

Government of India
Central Electricity Authority
System Planning & Project Appraisal Division
Sewa Bhawan: R.K.Puram
New Delhi-110066

No.26/10/2002-SP&PA/

Dated 20th November 2008

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Subject: 28th meeting of Standing Committee on Power System Planning in Western Region.

Sir,


In continuation to our letter of even no. dated 17-11-2008 on the above subject, it is to intimate that the venue and contact person for the 28th meeting to be held on 29th November, 2008 at 10.00 hrs at Aurangabad is as under.

Venue: Welcomhotel Rama International
R-3 Chikalhana, Aurangabad 431 210,
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Tel : (91) (0240)-6634141
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The agenda of the meeting is available at CEA website (www.cea.nic.in) at the following link: Home page – Power Systems – Standing Committee on Power System Planning – Western Region)

You are requested to kindly make it convenient to attend the meeting. Kindly confirm your participation.

for 
(P. K. Pahwa)
Director, SP&PA, CEA
Tel. no. 011-26108118

Agenda for 28th meeting of the Standing Committee on Power System Planning of Western Region

1. Confirmation of the minutes for the 27th Standing Committee Meeting held on 30.07.07 at Indore and Joint meeting of State Utility members of the Standing Committee for Power System Planning of Northern Region and Western Region held on 10th June 2008 at Delhi .

1.1 Minutes of the 27th meeting of the Standing Committee on Power System Planning of WR held at Indore were circulated vide CEA letter no. 26/10/2002-SP&PA/293-306 dated 06.09.2007. Subsequently Chief Engineer (PS-PMU), MPPTCL vide his letter dated 03.10.07 forwarded observations on the minutes of the meeting. Copy of the letter is enclosed. (Enclosed as Annexure-1)

Based on observations of MPPTCL following amendments are proposed

- i) Annex-2, S.no 18, item-e) corrected to read as “ LILO of both the Indore-Asoj 400 V lines at Indore(PG) (765 kV) substation”
- ii) First line of para 3.6 be replaced by “ After further discussions, the members concurred to scheme-B and scheme-C as detailed in following paras 3.6.2 and 3.6.3 and also decided to further re-discuss scheme-A (para 3.6.1) and scheme-D (para 3.6.2) at RPC level.

1.2 The minutes of the Joint meeting of State Utility members of the Standing Committee for Power System Planning of Northern Region and Western Region held on 10th June 2008 at Delhi were circulated vide CEA letter no 26/10/2008/SP&PA/CEA/605-624 dated 12th June 2008. No comments in the minutes have been received. The minutes may be confirmed.

2. Review of Progress on Earlier Agreed Transmission Schemes

POWERGRID may give the progress of earlier agreed schemes under implementation giving

- Date of firming-up in Standing Committee
- Target as in the standing committee meeting
- Date of FR for the scheme
- Date of approval by PGCIL board or PIB as the case may be
- Date of award of the major part
- Target date as of now
- Reason for delay if any

3. Transmission System for evacuation of power from Krishnapattnam UMPP (4000 MW) and SR-WR transmission system

3.1 In the 27th Standing Committee meeting held on 30.07.2007 at Indore, the transmission scheme for Krishnapattnam UMPP was discussed and scheme-B and scheme-C were concurred and it was decided to take up further discussions on

scheme-A and scheme-D at WRPC level. These issues were discussed at the highest level in a number of meeting- meeting taken by Chairperson, CEA on 10th Dec 2007 at Pune and 5th February 2008 at New Delhi, Special meeting of WRPC held on 16th April 2008, Joint meeting of State Utility members of Standing Committee for Power System Planning of Northern Region and Western Region held on 10th June 2008 at New Delhi , Joint meeting of WRPC and NRPC held on 22-7-2008 at New Delhi. During the 8th meeting of WRPC held on 12th Sept 2008 concurrence of WRPPC was accorded for the proposed as well as proposed sharing of transmission charges for Scheme-B, Scheme-C and Scheme-D. Regarding Scheme-A WR constituents agreed to share only 25% transmission charges and suggested that balance 25% charges may be asked from NR constituents as NR would be importing power on this link. As part of the proposal, it has been decided to shift the HVDC b-t-b terminal at Sasaram to Kolhapur. The possibility of sharing the transmission charges for this by NR was taken up in NR but the NR constituents have agreed to share 25% only to facilitate initiation of the project and the matter is now being taken-up at NRPC level. It is now proposed to seek additional 25 % transmission charges for this scheme from SR constituents factoring that IPPs in SR are seeking open access for inter-regional transmission from SR and once the charges are tied through SR IPPs, NR constituents would be relieved of the 25% charges.

4. Transmission System Associated with the Tilaiya Ultra Mega Power Project (4000 MW), in Jharkhand, Nabinagar (1000MW) of Railways and NTPC, Barh-II (1320 MW), Rihand-IV (1000MW), Vindhyachal-IV(1000MW) and Mauda (1000MW) of NTPC, and IPPs in Jharkhand, Orissa, MP, Chattisgarh, and Maharashtra

- 4.1 Government of India is pursuing the process of setting up of large sized thermal power projects around 4000 MW each at various locations through competitive bidding route with indigenous coal development or imported coal. So far LOA for three such projects have been issued by Government of India. GOI is now planning setting up of a Ultra Mega Power Project (UMPP) of around 4000 MW capacity at Tilaiya in Jharkhand through a shell company that would tie-up all necessary inputs needed for development of the project. The project developer would be selected through a tariff based competitive bidding process. The project is expected to materialize by 2014-15
- 4.2 As per the allocations finalized by Ministry of Power for Tilaiya UMPP(4000MW), Eastern Region would get 1500 MW, Northern Region 1700 MW, and Western Region 800 MW, as detailed below:
1. Madhya Pradesh (WR) 200 MW
 2. Gujarat (WR) 300 MW
 3. Maharashtra (WR) 300 MW
- 4.3 Nabinagar (1000MW) has allocation to Bihar, Jharkhand and Railways and out of the power for Railways, 410MW is for supply to their loads in WR and 60 MW for supply to their load in NR.

4.4 In respect of Barh-II, MoP is yet to finalize allocation. However, as per information furnished by NTPC tentative allocation of 367 MW to WR from Barh-II is being considered as per following:

Madhya Pradesh	68 MW
Gujarat	129 MW
Maharashtra	133 MW
Chattishgarh	28 MW
Goa	5 MW
D&D/DNH	4 MW

4.5 Proposed allocation from Rihand-IV(1000MW), Vindhyachal-IV(1000MW) and Mauda(1000MW) as proposed by NTPC is as following:

Rihand –IV : (Sept 2011)

Beneficiaries in NR :	700 MW
NTPC (for marketing)	150 MW
Unallocated	150 MW

Vindhyachal-IV: (Sept 2011)

MP(incl home state quota)	214 MW
Maharastra(MSEDCL)	210 MW
GUVNL	210 MW
CSEB	48 MW
Goa	10 MW
DNH	4 MW
D&D	4 MW
NTPC (for marketing)	150 MW
Unallocated	150 MW

Mauda (Unit-1 April 2011, Unit-2 : Sept 2011)

Gujarat:	273MW;
M.P. :	143MW;
Chattisgarh :	58 MW;
Maharastra :	358 MW;
Goa	10 MW

D&D	4 MW
DNH	4 MW
Unallocated	150 MW;

- 4.6 A number of other projects are also coming in Jharkhand, Orissa, West Bengal, MP, Maharashtra and Chattisgarh which have applied for Long Term Open Access to the CTU seeking to supply to target beneficiaries in the NR and WR, A comprehensive transmission system has been evolved for all these generation projects. From the comprehensive system, a sub-set has been worked out for meeting power evacuation needs considering only those IPPs which have shown progress indicating some possibility of their materializing with in the 11th Plan/ early 12th Plan. List of such generation projects and quantum of their sought open access for NR and WR is given below:

	MW of Open access sought for	
	NR	WR
Jharkhand:		
Essar (1800)	600	600
Corporate (660MW)	594	-
Electrosteel (1200MW)	600	500
Adunik(1005MW)	500	-
DumkaCESC(1200MW)	540	540
Orissa:		
Sterlite (2400MW)	500	500
GMR (1050MW)	350	-
Monet(1005MW)	300	375
Jindal (1200MW)	500	400
Essar (1200MW)	625	-
Lanco (2640MW)	389	1600
West Bengal:		
WBPDCCL projects at		
Katwa(1000MW)		
Bokareshwar(920MW)		
Santalidih(500MW) and		

PuruliaPSS(900MW)		
of which they have sough		
to export 2000MW	1200	800
M.P.		
Jaiprakash(1320MW)	523	797
Shahdol-RIL (1050MW)	350	700
Today home (1000MW)	300	400
Maharashtra		
JSW Energy (1200MW)	300	- (900 to Maharastra through STU system not using CTU system)
Maharashtra Egy(4000MW)	-	3500 (500 MW to SR)
Chhatisgarh		
Aryan Coal (270MW)	-	250
Maruti C Coal (270MW)	48	112
Spectrum C&P (100MW)	-	100
Dheeru (1050MW)	382	300
LancoAmrk-III(1320MW)	84	1236
Korba West (700MW)	-	550
Athena Chgrh(1320MW)	427	793
SKS Ispat (1200MW)	364	728
RKM PowerGen(1400MW)	-	900
Vidiocon Ind (1200MW)	335	775
Wardha KSK (3600MW)	-	3000

4.7 Thirty four number of generation projects (projects of WBSEDCL considered as one) have been listed in above paras viz. (1)TilaiyaUMPP (2)Nabinagar (3)Barh-II (4)Rihand-IV (5)Vindhyachal-IV (6)Mauda (7)Essar (8)Corporate (9)Electrosteel (10)Adunik (11)DoomkaCESC (12)Sterlite (13)GMR (14)Monet (15)Jindal (16)Essar (17)Lanco (18)WBPDCCL projects (19)Jaiprakash (20)Shahdol-RIL (21)Today home (22)JSW_Energy (23)Maharashtra Egy (24)Aryan Coal (25)Maruti C Coal (26)Spectrum C&P (27)Dheeru (28)LancoAmrknk-III (29)Korba

West (30)AthenaChgrh (31)SKS_Ispat (32)RKM_PowerGen (33)Vidiocon_Ind
(34)Wardha_KSK.

- 4.8 Transmission system requirements have been identified based on studies carried out by CEA and PGCIL. The studies have been carried out for evolving the system in an integrated manner considering a transmission system for the new generating stations coming up in all the other regions as well. The studies, carried out based on various transmission configurations and alternatives, indicate that in addition to existing and already planned transmission corridors, new high capacity transmission system, is required in following corridors:

From ER towards NR:

- (1) Tilaiya – Gaya – Balia - Lucknow – Bareilly – Meerut – Moga
- (2) Tilaiya – Sasaram – Fatehpur – Agra – Mundka – Moga

From ER towards WR:

- (1) Ranchi-Dhramjaygarh-Sipat pooling
- (2) Jharsuguda-Dhranjaygarh-Jabalpur pooling-Bina-Indore-Vadodara

Between WR and NR:

- (1) Bina-Gwalior-Jaipur
- (2) Vindhyachal-Satna-Gwalior-Jaipur

Within WR:

- (1) Pune-Phadghe-Aurangabad-Dhule-Vadodara
- (2) Raigarh-Raipur-Wardha-Aurangabad
- (3) Raigarh-Raipur-Wardha
- (4) Raigarh-Champa-Sipat pooling-Raipur

- 4.9 If all the IPP generation projects in Orissa and Chattisgarh which have applied open access are considered and higher demand in WR and NR is also considered, then, in addition to above transmission corridors, HVDC corridors from Orissa and Chattisgarh to Northern Region would also be required. Power evacuation from projects in Chattisgarh listed at sl.no. (28) to (34) of para 3.7 above would require HVDC outlet from Chattisgarh. As the beneficiaries from these projects and also for the major capacity of other IPP generation projects is yet to be firmed-up, the HVDC outlets from Chattisgarh can not be firmed-up at this stage and would need

to be studied further. Therefore, at this stage, it is proposed to further discuss and decide the proposal in respect of only the AC system in the corridors mentioned in para 3.8. Accordingly, only connectivity for Chattisgarh generation projects can be provided and open access would be considered after firming-up of beneficiaries.

4.10 It may be noted that most of the IPPs have not firmed-up their beneficiaries. Also, the generation capacity being stated to be programmed for 11th Plan/ early 12th Plan is much in excess of load demand projected by the state utilities even with accelerated growth. In view of this, it would be desirable to take-up only that subset of transmission system which would provide basic system for connectivity and onward transmission through the main identified corridors. Also, in those transmission corridors on which power that would flow is yet to be tied-up in PPAs, instead of 'N-1' redundancy, only 'N-0' redundancy could be considered at this stage.

4.11 With a view to estimate the investment requirement vis-à-vis power that would be transmitted, it may be noted that the total generation capacity of the projects from (1) to (27) of para 3.7 projects is 37592 MW out of which allocation/open access sought for supply to WR and NR is 15051 MW and 11361 MW respectively.

4.12 Based on the studies, the following transmission schemes have been identified:

4.12.1 **System strengthening common for WR and NR:**

Following system strengthening works have been identified which would benefit both WR and NR and accordingly are proposed as common system for WR and NR. Approximately estimated cost of this system is Rs 9000 crores. Transmission charges for this system is proposed to be divided in two parts in ratio of allocation to NR and WR from Rihand-IV(NR: 1000MW) and Vindhyachal-IV(WR : 1000MW) plus open access sought to NR and WR, from IPPs in Jharkhand, Orissa and M.P. connecting through dedicated or common system to Ranchi, Daramjaygarh, Jharsuguda, Jabalpur pooling, Vindhyachal pooling, or Satna. From the current list, it would include Essar, Electrosteel and Corporate in Jharkhand, all IPPs of Orissa, and Jaiprakash, Shahdol-RIL and Today home in M.P. which, in total, have sought open access of 5631 MW for NR and 5872 MW for WR. That is transmission charges divided in ratio of 6631 for NR and 6872 for WR and pooled in respective regional charges. The additional MW would go in denominator of respective regions.

1. Creation of 765kV Switching station at Daramjaygarh by LILO of Rinachi-Sipat 765kV S/C line
2. Ranchi-Daramjaygarh 765kV S/C line
3. Jarsuguda-Daramjaygarh 2xD/C 765kV lines
4. Dhramjaygarh-Jabalpur 765kV 2xD/C 765kV lines
5. Pooling station at Jabalpur with 2x1500MVA 765/400kV

6. Jabalpur-Bina 2XD/C 765kV lines
7. Bina-Gwalior S/C 765kV line (3rd ckt)
8. Gwalior-Jaipur 2XS/C 765kV lines
9. Vindhyaal pooling station with 2x1500MVA 765/400kV
10. Vindhyaal pooling-Satna 2XS/C 765kV lines
11. Satna-Gwalior 765kV S/C

4.12.2 **System strengthening for WR:**

Following system strengthening works have been identified for WR and are proposed to be pooled with WR system. Approximately estimated cost of the system is Rs 10000 crores. Additional 6872/(6631+6872) of Rs 9000 crores would add Rs 4600 Crores (approx), that is total addition of transmission system approximately estimated at Rs 14600 Crores. With this additional system 15051 MW (6872 MW + 8179 MW on account of Tillaiya, Nabinagar, Barh-II, Mauda, IPPs in West Bengal, Chattisgarh and Maharashtra and IPPs in Jharkhand other than those connected to Ranchi,) would get added to denominator of WR.

1. Dharamjaigarh-Sipat pooling 765kV S/C line
2. Bina – Indore 765kV S/C line (2nd line)
3. Indore – Vadodara 765kV S/C line
4. 765/400kV substation at Vadodara, Dhule, Padghe, Aurangabad, Raigarh, Champa, and Raipur each with 2x1500MVA 765/400kV and interconnecting 400kV lines/LILO
- 5.. Raigarh-Raipur 765kV S/C
- 6.. Raigarh-Champa 765kV S/C
7. Champa-Sipat pooling 765kV S/C
8. Champa-Raipur 765kV S/C
9. Sipat pooling-Raipur 765kV S/C
10. Raipur-Wardha 2XD/C 400kV lines upgradable to 2XS/C 1200kV lines
11. Wardh-Aurangabad D/C 400kV line (2nd line) upgradabile to 1200kV S/C line(2nd line)
12. Pune-Padghe 765kV S/C line
13. Aurangabad-Padghe 765kV S/C line
14. Aurangabad-Dhule 765kV S/C line
15. Dhule-Vadodara 765kV S/C line
16. Wardha-Nagpur South 400kV quad D/C with new 2x500MVA 400/220kV s/s at Nagpur South (Butibori) together with 220kV interconnectivity

4.12.3 **Generation Specific Transmission System**

Following generation specific transmission system is proposed. Transmission charges for these generation specific inter-connecting lines is proposed to be shared by beneficiaries of the specific generation project.

- Tilaiya UMPP (4000MW)
1. Tilaiya UMPP – Sasaram, 765kV S/C line
 2. Tilaiya UMPP – Gaya, 765kV S/C line
 3. Tilaiya UMPP – Balia 765kV S/C line
- Nabinagar (1000MW)
1. Nabinagar-Sasaram 400kV D/C line
- Barh-II (1320MW)
1. Barh – Gorakhpur 400kV quad D/C line
- Rihand-IV (1000MW)
1. Rihand-Vindhyachal pooling 2xS/C 765kV lines operated at 400kV (considering ageing of Rihand-Dadri HVDC system, it is suggested that in future, if it is decided to decommission the HVDC system, a 765kV switchyard could be established at Rihand utilizing the space of HVDC terminal. Considering this, 2XS/C 765kV lines operated at 400kV are being suggested instead of 400kV quad D/C line.)
- Vindhyachal-IV (1000MW)
1. Vindhyachal-IV – Vindhyachal pooling 400kV quad D/C line
- Mauda (1000MW)
1. Mauda-Nagpur South 400kV quad D/C
 2. Mauda-Khaperkheda 400kV quad D/C
- Essar(1800MW), Electrosteel(1200MW) and Corporate(800MW):
- These three IPPs in Jharkhad would connect at 400kV to Ranchi 765/400kV substation through dedicated/common 400kV transmission lines
- Adunik (1000MW) and DumkaCESC (1200MW) :
- These two IPPs in Jharkhan would connect to ER grid at Jamshedpur/Maithon/Gaya
- Sterlite(2400MW), GMR (1050MW), Monet (1005MW), Jindal (1200MW), Essar(1200MW) and Lanco (2640MW)
- These IPPs in Orissa would connect to 765kV and 400kV system specifically proposed in ER for Orissa IPPs. Three 765/400kV pooling stations at Jharsuguda, Angul and Denkenal have been proposed together with Jarsuguda-Angul-Denkenal-Jharsuguda 2xS/C 765kV lines. This system is proposed to be connected to WR system through following provision:

1. LILO of all four circuits of Rourkela-Raigarh 2xD/C 400kV lines at Jharsuguda.
2. Jarsuguda-Dharmjaygarh 2xD/C 765kV lines.

WBPDCL projects

To be connected to West Bengal and ER grid

IPPs in MP

Jaiprakash (1320MW)

1. Jaiprakash-Satna(or Vindhyaachal pooling) 400kV quad D/C

ShahdolIRIL(1050MW)

1. Shahdol-Jabalpur pooling 400kV D/C

Today Home(1000MW)

1. Today Home – Jabalpur pooling 400kV D/C

IPPs in Maharashtra

JSW Energy(1200MW)

Connected through MSETCL's STU system

Maharashtra Egy(4000MW)

1. MahaEgy – Phadghe 2X S/C 765kV lines

IPPs in MP

Aryan Coal (270MW), Spectrum C&P (100MW),
Maruti C Coal(270MW) and Dheeru (1050MW)

1. All the above projects are proposed to be connected to Sipat pooling
2. Earlier open access to Aryan Coal was agreed with connectivity to Bhatpara. In view of revised time frame for the generation project, it can now be planned to be injected at Sipat pooling. PGCIL have informed that Aryan and Sepctrum have planned to have a common dedicated 400kV line to Sipat pooling.
3. Maruti C Coal and Dheeru would have their own dedicated 400kV lines connecting to Sipat pooling.
4. Open access to Dheeru has already been agreed for 600MW. They have revised their application seeking open access of 682 MW (382 to NR and 300 to WR).

NOTE: PGCIL would take-up the scheme in phases based on time frame of generation projects and BPTA from Generators(NTPC/JV/IPPs) for sharing transmission charges of the regions for which they seek open access..

5. Transmission System for Export of power from different generation projects in Sikkim to NR/WR.

5.1 A large number of generation project developers are setting up generation projects in Sikkim. As per information furnished by PGCIL following is the list of projects along with tentative beneficiaries and schedule of commissioning:

List of Generation Projects in Sikkim

Sl. No	Name of the Developer/Open Access Applicant	Name of the Generation Plant	Capacity/ Power to be transferred	Tentative Beneficiaries In MW	Expected Comm. Schedule*
A	Upper Part of Sikkim				
1.	Teesta Urja Ltd./ PTC	Teesta-III	1200 MW	PSEB-40, HPGCL-200 UPPCL-200 Rajasthan Discom-100	Sept., 2011
2.	Himurja Infra Pvt. Ltd.	Teesta -II	480 MW	NR/WR	Dec., 2012 (uncertain)
3.	Himagiri Hydro Energy Pvt. Ltd.	Panan	300 MW	NR	March.,2013
4.	Himalayan Green Energy Pvt. Ltd.	Teesta-I	300 MW	NR	Dec., 2013 (uncertain)
5.	BSC(P)L -SCL JV Engineers & Contractors	Rongyong	60 MW	NR	Dec., 2012
6.	Sneha Kinetic Power Projects Ltd.	Dickchu	96 MW	NR	Dec2013
7. #	Chungtang Hydro Pvt. Ltd.	BOP(Chungtang)	99 MW	NR/WR	March 2013
8. #	Teesta Hydro Power Pvt. Ltd.	Bhimkyong I	99 MW	NR/WR	March 2013
9. #	Lachung Hydro Power Pvt. Ltd.	Lachung-Tangchi.	99 MW	NR/WR	March 2013
10		Chakungchu	90 MW	NR/WR	April 2013
		Subtotal	2823MW		
B	Lower Part of Sikkim				
1.	Lanco Energy Pvt. Ltd.	Teesta-VI	500 MW	MSEDCL (Maharastra)	June 2012

2.	DANS Energy Pvt. Ltd.	Jorethang	96 MW	NR/WR	March , 2011
3.	JAL Power Corporation	Rangit-IV	120 MW	ASEB, MP	April 2012
4.	Shiga Energy Pvt. Ltd.	Tashiding	80 MW	NR/WR	July 2012
5.	TT Energy Pvt. Ltd.	Tingting	90 MW	NR/WR	July,2012
6.	Madhya Bharat Power Corporation	Rongnichu	96 MW	Chhattishgarh	March, 2012
7.	Gati Infrastructure Limited	Chuzachen	118 MW	PSEB, DVB, HSEB, BSEB	Sept , 2009
8.		Rolep	80 MW		April 2012
9.		Ralong	100 MW		April 2013
10	Gati Infrastructure Limited	Sada Mangdher	71 MW		Feb 2011
11		Bhasme	51 MW		Nov 2010
		Subtotal	1402MW		
		Total	4225MW		

For projects 7,8 & 9 of (A), as mentioned by M/s CPTL
Yet to apply for long-term open access.

5.2 Based on the list of generation projects and its latest status, as informed by different generation developers, comprehensive transmission system has been evolved and phasing of transmission system matching with the generation schedule has been finalized, the details of which are the following:

A. Transmission System for development of pooling stations in Sikkim and transfer of power to a new pooling station on NER-NR/WR HVDC interconnector.

Pooling Station

- (i) 220/132 kV at Rangpo
- (ii) 400/220 kV at New Melli
- (iii) 400/132 kV at Mangan
- (iv) 400/220 kV near Teesta-II

Transmission Line

- i) Teesta-II Pooling Point – Mangan 400 kV D/C (Twin Lapwing)
- ii) Mangan – New Pooling Station in Northern part of West Bengal/Bihar (Kishanganj) 400 kV D/C line with quad conductor.
- iii) Mangan – New Melli 400 kV D/C (Quad Moose)
- iv) Dikchu - Gangtok 132 kV D/C
- v) New Melli – New Pooling Station in northern part of West Bengal/Bihar (Kishanganj) 400 kV D/C (Quad Moose).
- vi) Rangpo – New Melli 220 kV D/C line (Twin moose).
- vii) LILO of Gangtok - Melli and Gangtok – Rangit 132 kV lines at Rangpo.

- viii) LILO of Teesta-V - Siliguri 400 kV line at New Melli with quad Moose conductor. [This LILO would be withdrawn at a later date and the 4 nos. of 400 kV bays at New Melli used for LILO would be utilized for New Melli – Kishanganj and New Melli – Mangan 400 kV D/C lines].

Substation

- ix) New 400/220 kV GIS Pooling Station near Teesta-II HEP with 7x105 MVA, single phase transformers and 2x80 MVAR bus reactors at 400 kV bus.
- x) New 400/132 kV GIS Pooling Station at Mangan with 7x105 MVA, single phase transformers and 2x80 MVAR bus reactor at 400 kV bus.
- xi) New 400/220 kV GIS Pooling Station near New Melli with 13x167 MVA, single phase transformers and 2x80 MVAR bus reactors at 400 kV bus.
- xii) New 220/132 kV Gas Insulated Pooling Station near Rangpo with 3x100 MVA, transformers.
- xiii) Extension of 400 kV Kishanganj new pooling substation with 2 nos.63 MVAR switchable line reactors each on Kishanganj new pooling station end of Mangan and Kishanganj pooling station

5.3 Scope of works at Sl.no (ii) viz Mangan-Kishanganj 400 kV D/C quad line along with Teesta-III –Magan 400 kV D/C quad line is proposed to be executed through Joint Venture route between PGCIL and Generator.

B. Transmission System for development of pooling stations on NER-NR/WR HVDC interconnector.

- i) LILO of Siliguri(Existing) – Purnea 400 kV D/C Quad line at the new pooling station.
- ii) LILO of Siliguri(Existing) – Dalkhola 220 kV D/C line at new pooling station.
- iii) LILO of Biswanath Chariali – Agra +/- 800 kV, HVDC line at new pooling station for parallel operation of HVDC station.
- iv) Establishment of New 2x315 MVA, 400/200 kV and +/- 800 kV, 3000 MW HVDC sub-station at new pooling station
- iv) Earth Electrode line for the new pooling station.
- v) Addition of +/- 800 kV, 3000 MW HVDC Module at Agra.
- vi) Earth Electrode line at Agra HVDC terminal.

The above is for information of the members.

6. Proposal of MPPTCL for 220 kV Sujalpur-Badod D/C line

MPPTCL have vide their letter no 04-01/N-155/6270 dated 28th June 2008 (copy enclosed) intimated that 220 kV Badod substation in MP by LILO of Kota-Ujjain line has already been taken up by MPPTCL. They have suggested that 220 kV Sujalpur-Badod 220 kV D/C line be taken up as a regional project as it would facilitate Rajasthan in drawing power through Sujalpur-Badod-Kota line

Members may discuss and decide.

7. Intra-state Transmission System of STU at 400kV and 765kV in Maharashtra.

MSETCL have proposed following intra-state transmission system. This was discussed between CEA and MSETCL and it is observed that MSETCL are planning adequate transmission system for meeting their intra-state transmission needs. The system is detailed below:

MSPGCL Generation

1.	Bhusawal II	2x500 MW	2010-2011
2.	Khaperkheda	1x500 MW	2010-2011
3.	Koradi - II	3x660 MW	2011-12, 2012-13
4.	Chandrapur - II	2x500 MW	2011-2012

MAHADISCOM

1.	Dhopave	2x800 MW	2011-12, 2012-13
2.	Dhule	2x800 MW	2012-13, 2013-14
3.	Aurangabad	2x800 MW	2012-13, 2013-14

IPPs

1.	M/s JSW Energy Ltd.	4x300 MW	2009-10
2.	M/s Wardha Energy Co.	2x135 MW	2009-10
3.	Reliance Ind. Shirur	1x1000 MW	2012-13
4.	Reliance Ind. Talegaon	1x1000 MW	2012-13
5.	India Bulls, Sinnar(Nasik)	2x660 MW	2012-13, 2013-14
6.	Sophia Power Co., Nandgaonpet	4x660 MW	2012-13, 2013-14
7.	M/s Adani - Gondia	3x660 MW	2012-13

A) Intrastate system strengthening and common system for the comprehensive evacuation system :

- 1) 7 X 500 Mva-1 phase 765/400 kV pooling S/s at Koradi 765kV s/s
➤ LILO of 400 kV Satpura – Koradi-I S/c at Koradi 765kV s/s
- 2) 7 X 500 Mva-1 phase 765/400 kV S/s at Akola
➤ Akola 765kV – Akola 400kV 400kV quad D/C line OR
LILO of both ckts of Wardha (PG) – Aurangabad (PG) 400kv D/C line at Akola 765kV s/s.
- 3) Koradi – Akola 765kV 2xS/C lines
- 4) Akola – Aurangabad (PG) 765kV 2xS/C lines

- 5) Following new 400 kV substations each with 7 X 167 Mva-1 Phase 400/220 kV: Lonikand-II, Chakan, Hinjewadi, Kesurdi, Nasik, Nanded, Malharpeth (Karad-II), Padghe-II.

The above 400kV substations would have the following transmission connectivity:

1. LILO of both ckts of Parli (PG) – Pune (PG) 400 kV D/c at Lonikand-II.
2. LILO of one ckt of Lonikand-I – Pune (PG) 400 kV at Chakan.
3. LILO of both ckts of Koyna – Jejuri/Lonikand-I 400 kV D/c at Kesurdi.
4. Lonikand-II – Kesurdi 400 kV quad D/c
5. Kesurdi – Hinjewadi 400 kV quad D/c
6. LILO of both ckts of Navsari – Navi-Mumabai 400 kV at Nasik.
7. LILO of Chandrapur-I – Parli 400kV S/C at Nanded
8. LILO of both circuits of New Koyna-Karad 400kV D/C at Malharpeth
9. LILO of both circuits of Tarapur-Padghe 400kV D/C at Padghe-II

B. Intrastate transmission system for generation specific evacuation up to grid points:

MSPGCL Generation

Bhusawal II: Bhusawal-II – bhusawal 400kV D/C
Bhusawal-II – Aurangabad (MSETCL) 400kV D/C

Khaperkheda Khaperkheda- Koradi 765kV 400kV quad D/C

Koradi-II Koradi-II – Koradi 765kV Quad D/C
LILO of 400 kV Koradi-I – Bhusawal S/c at Koradi-II

Chandrapur-II LILO of both circuits of Chandrapur-Parli 400kV D/C at Chandrapur-II (that is LILO of 2 circuits out of 3)

Chandrapur-II – Warora – Wardha PG 400kV quad D/C with switching station at Warora

MAHADISCOM

Dhopave Dhopawe – Padghe-II 400kV quad D/C
LILO of both circuits of Jaigarh-New Koyna 400kV quad D/C at Dhopave

Dhule Dhule-Dhule existing 400kV quad D/C

Aurangabad LILO of both circuits of Aurangabad-Bhusawal 400kv D/C line at Aurangabad TPS

IPPs

M/s JSW Energy Ltd.	Jaigarh – New Koyna 400kV quad D/C Jaigarh – Malharpeth 400kV quad D/C
M/s Wardha Energy Co.	Wardha Egy – Warora Sw.St. 400kV D/C
Reliance Ind. Shirur	Shirur – Lonikhand-II 400kV quad D/C Shirur – Chakhan 400kV quad D/C
Reliance Ind. Talegaon	Talegaon – Hinjewadi 400kV quad D/C Talegaon – Chakhan 400kV quad D/C
India Bulls, Sinnar(Nasik)	Sinnar – Nasik 400kV D/C Sinnar – Bableshwar 400kV D/C
Sophia Power Co., Nandgaonpet	Nandgaonpet – Akola(765kV) 400kV D/C lines LILO of Akola-Koradi 400kV S/C at Nandgaonpet
M/s Adani - Gondia	Gondia – Koradi (765kV) 400kV quad D/C Gondia – Warora 400kV quad D/C

The studies have shown that this transmission system would meet the intra-State transmission requirements without leaning on the regional grid and would meet the contingency as per specified criteria.

Members may take note of the above transmission schemes and concur the proposed connectivity with the regional grid.

8. Provision of second 400 kV feed to Union Territory of Dadra and Nagar Haveli (DNH)

At present the peak load demand of DNH is of the order of 400 MW. The 17th EPS has projected a load demand of 778 MW by end of XI. Presently the load demand of DNH is met through drawal of its share from Central generating station through GETCO network. The 220 kV Vapi-Kharapada line has been commissioned recently in June 08 and 220 kV Vapi-Khadoli is under implementation and is programmed for commissioning in Sept 2010. Considering the future projected load demand and considering that DNH would be having allocation from many of the central generating stations proposed to come up and also tying up with various IPPs for meeting its power requirement another feed from 400 kV regional substation would be required. It is therefore proposed that a 400/220 kV substation at a suitable location in DNH. PGCIL may evolve connectivity through suitable 400kV D/C line or through feasible LILO of 400kV line.

Members may discuss and concur.

9. PGCIL have proposed the following

9.1 Addressing high short circuit level at 400kV Raipur substation in WR

With the growing number of interconnections at 400/220kV Raipur substation, the short circuit level is expected to be high (about 43kA) which is beyond the permissible limit of 40kA. Studies have been carried out to address the high short circuit level with split bus arrangement only and re-configuration/shifting of some of the terminating lines at Raipur S/s to even out the loading level on all the terminating lines. Based on the studies, it is found that split bus arrangement at Raipur is feasible. For this, by-passing of 400kV Korba/Bhatapara – Raipur - Bhilai at Raipur along with shifting of few line terminals from one side to other are required. Accordingly, it is propose to split 400kV Raipur bus into two(2) sections with re-configuration of few 400kV terminating line/line bays. A brief report on the same is enclosed at **Annexure-2**.

Members may deliberate and concur.

9.2 Control of high voltages in Dhule area in WR

In the 8th meeting of WRPC held on 12.09.2008. Member Secretary, WRPC stated that in view of high voltages in Dhule area and frequent tripping of 400kV Sardar Sarovar – Dhule line on high voltage conditions especially with low generation at Sardar Sarovar, in the TCC, it emerged that shunt reactors may be installed in nearby areas namely Rajgarh/Nagda. Further, WRPC suggested that provision of reactor at nearby station like Rajgarh/Nagda may be studied to control high voltages in Dhule area taking into account the reactors already under implementation.

Based on the above, studies have been carried out to examine the requirement of bus reactor at 400kV Nagda/Rajgarh substation in off-peak condition with low generation at Sardar Sarovar and taking into account reactors already under implementation. It has been observed that provision of 80MVAR bus reactor at Rajgarh/Nagda has marginal effect to reduce bus voltages at Dhule. In view of the above, it is suggested that to contain high voltage phenomena in WR grid, efforts may be taken by the respective utility to install the bus reactors already planned at various 400kV substations expeditiously. A brief report on the same is enclosed at **Annexure-3**.

Members may deliberate and concur.

9.3 Development of 400 kV network at Gwalior

To provide anchoring of Gwalior 400 kV bus through 400 kV network, PGCIL have suggested developing suitable 400 kV network from Gwalior. They have suggested 400 kV D/C Gwalior-Shujalpur line.

Members may deliberate and concur.

ANNEXURES



OFFICE OF THE CHIEF ENGINEER (PS-PMU)
MP POWER TRANSMISSION CO. LTD.
RAMPUR : JABALPUR.

No.0401/LF-19/ 7969

3 OCT 2007

To

The Director,
Central Electricity Authority,
System Planning & Project Appraisal Division,
Sewa Bhawan, R.K.Puram,
NEW DELHI -110 006.

Sub: 27th meeting of Standing Committee on Power System Planning
in Western Region.

Ref: Your letter No.26/10/2002-S&P&PA/293-306 dtd.6.9.2007.

Our comments on records of 27th meeting sent vide referred letter are as
under:

- a) Sl.No.1(1.1) of MOM and Sl.No.18(e) of Annexure-II.

The LILO of both circuits of Indore-Nagda 400 kV double circuit line at Indore 765 kV (PG) to be replaced by LILO of both the Indore-Ashoj 400 kV lines at Indore (PG) (765 kV) substation. This was confirmed at Sl.No.1(1.1) of MOM but in Sl.No.18(e) of Annexure-II, LILO of Indore (M.P)-Nagda 400 kV DC line at Indore(PG) has been indicated. This needs to be corrected in Annexure-II(b) also.

3. **Transmission System for evacuation of power from Krishnapatnam UMPP (4000 MW) and requirements for additional transmission capacity between SR-WR.**

(A) MPPTCL did not agree for the scheme 'A' HVDC back to back system comprising of (1) Narendra - Kolhapur 400 HVDC (2) 1000 MW HVDC back to back at Narendra.

It was requested by MPPTCL to provide techno economic analysis for the same. On page 6 of MOM, only the cost of A, B, C and D Schemes is given with no techno economic justification for Scheme 'A'. Further, MPPTCL representatives have not agreed to share the transmission charges for Scheme 'A'.

(B) Similarly, for Scheme 'D' Pune-Navi Mumbai 400 kV D.C line it was requested by MPPTCL to provide for the justification showing flow on the lines without Krishnapatnam UMPP and with Krishnapatnam UMPP generation. MPPTCL representatives have not agreed to share the transmission charges for this line also. While in the minutes it has been said that transmission charges for this scheme will be shared by WR constituents as regional pool transmission charges together with WR share from Krishnapatnam, UMPP which is not correct.

1877-01(P.S.)
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GETSP & PMU
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M

4,. Transmission system from the new generation capacity planned by DVC viz. Koderma TPS (2x500 MW), Bokaro-A (1x500 MW), Majia-B (2x500MW), Durgapur Steel (2x500 MW) and Reghunathpur TPS (2x500 MW) together with review of transmission system associated with North Karanpura (3X660 MW) and Maithon RB (1000 MW).

As load flow details were not made available to MPPTCL before the meeting no comments were offered by MPPTCL..

May kindly amend the MOM accordingly.


CHIEF ENGINEER(PS-PMU)
MPPTCI : JABALPUR

Copy to:

1. The Member(PS), Central Electricity Authority, Sewa Bhawan R.K.Puram, New Delhi-110066.
2. The Member Secretary, Western Regl. Electricity Bard, MIDC Area Marol, Andheri East, Mumbai.
3. The Executive Directttor(Engg.), Powergrid Corp. of India Ltd., " Saudamini", Pot No.2Sector-29, Gurgaon-122 001
4. The Executive Director(Engg.), NTPC Ltd., Engg. Office Complex, A-8 Sector-24, NOIDA-201301
5. The Managing Director, GETCO, Sardar Patel Vidyut Bhawan, Race Course, Baroda-390 007.
6. Member(Transmission & Distribution), Chhatisgarh State Electricity Board, Dangania, Raipur(CG)-492013
7. Director(operation), MAHATRANSCO, 'Prakashgad', Plot No.G-9, Bandra-East, Mumbai-400 051.
8. ED(Commercial), MP TRADCO, Jabalpur
9. CE(LD), MPPTCL, Jabalpur.
10. Staff Officer fo CMD MPPTCL, Jabapur

Addressing high short circuit level at 400kV Raipur substation in Western Region

In Western region, large portion of generation capacity is located in the Eastern part. In the Eastern part, 400/220kV Raipur substation is well connected with this major generation complex. In addition, Raipur is interconnected with Eastern Region grid for import of power from ER. Besides, about 4000MW capacity addition has been envisaged by various IPPs/ISGS in this generation complex by 2010-11. To transfer of power from this complex, a large number of transmission corridors have been planned towards Western part of the region via Raipur. It has been observed that with the growing interconnections at Raipur, short circuit level at Raipur is expected to be about 43 kA by 2010-11, which is beyond the permissible limits of existing switchgear capacity, i.e 40kA.

To address, high short circuit level at 400kV Raipur S/s, split bus-arrangement has been examined. Total number of 400kV bays terminated at Raipur is 22 nos. including under construction bays.

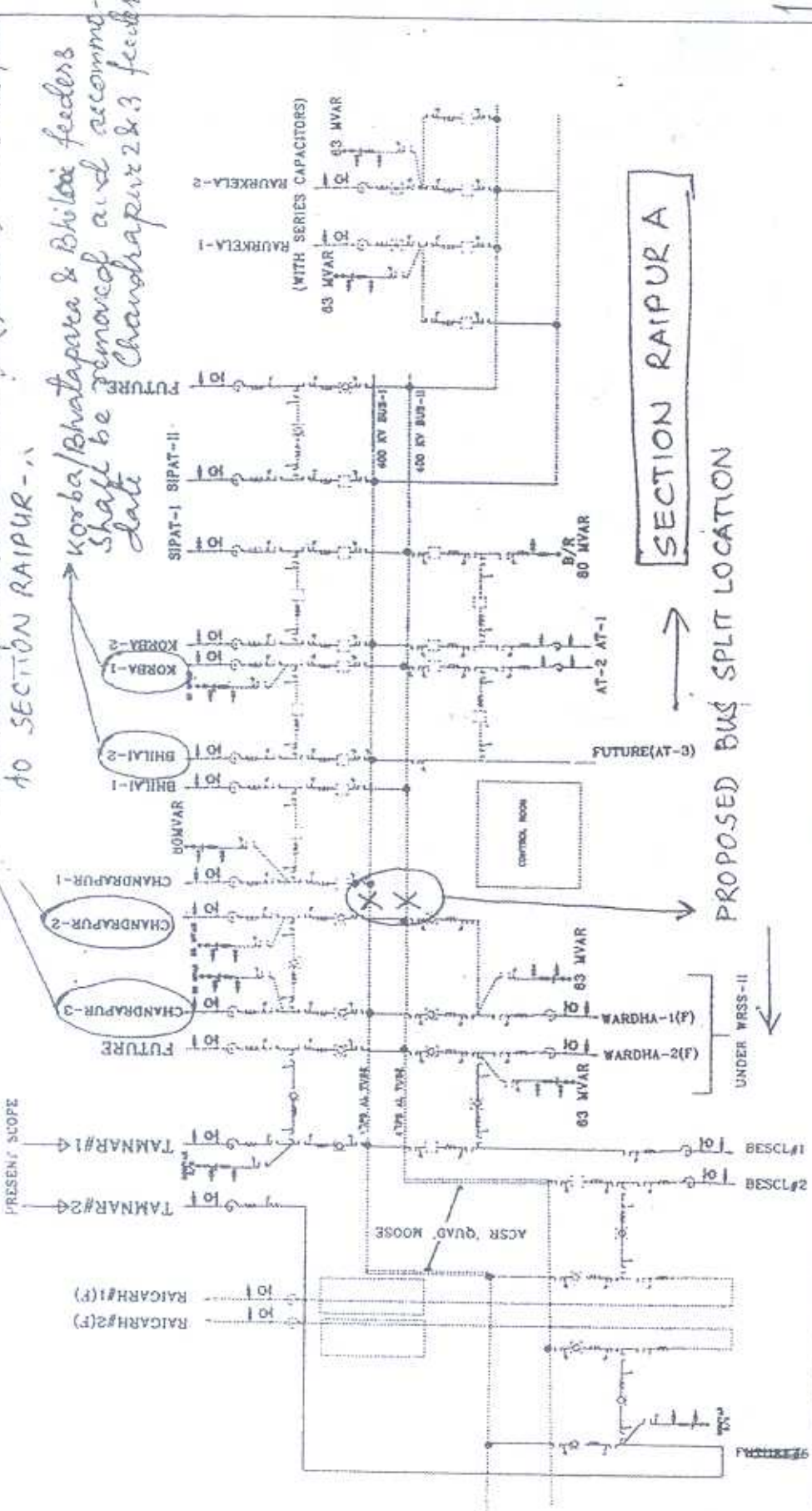
Splitting of bus has been carried out taking into account the typical loading on various incomer & outgoing lines/feeders and even out the loading of the feeders on each section of the split bus. For this, some of the incomer and outgoing feeders have been shifted/re-configured to ensure that total power injected at Raipur is distributed over all the incomer feeders and adequate no. of outgoing feeders available on either section.

Based on the above, it is proposed that bus split may be carried out between Chandrapur 1 and Chandrapur 2 line bays and shifting of both Chandrapur 2 and Chandrapur 3 line bays at the right section Raipur-A (Refer *Annexure-1*). For this, two(2) additional line bays are required in section Raipur-A. It may be mentioned that at section Raipur-A, only one(1) spare bay is available. In view of the above and to avoid criss-crossing of number of lines, it is proposed to open/by-pass Korba/Bhatapara-Raipur - Bhilai line at Raipur and restore it as Korba-Bhatapara-Bhilai line. In this way two(2) additional bays would be available at section Raipur-A to terminate Chandrapur 2 & 3 feeders. In addition, two(2) bays would be available at section Raipur-B for terminating Korba STPS – Raipur D/c line (proposed as a part of Korba-III transmission system) due to shifting of Chandrapur 2 & 3 feeders to Section Raipur-A. It has been observed that loading on all the lines due to above re-configuration and shifting is in order under normal as well as contingency conditions. Further, short circuit level at section Raipur-A and Raipur-B reduces to about 30kA and 20kA respectively. Results are enclosed at *Annexure-2* (without and with opening of Korba/Bhatapara-Raipur-Bhilai at Raipur) and *Annexure-3* (with bus split and feeder re-configuration).

Proposal

1. Split 400kV Raipur bus into two(2) sections between line bays of Chandrapur 1 & Chandrapur 2.
2. By-pass 400kV Korba/Bhatapara – Raipur – Bhilai at Raipur and restore the line as 400kV Korba/Bhatapara – Bhilai S/c.
3. Shifting of Chandrapur 2 and Chandrapur 3 line bays from section Raipur-B to Raipur-A.

ANNEXURE -1



400 kV Bhatapara & Biloi feeders shall be removed and reconnected to Chandrapur 2 & 3 feeders.

TO SECTION RAIPUR -1

SECTION RAIPUR A

PROPOSED BUS SPLIT LOCATION

SECTION RAIPUR B

BILL OF QUANTITY - 400 KV

Sl. No.	DESCRIPTION	QTY	UNIT
1	83 MVAR SHUNT CAPACITOR	2	+
2	CIRCUIT BREAKER WITH CR	4	+
3	CIRCUIT BREAKER WITHOUT CR	1	+
4	ISOLATOR WITH ONE EARTH SWITCH (B-PK)	14	+
5	ISOLATOR WITH TWO E/M3-PH	2	+
6	CURRENT TRANSFORMER	18	+
7	CAPACITIVE VOLTAGE TRANSFORMER	6	+
8	300 KV SURGE ARRESTER	12	+
9	WAVE TRAP	4	+

LEGEND:-
 _____ PRESENT SCOPE
 EXISTING/FUTURE SCOPE

2/7

FOR FR PURPOSE ONLY

POWER GRID CORPORATION OF INDIA LIMITED
 (A Government of India Enterprise)

PROJECT : TRANSMISSION SYSTEM FOR OP JINDAL STPP (CONSULTANCY WORK)

TITLE : SINGLE LINE DIAGRAM 400KV RAIPUR S/S (EXTENSION)

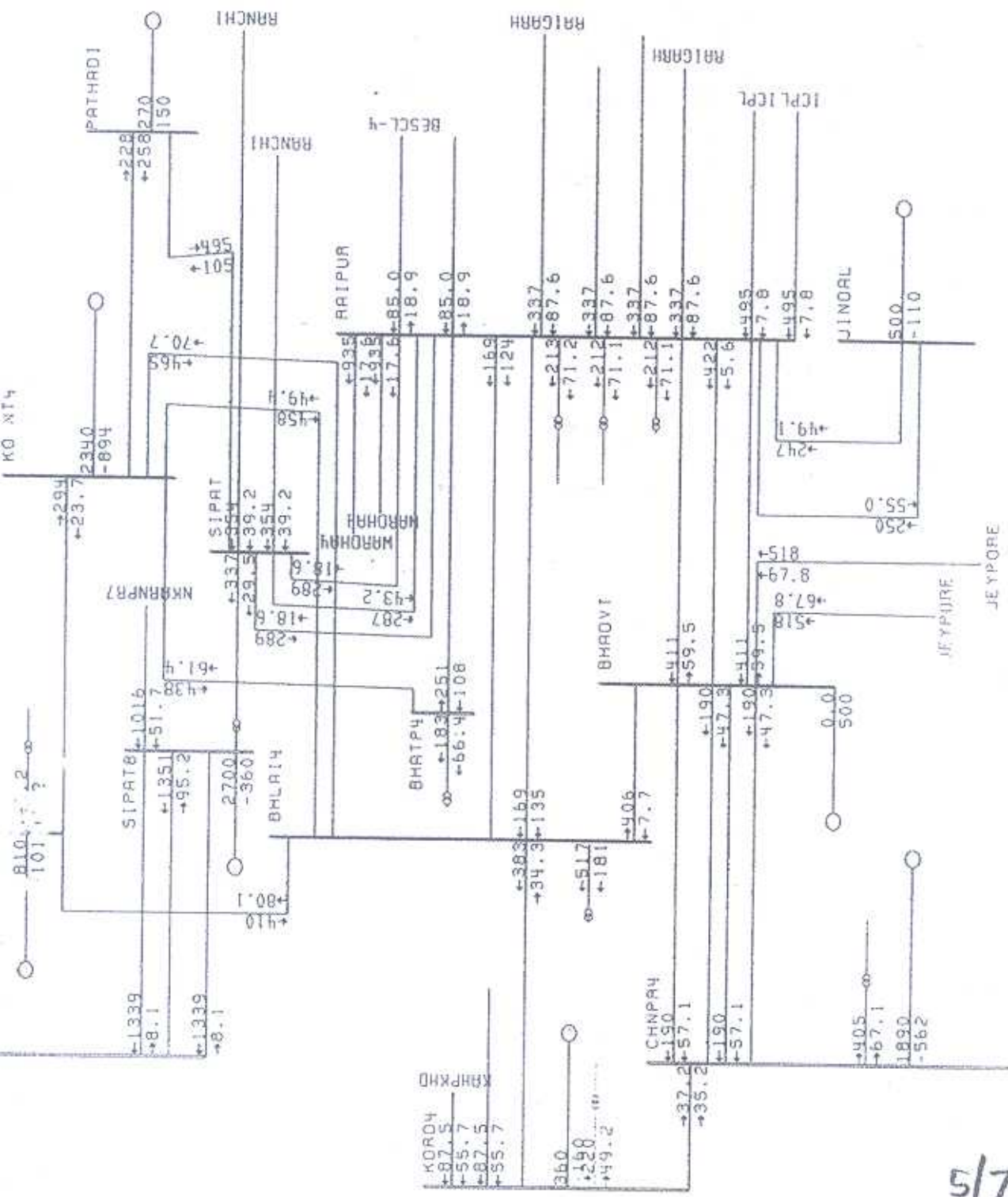
DATE: _____

SCALE: 1/2000/10/2000/2000/10

DRY: _____

DESIGN: _____

DRAWN: _____

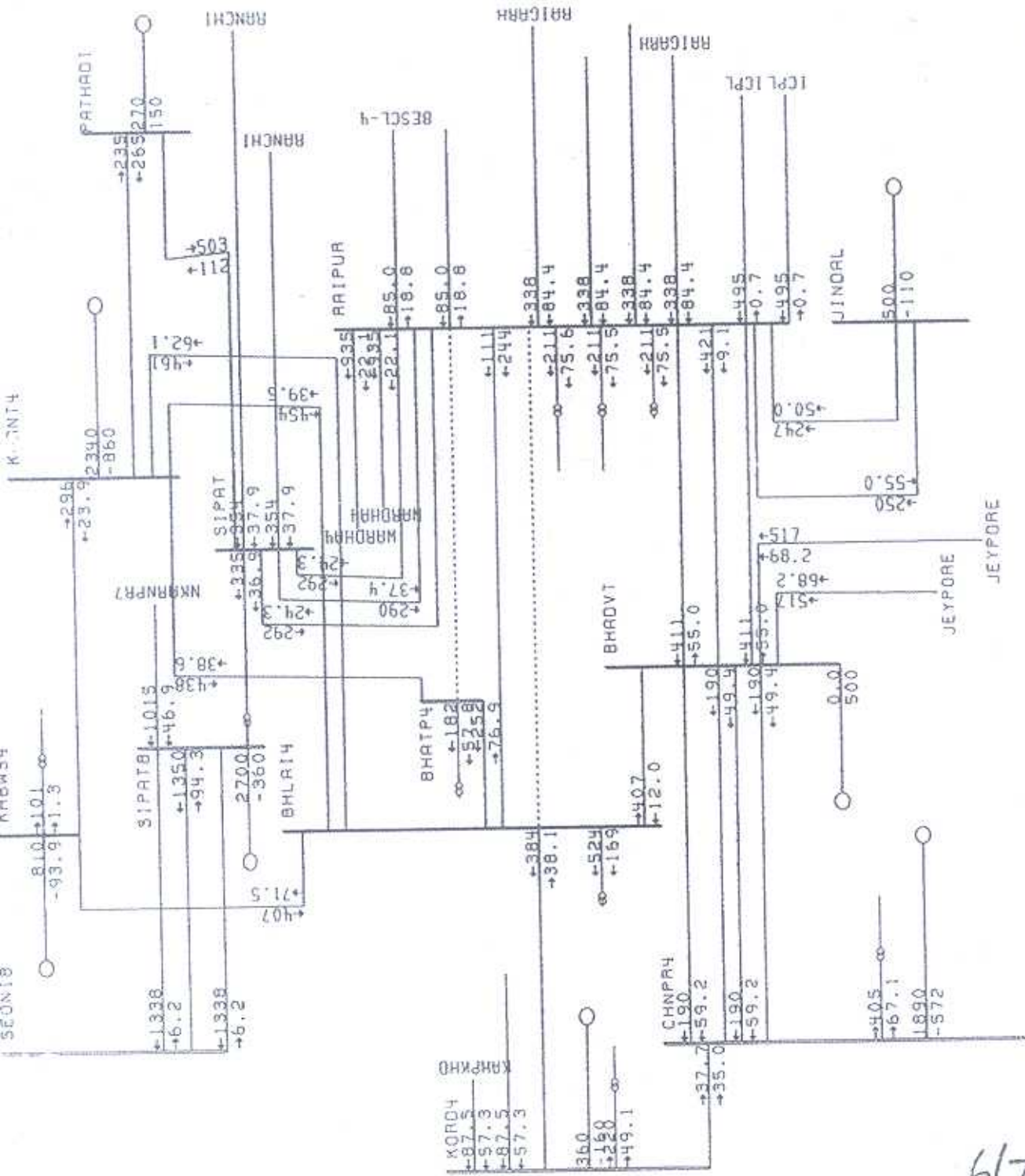


5/7

ANNEXURE - 2 (b)

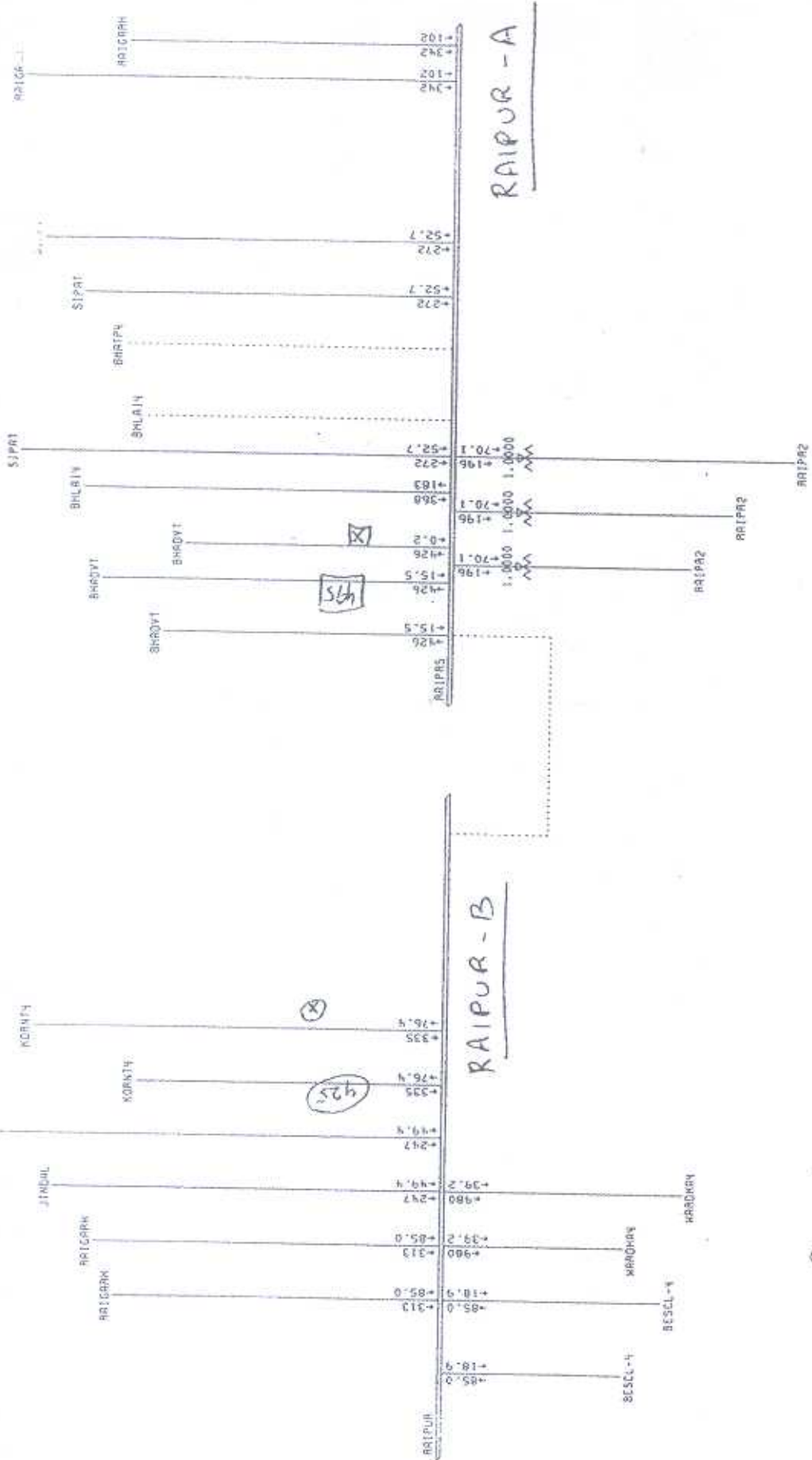
BY-PASSING OF KORBA/BHATAPARA - RAIPUR -
BILAI

AT RAIPUR



6/7

Cl. has shifted one side (for Bhal-Bhaloi Direction)



30.3 KA

20 KA

FK

BUS - NONE	
BRANCH - MW/MVAR	
EQUIPMENT - MW/MVAR	

Requirement of bus reactor at Rajgarh/Nagda to control high voltages in Dhule area

In order to control incidences of high voltages during low load periods in Western Regional Grid, installation of reactors at following locations has been planned by various utilities:

SI No.	400kV S/s	Size(MVAR)	Implementing agency	Expected commissioning
1.	Khandwa	1x125	POWERGRID	June, 2010
2.	Dhule	2x50	MSETCL	Mar, 2009
3.	Indore	1x125	MPPTCL	Mar, 2010
4.	Dehgam	1x125	POWERGRID	Jun, 2010
5.	Kasor	1x125	GETCO	Tender invited
6.	Nardipur	1x80	GETCO	Tender invited
7.	Padghe	1x80	MSETCL	Dec, 2008
8.	Karad	1x80	MSETCL	Dec, 2008
9.	Khargar	1x80	MSETCL	Mah would intimate

It has been envisaged that with the installation of above bus reactors, high voltage situation in the grid can be controlled.

In the 8th WRPC meeting held on 12.09.2008, Member Secretary, WRPC said that in view of high voltages in Dhule area and frequent tripping of 400kV Sardar Sarovar – Dhule line on high voltage conditions especially with low generation at Sardar Sarovar, in the TCC, it emerged that shunt reactor may be installed in nearby areas namely Rajgarh/Nagda. It was informed that although Sardar Sarovar units are being operated in synchronous condenser mode during low generation, WRPC suggested that provision of reactor at nearby station like Rajgarh/Nagda may be studied to control high voltages.

It was decided that POWERGRID may carry out studies to examine the requirement of reactor at Rajgarh/Nagda taking into account the reactors already under implementation. It was also suggested that funding of the above proposed reactor could be met from the surplus fund available in reactive pool account under system improvement (about Rs. 2.0 cr. is available).

Based on the above, studies have been carried out to examine the requirement of bus reactor at 400kV Nagda/Rajgarh substation in off-peak condition with low generation at

Sardar Sarovar and taking into account above reactors already under implementation are in place. Results are as under:

S. No	Case	Voltage (kV)		
		Rajgarh	Nagda	Dhule
1.	Base Case	410	405	410
2.	Base case + 80MVAR B/R at Rajgarh	408	404	409
3.	Base case + 80MVAR B/R at Nagda	409	403	410

It may be observed that without provision of any bus reactor at Rajgarh and Nagda, voltages remains at 410kV & 405kV respectively and Dhule at 410kV. Voltages can be controlled further by adjusting transformer taps suitably. Further, provision of 80MVAR bus reactor at Rajgarh and Nagda reduces the bus voltage marginally to 408kV & 403kV respectively and Dhule bus voltage to 409/410kV.

In view of the above, it is suggested that to contain high voltage phenomena in WR grid, efforts may be taken by the respective utility to install the bus reactors already planned at various 400kV substations on expeditiously. In addition, other means of voltage control like switching-off shunt capacitors during lean hours, settings of transformer taps etc. may also be explored.