

2.2 Haryana Vidyut Prasaran Nigam Limited

Erection, augmentation and maintenance of high tension lines and sub-stations

Highlights

The main function of Haryana Vidyut Prasaran Nigam Limited was to transmit power purchased from Haryana Power Generation Corporation Limited and Central Pool to distribution companies through its transmission network consisting of high tension lines and sub-stations.

(Paragraph 2.2.1)

The State Government did not initiate action to promote private sector participation in power sector companies, as envisaged in the reforms programme. As such the dependence of the Company on borrowed funds to finance its transmission works had increased interest burden from Rs. 201.79 crore in 1999-2000 to Rs. 277.61 crore in 2002-03.

(Paragraph 2.2.7)

Of the 28 transmission schemes got financed from financial institutions during 1999-2004, 23 schemes involving creation/augmentation of 51 sub-stations and related link lines were scheduled for completion up to March 2004. Only 12 schemes could be completed by March 2004, which not only increased interest burden during construction but also resulted in non-accrual of envisaged financial benefits of Rs. 89.76 crore per annum on account of reduction in transmission losses.

(Paragraph 2.2.8)

Construction of 132 KV sub-station at Sector 27-28, Hisar without assessing its actual requirement led to blocking of funds of Rs. 75.55 lakh on civil works and Rs. 1.20 crore on electrical works, which resulted in loss of interest of Rs. 78.94 lakh.

(Paragraph 2.2.10)

Shortfall of shunt capacitors in the system during 1999-2004 resulted in non-reduction of transmission losses to the extent of 1,122.85 million units valued at Rs. 224.57 crore. The Company also had to pay Rs. 4.22 crore as penalty on account of excess drawal of reactive power from the power grid during April-September 2003.

(Paragraph 2.2.16)

Inadequate and non-operational protection systems at sub-stations put the costly equipments at a greater risk of damage.

(Paragraph 2.2.20)

Due to failure of the protection system, one power transformer (100 mega volt ampere) was damaged at 220 kilo volt sub-station, Madanpur, which resulted in estimated loss of Rs. 2.19 crore.

(Paragraph 2.2.24)

Introduction

2.2.1 On unbundling of the erstwhile Haryana State Electricity Board (HSEB) on 14 August 1998, generation of power in the State of Haryana was entrusted to Haryana Power Generation Corporation Limited (HPGCL) and its transmission and distribution to Haryana Vidyut Prasaran Nigam Limited (Company). The distribution function was subsequently transferred (July 1999) to two distribution companies viz. Uttar Haryana Bijli Vitran Nigam Limited (UHBVNL) and Dakshin Haryana Bijli Vitran Nigam Limited (DHBVNL).

The main function of Haryana Vidyut Prasaran Nigam Limited (Company) was to transmit power purchased from HPGCL and Central Pool, apart from its own generation from shared projects, to distribution companies through its transmission network consisting of HT lines and sub-stations having design voltage of 220, 132 and 66 KV.

Organisational set up

2.2.2 The management of the Company is vested in a Board of Directors (BOD) comprising a Chairman, a Managing Director (MD), two whole time directors and five part time directors. The MD is the Chief Executive of the Company. The transmission works in the Company are planned by Chief Engineer (Planning). Construction, operation and maintenance of lines and sub-stations are supervised by two Chief Engineers (Construction, Operation and Maintenance), Panchkula and Hisar under the control of Director (Technical). They are assisted by six Superintending Engineers at circle level. The procurement of material for transmission works and award of contracts for their execution on turnkey basis is looked after by the Chief Engineer (Design and Procurement), under the control of Director (Projects).

As on 31 March 2004, the Company had 21 divisional offices under six circle offices for construction and maintenance of works at the field level besides one power transformer repair workshop at Ballabhgarh and one steel structure workshop at Panipat. There were 208 sub-stations having transformation capacity of 12,014 MVA and 5,961.51 circuit kilometers (kms) of lines under the control of the Company.

Scope of Audit

2.2.3 Construction of transmission lines and sub-stations in the erstwhile HSEB was last reviewed in the Report of the Comptroller and Auditor General of India for the year 1985-86 (Commercial), Government of Haryana. Recommendations of the Committee on Public Undertakings are contained in its 34th Report presented to the State Legislature on 12 March 1993.

The present review, conducted during October 2003 to March 2004, covers construction and maintenance of sub-stations and high tension (HT) lines of the Company for the last five years ending March 2004.

Audit findings as a result of test check of records of Chief Engineer (Planning) and Chief Engineer (Design and Procurement) at the Company's head office and two Chief Engineers (Construction, Operation and Maintenance) along with three* (11 divisional offices) out of six circle offices in the field for 1999-2004, were reported (May 2004) to the Government/Company with a specific request for attending the meeting of the Audit Review Committee for State Public Sector Enterprises (ARCPSE) so that the viewpoint of the Government/management was taken into account before finalising the review. The meeting of ARCPSE was held on 20 August 2004 which was attended by the Financial Commissioner and Principal Secretary to Government of Haryana, Power Department and the MD of the Company.

Transmission network

2.2.4 The Company has two sources of power viz. own generation in shared projects and purchase from HPGCL/Central Pool. Power generated by HPGCL at Tau Devi Lal Thermal Power Station (TDLTPS), Panipat is transmitted through 220 KV lines, while power generated at Faridabad Thermal Power Station and Yamunanagar Hydel Power Station is injected in the system through 66 KV lines of the Company. Power purchased from central pool and own generation from shared projects is pumped into the State through 400/220 KV inter-state lines and sub-stations of Power Grid Corporation of India Limited (PGCIL) and Bhakra Beas Management Board (BBMB). PGCIL has three 400 KV sub-stations in the State at Abdullapur, Hisar and Samaypur. BBMB has two 400 KV sub-stations at Bhiwani and Panipat, besides eight 220 KV sub-stations at other locations in the State.

* Hisar, Karnal and Panchkula.

The Company transmits power so received through its network of 220, 132 and 66 KV sub-stations to the distribution companies (UHBVNL and DHBVNL) for distribution to end consumers. A map showing transmission network of the Company (220 KV and above) is shown at **Annexure 8**.

Growth of transmission system

2.2.5 The table below indicates the transmission system built up vis-à-vis power availability during 1999-2004:

Particulars	1999-2000	2000-01	2001-02	2002-03	2003-04 (Provisional)
Generation/purchase (MUs)					
Own generation*	3,648.57	3,200.99	3,038.42	3,350.62	3,700.89
Purchase	11,957.86	13,654.43	14,808.80	16,088.77	17,062.35
Total energy available for sale (MUs)	15,606.43	16,855.42	17,847.22	19,439.39	20,763.24
Energy sold	13,086.97	15,712.39	16,566.85	18,336.96	19,813.06
Transmission losses	2,519.46	1,143.03	1,280.37	1,102.43	950.18
Percentage of losses	16.14**	6.78	7.17	5.67	4.58
Transmission lines (circuit kms) (At the end of each year)	5,029.3	5,153.5	5,313.6	5,459.7	5,961.51
Transformation capacity (MVA***)					
132 & 66KV	5,635	5,850	6,097	6,504	7,104
220 KV	3,260	3,310	3,510	4,010	4,910

The transmission losses during years 2000-04 ranged between 4.58 and 7.17 per cent. As the losses were above the norm of 2 to 4 per cent fixed by Central Electricity Authority (CEA), the Company suffered loss of Rs. 281.68 crore on account of energy loss of 1,479.79 MUs (in excess of four per cent) in these years. Due to strengthening of transmission system by addition of 132 and 66 KV sub-stations, the Company was able to reduce transmission losses to the level of 4.58 per cent during 2003-04.

Targets and actuals

Physical targets and achievements

2.2.6 The Company had been drawing up transmission programme by fixing the physical targets for erection of new sub-stations and lines besides augmentation of existing sub-stations and lines. The programme of erection/augmentation was approved on the basis of feasibility reports formulated after receiving the techno-economic justification from the distribution companies. The targets and achievements in physical terms during 1999-2004 are given in **Annexure 9**.

It would be seen from the **Annexure 9** that the Company had not achieved the targets for laying of transmission lines and addition in transformation capacity

The Company could not achieve targets for laying transmission lines and addition in transformation capacity.

* Own generation represents the Company's share in BBMB and Inderprastha Power Generation Company Limited.

** Includes distribution losses up to June 1999.

*** Mega Volt Ampere (MVA).

in any of the five years. The percentage of shortfall ranged between four and 62 in respect of transformation capacity and between 62 and 85 in respect of transmission lines. The shortfall was due to delay in execution of works.

The management stated (June 2004) that only need-based works were executed keeping in view the system requirements and availability of fund. The reply was not tenable in view of the fact that transmission programme was based on techno-economic justification given by the distribution companies and fund sanctioned by financial institutions could not be utilised as per schedule due to delay in execution of works. During ARCPSE meeting (August 2004), the management attributed the non-achievement of targets to the problem of 'right of way' and assured that more realistic and achievable targets would be fixed in future.

Financial outlay and actual expenditure

2.2.7 The Company prepared annual budget for capital expenditure for execution of various works including transmission depending upon the physical targets fixed in the annual plans formulated by the Company.

The table below indicates the budgeted (original/revised estimates) and actual expenditure on transmission works during 1999-2004:

(Rupees in crore)

Year	Budgeted estimates				Total revised estimates (allocation) (3+5)	Actual expenditure	Variation with reference to revised estimates (per cent) (7-6)
	Plan *		Non-plan **				
	Original estimates	Revised estimates/ (allocation)	Original estimates	Revised estimates/ (allocation)			
1	2	3	4	5	6	7	8
1999-2000	212.20	222.65 (184.99)	4.00	19.35 (19.00)	242.00 (203.99)	102.92	(-) 139.08 (57.47)
2000-01	289.55	104.61 (84.77)	19.40	19.40 (33.23)	124.01 (118.00)	91.06	(-) 32.95 (26.57)
2001-02	199.32	10.75 (15.29)	40.00	81.59 (46.83)	92.34 (62.12)	109.13	(+) 16.79 (18.18)
2002-03	12.00	2.10 (0)	190.04	199.01 (153.80)	201.11 (153.80)	207.97	(+) 6.86 (3.41)
2003-04	11.50	2.00 (2.00)	290.29	236.39 (106.21)	238.39 (108.21)	147.01	(-)91.38 (38.33)

It could be seen from the above table that:

- actual expenditure was low ranging from 26.57 to 57.47 per cent as compared to the revised estimates during 1999-2001 and 2003-04. Audit analysis revealed that this was mainly due to delay in execution of works as discussed in succeeding paragraphs (2.2.8, 2.2.9, 2.2.14 and 2.2.15);
- budget estimates were unrealistic as the actual expenditure compared to revised estimates varied from (+) 18.18 to (-) 57.47 per cent during 1999-2004.

* In the form of equity capital/World Bank loan.

** In the form of loans from financial institutions.

Over dependence on borrowings for funding transmission works increased interest burden.

- as a sequel to power sector reform programme, the State Government reduced contribution for funding the transmission projects. But it did not initiate action to promote private sector participation in power sector companies, as envisaged in the reform programme. As such, large investment programme to rehabilitate and expand the transmission and distribution system did not take place. The Company was left with no other option except resorting to borrowing from financial institutions to finance its transmission projects. The loan drawal for transmission works increased from Rs. 19 crore in 1999-2000 to Rs. 106.21 crore in 2003-04. This resulted in increased interest burden on the Company from Rs. 201.79 crore in 1999-2000 to Rs. 277.61 crore in 2002-03.

During ARCPSE meeting (August 2004), management stated that more realistic budget would be prepared in future.

Transmission schemes

2.2.8 During 1999-2004, the Company got financed 28 transmission schemes from PFC*, REC** and NABARD***. Of these, 23 schemes involving erection/ augmentation of 51 sub-stations (43 new sub-stations and augmentation of eight sub-stations) along with related link lines were slated to be completed during September 2001 to March 2004. Targets and achievements under these schemes are detailed below:

Source of finance (Number of schemes)	Estimated cost	Loan sanctioned	Loan drawn	Number of sub-stations covered under the scheme (capacity in MVA)					
				220 KV		132 KV		66 KV	
				Target	Actual	Target	Actual	Target	Actual
(Rupees in crore)									
PFC (12)	359.52	251.63	217.30	10 (1,500)	9 (1,150)	20 (526)	14 (362)	6 (96)	4 (52)
REC (8)	38.06	35.25	30.13	Nil	Nil	3 (48)	2 (32)	5 (80)	4 (56)
NABARD (3)	27.31	21.93	15.70	1 (100)	1 (100)	3 (48)	2 (32)	3 (48)	1 (16)
Total (23)	424.89	308.81	263.13	11 (1,600)	10 (1,250)	26 (622)	18 (426)	14 (224)	9 (124)

Out of 23 transmission schemes, the Company could complete only 12 within the target date and could create additional transformation capacity of 1,800 MVA (74 per cent) against the target of 2,446 MVA.

The Company could utilise only 85 per cent of the available loan fund although the completion period was over. Only 12 out of the 23 schemes had been completed up to March 2004. Due to delay in completion of schemes, projected reduction in transmission losses, which would have resulted in financial benefits of Rs. 89.76 crore per annum, could not be achieved. Due to slow pace of work, the Company could erect 30 against the target of 43 new sub-stations and augment seven against the target of eight sub-stations. As a result, 1,800 MVA (74 per cent) additional transformation capacity (against the target of 2,446 MVA) could be created. The Company could erect 821 circuit kms (57 per cent) of transmission lines against target of 1,433 circuit kms of lines.

* Power Finance Corporation Limited.
 ** Rural Electrification Corporation.
 *** National Bank for Agriculture and Rural Development.

In one of the schemes, PFC sanctioned (November 2001) a loan of Rs. 26.67 crore for completion of 220 KV sub-station at Jorian (Yamunanagar) and erection of two new 66 KV sub-stations at Gulab Nagar and Talakaur, besides augmentation of 66 KV sub-stations at Bilaspur and Sadhaura. The Company was to execute these works departmentally. Audit observed that although first and second 100 MVA 220/66 KV transformers were energised at 220 KV sub-station, Yamunanagar in July 2002 and January 2003 respectively, yet the erection of new 66 KV sub-stations as well as envisaged transmission lines were not completed (June 2004). Delay in completion of subsidiary works had, thus, postponed the accrual of projected financial benefits. Besides, this has also resulted in under utilisation of 220 KV sub-station valuing Rs. 17.90 crore.

Delay in execution of turnkey projects

2.2.9 The Company awarded 30 turnkey contracts valuing Rs. 198.54 crore during March 2001 to February 2002 for supply, erection and commissioning of 29 sub-stations and associated lines in eight districts. These transmission works, scheduled to be completed in 15/18 months i.e. by June 2003, were aimed at improving the quality and availability of power in these areas.

No turnkey contract was completed within scheduled time.

Audit noticed that no turnkey contract was completed within the scheduled time. As of March 2004, while works under only four schemes were completed with delay ranging from three to 11 months, the remaining four schemes were behind schedule with delay ranging between 10 and 17 months.

The management attributed (June 2004) the delay in completion of projects to lengthy procedure for acquisition of land, difficulty in handing over clear site to contractors on time, delay in obtaining forest clearance, shifting of existing HT/low tension (LT) lines, railway clearance etc. The reply was not convincing because the management failed to utilise the period of seven to 11 months available between sanction of schemes and award of contracts. A few such instances are given below where the Company initiated action only after the award of contracts:

- land at Fatehabad was made available after 10 months;
- the Company shifted its own structures and lines at Mohindergarh after a period of 10 months;
- part of land at Rania was made available to the contractor after nine months;
- land at Cheeka was acquired after 14 months and at Maharishi Dayanand University, Rohtak, land was made available after 12 months; and
- the Company shifted 11 KV lines at 66 KV sub-station Dukheri after a period of seven months.

* Ambala, Bhiwani, Fatehabad, Kaithal, Mohindergarh, Rohtak, Sirsa and Sonapat.

Thus, the Company was deprived of projected financial benefits of Rs. 105.13 crore on account of non-reduction in line losses due to delayed completion of works. Besides, consumers of these areas suffered on account of low voltage and poor availability of power for longer periods.

Erection and augmentation of sub-stations

132 KV sub-station at Hisar

2.2.10 With a view to meet growing demand of electricity and to supply quality power to industrial consumers of Hisar, HSEB approved (December 1992) a proposal to create a 132 KV sub-station in Sector 27-28 Industrial Estate, Hisar with one transformer of 10/16 MVA capacity having 132/11 KV rating. Civil works at the proposed sub-station were completed during 1993-94 for Rs. 31.20 lakh. Payment of Rs. 44.35 lakh towards cost of land was made in March/June 1998. The electrical works commenced in 1994-95 were scheduled to be completed by March 1995, which were not completed due to change of priority of the sub-station.

After a gap of five years, the Company decided (July 1999) to install one transformer of 10/16 MVA capacity having 132/33 KV rating (instead of 132/11 KV) transformer to feed the load of proposed 33 KV sub-stations at Mangali and Haryana Urban Development Authority (HUDA) complex, Hisar. Remaining electrical works at the sub-station were completed and the transformer was commissioned (August 2001) at the sub-station at a total electrical cost of Rs. 1.20 crore.

Audit observed that since the date of its commissioning (August 2001), the transformer remained energised on “no load” and the installed capacity of the sub-station remained untapped till 26 February 2004, when 6.3 MVA load of 33 KV sub-station, Mangali was put on the transformer.

Construction of sub-station without assessing its actual requirement resulted in blocking of fund of Rs. 1.96 crore and loss of interest of Rs. 78.94 lakh.

Thus, construction of sub-station without assessing its actual requirement resulted in blocking of Rs. 31.20 lakh from March 1995 on civil works, Rs. 44.35 lakh from June 1998 on cost of land, and Rs.1.20 crore on electrical works from August 2001, which resulted in loss of interest of Rs.78.94* lakh up to January 2004.

The management stated (June 2004) that the priority for the sub-station was lowered due to closure of steel industry (prospective consumers from the sub-station) owing to decontrol of steel. The contention of the management was not tenable as the proposal to create sub-station was meant for all industries located in the vicinity.

132 KV sub-station at Matlauda

2.2.11 The planning wing of the Company observed (January 2000) that upgradation of 33 KV sub-station to 132 KV level at Matlauda was not

* Worked out at 10 per cent i.e. minimum borrowing rate from financial institutions.

possible until a 220 KV sub-station was created at Safidon as the existing 132 KV TDLTPS-Safidon line was already over loaded.

Accordingly, the scheme for construction of 220 KV sub-station at Safidon and its associate transmission works, which, *inter alia*, included erection of 132 KV sub-station at Matlauda with two transformers (132/11 and 132/33 KV) was prepared and submitted (August 2001) to PFC. The Company, however, decided (May 2002) to take up construction of the 132 KV sub-station at Matlauda departmentally by delinking it from other works under the scheme. The sub-station was energised with one 132/11 KV transformer in July 2003 by making LILO* of 132 KV TDLTPS-Safidon line for feeding this sub-station. An expenditure of Rs. 3.23 crore was incurred on the erection of the sub-station including LILO arrangement (cost Rs. 90.38 lakh). The scheme including 132 KV sub-station at Matlauda was scheduled for completion by September 2004.

Audit observed that 132/11 KV transformer installed at the sub-station could not be fully loaded as only three (out of six) 11 KV feeders were being operated and that too in groups (alternately) due to feeding constraints. Remaining three 11 KV feeders were being fed from existing 33 KV sub-station which was to be dismantled after upgradation of this sub-station.

Injudicious decision to prepone erection of sub-station resulted in only partial utilisation of sub-station costing Rs.3.23 crore.

Thus, injudicious decision to prepone the construction of 132 KV sub-station at Matlauda by overlooking the feeding constraints had resulted in only partial# utilisation of the sub-station (costing Rs. 3.23 crore).

The management stated (June 2004) that due to heavy load demand and low voltage problems in the area there was great resentment among agricultural consumers and in order to remove this resentment, the Company decided to go ahead with the construction of the sub-station, which resulted in saving in line losses and better voltage. Reply was not tenable in view of the fact that only three out of six feeders were being fed from the newly created sub-station and other three feeders were being fed from existing 33 KV sub-station. As such the claim regarding saving in line losses did not hold good.

132 KV sub-station at Assakhera

2.2.12 A 33 KV sub-station at Assakhera (with installed capacity of one transformer of 5 MVA capacity having 33/11 KV rating) was being fed from 132 KV sub-station Dabwali over a 40 Km long Dabwali – Ganga - Assakhera line. Planning wing of the Company observed (April 2002) that the sub-station at Assakhera faced problem of low voltage due to its lengthy feeding line. The low voltage could be controlled by erecting a separate 33 KV Dabwali-Assakhera line (23 Kms) at an estimated cost of Rs. 60.49 lakh, yet the Company decided (April 2002) to control the low voltage by upgrading the sub-station to 132 KV level at an estimated cost of Rs. 4.61 crore.

* Loop in loop out (It is an arrangement for feeding a new sub-station from an existing transmission line).

Average utilisation was 39 per cent during August 2003 to January 2004.

The Company adopted uneconomical option to overcome the problem of low voltage at Assakhera and incurred extra expenditure of rupees four crore.

For this, a scheme involving construction of 132 KV sub-station Assakhera with one transformer of 16/20 MVA capacity having 132/33 KV rating, 132 KV single circuit Dabwali-Assakhera line and one 132 KV bay at Dabwali sub-station was got sanctioned (September 2003) from NABARD for loan assistance of Rs. 4.14 crore. The works scheduled to be completed by September 2005 were under progress (June 2004). Thus, uneconomical manner of solving the problem of low voltage resulted in additional investment of rupees four crore.

The management stated (June 2004) that with the construction of 132 KV sub-station at Assakhera, the existing line losses of 10.88 lakh units (LUs) per annum would be reduced to 1.53 LUs per annum. In case direct 33 KV line from Dabwali to Assakhera was constructed, the line losses would be reduced to 5.93 LUs per annum and that upgradation of 33 KV sub-station to 132 KV level was a long term solution to cater to increase in load demand.

The reply was not tenable because additional saving in line losses of 4.40 LUs (5.93–1.53) per annum (value Rs 9.11 lakh) by constructing 132 KV sub-station instead of direct 33 KV line was not adequate to meet interest burden of Rs. 32 lakh per annum on extra investment of rupees four crore leaving aside operation and maintenance expenses and depreciation. Further maximum demand recorded at 33 KV sub-station during 2001-02 was four MVA (against installed capacity of five MVA) and load growth in the area was 4.5 per cent per annum. According to planning criteria adopted by the Company, upgradation from 33 to 132 KV level was considered only when the load exceeded 12.5 MVA.

Non recovery of cost of sub-stations from HUDA

2.2.13 The Company issued (November 2000) instructions which, *inter alia*, required that HUDA and other Government agencies would provide land free of cost for new sub-stations and pay expenditure incurred on erection of sub-stations and lines to the Company for electrification of urban/industrial estates developed by them.

Audit observed that the Company constructed two 66 KV sub-stations (Sector 34 and Sector 56) at Gurgaon in HUDA urban estate at a cost of Rs. 6.57 crore during 2001-02. Against this, the Company recovered Rs. 80 lakh by December 2001. Balance Rs. 5.77 crore along with cost of switch house building and allied civil works and feeding line (not intimated by the Company) had not been recovered so far (June 2004) from HUDA. The 66 KV sub-station at Sector 34, Gurgaon was further augmented during 2002-03 by providing one additional transformer at a cost of Rs. 1.20 crore, which had also not been recovered (June 2004). Non-recovery of Rs. 6.97 crore had resulted in interest loss of Rs. 1.27* crore up to March 2004 and recurring interest loss of Rs 69.70** lakh per annum.

* Calculated at 10 per cent being the minimum borrowing rate of interest from financial institutions on Rs.5.77 crore for 2002-04 (Rs. 1.15 crore) and on Rs. 1.20 crore for 2003-04 (Rs.12 lakh).

** Calculated at 10 per cent on Rs.6.97 crore for one year.

On being pointed out in audit, the management took up (June 2004) the matter with HUDA for depositing the cost. The recovery was still awaited (July 2004).

Erection of transmission lines

Delay in completion of lines

2.2.14 In order to evacuate and transfer power from the gas based power plant, Faridabad to Rewari/Dadri areas and for providing relief to heavily loaded Samaypur-Badshahpur line, the Company awarded (March 2000) the work for construction of 220 KV double circuit Palli - Badshahpur line to Tata Projects Limited on supply-cum-erection basis (cost Rs. 4.22 crore) with loan assistance from PFC. The Company was to supply towers for the line. As per terms and conditions of the contract, erection work was to be completed within 15 months (June 2001) of placement of order subject to the condition that the Company would make available towers as and when required by the contractor.

Audit observed that although the scheduled completion period expired in June 2001, yet the line had not been commissioned so far (June 2004). Reasons for delay in completion of the work were as under:

- of the 84 towers required for construction of the line, the Company could supply 50 towers (cost Rs. 1.01 crore) to the contractor during March-August 2001 by procuring from BBMB. The contractor was paid Rs. 4.13 crore during the period from April 2000 to January 2002 for erection of 50 towers and stub setting at 80 locations. The remaining 34 towers could not be supplied by the Company as galvanising plant of its own workshop was closed in February 2000. Due to non-supply of balance towers, the work on the line remained suspended during January 2002 - May 2003. Though the process of selecting the contractor for galvanising could be completed within a reasonable period of six months, the Company took two and a half years in selecting the contractor. The contract for galvanisation was awarded in October 2002 and remaining towers were supplied during June-December 2003; and
- though land under tower location No. 63 to 66 had already been acquired (January 1999) by the State Government for construction of Jail complex, this aspect was not kept in view while finalising (September 2000) the route plan of the line. The route of the line from these towers had to be revised (June 2003) and the Company incurred extra expenditure of Rs. 38.03 lakh on dismantling of already erected towers and their relocation at alternate sites.

Failure of the Company to supply towers resulted in blocking of funds of Rs. 5.14 crore and loss of interest of Rs. 1.50 crore.

The management stated (June 2004) that the line was almost complete and it was likely to be commissioned shortly.

Thus, delay in completion of the line resulted in extra burden of interest of Rs.1.50[#] crore during construction up to March 2004. The delay had also resulted in non-accrual of projected financial benefits of Rs. 1.81 crore per annum by savings in line losses.

2.2.15 With a view to feed 132 KV sub-stations at Chandoli and Chhajpur from TDLTPS (presently fed from BBMB Sewah sub-station), the erstwhile HSEB proposed (1994-95) to erect a 14.8 Km long 132 KV double circuit line at an estimated cost of rupees two crore from TDLTPS to Chandoli which was scheduled for completion during 1995-96. Another estimate for making double bus bar arrangement with bays at 132 KV sub-station Chandoli (estimated cost: Rs. 1.09 crore) was sanctioned (May 1997) by the Chief Engineer (Construction and O&M) Panchkula with scheduled completion within three months (August 1997). The bus bar was required for energisation of the line.

Audit observed that TDLTPS- Chandoli line could not be completed and energised so far (September 2004) despite incurring expenditure of Rs. 4.24 crore on it during December 1995 to December 2003, although bus bar arrangement at 132 KV sub-station Chandoli was completed (September 2002) at a cost of Rs. 2.67 crore. Reasons for delay in completion of the line, as identified in audit, were as under:

- detailed route plan approved (April 1992) by the erstwhile HSEB had to be revised time and again (October 1993, May 1995, July 1997 and May 1998) due to disputes over route of the line; and
- problematic areas en-route the line were not identified during survey of the line. As a result, some land owners of Khukhrana village obstructed (December 2001) erection of six towers and erection work could be resumed (May 2003) after acquiring about one acre patch of additional land.

Delay in completion of line and bays resulted in cost overrun of Rs. 3.82 crore besides loss of interest of Rs. 40.05 lakh on blocked funds.

Delay in completion of the line (eight years) and bus bar (five years) resulted in cost overrun of Rs. 2.24 crore and Rs. 1.58 crore respectively. Besides, Rs. 2.67 crore incurred on erection of 132 KV bus bar with bays was lying blocked since September 2002 due to non-completion of TDLTPS-Chandoli line, resulting in loss of interest of Rs. 40.05 lakh (calculated at 10 *per cent* per annum for 18 months from October 2002 to March 2004).

The management stated (June 2004) that the route of line had to be revised as HUDA and railway authorities planned their works later on and some affected land owners requested to review the route. Accordingly, alternative route plan was prepared.

Calculated on the blocked funds of Rs. 5.14 crore (Rs.1.01 crore + Rs.4.13 crore) during April 2000 to January 2002 at 13 *per cent* rate of interest.

Deficiency in addition of shunt capacitors

2.2.16 Haryana being an agricultural State, bulk portion of power is supplied to agricultural sector and agro based industries. These loads are highly inductive in nature i.e. consume more reactive[@] power due to which voltage level remains quite low. The low voltage causes over loading of transmission lines and transformers and results in increase in system losses. To minimise the reactive power flow in the system, Northern Region Electricity Board^{@@} (NREB) had been emphasising on installation of shunt capacitor banks in the transmission system.

The table below indicates the availability vis-à-vis requirement of shunt capacitors based on studies conducted by NREB at the end of the year during 1999-2004:

Particulars	1999-2000	2000-01	2001-02	2002-03	2003-04
	(Capacity in MVAR*)				
Requirement	2,520	3,080	3,080 [#]	2,992	3,111
Capacitors installed at the year end	1,470	1,830	2,547	2,880	3,269
Addition since previous year	-	360	717	333	389
Capacitors available**	1,250	1,555	2,165	2,448	2,779
Shortfall	1,270	1,525	915	544	332

Shortfall in installation of shunt capacitors resulted in non-reduction of transmission losses to the extent of 1,122.85 MUs valued at Rs. 224.57 crore.

It would be seen from the table that shortfall in the available shunt capacitors ranged between 332 and 1,525 MVAR during 1999-2004. This resulted in non-reduction of transmission losses to the extent of 1,122.85 MUs valued at Rs. 224.57 crore. Audit observed that these losses could have been avoided by spending Rs. 22.79 crore on installation of shunt capacitors in the year of requirement. Besides, the Company had to pay Rs. 4.22 crore as penalty to NREB for excess drawal of reactive power from the power grid during April-September 2003.

The management stated (June 2004) that time available between declaration of requirement and target date of commissioning was insufficient to carry out activities involving identification of rating, location, arrangement of funds, purchase of equipments and testing and commissioning.

The reply was not tenable as installation of shunt capacitors was a continuous process and the Company should have made efforts in advance without waiting for directions of NREB keeping in view the cost-benefit analysis.

[@] Reactive power is part of current flow in the system to be used by electro-magnetic circuits of motors, transformers etc.

^{@@} A body to control and regulate the Northern grid.

* Mega Volt Ampere Rating.

[#] As no study was carried out by NREB, requirement of last year has been taken as requirement for the year.

^{**} 85 per cent of capacitors installed are treated as available as per norms of NREB.

Utilisation of lines

Healthy towers valuing Rs. 81.70 lakh on idle line had not been dismantled.

Idle transmission lines

2.2.17 Dadri-Bhiwani 132 KV line became idle after commissioning of 220 KV sub-station at Bhiwani in the year 1990. This line had 121 towers (estimated cost Rs. 81.70 lakh) along with relevant accessories in good condition. The Company did not take any action to dismantle towers and use them on ongoing works though a number of 132 KV lines were erected by the Company. It was only in June 2003 that the Company decided that the material of Dadri-Bhiwani line after dismantling would be used in erecting 132 KV Dabwali-Assakhera single circuit line. However, it subsequently decided (September 2003) to use new towers for this line. Thus, healthy towers of 132 KV Dadri-Bhiwani line valuing Rs. 81.70 lakh remained erected till date (June 2004) without any utility. During ARCPSE meeting (August 2004) the management assured to issue instructions for use of material of redundant lines within the shortest possible time.

2.2.18 Similarly, Khera-Yamunanagar (15 Kms) portion of 66 KV Khera-Ladwa line became (August 2002) idle after feeding arrangement of 66 KV sub-station Ladwa was made from newly created 220 KV sub-station at Yamunanagar. No action had been taken so far (June 2004) to dismantle the idle line valuing Rs. 17.43 lakh.

The management stated (June 2004) that the line had been retained for emergency use. The reply was not tenable as decision of the competent authority to this effect was not made available to Audit.

Maintenance of sub-stations and lines

Poor maintenance of sub-stations and lines

2.2.19 The Company issued (June 1999) guidelines for preventive maintenance of sub-station equipments and associated protection and control system. Under these guidelines, the staff deployed at sub-stations and lines is required to exercise periodical checks for healthy maintenance of transmission system. The position of maintenance carried out was recorded in the maintenance register placed at respective sub-stations.

The Metering and Protection (M&P) wing of the Company conducted maintenance audit of each sub-station on yearly basis and pointed out the deficiencies to Sub Station Engineer (SSE) and Executive Engineer concerned who were required to comply with the observations immediately.

A test check of records revealed that in 66 sub-stations checked by M&P in north zone during March 2003 to January 2004, 394 observations pointed out in previous checkings were not attended to by the Operation and Maintenance (O&M) wing even after a lapse of one year.

Similarly in south zone, 77 out of 106 observations of serious nature were not attended to and their pendency ranged between one and 13 months.

Non rectification of deficiencies rendered the costly equipments to a greater risk of damage.

Further analysis revealed that such observations included low insulation resistance value of transformers, dehydration of transformer oil/on load tap changer (OLTC) required, change of high set elements/relays required, OLTC panel not operating, lightening arresters to be provided/repared, sluggish/old oil circuit breakers requiring replacement, etc. Non rectification of deficiencies rendered the costly equipments to a greater risk of damage.

The management stated (June 2004) that observations pointed out by M&P wing were attended on priority and wherever required, the matter was referred to concerned authority for compliance. The fact, however, remained that there was abnormal delay in rectification of deficiencies of high risk nature for more than one year.

Inadequate protection system

2.2.20 For proper and efficient running of transmission system, it is necessary that all the systems including protection system are functional which could save the costly equipments from damage in case of any fault in the system. The Company conducted (May 2003) a survey on the protection system in the north zone and the results thereof are tabulated below:

Name of equipment	Number of cases checked	Non-operational/absence of equipment	Equipment in operation	Percentage of equipment in operation
Distance protection schemes	192	131	61	32
Bus bar protection schemes	19	17	2	11
Bus couplers	33	30	3	9

Inadequate and non-operational protection system at sub-stations put the costly equipments at a greater risk of damage.

It is evident that position of protection system at sub-stations of the Company was far from satisfactory and had put the costly equipments at a greater risk of damage.

The Company stated (June 2004) that efforts were being made to rectify/replace the defective protection equipments.

Damage to power transformers

2.2.21 The table below indicates the power transformers installed in the system and damaged during 1999-2004:

Particulars	1999-2000	2000-01	2001-02	2002-03	2003-04
Transformers in the system at the beginning of year (220, 132 and 66 KV rating)	374	399	410	426	449
Transformers damaged during the year (220, 132 and 66 KV rating)	14	16	8	13	11

The Company constituted (February 1999) a committee of three officers to investigate cases of damage to power transformers and report to the management within a fortnight of the date of damage. The committee was reconstituted (January 2000) into two different committees for 220 KV and

The Committee investigated only 29 out of 62 cases where damage of transformers had occurred.

132/66 KV rating transformers. These committees were again reconstituted (June 2000) and two committees for north and south zones were formed. The Company also formed (December 2000) special committees for investigation of damage to 100 MVA transformers. The reports of the committees were to be submitted to the Director (Technical) for consideration and corrective action.

Audit noticed that in 21 out of 29 cases the investigation reports were submitted after delay of four to 418 days. In 33 out of 62 cases where damage had occurred during 1999-2004, investigation was not carried out at all.

Thus, the delayed/non-investigation of causes of damage to transformers defeated the very purpose of constitution of committees and top management was deprived of valuable information on this count for taking corrective action.

The management attributed (June 2004) the delayed/non-investigation to non-receipt of required documents/information from the concerned field units; this indicated poor control and monitoring over field offices. During ARCPSE meeting (August 2004), the management stated that in 50 *per cent* cases, faults occurred due to over straining of the system and analysis would be carried out for taking remedial action.

2.2.22 Analysis of all the 29 investigation reports revealed that damage of transformers was due to repeated trippings and breakdowns on the outgoing feeders (15 cases), development of internal fault owing to internal design and manufacturing defects (eight cases), lack of maintenance and upkeep of equipment (four cases) and human fault (two cases). As damage in most of the cases was caused due to tripping/breakdowns on the outgoing feeders, the Company had not asked the distribution companies to make good the loss caused due to their fault.

Audit observed that the Company incurred Rs. 5.18 crore on replacement of 16 damaged transformers in three circles test checked in audit and incurred Rs. 1.98 crore on repair of 27 damaged transformers during 1999-2004.

2.2.23 One 10/16 MVA, 132/11 KV transformer at 132 KV sub-station Nangal Chaudhary was damaged on 15 January 2003 due to severe fault on 11 KV SBD* feeder near to the sub-station. The investigation report revealed that the operational staff of DHBVNL gave wrong clearance certificate of the line after tripping though conductors of the feeder were found inter-mingled in one span, which resulted in damage of transformer when switched on again. The Company had to spend Rs. 22.52 lakh for replacement and Rs. 13.68 lakh for repair of the damaged transformer. The investigation report alleged negligence on the part of operational staff of DHBVNL. Thus, the Company had to suffer a loss of Rs. 36.20 lakh. The Company had not taken up the matter with DHBVNL for recovery of loss.

* Sahibajpur distributory.

The management stated (June 2004) that matter had been taken up with DHBVNL for fixing responsibility of the official (s) at fault. No action had been taken so far (June 2004).

2.2.24 One 220/66 KV, 100 MVA power transformer was damaged at 220 KV sub-station Madanpur (Panchkula) on 24 December 2002 due to fire. The investigating Committee identified main reasons for damage of transformer as under:

- non-operation of 220 KV breaker due to blowing of fuse on the direct current circuit, which remained unnoticed till the date of accident;
- bus-bar protection, though installed at the sub-station, was not connected;
- bus coupler breakers on 220 KV and 66 KV sides were defective due to poor supervision of O&M supervisory staff;
- the trip alarm bell placed in the transformer relay alarm circuit was lying damaged since 16 December 2002;
- circuit breakers controlling Shahbad-Panchkula line did not operate; and
- periodical inspection and technical audit of the sub-station conducted by M&P team on 5 September 2002 was casual and not in detail as required under the instructions.

One 100 MVA transformer got damaged due to failure of protection system at a sub-station which resulted in estimated loss of Rs. 2.19 crore.

The Company decided (June 2003) to shift the transformer to power transformer repair workshop, Ballabgarh for carrying out detailed inspection of core, coils and residual life analysis. The transformer was, however, not shifted till date (June 2004). Replacement cost of the transformer was estimated at Rs. 2.19 crore.

During ARCPSE meeting (August 2004), the management stated that the detailed investigation of damaged transformer would be made and appropriate action would be taken thereafter.

Conclusion

The main function of the Company was to transmit power to distribution companies through its transmission network. The Company could not achieve its targets for laying transmission lines and addition in transformation capacity. Delay in implementation of transmission schemes/works resulted in cost overruns and non-accrual of envisaged benefits to be achieved through reduction in transmission losses. Inadequacy in installation of shunt capacitors contributed towards non-reduction of transmission losses. Construction of sub-stations without assessing actual requirement resulted in blocking of investment. The maintenance and upkeep of the system was marred by deficiencies, which rendered the costly equipments susceptible to a greater risk of damage.

In order to make optimum use of borrowed funds, project planning and their execution need to be improved to implement the transmission schemes within scheduled time. The maintenance and upkeep of the transmission system need to be strengthened in order to avoid damage of costly equipments and to ensure availability of quality power to consumers.

The matter was referred to the Government in May 2004; the reply had not been received (September 2004).