

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI**

Petition No. 113/MP/2014

Coram:

Shri Gireesh B. Pradhan, Chairperson

Shri A.K Singhal, Member

Shri A.S Bakshi, Member

Date of Hearing: 26.02.2015

Date of Order : 27.11.2015

In the matter of

Providing protection systems having reliability,selectivity,speed and sensitivity and keeping them functional in terms of Regulation 5.2 (1) of the CERC (Indian Electricity Grid Code) (2nd Amendment) Regulations 2014 read along with Regulation 3 (e) of the Central Electricity Authority (Grid Standards) Regulations, 2010, providing adequate load shedding through automatic under frequency relays (UFRs) in the state systems of North Eastern Region, keeping them functional in terms of Regulation 5.2 (n) of the CERC (Indian Electricity Grid Code) (Second Amendment) Regulations 2014 read along with Regulation 9 of the Central Electricity Authority (Grid Standards) Regulations, 2010 and providing of System Protection Schemes (SPS) in NER Grid to operate the transmission system closer to their limits and protect against situations like cascade tripping, tripping of critical elements in terms of Regulation 5.2 (o) of the CERC (Indian Electricity Grid Code) (Second Amendment) Regulations 2014 for ensuring security of the North Eastern Grid as well as the interconnected Indian Grid.

And

In the matter of

North Eastern Regional Load Despatch Centre
Dongtiah, Lower Nongrah, Lapalong,
Shillong - 793006

....Petitioner

Vs

1. Assam Electricity Grid Corporation Limited
Bijulee Bhawan, Guwahati- 781001, Assam

2. Meghalaya Power Transmission Corporation Limited
Lumjingshai, Short Round Road,
Shillong- 793001, Meghalaya.

3. Manipur State Power Company Limited
Keishampat Junction,
Imphal-795001, Manipur.

4. Tripura State Electricity Corporation Limited
Banamalipur,
Agartala- 799001, Tripura

5. Transmission Planning and Monitoring Zone
Department of Power,
Govt. of Arunachal Pradesh, Itanagar- 791111.

6. Power and Electricity Department
Government of Mizoram,
Aizawal-796001, Mizoram

7. Department of Power
Government of Nagaland,
Kohima-797001.

8. NERTS, Power Grid Corporation of India Limited
Dongtiah-Lower Nongrah,
Lapalang, Shillong-793006.

9. North East Transmission Corporation Limited
1st floor, Ambience Corporate Tower,
NH-8, Near Toll Plaza,
Gurgaon- 122001, Haryana

10. Loktak Hydro Electric Project,
NHPC, Komkeirap, Manipur-795124.

11. NEEPCO Ltd.
Brookland Compound, Lower New Colony,
Shillong-793003

12. Palatana GBPP,
OTPC Limited, Badarghat,
Agartala- 799014, Tripura

....Respondents

13. North Eastern Regional Power Committee
Meghalaya State Housing Finance Co-operative Society Limited Building,
Nongrim Hills, Shillong- 793003.

...Performa Respondent

Following were present:

Shri Amaresh Mallick, NERLDC
Ms. Pragya Singh, NERLDC
Shri G.K. Bhuyan, AEGCLs
Shri Shashi Bhushan, PGCIL

ORDER

The petitioner, North Eastern Regional Load Despatch Centre, has filed the present petition seeking directions to the respondents to ensure timely implementation of recommendations of Protection Audit. The petitioner has made the following prayers:

- “(a) MSPCL, MePTCL, OTPC, NEEPCO and NERTS, POWERGRID may be directed to:
- (i) Ensure adequacy and healthiness of protection system in compliance with the Regulation 3 (e) of the Central Electricity Authority (Grid Standards) in terms of IEGC Regulation, 5.2 (e);
 - (ii) Form their own expert group in protection audit for periodic protection audit of all sub-stations of 132 kV and above on continuous basis and discuss such Protection Audit Reports in the Protection Co-ordination sub-committee meeting of North Eastern Region; and
 - (iii) Ensure different types (Principle of Operation) and Make of relays of Main-I and Main-II protection as well as different inputs for different protection schemes in a time bound manner on priority and also ensure dual source of supply for all the Auxiliaries in the substation.
- (b) NETC may be directed to ensure and adopt proper and periodical preventive maintenance of transmission lines including ROW clearance, bush/jungle cutting, tightening of loose jumpers etc., particularly in forest area adopting best O&M practices.
- (c) All the Regional Entities of North Eastern Region may be directed to:
- (i) Implement the recommendations of Protection Audit Team of NERPC, which was submitted on April, 2013;
 - (ii) Ensure strict compliance of Regulation 12 (1) of CEA Grid Standards Regulations and IEGC provision under clause 5.2 (r) in promptly furnishing the detailed tripping report along with DR and EL printouts within 24 hours of the occurrence of the event;
 - (iii) Install/activate Disturbance Recorder in ICTs with lower voltage level of 132 kV and above and in transmission lines of voltage level of 132 kV, considering criticality of these elements in NER Grid;

(iv) Implement Islanding schemes as have been designed for safety of the grid, at the earliest in accordance with regulation 5.2(1) of IEGC;

(v) Complete the implementation of Under-Frequency Relay based load-shedding schemes as per recommendations of NERPC on a priority basis in accordance with regulation 5.2 (n) of IEGC;

(vi) Expedite the process of implementation of SPS based generation reduction and enhance the quantum of SPS based load-shedding in accordance with different scenarios, keeping in view the security of NER grid in accordance with regulation 5.2 (o) of IEGC;

(vii) Furnish details of UFR operation to NERLDC as per Regulation 9 (2) of CEA Grid Standards Regulation, 2010; and

(viii) Issue appropriate direction/advice to the respondent for its failure to comply with the:

I. Regulation 3 (e) of the Central Electricity Authority (Grid Standards) Regulations, 2010;

II. Regulation 5.1, 5.2 (e), 5.2 (i), 5.2 (r), 5.9.6 (a) of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Second Amendment) Regulations, 2014.

(d) May pass such other orders as deemed fit, in the circumstances of the case.”

2. Gist of the submissions of the petitioner is as under:

(a) From January, 2014, the following 45 Grid Disturbance of Category GD-I and above were occurred in North Eastern Region due to delayed operation or failure to operate of the concerned protective relays/schemes, i.e proper functioning of protection schemes:

S. No.	Category of Grid Disturbance	Number of times of occurrence
1	GD-I	31
2	GD-II	8
3	GD-III	2
4	GD-IV	3
5	GD- V	1

(b) As per recommendations of the Enquiry Committee on grid disturbances and decision taken in the 79th OCC Meeting of NERPC held on 8.11.2012, a third party protection audit was carried out for all sub-stations of 132 kV level and above in North Eastern Region.

(c) All the regional entities had agreed in-principle for implementation of the recommendations of the third party protection audit. However, the status review reveals that number of recommendations are yet to be implemented. In addition, there were Grid Disturbance (GD-I) instances due to non-compliance with the best O & M practices by the concerned utilities.

(d) There was a multiple tripping of elements on 19.3.2014 at 12:15 hrs which have resulted Grid Disturbance of Category-V and black-out of most of NER grid except for radial loads at 220/132 kV, 2x50 MVA, Balipara ICTs. The following was observed while tripping on 19.3.2014:

(i) A high resistive fault was persistent in 400 kV Balipara-Ranganadi-I which could not be cleared by relays at Balipara (PGCIL) end of the line due to DC input supply failure to the relays, while relays at Ranganadi (NEEPCO) end of the line also failed to clear this fault. This resulted in the fault being detected by Balipara end of 400 kV Balipara-Ranganadi-II line, which tripped on backup Directional E/F, resulting in much delayed fault clearance. As per information available from NEEPCO, fault was detected in 400/132 kV, 2x360 MVA ICTs at Ranganadi, which tripped on Neutral Displacement.

(ii) 220 kV Balipara-Samaguri S/C tripped at Samaguri end. However,

there was no tripping at Balipara end of the line. This was followed by tripping of 400/220 kV, 315 MVA ICT-I at Misa from 220 kV end on Directional E/F. As per information available from PGCIL, 400/220 kV, 315 MVA ICT II at Misa also tripped from 220 kV end on Directional E/F, though no trip indication was available in NERLDC, SOE.

(iii) 220 kV Misa-Samaguri-I tripped at Misa end on E/F and then from Samaguri end which caused isolation of major part of NER Grid from rest of All India Grid.

(iv) There was severe voltage dip at 400 kV Balipara (as observed from PMUs) which persisted for around 63 seconds in Y-phase. The time taken for fault clearance was in several seconds as against 100 milli-seconds as mandated in Regulation 3(e) of the Central Electricity Authority (Grid Standards) Regulations, 2010.

(v) The Islanding Schemes devised for AGBPP generation with Upper Assam load and for AGTPP generation with Tripura system and Dullavcherra loads, failed to operate successfully on 19.3.2014, while the part of separated system of North Eastern Regional Grid collapsed after around 14 seconds of islanded operation.

(e) On 8.4.2014 at 22:04 hrs, multiple elements of NER Grid, namely 400 kV Silchar-Byrnihat, 400 kV Silchar-Palatana D/C, 132 kV Badarpur-Khliehriat, 132 kV Jiribam-Halflong, 132 kV Jiribam-Loktak II, 132 kV Jiribam-Aizwal, 132 kV Loktak-Imphal and 132 kV Loktak-Ningthoukhong lines were tripped which resulted in

system comprising of Tripura, Mizoram, part of South Assam and part of Manipur separated from rest of All India Grid and subsequently collapsed on load-generation mismatch and led to a Grid Disturbance of Category-IV. It was observed that there was Y Ph to earth fault in 400 kV Silchar-Byrnihat line, while this line auto-reclosed successfully at 400 kV Silchar end. However, auto-reclose scheme at 400 kV Byrnihat end did not operate. Operation of auto-reclose at Byrnihat end could have saved the grid as most of the elements tripped on account of overloading or power swing after tripping of 400 kV Silchar-Byrnihat line. After tripping of 400 kV Bongaigaon-New Siliguri-I at 16:00 hrs, shutdown of this line was availed by PGCIL for the purpose of patrolling. The line was taken into service by 22:23 hrs on 8.4.2014.

(f) NERPC constituted an Operation and Protection sub-group to discuss grid disturbances which occurred in North Eastern Region (NER) on 19.3.2014, 29.3.2014 and 8.4.2014 to analyse the grid disturbances, suggest remedial measures, and to discuss SPS and Islanding schemes and any other issues related to Protection system/Grid disturbance/failure of major equipment in NER. A meeting of sub-group was held on 11.4.2014 to discuss the above issues. However, the meeting was concluded without any result.

(g) Out of the total 45 disturbances, around 17 disturbances occurred in Manipur system and on several occasions, there were no tripping of the lines at Manipur end which shows inadequacy in protection system in Manipur.

(h) The protection system of Manipur State Power Corporation Limited (MSPCL) is in appalling condition since long which has resulted in frequent power supply

interruptions in major parts of Manipur area and loss of Loktak generation and as a consequence there is reduction of power availability in NER. There were cases of multiple lines trippings due to non-operation/mal-operation of protection system of Imphal and Ningthoukhong sub-stations of MSPCL. The important areas such as capital load in Manipur get severely affected by non-operation/mal-operation of protection system of Imphal and Ningthoukhong sub-stations of MSPCL. On the other side, there were number of cases of loss of Loktak (NHPC) generation due to non-operation/mal-operation of protection system of Imphal and Ningthoukhong. The matter was regularly taken up with MSPCL. In the 14th TCC Meeting of NERPC held on 4.9.2013 at Agartala, MSPCL informed that its protection system would work properly after the renovation work associated with Yurembam sub-station and Yaingangpokpi and Ningthoukhong sub-stations is completed by December, 2013 and March, 2014, respectively. However, as evident from the recent tripping, it appears that the renovation work is yet to be carried out.

(i) The transmission network of Meghalaya Power Transmission Corporation Limited (MePTCL) comprises of 132 kV lines and sub-stations barring the 400/220 kV Killing (Byrnihat) sub-station. A major part of load of Meghalaya is fed through 132 kV Khleihriat (PGCIL)-Khleihriat (MePTCL) D/C lines. There were repeated instances of tripping of these lines which have resulted into load loss of Khleihriat area of Meghalaya. In certain occasions, the line was tripped due to relay operation at PGCIL end of the line while there was no tripping at MePTCL end of the line which shows that due to internal fault in MePTCL system, undesired tripping and load loss occurred. There were total 8 disturbances relating to Meghalaya (Khleihriat portion)

system. In 12th PCC meeting of NERPC held on 8.8.2013 at Guwahati, it was discussed that a team comprising of representatives from NERPC, PGCIL and MePTCL would visit Khliehriat (MePTCL) sub-station to identify the problem. However, no information has been received in this regard.

(j) There were repeated instances of tripping of associated transmission network of Palatana GBPP of OTPCL, which have resulted in complete generation loss at Palatana. There were instances of tripping of only 1 circuit of 400 kV Palatana-Silchar D/C line which have resulted in complete outage of Palatana generation which shows protection deficiencies or ill-coordination of protection in the system.

(k) There were instances when tripping of 400 kV Silchar-Byrnihat S/C led to isolation/islanding of Southern Part of NER Grid comprising of South Assam, Manipur, Mizoram and Tripura system loads together with generation from Palatana, AGTFP, Loktak and Tripura system generation from rest of NER Grid, which subsequently collapsed on account of mismatch in load-generation. It was observed that during fault in 400 kV Silchar-Byrnihat S/C line, several times Auto-reclose was operated successfully at one end of the line, but failed to operate at other end. This is a serious protection deficiency, considering the importance of this line in NER Grid. Apart from protection deficiencies, the line maintenance is also a serious issue and such frequent tripping highlights the need for appropriate vegetation management.

(l) NER Grid is connected to rest of All India Grid through only single in-feed, namely 400/220 kV Bongaigaon-Salakati and it depends heavily on imports through

this in-feed to meet the demand of constituent States. In case of any tripping of critical elements of this in-feed, whole or part of NER Grid may separate from rest of Indian Grid. Frequency of isolated part of NER Grid tends to dip very fast as generation is usually in much less quantum compared to the connected load.

(m) Frequency of isolated NER Grid except for radial loads at 220/132 kV, 2x50 MVA, Balipara ICT dipped to 44.83 Hz. Before the isolation, the power exchange of this isolated grid with rest of NER Grid was around 94 MW. It shows that there was no operation of UFR based load shedding, which could have saved the isolated part of the grid. In view of the above, it is of utmost importance to implement UFR based load shedding as per recommendations of NERPC so that in such events of isolation, the islanded grid can maintain load-generation balance which may reduce the impact and severity of Grid Disturbance.

(n) As per the following data, the implementation of UFR based load-shedding is still inadequate. Only AEGCL have completed installation of UFRs as per recommendations of NERPC. Considering the import quantum by NER, particularly when Palatana generation is low, more quanta of UFRs over and above the NERPC recommendations needs to be implemented.

Stage	Load shed Required	Installed	To be Installed
Stage - I (49.2 Hz)	100 MW	90.0	10.0
Stage - II (49.0 Hz)	100 MW	85.0	15.0
Stage - III (48.8 Hz)	100 MW	60.0	40.0
Stage - IV (48.6 Hz)	100 MW	55.0	45.0
Total	400 MW	296.0	110.0

(o) In case of grid disturbances, except certain States, the constituents of NER are

not submitting their UFR operation reports. There is no information regarding periodic inspection of the UFRs by NERPC in terms of Regulation 5.2(n) of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 (Grid Code).

(p) In case of tripping of 400 kV Silchar-Byrnihat line, this part of NER Grid may get isolated due to cascade tripping of other interconnecting lines on overloading/ power swing. Usually, Southern part of NER grid exports power to the rest of NER grid, when there is high generation at Palatana. Under this scenario, frequency of the isolated part rises sharply, which may cause tripping of generators in this isolated grid resulting in grid disturbance.

(q) In various OCC meetings of NERPC, SPS-3 was discussed with object to reduce generation at Palatana to around 230 MW in case of tripping of 400 kV Byrnihat Silchar line to prevent cascade tripping in Southern part of NER grid. In the said OCC meeting OTPC informed that SPS-3 would be implemented by April, 2014. However, SPS- 3 is not yet implemented by OPTC. In the 97th OCC sub-committee meeting, the issue of delay in implementation of SPS-3 was discussed and OTPC was requested for early implementation of the scheme.

3. The petitioner has filed IA No. 37/2014 seeking directions to the respondents to comply with the provisions of Regulation 3(e) of the Central Electricity Authority (Grid Standards) Regulation, 2010, Regulation 5.1, 5.2 (e) 5.2 (1) and 5.2(r) of the Grid Code and directions to all users, STU, CTU to ensure adequacy and healthiness of protection system at the earliest.

4. The petition was admitted on 21.8.2014 and notices were issued to the respondents to file their replies. During the course of hearing, the representative of the petitioner submitted as under:

(a) In the calendar year 2014, there have been 81 incidences of grid disturbance as defined in the Central Electricity Authority (Grid Standards) Regulations, 2010 out of which two have been of Category- V, which is the most severe category.

(b) On 19.3.2014 and 25.7.2014, there was multiple trippings of elements in NER grid resulted in a grid disturbance of Category-V, leading to black-out of most of North Eastern Regional grid.

(c) NER is the smallest of the five regions and the transmission system in NER is very fragile and calls for high order of O&M practices. Further, protection systems have to operate correctly as per Grid Standards and defense mechanism has to be equally strong. There are series of failures and in one of the case, faults were cleared in as much as 96 seconds after melting of the earth wire in 400 kV systems which obviously is a serious matter.

(d) According to NERPC, funding is the major constraint for implementation of recommendation of protection audit and other improvement required. The Commission vide order dated 21.2.2014 in Petition No.220/MP/2012 had directed the utilities to list out deficiency which needs to be rectified on urgent basis and it was further directed that in order to implement the recommendations of the Protection Audit, a compliance mechanism with definite time line needs to be put in

place. The Commission had also directed that non-availability of fund or delay in procurement process shall not be accepted as an excuse for non-implementation. Therefore, the constituents of NER may be directed to furnish action plan against each deficiency clearly stating the deficiencies which can be corrected without any procurement (Category A) and deficiencies involving procurement of equipment (Category B) to implement the recommendations of the Protection Audit.

5. The representative of Assam Electricity Grid Corporation Ltd (AEGCL) submitted that AEGCL is committed to implement the recommendation of the Protection Audit report. In 2013, immediately after the publication of the Protection Audit report, a DPR along with the BOQ on the requirement of the sub-station equipments for the entire State grid was prepared. The same was submitted to NERPC and CEA for onward submission to the DONER. As per the requirements from NLDC, AEGCL had prepared DPR for availing the grant from PSDF. He further submitted that the State of Assam is facing financial crisis and requires ₹ 382 crore for implementation of recommendations of the Protection Audit.

6. Reply to the petition has been filed by Assam Electricity Grid Corporation Ltd., North Eastern Regional Power Committee and Power Grid Corporation of India Ltd.

7. Assam Electricity Grid Corporation Ltd (AEGCL) in its reply dated 14.9.2014 has submitted that UFR based load shedding scheme for all four stages is already in operation. AEGCL has further submitted that it is facing financial hardship and the current ongoing projects are being funded either by the ADB or grants received from Central Government. AEGCL has submitted that one islanding scheme in NER has

already been implemented at the stipulated frequency with the stipulated time lag. In the PCC meeting held on 12.8.2014, AEGCL was directed to change the time lag to 500ms instead of 2 seconds. The said setting would be implemented by 15.9.2014. AEGCL has submitted that UFR based load shedding scheme is already in operation. As per the direction of NERPC, the scheme has already been implemented at different radial load feeders at four stages, namely 492 Hz, 49.0 Hz, 38.8 Hz and 48.6 Hz. AEGCL has submitted that under SPS scheme, AEGCL has already asserted that if needed, it would incorporate the required trip transfer scheme. As a part of SPS, Reserve Power Relays has already been commissioned at the HV side of the ICTs at the 400 kV Azara grid sub-station.

8. NERPC vide its reply dated 10.10.2014 has submitted that the issue of grid disturbances in NER were discussed in 91st, 92nd, 93rd and 94th meetings held in the months of November, 2013, December, 2013, January, 2014 and February, 2014 respectively. NERPC has submitted that only Mizoram is sending information of UFR based load shedding approved by PCC. NERPC has submitted the status of UFRs in NER as under:

- (a) Assam and Nagaland: UFR based load shedding for 220 MW and 20 MW have been implemented by both States.
- (b) Manipur: Manipur has informed that UFR based load shedding for all four stages have been implemented but exact amount of load relief is not known.

(c) Meghalaya: UFR based load shedding for Stage-I, II and III have been implemented. Implementation of stage-IV has been held up due to law and order problems.

(d) Tripura: UFR based load shedding for Stage-I and II have been completed and for Stage-III and IV, tendering process is in final stage and is expected to be completed by November, 2014.

(e) Arunachal Pradesh and Mizoram: Stage-I has been completed and Stage-II is under consideration. Stage-III and IV will take more time.

9. Power Grid Corporation of India Ltd.(PGCIL) in its reply dated 27.10.2014 has submitted as under:

(a) All observations of Third Party Protection Audit for PGCIL`s system under Category-A have been complied with and recommendations under Category-B to install 220 kV Bus-Bar Protection Scheme at 220/132 kV Dimapur sub-station is already under implementation and is expected to be completed by March, 2015.

(b) The islanding scheme for AGBPP and AGTPP has been implemented with UFR relays (without df/dt feature) and with time delay of 5 seconds. Subsequently, in the 99th OCC meeting, it was decided to reduce the time setting of UFR operation from 5 seconds to 500 ms which has already been implemented.

(c) With regard to Auto Reclose of 400 kV Silchar-Byrnihat line, Silchar end bays belongs to PGCIL while Byrnihat end bays belongs to MeECL. All instances of

non-operation of Auto Re-closer at Silchar end have already been investigated and rectified.

(d) PGCIL NERTS furnished the complete data to NERLDC timely and regularly. Therefore, the contention raised by the petitioner is not true. The protection system of NERTS are in compliance with the provisions of Central Electricity Authority (Technical Standards for connectivity of the Grid) Regulations, 2007 and Regulation 3(e) of the Central Electricity Authority (Grid Standards) Regulations, 2010. NERTS has a system of periodic technical audit of sub-stations by expert group.

10. The petition was heard on 27.11.2014. The Commission directed the petitioner, NERPC and all the constituents of NER to convene a joint meeting and determine intervention which are not related to PSDF funding and come up with a solution.

11. The petitioner vide its affidavit dated 31.12.2014 has submitted that as per the Commission`s direction, a joint meeting of NER constituents and NERPC was convened on 29.12.2014. The constituents of NER except Arunachal Pradesh have submitted their DPR and funding requirements. With regard to issue of determination of intervention required for rectification of protection system deficiency which is not related to PSDF funding, the constituents of NER agreed upon the following:

(a) Testing of all existing relays and schemes within 2 months to assess the healthiness of the existing protective relays;

(b) Review of relay settings based on the history of tripping and non-availability of Distance Protection Relays;

(c) To avoid tripping on account of vegetation growth;and

(d) To adopt, wherever available, Single Phase/three phase Auto Reclose Scheme of the transmission lines of voltage level 132 kV and above under List of important Grid Elements of NER.

12. During the next hearing on 26.2.2015, the representative of the petitioner submitted that a joint meeting of NER constituents, NERPC and NERLDC was convened on 29.12.2014 in which *inter-alia* the following interventions required for rectification of protection system deficiency which are not related to PSDF funding was agreed upon by the constituents of NER:

(a) Time line for implementation of the recommendations of third party Protection Audit has been submitted along with DPR to NERLDC.

(b) The States of Assam, Nagaland and Mizoram have got funding from PSDF.

(c) All constituents of NER have submitted their funding requirements from PSDF. Further, there is no shortage of trained manpower at sub-station level in NER and NER constituents require only equipments and funding from PSDF.

13. The representative of NLDC submitted that on 23.2.2015, there was a grid disturbance of category GD-V which caused complete blackout in NER except in Assam which survived the disturbance. He further submitted that there is shortage of adequate manpower as well as lack of trained manpower at sub-station level.

14. The Commission, vide Record of Proceedings for the hearing dated 26.2.2015,

issued the following directions to the constituents of NER:

- (a) Take proactive actions i.e. taking Board's approval, floating of NITs, selection of bidders etc. and place the award of work, as and when fund from PSDF is released;
- (b) In case of constraint of funds, the States of NER (who have not got funds from PSDF) may explore the possibility of arranging funds from PSDF; and
- (c) Complete the implementation of the recommendations of third party Protection Audit within 12 months from the date of placement of award for purchase of equipments.

Analysis and Decision:

15. We have considered the submissions of the petitioner, NERPC, PGCIL and AEGCL and perused the documents on record. The petitioner has submitted that 81 nos. of grid disturbances in NER have occurred during the year 2014, out of which two grid disturbances have occurred on 19.3.2014 and 25.7.2014 due to delayed operation or failure to operate of protective relays/scheme, which have resulted in more than 90% of load loss and 100% of generation loss in NER, due to fault persisting on Balipara ckt-I.

16. It is underlined that grid security and operation within the prescribed parameters is of prime importance and no compromise can be allowed in this regard. In the Central Electricity Authority (Grid Standards) Regulations, 2010, the category of grid disturbances has been defined as under:

"Category GD-1: When less than ten per cent of the antecedent generation or load in a regional grid is lost;

Category GD-2: When ten per cent to less than twenty percent of the antecedent

generation or load in a regional grid is lost.

Category GD-3: When twenty per cent to less than thirty per cent of the antecedent generation or load in a regional grid is lost;

Category GD-4: When thirty per cent to less than forty per cent of the antecedent generation or load in a regional grid is lost;

Category GD-5: When forty per cent or more of the antecedent generation or load in a regional grid is lost."

17. Out of the total 45 disturbances in NER, about 17 disturbances occurred in Manipur system. In the 14th TCC meeting of NERPC held on 4.9.2013, Manipur informed that renovation work associated with sub-stations would be completed by December, 2013 and March, 2014. However, the recent tripping shows that the renovation work is yet to be carried out by Manipur. We direct Manipur to complete renovation works within one year from the date of issue of the order.

18. NERPC, vide its letter dated 10.10.2014, has submitted the status of UFRs in NER as under:

(a) Assam and Nagaland: UFR based load shedding for 220 MW and 20 MW have been implemented by both States.

(b) Manipur: Manipur has informed that UFR based load shedding for all four stages have been implemented but exact amount of load relief is not known.

(c) Meghalaya: UFR based load shedding for Stage-I, II and III have been implemented. Stage-IV implementation is held up due to law and order problems.

(d) Tripura: UFR based load shedding for Stage-I and II have been completed and for Stage-III and IV, tendering process has been started. It is expected to be completed by November, 2014.

(e) Arunachal Pradesh and Mizoram: Stage-I has been completed and Stage-II is under consideration. Stage-III and IV will take more time.

19. We would like to emphasize that no complacency shall be accepted for ensuring safety and security of the Grid. Also, according to Enquiry Committee constituted by the Ministry of Power and headed by Chairperson, CEA, the response from generators and operation of defense mechanism like Under Frequency and df/dt based load shedding and special protection schemes should be ensured in accordance with provisions of the Grid Code so that Grid can be saved in case of contingencies.

20. In this connection, Regulations 5.2 (n) and 5.4.2 (e) of the Grid Code is reproduced below for ease of reference:

“5.2 (n). All SEBS, distribution licensees / STUs shall provide automatic under-frequency and df/dt relays for load shedding in their respective systems, to arrest frequency decline that could result in a collapse/disintegration of the grid, as per the plan separately finalized by the concerned RPC and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency. All, SEBs, distribution licensees, CTU STUs and SLDCs shall ensure that the above under-frequency and df/dt load shedding/islanding schemes are always functional. RLDC shall inform RPC Secretariat about instances when the desired load relief is not obtained through these relays in real time operation. The provisions regarding under frequency and df/dt relays of relevant CEA Regulations shall be complied with. SLDC shall furnish monthly report of UFR and df/dt relay operation in their respective system to the respective RPC.

RPC Secretariat shall carry out periodic inspection of the under frequency relays and maintain proper records of the inspection. RPC shall decide and intimate the action required by SEB, distribution licensee and STUs to get required load relief from Under Frequency and df/dt relays. All SEB, distribution licensee and STUs shall abide by these decisions. RLDC shall keep a comparative record of expected load relief and actual load relief

obtained in Real time system operation. A monthly report on expected load relief vis-a-vis actual load relief shall be sent to the RPC and the CERC."

"5.4.2 (e) order to maintain the frequency within the stipulated band and maintaining the network security, the interruptible loads shall be arranged in four groups of loads, for scheduled power cuts/load shedding, loads for unscheduled load shedding, loads to be shed through under frequency relays/ df/dt relays and loads to be shed under any System Protection Scheme identified at the RPC level. These loads shall be grouped in such a manner, that there is no overlapping between different Groups of loads. In case of certain contingencies and/or threat to system security, the RLDC may direct any SLDC/ SEB/distribution licensee or bulk consumer connected to the ISTS to decrease drawal of its control area by a certain quantum. Such directions shall immediately be acted upon. SLDC shall send compliance report immediately after compliance of these directions to RLDC."

21. As per the above provisions, All SEBs, distribution licensees/STUs are required to furnish periodic inspection report of UFRs. However, the constituents of NER are not submitting the periodic inspection report of UFRs to NERLDC. According to PGCIL, it is furnishing the complete data timely and regularly to NERLDC. PGCIL has submitted that the protection system of NERTS are in compliance with the provisions of the Central Electricity Authority (Technical Standards for connectivity of the Grid) Regulations, 2007 and the Regulation 3(e) of the Central Electricity Authority (Grid Standards) Regulations, 2010. PGCIL has submitted that NERTS has a system of periodic technical audit of sub-stations by expert group.

22. It is noticed that other constituents of NER are not complying with the provisions of Regulations 5.2 (n), 5.2 (r) and 5.4.2 (e) of the Grid Code. We direct constituents of NER to make their systems compliant with the provisions of the Grid Code within one month from the issue of the order failing which appropriate proceedings under Section 142 of the Act and other relevant provisions shall be initiated against them for non-compliance of the provisions of Grid Code.

23. In the 79th OCC meeting held on 8.11.2012, all the constituents of NER agreed to implement the recommendations of third party Protection Audit. However, the status submitted by the petitioner and NERPC reveals that number of recommendations are yet to be implemented by the constituents of NER. PGCIL has stated that all observations of Third Party Protection Audit for NERTS system falling under Category-A have been complied with and only recommendation falling under Category-B to install 220 kV Bus-Bar protection Scheme at 220/132 kV Dimapur sub-station is under implementation and is expected to be completed by March, 2015.

24. The petitioner has submitted that number of disturbances occurred in NER due to non-complying with best O&M practices by the concerned utilities. In the various OCC meetings, ONGC Tripura Power Corporation (OTPC) had agreed to implement SPS by April, 2014 to reduce generation at Palatana in the event of tripping of 400 kV Byrnihat-Silchar line to prevent cascade tripping in Southern part of NER grid. However, OTPC has not implemented System Protection Scheme so far. We direct OTPC to explain the reasons, on affidavit, by 31.12.2015 as to why action under Section 142 of the Act should not be initiated against it for non-compliance with the provisions of the Grid Code.

25. According to NERPC, the issue of grid disturbances in NER was discussed in 91st, 92nd, 93rd and 94th OCC meetings held in the month of November, 2013, December, 2013, January, 2014 and February, 2014 respectively as well as in the PCC forum. The petitioner has submitted that a joint meeting of the constituents of NER and NERPC was convened on 29.12.2014. In the said meeting dated 29.12.2014, the constituents of NER except Arunachal Pradesh submitted their DPR and funding

requirements to NRLDC as under:

Sl. N.	State/Utility	Funding Requirement (Rs. Crore)	Internal Source (Rs. crore)	External Source (Rs. crore)	Timeline of Activities (month)
1	Arunachal Pradesh	13.38	Nil	13.38	36 (from the date of receipt of fund)
2	MSPCL	40.82	Nil	40.82	18 (from the date of receipt of fund)
3	MePGCL	48.16	Nil	48.16	18 (from the date of receipt of fund)
4	MePTCL	102.8	Nil	102.8	18 (from the date of receipt of fund)
5	Mizoram	34.88	3.50	31.38	18 (from the date of receipt of fund)
6	Nagaland	39.96	Nil	39.96	18 (from the date of receipt of fund)
7	TSECL	79.95	Nil	79.95	18 (from the date of receipt of fund)

26. During the said meeting held on 29.12.2014, the constituents of NER also agreed for testing of all relays and schemes, review of relay settings and avoid tripping due to vegetation growth as these do not require PSDF funding. The minutes of meeting held on 29.12.2014 is extracted as under:

“State-wise plan, Funding requirement & Sources of Fund required for rectification of Protection System Deficiency to be furnished to Hon`ble CERC by 31.12.2014. Accordingly, the constituents of NER have submitted the signed copies of Detailed Project Report and Funding requirements to NERLDC. However, the DPR and funding requirement is yet to be submitted by Arunachal Pradesh.

The issue of determination of intervention required for rectification of Protection System Deficiency, which are not related to PSDF funding was discussed.

The constituents of NER agreed upon the following:

- (a) Testing of all existing relays and schemes within 2 months to assess the healthiness of the existing protective relays;
- (b) Review of relay settings based on the history of tripping and non-availability of Distance Protection Relays would be done;
- (c) Attempts would be made to avoid any tripping on account of vegetation growth which is frequent in NER;
- (d) Single Phase/Three phase Auto Reclose Scheme of transmission lines of voltage level 132 kV and above under List of Important Grid Elements of NER are to be adopted, wherever available. The status of implementation will be monitored in monthly

OCC/PCC meetings.”

27. The petitioner has submitted that AGECL vide its letter dated 26.12.2014 informed that NLDC/CEA has approved ₹ 299 crore (Approximately) against its proposal of ₹ 382.48 crore. However, amount pertaining to Automation part and Bay Control Unit (BCU) has not been sanctioned. AGECL has further informed that the resource requirement for Automation is ₹ 60 crore (Approximately). According to the petitioner, the matter was taken up with the Central Electricity Authority and National Load Despatch Centre and they have advised AGECL to submit the scheme for BCU separately.

28. It is noticed that AEGCL has initiated action to attend protection audit remarks and has narrated certain difficulties to implement third party protection audit remarks. Considering the efforts being made and difficulties projected by AEGCL, we direct AEGCL to implement the recommendations of third party protection audit remarks within one year from the issue of the order.

29. Clause (c) of sub-section (2) of Section 39 of the Act, 2003 provides as under:

“39. (2) (a) and (b)

(c) to ensure development of an efficient, co-ordinated and economical system of intra-State transmission lines for smooth flow of electricity from a generating station to the load centers:”

Perusal of the above provisions reveals that STU is required to ensure development of an efficient, co-ordinated and economical system of intra-State transmission lines for smooth flow of electricity. Therefore, the constituents of NER are

required to expeditiously complete the work identified in the third party protection audit so that frequent tripping in their systems are eliminated and grid security is not endangered.

30. Any fault in NER system affects the grid security. STU/SLDCs are responsible to ensure healthiness of their systems as a grid connected utilities. The constituents of NER should give utmost importance to make its system compliant with the provisions of the Grid Code and the Central Electricity Authority (Grid Standards) Regulations, 2010 for safety of the grid. We direct the constituents of NER strictly comply with the provisions of the Grid Code and the Central Electricity Authority (Grid Standards) Regulations, 2010.

31. We further direct all STUs, distribution licensees and SLDCs of North Eastern Region to ensure that UFRs, df/dt and Islanding scheme are always functional in their systems and shall operate to provide adequate load relief as agreed in NERPC forum. NERPC and NERLDC are directed to submit report to the Commission regarding operation of UFRs and df/dt below the setting, if any, and adequate relief to be made available by concerned States/utilities so that appropriate action may be taken against defaulting entities in accordance with law.

32. We feel that the present UFR settings are quite low considering the normal range of operation of the grid between 49.9 Hz to 50.05 Hz. National Power Committee should review the setting of UFR and df/dt , if required considering the above aspect and submit a report to the Commission in this regard.

33. Summary of our Decision:

- (a) Manipur is directed to complete renovation works within one year from the date of issue of the order.
- (b) OTPC is directed to explain the reasons for non-compliance with the provisions of the Grid Code.
- (c) AEGCL is directed to implement the recommendations of third party protection audit remarks within one year from the issue of the order.
- (d) The constituents of NER are directed to strictly comply with the provisions of the Grid Code and the Central Electricity Authority (Grid Standards) Regulations, 2010.
- (e) NERPC and NERLDC are directed to submit report to the Commission regarding operation of UFRs and df/dt below the setting, if any, and adequate relief to be made available by concerned States/utilities.
- (f) NERPC is directed to submit report regarding adequacy of funds requirement given by the constituents of NER from PSDF for rectification of protection system deficiency.
- (g) NERPC is directed to submit status of protection audit remarks in respect of all the constituents of NER within two months from the issue of the order.
- (h) All the constituents of NER are directed to submit their status to NERPC on regular basis to facilitate proper monitoring in PCSC meetings.

(i) NERPC is directed to submit bi-annually status report to the Commission confirming the completion of protection audit remarks of the constituents of NER.

34. The petition and IA are disposed of with the above directions.

Sd/-

(A.S. Bakshi)
Member

sd/-

(A. K. Singhal)
Member

sd/-

(Gireesh B. Pradhan)
Chairperson