

Eastern Regional Power Committee, Kolkata

Minutes of Special Meeting on evacuation of power from HEPs of Sikkim held on 13th June, 2017 at ERPC, Kolkata

List of participants is at **Annexure-A**.

Member secretary welcomed all the participants and referred to the CERC directions in its ROP dated 07.06.17 in Petition No- 114/MP/2017 regarding (a) Evacuation of the power from the generating stations including Teesta V and IPPs in Sikkim, (b) Steps to ramp up of the optimum transfer capability 400 kV Rangpo-Siliguri D/C line with SPS operation at Rangpo and (c) Reasons for non-completion of Rangpo Kishengunj line and steps being taken up for completion of the line. He informed that Teesta Urja Limited (TUL, Teesta-III) and ERLDC have presentations to share. He requested TUL representative to share his presentation followed by ERLDC.

1. Review of present Rangpo SPS for maximum power flow through 400 kV D/C Rangpo-Siliguri line

TUL representative through PPT presentation informed as under:

All the six units (200 MW each) of TUL has been commissioned. Teesta-III -Rangpo line section had been completed. Presently evacuation from Teesta-III has been restricted to 600 MW due to 1500 MW limit on Rangpo-Siliguri 400KV D/C line. As a result TUL is compelled to spill water equivalent to 12 MU of energy each day which would cost around Rs. 6 Cr. SPS has already been installed by PGCIL/TUL which would take care of the line loading of healthy line in case of a single circuit tripping of 400 kV Rangpo Siliguri D/c line. In the meetings of ERPC dated 14.10.16, 30.11.16 & 29.3.17 it was decided to enhance the permitted loading of the said line from 1500 MW to 2300 MW in steps in future but it had not materialized. Transient stability studies by TUL under various scenarios as per CEA transmission planning criteria was carried out and it was found that the system remains stable.

TUL requested to increase the line loading limit of 400 kV Rangpo Siliguri D/c line to 2200 MVA in line with CEA transmission planning criteria.

To cater the increased line loading TUL also proposed a modification in the existing SPS design at Teesta-III as follows:

In case of tripping of one circuit of 400 kV Rangpo-Siliguri D/c line to get the effective response from SPS, five machines of TUL are to be kept in one bus and the bus coupler is to be tripped through SPS command (1st Signal). Further in case of failure or delayed SPS (1st signal) response the 400 kV TUL-Rangpo from Rangpo (PG) end is to be tripped directly through a second SPS signal.

Representative from ERLDC through PPT presentation informed as under:

Studies showed there were oscillations in power flows in Chicken neck area in Siliguri and other parts of the synchronous grid due to loss of generation in Sikkim on tripping of 400 kV TUL-Rangpo. Further, oscillations were observed in PMU plots from Agartala, Bongaigaon and Balipara. Availability of Biswanath Chariali/Alipurduar HVDC could help in managing the oscillations. The power flow in the chicken neck area was around 3000 MW in the past year and it was estimated that with full generation evacuation from Sikkim IPPs it could go as high as 4500 MW in this year.

ERLDC stated that the Siliguri bay at Rangpo was designed for 1360 MW only. Further there was limitation due to cable capacity at Teesta-III. Non availability of 400 kV Purnea Biharshariff and 400 kV Patna Kishengunj for a long time could also create technical constraints for onward flow of extra power if the loadability was increased. Feasibility of load shedding schemes needs to be assessed afresh in case of loss of generation due to tripping of one circuit of 400 kV Rangpo Siliguri. Lacunae in the SPS operation at the IPPs was observed in a recent testing on 05.06.2017 and the response time of Generators for receipt of SPS code are as follows:

- a) Teesta-III: 123 ms
- b) Cuzachen: 456 ms
- c) Jorethang & Dikchu: Increments of PLCC Rx counter was observed however, SCADA did not register any receipt of signal. Later, it was inferred that the wiring and SCADA programming are in order.

Therefore, effective SPS operation under existing design is put on doubt. Further, in the event of tripping of 400 kV Rangpo-Siliguri line at Siliguri end only, SPS as planned may not provide the required relief.

Weather conditions & terrain in the transmission path are conducive to faults. Study results showed that non-operation/delayed operation of SPS could result in sustained oscillation.

On further deliberations --

TUL representative stated that the 130 ms response time of SPS at Teesta-III was sufficient and it included breaker operating time. He once again stressed that in case of tripping of one circuit of 400 kV Rangpo Siliguri, five units of TUL could be tripped. He stressed upon the point that daily there was a loss of 12 MU energy and suggested that all three channels of PLCC may be used in parallel for ensuring redundancy of SPS signal. Further, if required 400 kV TUL-Rangpo line may be tripped at Rangpo end after 400 ms if loading of healthy line could not be maintained within limits in case of tripping of one circuit of 400 kV Rangpo Siliguri line. Regarding the issue of oscillations in the system, TUL representative stated that loss of generation was a common feature in the grid and the system operator was well capable of handling such crises.

Powergrid informed that the SPS at Rangpo need to be redesigned if direct trip at Rangpo was required. He also informed that equipment had been ordered for full implementation of SPS which will take care of apprehensions of ERLDC. However, presently it may be possible to make out a scheme for direct tripping of Rangpo end breaker of 400 kV TUL-Rangpo line.

NLDC representative observed that only simulated signals had been transmitted and received via SPS and PLCC as of now. This may not include breaker operation time. He further observed that oscillations could be more harmful to the integrated grid than the loss of generation. To contain the oscillations the disconnection of 400kV TUL-Rangpo from Rangpo end within specified time could be resorted to.

Representative from DANS energy observed that if it is decided to trip 400 kV TUL-Rangpo within 400 ms in case of tripping of one circuit of 400 kV Rangpo-Siliguri and/or over loading of the healthy circuit, SPS operation at other IPP ends would not be critical to system security.

It was observed that the second stage of SPS may be modified to incorporate isolation of 400 kV TUL-Rangpo within 400 ms from Rangpo end in case of tripping of one circuit of 400 kV Rangpo Siliguri but with over loading of the healthy circuit.

PGCIL representative was enquired on the earliest time by which PGCIL could implement the SPS at Rangpo for incorporating tripping of 400 kV TUL-Rangpo within 400 ms in case of tripping of one circuit of 400 kV Rangpo Siliguri and over loading of the healthy circuit.

PGCIL representative informed that he would need to discuss this with his site personnel for confirmation of time. He also informed that the full fledged SPS had already been ordered at a cost of Rs. 40 Lakhs (approx) which would be commissioned in about two months time and wanted clarification regarding cost recovery of the same. TUL agreed to bear the cost of SPS at Rangpo being procured by PGCIL.

Powergrid also aired concerns regarding the end equipment overloading till the opening of breaker at Rangpo end. GM, ERLDC advised PGCIL to share the equipment ratings so that the allowable overloading time could be ascertained.

Member Secretary viewed that there are water spillage, a wastage of enormous economic resources and therefore increasing the loadability of the 400KV D/C Rangpo –Siliguri line needs to be further reviewed as per earlier meetings in ERPC. But that enhancement, he further emphasised, require a full-proof SPS operation. He stated that if all the concerned generators could give this assurance and ready to face real time testing with breaker opening at respective sites then possibilities of increasing the loadability of 400 KV Rangpo-Siliguri line could be explored. To this all the IPPs agreed.

Member Secretary further requested PGCIL to implement of the TUL-Rangpo tripping scheme from Rangpo end in SPS at the earliest.

The followings are therefore unanimously agreed:

- 1) *The Rangpo SPS for maximum power flow through 400 kV D/C Rangpo-Siliguri line is to be modified as given below:*
 - I. *In case of outage of one circuit of Rangpo-Siliguri 400kV D/c line if the power flow in the remaining circuit becomes more than threshold limit*, the SPS would send a control signal to each of the Teesta-III, Chuzachen, Dikchu, Jorethang and Tashiding HEPs generating stations so as to keep only one unit of each project in service and disconnect the remaining units.*
 - II. *Even after the above SPS operation, if the power flow in the surviving ckt of Rangpo-Siliguri still remains more than threshold limit*, at 400 ms the SPS would send a 2nd control signal to trip the breaker of Teesta-III- Rangpo at Rangpo end.*
- *Presently the threshold limit is kept at 750 MW as decided in previous meetings on Rangpo SPS held on 14.10.16 & 30.11.16 in ERPC and the same will be reviewed in the next meeting on 21.6.17as per the maximum power flow allowable through 400 kV D/C Rangpo-Siliguri line.*
- 2) *Powergrid would implement the modified SPS at Rangpo before 19.06.2017 and all other IPPs would keep ready the SPS at their end for testing on 19.06.2017.*
 - 3) *The SPS under modified version will be tested on 19.06.2017 (Monday) at 1030 Hrs and all concerned are requested to co-ordinate with ERLDC and Powergrid for testing with actual breaker operation.*
 - 4) *The complete response time (i.e. Time from signal initiation to tripping of CB at site) may be measured and placed in the next meeting on 21.6.17*
 - 5) *Based on the performance of above SPS testing decision on step wise enhancement of the optimum transfer capability of Rangpo-Siliguri line will be taken in the next meeting.*
 - 6) *The next review meeting will be convened on 21.06.2017 (Wednesday) at 1130 Hrs at ERPC, Kolkata.*

2. Progress of Rangpo – Kishanganj 400kV D/c (Quad) line:

In the meeting held on 29.03.2017, it was intimated that the line would be completed by October, 2017. Teesta valley Power Transmission Ltd. (TPTL) updated the progress of Rangpo – Kishanganj 400kV D/c (Quad) line as given below:

	Total	Completed
Locations/Foundation	493	441
Erection	493	418
Stringing	179 km	118 km

It was informed that pile work in Mahananda river had been completed and most of the work in Sikkim and Bihar has been completed. However, major work in Darjeeling area is getting delayed due to severe ROW issues. However, the line is now expected to be commissioned by March, 2018.

Member Secretary requested TPTL representative to update the position in OCC meetings on regular basis. TPTL agreed.

3. Status of Teesta-III - Rangpo 400 kV D/C line:

TPTL informed that one ckt of 400 kV Teesta-III- Rangpo (direct ckt) has been commissioned and Teesta-III power is getting evacuated through this line.

The other ckt of 400 kV Teesta-III-Rangpo line LILoed at Dikchu is ready but the Dikchu-Rangpo section of line could not be charged due to clearance problem near to one Church. It was intimated that the matter is under consideration and will be solved soon.

Further, the LILo-IN section of Dikchu HEP is under shutdown due to some clearance problem and presently Dikchu is connected through LILo-OUT section to Teesta-III.

Dikchu informed that the hill cutting work for maintaining the desired safety clearance is under progress and it will be completed by 30th June, 2017 and the LILo will be restored.

Meeting ended with vote of thanks to the chair.

Participants in Special meeting on evacuation of power from HEPs of Sikkim

Venue: ERPC Conference Hall, Kolkata

Time: 11:30 hrs

Date: 13.06.2017 (Tuesday)

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Venue: ERPC Conference Hall, Kolkata

Time: 11:30 hrs

Date: 13.06.2017 (Tuesday)

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