineer, GM Division, Central Electricity Authority, New Delhi – 110066

Sub: Minutes of the 27th PCC Meeting - Reg.

Sir,

The Minutes of the 27th PCC Meeting of NERPC held on 12.11.2014 at “Hotel Nandan”, Guwahati is enclosed for favour of kind information and necessary action please**.**

Any comments or observations may kindly be communicated at the earliest.

With warm regards,

Encl: As above

भवदीय / Yours faithfully,

बि. लिंगखोइ / B. Lyngkhoi
निदेशक **/ Director/ SE**

Copy to:

1. CGM, AEGCL, Bijuli Bhavan, Guwahati - 781001
2. CGM, APGCL, Bijuli Bhavan, Guwahati - 781001
3. CGM, DISCOM, Bijuli Bhavan, Guwahati - 781001
4. Head of SLDC, Me.ECL, Lumjingshai, Short Round Road, Umjarain, Shillong – 793 022
5. Head of SLDC, Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791 111
6. Head of SLDC, Department of Power, Dimapur, Nagaland
7. Head of SLDC, Electricity Department, Govt. of Manipur, Keishampat, Imphal – 795 001
8. Head of SLDC, Department of Power, Govt. of Mizoram, Aizawl – 796 001
9. Head of SLDC, TSECL, Agartala – 799 001
10. Chief Engineer(Elect), Loktak HEP,Vidyut Vihar, Kom Keirap, Manipur- 795124
11. Addl. GM (EED), NTPC Ltd., Bongaigoan Thermal Power Project, P.O. Salakati, Kokrajhar- 783369
12. DGM (C&M), OTPC, 6th Floor, A-Wing, IFCI Tower -61, Nehru Place, New Delhi – 110019.

वी. लिंगारेड्डी

निदेशक / **Director/ SE**

North Eastern Regional Power Committee

MINUTES OF THE 27th PROTECTION COORDINATION SUB-COMMITTEE MEETING OF NERPC

Date : 12/11/2014 (Wednesday)
Time : 14:00 hrs
Venue : "Hotel Nandan", Guwahati.

The List of Participants in the 27th PCC Meeting is attached at **Annexure – I**

Shri B. Lyngkhoi, SE (Operation), NERPC welcomed all the participants to the 27th PCC meeting. He expressed concerned about the less participants in the meeting and stated that the same will be intimated to the OCC forum so that they can decided if the PCC & OCC meetings are to be hosted separately or clubbed with the OCC meeting in future. Further, he mentioned that PCC Sub-committee is one of the most important to analyze the incidences occurred during the month so as to avoid major in future as recommended by Enquiry Committee. He requested all the participants to actively participate in the discussion for fruitful outcome.

Thereafter, the agenda were taken up for discussion.

A. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF 26th MEETING OF PROTECTION SUB-COMMITTEE OF NERPC.

The minutes of 26th meeting of Protection Sub-committee held on 15th October, 2014 at Guwahati were circulated vide letter No. NERPC/SE (O)/OCC/2014/2018-2053 dated 24th October, 2014.

No observations or comments were received from the constituents. The Sub-committee may discuss & confirm minutes of 26th PCCM of NERPC.

The Sub-Committee confirmed the minutes of 26th PCCM of NERPC as No observations or comments were received from the constituents

I T E M S F O R D I S C U S S I O N

A.1 Implementation of 3-phase Auto Reclosure Scheme in all lines connected to Khandong and Kopili HEP:

For reliable operation of Power system it is required to implement 3-Phase Auto Reclosure Scheme in all the 132kV lines connected to Kopili and Khandong HEP of NEEPCO. The lists of such lines are:

a) 132kV Khliehriat – Khandong # 1
b) 132kV Khliehriat – Khandong # 2
c) 132kV Haflong – Khandong
d) 132kV Kopili – Khandong # 1
e) 132kV Kopili – Khandong # 2

During 26th PCC meeting, NEEPCO representatives stated that breakers reached the site and may be expected to be commissioned within one month.

POWERGRID representative stated that they would implement the 3-Phase Auto Reclosure in the following lines where both the bays belong to POWERGRID

1) 132kV Khandong – Khliehriat - II

2) 132kV Kopili – Khandong - II

Regarding enhancement of bus capacity, NEEPCO was requested to intimate the status within a month. Representative of NEEPCO informed that concerned officer was not available, the matter maybe referred to OCC for further deliberation.

It was discussed that charging of any feeder at Khandong through transfer bus is not possible because of lower capacity of main bus conductor. Strengthening of Khandong bus has already been discussed in earlier RPC forum. NEEPCO will intimate the status by next OCC/PCC & expedite thereof.

Deliberation of the sub-Committee

NEEPCO representative stated that 3-phase auto-reclosure scheme is expected to be implemented by December 2014 in the following line: -

a) 132kV Khliehriat –Khandong #1

b) 132kV Khandong – Haflong

c) 132kV Kopili – Khandong # 1

DGM, NERTS informed that 3phase auto-reclosure scheme is already implemented in132kV Kopili – Khandong # 2 and 132kV Khliehriat–Khandong#2.

Regarding enhancement of bus capacity, NERPC Secretariat will write a letter to NEEPCO corporate office enclosing the approval of earlier RPC. NEEPCO may then pursue accordingly for the enhancement.

The sub-committee noted as above.

A.2 Implementation of 3-Phase Auto Reclosure scheme of Radially fed 132kV Lines connected to Ranganadi HEP:

At present, the power flows to Nirjuli, Gohpur and Ziro radially from Ranganadi HEP and any transient fault in line causes undesirable outages. Hence, to avoid outages during transient fault it is essential to implement 3- Phase Dead Line charging of following 132kV Lines.

a) 132kV Ranganadi – Nirjuli Line (Dead Line Charging at RHEP)
b) 132kV Nirjuli – Gohpur Line (Dead Line Charging at Nirjuli)
c) 132kV Ranganadi – Ziro Line (Dead Line Charging at RHEP)

During the 26th PCC meeting, NEEPCO representative stated that the design cell would be visiting the site during November 2014. The scheme would be implemented once clearance is given by design cell. The status will be reviewed in next PCC meeting.

The Sub-committee requested NEEPCO to look into the matter at the earliest as this is a system requirement and status should be spelt out in the next PCC meeting. NEEPCO agreed.

Deliberation of the sub-Committee

NEEPCO representative stated that drawings for implementing Auto-reclosure schemes in the above lines been finalized. Joint meeting with ED (O&M) and Design cell is expected by 18th November, 2014 for clearance and the same may be expected to be implemented by November, 2014.

POWERGRID informed that 3P Dead Line Charging of 132kV Nirjuli – Gohpur Line at Nirjuli has already been implemented.

The sub-committee noted as above.

A.3 Implementation of islanding scheme in NER

The proposed islanding schemes have been studied and discussed in detail by the system study group on 14.10.2014 at NERLDC, Shillong. The minutes of the meeting along with suggestions are attached at **Annexure A.3**

Deliberation of the sub-Committee

The proposed islanding schemes have been implemented in all respects, except islanding at 47.90 Hz i.e. isolation of NER from NEW grid at ER-NER boundary. The islanding schemes may be monitored and any further improvement may be suggested in subsequent meetings.

The sub-committee noted as above.

A.4 Testing of protective relays of downstream system of 132kV Khliehriat (Me.ECL) Sub Station:

All downstream faults of 132kV Khliehriat (Me.ECL) Sub Station gets reflected to 132kV Khliehriat (PG) Sub Station causing greater isolation of system. Hence, it is essential that Me.ECL should carry out testing of downstream Relays at 132kV Khliehriat (Me.ECL) Sub Station and based on the condition of relays further course of action may be decided. In case the relays are found defective POWERGRID will revise the existing relay setting at 132kV Khliehriat (PG) Sub Station in such a way that expedite tripping of both 132kV Khliehriat – Khliehriat Line # 1 & 2 occurs during downstream fault to avoid undesirable isolation of Lines at upstream.

During the 26th PCC meeting, Member Secretary I/C NERPC suggested to prioritize the 3rd party audit reports of NERPC so that most important items to be replaced may be identified. The prioritized reports may then be pursued for funding from PSDF. Constituents were agreed.

Deliberation of the sub-Committee

Me. PTCL representative stated that relays have been tested for NEHU, NEIGRIHMS, and LUMSHNONG jointly with POWERGRID and found correct. Relays of Khliehriat – Leshka and Khliehriat – Khliehriat (PG) are to be tested within this month. Funding from PSDF is being sought for up-gradation of the sub-station.

DGM, NERTS informed that joint inspection report have already been forwarded to Me. PTCL and all the recommendations etc., for improvement of sub-station has been spelt out. He requested them to go through the report and take the necessary steps accordingly.

After deliberation, it was agreed that NERPC will write a letter to Director (Transmission) Me. PTCL enclosing the joint inspection report, mentioning the immediate requirements for improvement of earthing. NERTS was requested to extend necessary help to Me. PTCL if required for needful.

The sub-Committee noted as above.

A.5 Transmission Availability verification for ISTS elements:

Availability certification of ISTS elements – POWERGRID & NETC submitted outage reports of their lines for certification for the first time for this control period i.e. 2014-19. Being the first certificate to be issued for the control period 2014-19 the same may be thoroughly deliberated by the constituents vis a vis the new tariff regulation so that any inadvertent mistake can be detected & corrected before issuance of certificate by NERPC.

Procedure for calculation of Transmission system availability factor for a month as per CERC Regulation 2014-19.

The OCC forum have agreed to the important points on the regulation regarding transmission availability calculations as follows:

- For Ac system, two trippings per year shall be allowed.
- After two trippings in a year, additional 12 hours outage shall be considered in addition to the actual outage
- In case of outage of a transmission element affecting evacuation of power from the generating station, outage hour shall be multiplied by a factor of 2.

- The weightage factor for each category of transmission elements shall be calculated as per regulation.

The procedure for finalizing certification by NERLDC was deliberated in detail and the following points were agreed: -

Planned Outages: -

1. In all cases of outages, RLDC will certify the actual outage period. The outage period will be cross-checked with the approved outage period in OCC forum. All planned outages should be availed by the executing agency as approved in the OCC forum.
2. Any deferment from approved outage hours and approved outage days may be intimated by the agency to NERPC with a copy to NERLDC, justifying the reason of deferment. The deferred hours/ days without proper justification will be deducted from the availability period.

Emergency Outages: -

1. Outages beyond the control of the agency when neither RPC nor RLDC could be informed earlier and immediate remedial actions are required.
2. Outages planned in OCC forum but are of emergency in nature like tower in danger; CBs need immediate replacement, etc. However, the agency has to intimate RPC with a copy to RLDC.
3. Outages that cannot be delayed till next OCC forum for proper approval.
4. However, the agency has to intimate RLDC with the reason of outage for all the above cases which may be approved in OCC forum.

Transient Outages: -

1. Outages that are of transient in nature due to lightning, mal-operation of relays, etc.
2. Transient Earth Fault, Auto-reclosure, phase-to-phase fault, etc.
3. Outages due to infringements.
4. However, the agency has to intimate RLDC with the reason of outage for all the above cases which may be approved in OCC forum.

Outages due to others: -

1. Outages due to fault in the downstream protection.
2. Outages as per direction of RLDC for desired system condition.
3. Outages due force majeure/ Acts of God.
4. However, the agency has to intimate RLDC with the reason of outage for all the above cases which may be approved in OCC forum.

Force Majeure: -

1. Act of God including lightning, drought, fire and explosion, earthquake, volcanic eruption, landslide, flood, cyclone, typhoon, tornado, geological surprises, or exceptionally adverse weather conditions which are in excess of the statistical measures for the last hundred years; or
2. Any act of war, invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, insurrection, terrorist or military action; or
3. Industry wide strikes and labour disturbances having a nationwide impact in India;
4. However, the agency has to intimate RLDC with the reason of outage for all the above cases which may be approved in OCC forum.

Conditions given in SoR: -

1. Only 2 trippings per annum allowed for each AC system, additional 12 hours may be added for each tripping in case of trippings more than 2 in a year.
2. Further, in case of outage of a transmission element affecting evacuation of power from a generating station, outage hours shall be multiplied by a factor of 2.

In the 102nd OCC meeting, DGM (MO), NERLDC also gave a presentation proposing the procedure for transmission availability certification. Members agreed to the proposal of NERLDC except the following points: -

1. Constituents may be allowed to study the outage data submitted by NERTS on weekly basis after uploading the same in NERTS website. Then more time will be available for comments to be submitted by next OCC.
2. Outage certification of period from April 2014 to June 2014 need to be revised as the same will have effect on number of trippings in a year. Further, constituents are not given the evidence provided by transmission licensees for claiming force majeure due to lightning.

DGM, NERTS also gave a presentation explaining the different waveforms recorded during infringements, lightning, etc.

During 26th PCC meeting, DGM, NERTS gave a presentation explaining the different waveforms recorded during infringements, lightning, etc.

Further, DGM (MO), NERLDC gave a presentation regarding steps to be taken for the purpose of verification of transmission system availability which are as follows:-

1. Submission of outage data of the month to NERLDC by the transmission licensee pertaining to previous month (say data of January shall be submitted by February)

2. Verification of duration of outage by NERLDC after receiving outage data of the month from the transmission licensee for verification of reasons of outage and ascertaining whether outage is attributable to transmission licensee or others (say by 1st week of March).

3. Simultaneously place the data in next OCC of NERPC for identifying the outages which caused generator backing down (say by 1st week of March)
4. Outcome/decision of PCC meeting and OCC meeting shall be intimated to NERLDC within a week after the meeting (say by 15th March)
5. NERLDC will verify and submit the data to NERPC Secretariat (say by 25th March)

Deliberation of the sub-Committee

It was agreed that NERPC will follow the decisions of PCC, OCC and CC forums and any disputed outages will be brought to PCC/ OCC forums for further deliberations.

A.6 Implementation of the recommendations of the Protection Audit:

As per para no 27 of CERC order in Petition No. 220/MP/2012 on 21.02.14,the deficiencies, if any, in Category-A (the deficiencies which can be corrected without any procurement) shall be rectified by the concerned STU and CTU within 2 months of issue of the order and compliance report in this regard shall be submitted to NERPC. **All deficiencies of Category-B (deficiencies involving procurement of equipment) shall be rectified within 6 months of issue of the order**. In this regard, reasons of non-availability of fund or delay in procurement process shall not be accepted. The procurement and implementation is to be completed by each STU using their own fund which can be reimbursed through a common request of funding through PSDF forwarded through NERPC as per procedure recently approved by Government of India.

During 26th PCC meeting, DGM, POWERGRID informed that issue of implementation of Bus Bar protection system at Dimapur S/S as recommended under category-B has already been taken up. Target Completion : January, 2015

Deliberation of the sub-Committee

SE(O) requested the Constituents of NER to intimate the status of rectification of protection deficiencies under Category A & Category B. He requested the constituents to furnish the data below:

i. the rectification of protection deficiencies under Category A already done

ii. the rectification of protection deficiencies under Category A required to be done

iii. the rectification of protection deficiencies under Category B already done by procuring equipment with own investment

iv. the rectification of protection deficiencies under Category B required to be done with huge investment in procuring equipment

It was agreed that the above actions initiated by NER constituents may be highlighted in the coming CERC hearing on 27.11.2014

The sub-committee noted as above.

A.7 Implementation of Auto Reclosure Scheme in 132kV Jiribam (PG) - Loktak and 132kV Imphal (PG) – Loktak Line:

The external Auto Reclose Relay Type VARM and MGA are already obsolete and without service support from OEM. At Loktak HEP, the AR Relay Type VARM and MGA of 132kV Jiribam (PG) and 132kV Imphal (PG) are not tested since 2008 and so healthiness could not be ensured. Further, during March'14 NHPC has installed Numerical DPR Type P442 of M/S Alstom Make in the said feeders. Further, the Old / Obsolete CBs are already replaced with SF6 CB. Hence, Auto Reclosure Scheme may be implemented in 132kV Jiribam (PG) - Loktak and 132kV Imphal (PG) – Loktak Line immediately by activating internal Auto Reclosure of Numerical DPR to avoid use of obsolete Auto Reclose Relay Type VARM and MGA.

Deliberation of the sub-Committee

NHPC representative stated that procurement of control cable is under process and SPAR will be implemented within January, 2015. Day time shutdown will be sought accordingly for implementation of the same.

The sub-committee noted as above.

A.8 Removal of Obsolete DPR Type THR-3 and SSRR3V from 132kV Jiribam (PG) and 132kV Imphal (PG) Feeder:

As per the existing practice, the protection scheme for 132kV Lines is Single Main and Backup Protection. During March'14 NHPC has already installed Numerical DPR Type P442 of M/S Alstom Make in 132kV Jiribam (PG) and 132kV Imphal (PG) feeders. However, the obsolete DPRs viz. THR-3 and SSRR3V of 132kV Jiribam (PG) and 132kV Imphal (PG) feeders have not been disconnected from the scheme which is unsafe so far as reliable protection is concerned considering the probability of mal-operation of the obsolete relays. There are instances of undesirable tripping of 132kV Jiribam (PG) – Loktak Line on account of mal-operation of old DPR at Loktak HEP. NHPC should disconnect the Old and Obsolete DPRs immediately.

Deliberation in the Meeting

NHPC representative informed that the relays have been replaced for the above feeders and old relays will be removed soon. Old and obsolete relays of bays and transformers will also be removed soon.

The sub-committee noted as above.

A.9 Rectification of CT Switching relays of 220kV Bus Bar Protection Scheme at 400/220kV Balipara Sub Station by AEGCL:

The 220kV Bus Bar Protection Scheme at 400/220kV Balipara Sub Station operated on 28.09.2014 during operation of Bus Transfer Scheme. On investigation it was found that the CT Switching Relay contact of 50MVA ICT Bay was not operating for Zone – B. Matter was referred to AEGCL for necessary rectification.

During 26th PCC meeting, AEGCL representative informed that approval for procurement of VAJH-11 relay from M/s Areva is awaited. The same may be expected to be installed by end of October, 2014.

Deliberation in the Meeting

AEGCL representative stated that installation of relay is expected to be completed by November 2014.

The sub-committee noted as above.

A.10 Submission of Information/Data required for preparation of final report of Grid Disturbance in NER on 25.07.2014:

As discussed in 26th PCC meeting of NERPC, the following information which are yet to be received from the constituents are to be furnished by the constituents for preparation of final report of Grid Disturbance in NER on 25.07.14:-

a. Exact time of tripping & relay flags of following elements at millisecond stamping:

i. Ranganadi Unit II & III
ii. Palatana GTG 1 & STG 1
iii. AGBPP Unit I, II, III, IV, V, VII, VIII & IX
iv. AGTPP Unit I, II, III & IV
v. Loktak Unit I, II & III
vi. Kopili Unit I & IV
vii. Khandong Unit I
viii. Doyang Unit III
ix. Kopili St II Unit I
x. Units of TSECL (Baramura, Rokhia & Gumti)
xi. Units of Me. PGCL (Umiam St I/ St II/St III/St IV, Umtru & Leshka)
xii. Units of APGCL (LTPS, NTPS & Langpi)
xiii. Units of DOP, Nagaland (Likimro)
xiv. 400 kV Silchar – Byrnihat line at Byrnihat (exact time)
xv. 132 kV Ranganadi – Nirjuli line at Ranganadi
xvi. 132 kV Nirjuli – Gohpur line at Gohpur

xvii. 220 kV Azara – Sarusajai I line at Azara and Sarusajai
xviii. 220 kV Azara – Sarusajai II line at Azara and Sarusajai
xix. 220 kV Misa – Mariani I line at Misa and Mariani
xx. 220 kV Misa – Mariani II line at Misa and Mariani
xxi. 400/220 kV, 315 MVA ICT I at Byrnihat (both ends)
xxii. 400/220 kV, 315 MVA ICT II at Byrnihat (both ends)
xxiii. 220/132 kV, 160 MVA ICT I at Byrnihat (both ends)
xxiv. 220/132 kV, 160 MVA ICT II at Byrnihat (both ends)
xxv. 220 kV Misa – Samaguri I line at Samaguri
xxvi. 220 kV Misa – Samaguri II line at Samaguri

b. Clarification of following points:

i. 220/132 kV, 2x50 MVA Balipara ICTs tripped on over-current when these ICTs feed radial loads only. Reason of tripping.

ii. 400/220 kV, 315 MVA ICT at Bongaigaon tripped on Dir. O/C, E/F. DR output from Samaguri shows that 220 kV Balipara – Samaguri line tripped before tripping of Bongaigaon ICT. Whether 220 kV Balipara – Samaguri line tripped after tripping of Bongaigaon ICT. Time Synchronization of DR installed at Samaguri with other DRs is to be checked.

iii. As informed by AEGCL, 220 kV Azara – Boko line tripped on overvoltage from Azara end. Just before tripping of this line, NER system was under steady state condition. Whether 220 kV BTPS – Agia tripped.

iv. Reason for Overflux tripping of 400/220kV, 2x315 MVA ICTs and 220/132 kV, 2x160 MVA ICTs at Byrnihat.

c. Further information:

i. Substation Event Loggers output from 400/220 kV Bongaigaon, 400/220 kV Balipara, 400/220 kV Misa, 400/132 kV Ranganadi, 220/132 kV BTPS, 400/220/132 kV Azara, 220/132 kV Samaguri, 400/220/132 kV Byrnihat & 400/132 kV Silchar sub-stations.

ii. Disturbance Recorder output of all elements mentioned as per Sl. No. 1.a.xiv to 1.a.xxvi.

iii. Quantum of feeder wise UFR based load shedding of each constituent.

iv. Whether any island formed in Upper Assam system.

Deliberation in the Meeting:

Members noted and agreed to send the required information by next PCC. It was also agreed that for all GD-IV & V disturbances, the system study group committee of NERPC which is already in place would analyses the tripping details. Constitutions of NER were requested to furnish the tripping details to NERLDC/NERPC. After receipt of the tripping details, NERPC would convey a meeting with system study group members of NERPC, NERLDC, NERTS and other two members one from the constituents states where grid disturbances occurred and one from neighboring states at the earliest.

A.11 Implementation of recommendation of the committee on Grid Disturbance of Category V in NER on 25.07.2014:

A committee was constituted by POSOCO to enquire about the causes of the disturbance in NER Grid occurred on 25.07.14. The committee submitted its report to the PCC forum of NERPC (26th PCCM). PCC forum of NERPC had requested NERLDC to submit the remedial measures pertaining to the Grid Disturbance in NER occurred on 25.07.14 to the constituents of NER. Letter No 56005-18 dtd 30.10.14 was sent to all constituents of NER which is attached at **Annexure- 11** for implementation of recommendation of the committee on Grid Disturbance of Category V in NER on 25.07.14.

Deliberation in the Meeting:

During 26th PCC meeting, NERPC stated that report on grid disturbances is sufficient and NERLDC required the data given at agenda item-10 for further study. For all GD-IV&V disturbances, the system study group committee of NERPC which is already in place would analyses the tripping details. NERLDC was requested to furnish the tripping details to system study group members. After receipt of the tripping details NERPC would convey a meeting with system study group members of NERPC,NERLDC,NERTS and other two members one from the constituents states where grid disturbances occurred and one from neighboring states at the earliest.

In the last PCC meeting, NERPC said that final report on grid disturbance occurred on 25.07.14 is to be prepared and NERLDC required the data given at item no A.10 for preparation of final report. Hence from now onwards for

all GD-IV & V disturbances, the system study group committee of NERPC which is already in place would analyses the tripping details. Constitutions of NER were requested to furnish the tripping details to NERLDC/NERPC.. After receipt of the tripping details, NERPC would convey a meeting with system study group members of NERPC, NERLDC, NERTS and other two members one from the constituents states where grid disturbances occurred and one from neighboring states at the earliest.

A.12 Furnishing list of Numerical Relays installed at bus bars and ends of transmission line & transformers:

As per section 43.4.a of Technical Standards for construction of Electrical Plants and Electric Lines Regulation, 2010, numerical relays shall be provided for transmission lines, transformers and bus bars.

Constituents are requested to furnish list of **Numerical Relays** installed at bus bars and ends of transmission line & transformers and list of inbuilt features of these numerical relays as per enclosed format in **Annexure - B**.

Constituents are also requested to furnish list of **Disturbance Recorder**, **Event Logger/Sequential Event Recorder**, **Fault Locator** and **Data Acquisition System (DAS)** installed/activated at ends of transmission line & transformers as per enclosed format in **Annexure - B**.

Deliberation in the Meeting:

Members requested NERLDC to refer to the 3rd party audit report of NERPC as the required data are already available there. Any further requirements may be intimated later.

The sub-committee noted as above.

A.13 Issues related to protection and relay setting co-ordination:

As per section 5.2.l of IEGC, provision of protections and relay settings shall be co-ordinated periodically throughout the Regional Grid, as per plan to be separately finalized by the Protection sub-committee of the RPC.

It has been observed that number of multiple elements tripping increases. It is required to review Protection and relay setting co-ordination to minimize multiple elements tripping.

Deliberation in the Meeting:

Members agreed to send the details of bus fault level and back-up relay settings for 132 kV and 220 kV lines. The data will further be reviewed by PCC forum for finalizing the protection schemes.

The sub-committee noted as above.

A.14 Furnishing protection details of Transmission Lines, Transformers, Reactors and Bus Bars:

As per section 43.4.c (Schedule V) of Technical Standards for construction of Electrical Plants and Electric Lines Regulation, 2010, Protection system of **400 kV lines** consists of Main I, Main II, DEF, Two Stage Over Voltage, Auto Reclosing and Carrier Aided Inter Tripping. Protection system of **220 kV lines** consists of Main I, Main II/Over Current & DEF, Auto Reclosing and Carrier Aided Inter Tripping. Protection system of **132 kV lines** consists of Main I, Over Current & DEF, Auto Reclosing and Carrier Aided Inter Tripping.

Constituents are requested to furnish **Protection Details of Transmission Lines** as per enclosed format in **Annexure - B**.

As per section 43.4.c (Schedule V) of Technical Standards for construction of Electrical Plants and Electric Lines Regulation, 2010, Protection system of **Transformer** consists of Differential Protection, Over Flux Protection, REF Protection, Backup Directional Over Current and Earth Fault Protection (HV & LV side)/Impedance Protection, Buchholz, WTI, OTI, MOG, OSR for OLTC, PRD, SA, Tertiary Winding Protection, Over Load Alarm.
Constituents are requested to furnish **Protection Details of Transformer** as per enclosed format in **Annexure -B**.

As per section 43.4.c (Schedule V) of Technical Standards for construction of Electrical Plants and Electric Lines Regulation, 2010, Protection system of **Reactor** consists of Differential Protection, REF Protection, Backup Definite Time Over Current and Earth Fault Protection/Impedance Protection, Buchholz, WTI, OTI, MOG, SA.

Constituents are requested to furnish **Protection Details of Reactor** as per enclosed format in **Annexure -B**.

As per section 43.4.c (Schedule V) of Technical Standards for construction of Electrical Plants and Electric Lines Regulation, 2010, Bus Bar Protection and Local Breaker Backup Protection are to be provided in 220 kV and above voltage interconnecting sub-station and all generating station switchyards.

Constituents are requested to furnish **Bus Bar Protection and Local Breaker Backup Protection** as per enclosed format in **Annexure -B**.

Deliberation in the Meeting:

Members requested NERLDC to refer to the 3rd party audit report of NERPC as the required data are already available there. Any further requirements may be intimated later.

The sub-committee noted as above.

A.15 Grid Incidences during October, 2014:

The following numbers of Grid Disturbances (GD) occurred during the period **w.e.f 01st October, 2014 to 26th October, 2014** :-

Sl No	Control Area	Grid Disturbance in nos	
		Oct'14 (till 26th)	Jan'14 to Oct'14(till 26th)
1	Palatana	0	8
2	AGBPP	0	6
3	AGTPP	0	9
4	Ranganadi	0	1
5	Kopili	0	2
6	Khandong	1	5
7	Doyang	0	2
8	Loktak	1	6
9	Arunachal Pradesh	0	10
10	Assam	2	38
11	Manipur	5	45
12	Meghalaya	1	16
13	Mizoram	1	14
14	Nagaland	1	18
15	Tripura	2	14

Sl No	Category of GD	Grid Disturbance in nos	
		Oct'14 (till 26th)	Jan'14 to Oct'14(till 26th)
1	GD 1	12	106
2	GD 2	0	14
3	GD 3	0	2
4	GD 4	0	3
5	GD 5	0	2
	Total	**12**	**127**

This is for information to the members. Remedial actions are to taken by the concerned power utilities of NER

A.16 Written reporting of events by constituents to NERLDC:

As per section 5.9.6 of IEGC, written report of events by constituents is to be sent to NERLDC with the following details:-

Time and Date of Event, **Location**, Plant and/or equipment directly involved, **Description and cause of event**, Antecedent conditions of Load and Generation, including frequency, voltage and the flows in the affected area at the time of tripping including weather condition prior to the event, **Duration of interruption and Demand and/or generation (in MW and MWh) interrupted**, All relevant system data including copies of records of all recording instruments including Disturbance Recorder, Event Logger, DAS etc, **Sequence of tripping with time**, Details of Relay Flags and **Remedial measures**.

Events occurred during period w.e.f 22.09.14 to 26.10.14 are given below. Constituents are requested to submit the information which was not furnished earlier as per attached format for analysis of root cause of tripping.

Deliberation in the Meeting:

Members noted and agreed to send data in required format to NERLDC with a copy to NERPC.

A.17 Root cause analysis of tripping of multiple elements:

i. At 1508 Hrs on 07.10.14, 220 kV Sarusajai - Langpi I line **(Sarusajai: DP, ZI, Y-B-E & Langpi: DP, ZI, Y-B-E)** & 220 kV Sarusajai - Langpi II **(Relay Flag: Not furnish)** lines tripped.

Due to tripping of these elements, there was loss of 100 MW generation of Langpi.

Grid Disturbance: GD I

Analysis of events:

It appears from the relay flags that fault was at 220 kV Sarusajai – Langpi I line, which were not cleared timely by Sarusajai. Due to delayed clearance of this fault, fault was seen by 220 kV Sarusajai – Langpi II line at Sarusajai & the line tripped.

These elements were radially connected.

For further analysis of these events, DR & EL output are required.

Deliberation in the Meeting:

AEGCL representative informed that MRT has been informed for remedial actions or further necessary actions.

ii. At 1110 Hrs on 15.10.14, 220 kV Sarusajai - Langpi I line **(Sarusajai: DP, ZI, B-E & Langpi: Not furnish)** & 220 kV Sarusajai - Langpi II **Relay Flag: Not furnish)** lines tripped.

Due to tripping of these elements, there was loss of 100 MW generation of Leshka & Khandong.

Grid Disturbance: GD I

Analysis of events:

It appears from the relay flags that fault was at 220 kV Sarusajai – Langpi I line, which were not cleared timely by Sarusajai. Due to delayed clearance of this fault, fault was seen by 220 kV Sarusajai – Langpi II line at Sarusajai & the line tripped.

These elements were radially connected.

For further analysis of these events, DR & EL output are required.

Deliberation in the Meeting:

AEGCL representative informed that time delay of the relay needs to be re-checked.

iii. At 0330 Hr on 28.09.14, 220/132 kV, 50 MVA ICT I at Balipara **(Relay: Not furnished)**, 132 kV Balipara – Depota line **(Balipara: DP, ZI, R-E & Depota: No tripping)**, 132 kV Balipara – Gohpur line **(Balipara: DP, ZI, RY-E & Gohpur: No tripping)** & 132 kV Balipara – Khupi line **(Balipara: DP, ZI, RY-E & Khupi: Not furnished)** tripped.

Due to tripping of these elements, power supply to Depota area of Assam and Khupi area of Arunachal Pradesh interrupted.

Grid Disturbance: GD I

Analysis of events:

As 132 kV Balipara – Depota line, 132 kV Balipara – Gohpur line & 132 kV Balipara – Khupi line were connected radially, it was not understood why these lines tripped simultaneously. For Root cause analysis, DR & EL output are required.

POWERGRID, AEGCL may explain

Deliberation in the Meeting:

NERTS informed that they will analyze the matter and and revert back with details.

iv. At 1240 Hr on 28.09.14, 220 kV Balipara – Samaguri line, 220/132 kV, 50 MVA ICT I at Balipara, 220/132 kV, 50 MVA ICT II at Balipara, 132 kV Balipara – Depota line, 132 kV Balipara – Khupi line tripped. **Bus Bar Protection operated at Balipara**

Due to tripping of these elements, power supply to Depota area of Assam and Khupi area of Arunachal Pradesh interrupted.

Grid Disturbance: GD I

Analysis of events:

It appears that these elements are tripped due to operation of bus bar protection at Balipara. These elements were connected radially.

Deliberation in the Meeting:

DGM, NERTS informed that the tripping was due to 220kV Bus Bar Protection operation which occurred during switching of ICT – 1 feeders in different bus. On investigation it was found that the CT Switching Relay of AEGCL was defective which AEGCL agreed to rectify by November 2014.

v. At 1144 Hrs on 02.10.14, 132 kV Imphal (PG) - Imphal (MSPCL) I line **(Imphal(PG) : Dir EF & Imphal(MSPCL) : Not furnish)** & 132 kV Imphal (PG) - Imphal (MSPCL) II line **(Imphal(PG) : Dir EF & Imphal(MSPCL) : Not furnish)** tripped.

Due to tripping of these elements, power supply to Imphal area of Manipur interrupted.

Grid Disturbance: GD I

Analysis of events:

These elements were connected radially. It is not known whether any fault was persisted in downstream element of MSPCL. Relay flag details at Imphal (MSPCL) not furnished.

Deliberation in the Meeting:

DGM, NERTS informed that the tripping was due to downstream problem. Manipur was not represented.

vi. At 1345 Hrs on 13.10.14, 132 kV Imphal (PG) - Imphal (Manipur) I line **(Imphal (PG) : Dir EF & Imphal (MSPCL) : Not furnish)** & 132 kV Imphal (PG) - Imphal (Manipur) II line **(Imphal(PG) : Dir EF & Imphal (MSPCL): Not furnish)** tripped.

Due to tripping of these elements, power supply to Imphal area of Manipur interrupted.

Grid Disturbance: GD I

Analysis of events:

These elements were connected radially. It is not known whether any fault was persisted in downstream element of MSPCL. Relay flag details at Imphal (MSPCL) not furnished.

Deliberation in the Meeting:

DGM, NERTS informed that the tripping was due to downstream problem. Manipur was not represented.

vii. At 1451 Hrs on 13.10.14, 132 kV Imphal (PG) - Imphal (Manipur) I line **(Imphal(PG) : Dir EF & Imphal (MSPCL) : Not furnish)** & 132 kV Imphal (PG) - Imphal (Manipur) II line **(Imphal(PG) : Dir EF & Imphal(MSPCL) : Not furnish)** tripped.

Due to tripping of these elements, power supply to Imphal area of Manipur interrupted.

Grid Disturbance: GD I

Analysis of events:

These elements were connected radially. It is not known whether any fault was persisted in downstream element of MSPCL. Relay flag details at Imphal (MSPCL) not furnished.

Deliberation in the Meeting:

DGM, NERTS informed that the tripping was due to downstream problem. Manipur was not represented.

viii. At 1410 Hrs on 18.10.14, 132 kV Loktak – Jiribam line **(Loktak : DP, Z-I, RY-E & Jiribam: DP, Z-I, RY-E)**, 132 kV Dimapur – Imphal line (**Dimapur: DP, Z-II, RY-E & Imphal: No tripping)** tripped.

Due to tripping of these elements, power supply to major part of Manipur interrupted and there was 50 MW generation of Loktak.

Grid Disturbance: GD I

Analysis of events:

It appears from the relay flags that fault was at 132 kV Loktak – Jiribam line, which were not cleared timely by Jiribam. Due to delayed clearance of this fault, fault was seen by 132 kV Dimapur – Imphal line at Dimapur & the line tripped.

For further analysis of these events, DR & EL output are required.

Deliberation in the Meeting:

NERTS informed that they will analyze the matter and revert back with details.

ix. At 0955 Hrs on 04.10.14, 132 kV Udaipur – Palatana line **(Udaipur: No tripping & Palatana: DP, Z-I, B-E)** & 132 kV Udaipur – Rokhia **(Udaipur: No tripping & Rokhia: O/C)** line tripped.

Due to tripping of these elements, power supply to Udaipur area of Tripura interrupted.

Grid Disturbance: GD I

Analysis of events:

It appears from the relay flags that fault was at 132 kV Udaipur – Palatana line, which were not cleared by Udaipur. Due to non-clearance of this fault, fault was seen by 132 kV Udaipur – Rokhia line at Rokhia & the line tripped.

For further analysis of these events, DR & EL output are required.

Deliberation in the Meeting:

TSECL was advised to review the relay settings with the help of NERTS.

x. At 1037 Hrs on 15.10.14, 132 kV Udaipur – Palatana line **(Udaipur: No tripping & Palatana: DP, Z-I, B-E)** & 132 kV Udaipur – Rokhia line **(Udaipur: E/F & Rokhia: No tripping)** tripped.

Due to tripping of these elements, power supply to Udaipur area of Tripura interrupted.

Grid Disturbance: GD I

Analysis of events:

It appears from the relay flags that fault was at 132 kV Udaipur – Palatana line, which were not cleared by Udaipur. Due to non-clearance of this fault, fault was seen by 132 kV Udaipur – Rokhia line at Udaipur & the line tripped. It is to be checked whether E/F relay of 132 kV Udaipur – Rokhia line at Udaipur is directional.

For further analysis of these events, DR & EL output are required.

Deliberation in the Meeting:

TSECL was advised to review the relay settings with the help of NERTS.

xi. At 0101 Hrs on 16.10.14, 132 kV Khliehriat (PG) - Khliehriat (MePTCL) I line **(Khliehriat(PG): DP, Z-III, Y-E & Khliehriat(MePTCL): No tripping)**, 132 kV Khliehriat (PG) - Khliehriat (MePTCL) II line **(Khliehriat(PG): No tripping & Khliehriat (Me. PTCL): E/F)**, 132 kV Khandong - Khliehriat I line **(Khandong: E/F & Khliehriat(PG): No tripping)**, 132 kV Khandong - Khliehriat II line **(Khandong: E/F & Khliehriat(PG): No tripping)**, 132 kV Khliehriat – Badarpur line (**Khliehriat(PG): E/F & Badarpur : No tripping)** tripped.

Due to tripping of these elements, power supply to Khliehriat area of Meghalaya interrupted and there was 66 MW generation of Langpi.

Grid Disturbance: GD I

Analysis of events:

It appears from the relay flags that fault were persisted in downstream element of Khliehriat area of Meghalaya, which was not cleared timely. The fault was seen by the above elements and the lines tripped. It is to be checked whether E/F relays of 132 kV Khliehriat (PG) - Khliehriat (Me. PTCL) II line at Khliehriat (Me. PTCL) & 132 kV Khliehriat – Badarpur line at Khliehriat (PG) are directional.

For further analysis of these events, DR & EL output are required.

Deliberation in the Meeting:

DGM, NERTS informed the members that the tripping was due to downstream problem of Me. PTCL. Me. PTCL was advised to re-check the relay settings with the help of NERTS.

Date and Venue of next PCC

It is proposed to hold the 28th PCC meeting of NERPC on first week of December, 2014. The exact venue will be intimated in due course.

****

Annexure-I

List of Participants in the 27th PCC Meetings held on 12/11/2014

SN	Name & Designation	Organization	Contact No.
1.	Sh.N.Perme, EE, SLDC.	Ar. Pradesh	9436288643
2.	Sh. G.K. Bhuyan, AGM.	Assam	9854015601
	No Representatives.	**Manipur**	
3.	Sh. H.F. Shangpliang, EE.	Meghalaya	9863315562
4.	Sh. A.G. Tham, AE, MRT.	Meghalaya	9774664034
	No Representatives.	**Mizoram**	
5.	Sh. Rokobeito Iralu, SDO (Trns).	Nagaland	9436832020
6.	Sh. Lengmwlal Singson, SDO (Trans).	Nagaland	9436831124
	No Representatives.	**Tripura**	
7.	Sh. Amaresh Mallick, DGM (SO II).	NERLDC	9436302720
8.	Sh. Tanya Taji, Sr. Manager.	NEEPCO	9436042053
	No Representatives.	**NTPC**	
9.	Sh. R.C. Singh, Manager (E).	NHPC	9436894889
10.	Sh. P. Kanungo, DGM (OS).	NERTS	9436302823
11.	Sh. Tapash Karmakar, AM (Electrical).	OTPC	9435239314
12.	Sh. B. Lyngkhoi, Director.	NERPC	9436163419
13.	Sh. Lalrinsanga, Assistant Secretary.	NERPC	9436161886
14.	Sh. S.M. Jha, EE (O).	NERPC	8731845175

ANNEXURE - 3

Implementation of Islanding Scheme in NER:

During the 94thOCC meeting, the committee had decided the following islanding scheme and associated frequencies levels for creation of islands in NER:

SN	Islanding Scheme	Lines required to be opened	UFR Location	Implementing Agency
1	**ISLAND AT 48.80 Hz with 5 Sec delay:** Island comprising of generating units of AGBPP (Gas), NTPS (Gas) & LTPS (Gas) and loads of Upper Assam system & Deomali area (Ar. Pradesh) **[Total Generation: 380-400MW and load: 200MW (off peak)-300MW (peak)]**	(a) 220 kV New Mariani (PG) – AGBPP	UFR-1 [At New Mariani (PG)]	**PGCIL**
		(b) 220 kV Mariani – Misa	UFR-2 [At Mariani, Samaguri of AEGCL]	**AEGCL**
		(c) 220 kV Mariani – Samaguri		
		(d) 132 kV Mokokchung – Mariani		
		(e) 132 kV Dimapur (PG) – Bokajan	UFR-3 [At Dimapur (PG)]	**PGCIL**
		(f) Generators to be desynchronized for reduction of generation [if Generation > Load in the islanded pocket]		
		(g) De-synchronization / isolation of one GT and one ST from each of two modules of AGBPP, which are in operation, leading to reduction of generation of about 80-90 MW [i.e each module will contribute to reduction of about 40-45 MW (GT:30MW+ST:15MW)].	At AGBPP [UFRs of line bays & Generator to be used]	**NEEPCO**
		(h) Lines required to be opened for load shedding of 30MW (off-peak) and 50MW (peak) [if load > generation in the islanded pocket]		
		(i) 132kV Tinsukia – Ledo S/C line (at 48.7Hz instantaneous).	UFR [At Tinsukia]	**AEGCL**
		(j) 66kV Tinsukia – Rupai S/C line (at 48.6Hz instantaneous)		**AEGCL**

		(k) 132kV Jorhat – Bokakhat line (at 48.5Hz instantaneous)	UFR [At Jorahat / Bokakhat]	**AEGCL**
2	**ISLAND AT 48.50 Hz with 5 Sec delay :** Island comprising of generating units of AGTPP (Gas), generating units at Baramura (Gas), Rokhia (Gas) & Gumati (Hydro) and loads of Tripura system & Dullavcherra area (Assam) **[Total Generation: 150-160MW and load: 110MW (off-peak) &170-180MW (peak)]**	132 kV Palatana – Udaipur	UFR-1 [At Palatana]	**OTPC**
		132 kV Palatana – Surjamani Nagar		
		132 kV Silchar – Dullavcherra	UFR-2 [At Silchar]	**PGCIL**
		132 kV AGTPP – Kumarghat	UFR-3 [At Kumarghat]	**PGCIL**
		132 kV P K Bari – Kumarghat		
3	**ISLAND AT 47.90 Hz:** Isolation of NER from NEW grid at ER-NER boundary with rest of the generation and load of NER	To be decided after system study		

Deliberation of the Committee

1. ISLAND AT 48.80 Hz with 5 Sec delay:

A. POWERGRID, NERTS has to implement the revised time setting of UFR from existing 5 Secs to 500 ms for the following lines:

a) 220 kV New Mariani (PG) – AGBPP, at New Mariani (PG)

DGM, NERTS informed that the UFR & Relay setting of the same with 500 ms delayed has already been implemented.

B. AEGCL has to implement the revised time setting of UFR from existing 5 Sec to 500 ms for the following lines:

b) 220 kV Mariani – Misa, at Mariani

Assam informed that the UFR & Relay setting of the same with 500 ms delayed has already been implemented at both ends.

c) 220 kV Mariani – Samaguri, at Samaguri

Assam informed that the UFR & Relay setting of the same with 500 ms delayed has already been implemented at Samaguri end.

d) 132 kV Dimapur (PG) – Bokajan, at Dimapur (PG)

The UFR & Relay setting of the same with 500 ms delayed has already been implemented at Dimapur end.

e) 132 kV Mokokchung – Mariani, at Mariani

Assam informed that the line is normally in open condition and out of service- the question of setting does not arise.

C. NEEPCO has to implement the revised time setting of UFR from existing 5 Sec to 500 ms for the following generation:

f) Generators to be desynchronized for reduction of generation [if Generation Load in the islanded pocket]

g) De-synchronization / isolation of one GT and one ST from each of two modules of AGBPP, which are in operation, leading to reduction of generation of about 80-90 MW [i.e each module will contribute to reduction of about 40-45 MW (GT:30MW+ST:15MW)]

The scheme is proposed to be implemented at AGBPP utilizing UFRs of line bays & Generator.

NEEPCO informed the above scheme has already been implemented.

D. Lines required to be opened for load shedding of 30MW (off-peak) and 50MW (peak) [if load > generation in the islanded pocket]

h) 132kV Tinsukia – Ledo S/C line (at 48.7Hz instantaneous) at Tinsukia

i) 66kV Tinsukia – Rupai S/C line (at 48.6Hz instantaneous) at Tinsukia

j) 132kV Jorhat – Bokakhat line (at 48.5Hz instantaneous) at Jorhat/Bokakhat

Assam informed that they agree to implement the above scheme if require and at the same time request NERLDC to conduct a system study and suggest the settings for above lines.

The Sub-committee is of the opinion that the above lines may not be required for implementation at present- and if necessary, the same will be reviewed again.

In view of the above, the Islanding Scheme No.1 is now taken as completed.

2. ISLAND AT 48.50 Hz with 5 Sec delay :

Island comprising of generating units of AGTPP (Gas), generating units at Baramura (Gas), Rokhia (Gas) & Gumati (Hydro) and loads of Tripura system & Dullavcherra area (Assam)

[Total Generation: 150-160MW and load: 110MW (off-peak) &170-180MW (peak)]

A. POWERGRID, NERTS has to implement the revised time setting of UFR from existing 5 Sec to 500 ms for the following lines:

(a) 132 kV Silchar – Dullavcherra, at Silchar

Since the above line has already been considered in Pallatana SPS scheme, the Sub-committee agreed to drop from the proposal scheme.

(b) 132 kV P.K. Bari – Kumarghat, at Kumarghat

(c) 132 kV AGTPP – Kumarghat, at Kumarghat

DGM, NERTS informed that the UFR & Relay setting of the same with 500 ms delayed has already been implemented at Kumarghat end.

A. OTPC has to implement the revised time setting of UFR from existing 5 Sec to 500 ms for the following lines:

(d) 132 kV Palatana – Udaipur, at Pallatana
(e) 132 kV Palatana – Surjamani Nagar, at Pallatana

OTPC agreed to complete the above scheme by October, 2014.

3. <u>ISLAND AT 47.90 Hz</u>:

Isolation of NER from NEW grid at ER-NER boundary with rest of the generation and load of NER.

After detail deliberation, it was agreed that the case may be dropped for the time being and if necessary the same will be reviewed later.

****

Annexure -I

पावर सिस्टम ऑपरेशन कारपोरेशन लिमिटेड

(पावरग्रिड की पूर्ण स्वामित्व प्राप्त सहायक कंपनी)

POWER SYSTEM OPERATION CORPORATION LIMITED

(A wholly owned subsidiary of POWERGRID)

उत्तर पूर्वी क्षेत्रीय भार प्रेषण केंद्र / North Eastern Regional Load Despatch Centre

डाक रिंज्हा, लापालांग, शिलांग–793006 (मेघालय), इ–मेल : nerldc1@sancharnet.in

P.O. Rynjah, Lapalang, Shillong - 793006 (Meghalaya), E-mail : nerldc1@sancharnet.in

दूरभाष / Tel : (0364) 2537486, 2537482 फैक्स / Fax : (0364) 2537470

संदर्भ : उपूक्षेभाप्रेके/एस.ओ-II/ 5600 5–18 *दिनांक/Date: 30.10.14*

Ref : NERLDC/SOII/

प्रेषक/From : उप.महाप्रबंधक /Dy.General Manager, उपूक्षेभाप्रेके,शिलांग/ NERLDC, Shillong

सेवा में/To:

1. Member Secretary, NERPC, Meghalaya State Housing Finance Co-operative Society Ltd Building, Nongrim Hills, Shillong – 793003.
2. Managing Director, AEGCL, Bijulee Bhavan, Paltan Bazar, Guwahati - 781001, Assam
3. Chief Engineer (Transmission), Meghalaya Power Transmission Corporation Limited (MePTCL), Lumjingshai, Short Round Road, Shillong-793001 Meghalaya.
4. General Manager (Transmission), Office of the Manipur State Power Company Limited (MSPCL), Keishampat Junction, Imphal – 795001, Manipur.
5. Additional General Manager (Tranmission), TSECL, Banamalipur, Agartala- 799001, Tripura.
6. Chief Engineer (P), Transmission Planning & Monitoring Zone, Department of Power, Govt. of Arunachal Pradesh, Itanagar - 791111.
7. Engineer-in-Chief (Power), Power & Electricity Department, Govt. of Mizoram, Aizawl-796001, Mizoram.
8. Chief Engineer (Power), Department of Power, Govt. of Nagaland, Kohima- 797001.
9. Executive Director, NERTS, Power Grid Corporation of India Limited, Dongtieh- Lower Nongrah, Lapalang, Shillong- 793 006.
10. Managing Director, NETC Limited, 1st Floor, Ambience Corporate Tower, NH-8, Near Toll Plaza, Gurgaon – 122001, Haryana
11. Chief Engineer, Loktak Hydro Electric Project, NHPC, Komkeirap, Manipur - 795124
12. ED (O&M), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong – 793003.
13. General Manager (Plant), Palatana GBPP, OTPC Limited, Badarghat, Agartala – 799014, Tripura

विषय/Sub: Recommendations of the Committee on Grid Disturbance of Category-V in NER Grid on 25th July 2014

Dear Sir,

The North-Eastern Regional Grid faced 2 major grid disturbances of Category-V in the year 2014, on 19th March 2014 and on 25th July 2014. Considering the severity of repeated Grid Disturbances in NER Grid, a committee was formed by POSOCO to enquire about the causes of the disturbances and suggest remedial measures.

Accordingly, the committee submitted its report on the GD-V that occurred in NER Grid on 25th July 2014. The report of the committee was submitted to the PCC forum of NERPC. The PCC forum of NERPC had requested NERLDC to submit the remedial measures pertaining to the Grid Disturbance on 25th July 2014.

The recommendations as per report of the Committee of Grid Disturbance are attached for your reference please.

Thanking You.

Enclosure: As above

भवदीय /Yours sincerely

30-10-14

(पी.पी.बनद्योपाध्याय/P.P Bandyopadhyay)

Annexure -I

Issues of Importance and Suggested Remedial Measures in respect of Grid Disturbance in NER Grid on 25th July 2014

1. **Investigation into failure of Main CB of 400 kV Balipara – Ranganadi I line at Balipara**

   Operational failure of the Main CB of 400 kV Balipara – Ranganadi I line at Balipara was due to sudden loss of SF_6 gas pressure in R-pole of the Circuit Breaker.

   Remedial Measures:

   It is necessary to adopt best O&M practices in all substations of NER Grid. Proper operation and maintenance procedure are to be followed rigorously. The possibility of visual and audio alarm to alert sub-station operator in the event of loss of SF_6 pressure or any other serious issue, may be explored as an additional check to maintenance of power system elements in healthy condition.

2. **Investigation into non-operation of LBB protection at 400 kV Balipara sub-station**

   The LBB relay at 400 kV Balipara sub-station failed to operate after operational failure of Main CB on 400 kV Balipara – Ranganadi I line at Balipara. As per information from NERTS, the LBB relay was found to be in blocked condition.

   Remedial Measures:

   It is necessary to ensure protection systems as per regulations of CEA and as decided in PCC meetings of NERPC, protection systems are put in place at all times. Any deviation to this must be intimated to NERLDC, NERPC and all other concerned. In sub-stations of NER Grid, it is necessary to keep LBB protection in service.

3. **Investigation into non-operation of protective system of 400 kV Bongaigaon – Balipara D/C lines**

   400 kV Bongaigaon – Balipara D/C lines did not trip in spite of fault persisting at 400 kV Balipara on Ranganadi I feeder. This could have global repercussions in that it could have led to fault spreading to Eastern Region and Bhutan system resulting in wide spread tripping and disturbance.

   On investigation, it was found that Distance Protection relays at Bongaigaon of 400 kV Bongaigaon – Balipara D/C lines did not pick-up due to low fault current. This should, however, have been picked up by Directional Earth Fault (DEF) relays at Bongaigaon of this lines, and lines should trip by DEF protection. But, the DEF feature was not active at Bongaigaon, as reported by NERTS, POWERGRID.

   Remedial Measures:

   The DEF feature is an important feature to detect high resistive faults, when fault current is low. As decided in the PCC meetings at NERPC, the inbuilt DEF feature of Numerical relays at each end of the transmission lines in NER Grid should be activated. If a separate DEF protection feature is already activated, the inbuilt DEF feature of Numerical Relay need not be enabled. It is necessary to check that DEF feature is always available in Transmission lines of NER Grid, and any deviation from this must be reported to NERLDC, NERPC and all concerned.

4. **Investigation into Directional feature of DEF relays**

DEF relays operated on 400 kV Balipara – Ranganadi II line from Balipara end with a delay of 1922 msec. It was found on investigation from DR prints at Balipara end of the line that the DEF relay picked up fault in reverse direction on 400 kV Balipara – Ranganadi I line.

Remedial Measures:

DEF feature on transmission lines in NER Grid are not only to be activated as per CEA's Regulation on Technical Standards for Construction of Electrical Plants and Line, 2010, but also the Directional feature must be consistent so as to prevent any mal-operation. It is thus necessary to do a thorough checking of all protective relays to ensure proper settings.

5. **Investigation into availability of Data and Voice communication to System Operators**

It has been observed time and again, that during major disturbances in NER Grid, the real time data from SCADA is not available. For this, the power system operator are facing problem of poor visibility of the NER power system. This creates hurdles to take appropriate action by Power system operator, which may otherwise prevent Grid events.

Remedial Measures:

It is suggested to check that all RTUs (Remote Terminal Units) in the NER Grid are healthy, and are supplied from the UPS supply and not AC mains power supply. It is also necessary to keep battery banks supplying UPS power healthy, along with a backup healthy battery bank.

In order to enable the system operator to take appropriate action, it is necessary to keep all voice communication channels healthy. At least one voice communication channel may be kept dedicated for incoming calls only at each sub-station/switching station, each power station and control center.

6. **Investigation into restoration of the Grid subsequent to Disturbance**

Black start facilities of generating stations in a Grid are essential for post disturbance restoration. However, it has been noticed that in cases of disturbance, the generating stations fail to black start, although mock black-start exercises have been carried successfully at those stations earlier.

Remedial Measures:

Black-start facility at all Power stations of NER Grid should be kept healthy. Also it should be able to operate quickly so that Grid can be restored quickly after a grid disturbance.

7. **Information pertaining to Analysis of the Disturbance**

For analysis of the disturbance and finding the root cause as also establishing the Sequence of Events leading to this disturbance, the important tools are Disturbance Recorder outputs, Sequential Event Logger – element-wise and of entire substations or power stations, Event information reports from all utilities, SOE obtained from SCADA and Synchrophasor data.

While analysing the disturbance of 25th July 2014, some necessary information pertaining to the disturbance was not readily available, and difficulty was faced in establishing the sequence of events.

Remedial Measures:

All entities of NER are required to keep their Disturbance Recorders(DR) and Event Loggers(EL) healthy and time synchronised in accordance with section 15 (4) of the CEA Grid Standards Regulations, 2010. DRs and ELs are to be installed and kept active in all transmission lines and transformers of NER Grid.

SOE should also be furnished by all entities of NER Grid, and time synchronisation ensured.

8. **Investigation into operation of UFR, Special Protection Schemes and Islanding Schemes**

During the disturbance of 25th July 2014, UFR based load shedding quantum was not sufficient to arrest decline in frequency in isolated Southern Part of NER Grid.

Islands of AGBPP with associated loads, and of AGTPP with associated loads also failed to operate successfully.

Remedial Measures:

UFR based load shedding may be implemented as decided in OCC meetings of NERPC and the quantum of UFR based load shedding are to be based on average load rather than on Peak load.

Review of Islanding schemes is necessary to ensure Islanding occurs successfully in event of grid collapse.

Review of SPS schemes of NER Grid is also necessary post commissioning of 400/220 kV Azara substation.

9. **Other Issues and Recommendations**

a. In the case of tripping of large generating units that may lead to sharp decline in frequency, it is necessary for all other generating units in the system to provide primary frequency response to arrest the decline in frequency. The need for primary and secondary control in the system needs to be addressed urgently.

b. NER Grid is now connected with Eastern Regional Grid through only a single infeed point at 400/220 kV Bongaigaon-Salakati substations. This needs to be addressed as any loss of this single infeed may result in collapse of the NER Grid due to load-generation imbalance. For stable grid operation, more infeed points are required.

c. The Southern part of NER Grid is connected to rest of NER Grid through weak ties, which make the Southern part of the Grid vulnerable to collapse. Commissioning of 400 kV Byrnihat – Bongaigaon line and 400 kV Azara – Bongaigaon line are to be expedited to address this issue.

d. Maintenance of transmission lines, substations, power stations and communication links are to be given utmost priority to prevent disturbances as also help speedy restoration.

132 kV Transmission Line Protection Details

Sl. No.	Name of Line	Charged Voltage in kV	End specified for Protection	Protection Details							Data Recording System Details		
				Main I Protection exists (Type of Relay and Make) (Yes/No)	Directional Instantaneous Definite Minimum Time(IDMT) Over-Current & Earth Fault Relay exists (Yes/No)	Auto Reclosing (Single Phase / Three Phase) exists (Yes / No)	Carrier aided Inter-tripping exists (Yes / No)	Power Swing Blocking Feature exists (Yes / No)	Pole Discrepancy Relay exists (Yes / No)	Number of Core used for CT & VT, used for Main I	Disturbance Recorder exists (Yes / No)	Event Logger / Sequential Event Recorder exists (Yes / No)	Fault Locator exists (Yes / No)
1. Owner of Line : POWERGRID													

Note : **1) Main-I Protection indicates Distance Protection**

2) Type of Relay indicates it's operational mechanism - Numerical / Static / Electro-mechanical

3) List of inbuilt features of Numerical Relays are also to be furnished alongwith this format

220 kV Transmission Line Protection Details

Sl. No.	Name of Line	Charged Voltage in kV	End specified for Protection	Protection Details										Data Recording System Details		
				Main I Protection exists (Type of Relay and Make) (Yes/No)	Main II Protection exists (Type of Relay and Make) (Yes/No)	Directional Instantaneous Definite Minimum Time(IDMT) type Earth Fault Relay exists (Yes/No)	Two stage Over-Voltage Protection exists (Yes/No)	Auto Reclosing (Single Phase / Three Phase) exists (Yes/No)	Carrier aided Inter-tripping exists (Yes/No)	Power Swing Blocking Feature exists (Yes/No)	Pole Discrepancy Relay exists (Yes/No)	Number of Core used for CT & VT, used for Main I	Number of Core used for CT & VT, used for Main II	Disturbance Recorder exists (Yes/No)	Event Logger / Sequential Event Recorder exists (Yes/No)	Fault Locator exists (Yes/No)
1. Owner of Line :																

Note 1) Main-I Protection indicates Distance Protection

2) Main-II Protection indicates one of Distance Protection / Directional Comparison Protection / Phase Segregated Line Differential protection

3) Type of Relay indicates it's operational mechanism - Numerical / Static / Electro-mechanical

4) List of inbuilt features of Numerical Relays are also to be furnished alongwith

400 kV Transmission Line Protection Details

Sl. No.	Name of Line	Charged Voltage in kV	End specified for Protection	Protection Details										Data Recording System Details		
				Main I Protection exists (Type of Relay and Make) (Yes/No)	Main II Protection exists (Type of Relay and Make) (Yes/No)	Directional Instantaneous Definite Minimum Time(IDMT) type Earth Fault Relay exists (Yes/No)	Two stage Over-Voltage Protection exists (Yes/No)	Auto Reclosing (Single Phase / Three Phase) exists (Yes/No)	Carrier aided Inter-tripping exists (Yes/No)	Power Swing Blocking Feature exists (Yes/No)	Pole Discrepancy Relay exists (Yes / No)	Number of Core used for CT & VT, used for Main I	Number of Core used for CT & VT, used for Main II	Disturbance Recorder exists (Yes/No)	Event Logger / Sequential Event Recorder exists (Yes/No)	Fault Locator exists (Yes/No)
1. Owner of Line : POWERGRID																

Note 1) Main-I Protection indicates Distance Protection
2) Main-II Protection indicates one of Distance Protection / Directional Comparison Protection / Phase Segregated Line Differential protection
3) Type of Relay indicates it's operational mechanism - Numerical / Static / Electro-mechanical
4) List of inbuilt features of Numerical Relays are also to be furnished alongwith

Transformer Protection Details

Sl. No.	Name of Transformer	LV side/ HV side	Differential Protection exits (Yes/No)	Over Fluxing Protection exits (Yes/No)	REF Protection exists (Yes/No)	Directional Over Current Protection exits (Yes/No)	Impedance Protection exists (Yes/No)	Buchholz Operation exits (Yes/No)	WTI Protection exists (Yes/No)	OTI Protection exists (Yes/No)	MOG with low oil level alarm exists (Yes/No)	OSR for OLTC exists (Yes/No)	PRD exists (Yes/No)	SA exists (Yes/No)	Tertiary Winding Protection exists (Yes/No)	Overload Alarm exists (Yes/No)
1. Owner of Transformer :																
1		LV side														
		HV side														
2		LV side														
		HV side														
3		LV side														
		HV side														
4		LV side														
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		HV side														
15		LV side														
		HV side														

Note : 1. REF : Restricted Earth Fault, 2. WTI : Winding Temperature Indicator., 3. OTI : Oil Temperature Indicator)
4. MOG : Magnetic Oil Gauge, 5. OSR : Oil Surge Relay, 6. OLTC : On Load Tap Changer
7. PRD : Pressure Relieve Device, 8. SA : Surge Arrestor
9. List of inbuilt features of Numerical Relays are also to be furnished

Reactor Protection Details

Sl. No.	Name of Line Reactor/ Bus Reactor/ Tertiary Reactor	Differential Protection exists (Yes/No)	REF Protection exists (Yes/No)	Definite Time Over Current Protection exists (Yes/No)	Earth Fault Protection exists (Yes/No)	Buchholz Operation exists (Yes/No)	WTI Protection exists (Yes/No)	OTI Protection exists (Yes/No)	MOG with low oil level alarm exists (Yes/No)	SA exists (Yes/No)
1. Owner of Reactor :										

Note : 1. REF : Restricted Earth Fault, 2. WTI : Winding Temperature Indicator., 3. OTI : Oil Temperature Indicator)
4. MOG : Magnetic Oil Gauge, 5. SA : Surge Arrestor
6. List of inbuilt features of Numerical Relays are also to be furnished alongwith this format

Bus Bar & Local Breaker Backup(LBB) Protection Details

Sl.No.	Name of Bus Bar	Bus Bar Protection exists (Yes/No)	LBB Protection exists (Yes/No)
1. Owner of Bus Bar/LBB			

Note : 1. List of inbuilt features of Numerical Relays are also to be furnished alongwith this

Bus Coupler Protection Details

Sl.No.	Name of Bus Coupler	Non directional O/C Protection exists (Yes/No)	Non directional E/F Protection exists (Yes/No)
1. Owner of Bus Coupler			

Note : 1. List of inbuilt features of Numerical Relays are also to be furnished alongwith this