North Eastern Regional Power Committee

MINUTES OF THE 42nd PROTECTION COORDINATION SUB-COMMITTEE MEETING OF NERPC

Date : 06/05/2016 (Friday)

Time : 10:00 hrs

Venue : "Hotel Nandan", Guwahati.

The List of Participants in the 42nd PCC Meeting is attached at **Annexure – I**

Shri P.K. Mishra, Member Secretary, NERPC welcomed all the participants to the 42nd PCC meeting. He mentioned that some constituents were again absent in the meeting and hence any items pertaining to them will not be able to conclude. Further, he stated that in-spite of sincere efforts taken by NERPC Secretariat with competent authorities of the constituents the same has been observed. He requested members to attend the meetings regularly and also to participate in the meeting for fruitful deliberation.

Thereafter, Member Secretary, NERPC requested Shri B. Lyngkhoi, Director/SE(O) to take up the Agenda items.

A. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF 41st MEETING OF PROTECTION SUB-COMMITTEE OF NERPC.

SE(O) informed that the minutes of 41st meeting of Protection Sub-committee held on 7th January, 2016 at Guwahati were circulated vide letter No. NERPC/SE (O)/PCC/2015/4520-4555 dated 15th January, 2016.

The Sub-Committee confirmed the minutes of 41st PCCM of NERPC since no comments/observations were received from the constituents.

ITEMS FOR DISCUSSION

A.1 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 39th PCC meeting, POWERGRID stated that they will extend help to incorporate 3-phase dead-line charging at RHEP end in EPAC Relay. For this NEEPCO will arrange for S/D with due consent of Arunachal Pradesh and intimate POWERGRID in advance. Meanwhile NEEPCO informed that new relay for Nirjuli & Ziro Line has been ordered and expected delivery is November, 2015 and the same will be installed by NEEPCO at RHEP by December 2015.

During 40th PCC meeting, Sr. Manager (O&M), NEEPCO once again informed the forum that material has already reached at site and installation would be completed by 31/12/2015 as mentioned earlier. He requested NERTS to help them in relay coordination during implementation of the scheme. NERTS agreed.

During 41st PCC meeting, it was agreed that shutdown of 132 kV Ranganadi – Lekhi Line and 132 kV Ranganadi - Ziro Line would be accorded on suitable date(s) as decided by 117th OCC with the consent of DoP, AP. Further Assam will support to meet the loads of Arunachal Pradesh during Shut Down through 132kV Gohpur – Nirjuli Line.

Deliberation of the sub-Committee

After detailed deliberation it was confirmed to the forum by NEEPCO that work would be completed by 15th June 2016.

The sub-committee noted as above.

Action: NEEPCO & DoP, Ar. Pradesh

A.2 Implementation of 3-phase Auto Reclosure Scheme in all lines associated with 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 associated with Kopili and Khandong HEP of NEEPCO. The lists of such lines are:

a) 132kV Khandong – Umrangso - Haflong

b) 132kV Kopili – Khandong #1

During 40th PCC meeting, AEGCL informed the forum that they have already written a letter to SAMA Power to carry out the work through ERL but so far they have not revert back. AEGCL stated that they will take up the matter once again.

The Sub-committee directed that a joint visit for carrier inter-trip signaling check to be conducted by POWERGRID & AEGCL at a suitable date and AEGCL should intimate to POWERGRID & NEEPCO 3 days in advance and the same should be completed before the next PCC meeting.

During 41st PCC meeting, AEGCL informed the forum that PLCC panel is already available at Umrangso, ABB ETL41 (Speech & data) panel will be shifted from Khandong to Umrangso within 15/01/2016. However panel would be commissioned after joint visit with POWERGRID. Further, for 132kV Kopili – Khandong Line NEEPCO informed the forum that Kopili end bay belongs to POWERGRID and Khandong end bay belongs to NEEPCO. Accordingly, job is to be taken up jointly by NEEPCO and POWERGRID.

Deliberation of the sub-Committee

AEGCL informed the forum that ETL 441 panel is to be shifted from Khandong to Umrangso and Carrier-Intertripping/AR to be checked by POWERGRID at Haflong. NEEPCO informed that at Khandong end Auto-Reclosure is functioning in all circuits. After detailed deliberation, the forum requested Assam, POWERGRID & NEEPCO to fix the suitable date for joint inspection and the above works should be completed within 30th May 2016.

Action: POWERGRID, NEEPCO & Assam

A.3 Implementation of the recommendations of the Protection Audit:

As per Sl. no 9.1.1 & 9.1.4 of Report on Enquiry Committee on Grid Disturbance in Northern Region on 30th July 2012 and in Northern, Eastern & North-Eastern Region on 31st July 2012, thorough Third Party protection audit needs to be carried out periodically along with independent audit of Fault Recording Instruments.

The status as intimated by NERLDC during the 42nd PCC meeting is as given below:

Status of submission of data related to Third Party Protection Audit			
Name of Constituent	***As per format of Task Force***	***As per format of NERPC***	***Remarks***
DoP, Ar. Pradesh	***Not submitted***	***Submitted***	***Data as per format of Task Force to be submitted by 30.05.2016***
AEGCL	***Partly submitted (Details as per Annexure-1)***	***Partly Submitted (Details as per Annexure-1)***	
TSECL	***Not submitted***	***Submitted***	***Data as per format of NERPC for Surajmaninagar & Rabindranagar and Data as per Task Force Format for all sub-stations by 30.05.2016***
NEEPCO	***AGTPP Not submitted as per format***	***Not Submitted as per format***	***Data for AGTPP as per Task Force format by 30.05.2016***

After detailed deliberation, the Sub-committee had decided that those who have not submitted the data as per format of Task Force in Annexure A.2 (II) & also, as per the format of NERPC in Annexure A.2 (i) for 3rd Party Protection Audit are requested to furnish these data **by *30.05.2016* positively**.

The Sub-committee noted as above.

Action: All remaining utilities as above.

A.4 Status of R&M Implementation of NER from PSDF:

The Sub-committee requested all the constituents to intimate the status of progress to NERPC regularly so that the same could be intimated to CERC.

During 40th PCCM, the Sub-committee requested all constituents to complete the proactive actions like taking Board's approval, floating of NITs, selection of bidders etc., as directed by the Hon'ble CERC.

During the meeting held on 11.12.2015 at Delhi under the Chairmanship CEA, the forum expressed concerned about delay in disbursement of fund and execution of R&M works**.**

In 41st PCC meeting, AEGCL informed the forum that once Tri-partite Agreement is signed LOA would be issued.

Deliberation in the Meeting:

The status as given in 42nd PCC meeting is given below:

Nagaland: NIT & LOAs for complete project of Rs. 39.96 Crores – Completed.

Assam: NITs is under progress & LOAs by June-July, 2016 for entire amount of Rs. 356.50 Crores.

MePTCL: NIT for Rs. 37.52 Cr – completed & LOAs for Rs. 8.66 Cr -out of Rs. 69.19 Crores. The rest NITs & LOAs is expected by June-July, 2016

MePGCL: NIT for Rs. 2.51 Crores & LOAs – Rs. 2.51 Cr out of Rs. 32.43 Crores. Other NITs in progress and LOAs will be completed by June - July, 2016

Tripura: NIT for completed project of Rs. 31.05 Crores – completed, LOAs by June - July, 2016

Mizoram: NIT is under progress & LOAs likely by June, 2016 for entire amount of Rs. 26.84 Crores.

Ar. **Pradesh & Manipur**: Approval from MoP is awaited. However, they have informed that NITs have already been prepared by them and the same would be published once the approval from MoP is received.

The forum requested all the constituents to complete the work at the earliest. Further, the forum directed that the status of progress of work be intimated to NERPC Secretariat every month so that the same can be submitted to Hon'ble CERC & CEA.

The Sub-committee noted as above.

Action: All 7 NER States.

A.5 Root cause analysis of tripping in Southern Part of NER on 08.08.2015 and 24.09.2015 & Remedial Measures:

Remedial Measures suggested by sub group members at the meeting held at NERPC on 29.09.15

The islanding scheme of AGTPP with Tripura system is to be reviewed so as to ensure successful islanding in such cases of isolation in NER Grid.

During 38th PCC meeting, the Sub-Committee decided that in addition to the recommendations of the sub-group the following should be implemented ASAP:

1. Modification to SPS-1 at Palatana: Unit-I and II to be put in AND logic so that SPS-1 would operate.

During 40th PCC meeting, OTPC informed that the work has already been completed.

DGM (SO-II), NERLDC stated that on 15.12.2015, SPS 1 was triggered when only one module is in operation which is not correct. The SPS 1 should be triggered when both the modules are in service. He requested OTPC to check the scheme and do the necessary logic correction at the earliest.

In 41st PCC meeting, DGM(O&M), OTPC suggested that SPS-1 be disabled when one module is not running, meanwhile OTPC would review the scheme and revert back to the forum with suggestions for further modification(if possible). The forum agreed to the proposal. DGM, OTPC also proposed for modification to SPS-3 since now both units are running. It was decided to refer the matter to System Studies sub-group.

Deliberation in the Meeting:

SE(O), NERPC informed that due to paucity of time, the System Studies sub-group meeting could not be held during the month and the same will be convened soon. It was discussed that review of Islanding Scheme No 2 are required in view of change in load pattern after commencement of power supply to Bangladesh. NERPC agreed to conduct meeting by end of May.

The Sub-committee noted as above.

Action: NERPC.

Root Cause Analysis & Remedial Measures by sub group members at the meeting held at NERPC on 18.11.15 regarding Non-Tripping of Azara-Bongaigoan as raised by AEGCL:

Cause: As per information given by POWERGRID, the incidences above are due to high arcing faults.

Remedial Measures:

a. Explore to increase the resistive reach of Z-2 and Z-3.
b. DEF characteristics should be IDMT in place of definite time with 1100msec opening time at maximum fault level

c. Further, Z-3 setting should be 1000msec and necessary co-ordination is required for associated lines.

d. NERPC Secretariat may extend help wherever necessary Administrative coordination is required for clearance of faults.

During 40th PCC meeting, POWERGRID requested AEGCL to implement Zone 3 setting as per the recommendation of task force. Also DEF delay setting should be 100 ms more than Zone 3 setting with IDMT characteristics. AEGCL proposed for review of Zone 3 setting as recommended by task force. However, POWERGRID opined that there is no scope for review as it is the matter for implementation.

AEGCL insisted for joint meeting for which POWERGRID sought agenda from AEGCL.

The Sub-committee requested NERPC to invite AEGCL during the monthly Sub-committee meeting to discuss about various grid incidences being held every month by NERPC along with above issues of Assam.

During 41st PCC meeting SE (O) informed the forum that the monthly Sub-Committee meeting could not be held in January, 2016 and the same will be conducted before the next PCC meeting and he also requested Assam to give some specific agenda/topic to be discussed so that meeting would be fruitful.

Deliberation in the Meeting:

S.E (O) NERPC requested AEGCL to kindly make it convenient to attend the next Sub-Committee (for GD/GI) meeting, so that the matter may be discussed. The sub-committee requested AEGCL to make Zone-3 protection settings as per Task Force recommendations.

The Sub-committee noted as above.

Action: NERPC.

A.6 Grid Incidences and Grid Disturbances from January, 2016 to March, 2016:

The following numbers of Grid Disturbances (GD) & Grid Incidents (GI) occurred during the period **w.e.f 1st January, 2016 to 31st March, 2016** :-

Sl No	Control Area	Grid Incidents	Grid Disturbance	Grid Incidents	Grid Disturbance
		Jan'16 to Mar'16	Jan'16 to Mar'16	Jan'16 to Mar'16	Jan'16 to Mar'16
1	Palatana	3	0	3	0
2	AGBPP	7	1	7	1
3	AGTPP	11	0	11	0
4	Ranganadi	0	0	0	0
5	Kopili	0	0	0	0
6	Khandong	0	0	0	0
7	Doyang	0	0	0	0
8	Loktak	2	0	2	0
9	BgTPP	0	1	0	1
10	Arunachal Pradesh	0	7	0	7
11	Assam	0	12	0	12
12	Manipur	0	20	0	20
13	Meghalaya	0	12	0	12
14	Mizoram	0	5	0	5
15	Nagaland	0	15	0	15
16	Tripura	0	0	0	0

Sl . No.	Category of GD/GI	Grid Disturbance in nos	
		Jan'16 to Mar'16	Jan'16 to Mar'16
1	GI-I	13	13
2	GI-II	10	10
3	GD I	63	63
4	GD II	3	3
5	GD III	0	0
6	GD IV	0	0

7	GD V	0	0
8	**Total GI**	**23**	**23**
9	**Total GD**	**66**	**66**

Deliberation in the Meeting:

As large numbers of grid disturbances and grid incidents occurred in a month, it is required to form separate committee comprising with the representatives of NERPC, NERLDC, POWERGRID, NEEPCO and MePTCL. Representative of AEGCL also agreed to join as per convenience. The committee will discuss the root cause of grid disturbances & grid incidents on weekly basis in NERPC office and suggest remedial measures. All the constituents of NER are requested to furnish weekly outage report of elements as per format alongwith DR output, EL output & relay details for detailed analysis of grid disturbances and grid incidents. Their report will be discussed in PCC sub group & OOC meetings.

The Sub-committee noted as above.

A.7 Root cause analysis of Major Grid Disturbance on 16th April 2016:

A major disturbance of category GD-V occurred in NER Grid on 16.04.16 at 1203 Hrs. Concerned persons of all constituents of NER are requested to participate in the meeting alongwith available data for fruitful discussion of the following disturbance.

NER Grid was in synchronism with ER Grid through 220 kV Birpara - Salakati I & II, 400kV Bongaigaon - New Siliguri I, II, III & IV lines and was connected with NR Grid through +/- 800 kV HVDC Biswanath Chariali - Agra Pole-I.

At around 12:00:35.739 Hrs, 400 kV Bongaigaon - BgTPP line I tripped from Bongaigaon end on DP, B-phase, Zone II.

At 12:01:03.001 Hrs, 400 kV Bongaigaon - Balipara line IV tripped on DP, B-phase, Zone II and fault cleared from Balipara end in 325 msec (as per DR data).

Around 12:03:07.272 Hrs, 400 kV Bongaigaon - New Siliguri line III tripped on Zone IV at Bongaigaon. 400 kV Bongaigaon - BgTPP line II tripped from both ends at 12:03:30.091 Hrs and 400 kV Bongaigaon - Azara line tripped at 12:03:30.464 Hrs on DP, B-phase, Zone II at Azara end.

After that, 400/220kV 315 MVA ICT at Bongaigaon tripped on Back Up Over Current Protection on HV Side at around 12:03:36.784 Hrs. 400 kV Bongaigaon - New Siliguri line I tripped at 12:03:36.827 Hrs, 400 kV Bongaigaon - New Siliguri line II tripped at 12:03:37.964 Hrs from Bongaigaon end on over voltage. 400 kV Bongaigaon- New Siliguri line IV also tripped.

Due to these trippings, NER grid desynchronized from rest of India grid and at 12:03:40.960 Hrs. AGTPP along with part of Tripura system separated from isolated NER Grid (from PMU). Sarusajai bus blacked out at 12:03:43.360 Hrs and at 12:03:45 Hrs, +/- HVDC BNC - Agra Pole I blocked. Subsequently major part NER grid collapsed due to load generation mismatch. 220 kV Salakati S/S remained connected with Birpara and Gelephu S/S. AGBPP, LTPS and NTPS stations survived with generation of 150 MW, 90 MW and 60 MW respectively with upper Assam load due to successful operation of islanding scheme at around 12:05 Hrs (information taken from SLDC). The island was synchronized with main grid at Misa at 1406 Hrs. Tripura system initially survived along with AGTPP generation with demand of around 60 MW. Subsequently this island collapsed at due to load generation mismatch.

Details of Restoration attached at **Annexure-A.7**

Load Loss: 973 MW

Generation Loss: 1125 MW

Category as per CEA Standards: GD-V

Root Cause Analysis:

Remedial Measures:

All utilities of NER are requested to furnish the details for fruitful discussion as mentioned below:

a. Disturbance Recorders (In COMTRADE format), Relay Flags, Pickup distance of DP relays, Event Loggers, and SOE from all 400 kV and 220 kV Substations for all feeders
b. Details of Operation of SPS during the disturbance on 16th April 2016
c. Details of Operation of UFR during the disturbance on 16th April 2016 along with feeder-wise quantum of load relief.
d. Detailed bus schemes indicating feeders connected in Main I and Main II at 400 kV Bongaigaon, 400 kV BgTPP (NTPC), 400 kV Balipara, 400 kV Silchar, 400 kV Azara, prior to the disturbance
e. Observations from your end regarding the disturbance.

f. Reason for pick-up of Backup O/C relays at HV side of ICT at Bongaigaon, even though fault was on HV side

g. Relay flags for all Units and Lines tripping along with time of tripping and restoration.

h. Loktak, AGBPP, AGTPP and Palatana may provide the bus frequency data at the time of disturbance (from 1200 Hrs to 1300 Hrs, on 16-04-2016).

i. Time of formation of AGBPP island along with details of tripping of lines.

j. Review of Relay Setting

k. Operation of HVDC Frequency controller during the disturbance.

l. Time synchronisation of DR & EL

m. Issues with timely submission of data

n. Dynamic response of Machines.

o. Second infeed point of NER.

Deliberation in the Meeting:

As per discussion in the Sub-Group meeting the preliminary investigation revealed the following:

1) Line differential protection for 400 kV BgTPP (NTPC)-Bongaigaon (PG) I & II lines was not commissioned (as on 16.04.2016) by NTPC & POWERGRID at their ends.

2) DEF operated (at Bongaigaon end) with time delay 440 ms to clear the fault.

3) However before DEF could trip the line, all circuits of 400 kV Binaguri-Bongaigaon tripped on Zone-2 from 400 kV New-Siliguri end with time delay 350ms.

After detailed deliberation the forum felt that line differential protection for 400 kV BTPS-Bongaigaon should have been commissioned and time delay for zone-2 at Binaguri should have been around 600ms as is the standard for long lines followed by a short line.

The non-clearance of fault by relays at Bongaigaon end on 400 kV Bongaigaon – BgTPP (NTPC) I line, and lower settings of Zone-2 as compared to that recommended by CEA's V. Ramakrishna Task Force seems to be the primary cause of the disturbance.

Members also suggested that a special Enquiry Committee be formed for detailed and thorough investigation for the GD. SE(O), NERPC suggested that a committee be formed with DGM(SO-II), NERLDC as the Chairman and members from NERLDC, NLDC, NERTS, NTPC, AEGCL, MePTCL, NEEPCO and NERPC. Enquiry Committees

for analysis of Grid Disturbance on 30th & 31st Jul12 were constituted by members of independent bodies. It is proposed to constitute Enquiry Committees for analysis of Grid Disturbance on 16th Apr16 with independent members. The forum unanimously agreed and set the deadline of 30.05.2016 for submission of report by the committee.

After detailed deliberation the forum felt that there are many pre and post disturbance events those need to be analyzed for correction, if any, of various scheme viz. Relay Setting, SPS Operation, Islanding Scheme, UFR Load Shedding Scheme functioning etc. Accordingly, SE (O), NERPC suggested that a committee be formed with DGM (SO-II), NERLDC as the Chairman and members from NERLDC, NERTS, NTPC AEGCL and NERPC to analyze the disturbance jointly conclude the same and submit report containing findings and recommendation thereof for corrective measures within 30.05.2016. The forum unanimously agreed to the suggestion.

The Sub-committee noted as above.

Action: NERPC/NERLDC/NERTS/NTPC/AEGCL.

A.8 Root cause analysis of Grid Disturbances w.e.f. 01.01.2016 to 31.03.2016:

A. Disturbances in Assam system:

a. **At 1020 Hrs 25.02.16**, 220 kV Misa (PG) - Mariani(AS) **(Misa (PG) – Not Furnished and Mariani(AS) – Auto Reclose Lockout)** line, 220 kV Samaguri – Mariani(AS) **(Samaguri (AS) – DP, ZI, R-E and Mariani(AS) – DP, ZI, R-E)** line and 220 kV AGBPP - Mariani(PG) **(AGBPP (NEEPCO) – Direct Trip received and Mariani(PG) – Over Voltage (O/V))** line tripped.

Upper Assam area and AGBPP system were connected with rest of NER Grid through 220 kV Samaguri - Mariani(AS), 220 kV Misa - Mariani(AS), 132 kV Bokajan - Golaghat and 220 kV AGBPP - Mariani(PG) lines (220 kV Misa -Mariani(PG) was under planned Shut Down from 0650 Hrs on 25.02.16 and 132 kV Mariani - Mokokchung line was under long outage). At 1020 Hrs on 25.02.16, 220 kV Samaguri - Mariani (AS), 220 Misa - Mariani(AS), 132 kV Bokajan - Golaghat lines tripped. 220 kV AGBPP - Mariani (PG) line tripped on O/V subsequently at 1022 Hrs. Due to the tripping these elements, Upper Assam area and AGBPP system got isolated from rest of NER Grid. The isolated grid frequency shoots up to 51.99 Hz and AGBPP Unit 3, Unit 4 and Unit 8 tripped on high frequency.

Generation loss: 124 MW in Assam & AGBPP

Category as per CEA Standards: GD-II

Root Cause Analysis:

Remedial Measures:

b. At 1817 Hrs 16.03.16, 400/220/33 kV, 315 MVA ICT at Bongaigaon (PG) **(Bongaogaon(PG) - R-Ph, Over Current),** 220 Agia (AEGCL)- Azara **(AEGCL) (Agia (AEGCL) - Over Current and Azara (AEGCL) - No Tripping)** and 220 kV Boko(AEGCL) – Azara (AEGCL) **(Boko (AEGCL) - Over Current & Azara (AEGCL) - No Tripping)** lines tripped.

Part of NER Grid (Dhaligaon, Agia and Boko areas of Assam and Nangalbibra area of Meghalaya), North Bengal system, Sikkim system and Bhutan Grid (except Motonga load) were connected with rest of Indian Grid through 400/220/33 kV,315 MVA Bongaigaon ICT, 400/220 kV,315 MVA ICT I & II at Binaguri , 220 kV Bus coupler at Dalkhola, 220 kV Azara – Agia line and 220 kV Azara – Boko line (132 kV Nangalbibra - Nongstoin line,132 kV Rangia - Bornagar line & 132 kV Rangia - Nalbari line kept open for system requirement and 400/220 kV, 200 MVA ICT-I at Malbase was taken in shutdown at 16:27 Hrs on 16.03.16 due to problem in R phase LA, 400 kV Binaguri – Bongaigaon – III, 400 kV Balipara – Bongaigaon – III and 400 kV Balipara – Biswanath Chariali – III were open due to over-voltage, 400 kV Patna - Kishanganj I & II lines were under breakdown). At 17:57 hrs, Dakhola Bus coupler was opened to reduce loading of 220 kV Purnea - New Purnea D/C which was around 180 MW per circuit. With the opening of the bus coupler at Dalkhola, 220 kV Dalkhola - Dalkhola(WB) D/C and 220 kV Dakhoila - Siliguri were on one bus while 220 kV Dalkhola - Purnea D/C and Dalkhola - Malda - D/C were on the other bus. Immediately after opening of the ICT at Malbase (Bhutan), flow on Binaguri ICTs increased from around 200 MW to about 300 MW flow (per ICT). The ICT I at Binaguri tripped at 18:09 hrs due to Back-up over current protection in B phase. At 18:15 Hr Dalkhola bus coupler was again closed to reduce loading of the Binaguri ICT - 2. But Dalkhola bus coupler tripped immediately after closing. ICT II at Binaguri tripped at 18:17 hrs due to the resulting over-load. Due to the tripping of these two ICTs, the load being met by these ICTs shifted to the 400/220 kV ICT at Bongaigaon. The ICT which was already loaded to around 250 MW further **over-loaded and tripped** at 18:09 hrs. At 18:17 Hrs on 16.03.16, 220 kV Azara – Agia line and 220 kV Azara – Boko line tripped. Due to tripping of these elements, part of NER Grid (Dhaligaon, Agia and Boko areas of Assam and Nangalbibra area of Meghalaya),

North Bengal system, Sikkim system and Bhutan Grid(except Motonga load) separated from rest of Indian Grid and subsequently collapsed due to no source in this area.

Load Loss: 259 MW in Assam & Meghalaya

Category as per CEA Standards: GD-II

Root Cause Analysis:

Remedial Measures : 400/220 kV, 2nd 315 MVA ICT at Bongaigaon & 400/220 kV, 2x315 MVA ICT at BgTPP are to be commissioned at the earliest.

Deliberation in the Meeting:

After detailed deliberation the Sub-Committee recommended installation of the above ICTs at the earliest and requested AEGCL to kindly attend the next Sub-Group meeting for review of zone-2 and zone-3 settings and other issues pertaining to co-ordination of relay settings.

The Sub-committee noted as above.

Action: NERPC/NERLDC/AEGCL.

B. Disturbances in Manipur system (16 nos)

a. At **0437 Hrs on 04.01.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 40 MW in Manipur.

b. At **1454 Hrs on 05.01.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Y-Phase Line 2 LA blast and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Y-Phase Line 2 LA blast),** power supply to Capital area of Manipur interrupted.

Load loss: 53 MW in Manipur.

c. At **0853 Hrs on 12.01.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 65 MW in Manipur.

d. At **0739 Hrs on 14.01.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 54 MW in Manipur.

e. At **0746 Hrs on 21.01.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.
Load loss: 64 MW in Manipur.

f. At **1511 Hrs on 21.01.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 65 MW in Manipur.

g. At **1905 Hrs on 24.01.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 68 MW in Manipur.

h. At **1443 Hrs on 01.02.16**, due to tripping of 132 kV Loktak (NHPC)- Imphal (PG) line & 132 kV Loktak (NHPC)- Ningthoukhong (MSPCL) line **(Line 1: Loktak (NHPC) - DP, Z-II, R-E & Imphal (PG)- DP, Z-I, R-E and Line 2: Loktak (NHPC) – No tripping & Ningthoukhong (MSPCL)- Not furnished),** power supply to Ningthoukhong area of Manipur interrupted.
Load loss: 10 MW in Manipur.

i. At **0410 Hrs on 09.02.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 41 MW in Manipur.

j. At **1523 Hrs on 07.03.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not**

Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished), power supply to Capital area of Manipur interrupted.

Load loss: 28 MW in Manipur.

k. At **1158 Hrs on 14.03.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 24 MW in Manipur.

l. At **1115 Hrs on 19.03.16**, due to tripping of 132 kV Loktak- Ningthoukhong (MSPCL) **(Loktak- DP, ZI, Y-E and Ningthoukhong (MSPCL)- Earth Fault)** line, (132 kV Kakching- Kongba line & 132 kV Imphal(PG)- Ningthoukhong line kept open for system constraint), power supply to Ningthoukhong area of Manipur interrupted.

Load loss: 26 MW in Manipur.

m. At **1545 Hrs on 19.03.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 33 MW in Manipur.

n. At **0546 Hrs on 26.03.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 50 MW in Manipur.

o. At **1200 Hrs on 26.03.16**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Earth Fault & Imphal (MSPCL)- Not furnished),** power supply to Capital area of Manipur interrupted.

Load loss: 25 MW in Manipur.

p. At **1725 Hrs on 31.03.16**, due to tripping of 132 kV Loktak- Ningthoukhong (MSPCL) **(Loktak- Earth Fault and Ningthoukhong (MSPCL)- not Furnished)** line, (132 kV Kakching -Kongba line & 132 kV Imphal(PG)- Ningthoukhong line kept open for system constraint), power supply to Ningthoukhong area of Manipur interrupted.

Load loss: 35 MW in Manipur.

Category as per CEA Standards: GD-I

Deliberation in the Meeting:

DGM(AM), NERTS informed that for Imphal(PG)-Imphal(Man) line, settings for DP, EF/OC have been reduced to isolate from severe faults in Manipur system. He also suggested that R&M works need to be expedited. After detailed deliberation the Sub-Committee suggested the following:

1) Yurembam & Ningthoukong S/S R&M works to be checked and status reported by Expert Committee (NERLDC/NERTS/NERPC).

2) Expert Committee to draw up action plan for completion of balance activities.

3) After submission of report, NERTS will decide timeline for restoration of settings to normalcy.

The forum requested NERPC to write a letter to MD, MSPCL for this issue.

The Sub-committee noted as above.

Action: MSPCL, NERPC.

C. Disturbances in Arunachal Pradesh system (4 nos)

a. **At 2227 Hrs on 19.01.16,** 132 kV Ranganadi - Lekhi **(Ranganadi- No tripping and Lekhi- Earth Fault)** line tripped. Due to tripping of this element, Lekhi & Capital area of Arunachal Pradesh separated from rest of NER Grid and subsequently collapsed due to loss of infeed.
   Load loss: 48 MW in Arunachal Pradesh

b. **At 2234 Hrs on 21.01.16,** 132 kV Ranganadi - Lekhi **(Ranganadi- DP, Z1, R--E and Lekhi- Not furnished)** line tripped. Due to tripping of this element, Lekhi & Capital area of Arunachal Pradesh separated from rest of NER Grid and subsequently collapsed due to loss of infeed.

   Load loss: 41 MW in Arunachal Pradesh

c. **At 1650 Hrs on 24.02.16,** 132/33 kV 50 MVA ICT-I at Nirjuli **(Nirjuli (PG) – Residual Earth Fault)** tripped. Due to tripping of this element, Nirjuli area of Arunachal Pradesh separated from rest of NER Grid and subsequently collapsed due to loss of infeed.

   Load loss: 11 MW in Arunachal Pradesh

d. At 1209 Hrs on 16.03.16, 132 kV Balipara- Khupi **(Balipara – DP, ZI, R-Y-B and Khupi- No Tripping)** tripped. Due to tripping of this element, Khuupi area of Arunachal Pradesh separated from rest of NER Grid and subsequently collapsed due to loss of infeed.

Load loss: 18 MW in Arunachal Pradesh
Category as per CEA Standards: GD-I
Root Cause Analysis:
Remedial Measures:

Deliberation in the Meeting:

Regarding tripping of 132 kV RHEP-Lekhi on EF, the Sub-Group felt that since power flow on this feeder is radial; the EF relay at Lekhi should be made DEF (directional) towards Nirjuli/Itanagar. The Sub-Group also suggested that EF relay setting to be high set with low time delay (if possible) for speedy fault isolation. DGM(AM) NERTS informed that REF for ICT at Nirjuli operated due to improper phase connection of CTs, which has been rectified afterwards.

NEEPCO representative informed that AR for 132 kV RHEP-Lekhi at RHEP end would be completed by 15th June 2016.

The forum approved the above suggestions and recommended speedy implementation.

The Sub-committee noted as above.

Action: DoP Ar. Pradesh, NEEPCO.

D. Disturbances in Nagaland system (13 nos)

a. At 1019 Hrs 11.01.16, 132 kV Dimapur (PG) – Dimapur **(Line I: Dimapur (PG) - Over Current and Dimapur (DoP,Nagaland) – Not Furnished, Line II: Dimapur (PG) – General Trip and Dimapur (DoP, Nagaland) – No tripping)** I & II lines tripped. Due to tripping of this element, Dimapur area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 21 MW in Nagaland

b. At 2255 Hrs 12.01.16, 132 kV Dimapur (PG) - Kohima **(Dimapur (PG)- Earth Fault and Kohima-Not Furnished)** line tripped. Due to tripping of this element, Kohima (Capital) area of Nagaland separated from rest of NER Grid and subsequently collapsed due to load generation mismatch.

Load loss: 26 MW in Nagaland
Generation Loss: 12 MW in Nagaland (Likimro generation)

c. **At 2320 Hrs 12.01.16**, 132 kV Dimapur (PG) - Kohima **(Dimapur(PG)- Earth Fault and Kohima-Not Furnished)** line tripped. Due to tripping of this element, Kohima (Capital) area of Nagaland separated from rest of NER Grid and subsequently collapsed due to load generation mismatch.

Load loss: 21 MW in Nagaland
Generation Loss: 12 MW in Nagaland (Likimro generation)

d. **At 1243 Hrs 22.01.16**, 132 kV Dimapur (PG) - Kohima **(Dimapur (PG)- General Trip and Kohima-Not Furnished)** line tripped. Due to tripping of this element, Kohima (Capital) area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 16 MW in Nagaland

e. **At 2021 Hrs 08.02.16**, 132 kV Doyang – Mokokchung (NA) **(Doyang (NEEPCO) - DP, ZI, B-E and Mokokchung (NA)- Not Furnished)** line tripped (132 kV Mokokchung (NA)- Mokokchung (PG) I & II lines were under planned shutdown,132 kV Mokokchung (NA)- Mariani (AS) is under long outage & 66 kV Tuensang - Likimro line kept open for system requirement). Due to tripping of this element, Mokokchung area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 29 MW in Nagaland

f. **At 1714 Hrs 18.02.16**, 132 kV Doyang – Mokokchung (NA) **(Doyang (NEEPCO) – Over Current and Mokokchung (NA) - Over Current)** line tripped (132 kV Mokokchung (NA)-Mokokchung (PG) I & II lines were under planned shutdown,132 kV Mokokchung(NA)-Mariani(AS) is under long outage & 66 kV Tuengsang-Likimro line kept open for system requirement). Due to tripping of this element, Mokokchung area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 24 MW in Nagaland

g. **At 0038 Hrs 21.02.16**, 132 kV Doyang - Mokokchung(NA) **(Doyang (NEEPCO) – Directional Earth Fault and Mokokchung(NA) – Not Furnished)** line tripped (132 kV Mokokchung (NA)-Mokokchung (PG) I & II lines were under planned shutdown,132 kV Mokokchung(NA)-Mariani(AS) is under long outage & 66 kV Tuensang-Likimro line kept open for system requirement). Due to tripping of this

element, Mokokchung area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 19 MW in Nagaland

h. At 0515 Hrs 21.02.16, 132 kV Dimapur (PG) - Kohima **(Dimapur (PG)- DP, ZI, Y-E and Kohima-Not Furnished)** line tripped. Due to tripping of this element, Kohima (Capital) area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 14 MW in Nagaland

i. At 1008 Hrs 21.02.16, 132 kV Dimapur (PG) - Kohima **(Dimapur(PG)- DP, ZI, B-E and Kohima-Not Furnished)** line tripped. Due to tripping of this element, Kohima (Capital) area of Nagaland separated from rest of NER Grid and subsequently collapsed due to load generation mismatch.

Load loss: 22 MW in Nagaland
Generation Loss: 8 MW in Nagaland (Likimro generation)

j. At 1120 Hrs 21.02.16, 132 kV Dimapur (PG) – Dimapur **(Line I: Dimapur (PG) - Over Current and Dimapur (DoP,Nagaland) - Not Furnished Line II: Dimapur(PG) – General Trip and Dimapur (DoP,Nagaland) – Not Furnished)** I & II lines tripped. Due to tripping of this element, Dimapur area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 36 MW in Nagaland

k. At 1710 Hrs 21.02.16, 132 kV Dimapur (PG) - Kohima **(Dimapur(PG)- Not Furnished and Kohima-Not Furnished)** line tripped. Due to tripping of this element, Kohima (Capital) area of Nagaland separated from rest of NER Grid and subsequently collapsed due to load generation mismatch.

Load loss: 20 MW in Nagaland

l. At 0537 Hrs 31.03.16, 132 kV Dimapur (PG) - Kohima **(Dimapur(PG)- General Trip and Kohima-Not Furnished)** line tripped. Due to tripping of this element, Kohima (Capital) area of Nagaland separated from rest of NER Grid and subsequently collapsed due to load generation mismatch.

Load loss: 11 MW in Nagaland

m. At 0924 Hrs 31.03.16, 132 kV Dimapur (PG) - Kohima **(Dimapur(PG)- General Trip and Kohima-Not Furnished)** line tripped. Due to tripping of this element,

Kohima (Capital) area of Nagaland separated from rest of NER Grid and subsequently collapsed due to load generation mismatch.

Load loss: 14 MW in Nagaland
Category as per CEA Standards: GD-I
Root Cause Analysis:
Remedial Measures:

Deliberation in the Meeting:

After detailed deliberation the forum decided no proper analysis can be done unless details (relay flags, DR etc.) are submitted by DoP Nagaland. However forum suggested that vegetation clearance activities be taken up in earnest by DoP Nagaland to reduce the number of trippings. As no representative from DoP, Nagaland attended in the meeting, the issues could not be discussed in detail. The members expressed concern over non-representation of DoP, Nagaland to the sub-committee. The forum requested NERPC to write a letter to Chief Engineer, DoP, Nagaland for this issue.

Action: DoP Nagaland.

E. Disturbances in Mizoram system (5 nos)

a. **At 1420 Hrs 09.01.16**, 132 kV Aizwal - Kolasib **(Aizwal (PG) - Earth Fault and Kolasib – No Tripping)** line and 132 kV Badarpur - Kolasib **(Badarpur (PG)- DP, ZIII, R-E and Kolasib - No Tripping)** line tripped. Due to tripping of these elements, Kolasib area of Mizoram separated from rest of NER Grid and subsequently collapsed due to no source in this area.

   Load loss: 10 MW in Mizoram
   Generation Loss: 2 MW in Mizoram

b. **At 0205 Hrs 24.02.16**, 132 kV Aizwal - Zuangtui **(Aizwal (PG) - General Trip and Zuangtui – No Tripping)** line tripped. Due to tripping of this element, Zuangtui area of Mizoram separated from rest of NER Grid and subsequently collapsed due to no source in this area.

   Load loss: 19 MW in Mizoram

c. **At 1226 Hrs 14.03.16**, 132 kV Aizwal - Zuangtui **(Aizwal (PG) – DP, ZII, R-Y-B and Zuangtui – No Tripping)** line tripped. Due to tripping of this element, Zuangtui area of Mizoram separated from rest of NER Grid and subsequently collapsed due to no source in this area.

   Load loss: 30 MW in Mizoram

d. At 1606 Hrs 28.03.16, 132 kV Aizwal - Zuangtui **(Aizwal (PG) – DP, ZIII, R-E and Zuangtui – Not furnished)** line tripped. Due to tripping of this element, Zuangtui area of Mizoram separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 46 MW in Mizoram

e. At 1621 Hrs 31.03.16, 132 kV Aizwal - Kumarghat **(Aizwal (PG) – Not Furnished and Kumarghat- DP, ZII, Y-E),** 132 kV Aizwal - Kolasib **(Aizwal (PG) – DP, ZI, B-E and Kolasib – Not Furnished) and** 132 kV Aizwal – Jiribam **(Aizwal (PG) – DP, ZII, B-E and Jiribam- Not Furnished)** line tripped. Due to tripping of these elements, Mizoram system separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 40 MW in Mizoram
Category as per CEA Standards: GD-I
Root Cause Analysis:
Remedial Measures:

Deliberation in the Meeting:

After detailed deliberation the forum decided no proper analysis can be done unless details (no tripping, relay flags, DR etc.) are submitted by DoP Mizoram. However forum suggested that vegetation clearance activities be taken up in earnest by DoP Mizoram to reduce the number of trippings. As no representative from P&E Dept., Mizoram attended in the meeting, the trippings pertaining to Mizoram system could not be discussed in detail. The members expressed concern over non-representation of P&E Dept., Mizoram to the sub-committee. The forum requested NERPC to write a letter to Engineer in Chief, P&E Dept., Mizoram for this issue.

Action: DoP Mizoram.

F. Disturbances in Meghalaya system (11 nos)

a. At 1830 Hrs 29.01.16, 132 kV Agia (AEGCL) – Medipathar (MePTCL) **(Agia (AEGCL) – Not Furnished and Medipathar (MePTCL) -Not Furnished)** line tripped. Due to tripping of this element, Nangalbibra & Medipathar areas of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 15 MW in Meghalaya

b. At 1414 Hrs 27.02.16, 132 kV Khliehriat (PG) - Khliehriat (ME) I&II **(Line I: Khliehriat (PG) – DP, ZIII, Y-E and Khliehriat (ME) -Not Furnished, Line II:**

Khliehriat (PG) – DP, ZIII, Y-E and Khliehriat (ME) -Not Furnished) lines tripped. Due to tripping of these elements, Khliehriat area of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 51 MW in Meghalaya

c. **At 1254 Hrs 28.02.16**, 132 kV Khliehriat (PG) - Khliehriat (ME) I&II **(Line I: Khliehriat (PG) – DP, ZI, B-E and Khliehriat (ME) -Not Furnished, Line II: Khliehriat (PG) – DP, ZI, B-E and Khliehriat (ME) -Not Furnished)** lines tripped. Due to tripping of these elements, Khliehriat area of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 31 MW in Meghalaya

d. **At 1514 Hrs 28.02.16**, 132 kV Khliehriat (PG) - Khliehriat (ME) I&II **(Line I: Khliehriat (PG) – DP, ZI, R-Y-B and Khliehriat (ME) - DP, ZII, R-Y-B, Line I: Khliehriat (PG) – DP, ZI, R-Y-B and Khliehriat (ME) - DP, ZII, R-Y-B)** lines tripped. Due to tripping of these elements, Khliehriat area of Meghalaya separated from rest of NER Grid and subsequently collapsed due to load generation mismatch.

Load loss: 43 MW in Meghalaya
Generation loss: 5 MW in Meghalaya (Leshka Generation)

e. **At 1600 Hrs 28.02.16**, 132 kV Khliehriat (PG) - Khliehriat (ME) I&II **(Line I: Khliehriat (PG) – DP, ZIII, Y-E and Khliehriat (ME) -Not Furnished, Line II: Khliehriat (PG) – DP, ZIII, Y-E and Khliehriat (ME) -Not Furnished)** lines and 220 kV Agia -Azara (**Agia (AEGCL) – DP, ZI, Y-B-E and Azara (AEGCL) - DP, ZI, Y-B-E)** line tripped. Due to tripping of these elements, Khliehriat area of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 23 MW in Meghalaya

f. **At 0804 Hrs 04.03.16**, 132 kV Lumshong- Panchgram **(Lumshong – Earth Fault and Panchgram- Earth Fault)** line tripped. (132 kV Lumshnong - Khliehriat line kept open for system requirement) Due to tripping of these elements, Lumshong area of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 14 MW in Meghalaya

g. **At 1149 Hrs 19.03.16**, 132 kV Khliehriat (PG) - Khliehriat (ME) I&II **(Line I: Khliehriat (PG) – DP, ZIII, Y-E and Khliehriat (ME) –No tripping, Line II: Khliehriat (PG) – DP, ZIII, Y-E and Khliehriat (ME) –No tripping)** lines tripped. Due to tripping of these elements, Khliehriat area of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 45 MW in Meghalaya

h. **At 1229 Hrs 19.03.16**, 132 kV Khliehriat (PG) - Khliehriat (ME) I&II **(Line I: Khliehriat (PG) – DP, ZIII, R-Y-B and Khliehriat (ME) –No tripping, Line II: Khliehriat (PG) – DP, ZIII, R-Y-B and Khliehriat (ME) –No tripping)** lines tripped. Due to tripping of these elements, Khliehriat area of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 13 MW in Meghalaya

i. **At 0224 Hrs 28.03.16**, 132 kV Khliehriat (PG) - Khliehriat (ME) I&II **(Line I: Khliehriat (PG) – DP, ZI, R-Y-E and Khliehriat (ME) –No tripping, Line II: Khliehriat (PG) – DP, ZIII, R-Y-B and Khliehriat (ME) –No tripping)** lines tripped. Due to tripping of these elements, Khliehriat area of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 18 MW in Meghalaya

j. **At 2150 Hrs 30.03.16**, 132 kV Nangalbibra (MePTCL) – Medipathar (MePTCL) **(Nangalbibra(MePTCL)- DP,ZII, R-Y-B and Medipathar (MePTCL) –No Tripping)** line tripped. Due to tripping of this element, Nangalbibra & Medipathar areas of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 57 MW in Meghalaya

k. **At 0040 Hrs 31.03.16**, 132 kV Khliehriat (PG) - Khliehriat (ME) I&II **(Line I: Khliehriat (PG) – DP, ZI, Y-B-E and Khliehriat (ME) –Not Furnished, Line II: Khliehriat (PG) – DP, ZI, Y-B-E and Khliehriat (ME) –Not Furrnished)** lines tripped. Due to tripping of these elements, Khliehriat area of Meghalaya separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 12 MW in Meghalaya
Category as per CEA Standards: GD-I
Root Cause Analysis:
Remedial Measures:

Deliberation in the Meeting:

In the Sub-Group meeting after analysis of all tripping, it was emphasized that R&M works (mainly earthing) is of utmost importance. SE, MePTCL informed that:-

1) Earthing at Khliehriat S/S will be completed within one week.
2) Within one month numerical relay will be installed in all feeders emanating from Khliehriat S/Stn.
3) Earthing of Towers of all transmission lines of MePTCL will be checked.

DGM(AM), NERTS clarified that POWERGRID would review relay settings at Khliehriat(PG) once line 1&2 are completed.

He also informed that POWERGRID is in the process of installing Line LAs for 132kV Aizawl-Kumarghat, 132kV Badarpur-Kolasib, 132kV Khliehriat-Khandong and 132 kV Khandong- Haflong. S.E.(O), NERPC proposed that for all the state lines (Meghalaya in particular) for lightning prone zones; line LAs may be installed with funding from PSDF. All members agreed.

Action: MePTCL.

G. Disturbances in Pavoi, Depota, Gohpur, Lekhi and Khupi areas (Associated with Biswanath Charali) – Group of Areas (2 nos)

a. At 0213 Hrs 12.01.16, 400 kV Ranganadi- Biswanath Charali 1 **(Ranganadi (NEEPCO) – Over Voltage and Biswanath Charali (PG) – Direct Trip)** line tripped (400 kV Ranganadi- Biswanath Charali II was under shutdown from 22:01 Hrs on 11.01.2016). Due to tripping of this element, Ziro & Lekhi areas of Arunachal Pradesh area and Gohpur area of Assam separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 48 MW in Assam and Arunachal Pradesh

b. At 1440 Hrs 13.01.16, 400 kV Ranganadi- Biswanath Charali 1 **(Ranganadi (NEEPCO) – Over Voltage and Biswanath Charali (PG) – Direct Trip)** line tripped (400 kV Ranganadi- Biswanath Charali II was under shutdown from 22:01 Hrs on 11.01.2016). Due to tripping of this element, Ziro & Lekhi areas of Arunachal Pradesh area and Gohpur area of Assam separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 36 MW in Assam and Arunachal Pradesh

c. At 1834 Hrs 25.01.16, 132 kV Biswanath Charali - Pavoi I **(Biswanath Charali (PG) – No Tripping and Pavoi (AEGCL) – Not Furnished)** line, 132 kV Biswanath Charali -Pavoi II **(Biswanath Charali (PG) – Over Current and Pavoi (AEGCL) – Not Furnished)** line, 220/132 kV, 50 MVA ICT I at Balipara **(Balipara – Over Current)** and 50 MVA ICT II at Balipara **(Balipara – Over Current)** tripped. Due to tripping of these elements, Khupi area of Arunachal Pradesh area and Depota & Pavoi areas of Assam separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 183 MW in Assam and Arunachal Pradesh

d. At 2030 Hrs 25.01.16, 132 kV Biswanath Charali-Pavoi I **(Biswanath Charali (PG) – No Tripping and Pavoi (AEGCL) – Earth Fault)** line, 132 kV Biswanath Charali-Pavoi II **(Biswanath Charali (PG) – Directional Earth Fault and Pavoi (AEGCL) – Earth Fault)** line tripped . Due to tripping of these elements, Depota & Pavoi areas of Assam separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 80 MW in Assam
Category as per CEA Standards: GD-I
Root Cause Analysis:
Remedial Measures:

Deliberation in the Meeting:

After detailed deliberation it was analysed that for (a) & (b) proper reactive power compensation is required at BNC-HVDC S/Sn. And it is needed to expedite commissioning of 1 no. Bus Reactor at 400 kV Rangandi. For (c) & (d) forum suggested that vegetation clearance activities be taken up in earnest by AEGCL & DoP Ar. Pradesh to reduce the number of trippings.

Action: DoP Ar. Pradesh, AEGCL.

H. Disturbance in Bongaigaon Thermal Power Plant

a. At 1242 Hrs 02.03.16, 400 kV BgTPP- Bongaigaon I & II (BgTPP- Bus Bar Differential Protection and Bongaigaon- Direct Trip) lines tripped. BgTPP Unit I also tripped due to operation of Busbar differential protection. Due to tripping of these elements Bongaigaon Thermal Power Plant blackout.

Generation Loss: 151 MW in BgTPP
Category as per CEA Standards: GD-II
Root Cause Analysis:
Remedial Measures:

Deliberation in the Meeting:

The sub-committee requested NTPC to ensure that there is proper sharing of load and outgoing feeders between Main-I and Main-II buses (DMT bus scheme at 400 kV BgTPP). From this incident, it appears that both the feeders of 400 kV BgTPP (NTPC) – Bongaigaon I & II were on same bus, which got tripped due to operation of Bus-bar differential protection on one bus. NTPC was asked to check what was the bus-bar configuration at the time of disturbance.

NTPC representative agreed to revert back to the forum with details of fault (due to which bus bar differential operated).

Action: NTPC.

I. Tripping of Inter-Regional Lines

A. +/- 800 kV HVDC Biswanth Chariali – Agra:

a. **At 1254 Hrs on 02.01.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to very early Smoke detection from valve hall at Agra.

b. **At 0948 Hrs on 05.01.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to very early Smoke detection from valve hall at Agra.

c. **At 0735 Hrs on 06.01.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to valve cooling system problem at Agra end.

d. **At 0733 Hrs on 14.01.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line hand tripped (De-blocked) due to 765 kV Agra - Gwalior line tripping.

e. **At 0550 Hrs on 15.01.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to line fault at Agra End.

f. **At 0846 Hrs on 15.01.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to line fault at Agra End.

g. **At 2149 Hrs on 20.01.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to VESDA (Smoke Detection) at Agra End.

h. **At 1307 Hrs on 30.01.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to commutation failure at Agra End.

i. **At 0207 Hrs on 01.02.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to operation of Converter Transformer Differential protection.

j. **At 1647 Hrs on 15.03.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to DCDB E/F at Biswanath Chariali end.

k. **At 1826 Hrs on 31.03.2016,** Pole-I of +/- 800 kV HVDC Biswanth Chariali – Agra line tripped due to DC Line Fault

Deliberation in the Meeting:

DGM(AM), NERTS informed that gestating issues of +/-800kV HVDC are being sorted out particularly Smoke detection, cooling problems and it is expected that number of trippings would reduce over the time.

Action: POWERGRID.

B. 400 kV Bongaigaon – New Siliguri:

a. **At 2310 Hrs on 17.01.2016,** 400 kV Bongaigaon - New Siliguri II line tripped **(Bongaigaon: Over Voltage & New Siliguri: Not Furnished)**.
b. **At 2310 Hrs on 17.01.2016,** 400 kV Bongaigaon - New Siliguri IV line tripped **(Bongaigaon: DP, ZII, Y-B-E & New Siliguri: Not Furnished)**.
c. **At 1629 Hrs on 02.03.2016,** 400 kV Bongaigaon - New Siliguri I line tripped **(Bongaigaon: No tripping & New Siliguri: Direct Trip received)**
d. **At 1634 Hrs on 15.03.2016,** 400 kV Bongaigaon - New Siliguri II line tripped **(Bongaigaon: DP, ZII, B-E & New Siliguri: DP, ZI, B-E)**
e. **At 2052 Hrs on 27.03.2016,** 400 kV Bongaigaon - New Siliguri I line tripped **(Bongaigaon: DP, ZI, R-E & New Siliguri: DP, ZI, R-E)**

Deliberation in the Meeting:

In case (e) above, there was no operation of Auto-reclose even though both ends of the line detected fault on Zone-1. S.E.(O), NERPC informed that due to time constraint the above trippings could not be properly analysed by the Sub-group. The forum referred the above to the next Sub-group meeting.

Action: NERPC/NERLDC.

C. 220 kV Birpara – Salakati:

a. **At 1817 Hrs on 16.03.2016,** 220 kV Birpara- Salakati I & II line hand tripped during disturbance in ER, NER & Bhutan.
b. **At 2354 Hrs on 27.03.2016,** 220 kV Birpara- Salakati I line tripped **(Birpara: DP, ZI, Y-B-E & Salakati: DP, ZI, Y-B-E).**
c. **At 0852 Hrs on 28.03.2016,** 220 kV Birpara- Salakati I line tripped **(Birpara: DP, ZI, R-E & Salakati: DP, ZI, R-E).**
d. **At 1728 Hrs on 31.03.2016,** 220 kV Birpara- Salakati II line tripped **(Birpara: Not Furnished & Salakati: DP, ZII, B-E)**
e. **At 1935 Hrs on 31.03.2016,** 220 kV Birpara- Salakati I line tripped **(Birpara: Not Furnished & Salakati: DP, ZI, R-E)**

Deliberation in the Meeting:

S.E.(O), NERPC informed that due to time constraint the above trippings could not be properly analysed by the Sub-group. The forum referred the above to the next Sub-group meeting.

Action: NERPC/NERLDC.

J. Tripping of Generating Units

A. AGBPP:

a. **At 1153 Hrs on 06.01.2016,** Units # 2, 5, 9 of AGBPP tripped due to tripping of Gas Compressor-IV **(Generation Loss = 73 MW)**
b. **At 0434 Hrs on 11.01.2016,** Units # 5 of AGBPP tripped due to tripping of Gas Compressor-II **(Generation Loss = 45 MW)**
c. **At 0508 Hrs on 12.01.2016,** Units # 2&4 of AGBPP tripped due to tripping of Gas Compressor-II **(Generation Loss = 89 MW)**
d. **At 0635 Hrs on 13.01.2016,** Units # 2,3,4&8 of AGBPP tripped due to tripping of Gas Compressor-II **(Generation Loss = 144 MW)**
e. **At 0544 Hrs on 08.02.2016,** Unit # 4 of AGBPP tripped due to tripping of Gas Compressor-II **(Generation Loss = 31 MW)**
f. **At 1052 Hrs on 11.02.2016,** GTG I & STG I of AGBPP tripped due to Tripping of Gas Booster Compressor **(Generation Loss = 250 MW)**
g. **At 0155 Hrs on 26.02.2016,** Units # 1,2,3,7&8 of AGBPP tripped due to Tripping of Gas Compressor II **(Generation Loss = 111 MW)**
h. **At 0050 Hrs on 06.03.2016,** Units # 7&8 of AGBPP tripped due to tripping of Gas Compressor II **(Generation Loss = 33 MW)**

Deliberation in the Meeting:

NEEPCO informed that reasons of GC tripping(s) would be furnished by them at the earliest.

Action: NEEPCO.

B. AGTPP:

a. **At 0654 Hrs on 10.01.2016,** Units # 3 of AGTPP tripped due to Differential pressure high in inlet air filter **(Generation Loss = 14 MW)**
b. **At 0324 Hrs on 11.01.2016,** Units # 2 of AGTPP tripped due to Differential pressure high in inlet air filter **(Generation Loss = 13 MW)**

c. **At 1520 Hrs on 05.02.2016,** Unit # 3 of AGTPP tripped due to control system problem **(Generation Loss = 15 MW)**

d. **At 1914 Hrs on 05.02.2016,** STG II of AGTPP tripped due to high core temperature **(Generation Loss = 20 MW)**

e. **At 1128 Hrs on 15.02.2016,** STG I of AGTPP tripped due to tripping of operator console **(Generation Loss = 22 MW)**

f. **At 1901 Hrs on 03.03.2016,** STG II of AGTPP tripped due to operation of Rotor earth fault protection **(Generation Loss = 23 MW)**

g. **At 2340 Hrs on 03.03.2016,** Unit # 1 and STG-I of AGTPP tripped due to low control oil pressure **(Generation Loss = 34 MW)**

h. **At 1042 Hrs on 04.03.2016,** Unit # 1 of AGTPP tripped due to boiler problem **(Generation Loss = 20 MW)**

i. **At 2127 Hrs on 27.03.2016,** Unit # 3 of AGTPP tripped **(Generation Loss = 15 MW)**

j. **At 1031 Hrs on 28.03.2016,** Unit # 3 of AGTPP tripped due to problem in Control System **(Generation Loss = 4 MW)**

Deliberation in the Meeting:

NEEPCO informed that cause and rectification(s) done, if any, would be furnished by them at the earliest. The reason for these disturbances could be un-cleared fault in Tripura system. However, due to absence of any representative from TSECL, the matter could not be discussed in detail. The sub-committee expressed concern over non-participation of TSECL in PCC meetings inspite of repeated requests.

The forum requested NERPC to write a letter to CMD, TSECL for this issue.

Action: NEEPCO.

C. Loktak:

a. **At 1720 Hrs on 17.01.2016,** Units # 3 of Loktak tripped due to high Air temperature **(Generation Loss = 35 MW)**

b. **At 1715 Hrs on 08.03.2016,** Unit # 1 of Loktak tripped due to GBOC pump failure **(Generation Loss = 35 MW)**

Deliberation in the Meeting:

The forum viewed very seriously the absence of representative of NHPC and requested NHPC to kindly submit details of above trippings and remedial actions undertaken in this regard.

Action: NHPC.

D. Palatana:

a. At 1611 Hrs on 24.02.2016, GTG I &II and STG I&II of Palatana tripped due to LA puncture at Palatana **(Generation Loss = 491 MW)**

b. At 1702 Hrs on 31.03.2016, GTG I & II and STG I & II of Palatana tripped due to operation of Generator Protection **(Generation Loss = 534 MW)**

Deliberation in the Meeting:

OTPC representative informed that remedial actions have been undertaken and the trippings would not recur.

The Sub-Committee noted as above.

A.9 Tripping of Imphal #2 and Unit # 2 at Loktak Power Station on 01st Feb 2016:

Before Tripping (Date: 01st Feb 2016, Time: 14:30Hrs)

1. 132 kV Loktak -Jiribam # 2 Feeder was already under shut down from 08:21 Hrs (NERLDC Code:5198)

2. Unit # 2 of Loktak Power Station was running as per the schedule of NERLDC with an Ex-Bus transmitted Power of 34 MW.

3. The Power Flow at 14:30 Hrs at other feeders were as follow:

I. Loktak – Jiribam # 1 : 1.5 MW
II. Loktak – Imphal # 1 : 5.5 MW
III. Loktak – Imphal # 2 : 27.0 MW

Details of the events at the time of Tripping

1. At 14:43:46 Hrs, Carrier signal (CR) received in Loktak – Imphal # 2 feeder and on activation of Zone # 2 Fault in Phase A at a distance of 32.05 km, tripping command for Phase A was initiated from MICOM 442 Distance Protection Relay. At the same time Auto-enclosure command was also initiated and elapsed of dead time i.e. 1 Sec, Auto-recourse closed Pole-A of Circuit Breaker.

2. Again after some time (Approx 500 msec) Current of Phase-A started rising and once again Carried Signal was received in Loktak – Imphal # 2 feeder. After activation of Zone # 2 fault by MICOM Relay, it initiated 3 Phase tripping of Loktak - Imphal # 2 Feeder (Since the Auto-enclosure is configured for Single Phase Single Shot Only and also reclaim time is 25 sec).

3. After tripping of Loktak – Imphal # 2 feeder, only Loktak – Imphal - I and Loktak – Jiribam # 1 feeders were available at Loktak Power Station and both the feeders

were radially feeding with the load indicated above, it is therefore mismatching of Load and Generation occurred and tripped Unit # 2 at Loktak Power Station on 115% Over speed Protection.

4. After Tripping of unit and due to dead bus condition, Breaker of Loktak – Imphal-I and Loktak Jiribam - 1 was manually opened at 14:45 Hrs.

Details of Restoration and again Tripping:

1. At 15:30 Hrs Voltage was extended from Imphal Substation through Loktak – Imphal # 1 Feeder, accordingly Unit # 2 was synchronized with the grid at 15:31 Hrs and loaded 34 MW as per the schedule.
2. Suddenly at 15:50 Hrs, load was disconnected from Loktak – Imphal # 1 Feeder (As only one feeder was available at that time for power evacuation) and Unit # 2 tripped on 115% overspeed protection due to unavailability of feeder for power evacuation.
3. After tripping of Unit Dead Bus was observed at Loktak Power Station for One minute. After confirmation from Imphal substation, it was confirmed that the same was observed at their end due to tripping of other feeder.
4. Again Unit # 3 was started, synced with the grid at 16:01Hrs and loaded as per the schedule.

Deliberation in the Meeting:

The matter was not discussed due to absence of NHPC representative.

The Sub-Committee noted as above.

10. Multiple trippings in 400 kV Bongaigaon– Balipara corridor during 400 kV Bus-I shutdown at Balipara on 29.04.16:

During 400 kV Bus-I shutdown at Balipara on 29.04.16 the following trippings took place putting the grid in very vulnerable condition on two occasions. Only 400 kV Bongaigaon – Balipara Ckt-II remained in service. Restoration of these lines also took considerable time.

400 kV Bongaigaon – Balipara- III was under outage due to O/V

400 kV Bongaigaon – Balipara- I tripped at 09:23 Hrs and restored at 11:29 Hrs

400 kV Bongaigaon – Balipara- IV tripped at 09:41 Hrs and restored at 09:51 Hrs

400 kV Bongaigaon – Balipara- I tripped at 11:40 Hrs and could not be charged

400 kV Bongaigaon – Balipara- III taken in service at 1146 Hrs

400 kV Bongaigaon – Balipara- IV tripped at 11:40 Hrs and restored at 12:04 Hrs

Similar situation may happen at any time during major shutdown when system remains in depleted condition. In view of above it is requested to all concerned for taking extra care during critical shutdown and also ensures that Senior Executives remain in control room for managing contingent situations.

Deliberation in the Meeting:

During the meeting of sub-group consisting of representatives from NERTS, NERLDC, NERPC, MePTCL & NEEPCO on 03.05.2015, DGM(AM), NERTS indicated that multiple tripping of 400 kV Bongaigaon – Balipara lines occurred due to fault in DC system at 400 kV Balipara end, which led to mal-operation of protective system. However, exact location of DC fault could not be verified indicating the system could be prone to more such disturbances. The PCC sub-committee members requested NERTS to act on it to get the fault rectified, and take appropriate care to prevent such disturbances in future, which endanger security of whole of NER Grid.

The Sub-Committee noted as above.

A.11 Completion of activities within specified time as per directives of CERC vide order in Petition No. 113/MP/2014

As per order in Petition No. 113/MP/2014 of Hon'ble CERC, CERC directed to power utilities and organizations of NER to complete the activities within specified time/submit monthly reports as per provisions of IEGC & Grid Standards of CEA etc.

List of actions/activities/reports to be completed within specified time as per directives of CERC vide order in Petition No. 113/MP/2014 attached at **Annexure-11.**

During 41st PCC meeting, NERLDC requested all Power utilities and organizations of NER to send monthly status report of activities related to order in Petition No. 113/MP/2014 to NERPC & NERLDC.

No report has been received till date from any Power utilities of NER. Based on the report submitted by you, NERLDC & NERPC will submit report to Hon'ble CERC.

Deliberation in the Meeting:

All the utilities were once again requested to submit compliance status latest by 20.05.2016.

Action: All utilities as above.

A.12 Standardization of Disturbance Recorder Channels:

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

POWERGRID had standardized Disturbance Recorder Channels for lines, transformers & reactors.

The Sub-committee requested NERPC/NERLDC to circulate the above standardization to all constituents of NER for giving comments and suggestion by 24.07.15. NERLDC had sent this document to all constituents of NER for giving comments and suggestion by **24.07.15.**

Till date no comments has been received from any constituents. It is requested all constituents of NER to standardize Disturbance Recorder Channels at the earliest.

Deliberation in the Meeting:

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

Action: NTPC, All utilities as above.

A.13 Frequent voltage dips/tripping on 132 kV line to Umrangshu Plant of Calcom Cement :

During the months of Feb-April'2016 frequent voltage dips/tripping were recorded leading to production losses of client. Such voltage dips/tripping were not recorded until January, 2016.

Deliberation in the Meeting:

After detailed deliberation it was suggested that the exact reasons for voltage dip can be ascertained only after physical inspection at site. It was decided that joint team of

NERTS/AEGCL would visit the plant at a suitable date and submit report to the forum for further action.

Action: NERTS/AEGCL.

A.14 Submission of Grid Disturbance Report on monthly basis:

As per communication from NPC *vide. 5/GDR/NPC/CEA/2016 dtd. 25.01.2016* henceforward GD reports in given proforma **(Annexure - 14)** is required to be submitted on a monthly basis. All the constituents are requested to provide necessary data likewise in a timely manner.

This is for information please.

Additional agenda item:

A.15 Protection System in Tripura and its ramifications in NER grid:

During 40th PCC meeting, SE(O), NERPC stated that the main concern is the protection within Tripura system. As it is learnt that no primary protection system is in place in many of their important lines and any delayed tripping on their system may affect the power supply to Bangladesh. Further, he stated that the issue was brought to the notice of Tripura in many occasions but no positive response was made from Tripura side. After detailed deliberation, the Sub-committee requested NERPC to write letter to highest authority of Tripura with a copy to MoP in this regard.

In 41st PCC meeting, SE(O), NERPC informed the forum that intimation has already been given to Govt. of Tripura, however response in this regard is awaited. The forum viewed seriously the non participation of TSECL representative in PCC meetings of NERPC and requested that this matter to be raised in the next TCC/RPC meeting.

In 121st OCC meeting in agenda item No. D.23 NEEPCO had raised the matter of frequent tripping of AGTCCPP units “Instances of tripping AGTCCPP units in many occasions exists due to nu-cleared downstream disturbance in Tripura system”. This has resulted to heavy stress to the machines in addition to reduce the maintenance interval time. Tripura is requested to analyze the fault and rectify the same at the earliest." and in item No. D.15 NERLDC had raised the matter of disturbance in power supply to Bangladesh.

Deliberation in the Meeting:

As per deliberation of the Sub-Group for analysis of Grid Disturbances the following were suggested for improvement of the protection system in Tripura:-

1) Proper protection systems are required urgently for 132 kV Surjamaninagar, 132 kV Udaipur and 132 kV 79 Tilla (Agartala).

2) In response to TSECL representative's request for CTU help in relay settings at the above stations, NERTS suggested that the following may please be provided:

<A> Feeder details- Name of feeder, kV level, Circuit configuration [D/C or S/C], MVA level(Short Circuit level), % impedance, line length, type of conductor, shortest and longest line length at next station at same voltage level.

<B> ICT Details- % impedance, tap position.

<C> Existing connected relay details and relay settings.

<D> C.T. and P.T. ratio for all feeders.

The forum approved the above. Regarding generation interruption at Palatana GBPP it was suggested that to prevent ICT tripping in case of fault in Tripura system, settings of 132 kV Palatana-S M Nagar and 132 kV Palatana- Udaipur lines are to be changed by OTPC in co-ordination with settings at 132 kV S M Nagar and 132 kV Udaipur S/Sn. Members readily agreed to the suggestion.

DGM(AM), NERTS suggested that Protection Audit of Tripura Power System needs to be done and sent to MoP. The forum unanimously agreed and requested to NERPC to kindly initiate action in this regard.

During deliberation it is discussed that Tripura has to ensure physical existence and proper functioning of Main & Back Up Protective Relays for all the elements connected to 79, Tilla and Surjamani Grid Sub Station buses to avoid undesirable tripping of Main Grid Lines including Bangladesh Line during fault in Tripura System. Further, DGM (AM) suggested forming a group of protection experts from AEGCL, POWERGRID and OPTC to visit Sujamani and 79 Tilla Grid Sub Station for activation and implementation of correction setting to available healthy relays. Further, the same group will carry out Protection Audit of Tripura Power System and submit the recommendation for corrective measures to TSECL, for implementation in stipulated time frame, and NERPC, for monitoring on regular basis in OCC & PCC Meeting. However, in case of any delay in implementation matter will be referred to CERC / MoP. The forum unanimously agreed and requested to NERPC to kindly initiate action in this regard.

Summarization of Deliberation during the meeting in regard to Grid Disturbance and Analysis for Remedial Measures:

During the meeting DGM (AM), POWERGRID expressed concern on frequent tripping of lines in NER during the monsoon. There are many trippings of Grid Lines due downstream faults not cleared in Meghalaya, Manipur and Mizoram System. In order to arrest trippings it was emphasized that Tripping / Disturbance Analysis of all events to be carried out to identify the flaw in the system for further corrective measures. Accordingly, followings are decided:

1. Committee comprising of NERLDC, NERPC, POWERGRID will jointly analyse all trippings (upto GD – 3 Level) on regular basis and recommend the corrective measures. The committee will sit after every 15 trippings and complete the analysis with recommendations which will be placed to OCC & PCC Agenda for monitoring the implementation.
2. Committee comprising of NERLDC, NERPC, POWERGRID and concerned utilities will jointly analyse all major Grid Disturbances (GD – 4 & 5 Level) and recommend the corrective measures. The committee will sit immediately (within 2 days) on occurrence of the Disturbance and complete the analysis with recommendations which will be placed to OCC & PCC Agenda for monitoring the implementation.
3. The committee has to ensure implementation of Relay setting as per the recommendation of ***RAMAKRISHNA TASK FORCE*** throughout the region within one month.
4. All PCC Meeting will be conducted along with Technical Presentation Session to share the knowledge amongst the engineers of NER constituents. The presentation will be given by the engineers of all the utilities of NER and others, if any, on rotational basis.

Action: TSECL/NERTS/NERPC.

Date and Venue of next PCC

It is proposed to hold the 43rd PCC meeting of NERPC in the second week of July, 2016. The exact venue will be intimated in due course.

The meeting ended with thanks to the chair.

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Annexure-I

List of Participants in the 42nd PCC Meeting held on 06/05/2016

SN	Name & Designation	Organization	Contact No.
	No Representative	**Ar. Pradesh**	
1.	Sh. Mukut Natu, AGM/Protection	Assam	08761028185
2.	Ms. J. Devi, AM/Protection cell	Assam	08822798944
3.	Sh. A. Bhattacharjee, Dy.Mgr /Protection	Assam	09435332928
4.	Sh. Themcham Woleng, Manager	Manipur	08731000143
5.	Sh. Leivon Nilemthang, Asst. Manager	Manipur	08131032269
6.	Sh. B. Narry, AEE, MePTCL	Meghalaya	09089000911
7.	Sh. A.G. Tham, AEE, MePTCL	Meghalaya	09774664034
	No Representative	**Mizoram**	-
	No Representative	**Nagaland**	-
	No Representative	**Tripura**	-
8.	Sh. Amaresh Mallick, DGM (SO-II)	NERLDC	09436302720
9.	Sh. Rahul Chakrabarti, Sr. Engineer (SO-II)	NERLDC	09402507543
10.	Sh. B.K. Chakraborty, DGM (E)	NEEPCO	09436309730
11.	Sh. Prasenjit Phooban, DGM (E/M)	NEEPCO	09435380415
12.	Sh. P. Kanungo, DGM (AM)	PGCIL	09436302823
13.	Sh. Tapash Karmakar, AM (Elect.)	OTPC	09435239313
14.	Sh. Rakesh Kumar, GM (OS), ER-II HQ	NTPC	09431011344
15.	Sh. J. Bhattacharyya, AGM (EMD)	NTPC	09435720036
16.	Sh. S.K. Dutta, Manager	NTPC	09435026764
17.	Sh. Brijendra B.Singh, Dy. Manager	NLDC	-
18.	Sh. P.K. Mishra, MS	NERPC	-
19.	Sh. B. Lyngkhoi, Director/S.E (O)	NERPC	09436163419
20.	Sh. L.B. Muanthang, Director/SE (Prot.)	NERPC	-
21.	Sh. P.N. Sarkar, DD/Ex. Engineer	NERPC	09830027523
22.	Sh. S. Mukherjee, AD-I/AEE	NERPC	08794277306
23.	Sh. Shaishav Ranjan, AD-II/A.E	NERPC	08794276168

Annexure - I

Sl. No.	Line Details	Restoration Time	Remarks
1	132kV RC Nagar-Agartala-I	1225	Power extended to Tripura
2	400KV Bongaigaon-New Binaguri-IV	1230	
3	220kV BTPS –Salakati-II	1250	Power extended to Assam
4	400KV Bongaigaon-New Binaguri-I	1251	
5	400 KV D/C Misa-Balipara-I	1300	
6	400 KV D/C Balipara-Bongaigaon-I	1316	
7	132kV S/C Kumarghat-R.C.Nagar	1321	
8	220 KV S/C Balipara-Tezpur	1328	
9	220 KV D/C Misa-Dimapur-II	1333	
10	220kV BTPS –Salakati-I	1335	
11	132kV Dimapur-Dimapur-II	1345	
12	400 KV D/C Balipara-Bongaigaon-II	1333	
13	132 KV Balipara - Depota	1335	
14	132 KV S/C Aizwal-Kumarghat	1337	Power extended to Mizoram
15	132 KV S/C Aizwal - Zemabawk	1337	
16	220 KV D/C Misa-Samaguri-I	1339	
17	132 KV S/C Dimapur - Imphal	1340	
18	220 KV D/C Misa-Kopili - I	1340	
19	220 KV D/C Misa-Samaguri-II	1340	
20	132kV Surajmaninagar-Palatana-I	1342	Power extended to Palatana
21	132 KV S/C Khandong - Kopili -I	1344	
22	132kV Dimapur-Dimapur-II	1345	Power extended to Nagaland
23	132 KV S/C Loktak - Imphal-II	1346	
24	132 KV S/C Imphal - Imphal-I	1348	Power extended to Manipur
25	132 KV S/C Khandong - Kopili - II	1349	
26	132 KV S/C Khandong - Khliehriat-I	1351	
27	132 KV S/C Badarpur - Khliehriat	1353	
28	132KV S/C Badarpur - Badarpur	1355	Power extended to South Assam
29	400 KV D/C Misa-Balipara-II	1358	
30	400 KV D/C Misa- Mariani old	1406	
31	400KV D/C Balipara-BNC-II	1407	
32	132 KV Balipara - khupi	1411	Power extended to AP
33	132 KV S/C Khliehriat-Khliehriat-I	1413	Power extended to Meghalaya
34	400KV Bongaigaon-BTPS-II	1418	Power extended to NTPC
35	132 KV S/C Khandong - Khliehriat-II	1421	
36	132KV S/C Badarpur - Jiribam	1423	
37	132KV S/C Khandong - Haflong	1423	
38	132KV S/C Badarpur-Kolasib	1424	
39	220 KV D/C Misa-Kopili - II	1424	
40	220 KV Misa-Kopili-III.	1424	
41	132KV D/C Doyang - Dimapur-I	1430	
42	132KV BNC-Pavoi-II	1430	
43	132KV S/C Kolasib-Aizwal	1432	
44	132KV Silchar-Badarpur-I	1432	
45	132 KV S/C Jiribam - Aizwal	1433	
46	400KV D/C Balipara-BNC-III	1434	
47	132kV S/C Badarpur-Kumarghat	1441	
48	132KV Silchar-Imphal-I	1441	
49	132KV S/C Jiribam - Loktak-II	1443	
50	132KV Silchar-Srikona-I	1444	
51	400KV D/C BNC-Ranganadi-II	1449	
52	132KV BNC-Pavoi-I	1456	
53	132KV Silchar-P.K.Bari-I	1458	
54	132KV Silchar-Srikona-II	1459	
55	132KV S/C Ranganadi-Ziro	1500	
56	132 KV S/C Khliehriat-Khliehriat-I	1501	
57	132KV Silchar-Badarpur-II	1501	

58	400KV Bongaigaon-BTPS-I	1501	
59	132 KV S/C Imphal - Imphal-II	1502	
60	132KV Silchar-Pachgram	1502	
61	132KV Silchar-Durlavchhera	1504	
62	132KV Silchar-Imphal-II	1507	
63	220 KV D/C Misa-Dimapur-I	1510	
64	132KV Silchar-P.K.Bari-II	1510	
65	132 KV S/C Khliehriat-Khliehriat-II	1511	
66	132KV D/C Doyang - Dimapur-II	1515	
67	132KV S/C Nirjuli-Ranganadi	1517	
68	400KV Bongaigaon-Azara	1518	
69	132KV D/C RC Nagar-Agartala-II	1530	
70	132kV Surajmaninagar-Palatana-II	1532	
71	132KV S/C Gohpur - Nirjuli	1534	
72	400kkV Silchar-Azara	1534	
73	132 KV S/C Jiribam-Haflong	1540	
74	400KV Bongaigaon-Bynihat	1545	
75	132KV D/C RC Nagar-Agartala-I	1549	
76	400 KV D/C Misa- Mariani(new)	1606	
77	400 KV D/C Kathalguri-Mariani(new)	1615	
78	400KV Bongaigaon-New Binaguri-III	1640	
79	400kV Silchar-Palltana-I	1700	

Annexure – A.11

A meeting was held at NERLDC between NERPC, NERLDC and constituents of NER as per directive of Hon'ble CERC in response to Petition No. 113/MP/2014 on 29.12.14.

The constituents of NER agreed upon the following:

a. Testing of all existing relays and schemes within 2 months by all constituents to assess the healthiness of existing protective relays

b. Review of relay settings based on 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.

It is requested to power utilities of NER to intimate the latest status of the above activities.

Many of tripping of transmission & distribution lines occurred due to vegetation problem. Tripping of transmission & distribution lines can be reduced if bush/jungle cutting done regularly. It was observed that number of tripping of transmission & distribution lines increases during the period of monsoon.

Deliberation in the Meeting:

It was requested to all the constituents to send monthly status report of the activities decided during joint meeting among NERLDC, NERPC & constituents of NER on 29.12.14. It was suggested that proper patrolling are to be done after tripping any elements and patrolling reports are to be submitted by the concerned utility to NERLDC & NERPC. It was requested to all transmission utilities of NER for furnishing monthly report on trimming of trees.

The Sub-committee once again requested all the constituents to carry out the above suggestions as decided earlier for safety of the grid.

Action: All Power Utilities.

ANNEXURE-14

Grid Disturbance Report

Details of Grid Disturbance (GD) during the Month of (*Month and Year*), in _____Region							
Sl No.	Category of Grid Disturbance (GD-I to GD-V)	Affected Area	Time and Date of occurrence of Grid Disturbance	Time and Date of Restoration	Duration	Loss of generation / loss of load during the Grid Disturbance (MW)	Brief details of the event (pre fault and post fault system conditions)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Note:

Categorization of Grid Disturbance: Refer Regulation 11(2) of Central Electricity Authority (Grid Standard) Regulations, 2010
GD-I: - When less than ten per cent of the antecedent generation or load in a regional grid is lost.
GD-II:- When ten per cent to less than twenty percent of the antecedent generation or load in a regional grid is lost.
GD-III:- When twenty per cent. to less than thirty per cent. of the antecedent generation or load in a regional grid is lost.
GD-IV:- When thirty per cent. to less than forty per cent. of the antecedent generation or load in a regional grid is lost.
GD-V:- When forty per cent. or more of the antecedent generation or load in a regional grid is lost.