North Eastern Regional Power Committee

Agenda
For
38th PCC Sub-Committee Meeting

Time of meeting : 10:00 Hrs.

Date of meeting : 08th October, 2015 (Thursday)

Venue : "Hotel Nandan", Guwahati.

A. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF 37th MEETING OF PROTECTION SUB-COMMITTEE OF NERPC.

The minutes of 35th meeting of Protection Sub-committee held on 06th August, 2015 at Guwahati were circulated vide letter No. NERPC/SE (O)/PCC/2015/4520-4555 dated 28th August, 2015.

NEEPCO vide mail dated 29.09.2015 has made an observations & wanted to incorporate in Item A.1 as follows:

Recorded in Item A.1 "Implementation of 3-Phase Auto Reclosure scheme of Radially fed 132kV Lines associated with Ranganadi HEP Issue": NEEPCO informed that retrofitting of relay is required and within six months new relay will be installed. PGCIL agreed the proposal of forum to extend all help for programming of relay for implementation of 3 phase auto reclose scheme of this line.

To be Recorded in Item A.1: **"**PGCIL agreed the proposal of forum to extend the all help for programming of relay for implementation of 3-Phase auto reclose scheme of this line on existing EPAC 3000 Relay".

Further, NEEPCO requested to put in record regarding the extension of OPGW from Ranganadi to Nirjuli as discussed during the 37th PCC meeting.

The Sub-committee may kindly discuss and approve the above observations so that minutes of 37th PCCM of NERPC can be confirmed.

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 37th PCC meeting, the status is given as above.

NEEPCO/Ar. Pradesh/NERTS may kindly intimate the status.

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 - Halflong

b) 132kV Kopili – Khandong #1

After detailed deliberation in the 37th PCC meeting, it was once again agreed that joint inspection comprising of POWERGRID, NEEPCO and Assam will be carried out soon for carrier inter-trip signal between Halflong-Umrangso-Khandong.

NEEPCO, NERTS & Assam may kindly intimate the status.

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 37th PCC meeting is 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***	***Not submitted***	***By 16.09.2015***
AEGCL	*Yes (only checklist submitted)*	***Not submitted***	***By 16.09.2015***
MSPCL	*Submitted*	*Submitted*	***Details of Protection as per Task Force Format not submitted***
MePTCL	***Not submitted***	*Submitted*	***By 16.09.2015***
P&E Dept. Mizoram	***submitted***	***Submitted***	
DoP, Nagaland	*Yes (Kohima,Wokha, Meluri, Kiphire, Dimapur, Mokokchung)*	*Yes (Kohima,Wokha, Meluri,Kiphire, Dimapur, Mokokchung)*	
TSECL	***Not submitted***	***Not submitted***	***By 16.09.2015***
POWERGRID	***submitted***	***Submitted***	
NEEPCO	***Yes (AGBPP, RHEP, Kopili & Khandong)***	***Yes (RHEP, Khandong & Kopili)***	***By 16.09.2015***
NTPC	*Submitted*	***Not submitted***	***By 16.09.2015***
NHPC	***Not submitted***	***Not submitted***	***By 16.09.2015***
OTPC	*Submitted*	*Submitted*	

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 16.09.15 positively**.

Constituents/NERLDC may kindly intimate the status.

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.

Latest available status is enclosed at **Annexure - A.4.**

Constituents may kindly intimate the status.

A.5 Furnishing Protection Details of Transmission Lines, Transformers, Reactors and Bus Bars:

The status as intimated by NERLDC during 37th PCC meeting is as given below:

Status of submission of data related to Protection Systems as per CEA regulations

Sl No	Name of Constituent	Transmission Line	Transformers	Reactor	Bus-Bar & LBB	Bus Coupler	Remarks
1	**DoP, Arunachal Pradesh**	**Not submitted**	**Not submitted**	Not Applicable	**Not submitted**	**Not submitted**	***By 31.09.15***
2	**NEEPCO**	Submitted	Submitted	Submitted	Submitted	Submitted	Details of Khupi & Doyang ***By 31.09.15***
3	**NTPC**	**Not submitted**	**Not submitted**	Not Applicable	**Not submitted**	**Not submitted**	***By 31.09.15***

After detailed deliberation, the Sub-committee had decided that those who have not submitted the data related to Protection System as per CEA regulations are requested to furnish these data by **31.09.15 positively**. All constituents agreed.

Constituents/NERLDC may kindly intimate the status.

A.6 Installation of PLCC Panel and Commissioning of SPAR in Loktak – Ningthoukhong 132kV Feeder (MSPCL):

NHPC informed that keeping in view of Power Evacuation, Loktak – Ningthoukhong 132 kV Feeder (MSPCL) is very essential feeder for Loktak Power Station. Since No PLCC Panel has been installed in this feeder, therefore no SPAR (Single Pole Auto Reclosure) has been installed. It is well known that maximum nature of fault occurred in the feeders are temporary in nature.

In order to increase the reliability of this feeder, MSPCL is requested to install PLCC Panels at the both ends so that necessary SPAR can be commissioned.

During 37th PCC meeting, MSPCL informed that provision for installation of PLCC panels is included in R&M and within 30/11/2015 commissioning of PLCC panels will take place.

MSPCL may kindly intimate the status.

A.7 Implementation of 3-Ph Auto Reclosure in 132 kV Loktak-Jiribam, (PG):

NERTS informed that on every tripping of 132 kV Loktak-Jiribam (PG) line Auto Reclosure is successful from Loktak end but, at Jiribam (PG) end the CB is of gang (3 pole) operated. Accordingly, NHPC may implement 3-Ph Auto Reclosure with check sync at Loktak end with 1.40 sec dead time and Jiribam (PG) end dead line charging with 0.80 sec dead time.

During 37th PCC meeting, NHPC requested that OEM is to be called for relay configuration and testing so that smooth implementation can be carried out.

DGM (AM), NERTS stated that the same work has been carried out by them in many locations and the same will be implemented by themselves.

NHPC stated that they would revert back on the offer very soon.

NHPC may kindly intimate the current status.

A.8 Tripping of 132 kV Khliehriat- Khliehriat # I & II lines due to Meghalaya downstream faults 132 kV Khliehriat- Khandong # I circuit also tripping on O/C & E/F tripping (as reported by NERLDC).

NERTS informed that as per the DRs of Khliehriat SS no undesired delay is persisting at Khliehriat (PG) SS, moreover no tripping observed in other Khliehriat (PG) connected lines like 132 kV Kliehriat- Khandong 3 I, 132 kV Khliehriat- Badarpur. During last visit by Manager (AM) POWERGRID on 11.06.2015 to Khandong- Badarpur HEP, P442 (Distance protection) relay is having E/F settings of PSM: 0.2, TMS: 0.15, with the settings the relay is operating with in 200 to 300 mS time for Zone-2 fault (Zone-2 time delay is 500 mS) leading to frequent tripping of 132 kV Khliehriat- Khandong #I ckt at Khandong HEP only. Accordingly, the setting was revised to PSM: 0.2, TMS: 0.2 and the feeder did not trip in next Meghalaya downstream fault. But, similar trippings are taking place again in the same line.

During 37th PCC meeting, the Sub-committee requested Meghalaya to co-ordinate with POWERGRID so that settings made by them should be in line with POWERGRID end.

MePTCL & POWERGRID may intimate the status.

A.9 Frequent tripping of 132 kV Ranganadi- Lekhi, 132 kV Lekhi- Nirjuli lines on O/C & E/F observed and POWERGRID section of line no infringement observed still feeders are tripping regularly.

NERTS, POWERGRID informed that in order to avoid system interruption they always took lead to patrol DOP, Arunachal Pradesh line section and infringement observed, the same was communicated to NERPC vide e-mail dt: 14.07.2015. Further, it was also observed that, no distance protection is installed in the lines

and only O/C & E/F protection is installed to protect the lines. Whereas for 132 kV lines shall have 1 No Numerical distance protection and 1 No Back up protection. This is leading to frequent tripping of feeders and loss of load to Nirjuli area in Arunachal Pradesh.

During 37th PCC meeting, EE SLDC Ar. Pradesh informed 132 kV Ranganadi - Lekhi – Nirjuli – Gohpur line loading is maximum due to Assam load at Gohpur end. So curtailment of Ar. Pradesh load, which is around 35 MW is not possible. Assam informed that commissioning of Bishwanath Chariali – Pavoi is in progress and once the above line is completed, loading problem will be addressed. Forum requested Ar. Pradesh to install Numerical Relay as soon as possible.

The Sub-committee suggested that joint inspection by AEGCL, DOP, Ar. Pradesh and NERTS, POWERGRID has to be carried out between 20.09.2015 to 30.09.2015 and status should be intimated in the next PCC meeting.

DOP, Arunachal Pradesh, AEGCL & POWERGRID may kindly intimate the current status.

A.10 Non-operation of Single Phase Auto Reclosure Scheme at Byrnihat and Azara Sub-stations:

On 24.09.15 at 2236 Hrs, 400 kV Byrnihat-Silchar and 400kV Silchar-Azara line tripped on single phase fault at both ends. At Silchar end, auto recloser schemes for both the lines operated successfully but the same did not operate at Byrnihat and Azara ends resulting in failure of SPS 3 as well as created grid disturbance of GD-4 category. AEGCL & MeECL are requested to look into the matter urgently so that same is not repeated in future.

From the report of OTPC it is observed that the GTG tripped at a frequency which was much lower than the setting as intimated by them. It is apprehended that there was some mal-operation of relay and needs investigation & corrective actions.

Members may like to discuss.

A.11 Event Reports during time of Grid Disturbance/Incidents:

As per IEGC clause 5.2(r) all the Users, STU/SLDC and CTU should send information/data Including disturbance recorder/sequential event recorder output to RLDC within 24 hours for the purpose of analysis of any grid disturbance/event. But unfortunately many users are not submitting the same within the stipulated time resulting in delay in analysis of events.

All concerned are requested to please ensure sending of data/information as per stipulated time line. Moreover, it is also requested to the generators to furnish reports at the earliest in cases of system oscillations highlighting units' behavior for taking remedial measures.

Members may like to discuss.

A.11 Data Telemetry & Communication problem during grid disturbances:

It has been observed that during most of the cases of grid disturbances data telemetry & voice communications systems are very much affected resulting in non-availability of most of the SCADA data causing poor visibility of the existing grid as well as communication with many locations remain out causing difficulty in information sharing. As a result of these restoration becomes very difficult and causes avoidable delay. All concerned are requested to kind ensure data & voice communication without interruption for smooth & secure grid operation.

Members may like to discuss.

A.12 Review of SPS & Islanding Schemes:

In both the cases of major grid disturbances on 08/08/15 & 24/09/15, affecting southern part of NER grid, it is observed that neither SPS-3 nor Islanding scheme-2 operated. The schemes may be reviewed and modification of implementation schemes if required should done.

Members may like to discuss.

A.13 Grid Incidences during August, 2015:

The following numbers of Grid Disturbances (GD) occurred during the period **w.e.f 1st September, 2015 to 30th September, 2015** :-

Sl No	Control Area	Grid Disturbance in nos.	
		1st September, 2015 to 30th September, 2015	1st January, 2015 to 30th September, 2015
1	Palatana	1	7
2	AGBPP	0	1
3	AGTPP	2	8
4	Ranganadi	0	4
5	Kopili	0	2
6	Khandong	1	3
7	Doyang	0	5
8	Loktak	1	10
9	Arunachal Pradesh	11	69
10	Assam	13	69
11	Manipur	12	59
12	Meghalaya	8	42
13	Mizoram	3	13
14	Nagaland	7	31
15	Tripura	1	8

Sl No	Category of GD	Grid Disturbance in nos.	
		1st September, 2015 to 30th September, 2015	1st January, 2015 to 30th September, 2015
1	GD 1	46	197
2	GD 2	0	3
3	GD 3	0	1
4	GD 4	1	1
5	GD 5	0	1
	Total	47	203

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

A.14 Root cause analysis of tripping in Southern Part of NER on 08.08.2015 and 24.09.2015:

i. Disturbance on 08.08.15

The Southern part of NER Grid was connected to rest of NER Grid through vital links of 400 kV Silchar – Azara – Bongaigaon S/C and 400 kV Silchar – Byrnihat – Bongaigaon S/C and 132 kV Kopili – Khandong I & II lines and 132 kV Dimapur – Imphal line.

At **0019 Hr on 08/08/15,** 400 kV Silchar- Azara **(Silchar – DP, B-E, Z-2, 350.5 km, Azara – DP, Y-E ,Z-1, 64.2 km)** and 400 kV Silchar- Byrnihat **(Silchar – DP, B-E, Z-2, 239.2 km, Byrnihat – DP, B-E, Z-1, 16.18 km)** tripped. Due to the tripping of above two 400 kV lines, the power evacuation from southern part of NER grid shifted to 132 kV Khandong – Kopili D/C and 132 kV Dimapur - Imphal lines. At that time, Meghalaya was injecting around 100 MW to the grid at Khliehriat (PG) due to high generation at Leshka HPP. Due to high evacuation of power from southern part of the grid, both 132 kV Kopili - Khandong D/C and 132 kV Dimapur - Imphal lines tripped on over current.

After tripping of 400 kV Silchar-Azara**,** 400 kV Silchar- Byrnihat, SPS-3 related to reduction of generation from Palatana to 200 MW should have operated, but the SPS was not in service. After tripping of 132 kV Khandong – Kopili D/C and 132 kV Dimapur - Imphal lines southern part of NER grid comprising of Tripura, Mizoram, Manipur, South Assam, AGTPP, Loktak and Palatana system was isolated from rest of the main grid.

The frequency of the isolated system shoot upto 53.4 Hz (as reported by TSECL) resulting immediate tripping of STG II of Palatana, AGTPP and Tripura generation. Subsequently, during the black starting of AGTPP units, Palatana GTG II tripped causing frequency dip to 47 Hz of the isolated system and isolated system collapsed due to load –generation mismatch at 0031 Hrs on 08/08/15. After tripping of GTG II of Palatana SPS- 1 & 2 operated.

As reported by TSECL, there was UFR based load shedding to the tune of around 20 MW in 3 feeders at around 00:23 Hrs, as frequency was declining in the isolated part of NER Grid.

Load loss: 375 MW

Generation Loss: 863 MW

Category as per CEA Standards: GD-III

ii. Disturbance on 24.09.15

The Southern part of NER Grid was connected to rest of NER Grid through vital links of 400 kV Silchar – Azara – Bongaigaon S/C and 400 kV Silchar – Byrnihat – Bongaigaon S/C and 132 kV Kopili – Khandong I & II lines. 132 kV Dimapur – Imphal line was under shutdown since 1719 Hrs of 29.08.15 due landslide at loc No 325.

At **2236 Hr on 24.09.15,** 400 kV Silchar- Azara **(Silchar – DP, ZI, Y-E 279 km, A/R successful & Azara – DP, ZI, R-E, 259.1 km)** and 400 kV Silchar-Byrnihat **(Silchar – DP, ZI, Y-E, A/R successful & Byrnihat – DP, ZII, Y-E, 200.5 km)** tripped. Due to the tripping of above two 400 kV lines, the power evacuation from southern part of NER grid shifted to 132 kV Khandong – Kopili D/C lines. At that time, Meghalaya was injecting around 70 MW to the grid at Khliehriat (PG). Due to high evacuation of power from southern part of the grid, 132 kV Kopili - Khandong D/C lines tripped on over loading.

After tripping of 400 kV Silchar-Azara**,** 400 kV Silchar- Byrnihat, SPS-3 related to reduction of generation from Palatana to 200 MW should have operated, but the SPS was not in service. After tripping of 132 kV Khandong – Kopili D/C lines southern part of NER grid comprising of Tripura, Mizoram, Manipur, South Assam, AGTPP, Loktak and Palatana system was isolated from rest of the main grid.

The frequency of the isolated system shoot upto 51.16 Hz resulting immediate tripping of Palatana, AGTPP and Tripura generation. After that the system frequency of the island started declining vey sharply and finally collapsed due to load – generation mismatch.

As reported by TSECL and Mizoram, there was UFR based load shedding to the tune of around 42 MW in Tripura in different stages and 22 MW in 4 stages in Mizoram, as frequency was declining in the isolated part of NER Grid.

Load loss: 463 MW

Generation Loss: 770 MW

Category as per CEA Standards: GD-IV

Root Cause Analysis by sub group members at the meeting held at NERPC on 29.09.15:

The events of 08.08.15 and 24.09.15 are similar in nature and was caused by tripping of vital 400 kV links of 400 kV Silchar – Byrnihat and 400 kV Silchar – Azara lines, leading to overloading of other 132 kV critical corridors, tripping of these corridors resulting in system isolation and finally collapse on account of load-generation mismatch.

From the Disturbance Recorder outputs from Silchar substation and relay flags received from Silchar, it was observed that fault occurred at same instant on 400 kV Silchar – Byrnihat and 400 kV Silchar – Azara lines on the same phase (B-phase in incident of 08.08.15 and Y-phase in incident on 24.09.15). Since after patrolling, no instance of infringement or any physical fault could be found, it was arrived at after discussion amongst NERPC, NERLDC, NERTS, MePTCL that the fault may have occurred on account of lightning.

In the case of 08.08.15, Autoreclose failed to operate at either of Silchar (PG), Azara (AEGCL) or Byrnihat (MePTCL) ends, and in the case of 24.09.15, although Auto-reclose operated successfully at Silchar end for both the lines, the same failed to operate at Azara (AEGCL) and Byrnihat (MePTCL) ends. Successful operation of Auto-reclose at both ends of lines could have saved at least one line and prevented the system isolation, considering faults due to lightning are transient in nature.

Also, in both cases, SPS-3 did not operate which could have backed down Palatana generation in the isolated system and prevented overloading of critical 132 kV lines and allow the system operator to take appropriate action.

In both the cases of 08.08.15 and 24.09.15, the islanding of AGTPP (NEEPCO) generation with loads & generation in Tripura system failed to occur successfully. It was checked from PMU plots of frequency at Agartala (TSECL) bus, that in case of event on 08.08.15, the frequency of isolated Southern part of NER Grid touched 48.8 Hz at 00:31:03.520 Hrs and remained at around 48.8 Hz till 00:31:32.920 Hrs (duration of 29.4 seconds). Again in the case of 24.09.15, the frequency of isolated Southern part of NER grid touched 48.8 Hz at 22:36:00.080 Hrs and after 500 milli-seconds, the frequency touched 48.511 Hz.

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

The autoreclose schemes at Azara (AEGCL) and Byrnihat (MePTCL) are to be checked at the earliest so as to prevent tripping of 400 kV Silchar – Azara and 400 kV Silchar – Byrnihat lines in case of transient fault.

It was decided that till restoration of Autoreclosure at Azara and Byrnihat ends of 400 kV Silchar – Azara and 400 kV Silchar – Byrnihat lines, the Autoreclosure at Silchar ends are to be kept in non-Auto mode so that tripping signal to SPS-3 related to generation reduction of Palatana upon tripping of 400 kV Silchar – Byrnihat and 400 kV Silchar – Azara lines is generated in case of such events.

It was decided that tower footing resistance of 400 kV Silchar – Azara and 400 kV Silchar – Byrnihat lines are to be brought within permissible limits at around 10 towers on either side close to location of faults and Tower top patrolling around 10 towers on either side close to the location of faults are to be carried out.

From the relay flags received from Azara for 400 kV Silchar – Azara line, it was seen that fault was shown on a different phase than Silchar or Byrnihat ends. This indicates a possibility of relay configuration problem at Azara end, which is to be checked in joint inspection with AEGCL and NERTS.

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.

NETC, NERTS, MePTCL, AEGCL, OTPC may further elaborate.

iii. <u>Disturbance in Meghalaya System.</u>

i. **At 1247 Hrs on 10.09.15,** 132 kV Khliehriat (PG) - Khliehriat (MePTCL) I & II lines **(**Line 1: **Khliehriat (PG) - DP, ZIII, R-Y-B & Khliehriat (MePTCL)- No tripping** and Line 2: **Khliehriat (PG) - DP, ZIII, R-Y-B & Khliehriat (MePTCL)- No tripping)** tripped. 132 kV Khlehriat (PG)- Khandong (PG)- I **(Khliehriat(PG)- No tripping & Khandong(PG)- Earth Fault)** also tripped.

   Load loss: 26 MW in Meghalaya

ii. **At 1522 Hrs on 16.09.15,** 132 kV Khliehriat (PG) - Khliehriat (MePTCL) I & II lines **(**Line 1: **Khliehriat (PG) - DP, ZIII, Y-E & Khliehriat (MePTCL)- No tripping** and Line 2: **Khliehriat (PG) - DP, ZII, Y-E & Khliehriat (MePTCL)- No tripping)** tripped. There was also tripping of Leshka Units.

   Load loss: 50 MW in Meghalaya
   Generation Loss: 70 MW in Meghalaya (Leshka)

iii. **At 1020 Hrs on 18.09.15,** 132 kV Khliehriat (PG) - Khliehriat (MePTCL) I & II lines **(**Line 1: **Khliehriat (PG) - DP, ZIII, B-E & Khliehriat (MePTCL)- No tripping** and Line 2: **Khliehriat (PG) - DP, ZII, B-E & Khliehriat (MePTCL)- No tripping)** tripped.

   Load loss: 44 MW in Meghalaya

iv. **At 1120 Hrs on 19.09.15,** 132 kV Khliehriat (PG) - Khliehriat (MePTCL) I & II lines **(**Line 1: **Khliehriat (PG) - DP, ZIII, R-E & Khliehriat (MePTCL)- No tripping** and Line 2: **Khliehriat (PG) - DP, ZII, R-E & Khliehriat (MePTCL)- No tripping)** tripped. There was also tripping of Leshka Units.

   Load loss: 64 MW in Meghalaya
   Generation Loss: 121 MW in Meghalaya (Leshka)

v. **At 2349 Hrs on 23.09.15,** 132 kV Khliehriat (PG) - Khliehriat (MePTCL) I & II lines **(**Line 1: **Khliehriat (PG) - DP, ZIII, B-E & Khliehriat (MePTCL)- No tripping** and Line 2: **Khliehriat (PG) - DP, ZIII, R-Y-B & Khliehriat (MePTCL)- No tripping)** tripped. There was also tripping of Leshka Units.

Load loss: 58 MW in Meghalaya
Generation Loss: 121 MW in Meghalaya (Leshka)

vi. **At 1449 Hrs on 30.09.15,** 132 kV Khliehriat (PG) - Khliehriat (MePTCL) I & II lines **(**Line 1: **Khliehriat (PG) – DP, ZIII, Y-B-E & Khliehriat (MePTCL)- No tripping** and Line 2: **Khliehriat (PG) - DP, ZIII, Y-B-E & Khliehriat (MePTCL)- No tripping)** tripped. There was also tripping of Leshka Units.

Load loss: 74 MW in Meghalaya
Generation Loss: 109 MW in Meghalaya (Leshka)

Category as per CEA Standards: GD-I

Root Cause Analysis by sub group members at the meeting held at NERPC on 29.09.15

It has been observed from above events that there were no tripping at Khliehriat (MePTCL) and fault were cleared by 132 kV Khliehriat (PG) - Khliehriat (MePTCL) I & II lines at Khliehriat (PG) on Zone II & Zone III / by relays at Khandong end. It means that fault persisted in downstream area of Meghalaya system from Khliehriat (MePTCL).

As informed by MePTCL, distance protection relays at Khliehriat (MePTCL) end are absent as of now. In such case, the fault gets picked up by distance relays at Khliehriat (PG) end and Khandong (NEEPCO) end resulting in undesirable tripping.

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

The distance relays at Khliehriat (MePTCL) end are to be restored to take care of faults within Meghalaya system.

Till such time the distance relays at Khliehriat (MePTCL) end are restored, the reach of Zone-1 of Distance Protection relays at Khliehriat (PG) end of 132 kV Khliehriat (PG) – Khliehriat (MePTCL) D/C lines would be increased by NERTS so as to cover faults in Meghalaya system also and prevent widespread tripping.

The setting of Distance Protection relays at Khandong (reach and time delay) would be checked by NEEPCO in consultation with NERTS, POWERGRID to prevent unwanted tripping.

Many of the faults in Khliehriat area of Meghalaya may have occurred on account of line infringement due to vegetation problem. Line section patrolling to check for line infringements due to vegetation problem are to be carried out by MePTCL and vegetation clearing done on regular basis till the Distance Protection relays at Khliehriat (MePTCL) are restored.

MePTCL, MePGCL, NEEPCO & NERTS, POWERGRID may elaborate

A.15 Root cause analysis of tripping during September, 2015:

A. Disturbance in Manipur System:

a. At **0924 Hrs on 02.09.15**, 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: 78 MW in Manipur.

b. At **1300 Hrs on 08.09.15**, 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.

c. At **1424 Hrs on 17.09.15**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- No triiping & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- No tripping & Imphal (MSPCL)- Not Furnished)** power supply to Capital area of Manipur interrupted. 132 kV Loktak- Imphal(PG) **(Loktak-DP, ZII,B-E & Imphal (PG)- No tripping)**, 132 kV Silchar- Imphal(PG) I & II line **(Line 1- Silchar- DP, ZII, B-E & Imphal (PG)- No Tripping and Line 2- Silchar- DP, ZII, B-E & Imphal (PG)- No Tripping)** also tripped.

Load loss: 55 MW in Manipur.

d. At **1523 Hrs on 17.09.15**, 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: 15 MW in Manipur.

e. At **0950 Hrs on 18.09.15**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- Over current & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- Over current & Imphal (MSPCL)- Not Furnished)** power supply to Capital area of Manipur interrupted.

Load loss: 27 MW in Manipur.

f. At **1244 Hrs on 19.09.15**, due to tripping of 132 kV Imphal (PG)- Imphal (MSPCL) I & II lines **(Line 1: Imphal (PG)- DP, ZIII, B-E & Imphal (MSPCL)- Not Furnished and Line 2: Imphal (PG)- DP, ZIII, B-E & Imphal (MSPCL)- Not Furnished)** power supply to Capital area of Manipur interrupted.

Load loss: 26 MW in Manipur.

g. At **1837 Hrs on 20.09.15**, 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: 63 MW in Manipur.

h. At **1621 Hrs on 29.09.15**, 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: 49 MW in Manipur.

Category as per CEA Standards: GD-I

NHPC, MSPCL, & NERTS, POWERGRID may elaborate the incidences.

B. <u>Disturbance in Capital Area of Ar. Pradesh and Gohpur Area of Assam.</u>

a. At 1014 Hrs on 10.09.15, 132 kV Lekhi- Nirjuli **(Lekhi- DP, ZI, B-E & Nirjuli- Not furnished)** line tripped. Due to tripping of this element, Nirjuli area of Arunachal Pradesh and Gohpur area of Assam separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 45 MW in Arunachal Pradesh & Assam

b. At 0318 Hrs on 11.09.15, 132 kV Ranganadi- Lekhi **(Ranganadi- Earth Fault & Lekhi- No tripping),** 132 kV Lekhi- Nirjuli **(Lekhi- DP, ZIII, R-Y-B & Nirjuli- No tripping) and** 132 kV Gohpur- Nirjuli **(Gohpur- DP, ZII, R-Y-B & Nirjuli- No tripping)** lines tripped. Due to tripping of this element, Lekhi & Nirjuli area of Arunachal Pradesh and Gohpur area of Assam separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 35 MW in Arunachal Pradesh & Assam

c. At 1915 Hrs on 11.09.15, 132 kV Ranganadi- Lekhi **(Ranganadi- No tripping & Lekhi- Earth fault)** line tripped. Due to tripping of this element, Lekhi & Nirjuli area of Arunachal Pradesh and Gohpur area of Assam separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 76 MW in Arunachal Pradesh & Assam

d. At 1733 Hrs on 19.09.15, 132 kV Ranganadi- Lekhi **(Ranganadi- Earth Fault & Lekhi- No tripping)** line tripped. Due to tripping of this element, Lekhi & Nirjuli area of Arunachal Pradesh and Gohpur area of Assam separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 70 MW in Arunachal Pradesh & Assam

Category as per CEA Standards: GD-I

AEGCL, DoP, Arunachal Pradesh & NERTS, POWERGRID may elaborate.

C. Disturbance in Nagaland system:

a. **At 0845 Hrs on 02.09.15,** 132 kV Dimapur(PG)- Kohima **(Dimapur(PG)- DP, ZI, Y-B-E & Kohima- No tripping)** line tripped. Due to tripping of this element, Capital area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 13 MW in Nagaland

b. **At 1903 Hrs on 13.09.15,** 132 kV Dimapur(PG)- Kohima **(Dimapur(PG)- Not furnished & Kohima- No tripping)** line tripped. Due to tripping of this element, Capital 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

c. **At 1545 Hrs on 14.09.15,** 132 kV Dimapur(PG)- Kohima **(Dimapur(PG)- Over current & Kohima- No tripping)** line tripped. Due to tripping of this element, Capital area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 22 MW in Nagaland

d. **At 1450 Hrs on 14.09.15,** 132 kV Dimapur(PG)- Dimapur(Nagaland) I & II **(Line 1: Dimapur(PG)- Over current & Dimapur(Nagaland)- Not furnished and Line 2: Dimapur(PG)- Over current & Dimapur(Nagaland)- Not furnished)** line 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: 56 MW in Nagaland

e. **At 0822 Hrs on 16.09.15,** 132 kV Dimapur(PG)- Kohima **(Dimapur(PG)- DP, ZI, B-E & Kohima- No tripping)** line tripped. Due to tripping of this element, Capital 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

f. **At 1455 Hrs on 25.09.15,** 132 kV Dimapur(PG)- Kohima **(Dimapur(PG)- Not Furnished & Kohima- No tripping)** line tripped. Due to tripping of this element, Capital area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 13 MW in Nagaland

g. **At 0435 Hrs on 29.09.15,** 132 kV Dimapur(PG)- Kohima **(Dimapur(PG)- DP, ZI, R-E & Kohima- No tripping)** line tripped. Due to tripping of this element, Capital area of Nagaland separated from rest of NER Grid and subsequently collapsed due to no source in this area.

Load loss: 7 MW in Nagaland

Category as per CEA Standards: GD-I

DoP, Nagaland & NERTS, POWERGRID may elaborate.

A.16 Standardization of Disturbance Recorder Channels:

Disturbance Recorders on Transmission elements are necessary for post disturbance analysis, and identification & rectification of any protection mal-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.

A set of Standards for Disturbance Recorder channels were prepared by CC, POWERGRID and circulated by DGM (AM), NERTS to NERPC/NERLDC. The set of standards were further circulated by NERLDC to all constituents of NER after 35th PCC meeting for comments by **24.07.2015**. However, no comments have been received till date.

Members may like to discuss.

It is proposed to hold the 39th PCC meeting of NERPC on first week of November, 2015. The exact venue will be intimated in due course.

****

Annexure – A.4

Rs. In Crore.

State	Name of Entity	Status	Funding Sought by Entity	Quantum of funding approved by Appraisal Committee (AC)	Quantum of funding approved by Monitoring Committee (MC)	Remarks/Actions taken by the States
Ar. Pradesh	DoP, AP	DPR submitted to CEA/NLDC- under examination of CEA – now it will be taken up in next meeting of the techno-economic sub-group	33.45	-	-	-
Assam	AEGCL	Scheme already approved by Monitoring Committee – MoP sanctioned awaited	382.48	299.37	299.37	NIT has already been called/published
Manipur	MSPCL	DPR submitted to CEA/NLDC- under examination of CEA – now it will be taken up in next meeting of the techno-economic sub-group	66.58	-	-	-
Meghalaya	Me. PTCL	Scheme already approved by Appraisal Committee & approval by Monitoring Committee is awaited	102.8	69.19 and recommended to MC	69.19	NIT has already been called/published
	Me. PGCL	DPR submitted to CEA/NLDC- under examination of CEA – now it will be taken up in next meeting of the techno-economic sub-group	48.16	32.43	32.13	NIT is in progress and will be called/published soon
Mizoram	DoP, Mizoram	Revised DPR submitted to CEA/NLDC- under examination of CEA – now it will be taken up in next meeting of the techno-economic sub-group	31.38	-	-	-
Nagaland	DoP, Nagaland	Scheme already approved by Monitoring Committee – MoP sanctioned awaited	39.96	39.96	39.96	NIT is in progress and will be called/published soon
Tripura	TSECL	Revised DPR submitted to CEA/NLDC- under examination of CEA – now it will be taken up in next meeting of the techno-economic sub-group	34.26	35.51	35.51	NIT is in progress and will be called/published soon