

North Eastern Regional Power Committee

MINUTES OF THE 14th PROTECTION COORDINATION SUB-COMMITTEE MEETING OF NERPC

Date: 04.10.2013 (Friday)

Time: 13:30 Hrs.

Venue: "Hotel Grand Starline," Guwahati.

The List of Participants in the 14th PCC Meeting is attached at **Annexure – I**

The meeting was started after the 90th OCC meeting. Member Secretary I/C requested Shri B. Lyngkhoi, SE (O), NERPC to take up the agenda items for discussion.

A. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF 13th MEETING OF PROTECTION SUB-COMMITTEE OF NERPC.

SE (O), informed that the minutes of the 13th meeting of the PCC held on 13th September, 2013 at Shillong were circulated vide letter No. NERPC/SE (O)/PCC/2013/5229-58 dated 18th September, 2013.

No comments or observations were received from any of the constituents, the minutes of 13th PCC meeting was confirmed.

ITEMS FOR DISCUSSION

B. FOLLOW UP ACTION

B.1. Independent third party audit of protection system

The protection audit of the substations / generating stations in NER was completed in February, 2013 and subsequently Detailed Project Report (DPR) was submitted to CEA in June, 2013. The estimated cost projected in the DPR for rectification / renovations of substations / generating stations of seven states of the region is about Rs. 816 crores. He also highlighted about the discussion in 2nd NPC meeting held at Delhi on July 16, 2013 regarding funding from PSDF for renovation & up-gradation of substations and generating station in NER. During the meeting CEA had informed that Min. of Power has been requested for considering 20% funding from PSDF. It was also made clear that the funding for entire amount, projected in the DPR will not be available and states should take up renovation & up-gradation of protection systems without waiting for funds from the center. The fund accumulated in PSDF from NER is only about Rs. 110 crores. The rectification / renovations work proposed in DPR cannot be taken up with this nominal fund.

During the 14th TCC meeting, the issue had been discussed in detailed. The committee decided that the states should plan to take up renovation & up-gradation of protection systems at the earliest without waiting for funding from PSDF. Since constituents are not in a position to finalize the funding pattern, the committee requested NERPC, on behalf of the region, to take up the matter with Ministry of Power and DoNER for funding from Non-Lapsable Central Pool Resources (NLCPR) – Central.

During 89th OCC meeting, SE (O) stated that consolidated project proposal for funding through NLCPR (Central) are to be prepared for taking up renovation/rectification works. The proposal is to be submitted on behalf of the region to MoP with copy to DoNER. The upgradation/ renovations of substations / generating stations are essential for safety, security and reliable operation of the system. Initiative should be taken for taking up rectification work at the earliest without waiting for funding.

Deliberation of the Committee

SE (O) stated that NERPC will help in preparation of the project proposal for funding through NLCPR (Central) for taking up renovation/rectification works. The proposal is to be submitted by each constituent state to Ministry of Power with copy to DoNER. However, a consolidated project proposal for funding through NLCPR (Central) for taking up renovation/rectification works will also be submitted to Ministry of Power with copy to DoNER through Chairman, NERPC & Hon'ble Minister of Power, Govt. of Tripura. The up-gradation/ renovations of substations / generating stations are essential for safety, security and reliable operation of the system. Initiative should be taken for taking up rectification work at the earliest without waiting for funding.

The Sub-committee noted as above.

B.2. Standardization of Protection Scheme for Generating stations in NER:

During 13th PCC meeting, the Sub-committee had also suggested that Generator protection Philosophy including protection for Generator Transformer (GT), Unit Auxiliary Transformer (UAT), Station Auxiliary Transformer (SAT), Excitation Transformers should also be prepared and requested all the Central sector and State sector Generating companies in NER (NEEPCO, NHPC, NTPC & OTPC; Assam, Meghalaya, Tripura) to furnish their practices at the earliest so that Draft can be prepared for discussion in the next PCC meeting. ***All Central sector and State Sector generating companies agreed to furnish the information.***

Deliberation of the Committee

The following Protection Philosophy for Generator [Hydro / Thermal (Coal / Gas based) Generator], Generator Transformer (GT), Unit Auxiliary Transformer (UAT), Station Auxiliary Transformer (SAT) / Station Supply Transformer (SST), Excitation Transformer was circulated to constituents of NER:

A: GENERATOR PROTECTION

SN	Protection	Purpose of Protection and Setting
1	Generator Differential Protection (87G)	Generator Differential Protection is provided for internal short circuit fault in generator. Trip
2	95% Stator Earth Fault Protection (64G1) for Unit size less than 100MW	Stator Earth Fault protection is provided for stator phase to earth fault. This protection is limited to approximately 95% of the stator winding. Trip Time delay: 0.3 to 0.5 Secs.
3	100% Stator Earth Fault Protection (64G2) for Unit size 100MW & above	Stator Earth Fault protection is provided for stator phase to earth fault. This protection covers the whole stator winding and the generator neutral. Trip Time delay: 2.0 Secs.
4	Negative Phase Sequence Protection(46G)	Negative Phase Sequence (NPS) protection current can appear due to unbalanced single phase loads or transmission line unsymmetrical faults. This protection safeguards the generator rotor against overheating. The relay should be set to the NPS capability of the generator. Time delay for Alarm at 50% of continuous withstands capability of the machine: 3 sec.
5	Low forward Power (for thermal machines) / Reverse Power Protection (for hydro machines) (32G / 37G) [To be duplicated for large generators]	Low forward Power (for thermal machines) / Reverse Power Protection (for hydro machines) is provided to prevent motor mode of operation. Trip
6	Loss of field Excitation Protection (40G) [To be duplicated for Unit size of 500MW and above]	Loss of Excitation protection is provided to prevent synchronous generator to act as an induction generator. Trip
7	Over Voltage Protection (59G)	Over Voltage provides protection against over voltage on the terminals of the generator, which can damage the insulation. Stage # I: $V_{S1} = 1.15 \times V_n$ & $T_{S1} = 10\text{Secs.}$ Stage # II: $V_{S2} = 1.3 \times V_n$ & $T_{S2} = 0.5 \text{ Secs.}$
8	Generator Over Load Protection (for Hydro	Generator Over load protection is provided as an additional check of the stator winding temperature.

	machines) (51G)	Alarm Time delay: 2.5 to 25 Secs.
9	Generator Over Fluxing Protection (99G) [To be duplicated for Unit size of 500MW and above]	Generator Over Fluxing Protection provides protection against operation at flux densities which may cause accumulative damage to the core. Trip with time delay
10	Generator Under frequency Protection (81G)	Generator Under Fluxing Protection prevents generator from operating for long time at reduced frequency. Alarm Time delay: 2 Secs. Trip
11	Dead machine protection / Accidental back energisation (27G/50G) [Generally recommended for Units of size of 100MW and above]	Dead machine Protection provides protection against inadvertent energisation of generator while at stand still or on turning gear. The generator and rotor may get damaged beyond repair under this condition. Trip
12	Generator Pole slip protection / Out of step protection (98G) [Generally recommended for thermal Units of size of 100MW and above. For hydro machines, utilities can decide the Unit size depending upon machine parameters]	Generator pole slip / out of step detects all pole slips leading to an increase in rotor angular position beyond the generator transient stability limits protection provides protection against inadvertent energisation of generator while at stand still or on turning gear. The generator and rotor may get damaged beyond repair under this condition. Trip
13	Back up impedance protection- 3pole (21G) Or Over Current / Under Voltage Protection (51G / 27G)	Backup impedance Protection operates for phase faults. Trip
14	Rotor Earth fault protection (64F1, 64F2)	Rotor Earth fault is provides protection against ground fault of field winding and field short circuit. Alarm (First Rotor Earth fault), Time delay: 1 Secs.

		<p>Trip (Second Rotor Earth fault), Time delay: 5 Secs.</p> <p>But it is recommended that the machine is taken out of service at the earliest opportunity after the occurrence of first earth fault.</p>
15	Generator winding and bearing temperature protection (49G)	<p>Generator winding and bearing temperature protection prevents generator winding / bearing from high temperature operation.</p> <p>Alarm</p> <p>Trip</p> <p>The temperature settings shall be as per manufacturer's recommendations.</p>
16	Generator Circuit Breaker Failure Protection(50ZGCB) [To be provided Generators provided with Generator Circuit Breaker (GCB)]	<p>Generator Circuit Breaker Failure operated in case of failure of GCB.</p> <p>Trip</p>
17	Condition Monitoring of Hydro-Turbine generator	Online condition monitoring system shall be provided for monitoring of radial & axial vibration, phasor diagram, air gap and Partial Discharge.
18	Process Control	Process Control is to be provided for sequential operation.
19	Disturbance Recorder (DR), Event Logger (EL) and Fault locator (FL)	To be provided as a standard practice. DR, EL & FL, being inbuilt feature in Numerical Relays, such features should also be used.
20	Time Synchronizing Equipment (TSE)	To be provided as a standard practice.
21	Overall Differential Protection (87OA) for Generator and Generator Transformer	<p>Overall Differential Protection is provided for internal short circuit fault in generator and Generator transformer.</p> <p>Trip</p>
	Grouping of Protection	The Protection of Generator could be divided into two groups (Group-A & Group-B) and each group should be connected to separate DC source. Both Group-A & Group-B protection shall give trip impulse to circuit breaker of Generator bay. The Group-A should include Generator Differential protection (87G), back up Back up impedance

		protection- 3pole (21G) [Or Over Current / Under Voltage Protection (51G / 27G)], overload protection (51G), 100% stator earth fault protection(64G2), Rotor Earth fault protection (64F1/64F2), Low forward Power / Reverse power protection (32G / 37G), and Over voltage protection (59G). The Group-B should include Overall differential protection (87OA), 95% stator earth fault (64G1) protection, loss of excitation protection(40G), pole slip protection (98G), under frequency protection (81G) and over fluxing protection (99G).
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(B) Bus bar and LBB Protection

SN	Protection	Setting
1	LBB protection and bus bar protection	Bus bar & LBB protection to be provided at 400kV, 220kV, 132kV/66kV level for Generating stations. LBB current should be in pick up condition always LBB Time delay = 200ms.

A: Protection for Generator Transformer (GT)

SN	Protection	Purpose of Protection and Setting
1	Generator Transformer Differential protection (87GT)	Differential Relay is provided for Internal Fault in Transformer Trip
2	Restricted Earth Fault (REF) protection (64GT)	REF to be provided for Internal Earth Fault in Transformer Trip
3	Generator Transformer back up IDMT O/C protection of HV winding (51GT)	Back up protection to be provided for Internal and external Fault. Trip
4	Generator Transformer back up Earth Fault protection of LV winding (51NGT)	Back up protection to be provided for Internal and external Fault. Trip
5	Over Fluxing (OF) protection (99GT)	Over Flux Relay be provided for protection from Over Fluxing (V/f)=1.1 for alarm & (V/f)=1.4 for tripping

6	HV winding cum overhang differential protection (87HV / 87 NT)	HV winding cum overhang differential protection is a unit type protection which operates for earth faults on the generator transformer HV side and also covers a large portion of the HV winding and the HV terminals upto the HV current transformers. Trip
6	Buchholz protection	Buchholz Relay to be provided for detection of incipient internal fault in Transformer Tripping for both stages (The contacts for both stages shall be paralleled so that tripping command goes to CB(s) in both stages.) However, the existing practice of two stage tripping may be reviewed by utilities.
7	Winding Temperature Indicator (WTI)	WTI to be provided for preventing the transformer winding from High Temperature Operation. Cooling, Alarm Trip The temperature settings shall be as per manufacturer's recommendations.
8	Oil Temperature Indicator (OTI)	OTI to be provided for preventing the transformer oil from High Temperature Operation. Alarm Trip The temperature settings shall be as per manufacturer's recommendations.
9	Pressure Relief Device (PRD)	PRD to be provided for protection of transformer tank from blasting due to development of high internal pressure during heavy internal fault Trip
10	Magnetic Oil Gauge (MOG)	MOG to be provided for Low oil level Alarm.
11	Surge Arresters	Gapless Surge Arresters shall be provided on both primary and secondary sides of transformers.
	Grouping of Protection	The Protection of Generator Transformer could be divided into two groups (Group-A & Group-B) and each group should be connected to separate DC source. Both Group-A & Group-B protection shall give trip impulse to circuit breaker of Generator bay. The Group-A should include Transformer Differential protection (87GT) and back up Earth Fault protection of LV winding (51NGT). The Group-B should include REF protection (64GT), back up IDMT O/C protection of HV winding (51GT) and HV winding cum overhang differential protection (87HV / 87 NT).

(D) Protection for Unit Auxiliary Transformer (UAT) and Station Auxiliary Transformer (SAT)

SN	Protection	Purpose of Protection and Setting
1	Differential protection (87T)	Differential Relay to be provided for Internal Fault in Transformer Trip
2	Restricted Earth Fault (REF) protection(64)	REF to be provided for Internal Earth Fault in Transformer Trip
3	Back up IDMT O/C protection of HV winding (51)	Back up protection to be provided for Internal and external Fault. Trip
4	Back up Earth Fault protection of LV winding (51N)	Back up protection to be provided for Internal and external Fault. Trip
5	Buchholz protection	Buchholz Relay to be provided for detection of incipient internal fault in Transformer Tripping for both stages (The contacts for both stages shall be paralleled so that tripping command goes to CB(s) in both stages.) However, the existing practice of two stage tripping may be reviewed by utilities.
6	Winding Temperature Indicator (WTI)	WTI to be provided for preventing the transformer winding from High Temperature Operation. Cooling, Alarm Trip The temperature settings shall be as per manufacturer's recommendations.
7	Oil Temperature Indicator (OTI)	OTI to be provided for preventing the transformer oil from High Temperature Operation. Alarm Trip The temperature settings shall be as per manufacturer's recommendations.
8	Pressure Relief Device (PRD)	PRD to be provided for protection of transformer tank from blasting due to development of high internal pressure during heavy internal fault Trip
9	Magnetic Oil Gauge (MOG)	MOG to be provided for Low oil level Alarm. Alarm
10	Surge Arresters	Gapless Surge Arresters shall be provided on both primary and secondary sides of transformers, located outdoors with

		overhead connection.
	Grouping of Protection	The Protection of Unit Auxiliary Transformer (UAT) could be divided into two groups (Group-A & Group-B) and each group should be connected to separate DC source. Both Group-A & Group-B protection shall give trip impulse to circuit breaker of Generator bay. The Group-A should include Transformer Differential protection (87T) and back up Earth Fault protection of LV winding (51N). The Group-B should include REF protection (64GT) and back up IDMT O/C protection of HV winding (51).

(E) Protection for Excitation Transformer

SN	Protection	Purpose of Protection and Setting
1	Restricted Earth Fault (REF) protection (64)	REF to be provided for Internal Earth Fault in Transformer Trip
2	Instantaneous and IDMT O/C protection of HV winding (51)	Back up protection to be provided for Internal and external Fault. Trip
3	Winding Temperature Indicator (WTI)	WTI to be provided for preventing the transformer winding from High Temperature Operation. Cooling, Alarm Trip The temperature settings shall be as per manufacturer's recommendations.

The Sub-committee requested all the constituents to go through the above protection philosophy and give their observations/comments so that the same can be discussed further and finalized in the next PCC meeting. NERPC has discussed the matter with concerned person of NTPC as all types of generating plants (thermal, hydro and gas based plants) are with NTPC and input from NTPC will help in finalization of the draft. The representative of NTPC has also been requested to attend the next PCC meeting.

B.3. SPS scheme for Pallatana

The following four (4) System Protection Scheme (SPS) associated with generating

Unit#1 (363.3MW) of OTPC at Palatana has been planned for NER and are under implementation.

Case 1: Tripping of generating unit of OTPC at Palatana

Case 2: Tripping of 400 kV D/C Palatana- Silchar line (with generation from OTPC's plant at Palatana)

Case 3: Tripping of 400 kV Silchar-Byrnihat line (with generation from OTPC's plant at Palatana)

Case 4: Tripping of 400 KV Silchar – Byrnihat line (without generation from OTPC's plant at Palatana)

The scheme for all the four cases will be as follows:

Case 1: When Palatana unit trips:

- i. When generator at Palatana trips a signal will be generated from trip relay of the unit.
- ii. This signal should trip the CB of 132 kV Silchar – Srikona D/C & 132 kV Silchar – Panchgram lines at Silchar.
- iii. Subsequent to tripping of 132 kV Silchar – Panchgram line, the CB at Badarpur of 132 kV Badarpur – Panchgram line should be tripped.
- iv. After these trippings an instant load of 80 MW will be relieved during off-peak hours & 130 MW will be relieved during peak hours which will prevent the system from cascade tripping
- v. Then manual demand disconnection/management should be imposed.

Case 2: When 400 kV Palatana-Silcher (D/C) lines trip

- i. When both the ckts of 400 kV Palatana – Silchar lines trips, a signal will be generated from trip relays at Silchar
- ii. This signal should trip the CBs at Silchar end of 132 kV Silchar – Srikona D/C & 132 kV Silchar – Panchgram lines.
- iii. Subsequent to tripping of 132 kV Silchar – Panchgram line, the CB at Badarpur end of 132 kV Badarpur – Panchgram line should be tripped.
- iv. After these trippings an instant load of 80 MW will be relieved during off-peak

hours & 130 MW will be relieved during peak hours which will prevent the system from cascade tripping

- v. Then manual demand disconnection/management should be imposed.

Case 3: 400 kV Silchar – Byrnihat line (with generation at Pallatana)

When 400 kV Byrnihat – Silchar lines trip, signal will be generated from trip relays at Silchar

- i. This signal should trip CB of GTG/STG of Generating Unit at Palatana. But unit may run in Full Speed No Load (FSNL) condition.
- ii. An instant relief of load of 230/130 MW will prevent the system from cascade tripping.
- iii. Then manual demand disconnection/management should be imposed.

Case 4: When 400 kV Silchar – Byrnihat line trip (without generation at Pallatana)

- i. When 400 KV Byrnihat – Silchar line trips, a signal will be generated from trip relays at Silchar.
- ii. This signal should trip the CB of 132 kV Silchar – Srikona D/C & 132 kV Silchar – Panchgram lines at Silchar.
- iii. Subsequent to tripping of 132 kV Silchar – Panchgram line, a signal will be generated from trip relay of 132 KV Silchar – Panchgram line. This signal should trip the CB at Badarpur of 132 kV Badarpur – Panchgram line.
- iv. After these trippings an **instant load relief** of around **95 MW in Peak Hours** which will prevent the system from cascade tripping.
- v. Then manual demand disconnection/management may be imposed, if necessary.

Load reduction in 132 kV pocket is required for SPS under Case-I and the scheme has already been implemented by NERTS in line with discussion in OCC forum.

For Case-II, generation reduction at Palatana as well as load reduction in 132 kV pocket are required. Load reduction part has already been implemented by NERTS in line with discussion in OCC forum. Regarding generation reduction, it has been

seen from the study that injection of power at Palatana should be reduced to around 20 MW excluding own auxiliary consumption.

For Case-III, generation reduction to the tune of 200 MW is required in case Unit # 1 is running under full load i.e. the generation should be brought down to around 150 MW. The scheme will be kept in 'OFF' mode/ineffective mode in case generation is around 150 MW. OTPC, BHEL will plan how the required generation reduction will be effected for implementation of the schemes under Case-II & III.

Regarding SPS under Case-IV, it has been decided that the scheme will be implemented as early as possible considering the adverse impact of tripping of the line on the NER grid. The scheme is similar to Case-I and hence implementation should not take much time. NERTS was requested to take necessary action for implementation at the earliest.

SPS will be reviewed from time to time after implementation for further improvement based on the system requirement. The SPS will be reviewed again when the second Unit at Palatana is connected to the NER grid.

During 14th TCC meeting, the committee requested OTPC to highlight action plan for reducing the generation for implementation of proposed SPS. OTPC requested NERLDC for providing certain information as desired by BHEL. Committee advised OTPC to communicate NERLDC accordingly for getting the required information. OTPC was requested for taking early action for implementation of SPS for safety & security of the NER grid.

During 89th OCC meeting, GM, NERTS informed that for SPS corresponding to Case I & IV will be made operational from 14.09.2013.

GM, NERLDC stated that the main concern is for SPS corresponding to Case – II & III above and requested OTPC to look into the matter for implementation at the earliest.

GM (Plant), OTPC stated that such reduction of load at very short duration would be difficult. However, he stated that no proposal has been received from BHEL. However, BHEL's representative will be requested to visit the site again and

discuss with NERLDC along with OTPC so that matter can be resolved at the earliest. Subcommittee requested OTPC to resolve the issue at the earliest in consultation with NERLDC & BHEL.

Deliberation of the Committee

The DGM, POWERGRID informed that POWERGRID has already implemented SPS associated with all the above cases w.e.f. 14.09.13 at their end. OTPC has to execute the work associated with SPS corresponding to Case – II & III.

SE (O) informed that OTPC vide their letter No. OTPC/UDP/Pallatana/13-14/768 dated 26.09.2013 has communicated that the machine will take about 12.5 minutes to come down to house load from full generation of about 350MW. The committee requested OTPC to implement the SPS immediately for safety and security of the grid. SPS will be reviewed from time to time after implementation for further improvement based on the system requirement. The SPS will be reviewed again when the second Unit at Palatana is connected to the NER grid and also after commissioning of the Silchar – Bongaigaon 400kV line.

The Sub-committee noted as above.

B.4 Automatic demand management, Implementation of islanding schemes

During 14th TCC meeting, the quantum of UFR based load shedding has been approved by the Committee as decided in the 88th & 13th PCC meeting as given below:

SN	Stages	Frequency (in Hz)	State-wise Load Shedding	Total Load shedding (in MW)
1	Stage-I	49.2	Arunachal = 5 MW Assam = 55 MW Manipur = 5 MW Meghalaya = 15 MW Mizoram = 5 MW Nagaland = 5 MW Tripura = 10 MW	100
2	Stage-II	49.0	Arunachal = 5 MW Assam = 55 MW Manipur = 5 MW Meghalaya = 15 MW Mizoram = 5 MW Nagaland = 5 MW Tripura = 10 MW	100

3	Stage-III	48.8	Arunachal = 5 MW Assam = 55 MW Manipur = 5 MW Meghalaya = 15 MW Mizoram = 5 MW Nagaland = 5 MW Tripura = 10 MW	100
4	Stage-IV	48.6	Arunachal = 5 MW Assam = 55 MW Manipur = 5 MW Meghalaya = 15 MW Mizoram = 5 MW Nagaland = 5 MW Tripura = 10 MW	100
			Total load shedding	400

During the 89th OCC meeting, the Sub-committee requested all constituents to identify and furnish the list of feeders for above quantum of UFR based load shedding in their respective States (Ar. Pradesh, Manipur, Mizoram & Nagaland – 4 x 5 = 20 MW, Assam – 4 x 55 = 220 MW, Meghalaya – 4 x 15 = 60 MW and Tripura – 4 x 10 = 40 MW) for all the four (4) stages.

Deliberation of the Committee

The subcommittee decided to change the existing setting of UFR. The UFR's frequency setting of 48.8Hz will be changed to 49.2Hz (i.e. 1st Stage), 48.5Hz will be changed to 49.0Hz (i.e. 2nd Stage), 48.2Hz will be changed to 48.8Hz (i.e. 3rd Stage) and one more setting will also be introduced at 48.6Hz (i.e. 4th Stage). Accordingly additional requirement of quantum of load can be calculated as per above Table. Subcommittee advised to include least important loads/feeders for 1st stage of UFR based load shedding (i.e. at 49.2Hz). Assam, Tripura & Meghalaya have submitted the list of feeders and quantum of load shedding at different stages. All other constituent states of the region agreed to submit the list of feeders at the earliest. The details of UFR based load shedding (existing/proposed/additional requirement) is given at **Annexure – B.4 (i & ii)**.

The Sub-committee noted as above.

B.5 Implementation of islanding scheme in NER

During the 87th OCC meeting, the committee had decided the following islanding scheme and associated frequencies levels for creation of islands in NER:

SN	Islanding Scheme	Lines required to be opened	UFR Location	Implementing Agency
1	ISLAND AT 48.80 Hz: Island comprising of generating units of AGBPP (Gas), NTPS (Gas) & LTPS (Gas) and loads of Upper Assam system & Deomali area (Ar. Pradesh) [Total Generation: 380-400MW and load: 200MW (off peak)-300MW (peak)]	(a) 220 kV New Mariani (PG) – AGBPP	UFR-1 [At New Mariani (PG)]	POWERGRID
		(b) 220 kV New Mariani (PG) – Misa		
		(c) 220 kV Mariani – Misa	UFR-2 [At Mariani, Samaguri of AEGCL]	AEGCL
		(d) 220 kV Mariani – Samaguri		
		(e) 132 kV Mokokchung – Mariani		
		(f) 132 kV Dimapur (PG) – Bokajan	UFR-3 [At Dimapur (PG)]	POWERGRID
2	ISLAND AT 48.20 Hz: Island comprising of generating units of AGTPP (Gas), generating units at Baramura (Gas), Rokhia (Gas) & Gumati (Hydro) and loads of Tripura system & Dullavcherra area (Assam) [Total Generation: 150-160MW and load: 110MW (off-peak)-150MW (peak)]	132 kV Palatana – Udaipur	UFR-1 [At Palatana]	OTPC
		132 kV Palatana – Surjamani Nagar		
		132 kV Silchar – Dullavcherra	UFR-2 [At Silchar]	POWERGRID
		132 kV AGTPP – Kumarghat	UFR-3 [At Kumarghat]	POWERGRID
		132 kV P K Bari – Kumarghat		
3	ISLAND AT 47.90 Hz: Isolation of NER from NEW grid at ER-NER boundary with rest of the generation and load of NER	To be decided after system study		

In the 14th TCC meeting, the islanding schemes 1 & 2 elaborated above have been agreed by TCC members as decided in the 12th PCC meeting. During meeting it was suggested that while finalizing the islanding scheme -1 (proposed at 48.8 Hz), 100MW of UFR based load shedding proposed at 48.8Hz (as decided by NPC) should be taken into account and adequate time delay should be provided for operation of UFR or df/dt relay. Regarding the Case – III mentioned above i.e. isolation of NER from ER at ER-NER boundary, the relevant study required is being carried out in association with WRPC. Further, the committee has requested Prof. Tripathi from IIT, Guwahati to assist the study group of NERPC in carrying out various system studies required for islanding scheme and other studies as and when required. Necessary data will be furnished to Prof. Tripathy by NERLDC for further action.

During 89th OCC meeting, the Sub-committee had decided to form a sub-group to look into the matter and discuss in detail for implementation of the islanding scheme 1 & 2.

The sub-group would comprise of representatives from Assam, Tripura, NEEPCO, POWERGRID, NERPC, NERLDC & IIT, Guwahati.

Deliberation of the Committee

The subcommittee decided to have a **meeting of the sub-group at 13:30 PM on 25th October, 2013 at SLDC, Kahilipara** to discuss about the Islanding scheme. Assam, Tripura, NEEPCO, POWERGRID, NERPC & NERLDC were requested to depute their concerned persons for discussion so that course of action can be finalized for implementation of the islanding scheme.

For the purpose of system study for Islanding Schemes of NER, the following sets of parameters are required for the generating Units within the proposed island:

- a. H : Machine Inertia Constant in p.u. on Machine Base (including turbine inertia)
- b. R : Governor Permanent Droop in p.u.
- c. D : Turbine Damping Factor/Co-efficient in p.u. on Machine Base
- d. Pmax/Qmax : Maximum Generator Active/Reactive Power Output (in MW)
- e. Pmin/Qmin : Minimum Generator Active/Reactive Power Output (in MW)

The subcommittee requested Assam (for NTPS, LTPS), NEEPCO (for AGBPP, AGTPP) and Tripura (for Rokhia, Baramura & Gumati Generating plants) to provide above information during the meeting

The Sub-committee noted as above.

B.6 Frequent Tripping Of 33kV System of DOP, AP at Nirjuli and Ziro:

The present status of tripping of 33kV Feeders at Nirjuli and Ziro Sub Station is as below:

(a) Tripping 33kV Feeders at Ziro

SN	Feeder	Jan'10 – Jun'13		Tripping in Aug'13	
		Nos.	Nos. / Month	Nos.	Nos. / Month
1	Kurung- Kamey	766	18.23	19	19
2	Old Ziro Feeder	440	10.47	3	3
3	Kimin Feeder	1208	28.76	61	61

(b) Tripping 33kV Feeders at Nirjuli

SN	Feeder	Jan'10 - Jun'13		Tripping in Aug,13	
		Nos.	Nos. / Month	Nos.	Nos. / Month
1	AP - 1	262	6.23	7	7
2	AP - 2	590	14.07	17	17
3	AP - 4	82	1.95	2	2

During 14th TCC meeting, the committee expressed concern for frequent tripping in 33kV system of Ar. Pradesh. POWERGRID informed that such repeated tripping resulted in failure of transformers at Ziro & Nirjuli substation. CE, Ar. Pradesh informed that matter has been discussed with POWERGRID and remedial measures have already been taken up after discussion. The work of change of conductor with higher size is in progress and work will be completed within two (2) months. Other remedial measures would be taken at the earliest to reduce tripping in 33kV system of Ar. Pradesh.

During the 13th PCC meeting, Assam stated that due to frequent tripping in 33kV system of Ar. Pradesh, the transformers at Ziro and Nirjuli substation have failed twice during the last few years and this has commercial impact on the constituents of the region. The representative of Assam re-iterated that on request of Ar. Pradesh all constituents had agreed to include augmentation of transformation capacity at above substations as the regional project although Ar. Pradesh was the exclusive beneficiary. Hence subcommittee desired that Ar. Pradesh should look into the matter seriously to reduce the frequent tripping in 33kV system so that unwarranted failure of transformers is not repeated.

Since no representative from Ar. Pradesh was present, the status could not be discussed. But subcommittee wanted to convey above message to Ar. Pradesh.

Deliberation of the Committee

DGM, POWERGRID informed the forum that one more 1-Phase 132/33kV Transformer unit failed at Ziro Sub Station during Sept'13. The same has been replaced with available spare. He also reiterated that if tripping is not reduced failure of major equipments cannot be prevented.

EE, SLDC, Ar. Pradesh informed that the matter has been intimated to the higher authority and hopefully the frequent tripping will be reduced.

The Sub-committee requested NERPC to take up the matter again with Ar. Pradesh for the benefit of the region. The Sub-committee also suggested for organizing the next PCC meeting in Ar. Pradesh.

The Sub-committee noted as above.

B.7 T- Connection of Lekhi & Bhalukpong sub-Station

In 14th TCC meeting, CE, Ar. Pradesh informed that work of Loop In Loop Out (LILO) of 132 kV Ranganadi-Nirjuli line at Lekhi is under progress and will be completed by September, 2013. Also the work of Loop In Loop Out (LILO) of 132 kV Balipara – Khupi line at Bhalukpong is under progress and will be completed by December, 2013.

During 13th PCC meeting, the status could not be updated since no representative from Ar. Pradesh was present.

Deliberation of the Committee

EE, SLDC, Ar. Pradesh informed that diversion of the line for LILO at Lekhi due to teak plantation. However, DoP, Ar. Pradesh is trying their best to complete the LILO at Lekhi by December, 2013. The LILO work at Bhalukpong will be completed by March 2014. The Sub-committee also suggested for organizing the next PCC meeting in Ar. Pradesh so that all issues can be discussed with higher authority of Ar. Pradesh.

The sub-Committee noted as above.

B.8 T- Connection at various points in NER Grid:

Currently following lines are being tapped (i.e. operating with T-connections) to feed radial loads:

- i. 220 kV Samaguri – Sarusajai I (Jawharnagar)
- ii. 220 kV Sarusajai – Langpi I (Star Cement)
- iii. 132 kV Balipara – Depota (Ghoramara)
- iv. 132 kV Samaguri – Depota (Pavoi)
- v. 132 kV Srikona - Panchgram
- vi. 66 kV Dimapur – Bokajan (Singrijan, Power House & Dairy Farm)

To ensure more reliability and security of these lines, LILO of these lines need to be done at those locations.

In the 13th PCC meeting, CGM (LDC), Assam stated that the matter will be looked into and the status will be intimated in the next PCC meeting.

Deliberation of the Committee

The status as informed by Assam in the meeting is given below:

- | | | | |
|------|------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------|
| i. | 220 kV Samaguri – Sarusajai I (Jawharnagar) - Completed | } | October, 2013 |
| ii. | 220 kV Sarusajai – Langpi I (Star Cement) | | |
| iii. | 132 kV Balipara – Depota (Ghoramara) | | |
| iv. | 132 kV Samaguri – Depota (Pavoi) | | |
| v. | 132 kV Srikona - Panchgram | | |
| vi. | 66 kV Dimapur – Bokajan (Singrijan, Power House & Dairy Farm) – Status could not be updated as the representative of Nagaland was absent | | |

The sub-Committee noted as above.

B.9 Installation of Harmonic Filters:

During 14th TCC meeting, CE, Ar. Pradesh informed that power supply to the Satyam Steel Plant at Banderdewa has been disconnected and only after completion of installation of harmonic filters the supply to the plant will be resumed. He also informed that the work is likely to be completed by December 2013.

Deliberation of the Committee

The representative from DoP, Ar. Pradesh informed that installation of harmonic filters is likely to be completed by December 2013.

The sub-Committee noted as above.

B.10 Un-authorized dismantling of POWERGRID owned 2 Nos PLCC panels at 132 kV Khliehriat (Me. ECL) substation.

Me. ECL has dismantled 2 Nos BPL make PLCC panels of 132 kV Khliehriat (PG)-Khliehriat (Me.ECL) # I at Khliehriat (Me.ECL) station without informing/discussing POWERGRID. Thus at present the PLCC link between these two stations through the PLCC link is out of service. Me.ECL has installed the PLCC panels, but away from the previous place of installation and the existing cable from relay panel to PLCC is not sufficient to reach up to new place. Hence, complete new cable is under diversion.

Deliberation of the Committee

Representative from Me. ECL informed that the work has already been completed in the month of July, 2013. The cabling work is to be done. Subcommittee requested POWERGRID to verify the status and the same can be discussed in the next PCC meeting.

The sub-Committee noted as above.

B.11 Installation of 2nd Distance Protection Relay (DPR) for 220KV and above System

The status of installation of 2nd DPR in respect of following lines as given in 12th PCC is as follows:

SN	Station	Line	Utility	Status
1	Samaguri SS	220 KV Balipara	AEGCL	Oct, 2013
2	BTPS SS	220 KV Salakati # I	AEGCL	Oct, 2013
3	BTPS SS	220 KV Salakati # II	AEGCL	Oct, 2013

During the 11th PCC meeting, the committee advised Assam to install Main –II (Distance protection) at Tinsukia end of Kathalguri-Tinsukia 220kV D/c line.

During 12th PCC meeting Assam had informed that they intend to install the relays, handed over by POWERGRID, at Samaguri Sub Station (for 220kV Balipara – Samaguri line) and Tinsukia Sub Station (for 220kV Kathalguri – Tinsukia line).

POWERGRID informed that they replenished the relays with Micom P442 and requested Assam to install the relays at BTPS (for BTPS - Salakati # 1 & 2 220kV line). Further, POWERGRID stated that the 220kV BTPS - Salakati Line # 1 & 2 is very important so far as NER-ER connectivity is concerned and in case of disturbance, DR data can be exchanged between Salakati and BTPS for analysis and corrective measures.

Deliberation of the Committee

Assam stated that since the BTPS – Salakati 220kV lines are very short (3-4 KM approx), installation of these DPR may not be very effective.

Subcommittee recommended Assam to consider installation of Line Differential relays for above lines and intimate the action plan in next PCC meeting.

The sub-Committee noted as above.

B.12 Non Operation of Protective Switchgear of DOP, Manipur & NHPC

In several cases Loktak connected transmission lines are getting tripped due to non-operation of protective switchgear Manipur downstream faults. This is resulting greater isolation of 132 kV System undesirably affecting 132kV portion of NER Grid. Please refer SN: 23, 24, 25, 38, 39, 57, 61 & 64 of Annexure-1. Protective Switchgear of DOP, Manipur is required to be made functional immediately. 132 kV Loktak-Jiribam-II line is tripping instantaneously on 99% distance for the fault in other lines like 132 kV Jiribam-Aizawl, 132 kV Jiribam-Pailapool, 132 kV Jiribam (PG)-Jiribam (Manipur) etc.

During 14th TCC meeting, CE, DoP, Manipur stated that LILO of Ningthoukhong-Yurembam(Manipur) at Imphal (PG) has been commissioned recently and also R&M work is under progress. Renovation work associated with Yurembam will be completed by December, 2013 and Yangpokpi & Ningthoukhong by March, 2014. Once the R&M works is complete, the problem of frequent tripping will be reduced.

NHPC also informed that replacement of numerical relays will be completed soon and relay setting has been modified as suggested by PGCIL.

GM, NERLDC expressed concern about the frequent tripping in Manipur & NHPC system. He requested that setting of relays can be changed / set in consultation with POWERGRID. Further, he requested CE, DoP, Manipur to furnish the details of tripping in the next PCC meeting for analyzing of the frequent tripping. Also he requested that patrolling of the lines should be done regularly to avoid unnecessary tripping.

Deliberation of the Committee

NHPC representative informed that they have requested the agency (M/S Alstom) to install the relays at the earliest. The status will be intimated in the next PCC meeting.

Since there was no representative from DoP, Manipur the status could not be updated.

The sub-Committee noted as above.

B.13 Parallel Operation of 3x20 MVA Transformer with 160 MVA Auto-transformer at Kopili

The committee discussed about the importance of bringing the 3x20MVA transformer back into service. Sr. Mgr. (E/M), NEEPCO informed that the matter has been taken up with POWERGRID. It has been observed that the 3x20MVA, transformer can only operate at Principal tap and there is no back up O/C+E/F protection on 220kV side of transformer. However, all efforts are to be taken to complete the work by July, 2013. The sub-committee had suggested that all required protection should be in place before operation of the transformer.

During 12th PCC meeting Sr. Manager, NEEPCO had informed that Kopili HEP is facing serious problem due to acidic nature of water and most of the engineers are busy with restoration of the plant. However, all efforts will be put by NEEPCO to complete all required tests at the earliest before bringing the transformers into service and parallel operation of above transformer is likely to be completed by August, 2013. The relay co-ordination will be done in consultation with PGCIL.

During 13th PCC meeting, Sr. Manager, NEEPCO informed that the transformer was in charged condition since 08.09.2012 and while attempt was made to load the transformer on 13.08.2013, the transformer got tripped. On inspection, it was found that the tap changer vent of phase-B Transformer has exploded. Once the repair work is over, further action will be initiated and status will be intimated to the forum in next PCC meeting.

Deliberation of the Committee

The representative of NEEPCO informed that the existing 3x20MVA transformer is more than 30 years old and there is no support from OEM.

DGM, POWERGRID stated that the 132 kV Kopili – Khandong D/c line is one of the most important 132kV link for South Assam and the states of Mizoram, Tripura and Manipur. Thus installation of another 160MVA, 220/132kV Transformer in parallel in place of existing 60MVA transformer will strengthen the link considerably. Further, the existing 132kV Single Main Bus Arrangement at Kopili is

also required to be replaced with Double Main Bus Arrangement (GIS may be required considering the space constraints) for enhancement of reliability at 132kV Level.

The subcommittee also agreed with the proposal for replacement of existing 3x20MVA, 220/132kV transformer by 1x160MVA, 220/132kV transformer. The matter will be taken up in RPC forum for approval. The conversion of existing 132kV Single Main Bus Arrangement to Double Main Bus Arrangement and possibility of introduction of GIS will be discussed further in next OCC meeting so that matter can be taken up to RPC forum for approval.

The Sub-committee noted as above.

C. NEW ITEMS

C.1 Review for implementation of Single Pole Auto Reclose Scheme (SPAR) in various lines:

In North Easter Region, following 132kV Lines do not have SPAR because of Gang (3P) Operated Circuit Breaker at one or both ends. Now, for reliable operation of transmission system SPAR plays most important role during transient fault. So far as, 132kV Lines are concerned these are more prone to transient fault because of

low clearance. Further, in NER, lightening is more and so there are many instances of transient tripping of 132kV lines during lightening. Under such circumstance implementation of SPAR is most important / essential even by replacing the existing Gang (3P) Operated Breaker for the improvement of Power System of N.E. Region.

The status of SPAR as reviewed during the 75th OCC meeting is as under.

Sl. No.	Name of the Line	Ownership	Status as per 75 th OCC meeting
	220kV Kopili - Misa # I & II	NEEPCO	December, 2012
	220kV Salakati - BTPS - I & II [Ckt#I]	AEGCL	December, 2012
	220kV Balipara - Samaguri	AEGCL	December, 2012
	132kV Khandong - Haflong	NEEPCO	December, 2012
	132kV Khandong - Kopili	NEEPCO	

Deliberation of the Committee

Sr. Manager, NEEPCO requested POWERGRID to help them so that the SPAR associated with 220kV Kopili - Misa # I & II can be made operational.

DGM, POWERGRID agreed to complete the above work by October, 2013.

Regarding other lines, he informed that order has already been placed for procurement of single pole CBs and the implementation of SPAR will be completed immediately after installation of CBs. CGM, Assam informed that CBs at BTPS and Samaguri are to be replaced to implement SPAR in above lines. The procurement process is in progress for replacement of CBs.

Further, DGM, POWERGRID informed that in North Easter Region, following 132kV Lines do not have Single Pole Auto Reclose (SPAR) facility because Gang (3P) Operated Circuit Breaker at one or both ends.

SN	Name of the Line	End 1	End 2
1	132kV Gohpur-Nirjuli	3P	3P
2	132kV Aizawl-Kumarghat	3P	3P
3	132kV Badarpur-Kolasib	3P	3P

4	132kV Kolasib-Aizwal	3P	1P
5	132kV Badarpur-Jiribam	3P	3P
6	132kV Badarpur-Khlieriat	1P	3P
7	132kV Badarpur-Silchar # 1	3P	1P
8	132kV Badarpur-Kumarghat	3P	3P
9	132kV Badarpur-Badarpur	3P	3P
10	132kV Kumarghat-R C Nagar	3P	NEEPCO (1P)
11	132kV K'dong-K'riat # I	3P	NEEPCO (MOCB)
12	132kV K'dong-K'riat # II	3P	3P
13	132kV K'riat(PG)-K'riat(M)	3P	3P
14	132kV Jiribam-Loktak II	3P	NHPC
15	132kV Nirjuli-Ranganadi	3P	NEEPCO (3P)
16	132kV Ranganadi-Ziro	NEEPCO (3P)	1P
17	132kV Agartala-RC Nagar # 1	3P	NEEPCO (1P)
18	132kV Agartala-RC Nagar # 2	3P	NEEPCO (1P)

During the deliberation DGM, POWERGRID stated that for reliable operation of transmission system, SPAR plays important role during transient fault. So far as 132kV Lines are concerned, these are more prone to transient fault because of low clearance. Moreover, NER is prone to lightening and hence many instances of transient tripping of 132kV lines are observed during lightening. Under such circumstance implementation of SPAR is most important / essential at 132kV level for which replacement of the existing Gang (3P) Operated Breaker by single pole CBs is required for increasing availability.

The representative of NEEPCO informed that order has already been placed for procurement of single pole CBs and the implementation of SPAR will be completed immediately after installation of CBs.

The subcommittee agreed with the proposal for replacement of existing Gang Operated (3P) Circuit Breakers. The matter will be taken up in TCC/RPC forum for approval.

DGM, NERLDC requested DGM, POWERGRID to furnish the list of lines where SPAR is operational and POWERGRID agreed to provide the same soon.

The Sub-committee noted as above.

C.2 Major Grid Disturbances during September, 2013:

There was no major grid disturbance during the month of September, 2013. However, one grid incident occurred on **21.09.2013**.

The sub-Committee noted as above.

A. Major Events in North-Eastern Regional Grid during the period w.e.f. 02nd September'13 to 29th September'13

The following major events /disturbances occurred in NER Grid during the period from 02nd September'13 to 29th September'13. NERLDC has issued letters in this regard to all concerned to furnish details of these events for further analysis and prevent happening of these events in future vide letter nos. NERLDC/SO-II/1569-76 dtd. 10.09.13, NERLDC/SO-II/1632-44 dtd. 18.09.13, NERLDC/SO-II/1853-64 dtd. 24.09.13 and NERLDC/SO-II/ dtd. 01.10.13.

Frequent disturbances in Loktak-Manipur sub-system:

Repeated disturbances have been experienced in the above system due to which the power supply to Manipur was affected and also the Grid security depleted. Matters related to corrective actions to be taken were discussed in details in 89th OCC & 13th PCC meetings.

- i. At 1040 Hrs on 03.09.13, 132 kV Imphal(PG) – Imphal I and II, 132 kV Loktak - Ningthoukhong S/C, 132 kV Loktak – Imphal S/C and all three units of Loktak tripped.
(Generation loss: 90 MW, Load loss: 35 MW).
- ii. At 0158 Hrs on 19.09.13, 132 kV Imphal(PG) – Imphal I and II and 132 kV Loktak - Ningthoukhong S/C tripped.
(Load loss: 50 MW).
- iii. At 1415 Hrs on 25.09.13, 132 kV Imphal(PG) – Imphal I and II and 132 kV Loktak - Ningthoukhong S/C tripped.
(Load loss: 25 MW).
- iv. At 1432 Hrs on 29.09.13, 132 kV Imphal(PG) – Imphal I and II and 132 kV Loktak - Ningthoukhong S/C tripped.
(Load loss: 70 MW).

In 13th PCC Meeting, Manipur informed that it will take action in regard to frequent and multiple tripping of elements in and around Manipur area. It was deliberated that action needs to be taken by all concerned to identify the reasons of such trippings and rectify the problems.

The matter was discussed in the 14th TCC meeting held at Agartala on 04-09-13 and during the meeting Manipur informed that renovation work of their major S/Ss are under progress and will be commissioned progressively by Dec-13 to March -14 and after that the false tripping could be minimized. NERLDC requested in the meeting that in meantime tripping due to other reasons such as vegetation growth should be minimized by regular patrolling of the lines and taking suitable action.

Deliberation of the Committee

Since no representative from DoP, Manipur was present; the status could not be updated.

The sub-Committee noted as above.

Multiple tripping of elements in and around Aizawl (PG) area:

- i. At 0158 Hrs on 19.09.13, 132 kV Aizawl(PG) - Jiribam S/C, 133 kV Aizawl(PG) - Kumarghat S/C and 132 kV Aizawl(PG) – Kolasib S/C tripped resulting in tripping of all feeders from Aizawl(PG) substation.
(Load Loss: 30 MW, Generation Loss : 6 MW)

- ii. At 0145 Hrs on 20.09.13, 132 kV Aizawl(PG) - Jiribam S/C, 133 kV Aizawl(PG) - Kumarghat S/C and 132 kV Aizawl(PG) – Kolasib S/C tripped resulting in tripping of all feeders from Aizawl(PG) substation.
(Load Loss: 34 MW, Generation Loss : 6 MW)

Deliberation of the Committee

DGM, NERTS informed that the problem is due to aging of isolators for which flashover across the insulator stack occurs causing Bus Fault. Further, he informed that all such old isolators need replacement. POWERGRID has already placed supply order to isolator manufacturer and the replacement will commence soon. Thus, once the replacement is complete, undesirable tripping of similar kind will be reduced.

The sub-Committee noted as above.

Multiple tripping of elements in and around Khliehriat area

- iii. At 1345 Hrs on 26.08.13, 132 kV Khliehriat (PG) - Khliehriat (S) I, 133 kV Khliehriat (PG) - Khliehriat (S) II and 132 kV Khliehriat – NEHU lines tripped.
(Load Loss: 43 MW)

In the 12th PCC Meeting, it was deliberated that installation of Distance Protection Relay at 132 kV Khliehriat (PG) # 2 bay at 132 kV Khliehriat (Me.PTCL) sub-station is likely to solve the problem.

Deliberation of the Committee

DGM, POWERGRID raised the issue of non-availability of Distance Relay at Khliehriat (Me.ECL) Station for 132kV Khliehriat (PG) – Khliehriat (MeECL) # 2 line.

Representative from Meghalaya informed that Distance Protection Relay is not available and the procurement of relay is under process. The same will be installed after receiving of relay.

The sub-committee suggested that as decided in the 12th PCC meeting, a joint inspection of Khliehriat sub-station by a team, comprising of representatives from NERPC, POWERGRID and Me. ECL, is required to identify the problem.

NERPC agreed and the date of inspection shall be intimated in advance to POWERGRID & Me. ECL

The sub-Committee noted as above.

Unit tripping/ Power Station Blackout:

- i. At 1040 Hrs on 03.09.13, all 3 units of Loktak tripped.
(Generation Loss: 90 MW)
- ii. At 1000 Hrs, 1104 Hrs and 1156 Hrs on 04.09.13, Unit-I of Loktak tripped.
(Generation Loss: 35 MW, 26 MW and 35 MW respectively)
- iii. At 1525 Hrs on 04.09.13, Unit-I of Kopili tripped.
(Generation Loss: 46 MW)
- iv. At 1149 Hrs on 06.09.13, Unit-III of Kopili tripped.
(Generation Loss: 47 MW)
- v. At 0808 Hrs on 08.09.13, GTG-I and STG-I of Palatana CCGT tripped.
(Generation Loss: 60 MW)
- vi. At 1512 Hrs on 08.09.13, GTG-I and STG-I of Palatana CCGT tripped.
(Generation Loss: 59 MW)
- vii. At 1927 Hrs on 13.09.13, AGTPP U#1 & 4, Rokhia U# 3 & 4, Baramura U# 4 tripped.
(Generation Loss: AGTPP - 37 MW, Tripura - 30 MW, Load Loss - 47 MW)
- viii. At 1340 Hrs on 16.09.13, Unit I and II of Leshka tripped.
(Generation Loss: 83 MW)
- ix. At 1423 Hrs on 16.09.13, Unit I and II of Leshka tripped.
(Generation Loss: 85 MW)
- x. At 1513 Hrs on 16.09.13, Unit I and II of Leshka tripped.
(Generation Loss: 85 MW)
- xi. At 1100 Hrs on 19.09.13, Unit I of Kopili tripped.
(Generation Loss: 44 MW)
- xii. At 0107 Hrs on 20.09.13, Unit I of Doyang tripped.
(Generation Loss: 23 MW)
- xiii. At 0844 Hrs on 20.09.13, Unit I of Kopili tripped.
(Generation Loss: 45 MW)
- xiv. At 0844 Hrs on 20.09.13, Unit I of Kopili tripped.
(Generation Loss: 45 MW)
- xv. At 1614 Hrs on 21.09.13, Unit II of Loktak tripped.
(Generation Loss: 45 MW)
- xvi. At 0201 Hrs on 25.09.13, Unit I and II of Leshka tripped.
(Generation Loss: 83 MW)
- xvii. At 1123 Hrs on 25.09.13, Unit I of Leshka, Unit-2 of Umiam Stg-I and Unit-2 of Umiam Stg-II tripped.
(Generation Loss: 46 MW)
- xviii. At 1330 Hrs on 26.09.13, Unit I and II of Leshka tripped.
(Generation Loss: 84 MW)
- xix. At 0101 Hrs on 25.09.13, Unit I of Langpi tripped.
(Generation Loss: 50 MW)

Repeated Tripping/ Cascade tripping of Transmission Elements:

- i. At 1223 Hrs and 1240 Hrs of 09.09.13, 132 kV Balipara - Depota S/C tripped.
- ii. At 1641 Hrs on 09.09.13 and 1308 Hrs on 10.09.13, 132 kV Loktak - Ningthoukong S/C tripped.

- iii. At 1110 Hrs and 1145 Hrs on 11.09.13, 132 kV Dimapur – Bokajan S/C tripped.
- iv. At 1130 Hrs and 1307 Hrs on 14.09.13, 132 kV Dimapur – Bokajan S/C tripped.
- v. At 0429 Hrs and 1609 Hrs on 14.09.13, 132 kV Jiribam – Aizawl S/C tripped.
- vi. At 0400 Hrs and 0429 Hrs on 26.09.13, 132 kV Balipara – Gohpur S/C tripped
- vii. At 1755 Hrs and 1815 Hrs on 28.09.13, 132 kV Balipara – Khupi S/C tripped

Tripping of critical elements:

- i. At 1320 Hrs on 05.09.13, 220 kV Sarusajai – Boko S/C tripped.
- ii. At 0557 Hrs on 06.09.13, 220 kV BTPS – Agia S/C tripped.
- iii. At 0106 Hrs on 06.09.13, 132 kV Salakati – Gelyphu tripped.
- iv. At 0557 Hrs on 06.09.13, 200 kV Samaguri – Sarusajai I tripped.
- v. At 0557 Hrs on 06.09.13, 200 kV Samaguri – Sarusajai II tripped.
- vi. At 0038 Hrs on 08.09.13, 200 kV Samaguri – Sarusajai I tripped.
- vii. At 0955 Hrs on 14.09.13, 132 kV Ranganadi – Nirjuli S/C tripped.
- viii. At 1755 Hrs on 16.09.13, 132 kV Salakati – Gelyphu S/C tripped along with 220/132 kV ICT I and II at Salakati(PG).
- ix. At 0005 Hrs on 20.09.13, 220 kV Misa – Kopili I tripped.
- x. At 0510 Hrs on 21.09.13, 132 kV Salakati – Gelyphu S/C tripped.
- xi. At 1244 Hrs on 22.09.13, 400 kV Silchar – Byrnihat S/C tripped.
- xii. At 0122 Hrs on 24.09.13, 400 kV Silchar – Byrnihat S/C tripped.
- xiii. At 0355 Hrs on 24.09.13, 132 kV Loktak – Jiribam II tripped.
- xiv. At 0514 Hrs on 24.09.13, 220 kV Balipara – Samaguri S/C tripped.
- xv. At 0632 Hrs on 24.09.13, 132 kV Badarpur – Khleihriat S/C tripped.
- xvi. At 2355 Hrs on 26.09.13, 132 kV Salakati – Gelyphu S/C tripped.
- xvii. At 0015 Hrs on 27.09.13, 220 kV Birpara – Salakati I tripped.
- xviii. At 1549 Hrs on 28.09.13, 400 kV Silchar – Palatana I tripped.
- xix. At 2053 Hrs on 28.09.13, 400 kV Binaguri – Bongaigaon I tripped.
- xx. At 2139 Hrs on 28.09.13, 220 kV Birpara – Salakati I and II tripped.
- xxi. At 0919 Hrs on 29.09.13, 132 kV Ranganadi – Nirjuli S/C tripped.
- xxii. At 1932 Hrs on 29.09.13, 400 kV Silchar – Palatana I tripped.

AGBPP Unit tripping due to problem of Gas Compressor:

- i. At 0435 Hrs on 03.09.13, the GC II tripped resulting in tripping of Unit-III (Generation loss: 30 MW).

- ii. At 1510 Hrs on 03.09.13, the GC I tripped resulting in tripping of Unit-VII (Generation loss: 35 MW).
- iii. At 0435 Hrs on 05.09.13, the GC III tripped resulting in tripping of Unit-III (Generation loss: 30 MW).
- iv. At 2131 Hrs on 05.09.13, the GC III tripped resulting in tripping of Unit-IV (Generation loss: 07 MW).
- v. At 1005 Hrs on 13.09.13, the GC IV tripped resulting in tripping of Unit-III & IV. (Generation loss: 68 MW).
- vi. At 1245 Hrs on 13.09.13, the GC IV tripped resulting in tripping of Unit-III (Generation loss: 30 MW).
- vii. At 1554 Hrs on 13.09.13, the GC IV tripped resulting in tripping of Unit-III (Generation loss: 36 MW).

Grid Incidence /Disturbance :

- i. At 0041 Hrs on 09.09.13, 132 kV Dimapur(PG) – Dimapur S/C tripped.
(Part of Nagaland system collapsed due to this tripping. Load loss – 50 MW)
- ii. At 1927 Hrs on 13.09.13, 132 kV PKBari – Ambassa S/C and 132 kV Budhjangnagar – Jirania S/C tripped followed by tripping of AGTPP U#1 & 4, Rokhia U# 3 & 4, Baramura U# 4.
(Generation Loss: AGTPP - 37 MW, Tripura – 30 MW, Load Loss – 47 MW)
- iii. At 1123 Hrs on 25.09.13, 132 kV Umiam I – Umiam III D/C lines tripped along with 132 kV Umiam III- Umiam IV D/C lines leading to partial load loss in Meghalaya system.
(Generation Loss: 55 MW, Load Loss – 46 MW)
- iv. At 0201 Hrs on 25.09.13, 132 kV Umiam I – Umiam III D/C lines tripped along with 132 kV Umiam III- Umiam IV D/C lines leading to partial load loss in Meghalaya system.
(Generation Loss: 89 MW, Load Loss – 70 MW)
- v. At 0101 Hrs on 25.09.13, 220 kV Sarusajai – Langpi I and II tripped along with U#1 of Langpi, followed by tripping of 220 kV Samaguri – Sarusajai I at 0140 Hrs and 220 kV Samaguri – Sarusajai II, 220 kV Sarusajai – Agia & 220 kV Sarusajai – Boko at 0145 Hrs leading to load loss in Capital area of Assam.

(Generation Loss: 50 MW, Load Loss – 150 MW)

- vi. At 1434 Hrs on 29.09.13, 132 kV Dimapur(PG) – Dimapur S/C and 132 kV Doyang-Mokokchung S/C tripped.

(Nagaland system collapsed due to these trippings. Load loss – 50 MW)

- vii. At 1626 Hrs on 29.09.13, 400 kV Balipara – Bongaigaon I and II tripped leading to isolation of NER Grid from rest of NEW Grid and subsequent loss of generation.

(Generation Loss: 380 MW)

Deliberation of the Committee

NERLDC informed that the PMU plots indicate that synchronisation of NER grid with NEW grid was not done properly. The subcommittee desired that such type of operation should be avoided in future. In case there is any problem with setting of check synchronizing relay, then same should be checked and rectified at the earliest. The subcommittee also expressed concern for tripping of generating units at Loktak, Kopili, Doyang, Pallatana and Leshka on number of occasions causing loss of generation. The generating companies were requested to look into the matter seriously and rectify the problem so that similar outages are not repeated in future. The sub-committee also requested Assam, POWERGRID to look into frequent tripping of 200kV Samaguri- Sarusajai line, 400kV Silchar-Byrnihat line, 400kV Silchar – Pallatana line and tripping of both circuits of 220kV Birpara – Salkati line etc. The remedial action taken by generating / transmission utility will be discussed in next PCC meeting. The Sub-committee requested that details of tripping should be sent to all the constituents in advance so that constituents can come with relevant information and discussion / deliberation can be fruitful.

NERPC agreed. NERPC has also requested all the constituents to furnish the details in advance so that the same can be circulated to them before the meeting.

The sub-Committee noted as above.

C.3 Any other item

- i. DGM (SO-II), NERLDC informed that Oscillation (including inter area oscillation) has been observed in NER system as per the PMU plots. This is a peculiar phenomenon and needs to be studied properly. The report from WRLDC is yet to be received by NERLDC. Once the report is received, it will be shared with constituents of the region so that thorough investigation can be carried out and matter can be discussed further.

The sub-Committee noted as above.

Date and Venue of next PCC

It is proposed to hold the 15th PCC meeting of NERPC in Arunachal Pradesh in second week of November, 2013. The exact date & venue will be intimated in due course.

The meeting ended with thanks to the Chair.

Annexure-I

List of Participants in the 14th PCC meeting held on 04/10/2013

SN	Name & Designation	Organization	Contact No.
1.	Sh. Tarik Mize, EE, SLDC	Ar. Pradesh	09436059758
2.	Ms. Oyi Nasi, AE, SLDC	Ar. Pradesh	08974938678
3.	Sh. H.C. Phukan, CGM, SLDC	Assam	09435559447
4.	Sh. J. K. Baishya, AGM, SLDC	Assam	09435041494
5.	Sh. A. K. Saikia, AGM, SLDC	Assam	09864116176
6.	Sh. G.K. Bhuyan, AGM, (Protection)	Assam	09954055295
7.	No Representatives	Manipur	
8.	Sh. A. Kharpan, SE, Me. PTCL	Meghalaya	09436117802
9.	Sh. D.J. Lyngdoh, AEE, SLDC	Meghalaya	09863063375
10.	Sh. M. Mawlieh, AEE	Meghalaya	
11.	Sh. Lalrema, SE, SLDC	Mizoram	09436140353
12.	Sh. Zoramdina, AE, SLDC	Mizoram	08415901755
13.	No Representatives	Nagaland	
14.	Sh. Debabrata Pal, Sr. Mgr	Tripura	09436500244
15.	Sh. N. R. Paul, DGM (SO -I)	NERLDC	09436302723
16.	Sh. P.P. Bandopadhyay, DGM (So-II)	NERLDC	09436302725
17.	Sh. Anupam Kumar, Engineer	NERLDC	09436335379
18.	Sh. P. Kanungo, DGM	NERTS	09436302823
19.	Sh. Bhaskar Goswami, Sr. Mgr.	NEEPCO	09436163983
20.	Sh. D.Goswami, Sr.Mgr. (E/M)	NEEPCO	09435577655
21.	Sh. R. C. Singh, Mgr (E)	NHPC	09436894889
22.	Sh. Parshuram Saha, Advisor(O&M)	OTPC	08974728670
23.	Sh. S.K. Ray Mohapatra, MS I/C	NERPC	09818527857
24.	Sh.B. Lyngkhoi, SE (O)	NERPC	09436163419
25.	Sh. S. M. Jha, EE (O)	NERPC	09831078162

UFR INSTALLED IN NORTH EAST

Sl. No	Name of States	Name of feeder where UFR Installed	Stage-wise & Frequency setting	Quantum of load relief	
				Peak Load (MW)	Off - Peak Load (MW)
1.	Ar. Pradesh	11 KV Banderdewa - Satyam Ispat	Stage - I (48.8 Hz)	3.5 MW	3.5 MW
			Stage - II (48.5 Hz)	3.5 MW	3.5 MW
			Stage - III (48.2 Hz)	3.5 MW	3.5 MW
2.	Assam	i) 132 KV Garmur (Jorhat - I)	Stage - I (48.8 Hz)	13 MW	8 MW
		ii) 220 KV Samaguri (Rupahi)		8 MW	6 MW
		iii) 132 KV Panchgram (Hailakandi)		7 MW	5 MW
		iv) 132 KV Dhaligoan (Chapaguri)		7.8 MW	4.5 MW
			Total of Stage - I	35.8 MW	23.5 MW
		i) 132 KV Depota (Jamaguri)	Stage - II (48.5 Hz)	8 MW	4 MW
		ii) 220 KV Mariani (Teok)		7 MW	5 MW
			Total of Stage - II	15 MW	9 MW
		220 KV Samaguri (Mirza)		20 MW	15 MW
3.	Manipur	33 KV Yurembam - Leimakhong	All 3 stages	3 MW	3 MW
4.	Meghalaya	33 KV NEHU - Happy Valley	Stage - I (48.8 Hz)	8 MW	5 MW
		33 KV Nongstoin - Mairang	Stage - II (48.5 Hz)	8 MW	5 MW
		33 KV Rongkhon - Garobadha	Stage - III (48.2 Hz)	10 MW	5 MW
5.	Mizoram	33/11 KV Lower SS at Zuangtui	Stage - I (48.8 Hz)	5.1 MW	3.1 MW
		33/11 KV Lower SS at Zuangtui	Stage - II (48.5 Hz)	5.1 MW	3.1 MW
		33/11 KV Lower SS at Mualpui	Stage - III (48.2 Hz)	5.1 MW	3.1 MW
6.	Nagaland	132/66/33 KV Mokokchung SS	Stage - I (48.8 Hz)	3 MW	3 MW
		132/66/33 KV Nagarjan SS	Stage - II (48.5 Hz)	3 MW	3 MW
		132/66/33 KV Kohima SS	Stage - III (48.2 Hz)	3 MW	3 MW
7.	Tripura	33 KV Mohan Pir Feeder	Stage - I (48.8 Hz)	8 MW	8 MW
		33 KV Badharghat Feeder	Stage - II (48.5 Hz)	7 MW	7 MW
		33 KV Durjoy Nagar Feeder	Stage - III (48.2 Hz)	7 MW	7 MW

Annexure - C. 3 (ii)

SN	Name of State	Total Quantum of Load Shedding required	Location where URF installed (Feeder's Name)	Stage	Load in each feeder	Quantum of Load shedding (MW) implemented	Additional quantum of load shedding required
1	Ar. Pradesh	20	At Satyam Ispat (11 KV Banderdewa - Satyam Ispat)	Stage - I (49.2 Hz)		3.5	1.5
			To be identified	Stage - II (49.0 Hz)		0	5
			To be identified	Stage - III (48.8 Hz)		0	5
			To be identified	Stage - IV (48.6 Hz)		0	5
2	Assam	220	At Gauripur (132 KV Dhaligoan - Gossaigoan - Gauripur)	Stage - I (49.2 HZ)	16	54.5	0
			At Sipajhar (132 KV Depota - Rowta - Sipajhar)		10		
			At Dhemaji (132 KV Gohpur - Nalkata - Dhemaji)		11		
			At Majuli (132 KV Nalkata - Majuli)		2.5		
			At Baghjap (132 KV Kahilipara - Chandrapur - Baghjap)		15		
			At Diphu (132 KV Samaguri - Sankardev - Diphu)	Stage - II (49.0 Hz)	11	61	0
			At Gohpur (132 KV Samaguri - B. Chariali - Gohpur)		8		
			At Rupai (132 KV Tinsukia - Rupai + AP Load)		17		
			At Jogighopa (132 KV Dhaligoan - Jogighopa)		7		
			At Sankardevnagar (132 KV Samaguri - Sankardevnagar)		18		

SN	Name of State	Total Quantum of Load Shedding required	Location where URF installed (Feeder's Name)	Stage	Load in each feeder	Quantum of Load shedding (MW) implemented	Additional quantum of load shedding required
2	Assam		At Gossaigoan (132 KV Dhaligoan - Gossaigoan)	Stage - III (48.8 Hz)	7	59	0
			At Rowta (132 KV Depota - Rowta)		18		
			At Chandrapur (132 KV Kahilipara - Chandrapur)		12		
			At Nalkata (132 KV Gohpur - Nalkata)		11		
			At Bokakhat (132 KV Jorhat - Bokakhat)		11		
			At Sishugram (132 KV Sarusajai - Sishugram)	45	57	0	
			At Ledo (132 KV Tinsukia - Ledo)	12			
3	Manipur	20	At Yurembam (33 KV Yurembam - Leimakhong)	Stage - I (49.2 Hz)		3	2
			To be identified	Stage - II (49.0Hz)		0	5
			To be identified	Stage - II (48.8Hz)		0	5
			To be identified	Stage - II (48.6Hz)		0	5
SN	Name of State	Total Quantum of Load Shedding required	Location where URF installed (Feeder's Name)	Stage	Load in each feeder	Quantum of Load shedding (MW) implemented	Additional quantum of load shedding required

4	Meghalaya	60	At Nangalbibra (33 KV Mendipathar - Nangalbibra)	Stage - I (49.2 Hz)	6.5	15	0
			At Rongkhon (33 KV Garobadha I - Rongkhon)		8.5		
			At Mawphlang (132/33 KV, 20 MVA Transformer)	Stage - II (49.0 Hz)		15	0
			At Khliehriat (132/33 KV, 20 MVA Transformer)	Stage - III (48.8 Hz)	12	15	0
			At Nongstoin (33 KV Nongstoin - Mairang)		3		
			At Mawlai (33 KV Mawlai - Nongthymmai)	Stage - IV (48.6 Hz)	7.5	15	0
			At NEHU (33 KV NEHU - Happy Valley)		7.5		
5	Mizoram	20	At Zuangtui (Feeder's Name to be given at Zuangtui)	Stage - I (49.2 Hz)		5.1	0
			At Mualpuii (Feeder's Name to be given at Mualpui)	Stage - II (49.0 Hz)		5.1	0
			To be identified	Stage - III (48.8 Hz)		0	5
			To be identified	Stage - IV (48.6 Hz)		0	5
SN	Name of State	Total Quantum of Load Shedding required	Location where URF installed (Feeder's Name)	Stage	Load in each feeder	Quantum of Load shedding (MW) implemented	Additional quantum of load shedding required
			At Mokokchung (11 KV Feeder of Mokokchung load)	Stage - I (49.2 Hz)		3	2

6	Nagaland	20	At Nagarjan (Feeder's Name to be given at Nagarjan)	Stage - II (49.0 Hz)		3	2
			At Kohima (Feeder's Name to be given at Kohima)	Stage - III (48.8 Hz)		3	2
			To be identified	Stage - IV (48.6 Hz)		0	5
7	Tripura	40	At Badharghat (33 KV Badarghat - Bishalghar)	Stage - I (49.2 Hz)	8.5	11	0
			At Badharghat (33 KV Badarghat - Takarjala)		2.5		
			At 66 KV Rabindra Nagar (33 KV Rabindra Nagar - Melaghar)	Stage - II (49.0 Hz)	6.5	10	0
			At 66 KV Rabindra Nagar (33 KV Rabindra Nagar - Kathalia)		3.5		
			At 79 Tilla (33 KV, 79 Tilla - Mohanpur)	Stage - III (48.8 Hz)	7.5	14.5	0
			At 79 Tilla (33 KV, 79 Tilla - Durjoy Nagar)		7		
			At 79 Tilla (33 KV, 79 Tilla - College Tilla)	Stage - IV (48.6 Hz)		12.5	0

Note: The inbuilt UFR of existing Numerical Relay at identified locations (at 132 KV level) of Assam, Meghalaya & Tripura can be used for above purpose. Existing UFR can also be shifted to new locations, wherever required.

In respect of Ar. Pradesh, Manipur, Mizoram & Nagaland: Setting of existing UFR needs to be changed in case they use the same Feeder. (i.e. 48.8 Hz to be set to 49.2 Hz for Stage - I), (48.5 to be set to 49.0 Hz for Stage - II) & (48.2 Hz to 48.8 Hz for Stage - III) Feeder is to be identified at the earliest for remaining quantum of load shedding of other stages of 48.8 Hz & 48.6 Hz.

STATUS OF UFR IMPLEMENTATION IN NER

Stage	Load shed Required	Implemented	To be Implemented
Stage - I (49.2 Hz)	100 MW	94.5	5.5
Stage - II (49.0 Hz)	100 MW	88	12
Stage - III (48.8 Hz)	100 MW	83	17
Stage - IV (48.6 Hz)	100 MW	80	20
TOTAL	400 MW	345.5	54.5