



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
NERPC Complex, Dong Parmaw, Lapalang, Shillong - 793006, Meghalaya



ISO 9001:2008

Ph. No: 0364 - 2534039

Fax No: 0364 - 2534040

Website: www.nerpc.nic.in

No. NERPC/SE/PCC/2016/

Dated: September 15, 2016

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. Director (Tech), TSECL, Banamalipur, Agartala – 799 001
10. Director (Tech), TPGL, Banamalipur, Agartala – 799 001
11. Chief Engineer (WE Zone), Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
12. Chief Engineer (EE Zone), Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
13. Chief Engineer (TP&MZ), Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
14. Engineer-in-Chief (P&E), Department of Power, Govt. of Mizoram, Aizawl – 796 001
15. Chief Engineer (P), Department of Power, Govt. of Nagaland, Kohima – 797 001
16. CGM, (LDC), SLDC Complex, AEGCL, Kahilipara, Guwahati-781 019
17. General Manager, TSECL, Agartala – 799 001
18. Group General Manager, NTPC, Bongaigoan Thermal Power Project, P.O. Salakati, Kokrajhar- 783369
19. General Manager (Coml.), NTPC, 3rd Floor, OLIC Bldg., PI No- N.17/2, Nayapalli, Bhubaneswar-12
20. ED, NERTS, PGCIL, Dongtiah-Lower Nongrah, Lapalang, Shillong -793 006
21. ED (O&M), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
22. ED (Commercial), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
23. ED (O&M), NHPC, NHPC Office Complex, Sector-33, Faridabad, Haryana-121003
24. GM (Plant), OTPC, Badarghat Complex, Agartala, Tripura - 799014
25. GM, NERLDC, Dongtiah, Lower Nongrah, Lapalang, Shillong -793 006

Sir,

The minutes of the Empowered Committee Meeting to analyze GD-IV & GD-V in NER followed by RGMO/FGMO related issues held on 21st August, 2016 (Friday) at NERLDC Conference Hall at 10:00 hrs. is sent herewith for your kind perusal and necessary actions of all concerned.

भवदीय / Yours faithfully,

(एल. बी. मुआनथंग / L. B. Muanthang)

अधीक्षण अभियंता / Superintending Engineer

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 (O&M & Elec), 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.



निदेशक / Director/ SE

North Eastern Regional Power Committee

MINUTES OF THE EMPOWERED COMMITTEE MEETING TO ANALYSE GD-IV AND GD-V IN NER FOLLOWED BY RGMO/FGMO ISSUE

Date : 31/08/2016 (Wednesday)
Time : 11:00 hrs
Venue : "NERLDC Conference Hall", Shillong.

The List of Participants in the Empowered Committee meeting to analyze GD-IV and GD-V in NER followed by RGMO/FGMO related issue is attached at **Annexure - I**

Shri L. B. Muanthang, Superintending Engineer, NERPC welcomed all the participants to the Committee. He expressed concerned about non participation of Tripura in spite of several reminders and assurances given by their authorities. He also thanked NLDC for their participation in the meeting through video conferencing. He then asked the committee to take up the agenda items for discussion.

1. GD-V

A major disturbance of Category GD-V occurred in NER Grid on 16.04.16 at 1203 Hrs. which led to blackout of the entire NER Grid (except Upper Assam & AGBPP System) after isolation from rest of All India Grid.

Again on 09.07.2016 a major grid disturbance of Category-IV occurred in NER that had affected the Southern part of NER Grid including state subsystems of South Assam, Manipur (with Tamu load of Myanmar), Mizoram & Tripura (including South Comilla load of Bangladesh), which collapsed subsequent to islanding from rest of NER Grid.

Deliberation in the meeting

Sr. Engineer, NERLDC gave presentations on the GD-V on 16.04.16 and GD-IV on 09.07.16 presenting the highlights of the disturbances with information available with NERLDC, highlighting the presumptive reasons, and raising the observations/queries for further resolution by the committee.

GD-V in NER:

The primary cause of the GD-V on 16.04.16, as discussed in earlier PCC meetings of NERPC, was fault on 400 kV Bongaigaon - BgTPP (NTPC) - I line, which could not be cleared by 400 kV Bongaigaon (PG) end of the line resulting in tripping of several 400 kV lines at Bongaigaon (PG) from remote ends, since as per R-X diagram the fault was

lying in the 4th quadrant outside the reach of Distance Relay. The 400 kV New Siliguri - Bongaigaon Q/C tripped upon detecting this persisting fault, from remote end at 400 kV New Siliguri (PG), on Distance Protection with a time delay of 350 milli-seconds. NERLDC highlighted that this tripping was undesired since as per the V. Ramakrishna Committee recommendations in such cases where a short line is followed by a long line, the time delay of Zone-II of Distance Protection shall be around 600 milli-seconds. In this case, the 400 kV Bongaigaon-BgTPP - I&II are short lines (of around 3 kms each) followed by other long lines from Bongaigaon. POWERGRID acknowledge the matter and intimated that the settings in these two lines have since been modified. From DRs available at NERLDC, 400 kV Azara - Bongaigaon from Azara end and 400 kV Bongaigaon - Balipara line from Balipara end was found to have tripped on Zone-II. These settings need modification as per consideration of long line following a short line. Since DR from Byrnihat end of 400 kV Bongaigaon - Byrnihat was not available, the same could not be confirmed by NERLDC.

It was also mentioned that the Line Differential protection on 400 kV Bongaigaon - BgTPP D/C lines were not installed which could have detected the fault in time and cleared it, thus preventing this disturbance. NERLDC requested all entities to comply with the protection schemes as suggested by V. Ramakrishna Task Force Committee report, and intimate accordingly.

In the GD-V case, after tripping of 400 kV Bongaigaon - New Siliguri Q/C and 400/220 kV Bongaigaon ICT, the NER Grid could have still remained in synchronism with rest of All India Grid, if the 220 kV Salakati - BTPS D/C lines had not tripped. No information regarding tripping of this D/C lines had been received from either POWERGRID or AEGCL. AGM(SO-I), NERLDC suggested that probably overloading of this line would be the cause of tripping. NERLDC requested POWERGRID & AEGCL to furnish the DR/TFR pertaining to tripping of these lines.

Dy. Manager, NLDC requested the attention of the committee to the DR at Bongaigaon (PG) end which shows that while fault was in 400 kV Bongaigaon - BgTPP-I line, whose fault current rose to 11 kA & voltage came down to 92 kV in the faulted phase, in 400 kV Bongaigaon - BgTPP-II line the fault current was found to be 1.88 kA and voltage had come down to 12 kV. This was not clear since voltage should have been lower in the faulted line which had fed the higher current - it was suspected that one of the reasons for such a behaviour might be error in CVT connections. Further, this could have resulted in the apparent movement of the impedance in the fourth quadrant. NERTS was requested to identify the reason of such behaviour of voltage & current and the reason for movement of impedance in the fourth quadrant. NERTS

agreed to check the same and intimate to PCC forum.

The primary cause of the fault was said to be lightning strike on the line, to which NLDC & NERLDC enquired as to why shielding was not effective against lightning. NERTS & NTPC were also requested to furnish details of increment of lightning counter during this disturbance, and take adequate steps to prevent tripping of important lines in lightning prone areas.

GD-IV in NER:

For the GD-IV on 09.07.16, NERTS claimed the fault was due to simultaneous lightning strike at tower locations 466 & 467 on 400 kV Silchar - Azara and 400 kV Silchar - Byrnihat lines, which led to multi-phase fault and further tripping of these lines. Flash-over marks on insulators was also observed, as told by NERTS.

NERLDC said that while tripping of these two 400 kV corridors between Northern and Southern part of NER Grid occurred, the SPS-3 related to reduction of generation from Palatana CCGT did not act properly leading to excess generation in Southern part of NER Grid and further collapse. The forum requested OTPC to take adequate steps in modification of SPS-3 so that such type of incidences do not recur due to delay in backing down of Palatana units.

NERLDC also said that reports of operation of UFRs were not being received timely from SLDCs of NER Grid, which are necessary for proper analysis of causes of grid failure.

Requisite data regarding the grid collapse from certain constituents yet to be received and submission of the same is to be expedited.

Action to be taken: All the concerned constituents to submit all the required inputs mentioned above within one week of the issue of minutes.

2. Relay setting as per task force

Deliberation in the meeting

DGM (AM), NERTS suggested that for changing Relay setting first list of short line and long line for all transmission line needs to be prepared. Then the relay setting needs to be changed from higher voltage end to lower end so that they are properly co-ordinated. Otherwise changing Relay setting at one place will affect all the others and will result in tripping of other lines due to lack of co-ordination of the settings.

NERTS and NERLDC will undertake bus-wise identification of long lines followed by short lines for this purpose. It is desired that complete relay setting norms as per V. Ramakrishna Report to be followed.

The Sub-Committee noted as above.

Action: NERTS

3. Line Differential Protection

Deliberation in the meeting

PGCIL had said that Short lines to be identified for this purpose and the TMS settings to be checked. NERLDC requested all constituents of NER Grid to comply and ensure installation of Differential protection in short lines.

Action: All constituents of NER Grid.

4. Review of Island No. 2

Deliberation in the meeting

DGM (SO-II), NERLDC informed that the Island No. 2 did not survive in either of the two Grid Disturbances. He suggested that post addition of Bangladesh load to Tripura system, the load-generation in the island may not be matching properly. He suggested that more no. of UFRs needs to be installed in Tripura system. Representatives of Tripura were absent. It was decided that the matter of UFR installation would be taken up with TSECL in consultation with NEEPCO/POWERGRID.

The Sub-Committee noted as above.

Action: TSECL

5. SPS related to blocking of +/- 800KV BNC- Agra Bipole

Deliberation in the meeting

DGM(SO-II), NERLDC informed that during the GD-V event when NE Region was facing shortage of power, it was exporting power to NR. During such events when NER is exporting to NR, if NER is separated from Eastern Region, it should not further export power to NR Grid and BNC-Agra HVDC line should be blocked. For this purpose SPS scheme related to blocking of +/- 800 kV BNC-Agra Bipole may be designed/installed.

Chief Manager(AM), NERTS informed that there is provision in HVDC BNC-Agra that when it detects a certain change in frequency between the two ends, power flow on the link can be blocked. The matter is still under approval stage at CC, POWERGRID and NERTS will inform about the developments.

The Sub-Committee noted as above.

Action: NERTS/ NERLDC

6. Non operation of UFRs

Deliberation in the meeting

DGM(SO-II), NERLDC informed that during the GD-V, UFRs did not operate as per designs as is evident from the PMU plots.

DGM (AM), NERTS suggested that the Relay operation should be checked physically as PMU plot do not give any clear evidence.

All constituents were requested to submit UFR report periodically as per format as well as in case of any events in the Grid. Periodic inspection of UFRs may also be carried out to check their healthiness.

The Sub-Committee noted as above.

Action: All Constituents.

7. Primary Response(FGMO)

Deliberation in the meeting

Manager, NEEPCO informed that in all hydro stations the governor is in RGMO mode. If frequency dips or rises by ≥ 0.3 Hz and sustains for 30s, then Governor response picks-up as per droop characteristics. The time cycle is 10 mins. NEEPCO representative also informed that only about 10% of all-India generators respond instantly in RGMO.

The Sub-Committee noted as above.

8. Installation of ROCOF(df/dt) - identification of large loads

Deliberation in the meeting

DGM(SO-II), NERLDC requested for further installation of ROCOF for isolating large load during grid disturbance may be necessary to provide instant relief. For this purpose lines with heavy loads (100MW and above) need to be identified and df/dt relay installed. It is agreed that states may be asked to identify the requisite lines for installation of df/dt relays as a pilot project.

The Sub-Committee noted as above.

Action: States

9. Problem of Synchronization

Deliberation in the meeting

Sr. Engineer, NERLDC informed that there was problem with synchronization problem at several substations during the Grid Disturbance-V on 16.04.16, which add to the delay in restoration. The problem was seen in 132 kV Kumarghat and 132 kV Badarpur Substations. PGCIL informed that these are to be checked. Also PGCIL will investigate the synchronization problem encountered in the 132 kV PK Bari SS.

NERLDC informed that they will take up checking of synchronization facilities at all substations where they are available.

The Sub-Committee noted as above.

Action: NERTS (To submit a report on reason of non-availability of check-sync facility at the stations during the GD-V event and to submit an undertaking that all the check-sync devices are in healthy conditions within one week of the issuance of minutes.)

10. Telemetry Issue- Battery healthiness.

Deliberation in the meeting

DGM(SO-II), NERLDC informed that after the Grid Disturbance telemetry data was not available from many of the station and also these station were not reachable over phone. He requested all utilities to check battery backup so that during such contingency telemetry data is available.

NLDC representative advised that there needs to be permanent solution to this matter considering the importance of telemetry in Grid operation. He suggested that a list could be made of substations where telemetry went out after the disturbance, and also check the healthiness of telecom links. If the links were healthy, then problem with substation would be identified. A format would be circulated to all SLDCs of NER/NERTS-Telecom for compilation of this information and further necessary action. Format as per ***Annexure-II***.

The Sub-Committee noted as above.

Action: NERLDC/NERTS/All utilities to submit the status and details within 10 days of the issuance of minutes.

11. Black Start issue.

Deliberation in the meeting

DGM(SO), NERLDC informed that in restoration after GD-V on 16.04.16, some generating stations were not able to black start while in case of Loktak HEP, the

island failed several times after Loktak HEP black started due to mismatch of load-generation mismatch.

Sr. Manager, NEPPCO informed that Black starting a machine is not easy and needs lots of synchronous effort. For smooth black starting an exercise must be carried out once every year.

The Sub-Committee noted as above.

Action: NERLDC/ Generating Stations.

12. Additional Infeed for NER:

Deliberation in the meeting

DGM(SO-II), NERLDC informed that the NER Grid is connected with the ER Grid with single point (electrically) and is not reliable, as single infeed point at present could result in isolation of the region. So possibility of one more infeed point is to be explored to enhance reliability.

After detailed deliberation it was decided that it may be taken up in next Standing Committee Meeting.

The Sub-Committee noted as above.

Action: NERLDC/ NERTS.

13. Expedite commissioning of identified elements.

Deliberation in the meeting

DGM(SO-II), NERLDC expressed the desire to expedite commissioning of identified elements to enhance security of grid in the events of incidences. It was agreed that commissioning of the 400/220 kV ICT of BgTPP is critical to improving stability of NER Grid by providing a parallel path to existing 400/220 kV ICT at Bongaigaon.

Sr. Engineer, NERLDC suggested that 220 kV Salakati - Rangia D/C may also be included in the list of elements to be expedited as it would provide a parallel corridor to 220 kV Salakati - BTPS D/C link.

The Sub-Committee noted as above.

14. Placement of more PMUs.

Deliberation in the meeting

DGM(SO-II), NERLDC informed that no PMU is installed in Upper Assam area (Island - I). During Grid Disturbance Island -I survived but data was not available for analyzing

the condition of the Islanded portion. He requested the forum to take up the issue of installation of PMU in Upper Assam.

The Sub-Committee noted as above.

15. Status of DAS.

Deliberation in the meeting

DGM(SO-II), NERLDC informed that as per CERC regulation all Generating Station must have DAS (Data Acquisition System). At present OTPC Palatana is having DAS . All Generating Stations are requested to upgrade their system to have DAS. The DAS records of AGBPP of the 16.04.2016 Grid Incident is to be given to NERLDC.

NEEPCO will further check in which stations DAS facility is available, and intimate the forum.

Loktak HEP intimated that they do not have any DAS facility.

NEEPCO representative also mentioned that although AGBPP has DAS facility, the DAS is not time synchronized. NERLDC expressed concern over this, and requested NEEPCO to ensure that their DAS are time-synchronised.

The Sub-Committee noted as above.

Action: All Generating Stations.

16. Load Generation Balance.

Deliberation in the meeting

DGM(SO-II), NERLDC informed that everybody should maintain Grid discipline for smooth Grid operation. Particularly in this matter Tripura does not reduce load during emergency situations. Since Tripura representative was absent DGM(SO-II), NERLDC requested SE, NERPC to take up the matter with Tripura. It is stated that frequency is to be maintained by SLDCs and instruction of NERLDC to be followed in case of grid events.

The Sub-Committee noted as above.

Action: TSECL/ NERPC

17. HVDC Frequency Controller.

Deliberation in the meeting

NERLDC informed that since Frequency controller facility is usually available on HVDC links for power order control in case of emergency, NERTS may check whether

the same is possible with HVDC BNC-Agra in case of exigency in NER Grid. NERTS informed that in this link, since Master station is Agra, it might be possible to control from Agra end. POWERGRID was requested to check with Agra if frequency controller can be used in cases of exigency in NER Grid.

The Sub-Committee noted as above.

Action: POWERGRID

18. HVDC filter banks- Delay in opening leads to O/V tripping of 400KV lines.

Deliberation in the meeting

NERLDC informed that at time of blocking of HVDC BNC-Agra, due to low fault level at 400 kV Bishwanath Chariali (PG), often there is overvoltage in the system due to delay in opening of filter banks at 400 kV bus. This cause tripping of important 400 kV corridors for NER Grid. Representative of NLDC informed that delay is there in Agra end of line also but voltages remained under control due to high fault level at Agra. DGM (SO-II), NERLDC requested NLDC and NERTS to explore if there could be any solution to this.

The Sub-Committee noted as above.

Action: NLDC

19. Non- receipt of Requisite information for GD analysis & Establishment of SoE (DR/UFR etc)

Deliberation in the meeting

DGM(SO), NERLDC informed till now all the stations have not send DR and UFR reports for the GD-V and GD-IV event. All entities were requested to submit the requisite data at the earliest.

DGM, NLDC requested NERPC to request all constituents to ensure that relevant data pertaining to any events are forwarded in time so as to come to conclusive analysis.

The Sub-Committee noted as above.

Action: NERPC/All Utilities.

20. Time Synchronization of Equipment.

Deliberation in the meeting

DGM(SO-II), NERLDC informed that since most of the stations are not time synchronized it become very difficult to analyze the chronological order of the event leading to Grid Disturbance.

DGM, SLDC Assam informed that the problem is with old substations as there is no time stamping in these substations. With PSDF funding when old substations will be upgraded, this problem will be rectified.

NLDC representative suggested that some important substation should be time synchronized on urgent basis without waiting for PSDF fund.

The Sub-Committee noted as above.

Action: All utilities

21. Island-I formation details.

Deliberation in the meeting

DGM(SO-II), NERLDC informed that both during GD-V and GD-IV Island-I survived but no PMU and SCADA data were available to analyze the condition during Islanding. NERLDC had requested NEEPCO vide emails to furnish the voltage & frequency plots for 1 hour from 12:00 Hrs to 13:00 Hrs on 16.04.16 to analyze further.

AGBPP would submit the data from their DAS.

The Sub-Committee noted as above.

Action: AGBPP/Assam

It was decided that the next meeting of the committee shall be held within 15 days of issuance of these minutes of meeting.

The meeting ended with thanks to the Chair.

Annexure-I

List of Participants in the Empowered Committee meeting held on 31/08/2016

| SN | Name & Designation | Organization | Contact No. |
|----|------------------------------------|--------------|-------------|
| 1 | Ms. Momai Dey, Engineer (SO-II) | NERLDC | 09436302716 |
| 2 | Sh. Niranjana Rajwar, Engineer | NERLDC | 09402100276 |
| 3 | Sh. Jerin Jacob, Engineer | NERLDC | 09402120113 |
| 4 | Sh. Amresh Mallick, DGM (So-II) | NERLDC | 09436302720 |
| 5 | Rahul Chakrabarti, Sr.Engineer | NERLDC | 09402507543 |
| 6 | Sh. N. L. Jain, DGM | NLDC | |
| 7 | Sh. B. B. Singh, Dy. Manager | NLDC | |
| 8 | Sh. Rahul Shukla, Sr. Engineer | NLDC | |
| 9 | Sh. N. R. Paul, AGM SO-I) | NERLDC | 09436302723 |
| 10 | Sh. P. Kanungo, DGM (AM) | PGCIL | 09436302823 |
| 11 | Sh. H. Talukdar, Chief Manager, AM | PGCIL | 09436335237 |
| 12 | Sh. C. L. Khayuingam, D. M.(E) | NHPC | 09402667740 |
| 13 | Sh. Ashutosh Bhattacharya, D. M. | AEGCL | 09435332928 |
| 14 | Sh. Mukut Nam, AGM | AEGCL | 08761028185 |
| 15 | Sh. L. P. Uthup, Sr. Manager | NEEPCO | 08761028185 |
| 16 | Sh. A. K. Sarmah, Dy. Manager | NEEPCO | 09435078860 |
| 17 | Sh. T. Gidon, EE, SLDC | Meghalaya | 09774479956 |
| 18 | Sh. B. Saibon, EE | Meghalaya | 09863066982 |
| 19 | Sh. B. Narry, EE | Meghalaya | 09436111580 |
| 20 | Sh. Thakor Prasad Pandey, DGM(O&M) | OTPC | 09402144712 |
| 21 | Sh. S. Ranjan Das, Manager | OTPC | 09612400784 |
| 22 | Sh. L. B. Muanthang, SE | NERPC | 09436731488 |
| 23 | Sh. P. N. Sarkar, EE | NERPC | 09830027523 |
| 24 | Sh. S. Imam, AEE | NERPC | 07421806242 |