Chapter III

Performance review relating to Statutory Corporation

Performance review on procurement, performance, maintenance and repair of transformers in Bihar State Electricity Board

Highlights

Mismatch of power transformation capacity with sub-power transformation capacity resulted in over loading of transformers. During 2002-07, against the growth of 53.45 *per cent* in sub-power transformation capacity, the growth in power transformation capacity was only 31.06 *per cent*.

(Paragraph 3.6.2)

Delay in taking decision to allow entry tax on procurement of transformers, resulted in avoidable expenditure of Rs 1.37 crore.

(Paragraph 3.6.3)

Delay in finalisation of tender for procurement of 5 MVA power transformers resulted in extra expenditure of Rs 3.47 crore.

(Paragraph 3.6.4)

Failure of 8,398 transformers in excess of norms resulted in extra expenditure of Rs 14.42 crore on repair during 2003-04 to 2005-06

(Paragraph 3.7)

Due to poor maintenance, the transformer valued at Rs 2.57 crore burnt completely.

(Paragraph 3.8 & 3. 9.4)

Transformer oil and parts valued at Rs 5.68 crore and Rs 45.26 lakh respectively were found missing from the transformers at TRWs for which no action has been taken.

(Paragraph 3.9.2 & 3.9.3)

Delay in finalisation and placing of orders for accessories for repair resulted in avoidable financial commitment of Rs 1.35 crore and an adverse effect on the augmentation programme.

(Paragraph 3.9.5)

Internal control system was not efficient and effective.

(Paragraph 3.10)

Introduction

3.1. Transformer is static equipment used for stepping up and stepping down voltage in transmission and distribution of electricity. Power is usually generated at low voltage (11 KV[1] to 15.75 KV), and then stepped up (132 KV, 220 KV and 400 KV) through power transformers for transmission to load centres. At the receiving sub-stations, the voltage is brought down (132 KV or 11 KV) for supplying power to various consumers. The transformers used at the generating stations and in the high voltage sub-stations (grid-sub-stations)

[1] Kilo Volt

are called power transformers, while transformers used in distribution system are called distribution transformers. Power is distributed to the consumers through transmission and distribution lines, having voltage ranging from 132 KV to 440/220 Volts.

Efficiency of transmission and distribution system depends on the transformation capacity by using transformers of adequate capacities and their proper maintenance.

Bihar State Electricity Board (Board) is headed by a Chairman who is assisted by Member (Finance and revenue), Member (Distribution and R. E.) and Member (Generation and Transmission). Four Chief Engineers at headquarters level and Project Manager, (Technical Services) also assist in executing the functions relating to procurement, performance, maintenance and repair of transformers. Detailed organisational chart is given in **Annexure-19.**

Scope of audit

3.2. A review on procurement, performance, maintenance and repair of transformers in B.S.E.B was featured in the Report of the Comptroller and Auditor General of India for the year 1999-2000 (Commercial), Government of Bihar, which is yet to be discussed by the Committee on Public Undertakings.

The present review conducted during March to May 2007 contains irregularities and deficiencies noticed in test check of records in seven out of 23 circles, three TRWs and Board's headquarters for the years 2002-07, selected on the basis of geographical distribution.

Audit Objectives

3.3. Performance review of procurement, performance, maintenance and repair of transformers was conducted with a view to assess whether:

- procurement of transformers was made conforming to Annual Development plan in accordance with the prescribed procedure and in a transparent, economical, efficient and effective manner;
- there existed an effective system for monitoring the performance of procured transformers with reference to functional manual and its standard life;
- the Board had framed a maintenance policy and ensured its adherence;
- damaged transformers were got repaired in time; and
- the internal control mechanism was efficient and effective.

Audit Criteria

3.4. The audit criteria adopted for assessing the achievement of audit objectives was to check the extent of adherence to:

- Board's procedures for procurement, storage and accounting of transformers;
- terms and conditions of tendering and purchase orders;
- norms fixed by the Ministry of Power for the life of transformers, terms and conditions of transformer repair agreements;
- performance parameters fixed under Statutes and by the Board; and

- norms fixed by Central Electricity Authority regarding Transmission & Distribution losses.

Audit Methodology

3.5. The following mix of audit methodologies was adopted for achieving the audit objectives of the performance review:

- analysis of assessment of requirement of transformers with reference to Annual Material Budget/Annual Development Plan;
- scrutiny of tenders and agreements executed with the suppliers for procurement of transformers;
- verification of the maintenance programme, cause-wise reasons for failure, time taken to repair the failed transformers so as to put them to use in system;
- analysis of cost of repair in Board's workshop and outside agencies;
- examination of agenda and minutes of the meetings of the Board; and
- issue of audit enquiries and interaction with the Management.

Audit Findings

3.6. The audit findings were reported to the Government/Management and discussed (24 August 2007) at the meeting of the Audit Review Committee for Public Sector Enterprises (ARCPSE) which was attended by the Secretary, Energy Department and the Chairman, Bihar State Electricity Board. The views expressed in the meeting have been taken into consideration while finalising the performance review.

The audit findings are discussed in succeeding paragraphs.

Assessment of Requirement/Procurement of Transformers

3.6.1 Assessment of requirement is essential prior to making purchase of any material/equipment to safeguard financial interest of an organisation. On the basis of field's requirements, procurement of transformers (63 KVA to 5 MVA) was made by the CE (Stores & Purchase) on the basis of the requirement of the annual plan for Rural Electrification (RE) Works and for Non-RE Works. In the case of power transformers (20 MVA and above), the requirement is assessed and procured by the CE (Transmission) considering the construction of new sub-stations/augmentation of existing sub-stations by inviting open tenders. On receipt for recommendations for procurement of transformers from the authority competent, as stated above, approval for purchase upto rupees five crore is accorded by the Central Purchase Committee (CPC) and approval for purchase above rupees five crore is accorded by the Board.

3.6.2. The table below indicates the assessed requirements, orders placed, transformers received and expenditure incurred during last five years upto 2006-07.

Year	Requirement of transformers		Order placed for transformers		Transformers received		Expenditure (Rs in crore)	
	Power	Distribution	Power	Distribution	Power	Distribution	Power transformers	Distribution transformers
2002-03	103 (400.7)	7432 (605.26)	Nil	3314 (286.03)	Nil	2,430 (209.61)	Nil	8.74
2003-04	79 (355.8)	9,532 (825.70)	15 (47.25)	625 (49.71)	25 (78.75)	595 (55.98)	1.68	2.28
2004-05	35 (138)	1,489 (76.84)	32 (160)	5,325 (440.41)	12 (60)	3,641 (314.80)	1.20	16.11
2005-06	96 (467.1)	2,711 (269.04)	Nil	2,497 (247.94)	Nil	2,590 (238.12)	Nil	16.67
2006-07	37 (168.4)	1,450 (178.87)	28 (121.5)	827 (73.01)	9 (45)	826 (72.95)	2.66	5.87
Total	**350 (1,530)**	**22,614 (1,955.71)**	**75 (328.75)**	**12,588 (1097.10)**	**46 (183.75)**	**10,082 (891.46)**	**5.54**	**49.67**

Source : Material budget and records of Chief Engineer (Stores & Purchase)
Note: 1. Figures in bracket indicate capacity in M.V.A.
2. Power transformers are of the capacity of 5 MVA and above.

Against requirement of distribution transformers of 1,955.71 MVA capacity, the Board procured 891.46 MVA capacity.

It will be seen from the above that, against the requirement of 1,955.71 MVA capacity of distribution transformers, the Board placed orders for 1097.10 MVA capacity and purchased only 891.46 MVA capacity during 2002-07. As such the purchases made were inadequate to meet the requirement resulting in break down of transformers and interruption of power supply.

Scrutiny of records (May 2007) revealed mismatch in transformation capacity and scrutiny of procurement of transformers further revealed that receipt of transformers was delayed due to delay in issue of dispatch instruction, delay made by suppliers and delay in finalisation of tenders. Besides, there were cases in which higher rates were paid for the same capacity of transformers in different schemes leading to loss to the Board.

Mismatch of transformation capacity

3.6.3 Each segment of transformation system *viz*. power transformation, sub-power transformation, distribution and connected load should match to each other to ensure that neither any system remained idle nor it got overloaded. In this connection the Board had been following norms of operation at 75 *per cent* of installed capacity of transformers installed at GSS[1], PSS[2] and DSS[3] for ensuring safety of transformers and safe passage of electricity. As such the capacity of GSS should be 133 *per cent* of PSS. The table below indicates the year-wise details of sub-power transformation capacity available, power

[1] Grid Sub-station
[2] Power Sub-station
[3] Distribution Sub-station

transformation capacity required and power transformation capacity available for the five years ending 31 March 2007.

Particulars	2002-03	2003-04	2004-05	2005-06	2006-07	Increase during 2002-07 (per cent)
Sub-power transformation capacity available (MVA)	1,845.75	2,171.00	2,544.46	2,555.76	2,832.34	53.45
Required sub-power transformation capacity (MVA)	2,454.85	2,887.43	3384.13	3,399.16	3,767.01	53.45
Power transformation capacity available (MVA[1])	1,899.40	1,909.40	1,909.40	2,169.40	2,489.40	31.06

Source : Figures made available by the Board.

Power transformation capacity was inadequate to match sub power transformation capacity.

It will be seen from the above, that against the growth of 53.45 *per cent* in sub-power transformation capacity, the growth in power transformation capacity was 31.06 *per cent* only which indicated that due to mismatch of transformation capacity the transformers were overloaded resulting in increased expenditure on repair of transformers and loss of revenue. The analysis of distribution capacity and connected load could not be made in audit due to non-availability of connected load in the Board.

The Board, while accepting the facts stated (October 2007) that transmission system in the state is being strengthened on massive scale.

Avoidable expenditure in purchase of transformers

3.6.4 The Board floated open tender (May 2003) for procurement of 6089 distribution transformers of 63 KVA at an estimated cost of Rs 21.93 crore at the rate of Rs 36,021 per transformer. The price was to be quoted indicating therein the ex-factory price, freight element upto destination, excise duty, sales tax and entry tax. Eleven firms (five from outside Bihar and six local SSI units) participated in the bidding process. The lowest landed cost of each transformer was Rs 32,801, offered by Manpur Electric Works Private Limited, Gaya and was inclusive of excise duty, sales tax and freight. All the firms agreed to supply at this rate. The firms from outside Bihar, however, did not agree to supply without entry tax at the rate of eight *per cent* (Rs 2,624). The offer was valid for 365 days from the date of opening the tender (May 2003) and all the firms were ready to supply the transformers within four to twelve months.

It was noticed that the CPC further decided (September 2003) that the payment of entry tax separately, over and above the landed cost, could not be allowed to the firms outside the Bihar. The CPC also decided that these firms should agree to supply at the above mentioned landed cost including entry tax failing which a fresh tender may be invited immediately.

[1] Million Volt Ampere

The outside firms refused to supply without entry tax and accordingly a fresh tender was issued at short notice (June 2004) for 3524 transformers against which, all the five firms (outside State) who had quoted in the earlier tenders responded. Anand Tranformers Private Limited, Faizabad (UP) quoted the lowest landed rate of Rs 39,949.20 per transformer inclusive of entry tax at the rate of eight *per cent* The Board placed orders (August to November 2004) on the five firms for 2204 transformers at the above rate and incurred extra expenditure of Rs 99.71 lakh[1].

The Board incurred extra expenditure of Rs.1.37 crore on procurement of transformers.

Similarly, in case of purchase of 625 transformers of 100 KVA capacity, the Board decided (September 2003) that payment of entry tax separately at the rate of eight *per cent* (Rs 3,431) over and above landed cost (Rs 42,883) (May 2003) would not be allowed to the firms. After the refusal of the firms to supply without payment of entry tax, the Board invited fresh tender for purchase of the same and placed orders (September to November 2004) on three firms for supply of transformers at landed cost of Rs 52,284 per transformer including eight *per cent* entry tax and incurred extra expenditure of Rs 37.31 lakh[2].

Had the Board acted on the earlier offer of the firms and allowed entry tax, extra expenditure of Rs1.37 crore on account of increase in price could have been avoided.

The Board stated (October 2007) that two different rates should not be fixed against one particular tender and thus fresh tenders were invited. The reply is not tenable as payment of entry tax to outside firms does not tantamount to fixation of two different rates.

Delay in finalisation of tender

3.6.5 A tender was floated (November 2002) by the Board for procurement of 32 power transformers of 5 MVA capacity with a delivery schedule of six months

Out of 10 firms, offers of four firms were found technically suitable. Lowest landed price of Rs 10.40 lakh (variable) was quoted by Anand Transformers Private Limited, Faizabad. CPC decided (November 2003) that the firm may be asked to give delivery schedule of a maximum of six months from the date of issue of LOI, (November 2003). The firm, however, requested (November 2003) the Board to accept original delivery schedule of 10 months after two months from receipt of technically and commercially clear order along with approval of drawings. The firm, however, refused to supply (March 2004) due to non-execution of contract agreement beyond schedule of supply offered by it.

The Board cancelled (June 2004) the purchase order and placed order (July 2004) on M&B Switchgear Private Limited, Indore at the same rate. The firm, however, could supply only 11 transformers upto November 2005. A fresh tender was floated (September 2006) for purchase of 18 transformers and purchase order was issued (February 2007) to East India Udyog Ltd. at the landed cost of Rs 29.66 lakh each.

[1] [Rs 39,949.20 – (32,801 + 2,624)}x 2204= Rs 99.71 lakh
[2] [Rs 52,284 – (Rs 42,883 + 3,431)] x 625 =Rs 37.31 lakh

Delay in finalisation of tender resulted in extra expenditure of Rs.3.47 crore.

This resulted in extra expenditure of Rs 3.47 crore[1] which could have been avoided by rescheduling the period of supply as requested by Anand Transformers Private Limited (November 2003). The delay in procurement of power transformers also hampered the objective of enhancing the sub-power transformation capacity.

The Board stated (October 2007) that due to paucity of fund, payment to M&B Switchgear Private Limited, Indore (supplier) was delayed and thus the firm refused to supply further transformers. The reply is not tenable as the Board refused to extend delivery schedule for six months to Anand Transformers whereas it accepted delivery for further two years from M & B Switchgears Private Limited. Besides, the purchase orders should have been placed by the Board keeping in view the availability of fund.

.

Extra expenditure

3.6.6 The work of electrification of villages and construction/augmentation of distribution sub-stations (DSS) are done by the Power Grid Corporation of India Limited (PGCIL) under Accelerated Power Development and Reforms Programme (APDRP) in 11 circles[2] of the Board.

The Board paid Rs.5.23 crore in excess of market rate of transformers.

It was observed (April 2007) that rates of 200 KVA (Rs 1.50 lakh) and 100 KVA (Rs 1.10 lakh) transformers charged by the PGCIL under APDRP were higher than the market rates of Rs 1.20 lakh and Rs 0.75 lakh respectively at which the same were purchased by the Board. This resulted in excess payment of Rs 5.23 crore[3] to PGCIL by the Board up to March 2007 on account of erection of 1,663 transformers of 200 KVA (1184) and 100 KVA (479) capacity.

The Board stated (October 2007) that Power Grid procurement is based on their own procurement policy. The fact, however, remains that the Board made excess payment of Rs 5.23 crore to PGCIL.

Performance of transformers

3.7. The Board had not fixed any norms for permissible limit of failure of transformers. As per norms laid down by the Uttar Pradesh Electricity Board, damage of transformer should not exceed 2 *per cent* of the transformers installed.

The table below indicates the position of damage of distribution transformers during 2002-07. The data relating to Power transformer was not available with the Board. The Board had also not compiled data relating to new and repaired transformers separately.

[1] (Rs. 29.66 lakh- Rs. 10.40 lakh)x18 = Rs. 3.47 crore

[2] Patna, Muzaffarpur, PESU (E), PESU (W), Darbhanga, Rohtas, Gaya, Bhagalpur, Chapra, Purnea, Saharsa

[3] [(Rs.1.50 lakh – Rs. 1.20 lakh) x 1184] + [Rs. 1.10 lakh – Rs. 0.75 lakh) x 479] = Rs. 5.23 crore

Year[1]	Distribution Transformers					Percentage of excess failure over prescribed norms of installed transformers
	Installed at the beginning of the year (Nos.)	Actual failure		Failure as per norms at the rate of two *per cent* (Nos.)	Failure in excess of norms (Nos.)	
		(Nos.)	(*per cent*)			
2003-04	33,429	3,360	10.05	669	2,691	8.05
2004-05	35,028	3,534	10.09	700	2,834	8.09
2005-06	37,513	3,623	9.66	750	2,873	7.66
Total	**1,05,970**	**10,517**		**2,119**	**8,398**	

Source : Records of O&M wing at the Board headquarters

Transformers failed in excess of norm.

It can be seen from the above table that against the norm of two *per cent*, percentage of failure ranged between 9.66 and 10.09 *per cent*. During 2003-06, 8,398 transformers failed in excess of norm resulting in extra expenditure of Rs 14.42 crore (at the average cost of repair, Rs 17,176 per transformer at TRWs).

The Board had not analysed the reasons for failure of transformers. It was, however, observed that overloading and non-maintenance of transformers as per maintenance schedule, was the main reason of failure of transformers.

The Board stated (October 2007) that the transformers burn not due to overloading only but due to many natural factors like weather and climate conditions. The Board further stated that action is being taken to bring the percentage of failure down.

The reply is not convincing. The fact is that if maintenance norms are followed, damages to transformers can be reduced drastically.

Maintenance of transformers

3.8. As per operation and maintenance manual (Manual) of Transmission and Distribution System, the following maintenance was required to be carried out at Circle level in respect of power and distribution transformers already in service for ensuring their smooth working:

- Dielectric strength of transformer oil was to be tested once in a year and was to be recorded in a register for each transformer.
- Level of the oil was to be checked half yearly.
- The condition of silica gel was to be checked every two to three months
- Oil change, if any, was also to be checked.

It was, however, noticed that:

- schedule of maintenance was not prepared at any level in the Board;

[1] The data for the years 2002-03 and 2006-07 was not available with the Board.

- there was no system of feed back of maintenance performed by divisions to Circle/Headquarters of the Board for monitoring and control;
- records relating to maintenance of transformers were not prepared;
- the Board had not prescribed any schedule for inspection of distribution transformers at division level to ensure effective and regular maintenance;

Non-maintenance of transformers contributed to high failure rate of transformers. Some of the cases are discussed below:

Transformer failed due to overloading.

- One transformer of 1.6 MVA capacity installed (August 1985) at PSS Pupri under Muzaffarpur circle failed (March 2004) due to overloading. The transformer was replaced at a cost of Rs 15.35 lakh.

The Board stated (October 2007) that the transformer failed due to natural factor and not to poor maintenance. The reply is not correct as the testing wing of the Board had reported, (March 2004) after due test, that the transformer had failed due to overloading.

Transformer valued at Rs 1.50 crore burnt due to delay in installation of battery.

- For control and protection of Grid Sub Station, healthy Direct Current (DC) system is required without which the operation of GSS is very risky and dangerous. It was noticed (May 2007) that one power transformer of 20 MVA of NGEF make installed (April 1993) in Rafiganj GSS caught fire (November 2005) and was burnt completely. A Committee was constituted (November 2005) to ascertain the reasons of fire and to fix the responsibility. The Committee in its report (January 2006), mentioned that due to continuous fault in feeding through 33 KV Rafiganj feeder owing to faulty DC system, non installation of new set of battery (procured in April 2005) and inoperative protection and control system, fire took place which damaged the transformer. The Committee further stated that it is a case of total system failure when nobody took required sufficient concerted and coordinated effort/persuation to get such important work done. As a result transformer costing Rs 1.50 crore burnt completely. Thus, the Committee clearly established the failure of the officials concerned, yet no action was taken by the Board in this regard.

  The Board while admitting the fact of delay in installing the new battery, stated (October 2007) that required action was taken. The reply is not tenable as the Board failed to take requisite action against the officials at fault.

- One Power transformer of 1.6 MVA installed (December 1992) at Sanahpurdih PSS failed (November 2002). The transformer, after repair was again charged on 22 May 2003. It was observed that reason for failure of transformer was non maintenance, despite repeated instructions of MRT division. This resulted in loss of revenue of Rs 1.12[1] crore besides expenditure on repair.

[1] calculated at average rate of realisation per unit mentioned in Accounts for 2002-03.
(1.6x 0 .75x .90 x 1000 x 24 x 175 x Rs 2.48 = Rs 1.12 crore.

The Board stated (October 2007) that the transformer failed due to natural factors and not due to poor maintenance. The reply is not tenable as the testing wing of Board (MRT) had, after due test report, stated that the transformer failed due to poor maintenance.

Repair of Transformers

3.9. Repair of transformers upto 5 MVA capacity is being carried out by four Transformer Repair Workshops (TRW) situated at Patna, Gaya, Muzaffarpur and Bhagalpur. Transformers of more than 5 MVA capacity are got repaired through private agencies.

The Board had not fixed any norm for fixation of target of repair in TRWs. In absence of installed capacity, same could not be ascertained in audit also. The table below indicates target fixed for repair of transformers and achievement there against during last five years upto 2006-07.

Year	Target	Achievement	Shortfall	Percentage of shortfall
2002-03	3,631	2,463	1,168	32
2003-04	3,641	3,098	543	15
2004-05	3,756	3,294	462	12
2005-06	3,756	3,696	60	2
2006-07	3,950	3,330	620	16
Total	**18,734**	**15,881**	**2,853**	

Source : Returns submitted by TRWs.

It can be seen from the above table that shortfall in achievement against target ranged between 2 to 32 *per cent* during 2002-07 and TRWs could repair 15,881 transformers against target of 18,734 leaving shortfall of 2,853 transformers. Shortfall in repair resulted in shortage of transformers in the system and thus the existing transformer in the system remained overloaded which in turn caused abnormal tripping and failure of transformers.

The shortfall in achieving the target was attributed (May 2007) by the Board to shortage of materials, non receipt of burnt transformers at the TRW and non disposal of scrap at the TRW.

Thus due to failure of the Board to make available the burnt transformers and materials required, targets could not be achieved. Further, non-disposal of scrap materials caused problem of space for repair work and had adverse effect on the efficiency.

Failure of repaired transformers

There was no guarantee clause in agreement for repair of distribution transformers.

3.9.1 Repair of transformers at TRWs is done by private agencies at rates finalised after open tender. Materials required are supplied by the Board and labour charges are paid to the agencies. It was observed (May 2007) that there was no guarantee clause in the agreement executed with the agencies for repair. It was further observed that 204 repaired transformers failed within one year on which Rs 19.05 lakh was incurred on re-repair during five years 2002-07. The expenditure could have been avoided by incorporating guarantee

clause to provide guarantee of one year on repaired transformer as decided by Central Labour Committee of the Board (September 1998).

The Board stated (October 2007) that the repairing is being done under guarantee clause of three months. The reply is not tenable as there is no clause of guarantee in the work order issued to the repairing agencies.

Shortage of transformer oil

3.9.2 On receipt of transformers in TRW for repair, transformer oil is drained out from the transformers for re-use after repair. Details of transformers received, transformer oil receivable and actually received during five years ending 31 March 2007 are as under:

TRWs	No. of transformers opened	Quantity of oil expected to be available (in litre)	Quantity of oil actually available (in litre)	Shortage of oil	Percentage of Shortfall
Patna	7,112	13,91,060	2,74,098	11,16,962	80.30
Gaya	3,576	5,91,849	1,17,963	4,73,886	80.07
Muzaffarpur	3,991	9,49,860	2,72,210	6,77,650	71.34
Total	**14,679**	**29,32,769**	**6,64,271**	**22,68,498**	**77.35**

Source : Records of TRWs.

Transformer oil valued at Rs 5.68 crore found short at TRWs

It will be seen from the above table that percentage of shortfall in recovery of transformer oil ranged from 71.34 to 80.30 *per cent* in three TRWs and on opening of 14,679 transformers, 22,68,498 litres of transformer oil was found short. The shortage was made up by purchase of new oil valuing Rs 5.68 crore at the rate of Rs 25,035.26 per kilo litre with consequential loss to that extent to the Board. The Board had not investigated the reasons for shortages to fix the responsibility for the same.

The Board instead of giving specific reasons for the loss of transformer oil in its reply, cited (October 2007) many probable reasons for shortage of transformer oil. The Board, however, did not state whether any action had been taken to reduce loss of transformer oil.

Loss due to missing parts of transformer

3.9.3 As per procedure, defective transformers received at TRWs for repair are required to be inspected physically before sending for repair and an inventory report of the parts available is to be prepared.

During test check of records of three TRWs, it was observed that at the time of receipt of transformers some parts were found missing. Year-wise details of missing major parts during last five years up to 2006-07 were as below:

Year	H.T. bushing	H.T. fittings	L.T. fitting	L.T. bushing
2002-03	2,023	2,946	3,477	3,408
2003-04	2,504	3,408	4,266	4,152
2004-05	2,430	3,499	4,180	4,144
2005-06	2,813	4,052	4609	4,702
2006-07	2,429	3,644	4,296	4,272
Total	12,199	17,549	20,828	20,678
Rate (Rs Per piece)[1]	78	46	67.33	66
Amount (Rs)	**9,51,522**	**8,07,254**	**14,02,349**	**13,64,748**

Source : Records of TRWs.

[1] Rate is based on average of the rates during 2002-07.

Major parts of Transformer valuing Rs 45.26 lakh were missing.

It can be seen from the above table that four major parts valued at Rs 45.26 lakh were missing (2002-03 to 2006-07) but no action was taken by the Board to analyse the reasons.

It was observed that there was no system to transfer defective transformers immediately to stores/workshops and transformers remained at site in defective condition for long period. This made theft of parts and transformer oil easy. Thus, due to inadequate monitoring of defective transformers the Board sustained loss of Rs 45.26 lakh.

The Board instead of giving specific reasons for the loss of missing parts in its reply, cited (October 2007) many probable reasons for damage of parts. The Board, however, did not state whether any action had been taken to prevent these losses.

Failure of 100 MVA, 220/132/33 KV Power transformers due to negligence.

3.9.4 One Power transformer of 100 MVA installed and commissioned at Fatwah Grid Sub-Station (December 1989) tripped (April 2002). With a view to rehabilitate the transformer, a Committee was formed by the Board (June 2005) for going into details of defects developed in the transformer and technical proposal for its rehabilitation. The Committee in its report (June 2005) stated that the main reasons for tripping were (i) deteriorated condition of transformer oil in the transformers concerned and violation of many parameters, such as BDV[1], Specific Resistivity, Tan-delta, ppm and presence of carbon Mono-oxide gas, (ii) worn out gaskets, *etc*.

Negligence in maintenance led to financial burden of Rs1.07 crore.

For repairing the above Power transformer one N.I.T. was issued (July 2005) and on the basis of final negotiated rate, offer of Aditya Vidyut Appliances Limited was approved (May 2006) at a cost of Rs 1.07 crore.

Thus, negligence on the part of the Board in maintenance, led to tripping of the transformer and avoidable financial burden of Rs 1.07 crore. Besides, due to non-repair of the transformer, Patna and its adjoining areas are facing power crisis (October 2007).

The Board stated (October 2007) that the transformer is lying with outside agency for repair. No reply has, however, been given by the Board regarding poor maintenance as pointed out be the Committee.

Avoidable loss of Rs 1.35 crore due to failure to get Power Transformers repaired as per agreement with the repairer firms.

Delay in taking decision caused additional financial commitment of Rs1.35 crore.

3.9.5 On the basis of the open tender (December 1999), the Board placed three work orders (September/October 2000) on three firms[2] for repair of eight Power transformers (50 MVA- five numbers and 20 MVA- three numbers). The Board, in order to avoid mismatching of accessories in the transformers to be repaired, invited (May 2000) quotations from these repairer firms for supply of needed accessories. Item wise lowest rates, were approved, however, the Finance wing of the Board desired (September 2000) that fresh tender should be called for. Tenders were invited on 13 June 2001. Tender opening

[1] Break Down Voltage

[2] Kanohar Electricals Limited, Mumbi, Aditya Vidyut Appliances Limited, Mumbai and Tarapur Transformers Limited, Mumbai

date was extended twice (July and October 2001). Due to poor response, re-tender was also called (January 2002). It was observed that despite tender and re-tender, decision in respect of procurement of the accessories could not be taken and the Board finally decided (December 2003) to place orders with the three repairer firms, from whom quotation were obtained initially (October 2000), for supply of needed accessories for the Power transformers under repair. During the period December 2003 to April 2005, two transformers were repaired and thereafter the two repairers (Konohar Electricals Limited and Aditya Vidyut Appliances Limited), on whom orders were placed refused to repair defective transformers due to price hike during the last five years (April 2005). The Board placed orders (July 2005) on these firms for repair of remaining six power transformers. Comparative rates for repair of transformer finalised in September/October 2000 and July 2005 are tabulated below:

Particulars	Final negotiated rate		Rs in lakh	
	September/ October 2000	July 2005	Additional expenditure	
			Per transformer	For three transformers
Net repairing cost of 1 no. 50 MVA Power transformer	39.07	65.91	26.84	80.52
Net repairing cost of 1 no. 20 MVA Power transformer	25.13	43.15	18.02	54.06
Total	**64.20**	**109.06**	**44.86**	**134.58**

Source : Records of Chief Engineer (Transmission), Board headquarters.

Though the orders for repair of transformers were placed (July 2005), the transformers are yet (October 2007) to be repaired. Due to inordinate delay in taking decision by the Board in finalisation and placing orders for accessories with the repairers, six power transformers (50 MVA- three number and 20 MVA- three number) could not be repaired despite tendering and signing of agreements between the Board and the repairers. This, adversely affected the augmentation programme and caused avoidable financial commitment of Rs 1.35 crore.

The Board stated (October 2007) that the delay appears to be due to abnormal situation. The reply of the Management shows total lack of professional approach as abnormal situation is a creation of the Board itself.

Delay in repair

3.9.6 One 100 MVA Auto transformer[1] of Crompton Greaves Limited (CGL) make costing Rs 25.95 lakh failed (30 January 2000) at GSS Dehri-On-Sone. The transformer was tested (February 2000) by the service engineer of CGL who recommended (February 2000) replacement of OLTC[2] unit and overhauling of transformer.

[1] Serial number T-7866/24081
[2] On Load Tap Changer

100 MVA Transformer was lying unrepaired for more than seven years.

A PO was placed on CGL (May 2000) for replacement of OLTC and site service including filtration of transformer oil at a cost of Rs 25.95 lakh. CGL fitted (September 2001) the OLTC and recommended (September 2001) that the gasket should be replaced to arrest the oil leakage. But gasket was not made available by the Board for replacement. The transformer was charged (30 December 2001) by the CGL but was immediately taken under shut down due to oil leakage. After plugging the leakage by applying M. Seal, the transformer was again charged (4 January 2002) but it again tripped within two minutes. On testing, (January 2002) the barrier board of OLTC was found broken. The transformer is still lying unrepaired (October 2007). The Board neither took any action against the repairer nor the transformer was got repaired from other agencies.

The Board stated (October 2007) that action has been taken to bring back the transformer into order. The reply is not tenable as the transformer is still lying unrepaired since last seven years.

Loss due to non-disposal of scrap materials at various Transformer Repairing Workshops and Central Stores.

Delay in disposal of scrap led to non realization of Rs.1.14 crore.

3.9.7 As on 31 March 2006, huge quantity of scrap materials comprising unserviceable transformers (312), burnt transformer oil (14,327 litres), Aluminium DPC scrap (246.99 MT), empty oil drums (2,444), were lying undisposed in various TRWs and Central Stores. These scrap materials have not been physically verified and the security arrangements for their safety were inadequate due to which several events of theft of scrap took place and the exact assessment of resultant loss could not be made. Due to lack of effective measures by the Board, the scrap materials were lying undisposed for more than four years. For disposal of 159.512 M.T. scrap Aluminium Winding wire (retrieved from damaged transformers lying at TRW stores, Patna, Gaya, Muzaffarpur and Central Store, Gaya), tender (October 2003) was opened on 27 November 2003. Out of the four tenderers who participated in the tender, the rate offered (Rs 71.60 per Kg) by one tenderer, Soni Engineering Company, Kako Road, Jehanabad, Bihar was higher than the reserve price (Rs 65.17 per Kg) fixed by the Board. Due to inordinate delay in concluding the proceedings for declaration of stores as surplus and unserviceable, the tender could not be finalised even in one year time. As a result, the tender was cancelled (15 November 2004). It was observed that earlier also two tenders for disposal of some materials were invited (July and August 2002), but the tenders could not be finalised and had to be cancelled due to indecision on the part of the Board.

Thus, due to not taking the decision by the Board, 159.512 M.T. scrap Aluminium Winding wire could not be disposed of despite the willingness of tenderer to lift the scrap materials above the reserve rate fixed by the Management. Quantity of scrap as on 31 March 2006 accumulated to 646.799 M.T. Had the Board acted judiciously, it could have realised an amount of Rs 1.14 crore[1] as quoted (October 2003) by the highest bidder (Soni Engineering Company, Jehanabad, Bihar).

[1] (159.512 MT x Rs. 71,600 per MT) = Rs. 1.14 crore

The Board while accepting the delay stated (October 2007) that 232 M.T. of scrap has been disposed off.

Leakage of transformer oil

3.9.8 Two transformers of 20 MVA capacity each were installed (1989) at Dumraon Grid Sub-station. Both the transformers had problem of leakage of transformer oil. One transformer, after leakage of 120 drum transformer oil, was kept under shut down condition whereas second transformer was in running condition despite leakage of oil. It was observed that up to 2005-06, transformer oil valued at Rs 11.70 lakh was wasted. Besides, the transformers were kept under shut down for 2.06 lakh hours resulting in loss of potential revenue of Rs 5.09 crore. It was further observed that there was leakage of transformer oil valued at Rs 50.42 lakh in four circles•.

Board failed to prevent leakage of transformer oil in time.

The Board stated (October 2007) that gasket had been replaced and the transformer had been brought back in service. Reply is not tenable as due to delay, Board sustained loss of Rs 5.20 crore. Moreover, no reply for leakage in other circles was given by the Board.

Internal Control

3.10. Internal control is a management tool to provide reasonable assurance that the organisation fulfills accountability obligations, carries out orderly and efficient operations, safeguards assets and discloses reliable financial data through timely reporting. Internal control includes budgetary control, accounting control, cost control, periodic operations report, statistical analysis and internal audit.

Internal control was not effective in the Board.

Effective internal control requires proper management information system. The following deficiencies were noticed in this regard.

- Basic records such as census of transformers, transformers history card were not being maintained either in the field or at the headquarters.
- Data of connected load is not available with the Board. As a result, required capacity of PSS could not be planned.
- The MIS was not effective in the Board.

The Board stated (October 2007) that data is available with the board. It was also stated that connected load is compiled every year.

The reply is not tenable as the Board in its accounts for 2002-03 and onwards has been mentioning that connected load is not available and despite repeated requisition by Audit, figures/data were not made available. Further, the BSERC had observed ineffective MIS in the Board.

The above matters were reported to the Government (July 2007); the reply is awaited (October 2007).

Conclusion

Performance of the Board with regard to procurement, maintenance and repair of transformers was found to be deficient due to lack of adequate

•Transmission Circles Muzaffarpur, Gaya, Bhagalpur and Purnea

planning and economy in procurement. No account of transformers procured, issued and commissioned was ever maintained by the Board. The Board did not have any system of maintaining details of transformers and analysing failure rate and monitoring maintenance schedule. Periodical maintenance of power and distribution transformers was not carried out resulting in high failure rate of transformers. The transformer repair workshops failed to achieve target of repair of transformers. Monitoring and internal control was not effective in the Board.

Recommendations

The Board needs to:

- **prepare realistic plan and maintain economy and efficiency in procurement of transformers and ensure quality along with fixing life of transformers;**
- **conduct census of transformers to monitor commissioning, physical existence and performance of transformers;**
- **ensure adherence to the maintenance schedule;**
- **evolve schedule of repair of transformer to get the failed transformers repaired expeditiously;**
- **ensure effective monitoring and internal control systems;**
- **take preventive measure against theft of transformer oil and parts.**