

MINUTES OF SPECIAL MEETING ON SPS

Date: 23/06/2017 (Friday)

Time : 10:30 hrs

Venue : "NERLDC Conference Hall", Shillong.

The List of Participants in the Meeting is attached at **Annexure - I**

Shri P.K. Mishra, Member Secretary, welcomed all the participants and stated that the issues relating to SPS for power transfer to Bangladesh, Islanding Schemes, SPS etc., are to be reviewed in view of the changing power scenario in the grid. He mentioned that the above schemes were prepared almost three years ago and has to be discussed, reviewed and finalized for the benefit of the region. He requested all the participants to actively participate in the meeting for fruitful deliberation.

Thereafter he requested Shri B. Lyngkhoi, Director/SE(O) to continue & take up the Agenda.

1. SPS for transfer of 160 MW to Bangladesh through Tripura-Bangladesh link:

CTU vide. C/CTU-Plg/NE/02/Bangladesh dated. 07.02.2017 has informed that in the 12th India-Bangladesh JWG & JSC meeting, decision was taken to enhance power transfer through 400 kV Surajmaninagar-South Comilla (Bangladesh) link (charged at 132 kV). In this regard, a SPS needs to be in place to increase reliability in power supply. Following SPS action has been suggested by CTU:

S. No.	Contingency	SPS Action
1	Outage of one ICT out of 400/132 kV, 2x125 MVA ICTs at Palatana	Limit transfer to 100MW on Cross-Border link, followed by shifting of 60 MW load from Indian Grid to Bangladesh Grid.
2	Outage of 400 kV Palatana – Surajmani Nagar line (Charged at 132 kV)	Tripping of cross border link followed by shifting of entire 160 MW load from India Grid to Bangladesh Grid.

3	Outage of one circuit of 400 kV Surajmani Nagar - South Comilla line (Charged at 132 kV)	Limit transfer to 130 MW on Cross-Border link, followed by shifting of 30 MW load from Indian Grid to Bangladesh Grid.
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In 129th OCCM, AGM (SO-I), NERLDC informed that as per the suggested scheme of SPS, its implementation involves load reduction in Bangladesh system. In order for effective resolution, he suggested that a meeting be convened with Bangladesh Power Department officials, NERPC, NERLDC, CTU and TSECL. The forum requested NERPC to write to CTU for taking up the matter with MoP.

In 132nd OCC, NERLDC informed the forum that during three major disturbances in NER on 25.04.17, 26.04.17 & 28.04.17, Bangladesh load was also affected. NERLDC again requested the forum to organize the meeting as soon as possible since CTU is asking about the implementation of Bangladesh SPS.

S.E.(C&O),NERPC informed that the meeting would be convened within next week.

In 6th Operation Coordination committee meeting held on 23rd march 2017, it was decided that NERPC will convene a special meeting to discuss the matters related to implementation of SPS related to transfer of 160 MW to Bangladesh through 132 kV Surajmaninagar – South Comilla I & II lines.

It is very much essential to implement SPS for the 3 scenarios proposed by CTU for the safe and secure operation of Tripura power system.

Deliberation of the sub-Committee

CM, NERTS presented the draft scheme to implement the suggested SPS for transfer of 160 MW power to Bangladesh through Tripura-Bangladesh link. The Sub-Committee discussed the suggested schemes in detail and agreed in principle to implement the schemes.

NLDC told the forum that in case of tripping of one ICT of 400/132 kV, 2x125 MVA ICTs at Palatana, other ICT in service at Palatana should not trip on over loading before operation of SPS under sl no 1.

Sr. Manager, OTPC informed that O/C settings for 400/132kV 125MVA ICTs at Palatana is set equivalent to 175 MVA loading (IDMT). Forum requested OTPC that operating time of Over Current protection of 400/132kV 125MVA ICTs at Palatana should be greater than 200 milliseconds.

Also, forum requested OTPC & POWERGRID to conduct mock test for checking healthiness and finding out total operation time of designed SPS before taking these schemes in to service. Total operation time of SPS under sl no 1 should be less than 200 milliseconds.

The Detailed schematic with explanation has been attached at **Annexure-II**.

The forum requested NERPC to take up the matter with CTU/NLDC for implementation at the earliest after vetting in OCC forum.

The Sub-committee noted as above.

Action: NERPC.

2. Review of existing SPS-2 & SPS-3 related to reduction of Palatana Generation:

a. Review of SPS-2

At around 13:54 Hrs on 20th March'17, 400 kV Silchar - Palatana I & II lines tripped. Also, 400 kV Silchar - Palatana II line tripped on 25.04.17 & 16.05.17 at 13:05 Hrs and at 08:27 Hrs respectively while 400 kV Silchar - Palatana line I was under Shutdown.

All these four events satisfied conditions for operation of SPS-2 which is designed to reduce Palatana generation to house load immediately.

However, at the time of events on 20th March & 25th April'17, SPS-II did not operate due to the non-availability of tripping signal. And, at the time of event on 16th May'17, Palatana generation was not reduced to house load immediately due to delayed operation of SPS-2.

Due to non-operation of SPS-II resulted in overloading of 132 kV AGTCCPP - Kumarghat line & 132 kV Agartala - Dhalabil line (low capacity) and subsequently tripped on over current. Due to tripping of these elements, part of Tripura, Bangladesh (South Comilla), Palatana & AGTCCPP power systems were separated from rest of NER Grid and subsequently collapsed due to load generation mismatch.

b. Review of SPS-3

Tripping of 400 kV Silchar – Byrnihat line at 19:11 Hrs & 400 kV Silchar – Azara Line at 18:42 Hrs dated 28.04.17 satisfied conditions for operation of SPS-III. However, SPS-III did not operate as direct trip signal from Silchar was not received by Palatana. Due to these, Southern part of NER grid comprising of Tripura, Manipur, Mizoram,

South Assam, Palatana & AGTCCPP power systems and Bangladesh (South Comilla) power system experienced major Grid Disturbances at 19:11 Hrs of 28th April 2017.

To avoid grid disturbances in the Southern part of NER Grid in future, SPS-2 & SPS-3 schemes are to be reviewed.

Periodic Mock Testing of SPS:

In the PCC Subgroup Meeting of NERPC held on 05th May'17 at Shillong, it was decided to conduct mock testing of SPS periodically for checking healthiness.

In 132nd OCC, the forum stressed the need for periodical testing of SPS so that it operates as per design during emergency condition.

It is proposed to conduct mock testing of SPS-II & SPS-III related to reduction of Palatana Generation on 15.06.17 & 16.06.17 respectively.

Existing SPS Schemes

SPS-2: When 400 kV Palatana- Silchar I & II lines trip:

Pre-condition:

Following lines should be kept in open condition:

- 1) 132 kV Khliehriat – Lumshnong line or 132 kV Lumshong- Panchgram line
- 2) 132 kV Pailapool – Jiribam line at Jiribam end or 132 kV Srikona - Pailapool line
- 3) 132 kV P. K. Bari – Dharmangar line or 132 kV Dharmanagar- Dullavcherra line

Scheme approved in 12th System Study Meeting:

1. When both the ckts of 400 kV Palatana - Silchar line trip, a signal will be generated from trip relay at Silchar.
2. This signal should trip the HV circuit breaker of 400/132 kV, 2 x 125 MVA Palatana ICTs to maintain safe, secure and reliable operation of Tripura system.
3. Palatana protection to operate at their end and bring generation to house load.
4. The signal from tripping of 400 kV Silchar – Palatana I & II lines should also enable reduction of Generation of Module I & II of Palatana, OTPC (both GTs to around 20 MW excluding the auxiliary consumption.)
5. Then manual demand management / disconnection should be imposed, if necessary.

It was found out in the forum that SPS-II did not operate due to the non-availability of tripping signal from Silchar at Palatana during grid disturbances on 20th March'17 & 25th April'17. It was decided that direct trip command from Silchar for operation of SPS-2 will be provided by NERTS within 15th May'17. For the time being, OTPC shall implement the SPS-2 using signal generated from tripping of Circuit Breakers at Palatana end of 400 kV Silchar - Palatana I & II lines. Later, after getting trip signal from Silchar end, scheme shall be in such a way that tripping of CBs (Main & Tie) either at Silchar or Palatana end of 400 kV Silchar - Palatana I & II lines will enable the reduction of generation at Palatana to 20 MW.

Proposed Scheme by OTPC in subgroup meeting held on 5th May'17

After getting trip signal from Silchar or Palatana of 400 kV Silchar – Palatana I & II lines, signal will be generated at Palatana and sent to trip both main & tie circuit breakers of GTG-1 & 2 , STG 1 & 2 and HV side of 400/132 kV, 2 X 125 MVA Palatana ICTs.

SPS 3 Scheme

SPS 3 - When 400 kV Silchar – Byrnihat line and 400 kV Silchar – Azara line trip (with generation at Palatana)

Pre-condition:

Following lines should be kept in open condition:

1. 132 kV Khliehriat – Lumshnong line
2. 132 kV Pailapool – Jiribam line at Jiribam
3. 132 kV P K Bari – Dharmangar line will be kept open

Scheme approved in 12th System Study Meeting:

1. When 400 kV Silchar – Byrnihat line and 400 kV Silchar – Azara line trip, signal will be generated from trip relays at Silchar. Also, in case of outage of either 400 kV Silchar – Byrnihat line or 400 kV Silchar – Azara line, if other line trips, signal will be generated from trip relays at Silchar.
2. This signal should trip CBs of GTG / STG of one Module of Palatana CCGT (as may be required). But the tripped unit of Palatana will be running in FSNL (Full Speed No Load). The units of Palatana may be tripped allowing a maximum of 240 MW generation including auxiliary.

3. Then manual demand management / disconnection of load should be imposed, if necessary.

Proposed Scheme by OTPC in subgroup meeting held on 5th May'17

After getting trip signal from Silchar, a signal will be generated at Palatana to trip both main & tie circuit breakers of GTG-1 & 2. Also, operation of SPS-3 shall not trigger the operation of SPS-1 and the tripped unit of Palatana will be running in FSNL (Full Speed No Load).

Deliberation of the sub-Committee

SPS-2

Sr. Manager, OTPC informed that the Silchar DT signal is now being received at Palatana. He also informed that the HV CB of 2x125MVA 400/132kV ICT is being tripped through DCS which may be causing the SPS to operate with a delay of 1s. After detailed deliberation the forum suggested the following modifications:-

- The logic for operation of SPS would be tripping of both circuits of 400 kV Silchar-Palatana D/C.
- Under any one of the following condition, SPS-2 should operate:
 - a. Tripping/opening of both 400 kV Silchar-Palatana I & II lines at both Silchar and Palatana ends
 - b. Tripping/opening of both 400 kV Silchar-Palatana I & II lines only at Silchar end
 - c. Tripping/opening of both 400 kV Silchar-Palatana I & II lines only at Palatana end
 - d. Tripping/opening of 400 kV Silchar-Palatana I line at Palatana end and 400 kV Silchar-Palatana II line at Silchar end
 - e. Tripping/opening of 400 kV Silchar-Palatana I line at Silchar end and 400 kV Silchar-Palatana II line at Palatana end
 - f. In event of one circuit under shutdown SPS should operate for tripping of the other circuit either at Palatana end or Silchar end.
- When these conditions are satisfied, a signal will be generated at Palatana.

- The signal from the above logic should trip HV side breaker of 2x125 MVA, 400/132 kV ICT at Palatana.
- Forum suggested that OTPC may trip both main & tie circuit breakers of GTG-1 & 2 and STG 1 & 2 at Palatana. Total operation time of SPS-2 should be less than 100 milliseconds so that low capacity tie-lines of Tripura will not trip on over loading.

The forum requested NERTS to kindly make it convenient to visit Palatana GBPP and implement the changes suggested by forum concurrently with OTPC, before the next OCC meeting. Member Secretary, NERPC concluded that Mock Testing of all SPS would be conducted every quarter and requested to all utilities to follow the same. Mock test should include activities like checking healthiness of scheme, finding out total operation time of designed SPS etc.

SPS-3

Sr. Engineer, NLDC enquired about the quantum of generation reduction from GTG 1&2 at the time of operation of SPS-3 (IC-464.3 MW) and duration for which STG-1 & 2 can run without GTG. Sr. Manager, OTPC informed that STG-1&2 can run singly for 20 min with residual steam. However exact quantum and duration can only be obtained from characteristic curve. He agreed to submit the curve to NERPC/NERLDC forthwith.

After detailed deliberation, the forum suggested the following modifications: -

- The logic for operation of SPS would be tripping/opening of both circuits of 400 kV Silchar-Byrnihat S/C and 400 kV Silchar-Azara S/C.
- Under any one of the following condition, SPS-3 should operate:
 - a. Tripping/opening of both 400 kV Silchar-Byrnihat S/C and 400 kV Silchar-Azara S/C at both ends
 - b. Tripping/opening of both 400 kV Silchar-Byrnihat S/C and 400 kV Silchar-Azara S/C only at Silchar end.
 - c. Tripping/opening of 400 kV Silchar-Byrnihat S/C only at Byrnihat end and 400 kV Silchar-Azara S/C only at Azara end.
 - d. Tripping/opening of 400 kV Silchar-Byrnihat S/C only at Byrnihat end and 400 kV Silchar-Azara S/C only at Silchar end.

- e. Tripping/opening of 400 kV Silchar-Byrnihat S/C only at Silchar end and 400 kV Silchar-Azara S/C only at Azara end.
- f. In event of one circuit under shutdown SPS should operate for tripping of the other circuit either at Silchar end/Byrnihat/Azara end.
- When these conditions are satisfied, a signal will be generated at Silchar.
- The signal from the above logic should trip HV side circuit breakers of GTG-1 & 2 at Palatana.
- Total operation time of SPS-3 should be less than 100 milliseconds so that low capacity tie-lines of Southern part of NER Grid will not trip on over current.

Forum requested POWERGRID to visit Palatana, Byrnihat & Azara for implementation of modifications suggested by forum in association with OTPC, MePTCL & AEGCL before next OCC meeting.

DGM(AM), NERTS informed that upon visit by NERTS officials to 400/220kV Byrnihat S/S, it has been found that Stage 2 gas pressure of circuit breaker of 400 kV Silchar – Byrnihat line is low and this may be the suspected reason for generation of direct trip from Byrnihat end. The forum requested MeECL to investigate and revert back at the earliest.

The Sub-committee noted as above.

Action: OTPC, NERTS, MeECL, AEGCL.

3. Review of UFR based load shedding schemes

Under Frequency Relay (UFR) based load shedding schemes are meant to provide relief to the power system in case of decline in frequency and arrest further decline. However, in the case of disturbance on 28th April'17, load relief from UFR based load shedding schemes was only reported from TSECL and P&ED, Mizoram. MSPCL and MePTCL have reported that UFR based load shedding schemes has not operated during disturbance on 28th April'17.

During analysis it has been observed that UFR feeders have not been identified in South Assam Area. Hence, no operation of UFR has been observed in Assam during disturbance of 28th April 2017.

Review of UFR based load shedding schemes and identification of feeders where UFR relay to be installed taking into consideration the changes in the power system in NER Grid, are to be carried out at the earliest.

Deliberation of the sub-Committee

S.E.(C&O), NERPC informed that a committee would be formed for UFR inspection (with officials from NERTS, NERLDC, NERPC and respective states) and requirement of additional UFRs will be reviewed after completion of 1st phase (1/3rd of locations) of UFR inspection.

The Sub-committee noted as above.

Action: NERPC.

4. Review of Islanding Schemes:

Islanding of AGTCCPP (Island-II) with Tripura power system & Dullavcherra load failed to operate during the disturbances on 25th April'17, 26th April'17, 28th April'17 and 16th May'17.

Load in the Island-II has increased and load relief from the UFR is not sufficient to balance load generation in this island. Due to this reason, Island-II collapsed during disturbances in 25th April'17, 26th April'17, 28th April'17 and 16th May'17.

Review of islanding schemes is to be carried out at the earliest, considering the changes in the power system.

Existing scheme of Islanding 2 is as follows:

- i. The island is to form at 48.8 Hz with 500 msec delay.
- ii. UFR tripping of 132 kV Palatana - Udaipur & 132 kV Palatana - Surjamani Nagar lines at Palatana.
- iii. UFR tripping of 132 kV Silchar - Dullavcherra line at Silchar (PG).
- iv. UFR tripping of 132 kV AGTPP - Kumarghat & 132 kV P K Bari - Kumarghat lines at Kumarghat (PG).
- v. Island comprising of generation of AGTPP (Gas), Rokhia (Gas), Baramura (Gas) & Gumti (Hydro) and loads of Tripura system & Dullavcherra area of Assam will be formed.
- vi. Load Generation to be balanced in real time.

Deliberation of the sub-Committee

NERLDC informed forum that loads in the island-2 has been increased drastically after interconnection Bangladesh (South Comilla) Power System with Tripura Power

System. Forum requested TSECL to identify 160 MW load quanta for stage wise load shedding for successful operation of Island-2.

S.E.(C&O),NERPC stated that since islanding scheme is interlinked with UFR operation, Islanding Scheme-II would be reviewed after UFR inspection in Tripura.

The Sub-committee noted as above.

Action: NERPC

5. Implementation of SPS related to BgTPP, Loktak, Doyang & AGBPP:

a. SPS related to secure & reliable operation of BgTPP

At present, BgTPP is connected to rest of NER Grid through 400 kV BgTPP - Bongaigaon I & II lines and 400/220 kV, 315 MVA ICT II at BgTPP. After commissioning of 2nd Unit of BgTPP, for the safe and secure operation of BgTPP, SPS related to generation reduction to 300 MW instantly/tripping of one unit of BgTPP is to be designed & implemented in case of tripping of 400 kV BgTPP - Bongaigaon I & II lines.

Deliberation of the sub-Committee

NERLDC informed the forum that for secure and reliable operation of BgTPP with upcoming units (Units 2 & 3), proposed scheme is to be implemented. Forum requested BgTPP, NTPC to do necessary studies and give their comments/suggestions to NERPC/NERLDC.

Action: BgTPP,NTPC

b. SPS related to secure & reliable operation of Loktak Power Plant

At present, Loktak Power Station is connected to rest of NER Grid through 132 kV Loktak - Imphal line, 132 kV Loktak - Jiribam line & 132 kV Loktak - Ningthoukhong line (132 kV Jiribam - Rengpang line is under long outage). It is observed that in case of tripping of 132 kV Loktak - Imphal line or 132 kV Loktak - Ningthoukhong, other line will be overloaded when there is full generation of Loktak (105 MW). Under this scenario, SPS related to generation reduction to 70 MW instantly/tripping of one unit of Loktak is to be designed & implemented.

Deliberation of the sub-Committee

NERLDC informed the forum that tripping of 132 kV Loktak - Imphal line or 132 kV Loktak - Ningthoukhong line, other line will be overloaded when there is full

generation of Loktak (105 MW). Over loading issue aggravates when 132 kV Imphal - Ningthoukhong line is in service. Results of system study using PSSE also indicate the same. Forum requested Loktak, NHPC to do necessary studies and give their comments/suggestions to NERPC/NERLDC.

Action: Loktak, NHPC

c. SPS related to secure & reliable operation of Doyang Power Plant

At present, Doyang Power Station is connected to rest of NER Grid through 132 kV Doyang - Dimapur I & II lines and 132 kV Doyang - Mokokchung line. In case of tripping of both 132 kV Doyang - Dimapur I & II lines when there is full generation at Doyang (72 MW), Mokokchung (PG) transformers (220/132 kV, 2 x 30 MVA Transformers) will get over loaded. Under this scenario, SPS related to generation reduction to 50 MW instantly/tripping of one unit of Doyang is to be designed & implemented.

Deliberation of the sub-Committee

NERLDC informed the forum that for safe and secure operation of Doyang HEP, proposed scheme is to be implemented. Forum requested NEEPCO to do necessary studies and give their comments/suggestions to NERPC/NERLDC.

Action: Loktak, NEEPCO

d. SPS related to secure & reliable operation of AGBPP

At present, AGBPP is connected to rest of NER Grid through 220 kV AGBPP - Mariani (PG) line, 220 kV AGBPP - Mariani (AS) line and 220 kV AGBPP - Tinsukia I & II lines. In case of tripping of both 220 kV AGBPP - Mariani (PG) line and 220 kV AGBPP - Mariani (AS) line, when generation at AGBPP is more than 180 MW, 220/132 kV, 2 x 50 MVA Transformers at NTPS, 132 kV NTPS - LTPS line & 132 kV LTPS - Mariani (AS) line will get over loaded. Under this scenario, SPS related to generation reduction to 180 MW is to be designed & implemented.

Deliberation of the sub-Committee

Sr. Manager, NEEPCO expressed reservations regarding the proposed SPS stating that currently no N-1 violations are taking place. In case of evacuation problems, generation is being backed down upon request by NERLDC. NERLDC informed the forum that for safe and secure operation of AGBPP, proposed scheme is to be implemented.

S.E.(C&O), NERPC assuaged the forum that these are proposed schemes, and requested them to study these and revert back with their comments/suggestions for implementation. Forum requested NEEPCO to do necessary studies and give their comments/suggestions to NERPC/NERLDC.

The Detailed schematic with explanation has been attached at **Annexure-III**.

The Sub-committee noted as above.

Action: NHPC, NTPC, NEEPCO.

6. Implementation of SPS related to Monarchak

At present, Monarchak Power Station is connected to rest of NER Grid through 132 kV Monarchak - Rokhia line & 132 kV Monarchak - Udaipur line. It is observed that in case of tripping of Monarchak GTG, loading of 400/132 kV, 2 x 125 MVA ICTs at Palatana increases alarmingly. Under this scenario, SPS related to load reduction at Udaipur area of Tripura is to be designed & implemented.

Deliberation of the sub-Committee

NERLDC informed the forum that for safe and secure operation of Tripura Power System, proposed scheme is to be implemented. S.E.(C&O), NERPC once again reiterated that this is a draft suggestion and requested concerned utilities to study in totality.

The Detailed schematic with explanation has been attached at **Annexure-III**.

The Sub-committee noted as above.

Action: NEEPCO, TSECL.

7. Design & implementation of SPS related to HVDC operation:

BNC-Agra +/- 800 kV HVDC BiPole is under operation since long and power, of the order of around 300-1000 MW is flowing in either direction depending on the system requirement. Any problem in AC interregional links, especially during power flow from BNC to Agra, may result in disturbance in NER grid. To address the situation it is very much essential to design a SPS scheme and implement as early as possible.

In 121st OCCM, this matter was referred to System Study Subgroup.

In Empowered Committee meeting held on 31/08/2016, DGM(SO-II), NERLDC informed that during the GD-V event when NE Region was facing shortage of power, it was exporting power to NR. During such events when NER is exporting to NR, if NER is separated from Eastern Region, it should not further export power to NR Grid and BNC-Agra HVDC line should be blocked. For this purpose; SPS scheme related to blocking of +/- 800 kV BNC-Agra Bipole may be designed/installed. Chief Manager (AM), NERTS informed that there is provision in HVDC BNC-Agra that when it detects a certain change in frequency between the two ends, power flow on the link can be blocked. The matter is still under approval stage at CC, POWERGRID and NERTS will inform about the developments.

Deliberation of the sub-Committee

GM, NERLDC stated that frequency controller feature of HVDC controls may be enabled at BNC. After detailed deliberation, the forum requested POWERGRID to explore the frequency controller and mode changeover features and reverts back to the OCC forum.

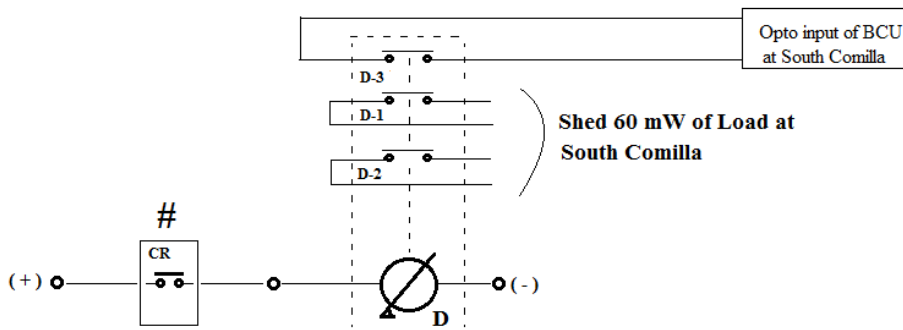
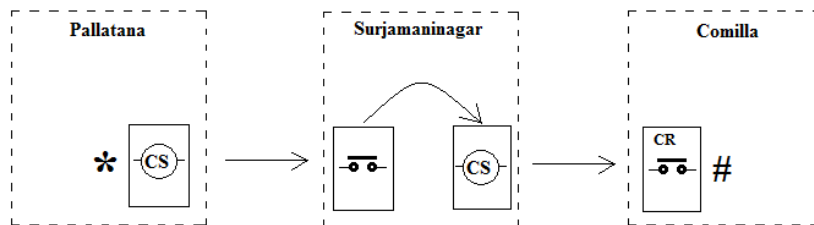
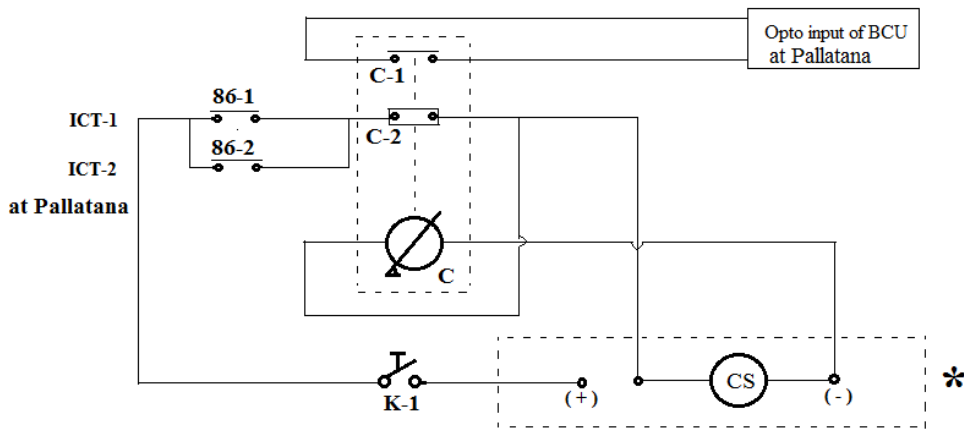
The Sub-committee noted as above.

Action: NERTS.

List of Participants in the Special Meeting on SPS, UFR etc. held on 23.06.2017

SN	Name & Designation	Organization	Contact No.
	No Representative	Ar. Pradesh	
	No Representative	Assam	
1	Sh. S. Kennedy, AM, MSPCL	Manipur	07085464547
2	Sh. F.E Kharshiing, SE (SLDC)	Meghalaya	09863066960
3	Sh. T. Gidon, EE, SLDC	Meghalaya	09774479956
4	Sh. B. Nikhla, EE (SP)	Meghalaya	09436314163
5	Sh. S. Saha, AE (C&C)	Meghalaya	09436112798
6	Sh. K. Kynjing, AE	Meghalaya	09488170070
	No Representative	Mizoram	
	No Representative	Nagaland	
7	Sh. Mrinal Paul, Manager	Tripura	09436137022
8	Sh. T.S. Singh, GM	NERLDC	-
9	Sh. Samar Ch. De, AGM	NERLDC	09436335369
10	Sh. Ankit Jain, Sr. Engineer	NERLDC	09436335381
11	Sh. Amaresh Malik, DGM(SO-II)	NERLDC	09436302720
12	Sh. N.R. Paul, AGM	NERLDC	09436302723
13	Sh. R. Sutradhar, DGM (MO)	NERLDC	09436302714
14	Ms. Momai Dey, Sr. Engineer	NERLDC	09436302716
15	Sh. Palash Jyoti Borah, Engineer	NERLDC	08761093397
16	Sh. Jerin Jacob, Engineer	NERLDC	09446483383
17	Sh. Subhash Kumar, Engineer	NERLDC	09985185899
18	Sh. Sundar Moni Mohan, Dy. Mgr (E/M)	NEEPCO	09436898604
19	Sh. Joypal Roy, Sr. Manager (E/M)	NEEPCO	09435577726
20	Sh. H. Talukdar, Ch. Manager	PGCIL	09436335237
21	Sh. P. Kanungo, DGM (AM)	PGCIL	09436302823
22	Sh. S.K. Singh, Manager	PGCIL	09435706099
23	Sh. Rahul Shukla, Sr. Engineer, POSOCO	NLDC	09650555388
24	Sh. Rahul Chakrabarti, Sr. Engineer, POSOCO	NLDC	09599449975
25	Sh. N. Yugandhar, Manager (E/M), Loktak P.S	NHPC	09800003819
26	Sh. Smruti Ranjan Das, Sr. Mgr	OTPC	09612400784
27	Sh. P.K. Mishra, MS	NERPC	
28	Sh. B. Lyngkhoi, Director/S.E (O)	NERPC	09436163419
29	Sh. L.B.Muanthang, SE/Director	NERPC	09436731488
30	Sh. S. Mukherjee, AD-I/AEE	NERPC	08794277306

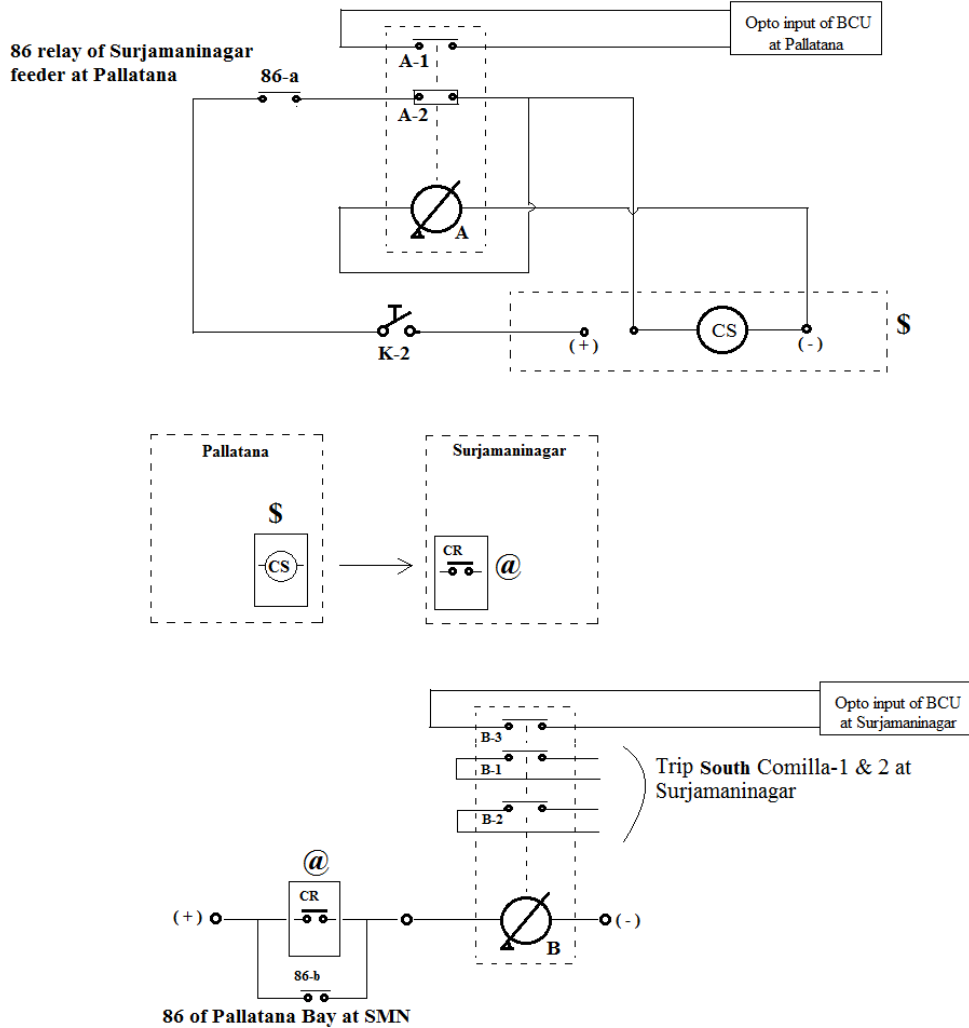
Condition : When one ICT at Pallatana trips



- Switch K1 at Pallatana shall be kept closed to keep the SPS in service.
- When ICT-1/ICT-2 at Pallatana trips, the trip relay NO contact 86-1/86-2 will make and extend the DC + to Carrier send relay CS of protection coupler as well as to the newly installed High Speed trip relay C through it's own NC contact C-2.
- CS will send a code through PLCC to Surjamaninagar.
- Relay C will operate and it's NC contact C-2 will open there by preventing continuous operation of CS.

- NO contact C-1 shall be wired to one binary input of one BCU at Pallatana to log the event with time stamping.
- At Surjamaninagar, the carrier receive contact of Pallatana protection coupler will be used to operate the carrier send relay of the protection coupler for South Comilla direction. Thus the code will be transferred to South Comilla.
- At South Comilla, the Carrier receive contact CR will make and this contact will be used to operate a newly installed High Speed Trip Relay D at South Comilla.
- NO contacts D-1 and D-2 of relay D shall be used to shed 60 MW of load at South Comilla.
- NO contact D-3 shall be wired to one binary input of one BCU at South Comilla to log the event with time stamping.

Condition : When Pallatana-Surjamaninagar trips

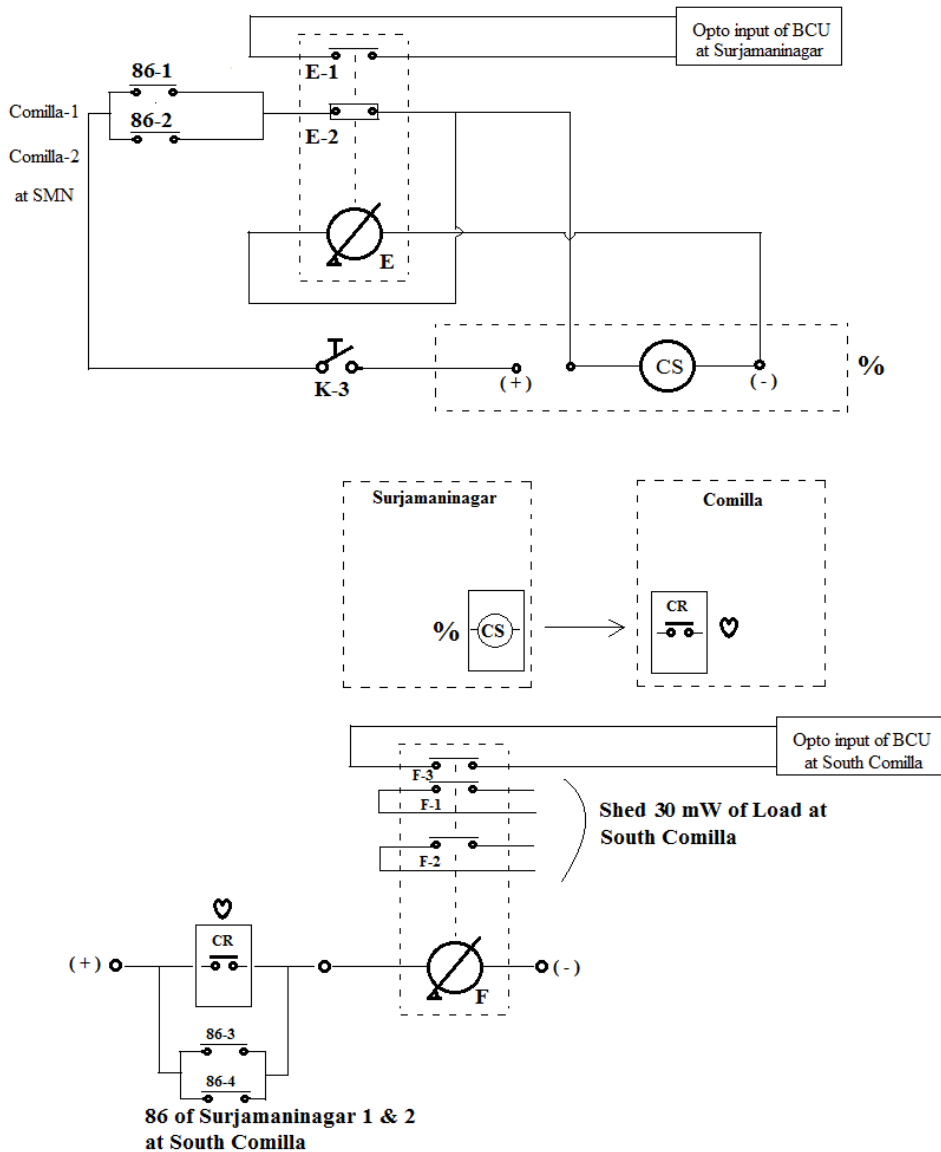


Alternatively Pallatana may send Direct Trip command to Surjamaninagar in case of three phase tripping

- Switch K2at Pallatana shall be kept closed to keep the SPS in service.
- When Surjamaninagar line at Pallatana trips, it's trip relay NO contact 86-a will make and extend the DC + to Carrier send relay CS of protection coupler as well as to the newly installed High Speed trip relay A through it's own NC contact A-2.
- CS will send a code through PLCC to Surjamaninagar. Relay A will operate and it's NC contact A-2 will open there by preventing continuous operation of CS.
- NO contact A-1 shall be wired to one binary input of one BCU at Pallatana to log the event with time stamping.

- At Surjamaninagar, the carrier receive contact of Pallatana protection coupler CR will be made parallel with one NO contact 86-b of the trip relay for Pallatana Feeder and shall be used to operate a newly installed High Speed Trip Relay B at Surjamaninagar
- NO contacts B-1 and B-2 of relay B shall be used to trip South Comilla-1 and South Comilla-2 feeders.
- NO contact B-3 shall be wired to one binary input of one BCU at Surjamaninagar to log the event with time stamping.

Condition : When one Ckt of Surjamaninagar-Comilla trips



- Switch K3 at Surjamaninagar shall be kept closed to keep the SPS in service.
- When South Comilla-1/2 line at Surjamaninagar trips, its trip relay NO contact 86-1/ 86-2 will make and extend the DC + to Carrier send relay CS of protection coupler as well as to the newly installed High Speed trip relay E through its own NC contact E-2.
- CS will send a code through PLCC/OPG to South Comilla. Relay E will operate and its NC contact E-2 will open thereby preventing continuous operation of CS.

- NO contact E-1 shall be wired to one binary input of one BCU at Surjamaninagar to log the event with time stamping
- At South Comilla, the carrier receive contact of Surjamaninagar protection coupler CR will be made parallel with one NO contact 86-3 and 86-4 of the trip relays for Surjamaninagar – 1 & 2 Feeder and shall be used to operate a newly installed High Speed Trip Relay F at South Comilla.
- NO contacts F-1 and F-2-2 of relay F shall be used to shed 30 MW of load at Comilla.
- NO contact F-3 shall be wired to one binary input of one BCU at South Comilla to log the event with time stamping.

Special Meeting on SPS, UFR, Islanding Schemes on 23rd Jun'17

By,
NERLDC

SPS in NER

Sl. No	Name of the Scheme	Implementing Agency	Status
1	SPS associated with tripping of generation of both Modules of Palatana CCGT (2 x 363.3 MW)	CTU, OTPC, AEGCL, MePTCL and TSECL	In Service w.e.f. 14.09.2013
2	SPS associated with tripping of 400 kV Palatana – Silchar D/C lines	CTU, OTPC AEGCL, MePTCL and TSECL	In Service w.e.f. 23.02.2015
3	SPS associated with tripping of 400 kV Silchar – Azara S/C and 400 kV Silchar – Byrnihat S/C lines with generation at Palatana CCGT	CTU, OTPC, AEGCL, MePTCL and TSECL	In Service w.e.f. 23.02.2015
4	SPS associated with tripping of 400 kV Silchar – Azara S/C and 400 kV Silchar – Byrnihat S/C lines when there is no generation at Palatana CCGT	CTU, AEGCL, MePTCL and TSECL	In Service w.e.f. 14.09.2013
5	SPS associated with overloading of 220 kV Salakati – BTPS D/C lines (PG)	CTU, AEGCL	In service w.e.f. 23.06.2015
6	SPS associated with generation evacuation from AGTPP	NEEPCO, CTU	In service w.e.f. 21.07.2015
7	SPS associated with tripping of 132 kV Umiam Stg-I to Umiam St-III D/C lines	MePTCL	In service w.e.f. June 2015
8	SPS associated with tripping of 400/132 kV, 2x200 MVA ICTs at Silchar (PG)	CTU, AEGCL	In service w.e.f. 29.06.15
9	SPS associated with more than 60 MW loading from LV to HV side of Azara ICTs	AEGCL	In Service w.e.f. August 2014

1. SPS for transfer of 160 MW to Bangladesh through Tripura-Bangladesh link

- 12th India-Bangladesh JWG & JSC meeting: Enhancement of power transfer through 400 kV Surajmani Nagar-South Comilla (Bangladesh) link (charged at 132 kV).
- Need of SPS: increase in reliability of power supply
- **Scheme**

Sl. No.	Contingency	SPS Action
1	Outage of one ICT out of 400/132 kV, 2x125 MVA ICTs at Palatana	Limit transfer to 100MW on Cross-Border link, followed by shifting of 60 MW load from Indian Grid to Bangladesh Grid.
2	Outage of 400 kV Palatana – Surajmani Nagar line (Charged at 132 kV)	Tripping of cross border link followed by shifting of entire 160 MW load from India Grid to Bangladesh Grid.
3	Outage of one circuit of 400 kV Surajmani Nagar - South Comilla line (Charged at 132 kV)	Limit transfer to 130 MW on Cross-Border link, followed by shifting of 30 MW load from Indian Grid to Bangladesh Grid.

Discussions in Various Fora

- **129th OCCM:** SPS implementation involves load reduction in Bangladesh system. It was decided to convene a meeting with Bangladesh Power Department officials, NERPC, NERLDC, CTU and TSECL.
- **130th OCCM:** S.E. (C&O), NERPC informed that the matter is being followed up with CTU/MoP and latest status would be informed in next OCCM.
- **131st OCCM:** S.E. (C&O), NERPC informed that the meeting would be convened within first week of May'2017 and TSECL would be informed one week in advance.
- **132nd OCC:** NERLDC requested the forum to organize the meeting as soon as possible since CTU is asking about the implementation of Bangladesh SPS.
- **6th Operation Coordination Committee Meeting between India & Bangladesh:** NERPC will convene a special meeting to discuss the matters related to implementation of SPS related to transfer of 160 MW to Bangladesh through 132 kV SurajmaniNagar – South Comilla I & II lines.
- **It is very much essential to implement SPS for the 3 scenarios proposed by CTU for the safe and secure operation of Tripura power system.**

2. Review of SPS-1

- Confirmation of present logic

Proposal:

- If one module of Palatana is under outage, SPS-1 should be deactivated by Palatana.

3. Review of existing SPS-2 & SPS-3 related to reduction of Palatana Generation

A. Review of SPS-2

- Instances of Misoperation since Apr'16

Sl No	Element Tripping	Date & Time	SPS operation
1	400 kV Silchar - Palatana I & II lines	20.03.17 13:54 Hrs	SPS-II did not operate due to the non-availability of tripping signal from Silchar
2	400 kV Silchar - Palatana II line (400 kV Silchar - Palatana I line was under S/D)	25.04.17 13:05 Hrs	
3	400 kV Silchar - Palatana II line (400 kV Silchar - Palatana I line was under S/D)	16.05.17 08:27 Hrs	Delayed operation of SPS-2

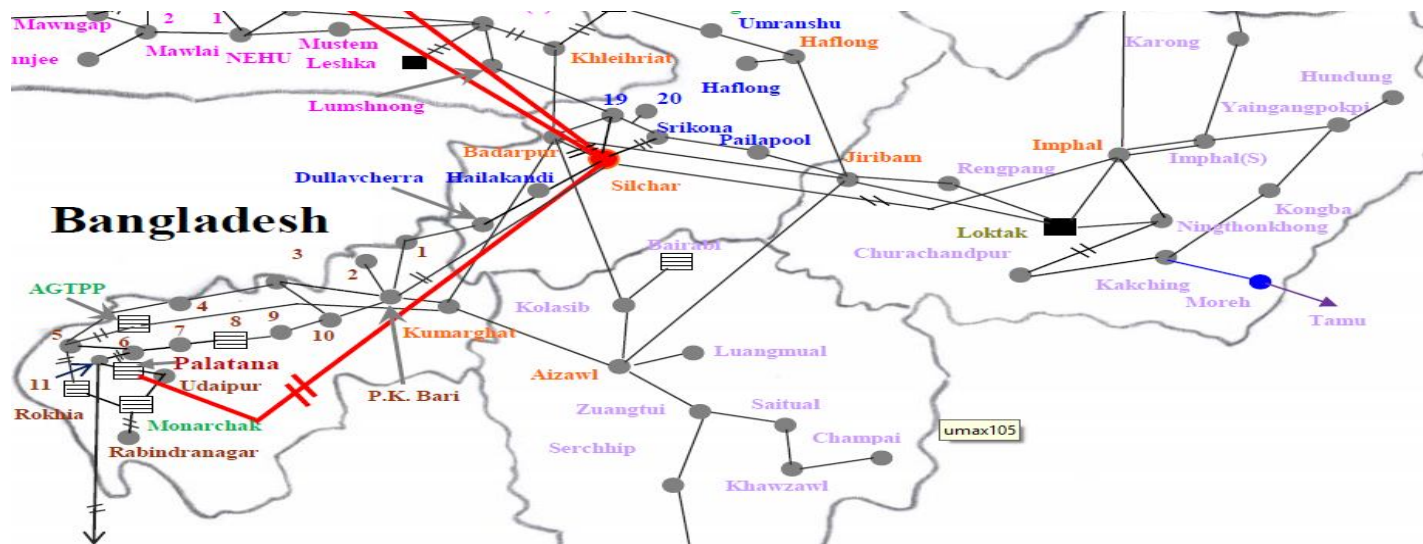
- Due to non-operation/delayed operation of SPS-II => overloading of 132 kV AGTCCPP - Kumarghat line & 132 kV Agartala - Dhalabil line (low capacity) and subsequently tripped on over current.

Tripping Details of 400 kV Silchar - Palatana D/C since Apr'16

Name of the Element	No of Occurrence	Remarks
400 kV Silchar – Palatana I	5	Tripura System was not N-1 reliable
400 kV Silchar –Palatana II	18	Tripura System was not N-1 reliable
Multiple Tripping	1	Satisfied conditions of SPS-2
Tripping of one circuit when other circuit was under Outage	3	Satisfied conditions of SPS-2 except for incident on 26 th Apr'17

SPS-2: Scheme Approved in 12th System Study Meeting

- **Pre-condition:**
- Following lines should be kept in open condition:
 - 132 kV Khliehriat – Lumshnong line or 132 kV Lumshong- Panchgram line
 - 132 kV Pailapool – Jiribam line at Jiribam end or 132 kV Srikona - Pailapool line
 - 132 kV P. K. Bari – Dharmangar line or 132 kV Dharmangar- Dullavcherra line



Scheme approved in 12th System Study Meeting:

- When both the ckts of 400 kV Palatana - Silchar line trip, a signal will be generated from trip relay at Silchar.
- This signal should trip the HV circuit breaker of 400/132 kV, 2 x 125 MVA Palatana ICTs to maintain safe, secure and reliable operation of Tripura system.
- Palatana protection to operate at their end and bring generation to house load.
- The signal from tripping of 400 kV Silchar – Palatana I & II lines should also enable reduction of Generation of Module I & II of Palatana, OTPC (both GTs to around 20 MW excluding the auxiliary consumption.)
- Then manual demand management / disconnection should be imposed, if necessary.

Proposed Scheme

- The logic for operation of SPS would be tripping of both circuits of 400 kV Silchar-Palatana D/C.
- Under any one of the following condition, SPS-2 should operate:
 - a. Tripping/opening of both 400 kV Silchar-Palatana I & II lines at both Silchar and Palatana ends
 - b. Tripping/opening of both 400 kV Silchar-Palatana I & II lines only at Silchar end
 - c. Tripping/opening of both 400 kV Silchar-Palatana I & II lines only at Palatana end
 - d. Tripping/opening of 400 kV Silchar-Palatana I line at Palatana end and 400 kV Silchar-Palatana II line at Silchar end
 - e. Tripping/opening of 400 kV Silchar-Palatana I line at Silchar end and 400 kV Silchar-Palatana II line at Palatana end
 - f. In event of one circuit under shutdown SPS should operate for tripping of the other circuit either at Palatana end or Silchar end.

- When these conditions are satisfied, a signal will be generated at Palatana.
- The signal from the above logic should trip HV side breaker of 2x125 MVA, 400/132 kV ICT at Palatana.
- Forum suggested that OTPC may trip both main & tie circuit breakers of GTG-1 & 2 and STG 1 & 2 at Palatana.
- Total operation time of SPS-2 should be less than 100 milliseconds so that low capacity tie-lines of Tripura will not trip on over loading.

B. Review of SPS-3

- **Instances of Mis-Operation of SPS-3 since Apr'16**

SI No	Element Tripping	Date & Time	SPS operation
1	400 kV Silchar-Byrnihat & 400 kV Silchar-Azara lines	09.07.16 13:19 Hrs	DT from Silchar not received at Palatana end
2	400 kV Silchar-Azara & 400 kV Silchar-Byrnihat lines	28.04.17 18:42 Hrs & 19:10 Hrs respectively	
3	400 kV Silchar-Azara & 400 kV Silchar-Byrnihat lines	08.06.17 14:58 Hrs	

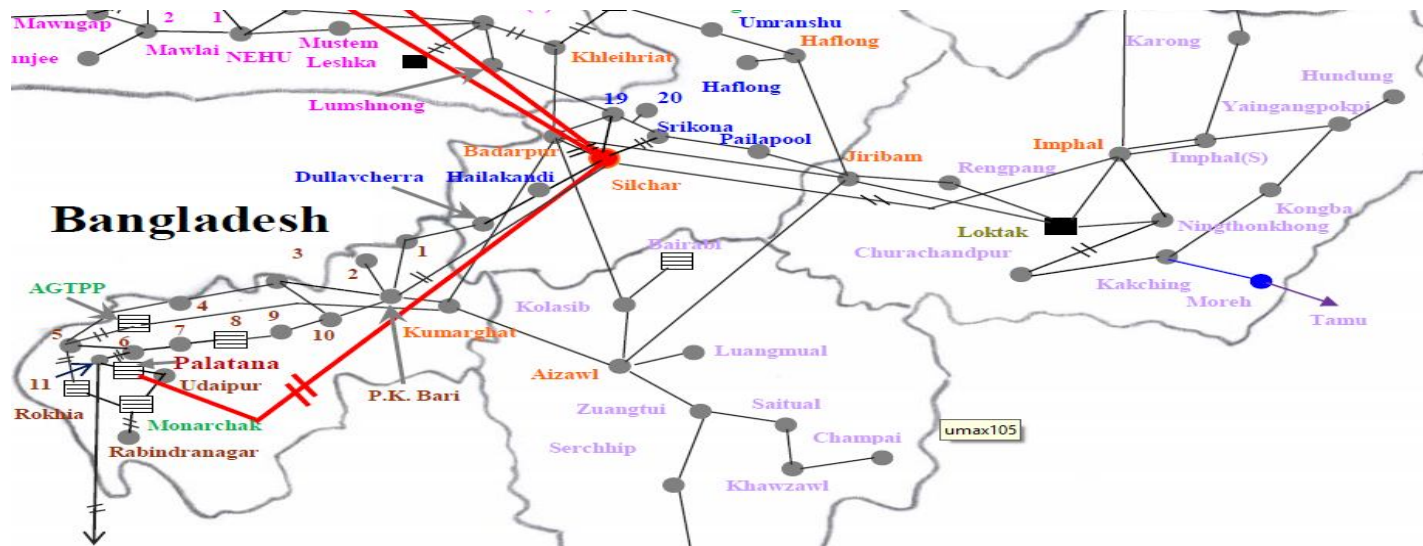
- **Southern part of NER grid** comprising of **Tripura, Manipur, Mizoram, South Assam, Palatana & AGTCCPP power systems and Bangladesh (South Comilla)** power system experienced major Grid Disturbances in all the 3 cases mentioned above.

Tripping Details of 400 kV Silchar - Byrnihat & 400 kV Silchar – Azara lines since Apr'16

Name of the Element	No of Occurrence	Remarks
400 kV Silchar – Byrnihat	27	Southern part of NER Power System was not N-1 reliable
400 kV Silchar – Azara	3	Southern part of NER Power System was not N-1 reliable
Multiple Tripping	4	Satisfied conditions of SPS-3
Tripping of one circuit when other circuit was under Outage	Nil	

SPS-3: Scheme Approved in 12th System Study Meeting

- **Pre-condition:**
- Following lines should be kept in open condition:
 - 132 kV Khliehriat – Lumshnong line or 132 kV Lumshnong- Panchgram line
 - 132 kV Pailapool – Jiribam line at Jiribam end or 132 kV Srikona - Pailapool line
 - 132 kV P. K. Bari – Dharmangar line or 132 kV Dharmangar- Dullavcherra line



Scheme approved in 12th System Study Meeting:

1. When 400 kV Silchar – Byrnihat line and 400 kV Silchar – Azara line trip, signal will be generated from trip relays at Silchar. Also, in case of outage of either 400 kV Silchar – Byrnihat line or 400 kV Silchar – Azara line, if other line trips, signal will be generated from trip relays at Silchar.
2. This signal should trip CBs of GTG / STG of one Module of Palatana CCGT (as may be required). But the tripped unit of Palatana will be running in FSNL (Full Speed No Load). The units of Palatana may be tripped allowing a maximum of 240 MW generation including auxiliary.
3. Then manual demand management / disconnection of load should be imposed, if necessary.

Proposed Scheme

- The logic for operation of SPS would be tripping/opening of both circuits of 400 kV Silchar-Byrnihat S/C and 400 kV Silchar-Azara S/C.
- **Under any one of the following condition, SPS-3 should operate:**
 - a. Tripping/opening of both 400 kV Silchar-Byrnihat S/C and 400 kV Silchar-Azara S/C at both ends
 - b. Tripping/opening of both 400 kV Silchar-Byrnihat S/C and 400 kV Silchar-Azara S/C only at Silchar end.
 - c. Tripping/opening of 400 kV Silchar-Byrnihat S/C only at Byrnihat end and 400 kV Silchar-Azara S/C only at Azara end.
 - d. Tripping/opening of 400 kV Silchar-Byrnihat S/C only at Byrnihat end and 400 kV Silchar-Azara S/C only at Silchar end.
 - e. Tripping/opening of 400 kV Silchar-Byrnihat S/C only at Silchar end and 400 kV Silchar-Azara S/C only at Azara end.
 - f. In event of one circuit under shutdown SPS should operate for tripping of the other circuit either at Silchar end/Byrnihat/Azara end.

- When these conditions are satisfied, a signal will be generated at Silchar.
- The signal from the above logic should trip HV side circuit breakers of GTG-1 & 2 at Palatana.
- Total operation time of SPS-3 should be less than 100 milliseconds so that low capacity tie-lines of Southern part of NER Grid will not trip on over current.

Also, operation of SPS-3 shall not trigger the operation of SPS-1

4. Review of UFR based load shedding schemes

- **28th April'17 Disturbance:**
- Relief reported by TSECL and P&ED, Mizoram
- UFR not operated at MePTCL & MSPCL
- No operation of UFR has been observed in Assam
- No UFR has been installed in South Assam area.

4. Review of Islanding Scheme II

- Instances of Mis-Operation since Apr'16**

SI No	Element Tripping	Date & Time	Affected Systems
1	400 kV Bongaigaon-BgTPP I & II	16.04.17 12:03 Hrs	All NER except Upper Assam
2	400 kV Silchar-Byrnihat & 400 kV Silchar-Azara lines	09.07.16 13:19 Hrs	Southern Part of NER Power System
3	400 kV Silchar - Palatana I & II lines	20.03.17 13:54 Hrs	Tripura, Palatana, AGTPP & Bangladesh (South Comilla) Power Systems
4	400 kV Silchar - Palatana II line (400 kV Silchar - Palatana I line was under S/D)	25.04.17 13:05 Hrs	
5	400 kV Silchar - Palatana II line (400 kV Silchar - Palatana I line was under S/D)	26.04.17 12:53 Hrs	
6	400 kV Silchar - Palatana II line (400 kV Silchar - Palatana I line was under S/D)	16.05.17 08:27 Hrs	
7	400 kV Silchar-Azara & 400 kV Silchar-Byrnihat lines	28.04.17 18:42 Hrs & 19:10 Hrs respectively	Southern Part of NER Power System
8	400 kV Silchar-Azara & 400 kV Silchar-Byrnihat lines	08.06.17 14:58 Hrs	

Existing scheme of Islanding 2

- The island is to form at 48.8 Hz with 500 msec delay.
- UFR tripping of 132 kV Palatana - Udaipur & 132 kV Palatana - Surjamani Nagar lines at Palatana.
- UFR tripping of 132 kV Silchar - Dullavcherra line at Silchar (PG).
- UFR tripping of 132 kV AGTPP - Kumarghat & 132 kV P K Bari - Kumarghat lines at Kumarghat (PG).
- Island comprising of generation of AGTPP (Gas), Rokhia (Gas), Baramura (Gas) & Gumti (Hydro) and loads of Tripura system & Dullavcherra & Hailakandi area of Assam will be formed.
- Load Generation to be balanced in real time.

	Max. Gen since Apr'16	Avg Generation (Apr'16-May'17)
Tripura with Monarchak (291 MW)	186 MW	103 MW
AGTPP (130 MW)	138 MW	98 MW

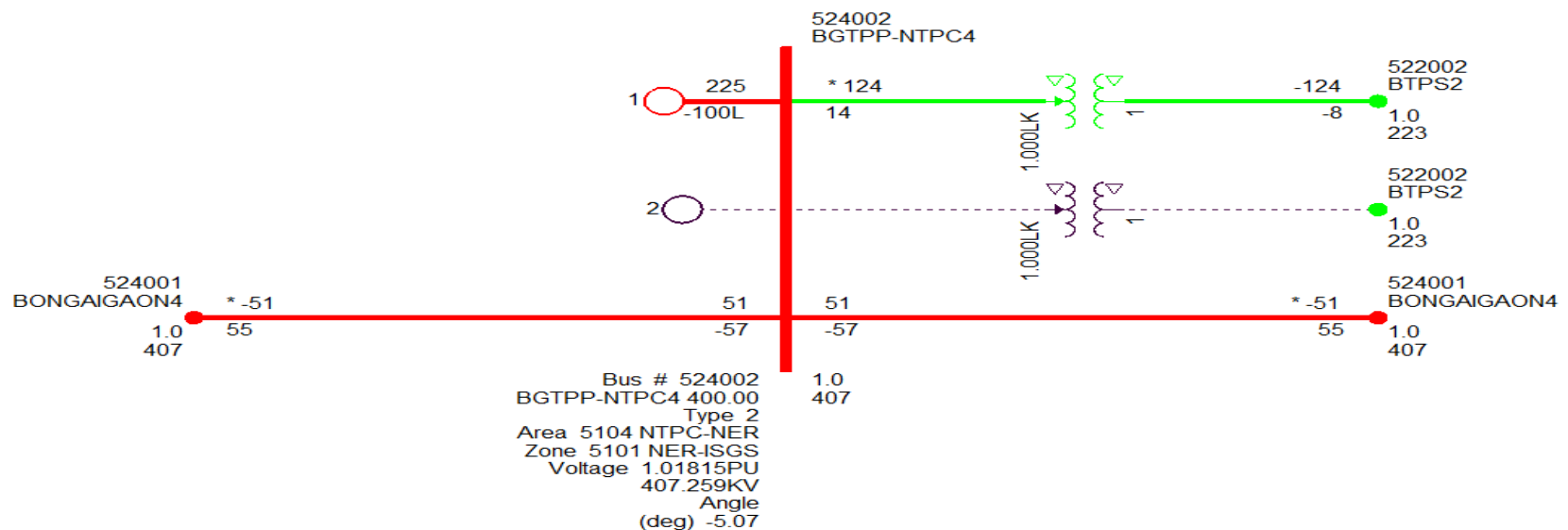
	Max Demand Met	Avg Demand Met (Apr'16-May'17)
Tripura	455 MW	220 MW

UFR Quantum identified in Island: 40 MW (4 x 10 MW)

Proposal: Tripping of cross border link followed by shifting of entire 160 MW load from India Grid to Bangladesh Grid.

5. SPS related to secure & reliable operation of BgTPP

- At present, BgTPP is connected to rest of NER Grid through **400 kV BgTPP - Bongaigaon I & II lines and 400/220 kV, 315 MVA ICT II at BgTPP.**
- After commissioning of 2nd Unit of BgTPP, for the safe and secure operation of BgTPP, SPS related to **generation reduction to 300 MW instantly/tripping of one unit of BgTPP** is to be designed & implemented in case of tripping of 400 kV BgTPP – Bongaigaon I & II lines.

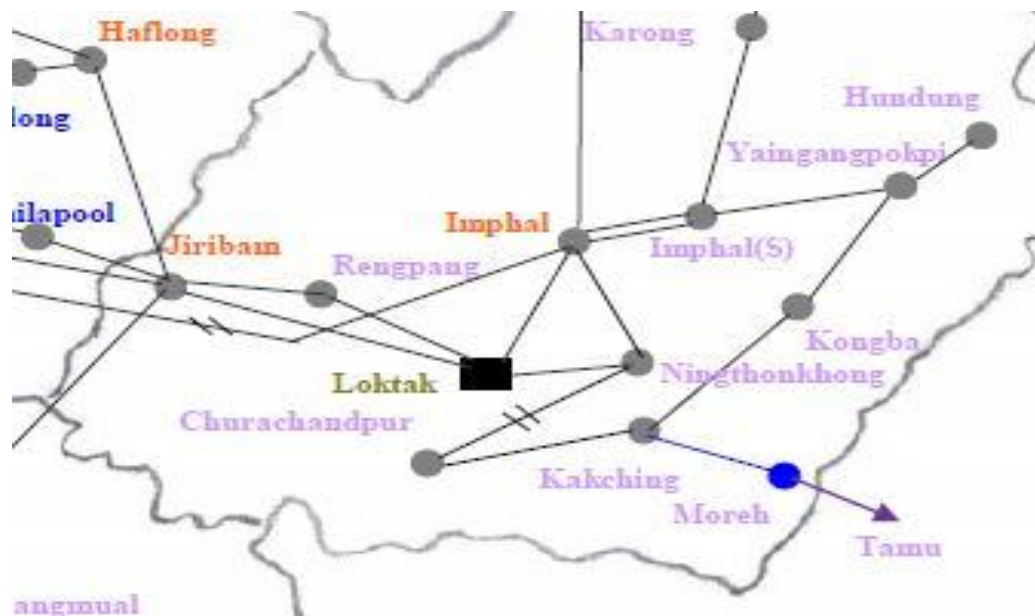


Scheme Proposed:

- When both the circuits of 400 kV BgTPP - Bongaigaon line trip **either at BgTPP end or at Bongaigaon end**, a signal will be generated at BgTPP end.
- Also, in case of one circuit of 400 kV BgTPP - Bongaigaon line is **under outage** and other circuit of 400 kV BgTPP - Bongaigaon line trips either at BgTPP end or at Bongaigaon end, **a signal will be generated at BgTPP end**.
- Signal should be generated at BgTPP after getting signal from trip relays at BgTPP end or carrier signal at BgTPP from Bongaigaon end of 400 kV BgTPP - Bongaigaon D/C lines.
- This signal should trip both main & tie circuit breakers of one of Unit of BgTPP immediately/ BgTPP **Generation reduction to 300 MW** immediately.
- If the Generation is less than 300 MW, SPS may be taken out of service.

6. SPS related to secure & reliable operation of Loktak Power Plant

- At present, Loktak Power Station is connected to rest of NER Grid through **132 kV Loktak - Imphal line**, **132 kV Loktak - Jiribam line** & **132 kV Loktak - Ningthoukhong line** (132 kV Jiribam - Rengpang line is under long outage).



- It is observed that in case of tripping of 132 kV Loktak-Imphal line or 132 kV Loktak-Ningthoukhong, other line will be overloaded when there is full generation of **Loktak (105 MW)**.
- Under this scenario, SPS related to **generation reduction to 70 MW instantly/tripping of one unit of Loktak** is to be designed & implemented.
- **Instances of Loktak Power Station Black Out since Apr'17:**

Sl No	Elements Tripped	Date	Gen Loss	Remarks
1.	132 kV Loktak-Imphal line, 132 kV Loktak-Jiribam line & 132 Loktak-Ningthoukhong, Loktak Units 1,2 &3	25.05.16 10:30 Hrs	103 MW	Loktak Power Station Blackout due to tripping of evacuation lines
2	132 kV Loktak-Jiribam line, Loktak Units 1,2 & 3	13.05.17 10:13 Hrs	95 MW	

- Tripping of Evacuation Lines since 2016:

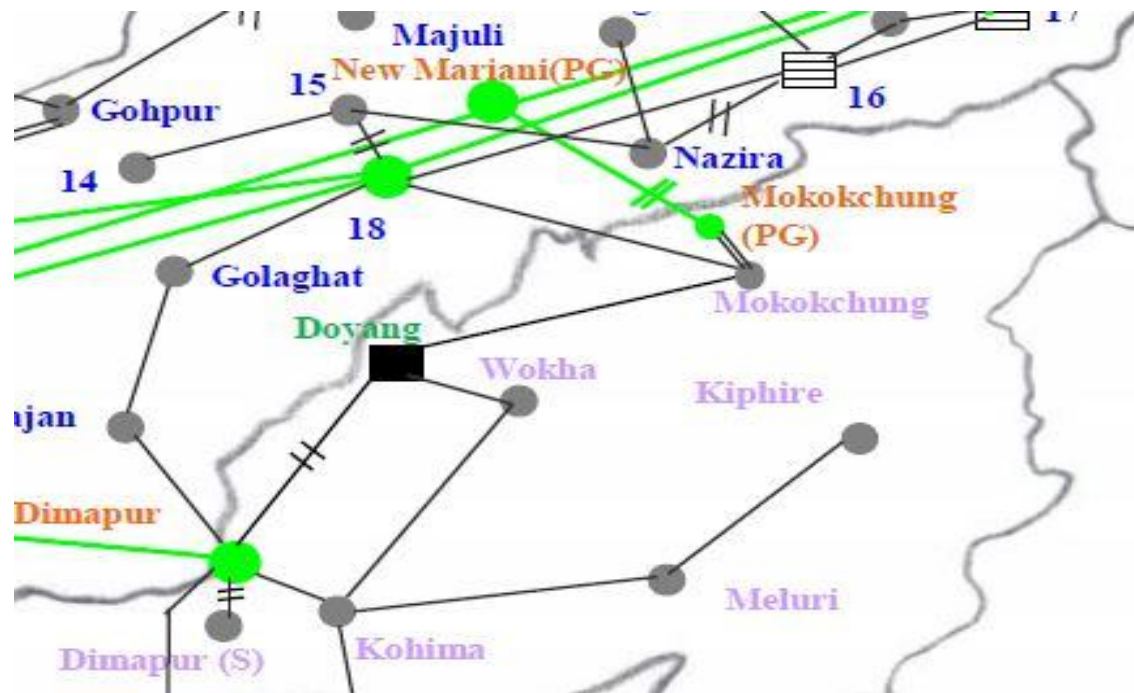
	No of Tripping	Remarks
132 kV Loktak-Imphal	5	
132 kV Loktak-Ningthoukhong	36	
132 kV Loktak-Jiribam	31	
Multiple Tripping	2	Loktak Station BlackOut

Scheme Proposed:

- When 132 kV Loktak - Imphal line trips either at Loktak end or Imphal end / 132 kV Loktak-Ningthoukhong line trip either at Loktak end or at Ningthoukhong end, a signal will be generated at Loktak.
- Also, in case of 132 kV Loktak - Imphal line / 132 kV Loktak-Ningthoukhong line is under outage and other line trips, a signal will be generated at Loktak end.
- Signal should be generated at Loktak after getting signal from trip relays at Loktak end or carrier signal from Imphal end of 132 kV Loktak - Imphal line and signal from trip relays at Loktak end or carrier signal from Ningthoukhong end of 132 kV Loktak-Ningthoukhong line.
- This signal should trip one of Unit of Loktak immediately/ Loktak **Generation reduction to 70 MW** immediately.
- If the Generation is less than 70 MW, SPS may be taken out of service.

7. SPS related to secure & reliable operation of Doyang Power Plant

- At present, Doyang Power Station is connected to rest of NER Grid through 132 kV Doyang - Dimapur I & II lines and 132 kV Doyang - Mokokchung line.



- In case of tripping of both 132 kV Doyang - Dimapur I & II lines when there is full generation at **Doyang (72 MW), Mokokchung (PG) transformers (220/132 kV, 2 x 30 MVA Transformers)** will get over loaded.
- Under this scenario, SPS related to generation reduction to **50 MW instantly/tripping of one unit of Doyang** is to be designed & implemented.
- **Instances of Doyang Power Station Black Out since Apr'17:**

SI No	Elements Tripped	Date	Gen Loss	Remarks
1.	132 kV Doyang- Dimapur II line & 132 kV Doyang-Mokokchung(NA) line, Doyang Unit 1,2 & 3	15.06.16 18:20 Hrs	51	Doyang Power Station Blackout due to tripping of evacuation lines
2	132 kV Doyang- Dimapur II line & 132 kV Doyang-Mokokchung(NA) line, Doyang Unit 1 & 2	15.06.16 18:56 Hrs	30	
3	132 kV Doyang- Dimapur I & II lines & 132 kV Doyang-Mokokchung(NA) line, Doyang Units 1,2 & 3	15.08.16 18:56 Hrs	72	
4	132 kV Doyang- Dimapur I & II lines & 132 kV Doyang-Mokokchung(NA) line, Doyang Units 1,2 & 3	03.10.16 21:26 Hrs	70	

- Tripping of Evacuation Lines since 2016:

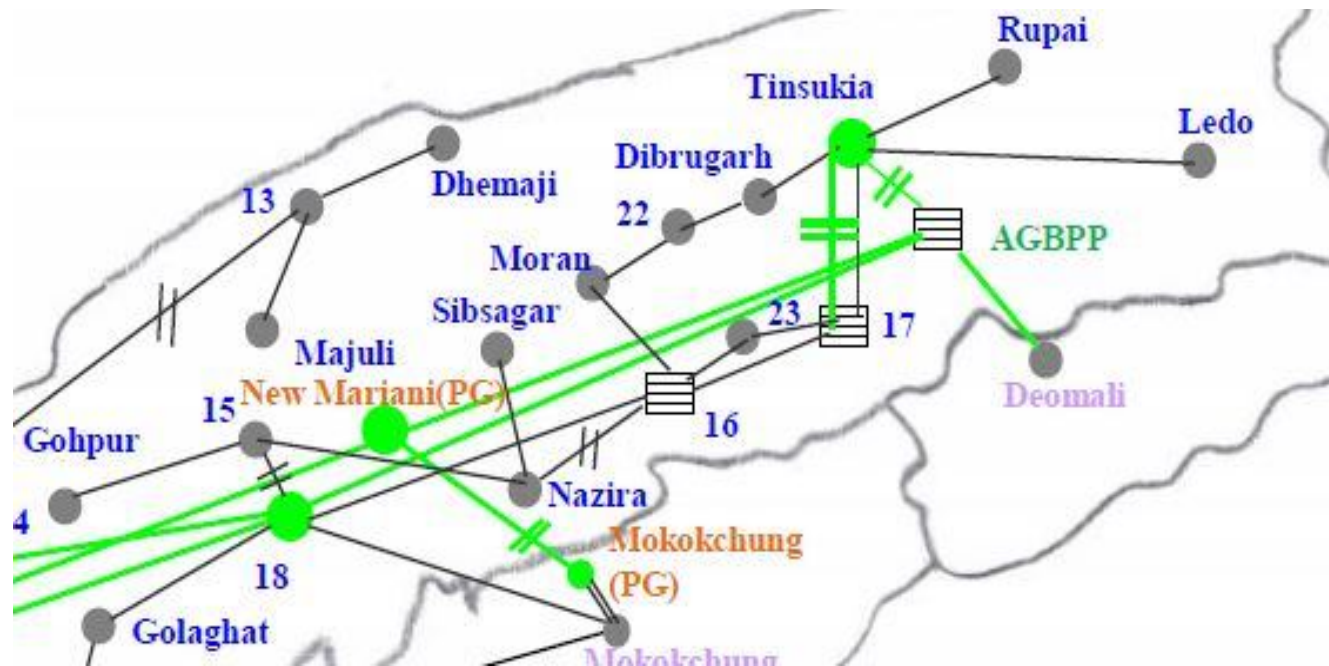
Element	No of Tripping
132 kV Dimapur-Doyang I	4
132 kV Dimapur-Doyang II	10
132 kV Dimapur-Doyang I&II	13
132 kV Doyang - Mokokchung	31
Multiple Tripping	4

Scheme Proposed:

- When both circuits of 132 kV Doyang – Dimapur D/C lines trips either at Dimapur end or Doyang end, a signal will be generated at Doyang.
- Also, in case of one circuit of 132 kV Doyang – Dimapur D/C line is under outage and other circuit trips, a signal will be generated at Doyang end.
- Signal should be generated at Doyang after getting signal from trip relays at Doyang end or carrier signal from Dimapur end of 132 kV Doyang – Dimapur D/C lines.
- This signal should trip one of Unit of Doyang immediately/ Doyang **Generation reduction to 50 MW** immediately.
- If the Generation is less than 50 MW, SPS may be taken out of service.

8. SPS related to secure & reliable operation of AGBPP

- At present, AGBPP is connected to rest of NER Grid through 220 kV AGBPP – Mariani (PG) line, 220 kV AGBPP – Mariani (AS) line and 220 kV AGBPP - Tinsukia I & II lines.



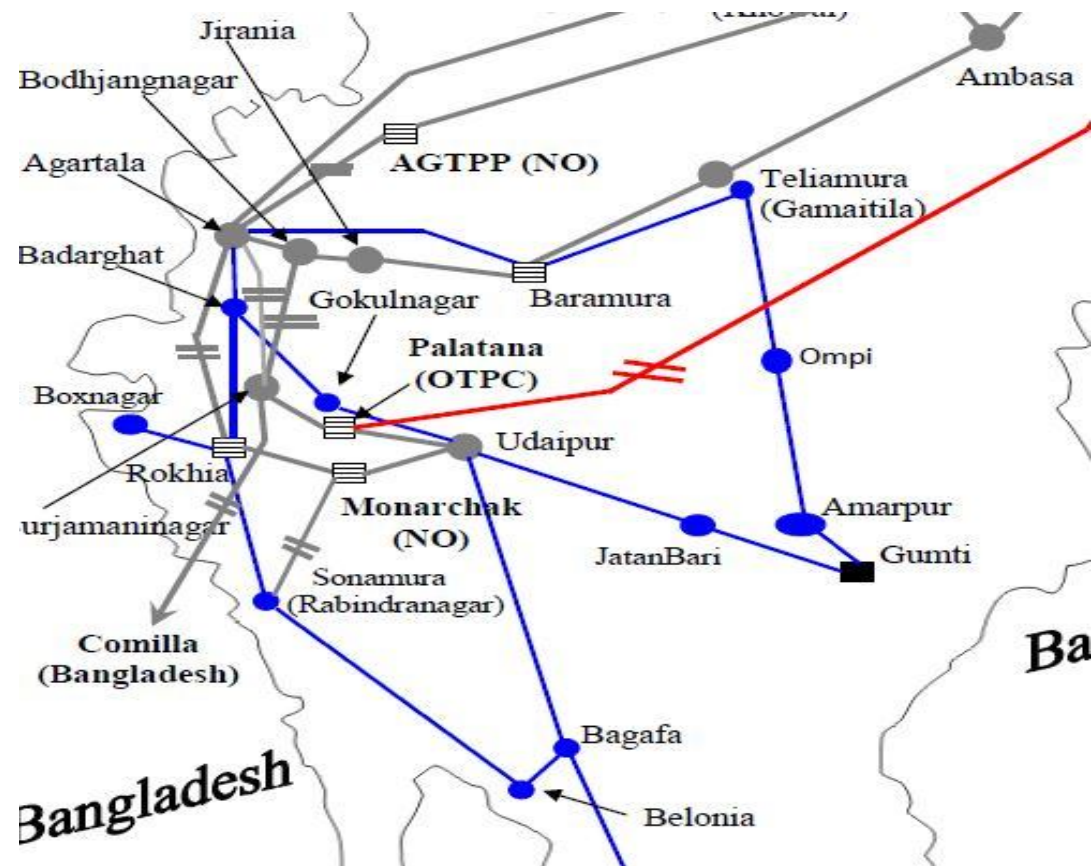
- In case of tripping of **both 220 kV AGBPP – Mariani (PG) line and 220 kV AGBPP – Mariani (AS) line**, when generation at **AGBPP is more than 180 MW**, 220/132 kV, 2 x 50 MVA Transformers at NTPS, 132 kV NTPS - LTPS line & 132 kV LTPS – Mariani (AS) line will get over loaded.
- Under this scenario, SPS related to **generation reduction to 180 MW** is to be designed & implemented.

Scheme Proposed:

- When both **220 kV AGBPP – Mariani (PG) line** and **220 kV AGBPP – Mariani (AS) line** trips either at AGBPP end / Mariani (PG) & Mariani(AS) ends, a signal will be generated at AGBPP.
- Also, in case of **220 kV AGBPP – Mariani (PG) line / 220 kV AGBPP – Mariani (AS) line** is under outage and other line trips, a signal will be generated at AGBPP end.
- Signal should be generated at AGBPP after getting, signal from trip relays at AGBPP end or carrier signal from Mariani(PG) end of **220 kV AGBPP – Mariani (PG) line** and signal from trip relays at AGBPP end or carrier signal from Mariani(AS) end of **220 kV AGBPP – Mariani (AS)**.
- This signal should reduce AGBPP **Generation reduction to 180 MW** immediately.
- If the Generation is less than 180 MW, SPS may be taken out of service.

9. SPS related to secure & reliable operation of Monarchak

- At present, Monarchak Power Station is connected to rest of NER Grid through 132 kV Manarchak - Rokhia line & 132 kV Monarchak - Udaipur line.



- It is observed that in case of tripping of Monarchak GTG, loading of **400/132 kV, 2 x 125 MVA ICTs at Palatana and 132 kV Palatana-Udaipur line** increases alarmingly.
- Under this scenario, SPS related to **load reduction at Udaipur area of Tripura** is to be designed & implemented.

Scheme Proposed

- **Pre-condition:**
- Following lines normally kept in open condition:
- 66 kV Bagafa – Belonia line
- 66 kV Amarpur – Gumti line
- 66 kV Badarghat– GokulNagar line
- **Scheme:**
- When Monarchak GTG HV side Circuit Breaker trips, a signal will be generated from trip relay at Monarchak.
- After getting signal at Udaipur from Monarchak, a signal shall be generated at Monarchak to trip 66 kV Udaipur – Bagafa, 66 kV Udaipur-GokulNagar and 66 kV Udaipur - Jatanbari lines at Udaipur end **immediately**.

10. SPS associated with +/- 800 kV Biswanath Chariali – Agra HVDC

- BNC-Agra +/- 800 kV HVDC BiPole under operation since long and power, of the order of around 300-1000 MW is flowing in either direction depending on the system requirement.
- Any problem in AC interregional links, especially during power flow from BNC to Agra, may result in disturbance in NER grid.
- During the GD-V event on 16th Apr' 16, NE Region was facing shortage of power, it was exporting power to NR.
- During such events when NER is exporting to NR, if NER is separated from Eastern Region, it should not further export power to NR Grid and BNC-Agra HVDC line should be blocked.
- To address the situation it is very much essential to design a SPS scheme and implement as early as possible.

Discussions in various Fora

121st OCCM

- referred to System Study Subgroup

Empowered Committee meeting held on 31/08/2016

- SPS scheme related to blocking of +/- 800 kV BNC-Agra Bipole may be designed/installed.
- Chief Manager (AM), NERTS informed that there is provision in HVDC BNC-Agra that when it detects a certain change in frequency between the two ends, power flow on the link can be blocked.
- The matter is still under approval stage at CC, POWERGRID and NERTS will inform about the developments.

Scheme Proposed

- When NER Power System is separated from ER Power System and power flow in BNC-Agra +/- 800 kV HVDC is towards Agra from BNC , BNC-Agra +/- 800 kV HVDC BiPole should get blocked.