

**RECOMMENDATIONS ON THE TRANSMISSION SCHEME REPORTS FORMULATED BY UPPCL AND SUBMITTED TO UPERC FOR INVESTMENT APPROVAL**

All the ten Scheme Reports formulated by UPPCL have been examined and Commission's recommendations on all the ten Scheme Reports are given below:

**A. COMMISSION RECOMMENDATIONS ON THE POINTS COMMON TO ALL THE TEN SCHEME REPORTS**

**A-1 SCOPE**

**The scope of works of the Scheme Reports is in order.** (UPPCL have confirmed that LILO of 132 kV Nibkarori – Kannauj line at Chhibramau, interalia, included in Scheme No. 1 – 220 kV Substation Chhibramau, is not required, as these are covered in some other Scheme Report).

**A-2 TECHNICAL FEASIBILITY**

As regards technical justification of the transmission works, UPPCL have confirmed that the works covered in these Scheme Reports are based on the Load Flow studies carried out for longer time frame and as such it is ensured that these works fit in the long term plans. The results of the studies have also shown that there would be no overloading of the upstream transmission works and that there would be considerable reduction in the system transmission losses, thus making the schemes financially viable. In cases where overloading of transformers is expected, UPPCL have confirmed that necessary augmentation would be taken up subsequently by covering the works in new scheme reports. In view of above **we have no further comments to make.** (Points relevant to specific schemes have been discussed separately in subsequent para).

**A-3 COMMISSIONING PROGRAMME**

The completion targets of various works covered in the Scheme Reports have been revised by UPPCL. **We have no further comments to make.**

**A-4 PHASING OF WORKS AND FUNDS**

Keeping in view the revised commissioning programme, phasing of works and funds have been revised. Some minor adjustments done due to cost estimates modified by us. **We have no further comments to offer.**

**A-5 COST ESTIMATES**

As regards cost estimates of Substations and Transmission line equipments and labour charges, UPPCL have intimated that these have been updated in the material

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schedule submitted to PFC at the time of agreement, so is the case in respect of civil works. Now that most of the transmission and substation works are targeted for completion in next 1-2 years it is presumed that the equipment / materials have already been procured or commitments made. Therefore it would not serve any purpose to comment on the quantities and rates of the equipment. However, UPPCL is advised to revise the Project Reports based on actual quantities of equipment used and expenditure incurred on labour etc. after completion of works. The surplus materials, if any, should be transferred to other projects and necessary credit given to the concerned project.

In case of Transmission lines (132 kV and 220 kV), UPPCL have updated the cost estimates to 01.04.2005 price level (circulated with their letter No. T39/ETDC/3/PS dated 27.04.2005). The cost estimates of Transmission lines in various schemes have been updated using the data with following modifications

- (i) As no forests are involved, the provision for the same has been deleted.
- (ii) Crop compensation @Rs.4500 per km. Is considered reasonable.
- (iii) Establishment, Audit & Accounts charges have been restricted to 10.75%. (Assuming works would be carried out departmentally).

The cost estimates of Transmission lines thus work out to as given below:

	Rs. Lacs / km.
➤ 132 kV S/C	13.30
➤ 132 kV D/C	23.38
➤ 220 kV S/C	19.92
➤ 220 kV D/C	33.91

(Other comments on cost estimates relevant to individual schemes are covered subsequently).

The cost estimates of Line Bays have also been worked out on the basis of information given in reports and is given below:

➤ 132 kV Line bay	Rs. 65 .08 Lacs
➤ 220 kV Line bay	Rs.140.00 Lacs

## **A-6 VOLTAGE REGULATION AND COST BENEFIT ANALYSIS**

UPPCL have intimated that power system studies to evolve optimal system development plans are being carried out by using computer software. Various alternative configurations are studied and it is also ensured that the system finally accepted is adequate under normal conditions and also in event of outage of critical transmission lines / transformers etc. The voltage profile in the system is maintained between 0.95 p.u and 1.05 p.u for 400 kV and 0.90 p.u to 1.05 p. u for 220 kV and 132 kV, both under normal and outage conditions. The system losses are also worked out with the help of

software. The load flow sketches in respect of various works covered in the scheme reports (except for radial systems where studies are not relevant) have been given with system loss figures.

#### **A-7 RELIABILITY ANALYSIS**

UPPCL have intimated that reliability analysis would be done after completion of the project. UPPCL is advised to incorporate in the scheme Report when revised, based on actual.

#### **A-8 INTEREST LIABILITY**

UPPCL have agreed in principle but have expressed that it has not been taken into account as the schemes were prepared for the purpose of PFC financing in their (PFC's) formats. The **liability of interest, if any, should be accounted for to arrive at overall costs of works.**

#### **A-9 VAT & SERVICE TAX**

UPPCL have intimated that cost estimates are on the basis of their standard cost schedule, which are being revised from time to time as per latest rates of equipment / materials supplies and that these include all Government levies.

### **B. RECOMMENDATIONS ON THE POINTS RELEVANT TO SPECIFIC SCHEME REPORTS**

#### **B-1 PROPOSAL FOR FINANCING OF 220 KV SUBSTAION CHHIBRAMAU**

UPPCL have clarified all the points brought out in our observations. They have confirmed that LILO of 132 kV Nibkarori – Kannauj line at Chhibramau has been covered in another Scheme Report, as such the provision for the same is not required to be made in this Scheme Report.

The works have now been targeted for completion by **31.08.2006.**

The cost estimates have been modified by considering the rates per km of transmission line as intimated by UPPCL (updated to April 2005 price level).

The provision for the equipment in Chhibramau 220 kV substation for LILO of 132 kV Nibkarori – Kannauj line should be deleted.

Provision for Establishment, Audit & Accounts etc. @10.75% and contingencies @3% needs to be provided.

The cost estimates have been modified in the light of above and revised cost given below.

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## Cost Estimates (Rs. Lacs)

Description	As Per Project Report	Recommended by Commission
(i) Cost of 220 kV S/S Chhibramau (2x100MVA)	1692.00	1642.87
(ii) LILO of 220 kV Panki – Mainpuri line through proposed 220 kV S/S Chhibramau	143.40	169.55
(iii) Cost of 132 kV S/C Chhibramau – Fatehgarh line	389.55	465.50
(iv) Cost of 132 kV bay at 132 kV S/S Fatehgarh	66.00	65.40
Total	2291.00	2343.32

**The Scheme is approved for an estimated cost of Rs. 2343.32 Lacs only.**

**B-2 CONSTRUCTION OF 132 KV S/S BABRALA (GUNNAUR) AND 132 KV S/C BISAULI-BABRALA LINE, 132 KV S/C BADAUN-BISAULI LINE AND 132 KV S/C BISAULI-CHANDAUSI LINE WITH ASSOCIATED WORKS**

UPPCL have clarified all the points brought in our observations. They have confirmed that transformer capacity of 220 kV S/S Moradabad is being enhanced from existing 3x100 MVA to (2x100+1x160 MVA) and that also a new 220 kV substation at Rampur has also been approved.

As regards 132 kV bay for the incoming line at Babrala, UPPCL have intimated this would be controlled by the breaker at Bisauli S/S. UPPCL at a later stage may install 132 kV bay at Babrala also, as is normal practice.

UPPCL do not intend to dismantle existing 66 kV lines. They may consider utilization of these lines for optimal utilization of resources. Enhancement of transformation capacity at Babrala (Gunnaur) considered later on.

The cost estimates have been revised on the basis of break up of cost given by UPPCL and modified by us.

Cost Estimates (Rs. Lacs)

Description	As Per Project Report	Recommended by Commission
(i) 132 kV S/S Babrala (Gunnaur)	417.20	393.88
(ii) 132 kV Line bay at Bisauli	83.51	65.08
(iii) 132 kV S/C Bisauli – Babrala line	629.56	665.00
(iv) 132 kV S/C Budaun – Bisauli line	478.28	505.40
(v) 132 kV S/C Bisauli – Chandausi line	276.65	292.60
	<b>Total</b>	<b>1921.96</b>

The works now have been targeted for completion by 31.01.2007

**The Scheme approved for an estimated cost of Rs. 1921.96 Lacs only.**

### **B-3 CONSTRUCTION OF 132 KV SUBSTATION AT THAKURDWARA**

In reply to the observations of Commission regarding inadequacy in transformation capacity at Moradabad 220 kV substation and proposed Thakurdwara 132 kV substation, UPPCL have informed that:

- (i) Additional transformer (132/33 kV) at Thakurdwara would be taken up in future expansion programme. Due to resource constraints it would not be possible to take up these works immediately.
- (ii) At Moradabad one of the existing three 100 MVA transformers is being replaced by 160 MVA transformer. Moreover another 220 kV substation at Rampur is also proposed in this area.
- (iii) Shunt capacitors would be covered in a separate scheme report.

UPPCL have also clarified that rearrangement of 33 kV line (shifting to proposed 220 kV substation) would be taken up by concerned Distribution company.

In view of above we have no further comments to make.

The cost estimates have been revised as per details given below:

Cost Estimates (Rs. Lacs)

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Description	As Per Project Report	Recommended by Commission
(i) 132 kV S/S at Thakurdwara	561.15	424.30
(ii) 132 kV D/C line (0.8 km)	20.51	18.70
<b>Total</b>	<b>581.66</b>	<b>443.00</b>

The works have now been targeted for completion by 31.01.2007.

**The Scheme is approved for an estimated cost of Rs. 443.00 Lacs only.**

**B-4 CONSTRUCTION OF 132 KV SUBSTATION AT KHARAD**

UPPCL have intimated that Kharad 132 kV S/S would be fed from Shamli 220 kV S/S over radial 132 kV line, therefore no system studies have been carried out. However, they have confirmed that to avoid overloading of 220/132 kV transformers at Shamli the transformation capacity is being increased from (1x160+1x100 MVA) to 2x160 MVA. (works already approved).

As regards enhanced transformation capacity at Kharad 132 kV S/S they intend taking the works later on as financial constraints do not permit these to be taken up simultaneously.

UPPCL have also confirmed that these works approved in January 2002 do not need any change

The cost estimates of the scheme have been revised and details are given below:

Cost Estimates (Rs. lacs)

Description	As Per Project Report	Recommended by Commission
(i) Kharad 132 kV S/S	403.00	364.60
(ii) 132 kV bay at Shamli S/S	83.51	65.08
(iii) Shamli-Kharad 132 kV S/C line (18 km)	230.76	239.40
(iv) Civil works	75.00	75.00

Total	792.27	744.08
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The works have now been targeted for completion by 31.12.2007

**The Scheme is approved for an estimated cost of Rs. 744.08 Lacs only.**

**B-5 132 KV SUBSTATION AT GANGOH**

UPPCL have confirmed that (i) power system studies have been carried out and that results of the studies have shown that there would be no overloading of the upstream transmission works. Load flow diagram has been provided. (ii) 33 kV works needed would be constructed by concerned Distribution company. (iii) additional transformation capacity is not possible at this stage due to financial constraints and that it would be taken up subsequently, and (iv) completion target has been revised to 31.03.2007.

The cost estimates have been modified and details are given below.

Cost Estimates (Rs. lacs)

Description	As Per Project Report	Recommended by Commission
(i) 132 kV S/S at Gangoh with 2x20 MVA 132/33 kV transformers	437.00	402.30
(ii) 132 kV line bay at Nakur existing S/S	65.00	65.08
(iii) 132 kV S/C line from Nakur to Gangoh (20 km)	256.00	266.00
Total	758.00	733.38

The works have been targeted for completion by 31.03.2007.

**The Scheme is approved for an estimated cost of Rs. 733.38 Lacs only.**

**B-6 CONSTRUCTION OF PARICHHA – ORAI 220 KV D/C LINE**

In reply to the observation of the Commission regarding adequacy of transmission system for evacuation of power under normal conditions and in event of outage of a critical transmission line UPPCL have stated as follows:

“ Based on load flow studies finally the following transmission system has been evolved:

- (i) 220 kV D/C Parichha – Orai line
- (ii) 220 kV S/C Parichha – Banda line

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- (iii) 220 kV S/C Panki / Kanpur (PGCIL) – Orai line along with 220/132 kV, 2x100 MVA Orai S/S and LILO of II circuit of 220 kV D/c Mainpuri – Parichha line at Orai.”

As regards item (i) above, this together with terminal bays at both ends have been covered in the scheme under consideration but UPPCL have not mentioned about works at (ii) and (iii) above. All the works should be covered in one scheme report.

We understand that works at (iii) above have been covered in another scheme report entitled “Construction of 220 kV S/S at Orai, 132 kV S/S Muranipur, 132 kV S/S Bilhaur, installation of 20 MVA, 132/33 kV transformers at Parichha and associated lines under Electricity Transmission circle Kanpur – estimated cost Rs. 6926 lacs.” This fact should have been stated by UPPCL in their replies. We are not aware if 220 kV S/C Parichha – Banda line and Banda S/S are included in any scheme or not. If not, a supplementary scheme prepared and submitted to UPERC for approval.

The provision for bays in the P.H for 220 kV D/C line to Orai deleted from the scheme report and covered under Generation Scheme Report.

The cost estimates have been modified taking into consideration the above comments also and details are given below.

Cost Estimates (Rs. lacs)

Description	As Per Project Report	Recommended by Commission
(i) Parichha – Orai 220 kV D/c line (95km)	3040.00	@Rs33.91 lacs/km 3221.45
(ii) *220 kV bays at Orai S/S – 2 nos.	* 282.00	282.00
(iii) 220 kV bays at Parichha P.H – 2 nos.	282.00	deleted from the scope-  covered in generation scheme
<b>Total</b>	<b>3604.00</b>	<b>3503.45</b>

\* We do not agree with the break up of cost given in the report; but overall cost of Rs.141 lacs per 220 kV line bay is in order and is recommended.

**The Scheme approved for an estimated cost of Rs. 3503.45 lacs subject to generation company formulates the scheme for terminal bays in the power house for 220 kV D/C line to Orai.**

**B-7 CONSTRUCTION OF 220 KV D/C LILO LINES OF 220 KV MAINPURI – HARDUAGANJ (II CIRCUIT) AND 220 KV MAINPURI-FIROZABAD LINE AT MAINPURI 400 KV S/S OF PGCIL**

UPPCL have confirmed that LILO of Mainpuri – Harduaganj 220 kV II circuit and Mainpuri – Firozabad 220 kV line at Mainpuri 400 kV S/S of PGCIL has been decided on the basis of system studies carried out for normal and also outage of critical transmission lines. The flow charts have been made available. The system evolved is in order and is required for availing share of UP's power from central sector stations.

It has also been clarified that Firozabad would be connected with Agra 400 kV S/S to provide requisite reliability. The proposals are in order.

No expenditure has been incurred so far and works have now been targeted for completion by 31.12.2007.

The cost estimates have been modified and details are given below.

Cost Estimates (Rs. lacs)

Description	As Per Project Report	Recommended by Commission
	@ Rs 32 lacs/km	@Rs 33.91lacs/km
(i) 220 kV D/C LILO of Mainpuri-Harduaganj II circuit at 400 kV Mainpuri S/S (22 km)	704.00	746.02
(ii) 220 kV D/C LILO of Mainpuri-Firozabad line at 400 kV Mainpuri S/S (26 km)	832.00	881.66
	1536.0	1627.68
(iii) Price variation @20%	307.20	Not required
	Total 1843.00	1627.68

The works are targeted for completion by 31.12.2007

**The Scheme is approved for an estimated cost of Rs. 1627.68 Lacs only.**

**UPERC**Investment proposals for Transmission Schemes submitted for UPERC approval dated 17<sup>th</sup> MAY 2006**B-8 CONSTRUCTION OF 132 KV SUBSTATION AT RAIBAREILLY**

The scope of works and technical feasibility is in order. These works were, interalia, included in Seventh Plan scheme accorded techno-economic approval by CEA vide their letter dated 30<sup>th</sup> March 1988.

Provision for Capacitor bank has not been made in the scheme report.

The cost estimates have been suitably modified and details are given below.

Cost Estimates (Rs. lacs)

Description	As Per Project Report	Recommended by Commission
(i) 132 kV S/S at Raibareilly with 2x40 MVA 132/33 kV transformers	1243.25	1142.36
(ii) 132 kV LILO lines (D/C LILO lines 1.5+2.5=4 km)	89.32	93.52
Total	1332.57	1235.88

The works are targeted for completion by 31.03.2008

**The Scheme is approved for an estimated cost of Rs 1235.88 Lacs only.**

**B-9 132 KV SUBSTATION POWAYAN AND ASSOCIATED 132 KV S/C SHAHJAHANPUR – POWAYAN LINE**

In reply to the observations of the Commissions regarding providing alternate feed also to Powayan 132 kV S/S and enhanced capacity of transformers, UPPCL have expressed their inability to do so due to resource constraints and that they would consider this under future expansion schemes. We would suggest that reliability of supply should be kept in view and reinforcements considered at the earliest possible.

The cost estimates of the works have been suitably modified and details are given below.

Cost Estimates (Rs. lacs)

Description	As Per Project Report	Recommended by Commission
(i) 132/33 kV S/S at Powayan with 2x20 MVA transformers	586.00	568.97

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(ii) 132 kV S/C line from Shahjahanpur to Powayan (28 km)	358.96	372.40
(iii) 132 kV line bay at Shahajahanpur 220/132 kV substation	83.50	65.08
Total	1028.46	1006.45

The works are now targeted for completion by 31.03.2008.

**The Scheme is approved for an estimated cost of Rs.1006.45 Lacs. UPPCL advised to provide necessary credit to the Scheme on account of the materials and equipment of 66 kV works which would be dismantled and used elsewhere or disposed off. This may be done after completion of works.**

#### **B-10 CONSTRUCTION OF 132 KV SUBSTATION AT TELIARGANJ**

UPPCL have expressed inability to install higher size transformers at Teliarganj, proposed by Commissions, due to financial constraints and have stated that it would be done in future expansion schemes. At Phulpur 220 kV S/S one of the two 100 MVA 220/132 kV transformers is being replaced by 160 MVA transformer.

It has been confirmed that the transmission works have been planned on the basis of load flow studies. UPPCL have also clarified that rupees 100 crore stated to have already been spent is not correct and that no expenditure has been incurred so far.

UPPCL are silent about our suggestion of drawing a Master Plan of Allahabad town. It is only a suggestion, which need not withhold works proposed in this scheme.

Cost estimates are as per standard schedule of UPPCL, updated from time to time, as such we have no comments. However, the cost estimates have been modified especially in regard to centage charges and details are given below.

Cost Estimates (Rs. lacs)

Description	As Per Project Report	Recommended by Commission
(i)(a) Teliarganj, Allahabad 132 kV S/S with 2x20 MVA, 132/33 kV transformers	433.03	387.59
(b) Civil works of S/S, special river foundations of Phulpur-Teliarganj line	547.03	450.76
(ii) Phulpur-Teliarganj 132 kV D/C line (35 km)	781.77	818.30
(iii) 132 kV line bays at Phulpur 220/132 kV S/S (2 nos.)	165.46	130.16

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(iv) 1x5 MVA 33 kV S/S MES with associated 33 kV line from 132 kV Teliarganj S/S	64.85	59.00
Total	1992.14	1845.81

**The Scheme is approved for an estimated cost of Rs.1845.81 Lacs only.**