Agenda of 11th System Studies Meeting in NER

Date: 16.12.2015. **Venue: Hotel Nandan, Guwahati**

1. Review of SPS I, II, III & SPS IV related to Palatana GBPP, OTPC after commissioning of Palatana Module II

Out of the four (4) System Protection Scheme (SPS) associated with generating Unit-1 (363.3MW) of OTPC at Palatana, two (2) SPS have already been implemented:

SPS II (implemented w.e.f 23.02.15):

In case of tripping of 400 kV Palatana- Silchar D/C lines (with Module I generation of Palatana, OTPC), load will be disconnected by tripping of the following elements:

132 kV Silchar - Srikona D/C
132 kV Silchar - Panchgram
132 kV Badarpur - Panchgram
132 kV Silchar - Dullavcherra - Dharmanagar

And Generation of Palatana, OTPC will be reduced to around 20 MW excluding their auxiliary consumption.

During 5th SS meeting, OTPC representative informed that they are planning different scheme in place of SPS-II above, since reduction of generation to 20 MW is not possible.

During 8th SS Meeting, DGM, (SO-II), NERLDC informed that till date they have not received the new scheme planned by them.

After detailed deliberation, the Sub-committee directed OTPC to send the schematic details of the new scheme planned by them to NERLDC/NERPC by **16.08.2015**.

During 9th SS meeting, DGM (SO-II), NERLDC informed that new SPS II scheme is proposed by Palatana, OTPC. He stated that the following scheme proposed by Palatana, OTPC may be agreed:-

1. On receipt of trip signal of both 400 kV lines from Silchar end through PLCC or at OTPC end, if both or single 132 kV line available and generation above 120 MW, then trip command generated to ICT HC side breaker to avoid sudden overloading of 132 kV lines. The trip signal will be generated by executing algorithm in DCS.

2. When both 132 kV lines tripped along with 400 kV line, no tripping shall be initiated as all generators breaker tripped on over speed protection on protection class C.

However the following scheme proposed by Palatana, OTPC may not be agreed as 120 MW may not be absorbed by Tripura system under certain scenario.

1. When total generation of OTPC<=120 MW, no breaker tripping shall be initiated. As the load reduction done manually subjected to availability of 132 kV lines (if both 132 lines available load reduction not required)

OTPC had informed that total generation shall be varying from 15 MW to 726.6 MW. It is proposed that in case of tripping of 400 kV Palatana – Silchar I & II line, Palatana generation will be reduced to 15 MW through SPS II when both 132 kV lines from Palatana are available.

During 10th SS meeting, OTPC informed that D/T signal from Silchar end is required to implement the changes in SPS-2, POWERGRID agreed to do the needful. The Sub-Committee requested OTPC to implement the changes in SPS-1, as decided in 38th PCCM and SPS-2 before next PCC meeting.

NERLDC/OTPC may kindly intimate the current status.

2. Submission of Detailed scheme and Schematic diagram of each SPS in NER:

SPS document of NER is updated on monthly basis for which details of SPS scheme, Date from which it is effective, Schematic Diagram of SPS are required. At present 9 no of SPS are in service in NER grid which can be categorized as:

a. Tripping of critical line(s) / corridor

i. Tripping of 400 kV Silchar- Palatana D/C lines

ii. Tripping of 400 kV Silchar – Azara S/C and 400 kV Silchar – Byrnihat S/C lines with no generation in Palatana

iii. Tripping of 132 kV Umiam Stg-I to Umiam St-III D/C lines

iv. Tripping of 400/132 kV, 2x200 MVA ICTs at Silchar (PG)

b. Safe evacuation of generation

i. Tripping of 400 kV Silchar – Azara S/C and 400 kV Silchar – Byrnihat S/C lines with 1st Module Palatana CCGT

ii. Generation evacuation of AGTPP

c. Overloading of Transformers / Critical line(s)

i. Overloading of 220 kV Salakati – BTPS D/C lines

ii. SPS associated with more than 60 MW loading from LV to HV side of Azara ICTs

d. For Reliable operation of Grid

i. Tripping of 1st Module of Palatana CCGT

During 10th SS meeting, AEGCL, POWERGRID & NEEPCO agreed to furnish the information in block diagram format to NERLDC/NERPC soon.

AEGCL, POWERGRID & NEEPCO may kindly intimate the status.

3. Review of SPS at AGTPP:

Tripura wanted to review the SPS of AGTPP as below:

SPS based on

a. Generation reduction of AGTPP (up to 40 MW)
b. Monarchak- Unit-I (up to 30 MW)
c. Opening of 132 KV P K Bari Silchar D/C line
d. Generation Reduction of Baramura Unit –V (15 MW)

In case of tripping of any one of the following lines:

i. 132 kV AGTPP –Kumarghat line/ 132 KV Dhalabil –Agartala line/ 132 KV Baramura –Gamaitilaline.

ii. And even in case of tripping of 132 KV Dhalabil – Kamalpur line/ 132 KV Kamalpur- PK Bari line & 132 KV Gamaitila- Ambassa/ 132 Ambassa- P K Bari line.

It has been observed from study results that after commissioning of Palatana 2nd Module, Monarchak Unit I, AGTPP Unit 5 & 6 and charging of 132 KV P K Bari – Silchar D/C lines, 132 kV AGTPP –Kumarghat, 132 kV Dhalabil –Agartala, 132 kV Baramura-Teliamura & 132 kV Teliamura Ambassa lines will be highly loaded.

Members may like to discuss.

4. Dynamic Simulation data for Generator in NER Grid:

The CERC's Procedure for Grant of Connectivity to generators makes in mandatory for new generators requesting connection to the Grid to furnish Dynamic Simulation data as per Schedule-VI of the Procedure for Generators and for Excitation system.

The data to be furnished as per CERC's Procedure for Grant of Connectivity includes complete data for the Generator model, complete Excitation system data alongwith Laplace Domain block diagram.

The CERC's Procedure for Grant of Connectivity does not make in mandatory for generators to furnish dynamics modelling data for Governors, Power System Stabilizer, Over-excitation limiter (OEL) and Under-excitation limiter (UEL), and any other control equipment.

The CEA's Manual on Transmission Planning criteria (Section 6.2.2, 6.3 and 6.4) also speaks of simulation in the Transient state for evaluation of stability under N-1-1

contingency criteria, for which working dynamics model data for all generators in the Grid are mandatory.

The dynamic simulation data from only IGSS are available with NERLDC as of now. The data available with NERLDC as of now are listed below:

i) Generator Model:

For the generator model, GENROU model has been considered for Thermal generators and GENSAL model considered for Hydro generators (Salient Pole) by NERLDC in absence of any concrete information from generating utilities.

- Palatana (GTG I, GTG II, STG I & STG II- except S(1.0) & S(1.2))
- BgTPP (Unit 1, 2 & 3- except S(1.2))
- AGBPP (Unit 1,2,3,4,5,6, 7, 8 & 9)
- AGTPP (Unit 1, 2,3 & 4 - only D-axis data)
- Monarchak (GT I- only D-axis data)
- AGTPP Extension (Unit 1 & 2- except S(1.0) & S(1.2))
- Doyang (Unit 1,2 & 3- only Xd, Xd' & Xd'')
- Kopili (Unit 1,2,3 & 4- except T''d0, T''q0, S(1.0) & S(1.2))
- Khandong (Unit 1 & 2 - except T"q0, D, Xl, S(1.0) & S(1.2))
- Kopili Stg II (except T"q0, D, Xl, S(1.0) & S(1.2))
- Ranganadi (Unit 1, 2, & 3, - except T''q0, H, D, S(1.0) & S(1.2))
- Loktak (Unit 1,2 & 3- except T''d0, T''q0, D, X'd, Xl, S(1.0) & S(1.2))

ii) Excitation system model:

- AGBPP (Unit 1,2, 3 & 4- partially given)
- Palatana (Only block diagram of Exciter given)
- BgTPP (Only block diagram of Digital AVR given)
- Monarchak (Only block diagram of Exciter given)
- Loktak (only Exciter data given; needs validation as values out of range as per setting of PSSE)

iii) Governor system model:

No data furnished by any generating utility.

iv) PSS model:

No data furnished by any generating utility.

v) Excitation limiters (OEL and UEL) model:

No data furnished by any generating utility.

Non-availability of dynamics simulation data makes it difficult to perform converged dynamic simulation for assessment of Contingencies or for study of efficacy of System Protection Schemes and Islanding Schemes.

All the ISGS are requested to furnish validated dynamic simulation data to enable NERLDC / NLDC to carry out simulation studies. The SLDCs of North-Eastern Region are required to collect the data from Intra-state generators for purpose of modeling.

5. <u>Assessment of Total Transfer Capability (TTC), Transmission Reliability Margin (TRM) and Available Transfer Capability (ATC) by SLDC on respective Inter-State Transmission Corridor</u>

SLDCs of NER are requested to assess the above on monthly basis, 5 months in advance (eg: TTC/TRM/ATC for the month of November to be calculated by 15th of July), for further assessment of TTC, ATC and TRM of NER–ER corridor, group of control areas, individual control areas with the region and state-control-area to state-control-area by NERLDC, if required.

SLDCs are also requested to send study results for Peak (Export & Import) & Off Peak (Export & Import) along with assumptions in details and 6 nos ".sav" case files (Base Case for Peak & Off Peak, Off Peak & Peak Export & Off Peak & Peak Import) to NERLDC by 15th of the month for the fifth month. All India ".sav" case files have been sent to SLDCs. SLDCs are requested to use this ".sav" case files while computing TTC, ATC & TRM for their state control area.

The study results for assessment of Total Transfer Capability (TTC), Transmission Reliability Margin (TRM) and Available Transfer Capability (ATC) have not been received from any SLDC of NER.

Updated Base Cases have been already mailed to all the SLDCs on 08.12.15. All the SLDCs are requested to assess the Total Transfer Capability (TTC), Transmission Reliability Margin (TRM) and Available Transfer Capability (ATC) and submit the cases to NERLDC for the month of April'16 by 15th December, 2015.

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