North Eastern Regional Power Committee

MINUTES OF THE 16th PROTECTION COORDINATION SUB-COMMITTEE MEETING OF NERPC

Date: 06.12.2013 (Friday)

Time: **13:30 Hrs.**

Venue: "Hotel Pragati Manor," Guwahati.

The List of Participants in the 16th PCC Meeting is attached at **Annexure – I**

The meeting was started after the 92nd 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 15th MEETING OF PROTECTION SUB-COMMITTEE OF NERPC.

SE (O), informed that the minutes of the 15th meeting of the PCC held on 15th November, 2013 at Itanagar were circulated vide letter NERPC/SE (O)/PCC/2013/6178 -6201 dated 27th November, 2013.

No comments or observations were received from any of the constituents, the minutes of 15th PCC meeting was confirmed.

I T E M S F O R D I S C U S S I O N

B. FOLLOW UP ACTION

B.1. Independent third party audit of protection system

During 91st OCC meeting, SE (O) informed that 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.

In the meantime the draft project proposal prepared by NERPC was sent to constituent states of the region for suggestion/comments / observations and no response was received from any states except Assam. After incorporating the suggestion from Assam, the draft project proposal has already been submitted to Secretary, Ministry of Power (Govt. of Tripura) with request to submit the proposal, on behalf of the region, to Ministry of Power (Govt. of India) through Chairman NERPC & Hon'ble Minster of Power, Govt. of Tripura.

Member Secretary I/C requested all constituent states of the region to take up the issue with their respective Power Ministry for approaching the Ministry of Power, Govt. of India so that funding under NLCPR-Central is approved at the earliest and the schemes is implemented early for smooth operation of the grid for the benefit of the region as well as for the country. He also highlighted that the project funded under NLCRP-Central will be executed by Central Agency as per the guidelines.

CE, Ar. Pradesh expressed reservation on implementation of the scheme by Central Agency. He was of the opinion that funds should be given to the States instead of getting the work done by Central Agency as the state agencies are more familiar with ground reality and can execute the work in a better manner. He requested all other constituent states to look into the matter regarding the funding pattern and executing agency.

DGM, POWERGRID stated that certain works need to be carried out on urgent basis by the NER constituents even if funding is not available from external resources in order to avoid unwarranted tripping / system isolation and smooth operation of the Grid. Accordingly, he suggested that based on the protection audit report, essential rectification work should be taken up at the earliest without waiting for funding.

Deliberation of the Committee

Member Secretary I/C requested all constituent states of the region to take up the issue with their respective Power Ministry for approaching the Ministry of Power, Govt. of India so that fund is made available from NLCPR-Central at the earliest and the schemes is implemented early for smooth operation of the grid for the benefit of the region as well as for the country.

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 Sub-committee reviewed 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 pertaining to NER as given below:

A: GENERATOR PROTECTION

SN	Protection	Purpose of Protection and Setting
1	Generator Differential Protection (87G1 &87G2)	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 x V_n & T_{S1}= 10 Sec. [**5 Sec. (NTPC)]** Stage # II: V_{S2}= 1.3 x V_n & T_{S2}= 0.5 sec. [**100 ms. (NTPC)]**
8	Generator Over Load Protection (for Hydro machines) (51G)	Generator Over load protection is provided as an additional check of the stator winding temperature. Alarm Time delay: 2.5 to 25 Sec.
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 Sec. 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 (This should be treated as separated item – NEEPCO)** 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 Sec. Trip (Second Rotor Earth fault), Time delay: 5 Sec. But it is recommended that the machine is taken out of service at the earliest opportunity after the occurrence of first earth fault. **Rotor O/L & O/C protection trip (NTPC)**
15	Generator winding and bearing temperature protection (49G)	Generator winding and bearing temperature protection prevents generator winding / bearing from high temperature operation. Alarm **Trip in place of winding warm gas temp high (NTPC)** The temperature settings shall be as per manufacturer's recommendations.

16	Generator Circuit Breaker Failure Protection(50ZGCB) [To be provided Generators provided with Generator Circuit Breaker (GCB)]	Generator Circuit Breaker Failure operated in case of failure of GCB. Trip
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	Overall Differential Protection is provided for internal short circuit fault in generator and Generator transformer **& Unit Transformer (NTPC).** Trip
	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).

(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 **picking up more than 20%. (NTPC)** 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 **No REF for 500MW unit, only 87 HV protection in place of REF- (NTPC)**
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 No O/C protection for GT – (NTPC).**
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. **Alarm & Trip contacts both hooked up for TRIP – (NTPC).**

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 with time delay – (NTPC)** 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 with time delay – (NTPC)** 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. 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) <u>Protection for Unit Auxiliary Transformer (UAT) and Station Auxiliary Transformer (SAT)</u>

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 with time delay – (NTPC)** 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 with time delay – (NTPC)** 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) <u>Protection for Excitation Transformer</u>

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. **No REF, Short Circuit Protection provided for excitation transformer – (NTPC).**
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. Suggestions received from NTPC has been incorporated and highlighted in bold letters.

B.3 <u>Implementation of islanding scheme in NER</u>

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		

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

During 91st OCC meeting, SE (O) informed that the above meeting of Study group could not be held at Kahilipara on 25.10.2013 due to unavoidable circumstances and the same was postponed.

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

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)

AGM (Protection), AEGCL had requested NERPC to include MD, APGCL/APDCL in the mailing list so that data pertaining to generation can be obtained from them. NERPC agreed.

The Sub-committee decided to have the **meeting of the sub-group at 13:30 PM on 29th November,** 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.

Accordingly, the 1st meeting of the subgroup on the Islanding Scheme was held on 29.11.2013 at SLDC, Kahilipara and the deliberation in the meeting was as follows:

1. NERLDC gave brief presentation on system studies carried out in connection with 1st and 2nd islanding schemes. NERLDC informed that in case of 1st islanding scheme, in general the generation (in the proposed islanded pocket) will be more (of the order of 100-150MW) than the connected load depending on peak/off-peak and summer/winter/monsoon condition. Similarly in case of 2nd islanding scheme the generation (in the proposed islanded pocket) will be more (of the order of 30-50MW) than the connected load under off-peak condition and less (of the order of 20-25MW) than the connected load under peak condition. The gap between expected generation and load will vary and hence proper load generation balance would be required for survival of islanded pocket.

2. It was decided to focus on implementation of 1st Islanding scheme comprising of generating units of AGBPP (Gas), NTPS (Gas) & LTPS (Gas) and associated load of Upper Assam System, Deomali Area of Arunachal Pradesh.

3. The representatives of NEEPCO, AEGCL & Tripura were requested to send the machine data to IIT, Guwahati & NERLDC by 1st week of December 2013. In case relevant information is not available with the generating companies, standard values may be assumed for the studies.

4. Professor Tripathy of IIT, Guwahati was requested to carry out relevant system studies associated with the proposed islanding schemes based on the relevant machine data provided by LTPS, NTPS, AGPPP, AGTTP, and Tripura. Simulation should be carried out by opening unit (s) of AGBPP / NTPS / LTPS to see the behavior of the system. NERLDC will also carry out similar exercise in consultation with Prof. Tripathy and the result of study will be discussed in OCC/PCC meetings.

5. Feeders / loads considered under four staged (49.2 Hz, 49.0 Hz, 48.80Hz, 48.60Hz) UFR based load shedding /any manual shedding should not form part of proposed islanded pocket.

6. During discussion it was brought to notice that machines at Namrup, Lakwa and AGBPP are quite old, unit sizes are also quite different and of different make. Moreover, being gas based machines, reduction in generation by way of reducing fuel/gas input may not practically feasible and hence de-synchronization / isolation of generating unit (s) one after the other, operating with own house load, will be done to balance load and generation. It was decided that the de-synchronization / isolation of generating unit (s) of AGBPP will be followed by units of Namrup and Lakwa as per requirement to achieve required load and generation balance.

7. UFR may also be installed in feeders / loads for automatic load shedding.

8. Programmable Logic Controller (PLC), UFR and df/dt relays etc. may be required at generating stations and substations for automatic balancing of load and generation.

9. The scheme will be formulated by NEEPCO and PGCIL in association with NERLDC and the target date of implementation of 1st Islanding Scheme proposed at 48.8Hz is January 2014.

10. The Committee also decided that the 2nd Islanding Scheme proposed at 48.2Hz will be implemented soon in similar line after implementation of 1st islanding scheme.

11. In general, the house was of the opinion that proposed 3rd islanding scheme (the isolation of NER from ER at 47.9Hz) should not be considered for the time being as most of the time NER is importing power from ER except during high hydro season. The isolation of NER from ER could be detrimental for NER Grid and NER grid may not survive after isolation.

Deliberation of the Committee

SE(O) stated that as the matter had already been discussed deliberately during the meeting held on 29.11.2013, he requested the forum to discuss about the implementation of the scheme so that the same shall be in place before January 2014.

After detailed deliberation, the Sub-committee decided to have the meeting of representative (s) of Assam, NEEPCO, POWERGRID, NERLDC & NERPC at Shillong during December 2013 to discuss about the implementation plan so that the first Islanding scheme proposed at 48.8 HZ will be implemented by January 2014. The date of the meeting will be intimated by NERPC.

The Sub-committee noted as above.

B.4 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 and Nagaland in the meeting is given below:

i. 220 kV Samaguri – Sarusajai I (Jawharnagar) - **Completed**
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 – **Dec'13**

To be reviewed by Assam

vi. 66 kV Dimapur – Bokajan (Singrijan, Power House & Dairy Farm) – **Representative of Nagaland** stated that they will refer to the case higher Authority.

The sub-Committee noted as above.

B.5 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	**Nov, 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).

Deliberation of the Committee

Sub-committee requested Assam to inform the status of implementation of 2nd DPR at Samaguri substation for 220kV Balipara – Samaguri line and action plan for installation of Line Differential relays for BTPS – Salakati 220kV lines in next PCC meeting.

The sub-Committee noted as above.

B.6 400 KV Bus Arrangement at Ranganadi:

It has been observed that 400 KV Bus at Ranganadi is operated in single bus mode and it is connected at Bus-B. As per information from Ranganadi, reason for keeping in single bus is due to failure of one of the Bus CT.

As per CEA's Technical Standard for Construction of Electrical Plants and Electric Lines Regulations, it is suggested that at 400kV level, layout of Air Insulated Substation shall be either one or half breaker scheme or double main and transfer bus scheme depending on the importance of the station.

Considering the importance of Ranganadi station, it is requested that bus arrangement at 400kV may be corrected at the earliest and both buses at 400kV should be available in service all the time and feeders/ICTs distributed at each bus accordingly.

Deliberation of the Committee

DGM, NERLDC requested NEEPCO to restore the bus coupler bay at the earliest for enhancing reliability of the system with two buses. NEEPCO agreed to that.

The Committee noted as above.

C. NEW ITEMS

C.1 Major Grid Disturbances during November, 2013:

There was no grid disturbance during the month of November, 2013**.**

For kind information only.

Major Events in North-Eastern Regional Grid during the period w.e.f. 4th November, 2013 to 30th November, 2013

List of multiple tripping of elements and tripping of important elements in North Eastern Regional Grid during the period w.e.f. 4th November, 2013 to 30th November, 2013 are attached at **Annexure C.1.**

C.2 Any other item

i. DGM, POWERGRID informed that on 11.11.2013 fault which occurred on 220 KV Samaguri – Sarusujai and surprisingly, the fault has been extended up to Misa S/S. He requested Assam to look into the matter.

Date and Venue of next PCC

It is proposed to hold the 17th PCC meeting of NERPC in second week of January, 2014. The exact date & venue will be intimated in due course.

The meeting ended with thanks to the Chair.

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Annexure-I

List of Participants in the 16th PCC meeting held on 06/12/2013

SN	Name & Designation	Organization	Contact No.
	No Representatives	**Ar. Pradesh**	
1.	Sh. H.C. Phukan, CGM, SLDC	Assam	09435559447
2.	Sh. P. K. Sarma, GM (Com-T)	Assam	09435344083
3.	Sh. B. C. Bordoloi, DGM, SLDC	Assam	09435045675
4.	Sh. P. Hazarika, DGM	Assam	09435193264
5.	Sh. J. K. Baishya, AGM, SLDC	Assam	09435041494
6.	Sh. A. K. Saikia, AGM, SLDC	Assam	09864116176
7.	Sh. K. Goswami, AGM, Com-T	Assam	09864020019
8.	Sh. G.K. Bhuyan, AGM, (Protection)	Assam	09954055295
9.	Sh. A. Bhattarcharjee, DM (Protection)	Assam	09435332928
	No Representatives	**Manipur**	
10.	Sh. T. Gidon, EE, SLDC	Meghalaya	09863063375
11.	Sh. K. Lyngwa, EE (T&T)	Meghalaya	
12.	Sh. Vanlalrema, SE, SLDC	Mizoram	09436140353
13.	Sh. A. Jakhalu, EE (Trans)	Nagaland	09436002696
	No Representatives	**Tripura**	
14.	Sh. N. R. Paul, DGM (SO –I)	NERLDC	09436302723
15.	Sh. Anupam Kumar, Engineer	NERLDC	09436335379
16.	Sh. P. Kanungo, DGM	NERTS	09436302823
17.	Sh. Bhaskar Goswami, Sr. Mgr.	NEEPCO	09436163983
18.	Sh. R. C. Singh, Mgr (E)	NHPC	09436894889
19.	Sh. Parshuram Saha, Advisor(O&M)	OTPC	08974728670
20.	Sh. S.K. Ray Mohapatra, MS I/C	NERPC	09818527857
21.	Sh.B. Lyngkhoi, SE (O)	NERPC	09436163419
22.	Sh. S. M. Jha, EE (O)	NERPC	09831078162

ANNEXURE – C.1

Period from 04/11/2013 to 30/11/2013

SN.	Name of Transmission Element/Generator Tripped	Owner / Utility	Date of Event	Time of Event	Effect (Loss of Generation/ Load in MW)
A. Multiple / Repeated tripping					
1	132 kV Imphal (PG)- Imphal -I	POWERGRID	08-11-2013	0652	**Load Loss: 86**
	132 kV Imphal (PG)- Imphal -II	Manipur			
2	132 kV Dimapur (PG) - Dimapur	POWERGRID	08-11-2013	1344	**Load loss: 49**
3	132 kV Loktak -Imphal	POWERGRID	09-11-2013	0555	**Generation Loss: 107 Load Loss: 107**
	132 kV Loktak- Jiribam				
	132 kV Loktak - Ningthoukhong	Manipur			
	132 kV Imphal (PG)- Imphal -I	POWERGRID			
	132 kV Imphal (PG)- Imphal -II	Manipur			
	132 kV Loktak - Renpang				
4	220 kV Misa- Samaguri I	POWERGRID	12-11-2013	1240	**Load Loss: 25**
	220 kV Misa- Samaguri II				
	220 kV Samaguri- Sarusajai II	AEGCL		1239	
	220kV J.Nagar- Sarusajai				
	220/33kV, 50 MVA Transformer I & II at J.Nagar				

5	400/132 kV, 360 MVA, ICT II at Ranganadi	NEEPCO	13-11-2013	1025	**Load loss: 55**
				1056	**Load loss: 41**
6	132 kV Khlierahat- Khlierahat I	POWERGRID	14-11-2013	1327	**Load Loss:48**
	132 kV Khlierahat- Khlierahat II	MePTCL			
7	400kV Balipara - Ranganadi I	POWERGRID	20-11-2013	1452	**Load Loss: 52**
	400kV Balipara - Ranganadi II				
	132kV Ranganadi - Nirjuli				
	132kV Ranganadi - Ziro				
8	132kV Ranganadi - Ziro	POWERGRID	21-11-2013	1816	**Load Loss: 25**
				1854	**Load Loss: 25**
9	132kV Silchar- Dullavchera	AEGCL	25-11-2013	1112	**Load Loss: 7**
	132kV Silchar- Dullavchera	AEGCL		1208	
	132kV Dullavchera- Dharmanagar	AEGCL/TSECL			

B. Cascade tripping					
1	132 kV Khliehriat(PG) - Khliehriat I	POWERGRID	13-10-2013	0829	-
	132 kV Khliehriat(PG) - Khliehriat II	MePTCL		0849	-

C. Power Station Blackout					
1	Loktak U#1	NHPC	09-11-2013	0555	**Generation Loss: 107 Load Loss: 107**
	Loktak U#2				
	Loktak U#3				

D. Unit tripping

1	AGBPP U#9	NEEPCO	04-11-2013	2250	**Generation Loss: 24**
2	Kopili U#2	NEEPCO	10-11-2013	1245	**Generation Loss: 31**
3	Kopilli U#4	NEEPCO	18-11-2013	1422	**Generation Loss: 48**
4	Ranganadi U#1	NEEPCO	18-11-2013	1736	**Generation Loss: 133**
5	AGBPP U#2	NEEPCO	21-11-2013	0948	**Generation Loss: 71**
	AGBPP U#4				
	AGBPP U#3			0955	
6	AGTPP U#1	NEEPCO	21-11-2013	1013	**Generation Loss: 40**
	AGTPP U#4				
7	AGBPP U#2	NEEPCO	21-11-2013	1020	**Generation Loss: 30**
8	AGBPP U#2	NEEPCO	22-11-2013	1256	**Generation Loss: 28**
	AGBPP U#4			1256	
9	Kopili U#2	NEEPCO	26-11-2013	0832	**Generation Loss: 52**

E. Tripping of critical element					
1	220 kV-Misa - Byrnihat I	Me. PTCL	13-11-2013	1232	
2	132 kV Dimapur- Imphal	POWERGRID	14-11-2013	1206	
3	132 kV Ranganadi - Nirjuli	POWERGRID	15-11-2013	1040	**Load Loss: 28**
4	132 kV Ranganadi - Ziro	POWERGRID	17-11-2013	1834	**Load Loss: 24**
5	132 kV Ranganadi - Ziro	POWERGRID	18-11-2013	1727	**Load Loss: 24**
6	220 kV BTPS - Agia	AEGCL	19-11-2013	1707	
7	132 KV Dimapur (PG) - Dimapur	Nagaland	29-11.2013	1558	**Load Loss: 60**