

Agenda for 16th Meeting of the Standing Committee on Transmission System Planning in Northern Region

Item – I Evacuation system from Chamera III HEP (231 MW).

The Chamera III project would be located in Ravi Basin with an installed capacity of 231 MW adjacent to other stages of Chamera. The project has been accorded Techno-economic clearance of CEA and is included under the 10th plan programme. The other HE P's envisaged in the Ravi Basin viz Kutehar (260 MW), Bharmour (45 MW), Kugti (45 MW) and Budhil (70 MW) which are likely to come in the same time frame/near future were also considered for framing the transmission system capable of evacuation of about 600 MW of power. For evolving the evacuation system for Chamera III HEP the following alternative have been considered:

Alternative –I

- ❖ Generation of Chamera III power at 220 kV level
- ❖ Creation of 400/220 kV pooling point near Chamera
- ❖ Chamera III – Pooling Point 220 kV D/C line
- ❖ Pooling Point – Jullandhar 400 kV D/C line
- ❖ Pooling Point – Chamera II 400 kV S/C line

Alternative –II

- ❖ Generation of Chamera III power at 220 kV level
- ❖ Creation of 220 kV pooling point near Chamera
- ❖ Chamera III – Pooling Point 220 kV D/C line
- ❖ Chamera PP – Hamirpur 220 kV D/C line
- ❖ Further evacuation of power through 220 kV existing Hamirpur – Jullandhar D/C line.

Alternative –III

Transmission system associated with Chamera-III:

- ❖ Generation of Chamera III power at 220 kV level
- ❖ Creation of 400/220 kV pooling point at Hamirpur
- ❖ Chamera III – Hamirpur Pooling Point 220 kV D/C line with 0.4 conductor
- ❖ Additional 1 no 220kV bay at Chamera-III for 220kV S/C 2x0.5 conductor line from Kutehar

Transmission system from Kutehar:

- ❖ Kutehar-Hamirpur 220kV D/C
- ❖ Kutehar-Chamera-III 220kV D/C
- ❖ Additional 2 nos 220kV bays at Kutehar for 220kV lines from upstream projects

Transmission system common for pooled evacuation and system strengthening:

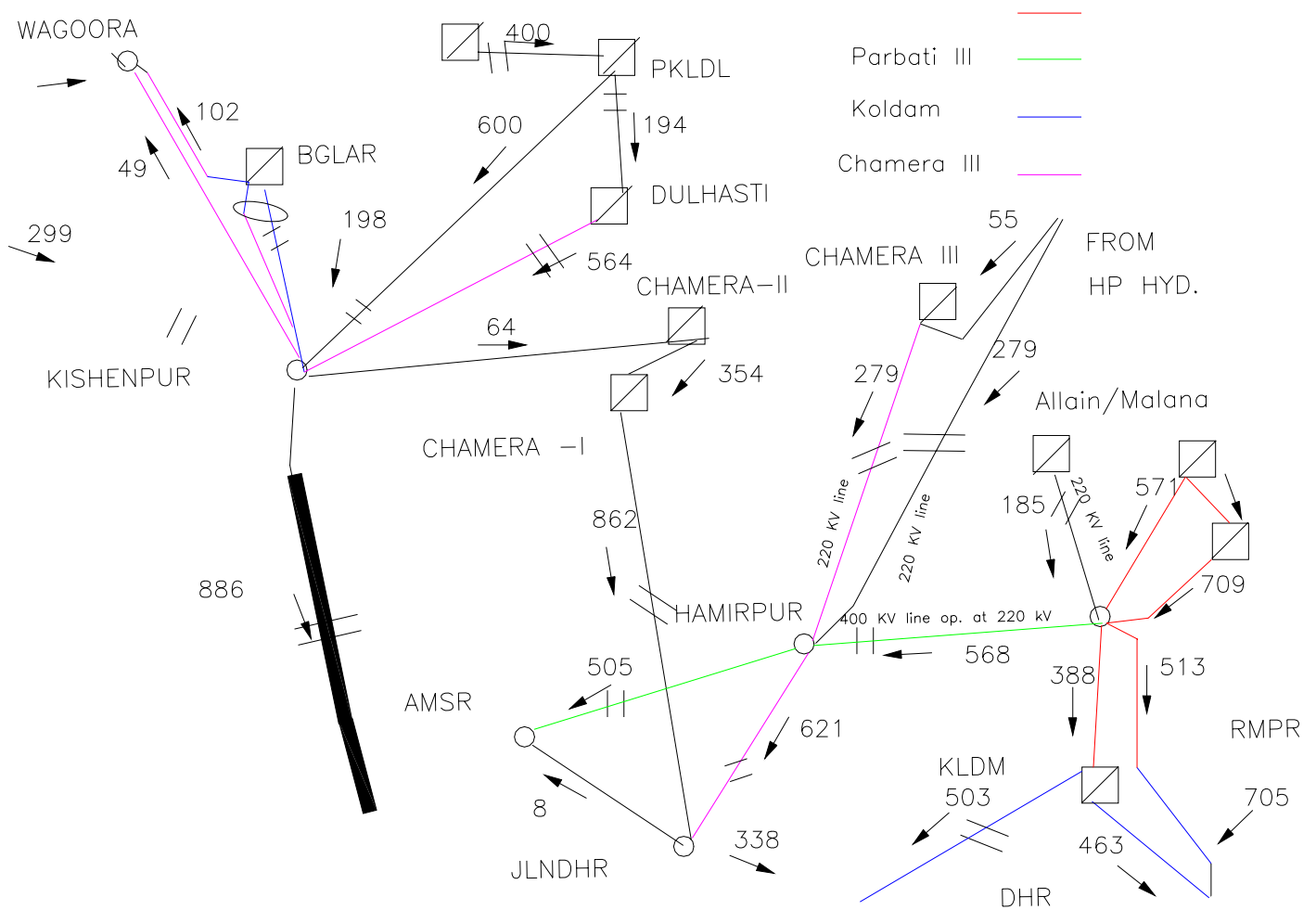
- ❖ Hamirpur – Jullandher 400 kV D/C line
- ❖ Hamirpur – Amritsar 400kV D/C line

Alternative– I takes into account the evacuation of power from Chamera III as well as other future generation projects in the Ravi basin. As an when any new project is commissioned near Chamera basin the same could be fed to the pooling Point at 220 kV level and the further evacuation would

take place through Chamera III system. However, with Chamer-II connected to pooling point, power flow may take place from Chamera II to Chamera pooling point, thereby consuming the spare capacity provided for other future projects in the basin and also deloading the already under utilized 765 kV Kishenpur – Moga lines.

Alternative-II is adequate for evacuation of power from Chamera –III, however, the 200 kV system beyond Hamirpur gets overloaded with the injection of power of Chamera III and would require further strengthening . Beside this, availability of land for creation of pooling point in the hilly Region could be difficult.

In alternative III, a 400/220 kV pooling point to be developed by POWERGRID at Hamirpur instead of in the hills as proposed in alternative I & II has been proposed. This alternative provides flexibility in project specific development of 220 kV and 400kV network towards 400/220 kV Hamirpur in phases. The other projects which are also expected in the upstream of Chamera can also be injected at Hamirpur for evacuation of power. Hamirpur pooling point also provides interconnectivity and evacuation system for projects in Ravi basin and Beas basin. Accordingly the same is recommended. **Case study for this alternative is as following:**



Members of the committee may discuss and concur on this issue.

Item-II Power Evacuation system associated with Parbati-II (800 MW) and Koldam HEP(4x200 MW)

The following evacuation system from Parbati II (800 MW) as well as Koldam HEP has been agreed in the 14th meeting of the Standing Committee held on 30/12/02.

- ❖ 400 kV lines with Quad conductor from Parbati II to Koldam as 2xS/C and thereon to Nalagarh on D/C tower so as to form the following circuits: -
 - ➔ Parbati II to Nalagarh 400kV line with Quad conductor
 - ➔ Parbati II to Koldam 400 kV line with Quad Conductor
 - ➔ Koldam to Nalagarh line with Quad Conductor
- ❖ Koldam – Ludhiana 400 kV D/C line with Triple ‘Snowbird’ conductor
- ❖ 400kV S/S at Ludhiana with 3x315 MVA, 400/220 kV ICT
(under transmission system strengthening scheme of Northern Region)

The execution and phasing of above network was evolved with commissioning of Koldam ahead of Parbati II. Now there is a change in commissioning programme of these hydro projects and Parbati II may come up ahead of Koldam HEP. To have a transmission programme which could be matched with the generation schemes irrespective of which of Parbati-II or Koldam comes first, the following is proposed:

Transmission system common to Parbati II and Koldam which is to be programmed for commissioning matching with whichever comes first:

- Koldam – Nalagarh 400 kV D/C line with Quad conductor
(in this, the provision for 400kV bays is to be kept for Nalagarh end only. The bays at other end get covered under Koldam or Parbati-II HEP)

Transmission System Under Northern Region Strengthening Scheme

- 400kV S/S at Ludhiana with 3x315 MVA, 400/220 kV ICT.

Transmission System for Koldam HEP

- 2 nos. 400kV bays for Koldam-Nalagarh/Parbati-II lines.
- Koldam – Ludhiana 400 kV D/C line with Triple ‘Snowbird’ conductor

Transmission System for Parbati-II HEP

- Parbati II – Koldam 400kV 2xS/C lines with Quad conductor.
(in this, the provision for 400kV bays is to be kept for Parbati-II end only. The bays at Kaldam/Nalagarh ends get covered under Koldam/ Common works)

The matching programme would be as following:

Transmission system if Parbati-II comes first:

- ◆ Parbati-II – Nalagarh 2 nos 400kV Quad circuits, on 2XS/C towers from Parbati-II upto Koldam site and D/C tower from Koldam site to Nalagarh

Transmission system if Koldam comes first:

- ◆ Koldam – Nalagarh 400kV D/C Quad line

Transmission system with both Parbati-II and Koldam:

- ◆ Parbati-II – Koldam 400kV S/C Quad line
- ◆ Parbati-II – Nalagarh 400kV Quad line on S/C towers upto Koldam and one circuit of D/C tower from Koldam site to Nalagarh
- ◆ Koldam – Nalagarh 400kV Quad line as one circuit of D/C

Members of the committee may discuss and concur on this issue.

Item – III Evacuation system from Parbati-III HEP (520 MW).

Parbati III (520 MW) HEP would be located in the downstream of Parbati II. In the comprehensive scheme for meeting the power evacuation requirements from Parbati II HEP, Parbati III HEP and Koldam HEP, the following transmission system has been proposed with Parbati III

- LILO of one 400 kV S/C line from Parbati II –Koldam at Parbati III
- Creation of Parbati pooling point at down stream of Parbati III HEP by LILO of both ckt of the Parbati II – Koldam and Parbati-II-Parbati-III-Nalagarh lines at Parbati Pooling point. The proposal under Parbati-III would cover only a 400kV switching station at the pooling point.
(Earlier, a 400kV S/C line between Parbati-III and Parbati pooling point was also considered in which case only one line of Parbati-Koldam was proposed to be LILOed at Parbati pooling point. With a view to conserve RoW, it is proposed to LILO both circuits of Parbati-II-Koldam lines at the pooling points and avoid the additional S/C line between Parbati-III and pooling point.)
- Parbati Pooling point – Hamirpur 400 kV D/C line
(The 400kV D/C line from Parbati pooling point to Amritsar is proposed to be bussed at Hamirpur and As discussed under item-I of this agenda, the Hamirpur-Amritsar line is proposed as a system strengthening scheme.)

The above arrangement was found to be adequate to evacuate full power from Parbati III HEP and also would dovetail in the overall transmission system planned for Beas Basin projects.

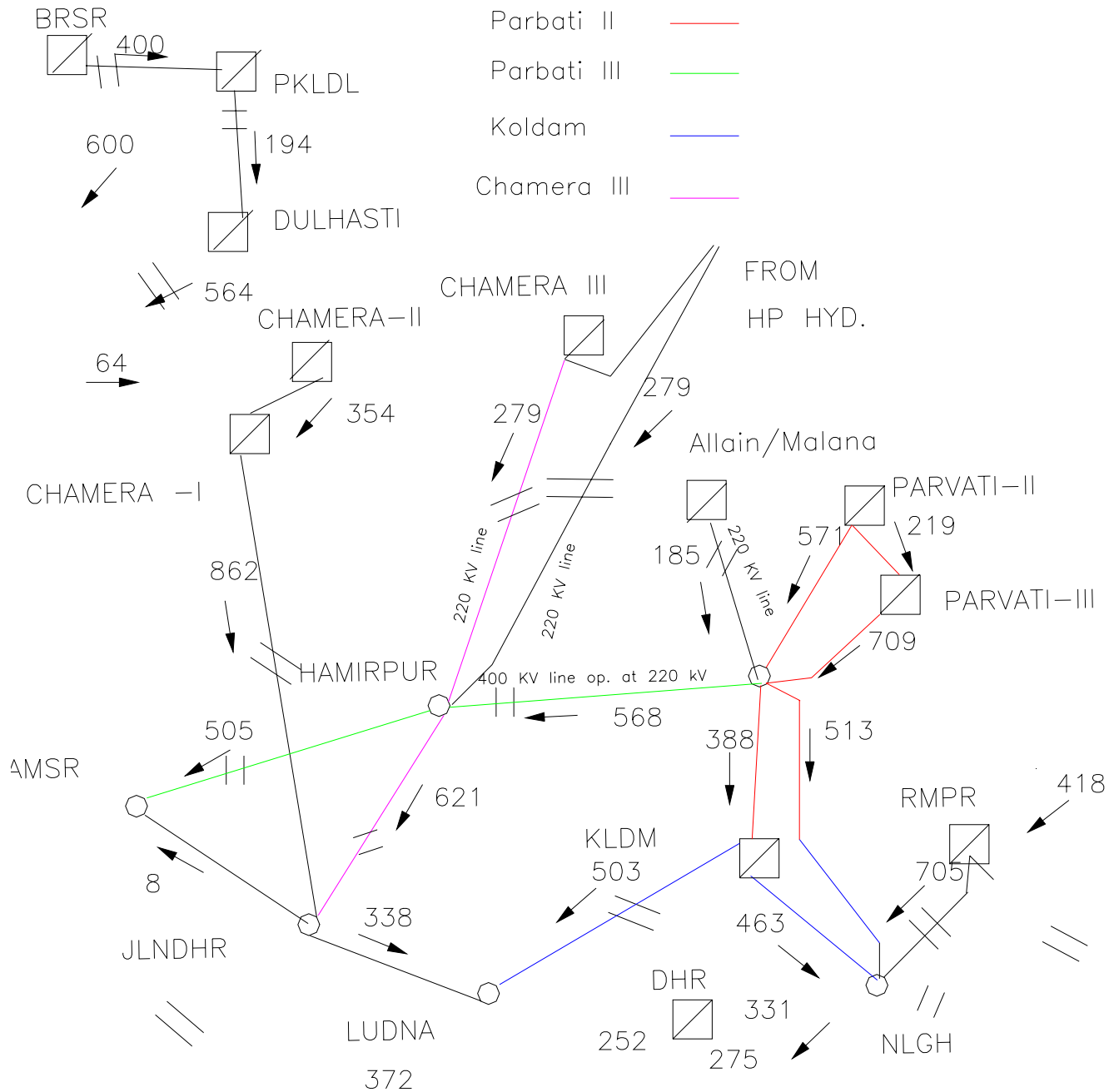
Members of the committee may discuss and concur on this issue.

Item – IV Evacuation system for Allain Duhangan and Malana-II.

The transmission system for Parbati-III would have spare capacity which could be utilized for evacuation of power from other projects in the Beas basin ie, Allan Duhangan HEP (192 MW) Malana II HEP (100 MW) and Sainj HEP (100 MW) etc, in Himachal Pradesh. For this a 400/220 kV S/S would need to be created at the proposed pooling point so that power from Allain Duhangan etc. could be evacuated and fed into the grid at the Parbati pooling point at 220 kV.

The different phase of development of the hydro project in Beas basin and the programme of early commissioning of Allain Duhangan has necessitated an arrangement for taking-up some part of Regional transmission system under Parbati-III ahead of the generation project. The following is proposed in this context:

- Parbati pooling point-Hamirpur 400kV D/C line, proposed with Parbati-III, may be taken-up on priority. This line could be initially charged at 220kV. The power from Allain Duhangan and Malana-II evacuated at 220kV could be transmitted upto Hamirpur using the 220kV evacuation lines from the projects upto Parbati pooling point and the 400kV Parbati pooling point-Hamirpur line charged at 220kV. From Hamirpur, the power could be further transmitted to the load centers using the Hamirpur-Jullundur and Hamirpur-Amritsar 400kV D/C lines proposed as system strengthening works at Agenda Item-I above, and the existing network.
- Till commissioning of 400/220kV ICT at Parbati pooling point, matching with commissioning of first unit at Parbati-III, the transmission charges for the Parbati pooling point-Hamirpur line to be paid by Allain Duhangan/ Malana-II.
- After commissioning of 400/220kV at Parbati pooling point, transmission charges for Parbati pooling point including ICT with bays on both side would be payable by Allain Duhangan/ Malana-II, and the 400kV Parbati pooling point-Hamirpur line would come under the Regional pool.



Members of the committee may discuss and concur on this issue.

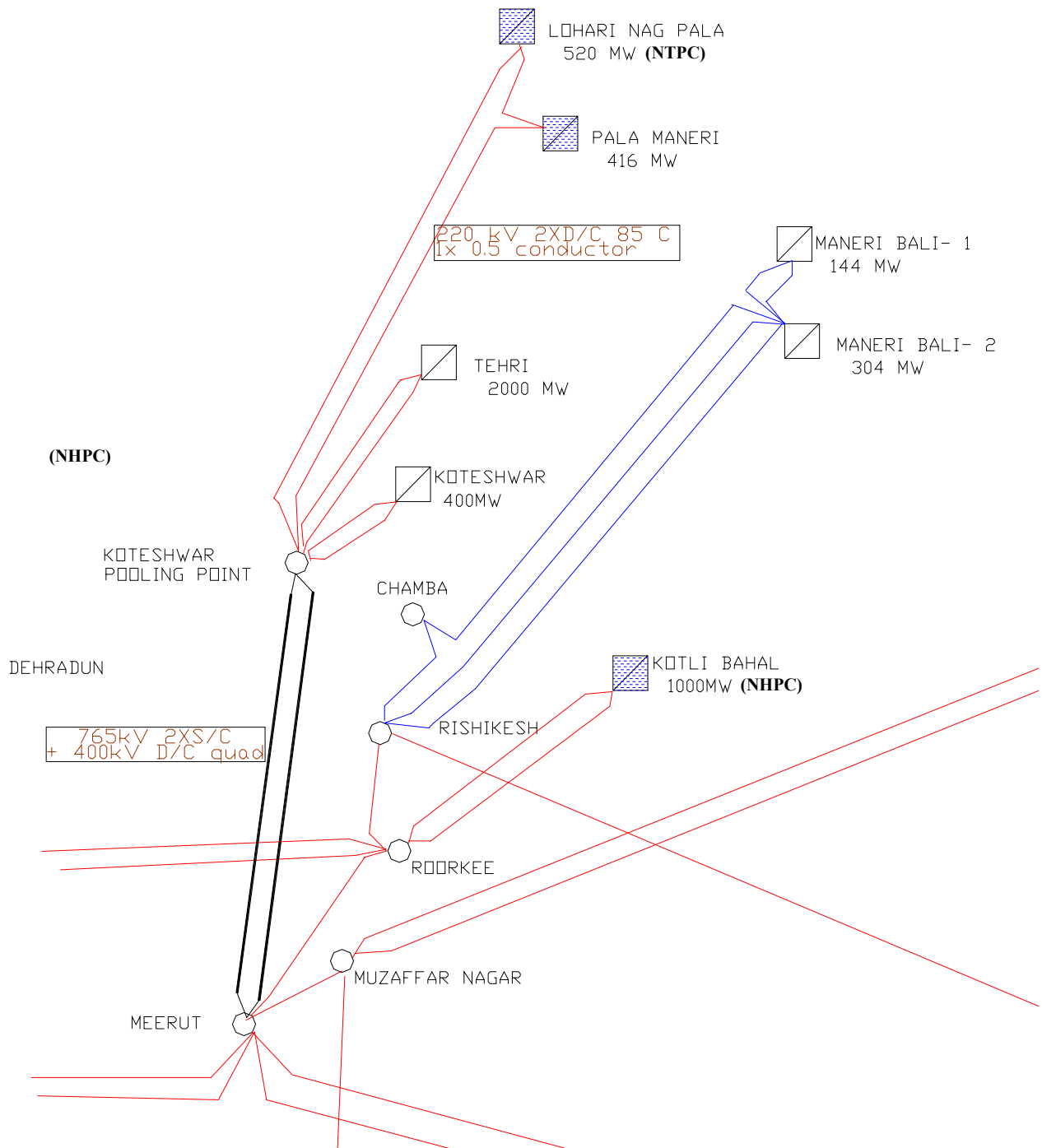
Item - V Power evacuation system from Koteshwar HEP

Koteshwar HEP would be located about 2 kms. downstream of Tehri project. Evacuation system from Tehri I HEP (4x250 MW) has already been cleared by the government and the part of the transmission system has already been completed. The transmission system with Tehri I HEP is as under:-

- The generation of Tehri would be stepped upto 400 kV
- Tehri – Meerut 765 kV 2xS/C lines (initially operated at 400 kV to evacuate the power from Tehri – I HEP)
- Meerut - Mandola 400 kV D/C line
- Meerut - Muzaffarpur 400 kV S/C line

Koteshwar HEP is expected by the end of 10th plan time frame. For evacuation of power from Tehri I & II and Koteshwar HEPs a pooling point near Koteshwar has been proposed by LILO of 765 kV Tehri – Meerut lines at the Pooling point. Koteshwar power would be injected at the pooling point through 400 kV D/C line. From pooling point to Meerut the Tehri - Meerut lines would be utilized. POWERGRID had conducted an extensive survey with THDC for locating suitable site (around 100 acre) for the Tehri/Koteshwar pooling point in the hills. A number of sites were inspected and three sites one near Pata village, one near Sagwan village and one near Chopra village were critically examined. However, suitable site for 800/400 kV outdoor/GIS switching station/Pooling Point could not be located. Subsequently, the place was revisited by team of engineers from CEA and POWERGRID and though clear cut land for 800/400 kV outdoor/GIS switching station could not be located in that hilly area, land near Sion village has been identified where a 400 kV GIS pooling Station could be established and subsequently by cutting hilltop, space for 765/400 kV GIS substation could also be created. Accordingly, the following proposal has been evolved for evacuation of power from Koteshwar HEP.

- Creation of 400 kV GIS pooling station by LILO of the Tehri - Meerut 765kV, initially charged at 400 kV, 2xS/C lines
- Koteshwar – Tehri Pooling Point 400kV D/C line
- Creation of 400kV S/S at Roorkee with 2x315MVA, 400/220kV ICT, by LILO of Rishikesh –Muradnagar 400 S/C line at Roorkee
- 400 kV S/C line from Meerut towards Roorkee- Muzaffarnagar section of Rishikesh – Muradnagar line and connecting rearrangement so as to have
 - Meerut – Roorkee 400 kV S/C
 - Meerut – Muzaffarnagar 400 kV S/C (covered under Tehri- I scheme)
 - Muzaffarnagar – Moradnagar 400 kV S/C
- Provision for 50% series compensation on Tehri – Meerut 765kV, initially charged at 400kV, 2xS/C lines



The 400/220 kV S/S at Roorkee has already been agreed in the 13th Standing Committee meeting. This S/S would provide connectivity to Uttaranchal for its share of power from Tehri and Koteshwar HEP.

The quantum of power to be evacuated from Tehri I and Koteshwar HEP would be around 1400 MW. Outage of one circuit of Tehri -Meerut 765kV, initially charged at 400 kV, 2xS/C lines may cause low voltage problem around Meerut and Delhi area. To mitigate the same POWERGRID have proposed for a provision for 50% series compensation on Tehri-Meerut 765kV, initially charged at 400kV, 2xS/C lines. The series compensation also helps in improving transient stability.

Studies carried out POWERGRID have also shown that with 50% series compensation and 400 kV operation of Tehri – Meerut lines, power upto 2400 MW stage, that is Tehri St-I(1000 MW), Tehri St-II (1000 MW) and Koteshwar HEP(400 MW) could be evacuated.

Also, the PSS of Tehri and Koteshwar machines generating machines would need to be tuned so as to save the generating units at Tehri and Koteshwar from possible oscillations.

Upgradation of transmission system between Koteshwar pooling point and Meerut for 765kV operation could be taken-up when power from Pala Maneri (416 MW), Lohari Nagpala (520 MW) and other projects envisaged in the upstream of Tehri is pooled at Koteshwar Pooling point. Accordingly, POWERGRID may acquire sufficient land at Koteshwar pooling point so that establishment of 765/400 kV substation with GIS could be made feasible by creating space at different levels in steps by suitably cutting the hillock.

Members of the committee may discuss and concur on this issue.

Item – VI Creation of 400/220 kV by POWERGRID in Delhi --- 400/220kV GIS substation at Maharani Bagh

400/220 kV S/S at Maharani Bagh is proposed to be established as a part of Tala transmission in South Delhi area. A site near Noida flyover (referred to as Maharani Bagh) has been envisaged. However due to some litigation DTL could not get clear possession of the land allocated to them from DDA as the matter was subjudice. In view of uncertainty in getting clear land at Maharani Bagh, and the urgency required for commissioning of the 400/220 kV S/S in Delhi matching with the Tala system, alternate location for the POWERGRID s/s adjunct to Sarita Vihar 220kV S/S of DTL, was being considered. In view of constraint in availability of adequate space at Sarita Vihar, S/S of GIS type was required. In the mean time, DTL continued efforts to get the stay vacated and obtain clear possession of the land. In December 2003, DTL informed that Hon'ble High Court has vacated the stay and DTL now has clear possession of the land. Accordingly a meeting was convened by Member (PS), CEA on 8/12/03 taking into consideration that the land at Maharani Bagh is available with DTL and the 400/220 kV S/S would be constructed at Maharani Bagh as per the original plan. In view of heavy pollution in Delhi area and the reliability factor, it was considered that GIS switchyard could be adopted for Maharani Bagh S/S to be constructed by POWERGRID under the Tala transmission system.

As this S/S would be constructed by POWERGRID as a part of Regional project, the Standing Committee may concur.

Item – VII Deferring LILO of Kanpur-Agra 400kV S/C at Auraiya for re-consideration at a future date

In the last Standing Committee Meeting held on 30th May 2003, various Strengthening Schemes for Northern Region were finalized. Amongst these schemes, NR Strengthening Schemes–I, interalia, included the LILO of Kanpur-Agra 400 kV S/C line at Auraiya and Kanpur-Auraiya 400

kV D/C line. These elements were proposed to provide a transmission corridor parallel to the existing corridor between Kanpur and Ballabgarh/Delhi.

Subsequently, a reassessment has been carried out to see whether the provision of these two transmission elements could be phased and it has been found that with Kanpur-Auraiya 400kV D/C line in place, the LILO of Kanpur-Agra 400kV S/C line at Auraiya can be deferred for reconsideration at a future date. Accordingly, it is proposed to defer the LILO of Kanpur-Agra 400 kV S/C line at Auraiya at this stage.

The Standing Committee may concur.

Item –VIII Capacity of Balia-Bhiwadi HVDC bi-pole line

In the last meeting of the Standing Committee held on 31-05-2003, transmission system for evacuation for of power from Barh TPS was decided. This system, interalia, included Balia-Bhiwadi HVDC bi-pole of 2000MW or 2500MW capacity. Final decision on the capacity of this HVDC link was to be taken after further studies.

POWERGRID had proposed a capacity of 2500MW and stated that the line design was sufficient for 2500MW level and incremental cost of terminal equipment on account of increase in capacity from 2000MW to 2500MW would be of the order of Rs 150 crore only. CEA studies presented in the last meeting had shown that increased capacity did not result in reduction of any other requirement in the proposed system. However, enhanced capacity would provide useful margin for future. It was also observed that though the increased HVDC capacity resulted in overall reduction in transmission losses, the losses in HVDC bi-pole would increased substantially if the capacity was enhanced without upgrading the transmission line design. After discussion, it was decided that POWERGRID would carry out the necessary studies with respect to loss optimization/transmission line design up-gradation and send the same for further examination in CEA so that final decision in the matter could be taken.

Accordingly, POWERGRID has submitted the relevant studies (Copy enclosed at Annex-I). As per this study report, HVDC bi-pole line with Quad-Bersimis conductors and designed for ambient and maximum conductor temperatures of 45°C and 85°C respectively can carry up to 3764 MW and thus Bersimis conductor is suitable for 2500 MW capacity. The comparative study between Bersimis conductor and Lapwing conductor (taken as next higher size conductor) shows that with Lapwing conductor, cost of the line would increase by Rs 90 crores, which amounts to increase in annual charges by about Rs 18 crores (taking annual charges as 20% of the project cost), whereas, the losses are reduced by 20 MW, which correspond to a saving of about Rs 18.5.

After examination of the comparative study submitted by POWERGRID, it is viewed that:

- (a) If normalized tariff were calculated with revised norms as per CERC orders, the annual charges for additional investment of Rs 90 crores towards higher size conductor (Lapwing), would reduce to about Rs 15 Crores. This would further be reduced on account of softening of interest rates.

- (b) The assumption of cost of energy as Rs 2.00/kWH may need to be revised upwards based on projected cost of the incremental energy in the Region in future.
- (c) Considering the above factors, Lapwing conductor would workout to be economic option.

Thus, the total additional cost on account of incremental capacity from 2000MW to 2500MW for terminal equipment plus upgraded line with higher size (Lapwing) conductor, would be of the order of Rs 240-250 crores. The increased capacity would be advantageous for import of additional power by the Northern Region in future. Also, with higher size conductor, it would also help in loss reduction in transmission system, As such, the HVDC capacity of 2500MW for the Balia-Bhiwadi link, is recommended.

Members of the committee may discuss and decide.

Item – IX Transmission system associated with Unchahar III TPS

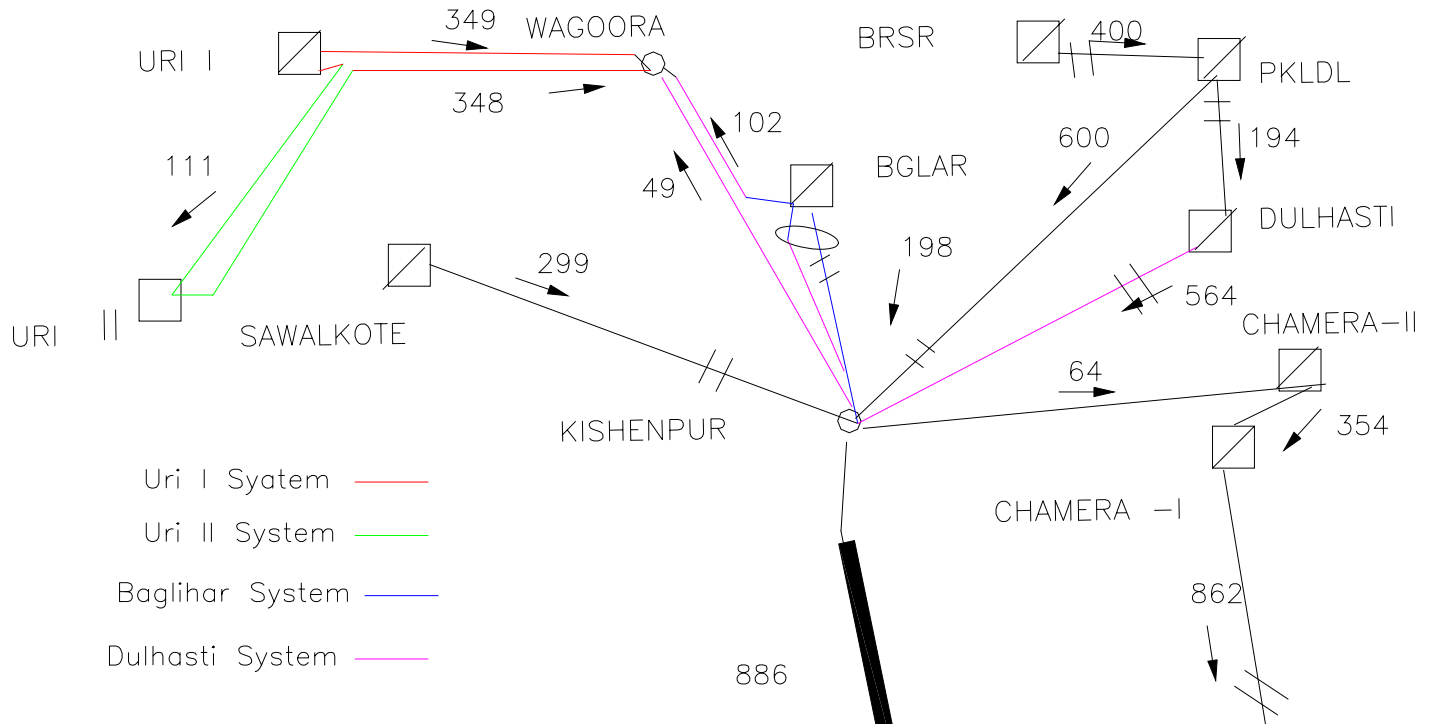
Requirement of evacuation system for Unchahar TPS Stage III (1x250) was discussed in the 13th Standing Committee Meeting of Northern Region held at Dehradun. It was observed that the existing system would be sufficient to meet the evacuation requirement for Stage-III also under normal conditions but the loadings were critical in the event of outage of one circuit of Unchahar-Lucknow 220kV D/C line. To address this, a 220kV S/C line from Unchahar to the proposed s/s of UPSEB at Raibareilly was planned. However, as per the information available in CEA, the construction of 220 kV Raibareilly s/s has not yet been taken-up by UPPCL and their plans in this regard are dependent on load growth in Raibareilly area. As NTPC has already started necessary exercise for executing the Unchahar III switchyard, the criticality of outage of one circuit of Unchahar-Lucknow 220kV D/C line needs a revisit. As the time frame of UPPCL's programme of Raibareilly s/s may not match with Unchahar-III, there are two options. One option is to take-up a new 220kV S/C line from Unchahar to Lucknow(PG) under the Regional scheme and leave Raibareilly s/s to be developed by UPPCL as and when programmed by them. The option is to take-up the Raibareilly s/s and the associated LILO and Unchahar-Raibareilly S/C line at this stage itself, all as part of Regional scheme. The cost economics would favor the second option.

Members of the committee may discuss and decide.

Item – X Evacuation system from Uri II HEP (240 MW)

Uri-II HE Project (4x60 MW) is a run of the river project and is located in the downstream of Uri-I HE Project. The project is being taken-up by NHPC. The evacuation system for Uri II HEP has been evolved utilising the capacity margin available in the Uri I – Wagoora 400 kV D/C line. Accordingly, it is proposed to evacuate Uri-II power at 400kV for which LILO of one circuit of Uri-I – Wagoora 400kV line at Uri-II would be done. Due to space constraint, the 400kV switchyard at Uri-II is to be of GIS type instead of conventional open-yard type.

Flow conditions corresponding to full evacuation from Uri-I and Uri-II as per studies are:



POWEGRID have proposed that contingency of tower outage for the 400kV D/C line should also be considered and 400/220kV transformation and 220kV Uri-II-Amargarh-Wagoora D/C line may also be provided. As space for 400/220kV transformation may not be feasible at Uri-II, a separate pooling point may be required for this. As such, this would substantially increase the transmission costs.

Members of the committee may discuss and decide.

Item – X Maithon Transmission system

Under Maithon transmission system, requirement of a transmission line between Agra and Meerut was established and it was proposed to have either a 765kV S/C line or a 400kV D/C line. Based on their studies, POWEGRID have suggested a 400kV D/C line. POWERGRID may present their case.

Members of the committee may discuss and decide.

Item – XII Inter-Regional links for increased connectivity between Northern Region and Western Region.

In the context of development of all India National Grid, the following additional links between Northern Region and Western Region have been identified:

- Agra-Gwalior 765kV, 400kV operation, S/C second line.
- Kankroli-Zerda 400kV D/C line.

The above links would provide the following:

- ◆ Increased power transfer capacity between NR and WR
- ◆ Stability to the National grid
- ◆ Alternate path for import of power from Eastern Region.
- ◆ Reliability
- ◆ Operational margins that would be useful in open access

The Western Region constituents have already agreed to the above proposals in the WR Standing Committee meeting held on 23rd January 2004.

Members of the NR committee may also discuss and concur.

Additional agenda for 16th Standing Committee Meeting of NR

Supplimentary Item-1- NR-WR Inter-Regional links viz.
(i) Agra-Gwalior 765kV S/C line-2, 400kV operation
(ii) Kankroli-Zerda 400kV D/C line

Agra-Gwalior 765 kV S/C (2nd ckt) (initially operated at 400 kV) would provide additional power transfer capacity between Western Region and Northern Region. This would also improve the reliability of the network. This second circuit on the Agra-Gwalior is also included in the master plan of National Grid. Power flow studies for WR have shown that the provision of second circuit on Agra-Gwalior-Bina section would be required and WR constituents have agreed for the scheme. For the Northern Region, the second circuit of Agra-Gwalior line would be of enhanced utility as it would help in wheeling power from Eastern Region to Northern Region via Western Region particularly under pole-outage condition on Balia-Bhiwadi HVDC line or AC lines in the parallel sections.

Zerda-Kankroli 400kV D/C between Gujarat and Rajasthan would improve the reliability of the system and would be of advantage when WR/ER/NER system is integrated with NR system. Load flow cases have shown utility of this link in term of power transfer also. The line length is about 250 km.

Transmission charges for the above inter-regional lines are to be shared between NR and WR on 50:50 basis.

WR constituents have concurred to the above lines in in the 20th Standing Committee meeting of WR. Memebtrs of NR may also concur to the above lines so that POWEGRID may take-up the works.

Supplimentary Item II- Evacuation System from Sewa II HEP(120 MW) in J&K

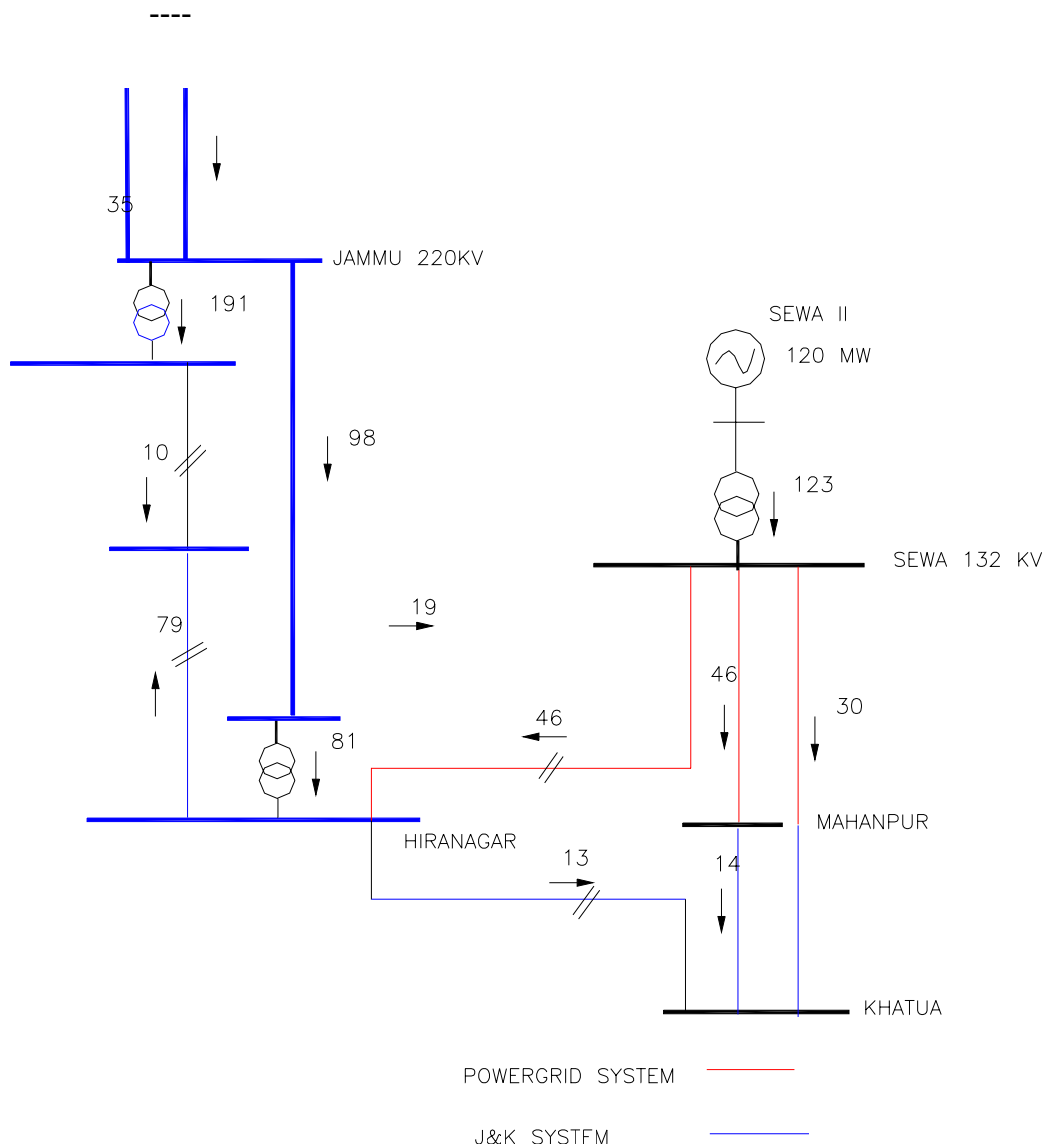
In the 15th Standing Committee Meeting for development of the transmission system in Northern Region following evacuation system from Sewa II HEP were agreed.

- (i) Sewa II – Hiranagar 132 kV D/C
- (ii) Sewa II - Kathua 132 kV D/C via Mahanpur 132 kV S/S of J&K

POWERGRID has intimated that PDD, J&K is constructing 132 kV S/C on D/C line from Kathua to Mahanpur for meeting the demands at Mahanpur. POWERGRID have proposed this to be constructed as D/C from beginning and for evacuation of power from Sewa II, 132 kV D/C line from Sewa II – Mahanpur be constructed and one circuit be terminated at Mahanpur and the other circuit be taken to Kathua S/S by passing Mahanpur. With this arrangement there would be following circuits:

- 132 kV Sewa II-Mahanpur-Kathua
- 132 kV Sewa-II-Kathua

Power flows after the commissioning of Sewa-II, as per load flow studies are given below:



As both above the 132kV circuits from Sewa-II right up to Kathua would be primarily used for evacuation of power from Sewa-II, it is proposed that this is taken-up as a Regional scheme by POWERGRID. The works which J&K have executed for the Kathua-Mahanpur line could be transferred to POWERGRID and the cost of the same also included in the Regional scheme.

Members may concur on the issue.

Supplementary Item III- Transmission System for RAPP

While planning the evacuation system for RAPP units 5,6,7 & 8, advantage was taken of the 400kV Kota- Kankroli 2xS/C & Kankroli-Bhinmal S/C, initial op. 220kV and Hirapura – Merta – Jodhpur 400 kV S/C lines which were proposed by RVPNL as a part of their own transmission system. However, now it is understood that RVPNL are not taking up the 400kV Kota- Kankroli 400 kV 2xS/C and Kankroli-Bhinmal 400kV S/C lines in RAPP units 5 & 6 time

frame. POWERGRID have proposed to take-up a supplementary scheme for RAPP unit 5 & 6 in which Kota-Konkroli-Bhinmal lines are proposed to be covered as regional scheme and also to advance the second circuit of Kankroli-Bhinmal and Bhinmal-Jodhpur S/C lines from RAPP unit 7 & 8 time frame to RAPP unit 5 & 6 time frame and cover under the same supplementary scheme. CEA has made an overall review and arrived at the following proposal:

AS WAS AGREED EARLIER	AS PROPOSED BY POWERGRID	PROPOSED BY CEA AFTER REVIEW
<p>APP ‘C’ (2x220 MW) unit 5,6</p> <p>a) RAPP – Kankroli 400 kV D/C line</p> <p>b) RAPP – Kota 400 kV S/C line</p> <p>c) Establishment of 400/220 kV Kota S/S (2x315 MVA)</p> <p>d) Establishment of 400/220 kV Kankroli S/S (3 x315 MVA)</p> <p>e) Operation of Kota – Kankroli 2xS/C lines at 400 kV</p> <p>Est Cost Rs 400 crores</p> <p>Est cost of RVPNL’s Kota-Knkroli 2xS/C and Kankrol-Bhinmal S/C lines: Rs 300 crores</p>	<p>RAPP ‘C’ unit 5,6</p> <p>No change</p> <p>Est Cost Rs 400 crores</p> <p>RAPP 5,6 Suppl.</p> <p>a) Kota-Kankroli 400kV 2XS/C</p> <p>b) Kankroli-Bhinmal 400kV D/C</p> <p>c) Bhinmal-Jodhpur 400kV S/C</p> <p>d) Bhinmal 400kV s/s with 2x315 MVA</p> <p>Est Cost Rs 460 crores</p>	<p>RAPP ‘C’ unit 5,6</p> <p>Minor change that:</p> <p>(i) instead of work relating to upgradation of Kota-Kankroli line for 400kV operation, it would be 220kV D/C lines for connecting POWERGRID s/s at Kota and Kankroli to RVPNL s/s</p> <p>(ii) 2x315 MVA 400/220kV transformer at Kota in place of earlier proposal of 3x250MVA</p> <p>Est Cost Rs 400 crores</p> <p>RAPP 5,6 Suppl.</p> <p>(a) Kota– Merta 400kV D/C</p> <p>(b) Kankroli-Jodhpur 400kV S/C</p> <p>Est Cost Rs 300 crores</p>
<p>RAPP ‘D’ (2x 700 MW) unit 7,8</p> <p>a) RAPP – Jaipur 400 kV D/C line</p> <p>b) Kankroli – Bhinmal 400 kV, 2nd S/C line</p> <p>c) Bhinmal – Jodhpur 400 kV S/C line</p> <p>d) Establishment of 400/220 kV Bhinmal S/S(2x315 MVA)</p> <p>e) Augmentation of 400/220 kV Kankroli S/S by 4th ICT of 315 MVA</p> <p>Est Cost Rs 430 crores</p>	<p>RAPP ‘D’ unit 7,8</p> <p>a) RAPP – Jaipur 400 kV D/C line</p> <p>b) Augmentation of 400/220 kV Kankroli S/S by 4th ICT of 315 MVA</p> <p>Est Cost Rs 220 crores</p>	<p>RAPP ‘D’ unit 7,8</p> <p>(a) RAPP – Jaipur 400 kV D/C line of which one circuit to be LILOed at Kota</p> <p>(b) RAPP-Nagda(WR) 400kV D/C (NR:WR:: 50:50)</p> <p>Est Cost Rs 350 crores of this Rs 280 crores to NR and Rs 70 crores to WR</p>
<p>Rs 830 crores Regional NR</p> <p>Rs 300 crores RVPNL</p>	<p>Rs 1080 crores</p>	<p>NR Rs 980 crores</p> <p>WR Rs 70 crores</p>

Above proposed system alongwith the completion of 400 kV Hirapura – Merta – Jodhpur 400 kV S/C line by RVPNL, would provide a 400 kV ring in Rajasthan which would reliably meet the load in the Rajasthan area and facilitate the evacuation of RAPP power. Also, the RAPP-Nagda 400kV D/C proposed with RAPP unit 7 & 8 would provide strength to NR-WR interconnection that would help in reliability and also provide margins in transmission system for trading,

Member of the committee may discuss to the above proposal.

**CENTRAL ELECTRICITY AUTHORITY
SYSTEM PLANING AND PROJECT APRAISAL DIVISION**

No.1/9/03-SP&PA/

Dated : 16/03/04

-As per List enclosed-

Sub: The 16th meeting of the Standing Committee on Power System Planning of Northern Region.

Sir,

The 16th meeting of the Standing Committee on Power System Planning of Northern Region would be held **on 24th of March 2004 at 1100 Hrs. in Conference Hall of Northern Regional Electricity Board, Katwaria Sarai, New Delhi-16.** The Agenda for the meeting has already been circulated vide our letter No. 1/9/2003-SP&PA/ 136 dated 20/02/04. Kindly make it convenient to attend the meeting.

Confirmation regarding your participation may also be sent to CEA in **Fax No. 011-6102045** or in E-mail address **ceasppa@yahoo.co.in**

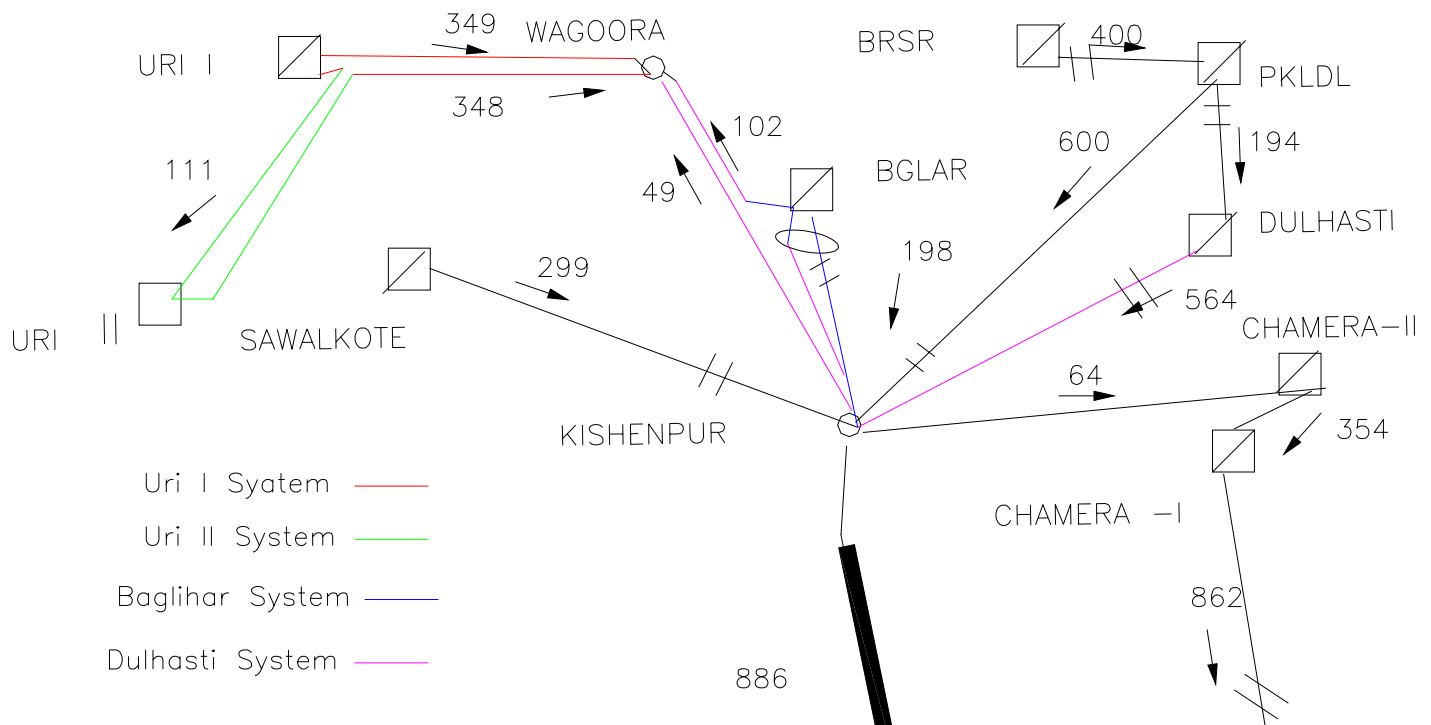
Yours faithfully,

**(A K Asthana)
DIRECTOR (SP&PA)**

Item – X Evacuation system from Uri II HEP (240 MW)

Uri-II HE Project (4x60 MW) is a run of the river project and is located in the downstream of Uri-I HE Project. The project is being taken-up by NHPC. The evacuation system for Uri II HEP has been evolved utilising the capacity margin available in the Uri I – Wagoora 400 kV D/C line. Accordingly, it is proposed to evacuate Uri-II power at 400kV for which LILO of one circuit of Uri-I – Wagoora 400kV line at Uri-II would be done. Due to space constraint, the 400kV switchyard at Uri-II is to be of GIS type instead of conventional open-yard type.

Flow conditions corresponding to full evacuation from Uri-I and Uri-II as per studies are:



POWEGRID have proposed that contingency of tower outage for the 400kV D/C line should also be considered and 400/220kV transformation and 220kV Uri-II-Amargarh-Wagoora D/C line may also be provided. As space for 400/220kV transformation may not be feasible at Uri-II, a separate pooling point may be required for this. As such, this would substantially increase the transmission costs.

Members of the committee may discuss and decide.

**CENTRAL ELECTRICITY AUTHORITY
SYSTEM PLANING AND PROJECT APRAISAL DIVISION**

F. No.1/9/03-SP&PA/

Dated : /06/03

-As per List enclosed-

Sub: Summary Record of the meeting for the 15th meeting of the Standing Committee on Transmission System Planning of Northern Region.

Sir,

Please find enclosed the minutes of the meeting of the 15th Standing Committee on Transmission System Planning of Northern Region held on 30/05/03 at Manali, HP for information and further necessary action at your end.

Yours faithfully,

**(A.K.ASTHANA)
DIRECTOR (SP&PA)**

LIST OF ADDRESSES

Sh. S.K. Agarwal, Chief Engg. (Plg.),
Haryana Vidyut Prasaran Nigam Ltd.,
Shakti Bhawan, Sector-6,
Panchkula-134109, Haryana,
(Fax No.0172-2565746)

Executive Director
U.P. Power Corporation Ltd.,
Shakti Bhawan Extn. (3rd Floor)
14, Ashok Marg, Lucknow-226001
(Fax. No.0522-2280178)

Shri Y K Raizada,
CE (PP&M.),
Rajasthan Rajya Vidyut Prasaran Nigam Ltd
Vidyut Bhawan, Jyoti Nagar, Janpath,
JAIPUR, **(Fax No.0141-2740794)**

Shri A S Chugh, Chief Engineer(Transmission system)
Bhakra Beas Management Board (Power Wing)
Admn. Block, SLDC Complex, Ind. Area, Phase 1
Chandigarh-160002
(Fax No.0172- 2654590)

Shri R.N. Nayak,
Executive Director (Engg.)
POWERGRID Corpn. of India Ltd,
Plot No.-2, Sector- 29,
Gurgoan- 1122001.**(Fax No95-124-2571802)**

Shri S Sen, executive Director
NTPC, Corporate Centre, Engineering Office Complex
Plot No.A-8 4, Sector 24, Post Box No.13,
NOIDA(UP) – 110 016.**(Fax No.95120-2536181)**

Sh.N .S. M. RAO,
GM (Transmission),
Nuclear Power Corporation Of India Ltd.
11-N-28, Vikram Sarabhai Bhawan
Anushakti Nagar, Mumbi- 400094,
(Fax No. 022-25563350)

Shri SPS Raghav,
Director (O), UPCLtd.
Urja Bhawan, Kanwali Road
Dehradun, Uttaranchal-248001
(FAX No. 0135-2768867)

Shri G.S. Chawla
Chief Engineer (Plg.)
Punjab State Electricity Board,
Mall Road, Patiala,-147001, Punjab.
(Fax No.0175-2215897)

Shri J.N.Sachdeva,
The Superintending Engineer,
Electricity Operation Circle
U.T. Chandigarh,
(Fax.No.0172-2775733, 2742733)

Shri P K Tripathy
Manageing Director(Power)
J&K state Power Devlopment Corporation
Ashok Nagar, satwari, Jammu
(Fax No.0191-2435403)

S C Chattopadhyay, Chief Engineer(Plg.),
TRANSCO, DELHI, Shakti Deep Building,
Anarkai Market, DDA Complex,
Jhandewalan Extension, New Delhi- 110055.
(Fax No.23552070)

Shri S N Kapur
Chief Engineer(SP),
H.P.State electricity Board,
Vidyut Bhawan, Shimla-171004.
(Fax No.01772-258984)

Shri B K Mishra, Member Secy.,
Northern Regional Electricity Board,
18-A, Shaheed Jit Singh Sansanwal Marg,
Katwaria Sarai, New Delhi-110016
(Fax No.2868528)

Shri Raj Kumar,
GM(DEM),
NHPC, NHPC office complex
Sector-33, Faridabad-121003
(Fax No.-95-129-5256571, 2279137)

Shri Mohinder Kumar, Vice President (BD)
Power Trading Corporation Ltd.
2nd Floor, 15 NBCC Tower
Bhikaji Cama Place, New Delhi 66
(Fax No. 011-8659502)

Shri M L Gupta, CMD THDC
A-1, Sector- 1, 4th floor, KRIBCO Bhawan
NOIDA, Uttar Pradesh
(Fax No. 95-120 5555092)

**CENTRAL ELECTRICITY AUTHORITY
SYSTEM PLANING AND PROJECT APRAISAL DIVISION**

F. No.1/9/03-SP&PA/

Dated : /02/04

-As per List enclosed-

Sub: Agenda note for the 16th meeting of the Standing Committee on Transmission System Planning of Northern Region.

Sir,

Please find enclosed the agenda note for the 16th meeting of the Standing Committee on Transmission System Planning of Northern Region. The date, time and the venue for the meeting would be intimated shortly.

Yours faithfully,

**(A.K.ASTHANA)
DIRECTOR (SP&PA)**

Fax Message

**CENTRAL ELECTRICITY AUTHORITY
SYSTEM PLANING AND PROJECT APRAISAL DIVISION**

No.1/9/03-SP&PA/

Dated : 16/03/04

-As per List enclosed-

Sub: The 16th meeting of the Standing Committee on Power System Planning of Northern Region.

Sir,

The 16th meeting of the Standing Committee on Power System Planning of Northern Region would be held **on 24th of March 2004 at 1100 Hrs. in Conference Hall of Northern Regional Electricity Board, Katwaria Sarai, New Delhi-16.** The Agenda for the meeting has already been circulated vide our letter No. 1/9/2003-SP&PA/ 136 dated 20/02/04. Kindly make it convenient to attend the meeting.

Confirmation regarding your participation may also be sent to CEA in **Fax No. 011-6102045** or in E-mail address **ceasppa@yahoo.co.in**

Yours faithfully,

**(A K Asthana)
DIRECTOR (SP&PA)**

**CENTRAL ELECTRICITY AUTHORITY
SYSTEM PLANING AND PROJECT APRAISAL DIVISION**

F. No.1/9/03-SP&PA/

Dated : /02/04

-As per List enclosed-

Sub: Additional agenda for 16th Standing Committee Meeting of NR

Sir,

Please find enclosed the additional agenda note for the 16th meeting of the Standing Committee on Transmission System Planning of Northern Region to be held **on 24th of March 2004 at 1100 Hrs. in Conference Hall of Northern Regional Electricity Board, Katwaria Sarai, New Delhi-16.** Please make it convenient to attend the meeting

Yours faithfully,

**(A.K.ASTHANA)
DIRECTOR (SP&PA)**

The Development commissioner (Power)
Power.Development Deptt.,Lottery Building
Govt. of J&K, New Secrateriate , Srinagar

Summary record of the 16th Standing Committee Meeting on Transmission System Planning in Northern Region held in NREB on 24.03.04

List of the participants annexed.

Welcoming the participants of the meeting, Chief Engineer (SP&PA) thanked MS(NREB) for arranging the meeting at a short notice. He stated that the agenda for the meeting mostly covered the transmission system from the hydro projects of Northern Region. Many hydro projects in Uttaranchal, Himachal Pradesh and J&K were being envisaged, for benefits in the 11th plan/ early 12th plan time frame. CEA was in the process of framing a master plan for evolving the transmission system from these generation projects so that phased development of transmission system for evacuation of power from generating projects could be taken up.

Thereafter the agenda items were taken up.

Item No. 1 - Evacuation system from Chamera III HEP

Director (SP&PA) stated that Chamera III (231 MW) would be located adjacent to existing stages of Chamera I and Chamera II in Ravi Basin. Besides Chamera III other contemporary hydro project like Kutehar (260 MW), Bharmour (45 MW), Kugti (45 MW), Budhil (70 MW) in the upstream of Chamera III were also envisaged in the Ravi Basin. Power from Chamera III was proposed to be evacuated at 220 kV.

He stated that three alternative system as indicated in the agenda were considered for evacuation of power from Chamera III. In alternative I pooling point near Chamera III and 400 kV therefrom to Jullundhar was proposed. The pooling point was also proposed to be connected to Chamera II at 400 kV. In alternate II 220 kV evacuation upto Hamirpur and there after evacuation through existing 220 kV Hamirpur – Jullunder lines was proposed. In alternate III 220 kV evacuation upto pooling point near Hamirpur and 400 kV lines thereafter to Jullundhar was proposed. Of these option Alternative-3 was considered to be better option due to the following reasons:-

- (i) Difficulty in locating of adequate/suitable land for construction of pooling point in hilly region.
- (ii) In alternative-I interconnection of Chamera III with the existing stages of Chamera would create deloading of the existing Kishenpur – Moga 765 kV line (operated at 400 kV) and consume transmission capacity from proposed Chamera pooling point – Jullundhar 400 kV line. As such, this option did not lead to optimum utilization of network.
- (iii) Considering the number of projects envisaged in Ravi basin a 400/220 kV pooling point was required to be established which would serve the purpose of evacuation of power from Ravi as well as Beas basin projects.
- (iv) Evacuation at 400 kV from pooling point in hills to the load center would create an over voltage/stability problem due to long line length and less load absorption capacity in the nearby area.
- (v) With 220 kV evacuation option as per alternative II, the requirements for future projects of HP would call for additional network, leading to sub-optimal development.

Considering the above facts a 400/220 kV pooling point near Hamirpur had been envisaged, the location of which was to be finalised depending on the alignment of the line crossing of Chamera to Jullundhar viz-a-viz Parbati III to Amritsar line. With the commissioning of other upstream Ravi basin hydro projects, Kutehar would be interconnected with Chamera III by SC line and 220 kV D/C line from Kutehar would be taken to Hamirpur pooling point. The Hamirpur – Jullandhar section charged at 220 kV with Chamera III would then be charged at 400 kV.

Addl. SE (Planning), HPSEB stated that other hydro projects like Hadsar (60 MW), Kugti (45 MW), Chamba (125 MW) and Bara Bangal (200 MW) were also envisaged in the same basin and these should also be consider to ascertain the adequacy of the transmission system. Director (SP&PA) stated that the projects upstream of Chamera III considered in the study were taken based on the information given by HPSEB earlier and if the projects being indicated by HPSEB were also envisaged then the 220kV line from Kutehar to Hamirpur could be constructed with Quad conductor and series compensation.

Chief Engineer, RVPNL stated that the system envisaged from Chamera III indicates strengthening of the transmission portion upto Hamirpur / Jullandhar. However, further strengthening of the transmission system beyond Jullandhar had not been shown. Chief Engineer (SP&PA) stated that the studies were conducted for all India basis considering the requirement for evacuation of power from the generation projects as well as Regional and intra/inter regional transmission requirements. Wherever strengthening required was either covered as a part of works under strengthening of transmission system or evacuation system with other projects of Northern Grid. The existing transmission system beyond Jullandhar was adequate for evacuation of power from Chamera III as well as other projects envisaged in that valley. As such, no further strengthening of the transmission system beyond Jullandhar would be required.

Concluding the discussion Chief Engineer (SP&PA) stated that following system were recommended with Chamera III/ Kutehar HEP.

Transmission system associated with Chamera III

- Generation of Chamera III power at 220 kV level
- Creation of 400/220 kV pooling point near Hamirpur at suitable location.
- Chamera III – Hamirpur pooling point 220 kV D/C line with 2x0.5 conductor
- Additional 1 no. 220 kV bay at Chamera III for 220 kV S/C line from Kutehar
- Hamirpur – Jullandher 400 kV D/C line(operated at 220 kV)
- POWERGRID to locate and purchase requisite land for S/S near Hamirpur corresponding to requirement of 400 kV substation

Transmission system from Kutehar

- Kutehar – Hamirpur 220 kV D/C (with 2x0.5 conductor or 4x0.5 conductor depending on total capacity of projects envisaged by HPSEB in Ravi basin).
- Kutehar – Chamera III 220 kV D/C with 2x0.5 conductor bunched into S/C
- Additional 2 nos. 220 kV bays at Kutehar for 220 kV lines from upstream projects
- LILO of Parbati Amritsar 400 kV D/C line at Hamirpur Pooling Point

- 400 kV operation of Hamirpur – Jullundhar D/C line

The members of the Standing Committee agreed with the above proposal.

Item 2 - Power Evacuation system associated with Parbati-II (800 MW) and Koldam HEP(4x200 MW)

Director (SP&PA) stated that the evacuation systems from Parbati II and Koldam HEPs were agreed in the 14th Standing Committee Meeting wherein following transmission systems were envisaged.

Parbati II

- Parbati II to Koldam site 2xS/C with Quad Conductor

Koldam HEP

- Koldam – Nalagarh 400 kV D/C with Quad Conductor
- 400 kV Koldam – Ludhiana 400 kV D/C line with triple conductor
- 2 nos. of 400 kV bay for Koldam – Nalagarh/Parbati II lines.

System under Northern Region strengthening scheme

- 400 kV S/S at Ludhiana with 3x315 MVA ICT

The above system was finalized in the 14th meeting of the Standing Committee considering the commissioning of Koldam HEP ahead of Parbati II HEP. However subsequent indication was that, Parbati II was expected during 2007-08 time frame while Koldam was expected around 2008-09 time frame. Considering the uncertainty in the commissioning programme of the hydro projects, the following was suggested.

Transmission system common to Parbati II and Koldam which is to be programmed for commissioning matching with whichever comes first:

- Koldam – Nalagarh 400 kV D/C line with Quad conductor
(in this, the provision for 400kV bays is to be kept for Nalagarh end only. The bays at other end get covered under Koldam or Parbati-II HEP)

Transmission System for Koldam HEP

- 2 nos. 400kV bays for Koldam-Nalagarh/Parbati-II lines.
- Koldam – Ludhiana 400 kV D/C line with Triple ‘Snowbird’ conductor

Transmission System for Parbati-II HEP

- Parbati II – Koldam 400kV 2xS/C lines with Quad conductor.
(in this, the provision for 400kV bays is to be kept for Parbati-II end only. The bays at Kaldam/Nalagarh ends get covered under Koldam/ Common works)

DGM, POWERGRID stated that their study indicates that Koldam - Ludhiana line might not required to be constructed with triple conductor as twin conductor would be adequate and it would incur saving in the cost of transmission line. Director (SP&PA) stated that as suggested by DGM, POWERGRID the Koldam – Ludhiana could be constructed with twin conductor instead of triple conductor as envisaged earlier.

The members of the Standing Committee agreed with the above proposals.

Item 3 - Evacuation system from Parbati III HEP (520 MW)

Director (SP&PA) stated that for evacuation of power from Parbati III HEP, a 400 kV S/C line between Parabti III and Parabti pooling point was considered and one of the line from Parbati to Koldam D/C line was to be LILOed at Parbati pooling point. Further from Parbati Pooling point 400 kV D/C line to Amritsar was envisaged. In view of serious R-O-W constraint experienced in the Parbati valley, it had been proposed to LILO both the circuits from Parbati III to Koldam at Parbati pooling point and dispensing with the additional circuit from Parbati III - Parbati pooling point. For further evacuation of power 400 kV D/C line from Parbati Pooling point - Amritsar was proposed.

After deliberation, Chief Engineer (SP&PA) stated that following system were recommended with Parabti III HEP:-

- (i) Stepping up the generation of Parbati III at 400 kV
- (ii) Creation of 400kV pooling point at Parbati (**Panarsa**)
- (iii) LILO of both line from Parbati to Koldam at Parabti Pooling point(**Panarsa**)
- (iv) Parbati Pooling point - Amritsar 400 kV D/C line

The members of the Standing Committee agreed the above proposal

Item 4 - Evacuation system from Allain Dhuangan (192 MW) and Malana II (100 MW)

CE (SP&PA) stated that evacuation system with Allain Dhuangan /Malana II HEP was agreed in the 14th SCM of NR. However, due to some apprehension indicated by the promoters of the Allain Dhuangan /Malan II HEP regarding the availability of evacuation system matching with the commissioning of their projects a review meeting was held on 23.02.04 in CEA with promoters of the company along with POWERGRID, NHPC as well as NTPC, discussed on the issue. In the meeting it was suggested that in case Allain Dhuangan / Malana II projects were programmed ahead of Parbati III, a part of Parbati III transmission system could be taken up for early construction provided Allain Dhuangan / Malana II project authorities agreed to bear the full transmission charges for the advanced system till commissioning of Parbati III. However, the Allain Dhuangan / Malana II project authorities were not in favour of the proposal and wanted to reconsider the issue when firmer commissioning schedule of the HEPs would be available. As per the proposed evacuation scheme, power from Allain Dhuangan / Malana II projects would be injected at Parbati pooling point and from there power would be evacuated to Northern Regional grid. The 220 kV transmission system from Allain Dhuangan/ Malana II and also 400/220 kV augmentation at Parbati pooling viz. including 400/220 kV ICTs, ICT bays on 400 kV side and total 220 kV switchyard would be at the cost of Allain Dhuangan/ Malana II project authorities and pooled wheeling charges for Northern Regional grid would be applicable for use of transmission system beyond Parbati Pooling point.

Item 5 - Power evacuation system from Koteshwar HEP

Director (SP&PA) stated that as a part of Tehri St I and Koteshwar HEP evacuation system, a 765/400 kV pooling point was to be created near Tehri and power from Koteshwar as

well as Tehri was to be pooled at Tehri/Koteshwar pooling point. From Tehri/Koteshwar pooling point power was to be stepped up at 765 kV and evacuated through Tehri – Meerut 765 kV 2xS/C line to the NR grid. However suitable land for creation of 765 / 400 kV pooling point with conventional 765/400 kV switchyard could not be located in that area. Teams including officers from POWERGRID, CEA and THDC visited different sites and located land where GIS S/S could be constructed.

Accordingly, for evacuation of power from Koteshwar HEP, the following transmission system was proposed.

- (i) Creation of 400 kV GIS pooling point by LILO of Tehri – Meerut 765 kV 2xS/C line to be charged at 400 kV
- (ii) Koteshwar to Tehri pooling point 400 kV D/C line
- (iii) Creation of 400 kV S/S at Roorkee with 2x315 MVA ICT by LILO of Rishikesh – Moradnagar line
- (iv) 400kV S/C line from Meerut towards Roorkee – Muzaffarnagar section of Rishikesh – Moradnagar section of the line so as to have
 - Meerut – Roorkee 400 kV S/C
 - Meerut – Muzaffarnagar 400 kV S/C line (covered by Tehri St- I)
 - Muzaffarnagar – Moradnagar S/C line
- (v) Provision of 50% series compensation of Tehri – Meerut 2xS/C line initially charged at 400 kV.

Director (SP&PA) stated that above system would be adequate for evacuation of power from Tehri St I as well as Koteshwar HEP. However with the commissioning of Tehri St II and upstream projects like Pala Maneri and Lahori Nagpala HEP there would be a need to upgrade the 400kV Tehri /Koteshwar GIS pooling point and Meerut S/S to 765 kV and charge the Tehri /Koteshwar pooling point – Meerut 765 kV 2xS/C line at 765 kV. For establishment of 765/400 kV S/S at Tehri /Koteshwar pooling point space would need to be created at different tier by cutting the hill. Considering the space constraint the 765 kV S/S would also need to be GIS type. With the charging of Tehri – Meerut lines at 765 kV, the series compensation could be shifted to another suitable location.

CE (SP&PA) stated that 400 kV Muzaffarnagar – Roorkee portion of the Rishikesh – Moradnagar line which belonged to UPPCL could create a maintenance problem for POWERGRID. As such he suggested that POWERGRID should take necessary measures for acquiring the line from UPPCL so that future maintenance problem of the line could be avoided. Concluding the discussion CE (SP&PA) stated that following system have been agreed with Koteshwar HEP.

- i) Creation of 400 kV GIS pooling point by LILO of Tehri – Meerut 765 kV 2xS/C line to be charged at 400 kV
- ii) Koteshwar to Tehri pooling point 400 kV D/C line
- iii) Creation of 400 kV S/S at Roorkee with 2x315 MVA ICT by LILO of Rishikesh – Moradnagar line
- iv) 400kV S/C line from Meerut towards Roorkee – Muzaffarnagar section of Rishikesh – Moradnagar section of the line so as to have
 - Meerut – Roorkee 400 kV S/C

- Meerut – Muzaffarnagar 400 kV S/C line (covered by Tehri St- I)
 - Muzaffarnagar – Moradnagar S/C line
- (v) Provision of 50% series compensation of Tehri – Meerut 2xS/C line initially charged at 400 kV
- (vi) POWERGRID to acquire Roorkee – Muzaffarnagar section of Rishikesh – Muradnagar 400 kV S/C line from UPPCL.

The members of the Standing Committee agreed with the above proposal.

Item 6 Creation of 400/220 kV Maharani Bagh GIS S/S

CE(SP&PA) stated that 400/220 kV Maharani Bagh S/S was envisaged as a part of Tala transmission system. Initially DTL had to face lot of problem in acquiring adequate land for construction of 400/220 kV S/S in Delhi. However when they acquired land it was found that a portion of it was encroached by temple which could create problem in construction of the conventional type 400 kV S/S. Considering the recent reduction in cost for GIS S/S, as well as benefit in terms of reliability, it was proposed to construct 400/220 kV GIS S/S at Maharani Bagh in place of conventional type of 400 V S/S.

Members of the Standing Committee agreed with the proposal.

Additional SE, PSEB stated that the 400/220 kV S/S proposed at Amritsar with Tala envisaged only one ICT. However with the commissioning of other generation as well as increase in load at Amritsar, their studies shows requirement of second ICT at Amritsar. He requested the Standing Committee to consider the proposal for creation of second ICT at Amritsar. The members of the Standing Committee agreed for the same and it was decided that 2nd 400/220 kV ICT at Amritsar would be provided as a part of strengthening works of Northern Region Grid.

Item – 7 Deferring LILO of Kanpur – Agra 400 kV S/C at Auraiya

Director (SP&PA) stated that in the 15th Standing Committee meeting LILO of 400 kV Kanpur to Agra S/C line at Auraiya and 400 kV Kanpur – Auraiya D/C line was agreed. However after subsequent re-assessment it was found that with 400 kV Kanpur – Auraiya D/C line in place the LILO of Kanpur – Agra S/C line at Auraiya can be deferred for reconsideration in future.

The proposal was agreed by the Committee.

Item 8 Balia – Bhiwadi HVDC bi-pole line

Director (SP&PA) stated that the 400 kV Balia – Bhiwadi HVDC line which forms a part of Barh evacuation system was agreed in the 15th Standing Committee meeting of NR. However the capacity of the line was to be decided. POWERGRID had suggested capacity for 2500 MW and proposed to adopt the same line design as adopted for 2000 MW line which had thermal

capacity of 3764 MW. Incremental cost in that case would have been of the order of Rs. 150 crores. For adopting optimum design, it was decided that if 2500 MW capacity was to be adopted, the design of the line would also required to be reviewed and re-optimised. Accordingly, POWERGRID had done analysis considering options of using Bersimis used in the existing lines vs Lapwing the next higher conductor. The result of these studies was enclosed in annexure. It had been observed that the saving in loss on (a) using Lapwing conductor with HVDC kept at 2000 MW in both option is 20 MW (b) HVDC flow increased to 2500 MW with Lapwing option is 26 MW. Additional investment on account of upgrading to Lapwing conductor is RS 90 crores and as such the saving in losses would justify use of Lapwing conductor.

Therefore the additional cost on account of incremental capacity from 2000 to 2500 MW for terminal equipments, upgradation to higher size conductor (lap wing) could be order of 250 crs. The additional capacity would be advantageous for import of additional power from Eastern/ North Eastern Region in future. Increase in the capacity would also help in loss reduction in transmission system. As such the capacity of 2500 MW for HVDC Balia – Bhiwadi bipolar terminal line was recommended. Members of the Standing Committee agreed for the same.

Item 9 – Transmission system associated with Unchahar

CE (SP&PA) stated that the matter referred to creation of 220 kV S/S at Rai Bareilly. However, since no representative from UPPCL was present in the meeting, the matter could be deferred and discussed in a subsequent meeting with UPPCL. However, NTPC should keep a provision for one no. of 220 kV line bay at 220 kV Unchahar. This was agreed.

Item 10 - Evacuation system from Uri II HEP (240 MW)

Director (SP&PA) stated that Uri I & II HEP were located close to border area and there were serious R-O-W as well as land availability problem for creation of switchyard with 2 voltage levels. Considering this, evacuation from Uri II at 400 kV by LILO of one of the existing Uri Wagoora D/C line at Uri II was suggested. POWERGRID had suggested another outlet at 220 kV from Uri for meeting contingency tower outage condition. GM, NHPC stated that it would be very difficult to obtain any additional space at Uri II. However he would check the space provision at Uri I and if available one additional S/C line at 220 kV could be taken from Uri I to Wagoora.

Chief Engineer (SP&PA) stated that the proposed system by LILO of one circuit of Uri I – Wagoora at Uri II could be agreed. However, for exploring the possibility for construction of an alternate line from Uri a team from NHPC, POWERGRID and CEA could visit the Uri site.

Members of the committee agreed with the above proposal.

Item 11- Maithon transmission system

Director (SP&PA) stated that evacuation system from Maithon TPS was agreed in the 15th Standing Committee Meeting. However decision regarding the voltage level of Agra –Meerut line was pending. He stated that POWERGRID had proposed for 400kV D/C line. However under present circumstances when the commissioning schedule of Maithon TPS was uncertain the decision regarding Agra –Meerut line could to be deferred.

Members of the Standing Committee committee agreed for the same.

Additional agenda :-

Item 1 Inter regional links for increased connectivity between Northern region and Western Region.

Director (SP&PA) stated that from the point of view of development of All India National Grid, Agra – Gwalior 765 S/C 2nd line with 400 kV operation, and Kankroli – Zerda 400 kV D/c line was agreed in the Standing Committee meeting of western region held in January 2004. He stated that the above links would provide increased power transfer capacity between NR and WR besides providing stability, reliability and operational flexibility to the grid. Under HVDC pole outage on Balia – Bhiwadi line, the proposed inter regional links would help in wheeling power of ER to the NR via WR. He intimated that since benefit of the line would be accrued equally by NR as well as WR constituents so the cost of the above link lines would have to be shared between NR and WR on 50:50 basis.

Members of the Standing Committee committee agreed with the above proposal

Item 2 Evacuation system from Sewa II HEP (120 MW) in J&K

Director (SP&PA) stated that evacuation system from Sewa II HEP (120 MW) in J&K was agreed in the 15th Standing Committee meeting of NR. Following transmission lines were agreed with Sewa II HEP :-

- (i) Sewa II HEP – Hiranagar 132 kV D/C
- (ii) Sewa II – Kathua 132 kV D/C line

Kathua - Mahanpur 132 kV S/C on D/C line was under construction by PDD, J&K. POWERGRID had suggested that PDD, J&K should construct the line between Kathua – Mahanpur as D/C instead of S/C, so that POWERGRID construct the line between Sewa II – Mahanpur and terminate the one circuit at Mahanpur and connecting other circuits to one of the Kathua – Mahanpur line to J&K bypassing Mahanpur S/S so as to form

- Sewa II – Mahanpur – Kathua 132 kV line
- Sewa II – Kathua 132 kV line

SE PDD, J&K stated that order for construction of 132 kV S/C on D/C tower had already been placed and the construction work had started and at this stage it would be difficult to construct line as D/C. Considering this CE (SP&PA) stated that PDD may construct the line between Kathua – Mahanpur as S/C on D/C and POWERGRID should take over the line from J&K after completion and then construct the second circuit on the line and have the line from Sewa to Mahanpur and to Kathua as envisaged.

The Members of the Committee agreed with the proposal.

Item 3 Transmission system for RAPP

Director (SP&PA) stated that the evacuation system from RAPP unit 5,6,7 & 8 was agreed in the 14th Standing Committee Meeting of the NR, wherein a portion of the RRVPN system ie, Kota-Kankroli 400 kV 2xS/C was to be utilized for evacuation of power from RAPP stage 5,6,7 & 8. RRVPN had intimated POWERGRID their inability to construct the Kota – Kankroli lines as well as Kankroli – Bhinmal line matching with the RAPP timeframe. In view of this the proposal for RAPP was reviewed and following was suggested.

With RAPP unit 5&6

Changes in earlier proposal

- (i) 2x315 MVA 400/220 kV transformer at Kota in place of earlier proposal of 3x250 MVA

Additional transmission lines

- (i) Kota – Merta 400 kV D/C line
- (ii) Kankroli – Jodhpur 400 kV S/C line

With RAPP unit 7&8

- (i) RAPP – Jaipur 400 kV D/C line of which one circuit to be LILOed at Kota
- (ii) RAPP – Nagda (WR) 400 kV D/C (NR: WR :: 50:50)

Chief Engineer, RRVPN stated that since RRVPN was constructing Hirasur – Merta – Jodhpur line and the same was scheduled for 2005-06 time frame, it would be beneficial to consider creation of 400/220 kV Beawar S/S and take the line from Kota to Merta via Beawar. CE (SP&PA) stated that the 400/220 kV Beawar S/S earlier formed the part of Anta St II transmission system and was located in a close vicinity to Merta 400 kV S/S which is under construction by RRVPNL. If RRVPNL feels any need for creating 400 kV Beawar S/S at this stage they should consider creation of the same at their own expense.

Concluding the discussion CE(SP&PA) stated that following system was recommended with RAPP C & D.

With RAPP unit 5 & 6

- (i) RAPP – Kankroli 400 kV D/C
- (ii) Kankroli – Jodhpur 400 kV S/C
- (iii) RAPP – Kota 400 kV S/C
- (iv) Kota – Merta 400 kV D/C
- (v) Creation of 2x315 MVA and 3x315 MVA S/S at Kota and Kankroli respectively

With RAPP unit 7 & 8

- i) RAPP – Jaipur 400 kV D/C line of which one circuit to be LILOed at Kota
- ii) RAPP – Nagda (WR) 400 kV D/C (NR: WR :: 50:50)

RRVPNL would construct a 220 kV line to interlink with 400 kV S/S at Kota and Kankroli of POWERGRID with their 220 S/S at Kota and Kankroli respectively.

The Members of the Committee agreed with the proposal.

List of Participants of the 16th Standing Committee meeting held at NREB Delhi on 24.03.04

S/SHRI

<u>Name</u>	<u>Designation</u>
--------------------	---------------------------

CEA

V. Ramakrishna	Chief Engineer
A.K. Asthana	Director
Gautam Roy	Dy. Director

NREB

A K Malik	SE(Op.)
Prahlad Meena	Exec. Engineer
Vikram Singh	Astt. Engg.

NTPC

A.K. Gupta	HOD (Elect.)
------------	---------------

NHPC

Raj Kumar	GM(Elect.)
-----------	------------

POWERGRID

R.N. Nayak	E.D. (Engg.)
Y K Sehgal	DGM (Engg.)
M. Khanna	CDE (Engg.)
V Thiagrajan	DCDE(Engg.)

NPCIL

NSM Rao	GM (Trans.)
---------	-------------

Delhi Transco Ltd.

Raj Bhartiya	D.GM (Plg.)
--------------	-------------

RVPN Ltd.

Y K Raizada	CE(PPM&R)
L.N. Nimawat	XEN (PSS)

PSEB

I.S. Anand	Addl. S.E./Plg.
------------	-----------------

HVPN

S R Singla	CE(Plg.)
T.K. Dhingra	S.E./Plg.

HPSEB

P C Sharma	Addl. SE
V K Kaprate	Addl. SE

PDD J&K

K L Bhagat	SE
------------	----

BBMB

A S Chugh	CE
A L Wadhawan	Dy. CE

UPCL

Mahesh Chandra	DGM (SO.)
----------------	-----------

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 12th April 2004

- | | |
|--|---|
| 1 The Member Secretary,
Western Regl. Electricity Board,
MIDC Area, Marol, Andheri East, Mumbai
Fax 022-28370193 | 7 The Chief Engineer (Trans. & Plan co-ord.),
MP State Electricity Board, Block No.3,
Shakti Bhawan, Rampur, Jabalpur-482008
Fax 0761-2664141 |
| 2 The Executive Director (Engg.),
Powergrid Corp. of India Ltd., "Saudamini",
Plot No. 2, Sector-29, Gurgaon-122001
Fax 95124-2571802 | 8 Chief Engineer (Tr.),
Chhatisgarh State Electricity Board,
Qrt. No. B-1, Gudhiyari, Raipur-492009
Fax 0771-5066900 |
| 3 GM (I/C) (Engg.),
NTPC Ltd., Engg. Office Complex,
A-8, Sector-24, NOIDA 201301
Fax 95120-2410201 | 9 The Chief Engineer (Tr. Plg.),
MSEB,'Prakashgad', Plot No.G-9, Bandra-
East, Mumbai-400051
Fax 022-26472868 |
| 4 Shri N.S.M. Rao, GM (Transmission),
Nuclear Power Corp. of India Ltd.,
12 th Floor, North Wing, VS Bhavan, Anushakti
Nagar, Mumbai-400094
Fax 022-25563350 | 10 The Chief Engineer,
Electricity Department,
The Government of Goa, Panaji
Fax 0832-2222354 |
| 5 Member (Power),
Narmada Control Authority, 113-BG, Scheme
No.74-C, Vijay Nagar, Indore-452010
Fax 0731-2559888 | 11 The Director (O)
PTC Ltd., 2 nd Floor, 15 NBCC Tower,
Bhikaji Cama Place, New Delhi-66
Fax 011-51659504 |
| 6 The Chief Engineer (Tr.),
GEB, Sardar Patel Vidyut Bhawan,
Race Course, Baroda-390007
Fax 0265-2338221 2337918 / 2338164 | |

Subject: Minutes of 20th Standing Committee meeting on Power System Planning in Western region – Corrigendum regarding

Sir,

Please refer to the minutes of the 16th Standing Committee meeting on Power System Planning in Western region held on 23rd Jan. 2004 at Jamnagar circulated vide our letter of even number dated 17th Feb. 2004. Corrigendum to the above is enclosed.

Encl. As above

**(P. K. Pahwa)
Director (SP&PA)**

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

No.1/9/2004/-SP&PA/

Dated 22th April 2004

Sh. S.K. Agarwal, Chief Engg. (Plg.),
Haryana Vidyut Prasaran Nigam Ltd.,
Shakti Bhawan, Sector-6,
Panchkula-134109, Haryana,
(Fax No.0172-2565746)

Shri G.S. Chawla
Chief Engineer (Plg.)
Punjab State Electricity Board,
Mall Road, Patiala,-147001, Punjab.
(Fax No.0175-2215897)

Executive Director
U.P. Power Corporation Ltd.,
Shakti Bhawan Extn. (3rd Floor)
14, Ashok Marg, Lucknow-226001
(Fax. No.0522-2280178)

Shri J.N.Sachdeva,
The Superintending Engineer,
Electricity Operation Circle
U.T. Chandigarh,
(Fax.No.0172-2775733, 2742733)

Shri Y K Raizada,
CE (PP&M.),
Rajasthan Rajya Vidyut Prasaran Nigam Ltd
Vidyut Bhawan,Jyoti Nagar,Janpath,
JAIPUR, **(Fax No.0141-2740794)**

Shri P K Tripathy
Manageing Director(Power)
J&K state Power Devlopment Corporation
Ashok Nagar, satwari, Jammu
(Fax No.0191-2435403)

Shri A S Chugh, Chief Engineer(Transmission system)
Bhakra Beas Management Board (Power Wing)
Admn. Block, SLDC Complex, Ind. Area, Phase 1
Chandigarh-160002
(Fax No.0172- 2654590)

S C Chattopadhyay, Chief Engineer(Plg.),
TRANSCO, DELHI, Shakti Deep Building,
Anarkai Market, DDA Complex,
Jhandewalan Extension, New Delhi- 110055.
(Fax No.23552070)

Shri R.N. Nayak,
Executive Director (Engg.)
POWERGRID Corpn. of India Ltd,
Plot No.-2, Sector- 29,
Gurgoan- 1122001.**(Fax No95-124-2571802)**

Shri S N Kapur
Chief Engineer(SP),
H.P.State electricity Board,
Vidyut Bhawan, Shimla-171004.
(Fax No.01772-258984)

Shri S Sen, executive Director
NTPC, Corporate Centre, Engineering Office Complex
Plot No.A-8 4, Sector 24, Post Box No.13,
NOIDA(UP) – 110 016.**(Fax No.95120-2536181)**

Shri B K Mishra, Member Secy.,
Northern Regional Electricity Board,
18-A, Shaheed Jit Singh Sansanwal Marg,
Katwaria Sarai, New Delhi-110016
(Fax No.2868528)

Sh.N .S. M. RAO,
GM (Transmission),
Nuclear Power Corporation Of India Ltd.
11-N-28, Vikram Sarabhai Bhawan
Anushakti Nagar, Mumbai- 400094,
(Fax No. 022-25563350)

Shri Raj Kumar,
GM(DEM),
NHPC, NHPC office complex
Sector-33, Faridabad-121003
(Fax No.-95-129-5256571, 2279137)

Subject: Minutes of 20th Standing Committee meeting on Power System Planning in Western region – Corrigendum regarding

Sir,

With reference to the minutes of the 16th Standing Committee meeting on Power System Planning in Western region held on 24rd March. 2004 at NREB, New Delhi, circulated vide our letter of even number dated 17th Feb. 2004, following corrigendum is enclosed.

Encl. As above

(S. K. Thakral)
Director (SP&PA)