



भारत सरकार
Government of India
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
पश्चिम क्षेत्रीय विद्युत समिति



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Western Regional Power Committee

एफ -3, एमआयडीसी क्षेत्र, अंधेरी (पूर्व), मुंबई - 400 093

F-3, MIDC Area, Andheri (East), Mumbai - 400 093

दूरभाष Phone: 022- 28209506, 28200195; 28200196; फैक्स Fax : 022 - 28370193

Website : www.wrpc.gov.in

E-mail : pre-wrpc@nic.in protectionwrpc@gmail.com

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1773

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Date:

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To,

As per list.

Subject: Minutes of the Meeting held at SUGEN on 07.11.2016 for Islanding scheme of SUGEN- Reg.

Sir/Madam,

Please find enclosed herewith Minutes of the Meeting held at Sugen TPL on 07.11.2016 for finalizing Islanding scheme of SUGEN with Surat load.

This is for your information and further needful action please.

The same is uploaded at www.wrpc.nic.in (in news and PCM minutes)

Yours' faithfully

(S.D. Taksande)

MS, WRPC

Mailing list

1. General Manager, WRLDC, MUMBAI
2. The Executive Director, Sugem CCPP Torrent Power Limited; Tal: Kamrej, Distt: Surat
Gujarat 394155
3. Chief Engineer (LD) GETCO, SLDC, Premises of 132 kV S/S, Gotri Vadodara-390 021
4. SE (Testing), GETCO, Baroda, Fax no.: 0265-2351218
5. GM, WRTS-II, PGCIL, Vadodara, Fax: 0265-2480952
6. Chief Engineer (GM), C.E.A., Sewa Bhawan, R.K.Puram, New Delhi-110066
7. Chief Engineer (NPC), New Delhi
8. SE (Operation), WRPC, Mumbai

MINUTES OF THE MEETING HELD AT SUGEN ON 07.11.2016 FOR ISLANDING SCHEME OF SUGEN:

Shri Sanjay Dalal, ED, Sugen TPL welcomed MS, WRPC and all the participants to today's special meeting to finalize islanding scheme for Surat city with available generation of Sugen TPL. Shri S,D, Taksande, MS, WRPC appreciated the initiatives taken by Sugen and GETCO in conceiving island for Surat City. He stated that after the major Grid disturbances of 30th and 31st July-2012, thrust is given to develop islanding scheme for major city which will not only maintain the supply to city emergency loads but also help in restoration of the Grid. He requested Sugen representatives to make a presentation on islanding scheme developed by Sugen in consultation with GETCO. Shri L.N. Lalwani, ED(O&M), Sugen TPL made a presentation of islanding scheme for the benefit of participants.

Islanding Scheme for SUGEN:

SUGEN Mega Power Project with Capacity of 1147.5 MW (3x 382.5 MW) and 81 MW GENSU solar power plant are connected with National Grid, Gujarat State Grid and Surat Electricity radial Grid. Also, one more Unit of 382.5 MW (Unit 40-UNOSUGEN) is connected with SUGEN switchyard through 400 KV line.

SUGEN switchyard consists of the following:

400 KV switchyard – 2 Main Bus and 1 Transfer Bus

- 3 x 382.5 MW Generators
- Sugen-Vapi Line – Power Grid line
- Sugen Jhanor Line – Power Grid line
- Sugen-Unosugen line – TPGL line
- Sugen-Pirana Line – TPGL line

220 KV switchyard – 2 Main Bus

- TPL Surat Bhatar Feeders – 2nos.
- TPL Surat Ved Feeders – 2nos.
- TPL Surat Puna Feeders – 2nos.
- GETCO Kim Lines – 2 nos.
- GENSU Feeders – 2 nos. (Under Commissioning)

400/220 KV Interconnecting Transformers (ICTs):

- 315 MVA ICT – 3 nos.

Surat Load of around 630 MW consists of load on Surat-Ved, Surat-Bhatar and Surat-Puna Lines (220 KV D/C lines).

Islanding of SUGEN with Surat load is designed as follows:

1. **48.5 HZ:** 220 KV Sugen-Kim line and Gensu line D/C will be tripped

2. **48.4 Hz:** Load-Generation balance to be monitored with respect to 220 KV feeders for Surat City and Generation at Sugan. If generation is more than Surat Demand, the adaption Logic will Trip the Unit/ST or various combinations of Units/ST to reduce the load-Generation difference.
If Surat Load is more than Generation, Load shedding PLC Logic will Trip the Substation Breakers at 66 KV level as per Priority Logic.
3. **48.2 Hz:** 400 KV Sugan-Pirana and 400 KV Sugan-Vapi (PG) to be opened in first phase one by one. Fine frequency tuning would be intimated by Sugan at the time of implementation.
4. **48.0 Hz:** 400 KV Sugan-Unosugen and Sugan-Jhanor line have to be opened in next phase resulting in islanding of Sugan with Surat load. Fine tuning of frequency would be intimated by Sugan at the time of implementation.
5. Load-Generation balance to be monitored with respect to 220 KV feeders for Surat City and Generation at Sugan.

EE, WRPC suggested to open the 400 KV Lines in sequence mentioned above before opening the Sugan-Kim line and Gensu Line considering the fact that the 400 KV lines will be in close proximity and highly affected by the Fault in the Grid leading to Grid failure. If the 400 KV lines remain connected till frequency falls to 48.0 Hz, the current and hence Power will start flowing towards the Faulty section of the Grid. This will result into unwanted load to be seen by the Sugan generators and therefore, load-generation balance could never be achieved as long as these 400 KV lines remain in the picture of Sugan 400 KV Switchyard. Further, if 220 KV Sugan-Kim lines and Gensu lines remain connected, it is possible to form the island with large portion of Gujarat and Surat load. Considering the dropping rate of frequency during Grid failure, the logic of tripping of 400 KV Sugan-Unosugen and Surat- Jhanor line at 48.0 Hz will be modified with time delay as follows:

At 48.0 Hz OR (Freq<48.2 Hz and time delay =0.15 sec): 400 KV Sugan-Unosugen and Sugan- Jhanor lines will be tripped.

However, GETCO representatives emphasized on opening of 220 KV Sugan-Kim and Gensu line initially at frequency of 48.5 Hz as it will result in ease of operation of forming the Sugan island. MS, WRPC stated that tripping of 400 KV lines at the beginning of island formation may cause severe disturbance and preparation of island by matching Surat load and Sugan generation in real time is a prerequisite for sustaining island which is possible when 220 KV Sugan-Kim line and Gensu line (D/C) are tripped earlier to tripping of 400 KV lines.

MS, WRPC further added that as Surat load is only 630 MW and after forming islanding, Power Number of Surat will be reduced to 20 MW approximately (630x3.5%) which may be much lower in actual situation. Therefore, Load-Generation balance should be done with very fine tuning of load at much lower voltage level i.e. 33/11 KV; Otherwise, it will be difficult to control the variation in the load and the island will not be sustained once it is formed. Similarly, it is necessary to inform PGCIL that 400 KV Sugan-Vapi line has been envisaged in Sugan-Surat islanding scheme.

SLDC, GETCO representative requested to carry out the mock drill on Black start at Sugen TPL. Sugen representative stated that the facilities are available at Sugen for such mock drill with load on 220 KV GETCO Kim line as Surat feeders comprises of radial Grid and therefore, it is not advisable to use Surat feeders for black start.

Considering all the above discussion, following Sugen island scheme is formulated as follows.

1. **48.5 HZ:** 220 KV Sugen-Kim line and Gensu line D/C will be tripped
2. **48.4 HZ:** Load-Generation balance to be monitored with respect to 220 KV feeders for Surat City and Generation at Sugen.
 - i. If generation is more than Surat Demand, the adaption Logic will Trip the Unit/ST or various combinations of Units/ST to reduce the load-Generation difference.
 - ii. If Surat Load is more than Generation, Load shedding PLC Logic will Trip the Substation Breakers at 66 KV level as per Priority Logic.
3. **48.2 Hz:** 400 KV Sugen-Pirana and 400 KV Sugen-Vapi (PG) to be opened in first phase one by one. Fine frequency tuning would be intimated by Sugen at the time of implementation.
4. **[48.0 Hz OR (Freq<48.2 Hz and time delay 0.15 sec)]:** 400 KV Sugen-Unosugen and Sugen- Jhanor line have to be opened in next phase resulting in islanding of Sugen with Surat load. Fine tuning of frequency would be intimated by Sugen at the time of implementation.
5. However, in order to sustain the island mode of operation till the normalization of the system, fine tuning of the load at much lower voltage level i.e. 33/11 KV to be achieved for Load-Generation balance with respect to 220 KV feeders for Surat City and Generation at Sugen.
6. Informing PGCIL about inclusion of tripping of 400 KV Sugen-Vapi line and Sugen-Jhanor line in islanding scheme.
7. To initiate and proceed for the mock drill on Black Start at Sugen TPL with load on 220 KV GETCO Kim line.

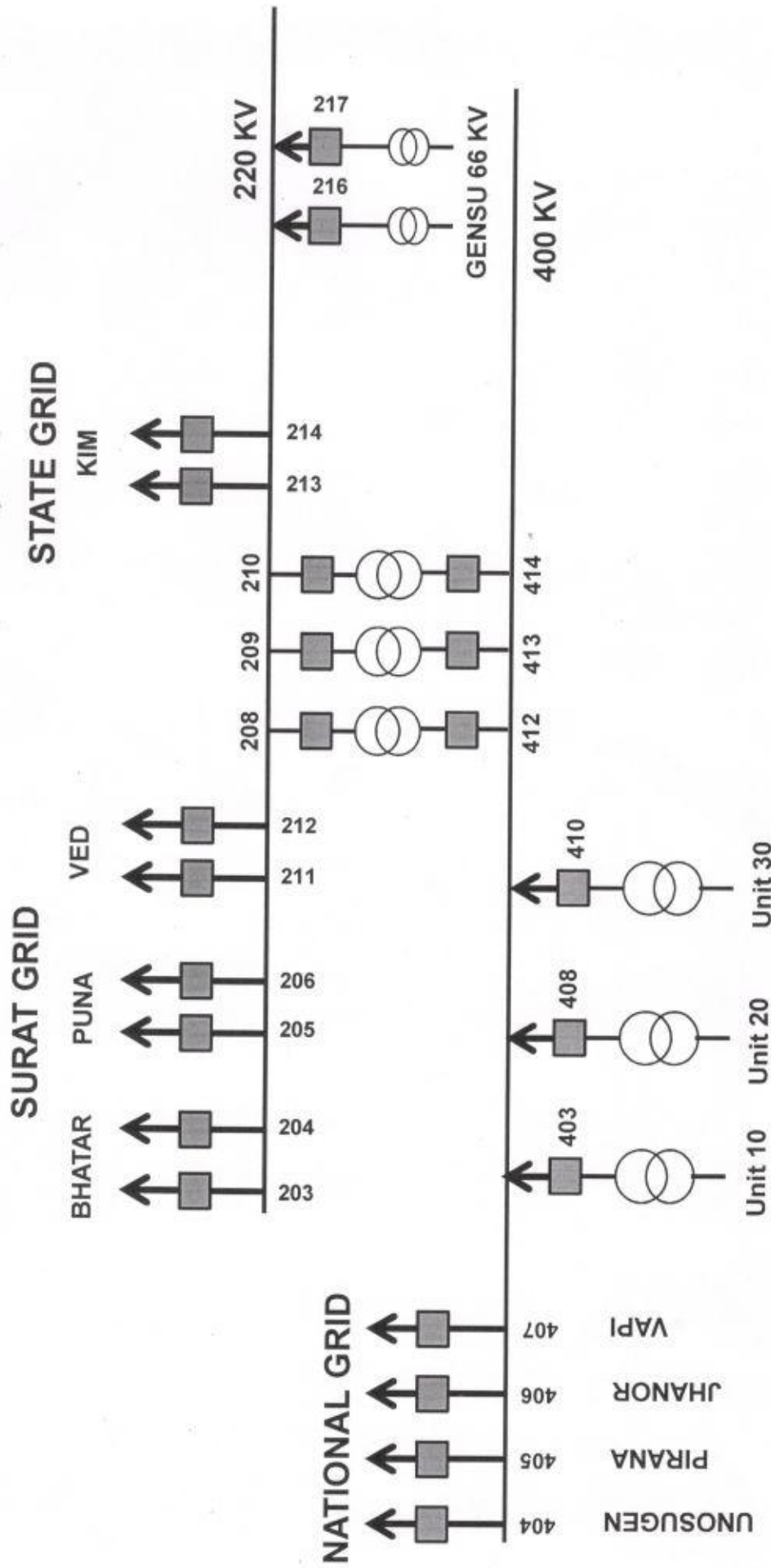
M/s Sugen was requested to implement the above proposed islanding scheme at the earliest. Meeting ended with vote of thanks to MS, WRPC and all the participants.

INTRODUCTION – SUGEN AT A GLANCE



SUGEN Mega Project

Schematic Diagram



Islanding scheme at SUGEN