CHAPTER II

2 Performance reviews relating to Government companies

Karnataka Road Development Corporation Limited

2.1 Implementation of the project of four-laning of Bangalore – Mysore State Highway

Highlights

The project of four-laning of Bangalore - Mysore road was taken up (2004) in five packages at a cost of Rs. 641.68 crore. The decision of the Government to implement the Bangalore – Maddur (BM I & II) package on annuity basis was not economical as it resulted in extra liability of Rs. 17.43 crore as against the option of executing the package through bank loans.

(Paragraph 2.1.8)

The Company had not identified the revenue sources to meet the annual liability of Rs. 59.20 crore (annuity) and loan repayment (HUDCO: principal: Rs. 10.96 crore and average interest of Rs. 4.97 crore); instead it solely depended on the budgetary support of the Government.

(Paragraph 2.1.8)

Though the project work was opened for commercial operation in June 2006, the Company / Government had not been able to levy and collect user fee as Karnataka State Highway Act is yet to be amended and the probable revenue foregone was Rs. 18.30 crore till date (July 2008).

(Paragraph 2.1.8)

The Detailed Project Report was deficient in terms of determination of quantities and nature of items of work, adoption of correct nature of sub-soil, technical specification, number of cross drainage works to be constructed, quantum of road reconstruction and allowance of additional transportation charges which resulted in additional / extra expenditure of Rs. 29.81 crore.

(Paragraph 2.1.10)

Deficiencies noticed in implementation of project included non-reduction of annuity on account of reduction in capital cost (Rs. 7.34 crore), non-adjustment of reduction in work contract tax in BM III package (Rs. 2.13 crore) and non-adjustment of reduction in taxes on bitumen (Rs. 0.85 crore).

(Paragraphs 2.1.18 to 2.1.21)

The Company had not evolved a feedback system to assess the achievement of the project objectives of reduction in travel time and fuel cost.

(Paragraph 2.1.24)

Introduction

2.1.1 The Karnataka Road Development Corporation (Company) was established in July 1999 by the Government of Karnataka to take up development programme of roads, bridges and other related infrastructure works connected with surface transport. The Company is headed by Managing Director who is assisted by Chief Engineer, Superintending Engineer and other technical staff at head office and four[29] divisional offices.

The Bangalore - Mysore road was a two lane State Highway (No.17) of 141 kilometres. It was proposed (2001) to widen the existing two lane into four lane (divided carriageway) to accommodate the present and projected traffic volume for 15 years. The four laning envisaged considerable reduction in travel time between two cities apart from benefits in terms of accident reduction and savings in fuel and vehicle operation cost.

The Project for four laning this road was taken up (2004) in five packages at a cost of Rs. 641.68 crore to be completed by April / May 2006. While the Bangalore –Maddur and Maddur – Mysore packages were completed and opened to traffic in June and November 2006 respectively, two incidental[30] packages were completed later (January 2007 / May 2008) and only one incidental[31] package is pending completion (July 2008). The Road has been opened to traffic since November 2006. The expenditure incurred till date (July 2008) on the project was Rs. 624.51 crore.

Scope of audit

2.1.2 Performance Audit was conducted between January and February 2008 covering project planning, financing, award of consultancy and construction works, and execution of all five packages (contract value : Rs. 641.68 crore) in the implementation of four-laning of Bangalore – Mysore State Highway. The project executed during 2001-2008[32] was covered in audit by test check of records in the head office of the Company and the Special Land Acquisition Offices at Bangalore and Ramanagaram. All the five packages under which the project was executed were reviewed in audit.

[29] **Gulbarga, Hassan, Hubli and Mysore.**

[30] **improvements to the existing four lane in Ramanagaram and Channapatna town limits and improvements to the existing four lane in Mandya Town.**

[31] **grade separator at Kengeri.**

[32] **though, the project was open to traffic in June/November 2006, the works in Mandya, Ramanagram, Channapatna and Kengeri town limits was taken up during 2007-08.**

Audit objectives

2.1.3 The audit objectives were to ascertain whether:

- the management took up the work of implementation of the project after detailed planning, surveys and investigations;
- critical components of project management and implementation like land acquisition and cash flow were initiated and carried out before incurring contractual liabilities;
- the management devised and put in place transparent system for contract documentation, bid invitation, bid evaluation and award of works;
- contract management facilitated enforcement of the terms of contract to ensure economy and efficient execution of works; and
- internal control system of the Company was sensitive to large variation between the estimated and actual quantities of work and the management had put in place a feedback system to ascertain the achievement of the objectives.

Audit criteria

2.1.4 The following criteria were used for audit evaluation:

- programme objectives and targets;
- compendium of Notifications issued by Ministry of Shipping, Road Transport and Highways (MORTH) and MORTH specifications on construction of roads, Publications of Indian Road Congress (IRC); and
- road traffic census data, Consultancy Reports, Detailed Project Reports (DPRs), minutes of Technical Committee and Board of Directors of the Company.

Audit methodology

2.1.5 The audit methodology adopted for achieving the audit objective with reference to audit criteria of the performance review relating to implementation of the project was based on the review and scrutiny of records at the head office of the Company such as DPRs, tenders, agreements, minutes of Technical Committee and Board of Directors, quality control / assurance test reports, work bills, project consultancy reports, completion reports *etc.,* besides interaction with the Management and issue of audit enquiries.

Status of the project

2.1.6 The project road was divided into five packages. Package (BM I & II) was taken up on annuity basis through a consortium, while the other four packages were taken up on Engineering, Procurement and Construction (EPC) contract. The cost and status of the project are indicated below **:**

Package and Project Road	Designed / tendering by	Executed by	Project Management consultants	Contract Value (Rs. in crore)	Actual value (Rs. in crore)	Date of commencement	Due date of completion	Actual date of completion	Time overrun (in No. days up to 31 July 2008)
BM I & II (package) from Bangalore to Maddur Km. 11.600 to 45.470 Km. 51.200 to 59.600* Km. 62.100 to 82.500	Span Consultants Private Limited for design and iDeCK for tender evaluation	Brindavan Infrastructure Company Limited (a consortium[33])	LEA Associates South Asia Pvt. Ltd	475.20 (188.00 base cost *plus* maintenance cost)	475.20 (liability)	22-4-2004	21-04-2006	30-06-2006	97
BM III (package) from Maddur to Mysore Km. 82.500 to 97.200 Km. 101.00 to 135.35		Soma Enterprises	Construction Engineers Limited	118.60	117.33	06-5-2004	05-05-2006	30-11-2006	209
Improvements to the existing four lane in Ramanagaram and Channapatna town limits Km. 45.400 to 51.200* Km. 59.400 to 62.300	Not applicable	KMC Constructions Limited	LEA Associates South Asia Pvt. Limited	13.68	15.41	19-12-2005	18-03-2006	31-01-2007	319
Improvements to the existing four lane in Mandya Town Km. 97.200 to 101.00			Construction Engineers Limited	11.21	8.02	9-3-2007	8-12-2007 (extended up to 15-02-2008)	31-05-2008	104
Grade separator at Kengeri	Not applicable	Nagarjuna Constructions Limited	SM Bhobe and Associates	22.99	8.55	29-5-2006	29-08-2007 (extended up to 30-6-2009)	work is under progress	under progress
Total				**641.68**	**624.51**				

***four lane road exists in the intermittent stretches.**

Audit findings

2.1.7 Audit findings arising from the performance review were reported (June 2008) to the Government / Management and were discussed (3 July 2008) in the meeting of Audit Review Committee on Public Sector Enterprises (ARCPSE). The meeting was attended by the Principal Secretary to the Government of Karnataka, Public Works Department, the Managing Director of the Company and Technical Member from the State Government. The replies furnished (April / July 2008) by the Management, the views expressed by the representatives of the Government / Management in ARCPSE meeting and confirmation of minutes by Government in August 2008 have been taken into consideration while finalising the review.

The audit findings are discussed in the succeeding paragraphs:

[33] **a consortium of KMC Constructions Limited, Nagarjuna Constructions Company Limited and MYTAS Construction Company Limited.**

Project funding and Financial management

2.1.8 The Project was taken up in five packages at a cost of Rs. 641.68 crore, of which Rs. 475.20 crore related to Bangalore – Maddur package which was taken up on annuity basis (payable bi-annually over a period of eight years). The annuity liability is met out of budgetary support of Government of Karnataka. The Maddur - Mysore package with contract cost of Rs. 118.60 crore, was by line of credit (LOC) facility (at 8.25 *per cent* per annum as interest) with HUDCO, which was guaranteed by the State Government. The other three packages (incidental works) connected with Bangalore – Mysore four laning with contract value of Rs. 47.88 crore were taken up with Government grants / HUDCO loan.

Audit observed the following:

- Bangalore – Maddur package was not economical as the Company had taken up many road projects with borrowed funds from HUDCO including the Maddur – Mysore package. Had the Company executed the Bangalore – Maddur package on borrowed funds from HUDCO, the total cash outflow would have been Rs. 457.77 crore, instead of the implementation on annuity basis which caused a total liability of Rs. 475.20 crore resulting in extra liability of Rs. 17.43 crore[34]

  The Government stated (August 2008) that the work was executed under annuity basis as per the Government order and the Company had utilised its borrowing limits (with government guarantee) for the year. The Government also stated that the total cost would work out to Rs. 487.43 crore considering a tender premium of 10 *per cent* and interest rate of 10 *per cent.* Audit observed that even considering rate of interest of 10 *per cent* on the estimated cost, the option to go for HUDCO loan worked out to Rs. 457.77 crore as detailed in **Annexure 9.** Moreover, the work was to be executed in two years 2004-05 and 2005-06 and overall guarantee limits were also not exceeded in these years.

The Company had not identified the revenue sources, instead it solely depended on the budgetary support of the Government to meet the annual liability of repayments.

- the Company had not identified the revenue sources to meet the annual liability of Rs. 59.20 crore (annuity) and loan repayment (HUDCO: principal: Rs. 10.96 crore and average interest of Rs. 4.97 crore), instead it solely depended on the budgetary support of the Government.
- the Company had not identified the sources to meet the inherent additional financial burden of Rs. 3.48 crore[35] up to 2007-08 towards guarantee fee payable to the State Government and recurring annual liability of one *per cent* on outstanding guaranteed loans.

The Company delayed taking up the matter of toll collection with the Government.

- the Company failed to address PWD / Government for levy and collection of toll on the roads constructed till date (June 2008) and the

[34]excluding Rs. 15.80 crore revenue that could have been earned by the Company (at eight *per cent*) on Rs. 44 crore (Rs. 29 crore *plus* Rs. 15 crore) investment of unutilised portion of costs of Bituminous macadam layer and maintenance.

[35]Rs. 17.07 lakh (2004-05), Rs. 89.80 lakh (2005-06), Rs. 1.26 crore (2006-07) and Rs. 1.15 crore (2007-08).

probable revenue foregone worked out to Rs. 18.30 crore[36] for the period November 2006 to July 2008. The Management stated (April / July 2008) that it requested (September 2005) the Government to amend[37] the Karnataka State Highway Act in order to enable it to collect toll. The Government stated (August 2008) that a viability report for service roads / underpass was prepared, so that toll collection could be made, but it was found that land acquisition cost was high. The Government also stated that there was also an expressway coming up in the corridor and this may become a restriction, but stated that if the project is viable for toll collection, the matter would be taken up. The fact remained that the Company had not taken up the matter with the Government at the stage of the project conception.

- The Company had not explored revenue generation through advertisement / hoarding or other commercial activity on the project road till date (July 2008).

Project planning

Detailed Project Reports

2.1.9 Preparation of accurate and realistic DPR for highway projects is critical to planning. The State Government directed (January 2000) the Company to take up the work of major maintenance and strengthening of the two lane road. The Company entrusted (July 2000) the work of preparation of DPR for the major maintenance and strengthening of Bangalore - Mysore road with two lane road to Span Consultants Private Limited for Rs. 91 lakh which included Rs. 45 lakh for design and Rs. 46 lakh for construction supervision. The DPR was prepared and submitted in February 2001 and Rs. 45 lakh was paid. The estimated cost for maintenance and strengthening of the two lane road was Rs. 126 crore. The Board of Directors decided (February 2001) to undertake survey of the four laning of Bangalore - Mysore Road. The same consultant was entrusted (August 2001) with four-lane work at an additional contract price of Rs. 79.80 lakh through supplementary agreement. The consultant submitted (January 2003) the revised DPR with an estimated project cost of Rs. 307.20 crore[38] and target date of completion as April / May 2006.

Audit observed that while entrusting the work of preparation of DPR for the major maintenance and strengthening of Bangalore - Mysore road with two lane, the Company was aware that stretches in three town limits (13 kilometres approx) were already four-laned (1999-2000) by another Government Company (KUIDFC). As such, the DPR consultant should have been directed to prepare four-lane DPR in the first instance itself. By not doing so, the Company had to incur Rs. 45 lakh on the DPR of two lane, which had become wasteful.

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[36] **at an average fee of Rs. 25 per vehicle based on user charges levied for other roads (National highway) in the State and projected average annual daily traffic of 12,197 (least traffic) vehicles (12,197*30 days * 20 months *Rs.25).**

[37] **as per Section 48(a) of the Karnataka State Highway Act, there is a provision to collect toll on bridges, causeways and tunnels only.**

[38] **Rs. 188 crore for BM I & II and Rs. 119.20 crore for BM III packages.**

Deficiencies in estimate

The DPR was deficient.

2.1.10 Audit scrutiny revealed (February 2008) that the DPR finalised by Span Consultants Private Limited was deficient in terms of determination of quantities and nature of items of work, adoption of correct nature of sub-soil, technical specification, number of cross drainage works to be constructed, quantum of road reconstruction and allowance of additional transportation charges resulting in additional / extra expenditure of Rs. 29.81 crore as indicated in the succeeding paragraphs.

Finalisation of estimate not based on site conditions

2.1.11 The DPR consultants while finalising the estimates failed to undertake proper survey of the existing conditions of the road and minor bridges and culverts and also to include necessary items of lane markings on the edges of the carriage way. Therefore, while implementing the project, the variation in scope of these works ranged between 21 and 707 *per cent* resulting in additional expenditure of Rs. 21.79 crore as given in **Annexure 10.**

The Government stated (August 2008) that in some works like bridges and culverts, it was not possible to estimate correctly, as actual examination would depend on site conditions. The Government, however, accepted that there was a need to fix a penal clause for variations beyond a certain percentage to be arrived at for each contract in future.

Adoption of incorrect test results of sub-soil

2.1.12 The Indian Road Congress guidelines (IRC: 37-2001) specify the designs of pavement and overlays. According to these specifications, the thickness of the pavement and over layers is to be designed depending upon the California Bearing Ratio[39] (CBR) value of the sub-soil and the proposed cumulative Million Standard Axle (MSA)[40] for designed life. The consultants adopted a CBR value of 10 in Bangalore - Maddur package (BM I & II), but adopted a CBR of eight in Maddur - Mysore (BM III package). This reduction in BM III resulted in usage of 14,719.07 cum of bituminous macadam / dense bituminous macadam in excess of IRC design specifications and consequential extra expenditure of Rs. 3.93 crore (at Rs. 2,668 per cum).

While confirming to the minutes of the ARCPSE meeting, the Government stated (August 2008), that in Bangalore - Maddur package (BM I& II) one more renewal of surface after five to six years would act as additional thickness as by then traffic volume would reach the design traffic, whereas in Maddur - Mysore package (BM III), the additional thickness was given at once, considering the safety of the road and providing additional layer after three-four years would be costlier. The Government further stated (July 2008), that such stage provisions of providing present thickness or providing for design life at once were not a deviation from relevant IRC codes. The reply is not acceptable as it is a single road executed under two packages. Hence, both safety and design traffic are to be considered for the road as a

[39] a penetration test for evaluation of the mechanical strength of road sub-grades.
[40] represents a count on the vehicular (axles) movement on the road.

whole, and the pavement thickness is to be determined by reckoning the factual values for various parameters prescribed by IRC guidelines.

Avoidable expenditure due to provision of tack coat over prime coat

2.1.13 A bituminous pavement is a multi-layered structure, generally made up of surface base, sub-base and sub-grade. The boundary between any two consecutive layers is the layer of interface. Tack coat comprising thin layer of bitumen is applied at the interface to provide adequate adherence between the layers and laid between bitumen macadam and bitumen concrete. Prime coat is applied on the surface of granular base before laying bituminous surface course. Therefore, application of tack coat over primed granular base is superfluous as the prime coat takes care of bonding the interface. Audit observed that the consultants made provision for 513 MT of tack coat in addition to prime coat in the estimates of the project road in BM I & II and BM III packages, and the works were executed accordingly. Incorrect provision of tack coat in the estimates resulted in execution of 470.92 MT of this item of work and the consequential avoidable expenditure was Rs. 1.46 crore[41].

The Management / Government stated (July / August 2008) that as per the MORTH specifications, prime coat is provided over granular base / bituminous macadam layer and that tack coat should be applied over it and that the same was the usual procedure adopted for road construction. The Government, further, accepted that there were practical problems in laying the fresh road within 48 hours. The reply is not acceptable as MORTH specifications provide that the contractor shall provide and maintain at his own cost, during execution of the work, a passage for the traffic without hindrance to the work in progress. As these conditions are embodied into the agreement and the contractor would have quoted his rates accordingly, the Company was bound to enforce the contractual obligations to ensure the completion of works within forty-eight hours.

Increase in cost due to allowance of transportation charges for excavated materials re-used in work

2.1.14 The DPR of BM I & II package provided for earthwork excavation in all types of soil for roadway of 9.88 lakh cum at estimated rate of Rs. 50 per cum, which included excavation, loading, unloading and transportation charges for the disposal of excavated material with lead of five kilometres. The DPR also provided for construction of 5.29 lakh cum of embankment, sub grade and median with material available from roadway excavation at an estimated rate of Rs. 69 per cum, which included Rs. 43.25 per cum towards excavation, loading and unloading with lead of five kilometres.

Similarly, the DPR of BM III package provided for earthwork excavation in all type of soil for roadway of 5.01 lakh cum at the estimated rate of Rs. 82.90 per cum which included lead charges of Rs. 42.90 per cum for disposing the excavated material with lead of five kilometres. The accepted tenderer had quoted the rate of Rs. 28 per cum as against estimate rate of

[41] for BM I & II -Rs. 1.11 crore (as per estimate) and for BM III Rs. 0.35 crore (actuals).

Rs. 82.90 per cum. The earthwork excavation of 2.83 lakh cum was executed and payment at the rate of Rs. 28 per cum was made. Out of the excavated soil, 2.37 lakh cum was utilised for construction of road embankment and shoulders and only the balance excavated soil of 0.46 lakh cum was disposed.

Thus, inclusion of charges for excavation, loading, unloading and transportation of excavated material to be re-used in construction of embankment, sub grade and median resulted in increase in the cost of the project by Rs. 2.63 crore[42].

In the ARCPSE meeting (July 2008), the Management accepted to look into the matter and effect necessary recoveries. The Government (August 2008) stated that excavation and embankment cannot be tackled simultaneously, because existing road had to cater to traffic without blocking many stretches at a time. The reply further stated that quotations of bidders were based on actual site conditions and work to be done and not on estimate / rate analysis. The reply is not acceptable as embankment and excavation is generally done simultaneously in different stretches and the excavated material required for embankment could be directly transported from excavation reaches, instead of dumping it in an alternative spot and transporting it again from that spot to embankment site. Further, the 'estimated cost' is a factor in annuity package (BM I & II) as this is the base cost considered by the bidders for their quotation and including the transportation cost (twice) in estimate increased the bid amount**.**

Award of Packages

2.1.15 The project consists of five packages, which included two construction packages (BM I & II and BM III) and three packages for improvement of road in town limits. The works were awarded on open tender basis at a total cost of Rs. 641.68 crore. The improvement works to four lane roads in Ramanagaram, Channapatna and Mandya town limits were, however, awarded without adherence to provisions of KTPP Act[43] as detailed below:

Non-adherence to provisions of KTPP Act and acceptance of single tender

- Audit observed that in respect of improvements to four lane roads in Ramanagaram and Channapatna town limits and improvements to four lane road in Mandya town limits (tendered cost: Rs. 22.94 crore), tender notifications were issued (October 2005 and July 2006), by allowing only 18 and 38 days respectively for submission of tenders as against the stipulated 60 days as per KTPP Act. The reduction in time was neither specifically authorised nor reasons recorded by an authority superior to the tender inviting authority (Managing Director). Thus, as a result of non-adherence of the tender proceedings only one agency (KMC Constructions Limited) participated in these tenders.

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[42] **in respect of BM I & II for 5.29 lakh cum at Rs. 43.25 per cum and in respect of BM III for 2.37 lakh cum at Rs. 14.47 per cum – (proportionate quoted rates to estimated rate).**

[43] **Karnataka Transparency in Public Procurement (KTPP) Act, 2000.**

- Audit observed that the award of contract on single tender basis in respect of 'improvements to existing four lane in Mandya town limits' for Rs. 11.21 crore (tender cost: Rs. 9.50 crore), was 18 *per cent* higher as compared to the offer of 9.93 *per cent* above estimate in respect of 'improvements to existing four lane in Ramanagaram and Channapatna town limits', which was also on single tender basis from the same agency (KMC Constructions Limited). Audit further observed that rates for certain items of work (scarified area, laying profile correcting course, laying bituminous macadam) were higher by 23 to 37 *per cent* compared to estimated rates. Even the rate (Rs. 7.09 crore) for bituminous works was 29 *per cent* higher than the estimated cost (Rs. 5.47 crore).

The Government stated (August 2008) that improvement works in Mandya town limit roads was not a major work and in case of small works the percentage of overheads and cost of mobilising were more. The Management stated the stretch was in urban area with constraints resulting in idle men and machinery and considering rising cost and urgency, the work was awarded at higher cost. The reply is not acceptable as it was a single tender with high premium. The mobilisation cost would not be high as the contractor (KMC Constructions Limited) was also part of the consortium that executed Bangalore - Maddur stretch. The contention that the work was in urban limits is not acceptable as the Ramanagram - Channapatna work to which the comparison is made was also within urban limits. Further, all these aspects must have been considered while working out the estimates.

Execution of the Project

2.1.16 The details of the status and execution of the various packages under this project are as enumerated in paragraph 2.1.6. Audit analysis of records relating to execution of works connected with the project revealed that while there was no cost overrun, there was time overrun and deficiency in planning in land acquisition, non-reduction in annuity on account of reduction in capital cost, non-adjustment of reduction in taxes, execution of unnecessary works, which are brought out in succeeding paragraphs.

Land acquisition

2.1.17 Land acquisition is a time consuming process. The time required cannot be estimated with any degree of certainty. In the absence of control over acquisition, date of completion of the project also becomes uncertain. Starting a project without prior acquisition of land may lead to additional payments and other related liabilities to the contractors due to extended period of execution and other disputes regarding commencement and completion of the project.

Audit observed that :

- the delay in completion of work in Bangalore - Maddur package was about three months, due to the dispute in the finalisation of commencement date. While the contractor claimed bonus for Rs. 19.93 crore for early completion, the Company had recovered

Rs. 17.60 crore due to delay in completion, which is under dispute pending the reckoning of the date of commencement and change in scope of work.

- in the Maddur – Mysore package the delay of 209 days was due to delay in acquisition of land as the SLAOs failed to acquire / hand over the land in time.
- in respect of other two packages, the delay ranged from 104 to 319 days due to various reasons such as land acquisition, change in design of kerbs[44], heavy traffic on the project site during Dasara festival and unprecedented rains.
- the work of grade separator at Kengeri is yet to be completed due to difficulties in land acquisition and change in design, which resulted in cost overrun of Rs. 1.68 crore so far (July 2008).

Non-reduction of annuity on account of reduction in capital cost

The Company had not reduced annuity payments on account of reduction in capital cost.

2.1.18 The Bangalore – Maddur package with base cost of Rs. 188 crore was entrusted to Brindavan Infrastructure Company Limited (concessionaire) at an annuity liability of Rs. 475.20 crore. The agency was required to construct the project road as per the provisions of DPR and design drawings of the concession agreement. As per the concession agreement, it was stipulated that in case of change of scope resulting in reduction of capital cost the same along with interest thereon at weighted average cost of debt to agency was to be deducted in equal installments from annuity. During execution of the package, there was reduction in capital cost of Rs. 7.34 crore as indicated in the **Annexure 11**.

The Company, however, did not reduce this amount from the capital cost nor from the annuity payable. Accordingly, Rs. 7.34 crore reduction in capital cost worked out to Rs. 18.55 crore[45] (total amount) and was required to be deducted at the rate of Rs. 1.16 crore out of each annuity. Even though three annuity payments had been made so far (February 2008), the Company had not recovered this amount as per terms of concession agreement.

In the ARCPSE meeting (July 2008) the Management stated that these aspects would be looked into and recoveries effected. The Government, while confirming the minutes of meeting, stated (August 2008) that there were no provisions for reduction for lesser consumption of dense bituminous macadam (DBM) and bituminous concrete (BC) in the concession agreement. The reply further stated that the concession agreement did not provide for chain link fence for the entire length and hence its non-execution was not accounted as change in scope, but stated that the chain link fencing and road marking will be looked into as per agreement provisions. The reply is not acceptable as the agreement is defective to the extent of not having a provision for reduced consumption of DBM / BC. Further, providing chain link fence throughout

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[44] **edge between sidewalk and roadway.**
[45] **for Rs. 475.20 crore annuity is Rs. 29.70 crore, therefore for Rs. 7.34 crore reduction annuity works out to Rs. 1.16 crore quarterly for 16 instalments (Rs. 18.55 crore).**

the length of the road was in the DPR and the DPR was part[46] of concession agreement and as such the work was within the scope. As regards road marking (kerb painting), the fact that tenders were called for in July 2006 to execute balance work indicated that the work was still pending.

Non-adjustment of reduction in Work Contract Tax

2.1.19 The Maddur - Mysore package was entrusted (May 2004) to Soma Enterprises at a cost of Rs. 116.31 crore. As per the provisions of clause 2.33.2 of General conditions of contract under cost control, the quoted prices were inclusive of Work Contract Tax at the prevailing rates as on 31 December 2003. It also stipulated that the increase / decrease in the rate of Works Contract Tax with reference to that prevailing as on that date should be paid / deducted as the case may be. As the Works Contract Tax at composite rate was four *per cent,* the work contract tax was to be recovered at four *per cent*. The Company, however, based on the certificate issued (September 2004) by the Commercial Tax authorities recovered works contract tax of Rs. 2.34 crore at rate less than four *per cent.* The actual turnover tax on Rs. 116.31 crore (contract value) worked out to Rs. 4.47 crore, against which the company recovered only Rs. 2.34 crore, resulting in overpayment of Rs. 2.13 crore to the contractor.

In the ARCPSE meeting (July 2008), the Management accepted that action would be taken to recover the amount. The Government, while confirming the minutes of meeting stated (August 2008) that action was taken based on certificate of commercial tax authorities. The reply is not acceptable, as non-deduction as per contract resulted in overpayment to contractor.

Non-adjustment of reduction in taxes on bitumen

2.1.20 As per bidding documents of the project work in Maddur - Mysore package, the basic price (exclusive of taxes) of bitumen (grade 60 / 70 used for bitumen macadam and dense bitumen macadam) was Rs. 10,660 per metric tonne. Therefore, the quoted rates for bitumen were based on the basic cost, duties and taxes prevailing as on 31 December 2003. The terms of the contract under Section I of Instructions to bidders further specified that reduction in taxes and duties if any from those prevailing as on 31 December 2003, should be passed on to the Company. The rate of Sales Tax on bitumen was 16 *per cent* in December 2003 and on introduction (1 April 2005) of Value Added Tax by the State Government, it was revised to four *per cent*. The contract agency purchased 6,638 MT of bitumen after 1 April 2005 and utilised in the work. The Company, however, paid for bitumen with sales tax at 16 *per cent* instead of four *per cent* resulting in overpayment of Rs. 0.85 crore, to the contractor (KMC constructions Limited).

The Government stated (August 2008) that action would be taken to recover the amount after final internal audit verification.

[46] **'Schedule D - Project facilities' of the concession agreement stipulated that 'the facilities to be procured, constructed, built, installed, erected or provided by the concessionaire in the project site shall be those set out in the DPR'.**

Execution of unnecessary works

2.1.21 Execution of 50 mm bituminous macadam (BM) layer of 3,025.75 cum even though the same was not required as evaluated (July 2007) by the Technical Committee resulted in extra expenditure of Rs. 1.62 crore at the rate of Rs. 5,350 per cum in 'improvement of existing four lane in Mandya town limits' package.

The Government stated (August 2008) that even if 50 mm thick BM layer is treated as additional BM layer beyond requirement, in view of delay in taking up by-pass roads in Mandya town, it increased the serviceability of the road for some more period. The reply that delay in construction of by-pass road at Mandya would increase the serviceability is an afterthought as this aspect was not discussed at that time, and the Technical committee itself had observed that there was no need for this additional layer.

Payment of compensation for borrow soil

2.1.22 In the absence of adequate clause in the contract (BM III package) for incorporating the details of lands from where the borrow soil of 6.63 lakh cum were procured, Audit could not ensure that the materials for which Rs. 1.09 crore was paid were taken from borrow area only. In the ARCPSE meeting (July 2008) the Management agreed to look into the matter.

Irregular payment of compensation

Even though the project was completed in November 2006, the SLAOs have neither submitted the accounts nor refunded the balance amount till date.

2.1.23 For the implementation of the project, the Company acquired 109 acres and 1.25 guntas of land and commercial buildings and deposited Rs. 16.62 crore with the Special Land Acquisition Officers (SLAOs). Audit scrutiny of acquisition of land through SLAO's revealed the following deficiencies:

- the SLAO's neither submitted the accounts nor refunded balance amount of Rs. 5.95 crore and the Company is yet to take up the matter with them (May 2008) even though the road was completed and opened to traffic in November 2006.
- payment of Rs. 0.63 crore due to extension of solatium[47] and additional market value on structures and trees which were not admissible.
- incorrect categorisation of land as non-agricultural land instead of agricultural land resulted in avoidable payment of Rs. 0.61 crore for 30 guntas[48] in Channapatna.

In the ARCPSE meeting (July 2008), the Management agreed to look into the matter. The Government while confirming (August 2008) the minutes of meeting stated that the SLAO had stated that the details would be submitted after complete disbursement.

[47] compensation for emotional hardship / wounded feelings.

[48] 12 guntas in survey No. 237/1 and 18 guntas in survey No. 237/2 of Manglapet of Channapatna town.

Feedback system

2.1.24 The implementation of the project envisaged considerable reduction in travel time between the two cities apart from benefits in terms of accident reduction, fuel and vehicle operating cost savings of Rs. 278.05 crore over a period of 15 years.

Audit observed that:

- the Company had not evolved a feedback system to ascertain the reduction in savings in vehicle operation cost.
- the Company is yet to establish a feedback system to ensure proper maintenance by the agencies and also to assess the achievements of the project objectives.

The Government stated (August 2008) that the travel time was reduced after completion of the project and if required an assessment of effectiveness of the project would be done through a competent consultant. The fact remained that no system was evolved by the Company and as maintenance work would be carried out for next eight years, a feed back system was necessary**.**

Internal control

2.1.25 Internal control is a management tool used to provide reasonable assurance that management objectives are achieved in an efficient and effective manner. Audit noticed the following deficiencies in the internal control system :

- inadequate project monitoring in respect of deviations in the project / design / DPR.
- non-compliance to KTPP Act and non-revision of Statutory levies.
- absence of internal control systems to explore the options of revenue generation to execute projects independent of budgetary support.
- absence of feedback mechanism to assess the achievements of the project objectives.

Acknowledgement

Audit acknowledges the co-operation and assistance extended by the staff and the Management of the Company at various stages of conducting the performance review.

Conclusion

The work of four-laning of Bangalore - Mysore highway was undertaken without identifying the probable revenue sources to make the project viable. The Company, however, depended solely on State budgetary support for repayment obligation. While the project was completed

without any cost overrun, there was time overrun mainly due to delay in acquisition of land. The DPR finalised was found deficient in terms of determination of quantities and nature of items of work, adoption of correct nature of sub-soil and number of cross drainage works to be constructed resulting in additional / avoidable expenditure. Deficiencies noticed in implementation of project included non-reduction of annuity on account of reduction in capital cost and non-adjustment of reduction in taxes. Though the project work was opened for commercial operation in June / November 2006, the Company failed to evolve a feedback system to assess the achievements of the project objectives of reduction in vehicle operation cost and proper maintenance of the road.

Recommendations

The Company may ensure the following:

- **Improve contract management to enforce the terms of contract to ensure economy and efficiency in execution of works;**
- **A feedback system may be introduced to analyse the extent to which the desired objectives were achieved.**
- **The matter relating to toll tax may be pursued with the Government vigorously.**

Karnataka Neeravari Nigam Limited

2.2 Implementation of Upper Tunga Project (UTP)

Highlights

The allocation of funds to the project was very low and at the rate of financial progress achieved during 2007-08, it would take another six years to complete the project.

(Paragraph 2.2.9)

The Company incurred (March 2008), Rs. 613.16 crore towards the project but none of the milestones as contemplated in DPR had been achieved till date. Thus, even after 17 years of project inception the objective to irrigate 80,494 Ha of land was not achieved as water has not been let into the main canal (July 2008).

(Paragraph 2.2.11)

The Company did not prepare PERT chart / CPM, which would ensure a detailed plan for achievement of objectives within the target date. In the absence of PERT chart / long-term plan the cost overrun for the work not completed as per milestones could not be assessed.

(Paragraph 2.2.11)

Between March 1993 and March 2008, only 54 per cent of the land required for canals was acquired.

(Paragraph 2.2.14)

There were delays in awarding the works as well as in their execution. Out of 120 works relating to dam and main canal which were awarded, only 33 were completed by June 2008, as evidenced by completion reports. The cost overrun occasioned by the delay of 2 to 133 months in these works was Rs. 239.16 crore.

(Paragraph 2.2.13)

The Company incurred additional expenditure of Rs. 21.41 crore towards cement concreting lining works, sanction of excavation of hard rock with controlled blasting as an extra item and re-handling of excavated muck.

(Paragraphs 2.2.19 to 2.2.22)

Introduction

2.2.1 The Krishna Water Disputes Tribunal award (July 1971) included 12.24 thousand million cubic feet (TMC) of water to be tapped from the Tunga-Bhadra river basin. The Upper Tunga Project was conceived (October 1991) by the Irrigation Department, Government of Karnataka to irrigate additional 94,698 hectares (Ha) of gross command area (net command area: 80,494 Ha) in the Shimoga, Davanagere and Haveri districts using the above allotment of water and increase food production by 2.09 lakh tonnes, as against the existing irrigable land of 8,700 Ha covering Shimoga district.

The Project was taken up by the Government during 1991-92 and was proposed to be completed in a phased manner over a period of 14 years *i.e.,* by December 2005 at a cost of Rs. 1,052.33 crore[49]. It was decided (February 1999) to construct a new dam[50] 100 metres downstream of existing Anicut and construct a canal to run from the foreshore of the dam to a length of 269.283 kilometres. Government of Karnataka transferred (February 1999) this project to the Company. Out of the total length of the main canal of 269.283 kilometres, contracts were awarded only for works up to running length of 192 kilometres. The Company had so far incurred Rs. 613.16 crore towards the project (March 2008), but water has not been let into the canal till date (July 2008). This was due to non-installation of head regulators in the dam and non-completion of construction work in the first three kilometres of the canal as per the revised design, though the construction of dam was completed in 2002-03.

Organisational set-up

2.2.2 The Company is headed by the Managing Director who is assisted by the Chief Engineer, Superintending Engineer and Executive Engineers in the implementation of the project. All major decisions relating to technical aspects are discussed and recommended by the Technical Sub-Committee (TSC) consisting of experts in the field and later approved by the Board of Directors.

Scope of audit

2.2.3 The performance audit of the project conducted from October 2007 to January 2008 covered review of designing, tendering, award of contracts and the execution of works relating to the dam and main canal. 70 works (valued at Rs. 437.59 crore), out of 145 works (valued at Rs. 673.43 crore), relating to dam and main canal works were reviewed in Audit.

Audit objectives

2.2.4 The performance review of the project was conducted to assess whether:

- the management took up the work of implementation of the project after detailed planning, surveys and investigation;
- critical components of Project management and implementation like land acquisition were initiated and carried out when entering into contractual obligations;
- the execution of the project and other related works were carried out economically, efficiently and effectively and in accordance with the requirements;

[49] based on Schedule of rates of 2001-02.

[50] the Full Reservoir Level (FRL) of the new dam was fixed at 588.24 metres, while the Maximum Water Level (MWL) was fixed at 589.20 metres and the storage capacity was 3.24 TMC of water.

- works were entrusted to the lowest bidders and were executed in time; and
- sufficient funds were provided in the Annual Work Plan (AWP) and that these funds were effectively utilised.

Audit criteria

2.2.5 The criteria considered for assessing the achievement of objectives were:

- Karnataka Public Works Department Code;
- Indian Standards Institution (ISI) Code and specifications,
- Annual Work Plan (AWP);
- Detailed Project Report; and
- Karnataka Transparency in Public Procurement (KTPP) Act.

Audit methodology

2.2.6 The following mix of Audit methodology was adopted:

- examination of Detailed Project Report and its implementation;
- review of the minutes of the meetings of the Board of Directors;
- scrutiny of records and management's decision relating to award of contracts;
- scrutiny of contractors Running Account bills against works, and
- Government orders and notifications issued from time to time and the correspondence related to the project.

Audit Findings

2.2.7 Audit findings arising from the performance review were reported (June 2008) to the Government / Management and were discussed (14 July 2008) in the meeting of Audit Review Committee on Public Sector Enterprises (ARCPSE). The meeting was attended by the Secretary to the Government of Karnataka, Water Resources Department, the Managing Director of the Company, and Technical Member from State Government. The replies furnished (July 2008) by the Management and the views expressed by the representatives of the Government / Management in ARCPSE meeting have been taken into consideration while finalising the review.

The audit findings are discussed in the succeeding paragraphs:

Financial management

Sources of funds

2.2.8 The Company's inability to mobilise sufficient funds for timely completion of the projects had already been commented upon in the Audit report (Commercial), Government of Karnataka of the Comptroller and

Auditor General of India for the year ended 31 March 2005. Audit pointed out therein that no corporate plan was prepared to assess the requirement of funds on long term basis and that the Company depended mainly on budgetary support and Government guarantee for mobilisation of funds. Audit observed (January 2008) that the company is yet to formulate a Corporate plan.

Funding

2.2.9 Based on the funds received as budgetary support from the Government and funds mobilised, the Company prepares an Annual Work Plan and apportion the funds to each project. The details of the value of works projected in the AWP and the funds earmarked for UTP are shown below:

Year	Balance cost of work as at 1st April	Annual Work Plan of UTP	Funds apportioned to UTP	Progress achieved	Percentage of Funds apportioned to works in AWP[51]
	Rupees in crore				
1	2	3	4	5	6
2003-04	1,377.73	471.00	100.00	95.70	21
2004-05	1,282.03	531.00	92.00	131.50	17
2005-06	1,150.53	450.00	112.00	116.29	25
2006-07	1,034.25	299.94	147.00	129.29	49
2007-08	904.95	217.46	120.00	126.61	55
Total	**-**	**1,969.40**	**571.00**	**599.39**	**29**

Audit observed that:

- the allocation of funds to the project was very low as compared to the cost of balance works. The Company could reflect better progress in 2006-07 and 2007-08 mainly because of reduced works contemplated in the AWP.

- the over all financial progress achieved was only 44 *per cent*[52] of the value of balance works for the five years ended March 2008.

The Management stated (July 2008) that the allocation to works was based on their progress. The reply is not acceptable as the fact remained that the project was due for completion by December 2005 had not been completed till date (July 2008) even after 30 months. As the balance works remaining under execution as on 31 March 2008 worked out to Rs. 778.34 crore and at the rate of financial progress achieved during 2007-08, it would take another six years[53] to complete the project.

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[51]**Column 4 / Column 3*100.**

[52]**Rs. 599.39 crore / Rs. 1,377.73 crore * 100 = 44 *per cent;* (Rs. 1,377.73 crore = Rs. 599.39 crore + (Rs. 904.95 crore – Rs. 126.61 crore).**

[53] **Rs. 904.95 crore –Rs. 126.61 crore= Rs. 778.34 crore / Rs. 126.61 crore = 6.15 years.**

Planning of the project

Project planning

2.2.10 Prior to transfer of the project (February 1999) to the Company, the Government incurred (1991-1999) an expenditure of Rs. 19.99 crore on works relating to the project.

Audit observed that the company had not assessed the status of works transferred to it, specifying the extent of works completed and the works that were to be undertaken, funds and time required for completion of the balance works at the time of transfer.

Status of the Project

2.2.11 The status of the project with reference to the milestones as per the DPR is given below:

(Rupees in crore)

Milestones		Target year of Comme-ncement	Target year of Comple-tion	Projected expenditure[54]	Contracts: Awarded		Contracts: Completed including EFI		Pending completion including EFI	
					No.	Amount	No.	Amount incurred	No.	Amount incurred up to June 2008
1.	Preliminary works-dam and canal, and execution from Km. 3 to 10	1991-92	1998-99	30.00	8	6.58	0	-	8	9.77
2.	Commencement of new dam work, completion of main canal from Km. 11 to 170 and completion of Tunnel Work	1999-00	2002-03	310.18	110	331.87	33	245.54	77	333.98
3.	Completion of dam work, completion of main canal in Km. 171 to 250	April 2003	March 2004	300.00	2	39.39	0	-	2	23.87
4.	Main canal from Km. 251 to 269.283	April 2004	December 2005	412.15	0	-	0	-	0	-
				1,052.33	**120[55]**	**377.84**	**33**	**245.54**	**87**	**367.62**

EFI = extra financial implication.

The objective to irrigate 80,494 Ha was not achieved even after lapse of 17 years of project inception and three years of its scheduled date of completion even after spending Rs. 613.16 crore as water is not let into the main canal (July 2008).

The Company had so far incurred Rs. 613.16 crore towards the project (March 2008) but none of the milestones had been achieved till date. Thus, even after 17 years of project inception, the objective to irrigate 80,494 Ha of land was not achieved as water has not been let into the main canal (July 2008). The delay was due to land acquisition, side slips and delay in completion of bridge and tunnel works as discussed in succeeding paragraphs.

Audit observed that:

- For timely completion of each milestone of any project the standard practice was to prepare PERT[56] chart / CPM[57] for various activities. The Company, however, did not prepare PERT charts / CPM but executed the project as per Annual work programme on piece meal basis. The Company did not have a long-term plan for implementation of the project, which would ensure a detailed plan for achievement of objectives within the target date. In the absence of PERT chart /

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[54] **as per 2001-02 Schedule of Rates.**
[55] **excluding 25 works relating to cross drainage, culverts, super passages *etc.***
[56] **Project, Evaluation and Review Technique.**
[57] **Critical Path Method.**

long-term plan, the cost overrun for the work not completed as per milestones could not be assessed in Audit.

- Though the construction of dam was completed in 2002-03, the head regulators had not been constructed till date (July 2008). The work of canal up to Km. 168 is under advanced stage of completion. The Company, however had not finalised the revised design for construction of canal in the first three kilometres (Km. 0 to 3), as there were slippages in side slopes. Unless, the Company revises the design and complete the construction / modification of the work in the first three kilometres, and install head regulators for the dam, the work completed up to Km. 168 would not be fruitful as the water cannot be let out into the canal.

- Out of the total length of the main canal of 269.283 kilometres, the contracts were awarded only for works up to running length of 192 kilometres. Estimates relating to works between Km. 193 and Km. 212, though prepared, have not been approved so far (June 2008), while those relating to the stretch beyond Km. 212 were not finalised / revised (June 2008).

The Government stated (August 2008) that PERT charts could not be taken up as the parameters were complex *viz.,* statutory clearances from Ministry of Environment and Forests, State Pollution Control Board *etc.,* but stated that annual programmes were prepared and monthly targets reviewed at frequent intervals. The reply is not acceptable as audit noticed that in the absence of an effective plan for acquisition of land in various districts in a phased manner, PERT charts for execution of the project, the effectiveness of implementation of the project, prioritisation and synchronisation of each module under each milestone could not be assessed.

Detailed Project Report

2.2.12 While the work relating to investigation and preparation of estimates for 131 kilometres was done by the Government / Company, the work beyond 131 kilometres was entrusted (June 2000) to a consultant for a fee of Rs. 75 lakh, to be completed within 12 months (June 2001) by taking trial pits / bores at specified intervals. As the Consultant demanded extra-payment for trial bores, the Company closed (November 2004) the contract and decided to take up the balance work (Km. 164 to Km. 269) departmentally.

Audit observed that between November 2004 and January 2008 (39 months), work relating to survey, investigation, alignment and preparation of estimates was completed by the Company (January 2008) for a running length of 18 kilometres only (up to Km. 192).

The Government stated (August 2008) that the decision to terminate the contract was taken after obtaining legal opinions and also it was decided not to penalise the consultant. The Government attributed no reasons for preparation of estimates for only 18 kilometres in 39 months.

Project execution

Time and cost overrun

2.2.13 The essence of completion of a project in time was the completion of each milestone within the targeted date without cost overrun. The contracts for 120 works (up to 3rd milestone) relating to dam and main canal were awarded during the period from September 1993 to March 2007 at a total cost of Rs. 377.84 crore. The target date for completion up to 3rd milestone was March 2004.

Audit observed that the Company had not achieved any of the first three milestones and sanctioned 'extra financial implications (EFI)' to the extent of Rs. 239.16 crore. Audit analysed the reasons for time and cost overrun, which are detailed below:

Out of 120 works relating to dam and main canal which were awarded, only 33 were completed by July 2008, as evidenced by completion reports.

- out of 120 works that were awarded, four works (covered under 2nd and 3rd milestone) were awarded with a delay ranging from 15 to 28 months due to delay in finalisation for award of contracts.
- of the 120 works, only 33 works were completed (July 2008) as evidenced by the completion certificates. 26 works were completed after a delay ranging between 2 and 55 months from date of completion as per contract due to delay in obtaining forest clearance, delay in finalisation of alignment, canal passing through human habitation and alignment running in deep cut with highly jointed, fissured and weathered rock strata. The increase in cost of these completed works was Rs. 86.89 crore.
- the balance 87 works were under different stages of completion although 18 to 133 months had elapsed since they were awarded. The cost of these works had increased by Rs. 152.27 crore. The delay in these works was attributed (July 2008) to side slips (eight works) and delay in completion of bridge and tunnel works besides problems encountered in land acquisition (79 works). The Company had not fixed the revised design to be adopted to prevent side slips and its further occurrence.

The Government stated (August 2008) that 101 works were completed physically, of which 33 works were completed in all respects whereas completion reports were pending to be issued in 68 cases pending final settlements. The Government further stated (August 2008) that there were delays in achieving the milestones due to delay in obtaining forest clearance, finalisation of alignment of aqueduct and decided to focus on completion of first two milestones, canal passing through human habitation and alignment passing through rocks having deep cut with highly jointed, fissured and weathered nature. The reply is not acceptable as the entire work of canal in 269 kilometres had to be completed by 2005 whereas even as on July 2008, estimates relating to works between Km. 193 and Km. 212, though prepared, have not been approved while those relating to the stretch beyond Km. 212 were not finalised / revised (June 2008). This points to the fact that problems are tackled as and when they occur, instead of having a long term plan, which would avoid time and cost overrun to a large extent.

Delay in land acquisition

Between March 1993 and March 2008, only 54 *per cent* of the land required for canals was acquired.

2.2.14 Delay in land acquisition leads to delay in the overall progress of the work. Audit observed that:

- between March 1993 and March 2008, 2,532.98 Ha of land (414 cases) required for canals were referred to Special Land Acquisition Officer (SLAO) for acquisition. Of these, 1,365.33 Ha of land (190 cases) were acquired (54 *per cent*) for which an amount of Rs. 39.84 crore was paid as compensation, leaving a balance of 1,167.65 Ha (224 cases) yet to be acquired (March 2008).
- the Company had not taken efforts to acquire these lands through SLAOs on fast track basis to avoid delay. Pending completion of proceedings relating to acquisition of the land, responsibility was fixed on the contractors to obtain possession of the required land from the owners through negotiations, without extra cost to the Company.

The Government accepted (August 2008) that there were delays in acquisition of land as SLAOs at Ranebennur was established only in 2003-04 whereas it had to be done by 1999-2000 and due to shortage of Officers at SLAO office.

Award of contract

2.2.15 The contracts for 145 works relating to dam and main canal (up to 3rd milestone) estimated at Rs. 539.46 crore were awarded during the period from September 1993 to March 2007 to the lowest bidders at a total bid price of Rs. 398.52 crore, indicating an over all reduction of 26.13 *per cent* obtained in competitive tendering.

Audit observed that out of 145 works, 33 works were completed with an 'extra financial implication (EFI)' of Rs. 86.89 crore. The cost of remaining 112 works, which were in progress increased from Rs. 242.27 crore (tendered amount) to Rs. 433.61 crore (revised cost). The cost overrun was Rs. 191.34 crore representing 79 *per cent* increase in the tendered cost (March 2008). The Company estimated the cost for fourth milestone as Rs. 412.15 crore as per Schedule of rates of 2001-02. The Company is yet to revise the estimated cost as per current Schedule of rates and initiate action for award of contracts.

Selective cases involving sanction of extra financial implication have been commented in succeeding paragraphs.

Deviation in approved designs and plans

2.2.16 The estimates were to be prepared based on the soil strata (layer) found during the course of excavation of trial pits / bores and in accordance with designs originally approved.

Audit observed that:

The extent of slope and the type of cross drainage works required to be executed were not properly assessed, resulting in increased cost of works by Rs. 20.29 crore.

- the designs relating to 26 works, which were originally approved were modified resulting in increased cost by Rs. 29.01 crore. The change in designs was attributed (October 2007) to slippage of canal sides, actual site conditions encountered while executing works, change in soil strata and variation in ground levels.
- Of the 87 works, 23 were pending completion for period ranging from nine months to 116 months due to change in design / plans, thus contributing to time overrun.
- A test check of the circumstances leading to changes subsequently effected in the designs of 23 works based on the site conditions revealed that even the extent of slope and the type of cross drainage works required to be executed were not properly assessed, resulting in increased cost of works by Rs. 20.29 crore.

The Government stated (August 2008) that sub-strata investigation was done taking trail pit / bore as per the instructions of the Government but during the course of execution, the strata encountered varied from the estimates, and as such the designs were modified in consultation with experts. Audit observed that the error in estimation of strata classification in reaches which were done by a consultant was five *per cent*, whereas the error in strata classification in reaches done by the Company was as high as 92 *per cent*, as discussed in paragraph 2.2.17**.**

Variation in strata classification

2.2.17 The strata were to be classified in three groups such as excavation in all soils, in disintegrated hard rock boulders of size more than 300 mm and in hard rock boulders of more than one cubic metre size. Rocks requiring crushing strength of not less than 100kg shall be classified as hard rock otherwise the same was to be classified as disintegrated rock.

Audit observed that:

- in 74 works, the strata actually found during excavation, varied widely as compared to the estimates originally prepared resulting in increased cost of works by Rs. 121.85 crore. Audit, further, observed that out of 74 works where variations in strata classification were noticed, the error in the estimation by the consultant was only 5 *per cent* (Km. 132 to 174) while that of the Company / Department was as high as 92 *per cent* (Km. 0 to 131 and Km. 174 to 192).
- in seven works (Km. 159 to 168.50) which were awarded (June 2004 and February 2005) to two contractors, the strata actually encountered while executing the work varied with those indicated in the specification and the specified side slope was unstable. Consequently, slips occurred in these reaches. The Company had not finalised the required modification to the slope to maintain stability of the soil even though the contractors had lined up men, material and equipments for

Failure to evaluate the soil strata properly and to fix the modified slope in time resulted in escalation of cost by Rs. 41.92 crore in respect of unfinished portion of work in Km. 159 to 168.50.

executing the remedial works. The contractors demanded (March 2005) higher rates for completion of the works and hence the contracts were rescinded between May and December 2006. The cost of the unfinished portion in these works was estimated at Rs. 41.92 crore. Thus, failure to evaluate the soil strata properly and to fix the modified slope in time resulted in escalation of cost relating to unfinished portion by Rs. 41.92 crore.

- in three works finalised by the Company / Government estimates were prepared without considering excavation of soft rock with blasting (2.04 lakh cubic metres) and hard rock with controlled blasting (1.33 lakh cubic metres) resulting in increased cost for these works subsequently by Rs. 7.11 crore.

The Government stated (August 2008) that the reaches for which estimates were prepared by the Company involved deep cut, while the reaches where survey and investigation was done by the consultant involved normal cut and hence they were not comparable. The reply is not acceptable as it observed that while recommending the closure of the contract with the consultant, the Technical subcommittee of the Company took note of the fact that the works completed by the consultant involved deep cuts also.

Variation in ground levels

2.2.18 The Temporary Bench Marks (TBM) levels along the proposed canals were to be established based on Permanent Bench Mark (PBM) prescribed for the topography. The ground levels along the alignment of the proposed canal were to be fixed with reference to the TBM values.

Audit observed that in 65 works, the ground levels as figured in the measurement books relating to canal excavation and embankment works were at variance with those considered in the estimates. Of this, in two works the variation in ground levels was 7.1 metres and 12 metres, while in others it was less than two metres. The difference in values of ground levels that occurred was due to the fact that the estimates were prepared with reference to the TBM fixed for an already existing premises[58] where as during execution the values were taken with reference to the previous reaches. Consequently, 20.11 lakh cubic metres of earthwork had to be handled additionally due to excavation (18.36 lakh cubic metres) and embankments (1.75 lakh cubic metres) resulting in increased costs of works by Rs. 22.51 crore.

The Government while accepting the observation stated (August 2008) that the variations were due to scarcity of technical staff during the survey and investigation, lapses occurred while shifting bench mark levels. The two major variations were attributed to alignment passing through hillocks and survey and investigation were complex. The Government, however, stated that there was no extra expenditure. The fact remained that the water is intended to flow in the canal by gravitation and consequent correction in levels during execution would involve additional planning and time, which would further delay the project.

[58] inspection bungalow at Ratihalli.

Execution of works

Cement concrete (CC) lining works

2.2.19 Lining of canals is considered as an important feature of irrigation projects as it minimises loss of water due to seepage, reduced maintenance cost and results in achieving considerable economy in the use of cultivable land.

Audit observed that:

- CC lining works relating to 45 kilometres in different reaches were awarded separately after nearly three years of completion of excavation / embankment work in these reaches, while even tenders had not been floated for works relating to 113 kilometres.

- due to the delay in commencement of CC lining works after completion of work relating to excavation / embankment, the stretch of 63 kilometres of canal in different reaches was exposed to monsoon resulting in side-slope slips, scouring and accumulation of heavy silt. The Company incurred (October 2004 to April 2007) additional expenditure of Rs. 7.02 crore towards trimming the slopes, sectioning, clearing of silt and leveling the canal bed for restoring the gravity flow.

The Government stated (August 2008) that the Technical subcommittee (TSC) of the Company had decided to include CC lining works in the estimate but not in tenders of excavation and embankment. The TSC, further, decided that the CC lining tenders be invited in large packages making usage of advanced mechanical pavers so as to carry out quality works. The Government, further, stated that since slopes were steeper and mechanical pavers could not be used, CC lining works were taken up in slip form after completion of three to four years of earth work. The Government also accepted (July 2008) that the CC lining works could not be taken up as planned and stated that CC lining was completed in 72 kilometres; was under progress in 47 kilometres and works in balance up to 192 kilometres would be taken up shortly. The Company could have avoided the extra expenditure had it decided on the technology to be adopted expeditiously.

Controlled blasting

2.2.20 A Paragraph on ‘sanction of excavation of hard rock by controlled blasting as an extra item although this was within the scope of excavation of hard rock resulting in extra expenditure of Rs. 68.09 crore’ was included in the Audit Report (Commercial) – Government of Karnataka, of the Comptroller and Auditor General of India for the year ended 31st March 2002.

Committee on Public Undertakings (COPU), in its 106th Report after discussion of the paragraph, concurred (February 2004) and recommended that this item should have been included in the tender awarded for excavation and was the main reason for the increased cost of the project. Government, in its Action Taken Report (ATR), intimated (July 2004) that the item rate for excavation in hard rock with controlled blasting was included in the estimates prepared from April 2001.

Sanction of excavation of hard rock by controlled blasting as an extra item although it was within the scope of contract resulted in extra expenditure of Rs. 8.85 crore.

Audit observed that in six works which were awarded subsequently, between April 2001 and August 2005, the item was not included in the tender and was paid for separately involving an expenditure of Rs. 8.85 crore.

The Government stated (August 2008) that this item was not included in the estimates as it was expected that the power lines of Karnataka Power Transmission Corporation Limited (KPTCL) would be shifted, but subsequently, not agreed to by KPTCL. The reply was contrary to the ATR furnished.

2.2.21 The work of construction of main canal at Km. 14 and Km. 15 was entrusted (January and March 2001) to R[59] and S[60] respectively. While the rate payable for soft rock with blasting (SRB) was fixed at Rs. 119 per cum, in terms of Honorable Court order (August 2004), the rate for hard rock with controlled blasting (HRCB) was fixed at Rs. 320 per cum with all leads and lifts *i.e.,* lifting and transporting the excavated material and stacking it as directed by the Engineer in charge.

Audit observed that the company admitted lead charges in excess of the agreed rates by Rs. 24.89 per cubic metre and Rs. 37.78 per cubic metre for SRB (1.125 lakh cubic metres) and HRCB (2.45 lakh cubic metres) respectively involving additional payment of Rs. 1.16 crore.

The Government stated (August 2008) that though tender specified with all lifts and leads, a decision was taken in this particular case to give extra lead charges for one kilometre to avoid encroachment of the premises of educational institution and a tank, thereby avoiding public agitation. The reply is not acceptable as the Management confirmed during ARCPSE meeting that the educational institution and tank existed during 2001. As the fact that dumping of excavated material could not be carried out was known both to the Company and tenderer, the payment of extra lead charges of Rs. 1.16 crore lacked justification.

Re-handling of excavated muck

2.2.22 The work of construction of main canal from Km. 183 to 192 was awarded (August 2005) to a contractor[61] for Rs. 22.83 crore. During excavation, shear slips occurred at several points along the canal due to unstable slopes. A team of experts constituted to investigate the reasons for slips recommended (July 2006) *inter alia* that the excavated muck, which was deposited along the length of the canal, be disposed off to form spoil bank beyond 15 metres from the surcharge line of the canal to avoid further slips. After delay of six months, the TSC constituted (January 2007) a subcommittee to verify the extra financial commitment. The subcommittee suggested (April 2007) that the excavated muck which was originally dumped along the length of the canal, be re-hauled to a dump yard with a lead of one kilometre involving an expenditure of Rs. 8.94 crore. TSC approved the suggestions of the subcommittee only in July 2007. Between July 2006 and July 2007 the

[59] **Ramkey Infrastructures Limited.**
[60] **Shri. K. Sadashivareddy.**
[61] **Shri. M.Y. Kattimani**

quantity of excavated muck to be re-handled increased by 5.25 lakh cubic metres. This involved an additional expenditure of Rs. 4.38 crore.

The Management stated (November 2007) that the decision regarding re-hauling of the muck to a dump yard with a lead of one kilometre was received only in July 2007 and attributed (July 2008) the acquisition of land for spoil bank due to delay in obtaining order from the competent authority. The Government stated (August 2008) that the decision to shift the material was taken by TSC of the company based on recommendations of the expert committee as a slope stabilization measure.

Defective estimation of strata and the quantity of earth to be excavated resulted in extra expenditure of Rs. 8.94 crore on re-handling the excavated muck.

Audit observed that the extra expenditure of Rs. 8.94 crore on re-handling the excavated muck was due to defective estimation of strata and the quantity of earth to be excavated. Of this, the delay by 12 months in initiating action on the report of the team of experts resulted in further accumulation of muck by 5.25 lakh cubic metres involving an avoidable extra expenditure of Rs. 4.38 crore.

Non-adherence to KTPP Act

2.2.23 While the Company followed the procedure laid down as per the KTPP Act 2000 in awarding of contracts, a case of non-adherence to the Act, was noticed which resulted in avoidable expenditure of Rs. 1.86 crore as detailed below:

The Company floated (February 2005) tenders for the construction of distributary No:2 in the stretch from Km. 30 to 40.46, off-taking at Km. 166.267 of UTP main canal. During negotiations, Shri. Tam Tam Pedda Guruva Reddy (T) offered to execute the work at Rs. 8.24 crore. The Board deferred (June 2005) its acceptance until the report of the Government on the status of blacklisting or otherwise was obtained and requested (between June 2005 and February 2006) the Government to intimate the status. As no reply was received even during the extended period of three months, and since there was no provision under the KTPP Act, to accord further extension of time for the validity of the tender, the tender floated (February 2005) was cancelled (March 2006). T represented (April 2006) that he was not blacklisted and that his registration was renewed for the period from 2005 to 2010 by the Karnataka Public Works Department, Bangalore, and furnished documentary proof to this effect and requested that the work be awarded to him, without inviting fresh tenders. As tenders were cancelled by then, fresh tenders were floated (March 2006) for the same work and awarded (August 2006) to P[62] at a cost of Rs. 10.10 crore.

In accordance with the KTPP Act, the tender floated could be rejected only on the grounds of changes in the scope of procurement, failure of anticipated resources, accidents, calamities and to avoid unnecessary procurement. In the ARCPSE meeting, the Management attributed (July 2008) the cancellation of the tender to communication gap with the Government. The cancellation of the tender originally floated (April 2005) merely because the status of blacklisting or otherwise of T had not been received from the Government was

[62] **P. R. Nayak Associates.**

thus not authorised under the KTPP Act. The extra expenditure occasioned by cancellation of the tender was Rs. 1.86 crore[63].

Monitoring and internal control systems

2.2.24 A paragraph on absence of Management Information Systems which is very essential for identifying problems in the execution of the projects and for taking corrective action to prevent the recurrence was commented in the Audit Report (Commercial), Government of Karnataka of the Comptroller and Auditor General of India for the year ended 31 March 2005. The Company has since introduced monitoring and internal control systems. Audit observed that the system was found to be deficient as:

- the annual budgets for implementation of the project were not split into sub-periods for monitoring and variations were not analysed.
- critical components / areas relating to bottlenecks encountered during implementation of the project were not prioritised for remedial action.
- cost estimates of the various contracts which are yet to be awarded were not updated periodically to ensure correct estimation of funds requirement.
- the Company did not have a system of monitoring the phase of progress of land acquisition and utilisation of advances made to SLAOs.

Acknowledgement

Audit acknowledges the co-operation and assistance extended by the staff and the Management of the Company at various stages of conducting the performance review.

Conclusion

The UTP project was started in 1991 with the objective of irrigating 80,494 Ha of land in the districts of Shimoga, Davanagere and Haveri and increase the food production by 2.09 lakh tonnes by tapping 12.24 TMC of water of the Tunga river. The project was to be completed by December 2005. The objective was not achieved as deficiencies were noticed in planning, execution and monitoring of the project. The Company did not prepare any PERT chart / CPM for planning / execution of the project. The lapses in planning included delays in critical areas such as land acquisition, obtaining statutory clearances and non finalisation of design in areas where slippages had occurred. The allocation of funds for the project was meagre.

Deficiencies were noticed in execution of the project. Even though, work up to Km. 168 is at an advanced stage of completion, the work in the first three kilometres of the canal is pending completion and as such it is not

[63] **Rs. 10.10 crore– Rs. 8.24 crore = Rs. 1.86 crore.**

possible to let out water into the canal. The Company incurred extra expenditure due to deficiencies in the execution and monitoring of the project. The extra expenditure was attributed to change in design, deviations from the estimates due to variation in ground levels, change in strata classifications, and reckoning of excavation of hard / soft rock with controlled blasting as extra item. None of the milestones were completed till date and the Company allowed the project to take its own course. The resultant time and cost overrun could not be quantified. Due to various deficiencies in implementation and failure of the Company to monitor the project, the basic objective to irrigate 80,494 Ha is yet to be achieved (July 2008) even after 17 years of inception of the project and 30 months from its scheduled date of completion. Until water is let out into the canal and to the lands proposed under cultivation, the amount of Rs. 613.16 crore spent so far (July 2008) would remain unfruitful.

Recommendations

- **Project milestones may be reworked with revised cost and time targets.**
- **PERT / CPM technique may be adopted for implementation of the project.**
- **Funding arrangements may be made to ensure timely availability of funds.**
- **Monitoring mechanism may be strengthened to conduct periodical review of progress of work with reference to cost and time targets.**

Bangalore Electricity Supply Company Limited

2.3 Information Technology Audit Review Report on Computerisation of High Tension (HT) Billing and Collection

Highlights

Real-time Remote Automatic Meter Reading System (RRAMR) implemented in January 2004 for automating and remote reading of High Tension (HT) meters could not cover all the HT installations even after three years due to technical problems, inconsistencies in reading, lack of connectivity *etc.*

(Paragraph 2.3.7)

The various modes of network connectivity created at a cost of over Rupees two crore for billing and improvement of service were not functional due to technical problems in spite of repeated changes resulting in sub-optimal utilisation of the computerised systems.

(Paragraphs 2.3.8 to 2.3.11)

There was delay of nearly three years in implementation of BillNet software and manual feeding of data for billing continued due to software problems. As a result, most of the bills were generated by manual feeding of data and 100 per cent billing accuracy could not be achieved.

(Paragraphs 2.3.12 and 2.3.13)

Inadequate security features in the software, non-segregation of duties and improper access control allowed unauthorised access to the master data tables at the backend leading to security lapses and absence of audit trail.

(Paragraphs 2.3.14 and 2.3.18)

There are no documented Business Continuity Plan / Change Management controls.

(Paragraphs 2.3.19 and 2.3.20)

Introduction

2.3.1 Bangalore Electricity Supply Company Limited (Company), one of the regional companies formed by the Government of Karnataka to take over the function of electricity distribution from the Karnataka Power Transmission Corporation Limited (KPTCL), started its operations in June 2002. The Company is responsible for distribution of electricity in six districts divided into three operating zones *viz.,* Bangalore Metropolitan Area Zone (BMAZ), Bangalore Rural Area Zone (BRAZ) and Chitradurga Zone (CTDZ).

The review covers the Information Technology (IT) initiatives undertaken by the Company for High Tension (HT) billing during the last five years. The revenue from HT services during the five years from 2002-03 to 2006-07 aggregated to Rs. 7,813 crore, which accounted for 41.59 *per cent* of the total revenue generated by the Company from sale of power.

Organisational set-up

2.3.2 The Company was being managed by a Board of Directors headed by a Chairman, with the Managing Director as its executive head. The General Manager (Technical) was the head of the IT organisation and was responsible for the IT initiatives as well as the routine functional matters of the computer centre. The HT Cell headed by the Assistant General Manager was responsible for billing and collection of High Tension revenue.

IT initiatives

2.3.3 The Company introduced (January 2004) the Real-time Remote Automatic Meter Reading System (RRAMR) under the centrally sponsored Accelerated Power Development and Reforms Programme (APDRP) Scheme. During the same period, installation of communication networks through Digital Subscriber Line / Broadband, Local Area Network and Managed Leased Line was also taken up at different times under the scheme, to establish connectivity between the divisions, sub-divisions and the Corporate Office.

In November 2005, the Company introduced a software package called BillNet to overcome the shortcomings in the existing Billing and collection software in use developed by the erstwhile KPTCL. BillNet was later modified for use in HT Billing in January 2007 and is presently being used for HT billing. HT billing function is centralised in the HT Cell in Bangalore.

Scope of audit

2.3.4 The records relating to implementation and functioning and utilisation of RRAMR system, networking and BillNet were test checked during the review. The electronic data relating to billing of HT connections, obtained from the HT Cell was analysed through MS-SQL software. Three sub-divisions each in the BMAZ and BRAZ and one sub-division in CTDZ were selected for detailed review of the operation of the computerised facilities. The Entry and Exit Conferences were conducted with the Management of the Company during January 2008 and April 2008 respectively.

Audit objectives

2.3.5 The development and functioning of IT systems and services established for High Tension billing *viz.,* RRAMR, Network Connectivity and BillNet were reviewed with the objective of evaluating their efficiency and effectiveness.

The objectives of audit were to check and ensure whether:

- business rules were properly incorporated in the software and correctly adhered to;

- computer facilities implemented were effective, efficient and secure in operation;
- data integrity and security had been maintained;
- general IT controls and other controls specific to billing were incorporated; and
- backup and continuity procedures were in place to take care of any system failures.

Audit findings

Real Time Remote Automatic Meter Reading System (RRAMR)

2.3.6 With the intention of automating reading of Electronic Tri-Vector Meters (ETVM), the Company decided (November 2003) to introduce computerised RRAMR System, under the APDRP scheme. The project envisaged coverage of all existing and future HT and LT installations (above 40HP), estimated at 10,000 to be completed in five years. Apart from automatic reading and transmission of consumption data, RRAMR provided for theft alarms, malfunctioning alerts, *etc.,* along with capabilities to download meter readings on-line to a central server and analysis of consumption patterns. The real-time data from the ETVM transmitted by RRAMR through phone / wireless lines to the Company Server was proposed to be utilised for computerised billing and other analytical purposes.

In January 2004, Yokogawa India Limited, Bangalore (YIL), selected through a tendering process, was awarded the work of providing RRAMR systems on a Build-Own-Operate and Transfer (BOOT) basis. According to the contract, the work was to be completed in six months for existing HT / Low Tension (LT) meters (two months for HT) and the systems maintained for five years by YIL. At the end of the contract period of five years, the RRAMR system will be transferred to the Company at the agreed transfer price of Rs. 10 lakh. The charges payable for the services were fixed at Rs. 264 per installation per month for providing billing data and Rs. 176 per installation for providing data relating to load, tampering of the meter, surveillance reports, *etc.*, of any installation against specific request from the Company. Though the work was to be completed by the end of February / July 2004, the installation of RRAMR system was put into commercial operation partially from April 2005.

Deficiencies in the functioning of RRAMR

2.3.7 Audit observed the following deficiencies in the functioning of the RRAMR systems, which adversely affected the implementation of remote meter reading project.

(i) To access and transmit the consumption data, the modem fitted to each ETVM required an interface patch known as the 'meter protocol'. As per the agreement, YIL had to obtain the protocol from manufacturers of ETVMs. However, YIL could not obtain the protocol from one manufacturer who supplied ETVM, there by, leaving nearly

48 *per cent* of ETVM inaccessible (December 2007) for remote reading.

(ii) Though YIL proposed to install intelligent modems to the meters to overcome the protocol problem, installation of these modems could not be completed so far and the RRAMR system continued to be operated only partially even after three and a half years. The HT readings could be obtained through the system only in respect of 2,974 out of 5,763 installations (December 2007).

(iii) The number of readings logged through RRAMR differed from month to month. The reasons attributed for such inconsistencies were omission / repetition in reading due to crossing / overlapping of billing periods, failure of power supply to modems / controllers, problems with infrared interface of controller and ETVM, *etc.,* These reasons indicated that the system was prone to errors, inconsistent and unreliable.

Incomplete coverage led to continuance of manual meter reading.

(iv) Since the entire HT installations could not be covered under RRAMR, the Company continued the manual system of readings of 100 *per cent* of HT installations so far, resulting in excess deployment of manpower and other resources. The fact that it relied upon the manually collected readings for monthly billings, indicated non-achievement of objectives of the automated system.

(v) The data obtained through the system was not used for generating MIS Reports and for statistical analyses that could improve services. Further, the RRAMR data received by the Server could not be interfaced with the BillNet for automatic generation of bills. The readings were obtained from the RRAMR Server in Excel spreadsheets and ported to the BillNet. This not only led to duplication of work but also provided scope for data entry errors and manipulations.

(vi) Remote meter reading of Feeders located in sub stations, which was also included in the scope of the contract, could not be fully achieved.

The objective of the project could not be realised in spite of spending Rs. 2.20 crore and lapse of more than four years.

Thus, even after spending Rs. 2.20 crore towards service charges during February 2004 to March 2008**,** the Company was not successful in achieving the expected results out of the RRAMR project. The failure to overcome technical problems resulted in continuance of manual reading of a substantial proportion of meters and non-achievement of the objectives of project.

The Government stated (September 2008) that intelligent modems and GPRS technology are being installed to overcome the problems and RRAMR systems have been installed in 4,370 HT installation (68 *per cent*). The fact however, remained that the company was yet to bring the balance 32 *per cent* HT installations under RRAMR so far to realise the objectives of the project.

Network Connectivity

2.3.8 The requirement of network connectivity between all the field offices and the Corporate Office was a vital factor for carrying out many of the on-line computerised operations such as:

- the billing functions through the BillNet module;
- revenue collection through remote kiosks and other citizen service centres such as Bangalore One / KaverEcom;
- updating of data for MIS reports through various computerised systems in use;
- for providing direct link to designated Banks for collection of revenue.

Each of the 104 (39 Urban and 65 Rural) sub-divisions were therefore to be provided with connectivity to the database on the central server located at the Corporate Office in Bangalore. With this objective, the Company undertook various initiatives to provide connectivity through different means like Direct Subscriber Link, Virtual Local Area Network, broadband, managed lease line *etc.,* at different stages. Audit scrutiny revealed that none of the initiatives was successful so far in realising the objectives as discussed below.

DSL and ISDN connections had to be abandoned resulting in unfruitful expenditure of Rs. 38.91 lakh.

2.3.9 To provide connectivity to the offices in the urban zone, DSL (Digital Subscriber Line) connectivity was implemented (September 2003) through a private service provider in 42 urban locations at a cost of Rs. 34.23 lakh. Additionally, ISDN (Integrated Services Digital Network) connectivity was provided to 13 other locations through Videsh Sanchar Nigam Limited, by spending Rs. 4.68 lakh. Though the DSL and ISDN connections at these 55 locations were in use for a period of one year and ten months, *i.e.,* up to May 2005, recurring problems such as unstable connectivity, disruptions during monsoon, security risks and virus attacks, *etc.,* were reported. As on-line transfer of data could not be carried out without interruptions, manual transfer through floppies and other media to the corporate office had to be undertaken. In view of the frequent difficulties encountered, the Company decided to discontinue these services and opt for other alternative modes for better connectivity.

The Government stated (September 2008) that the performance review appraisal and other reviews were carried out using the facilities and this was the best means of connectivity available at that time. The reply is not acceptable as the interruptions in the services, intermittent use did not justify the investment and the services defeated the objective of providing online connectivity.

V-LAN could not be utilised even after investing Rs. 26.96 lakh.

2.3.10 To provide connectivity between the Corporate Office and unit offices in the rural areas, a decision was taken (August 2003) to provide 64 kilo bits per second (kbps) Virtual Local Area Network (V-LAN) in 18 rural offices, in the first phase. The work order was placed with Bharat Sanchar Nigam Limited (BSNL) during January 2004, at a cost of Rs. 27 lakh, with a period of one month for completion. It was, however, implemented in only 15 offices at a cost of Rs. 26.96 lakh and there were delays of one to six months due to technical faults, absence of link to telephone exchanges, incomplete cabling works, *etc.* In August 2006, the V-LAN connections of 10 locations were cancelled and Broadband connections were provided. The connections of rest of the five locations were proposed to be shifted to the Corporate Office / other offices but these connections were finally cancelled due to restrictions on inter-city shifting of leased lines. Thus, these five locations remained without connectivity from then onwards, which affected the utilisation of the on-line system resulting in wasteful expenditure to that extent.

The Government stated (September 2008) that payment was made only towards commissioned lines and the facility was used to transfer MIS data to corporate office. The fact, however, remained that only 10 locations could be connected out of 18.

The very purpose of ISDN connections as back-up was defeated.

2.3.11 To connect Corporate Office with all other offices in the urban zone and for the integration of the urban and rural connectivity, the Company placed work orders with BSNL (January 2005) to establish Managed Leased Line (MLLN) connections in 56 locations and ISDN-Basic Rate Interface (BRI) connections at 39 sub-divisional offices as a back up. In addition, ISDN-Primary Rate Interface connections and an Internet Leased Line for Corporate Office was also provisioned. The total cost of the project was Rs. 94.93 lakh. BSNL had also demanded Rs. 54.78 lakh towards 'one-time' charges for networking components, racks and overhead charges, of which, 70 *per cent* was paid. The Company also procured 63 units of racks, at their cost, from BSNL at a cost of Rs. 4.70 lakh. The work was completed in May 2006.

The MLLN facility was intended mainly to ensure reduced downtime by enabling quick rectification of faults. However, a survey conducted by consultant (M.N. Dastur & Co) revealed that the downtime between July 2006 and December 2006 in various locations ranged from a minimum of five hours to a maximum of 1,639 hours (68 days). The throughput in the leased lines was inconsistent and cases of fluctuations in connectivity were reported from many locations, severely affecting the functions at the sub-divisions as well as disrupting the on-line revenue collection activity.

The ISDN-BRI back-up connectivity was provided to only seven out of 39 sub-divisions. BSNL stated (May 2006) that the rest of the connections were not possible due to the disconnection of many telephone lines for non-payment of dues by the Company and also that the project could not be executed as more than a year had lapsed since placing of the work order.

Thus, selection of various modes of connectivity without evaluation of their feasibility led to repeated changes and discontinuance of facilities after investment of over Rupees two crore. Frequent interruptions in connectivity resulted in sub optimal utilisation of the computerised systems.

The Government stated (September 2008) that core router downtime was minimal and downtime rebates were claimed for disruptions. However, the very purpose of provision of ISDN connections for use as a back-up line during downtime of MLLN was thus defeated rendering the investment unproductive.

Billing and Collection Software module (BillNet)

2.3.12 With the aim of achieving generation of 100 *per cent* accurate bills, Demand, Collection and Balance (DCB) reports at any given time and dispensing of manual system of billing / ledger maintenance, Zygox Infotech Private Limited, Bangalore (ZIPL) was awarded (September 2003) a contract for re-designing the existing billing software which was to be completed in three months. ZIPL was also entrusted with the maintenance of billing data for two years. The total cost of the project was Rs. 43.20 lakh. ZIPL developed a new software package called as BillNet in November 2005, which was modified and implemented for HT billing in January 2007. The software featured enhanced security and user interface, simple administrative tools, exhaustive reports, option to integrate with electronic meter reading instruments and transformer energy audit system. The billing using the software started from the month of February 2007.

2.3.13 Inadequacies in the software

(i) Though the BillNet software was introduced for HT billing in February 2007, the generation of bills for 100 *per cent* of the HT installations has not been achieved so far (July 2008).

(ii) The consumption data from RRAMR was provided by YIL in Excel spreadsheets, which were ported, to BillNet by the ZIPL personnel at the HT Cell Server. The missing data pertaining to HT installations where RRAMR systems were not working were being fed afresh from the manual readings in BillNet system.

(iii) The details of Security deposits collected at the time of initial service connection and the interest to be paid to the consumers were maintained at sub-divisions manually. Though the BillNet module had a provision for calculating and maintaining the database with reference to Security Deposit, the same was not being utilised.

(iv) The consumer ledgers were maintained in the sub divisions manually. The computerised billing and collection data available in the Central Server in Corporate Office / HT cell did not contain master data of consumers for earlier periods due to failure of sub-divisions to furnish the same. As a result, maintenance of complete consumer ledger electronically was not achieved. This defeated the very purpose of computerisation.

(v) The BillNet software did not have the provision for generating HT bills with differential tariff like Time of the Day (TOD).

(vi) In cases where bill had to be generated in two parts, (in the event of change in Demand) the program calculated the first part of the bill, adopted that figure as arrears and automatically levied penal interest for that portion. In such cases, the interest erroneously calculated had to be reversed manually and the revised bill generated. It was stated by the Government that the defect has since been corrected by ZIPL (September 2008).

(vii) An analysis of data of one year (January 2007 to January 2008) revealed that there were 7,444 records related to cancellation of bills, carried out by users who were not authorised. It was stated that most of the cancellations were resorted to when the bills were required to be regenerated to correct the mistakes and the service providers carried out corrections from the back-end. This also indicated that the software did not incorporate all business requirements pertaining to data security.

2.3.14 Security lapses in the software

(i) The front end of the application did not have provision for bill cancellation and powers to access the database directly were provided only to Assistant Accounts Officer (AAO) level officers. This was not a good practice looking at the requirements of IT security. Further, it was seen that corrections in bills were carried out by unauthorised personnel through the back end without creating any audit trail.

(ii) The master data tables were also accessible to different users apart from the AAO level officers which was not desirable. It was also noticed from the history of the Consumer Master Table, that changes were effected to the basic information of HT consumers by users other than those authorised.

(iii) The time and date stamps in data tables contained User IDs of those users who had already been transferred from the unit office. This was a security lapse as unauthorised changes could be made by these ex-users.

(iv) Investigation into a case of misappropriation with respect to LT database at one sub-division (June 2007), revealed that the crime was committed in connivance with the outsourced personnel from ZIPL, who had unrestricted access to the central database. As the complete control of the database has not been taken over by the Company, the HT database was also vulnerable to such risks.

(v) A case of unauthorised alteration, purportedly committed by a staff member, in the status of 60 LT installations – from ‘active’ to ‘dismantled’ - which would have led to non-collection of revenue to the tune of Rs. 19.89 lakh, was detected in one sub-division (October 2007). Such instances cannot be ruled out in the HT database in the absence of adequate security measures.

Manuals and Source Code

2.3.15 As per the contract, ZIPL was required to submit deliverables such as system manuals, user manuals, source code, Flow chart diagram *etc*. It was, however, noticed that these deliverables were not available in HT cell / sub-divisions.

Lack of user training

2.3.16 As per the contract terms, ZIPL was required to provide user training to the staff of the Company. Audit observed that the vendor had neither imparted any training to the users nor given any training notes. The work was being carried out at HT Cell / sub-division level purely based on the work experience and practice. The personnel of ZIPL were still carrying out most of the billing functions at the HT Cell.

IT Controls

Access Controls

2.3.17 A review of the access controls revealed that the Company has not formulated and implemented a password policy and the User Identification (IDs) and passwords set at the time of installation in the case of BillNet software have not been changed so far. The Government stated (September 2008) that the user IDs and passwords of those who are not working in the HT Cell have been disabled.

In the absence of the well-defined authentication procedure for user identification, it could not be ensured that the users with appropriate access permission alone had carried out the modifications in data.

Non-segregation of duties and responsibilities

Responsibilities of IT personnel were not segregated.

2.3.18 The Company had not formulated a policy for defining user roles and segregation of duties. The database on billing and collection was maintained and operated by personnel of ZIPL, who had absolute access to the entire system. In the computer wing of the corporate office as well as in HT cell and sub divisions, specialized IT personnel did not exist for different / specific roles.

Change Management Controls

Change Management policy was not formulated.

2.3.19 There was no documented procedure for effecting changes in the program. The changes in the business rules were incorporated in the program by ZIPL personnel (in the case of BillNet), without any formal authorisation from the competent authority. For different versions of the program released periodically, a master copy was not maintained in program library to ensure that the amendments to the software were authorised, tested and accepted.

The History of program amendments indicating briefly the reasons for effecting changes in the program, the modules affected, the effective data of production run were not kept for reference and record in the archives. The details of operating version of the program were also not maintained.

Business Continuity

Business Continuity policy was not formulated.

2.3.20 There was no documented Business Continuity Plan, detailing the back up and recovery procedures. Although the corporate office issued back up procedures, there was no monitoring to ensure its compliance. There was no external / off site storage of back ups. The back ups taken are stored in a folder in the same server. No logs were also maintained to ensure that they were subjected to periodical test checks and the data recovery was successful.

The Government stated (September 2008) that it has allotted a Disaster Recovery site in the State Data Centre (SDC) and testing of automatic transfer of data for back up from the Company to SDC is being carried out. The fact however, remained that no back-up data was available for the periods from the day of computerisation so far.

Audit Controls

2.3.21 The staff of the Internal Audit wing of the Company has not been trained to audit in a computerised environment. During the test check of the HT billing transactions of a sub division, it was observed that no internal audit had taken place in that sub division since its formation in 1999.

IT Security Policy

IT Security policy was not formulated.

2.3.22 The Company had not formulated and documented an IT Security Policy to ensure security of IT assets. Although the BillNet software was in use in HT Cell from January 2007, no validation by external agency had been conducted so far. Periodic review of security threats to the hardware and data / information has not been conducted to implement suitable control measures to safeguard IT assets. The Government stated (September 2008) that third party validation of billing software has since been entrusted to an agency and their report was awaited.

IT Strategy / Policy

A comprehensive IT strategy and policy were not formulated.

2.3.23 Though the IT initiatives started in September 2003, the Company was yet to formulate and document the IT policy with regard to the implementation of IT projects in a comprehensive manner. Further, it has also not formulated the IT strategy incorporating the period, targets, key performance indicators and cost benefit analysis for development and integration of various systems.

The Government stated (September 2008) that IBM has been entrusted with the work of formulating the IT strategy and the IT section of the Company has been re-constituted as per their report. The reply confirmed the fact that the IT initiatives so far implemented were not based on any documented IT strategy.

Conclusion

- **The on-line initiatives like RRAMR and connectivity area were fraught with interruptions on account of technical problems resulting in partial achievement of the objectives of**

computerisation. The initiatives were undertaken without a full appreciation of the constraining factors.

- **Total dependency on external agencies had led to data security lapses and loss of control over critical information.**

- **Connectivity problems hampered the optimum utilisation of remote meter readings systems and consequent under-utilisation of IT facilities created.**

Recommendations

- **Action may be initiated to connect all HT installations under the RRAMR system, by establishing connectivity to ensure uninterrupted data flow.**

- **A formal Service Level agreement may be entered into with the service providers for connectivity to ensure uninterrupted services.**

- **The Company may formulate IT security policy for the security of IT assets and take over control of the database by appointing qualified DBA and other trained staff.**

- **There is need for review and implementation of adequate logical access controls and change management controls.**