CHAPTER-III

PERFORMANCE REVIEW RELATING TO STATUTORY CORPORATION

3 TAMIL NADU ELECTRICITY BOARD

EXECUTION OF BHAVANI KATTALAI BARRAGE-I HYDRO ELECTRIC PROJECT

HIGHLIGHTS

The Board accorded adminisrative approval for commissioning the Bhavani Kattalai Barrage-I Hydro Electric Project with an installed capacity of 30 MW at a total cost of Rs.90.62 crore within 36 months from July 1997. There was time overrun of six years in completion of the project.

(Paragraph 3.1)

Delay in commissioning of the project led to potential generation loss of 394.41 MUs of power and extra expenditure of Rs.8.91 crore on exchange rate variation.

(Paragraphs 3.7 and 3.11.1)

The project suffered a cost overrun of Rs.125.63 crore resulting in increase in cost of power generation from the envisaged 203 to 439 paise per unit, and in the per MW cost from Rs.3.02 crore in 1995-96 to Rs.7.21 crore in 2005-06.

(Paragraph 3.8.1)

Introduction

3.1 The composite project of Bhavani Kattalai Barrages Hydro Electric Project Stage-I (BKBHEP Stage-I) comprising three barrages with a total installed capacity of 90 mega watt (MW) was initially conceived in 1984 at an estimated cost of Rs.78.67 crore (at 1982-83 price level). The project envisaged power generation along the course of Cauvery river as a run of the river scheme utilising the irrigation releases from the Mettur dam and contributory flow from the Bhavani river by making use of the nine meter bed fall available at three places below the confluence of Bhavani river. The project, however, could not be formalised as it involved inter State issues that could not be resolved. In the meantime, the Government of India (GOI) notified (October 1994) that projects costing less than Rs.100 crore need not be forwarded to the Central Electricity Authority (CEA) for its clearance. After this, the Board split the composite project (1995) into three distinct projects each with a capacity of 30 MW and decided to implement one of the three projects.

The project *viz*., Bhavani Kattalai Barrage-I Hydro Electric Project (one out of the three projects) with an installed capacity of 30 MW (two units of 15 MW each) was estimated to cost Rs.90.62 crore at 1995-96 price level. The State Government approved the project in January 1997 and the Board gave administrative approval in July 1997. The project work commenced in July 1997 and was expected to be completed within 36 months *i.e*., by June 2000. One unit of 15 MW was commissioned on 1 August 2006; the second unit is yet to be commissioned (August 2006). Total expenditure of Rs.216.25 crore had been incurred on the project till March 2006.

Scope of audit

3.2 The performance audit of the project was conducted during December 2005 to April 2006 covering aspects such as execution of the project, funding of the project and contractual matters. The Audit reviewed the records maintained in the following offices of the Board connected with the execution of the project.

- The Chief Engineer (Civil Designs);
- The Chief Engineer (Project – Electrical and Machinery);
- The Chief Engineer (Investigation);
- The Chief Engineer (Hydro Projects – Execution);
- The Superintending Engineer (Civil Hydro Projects – Execution);
- The Superintending Engineer (General Construction Circle); and
- The Superintending Engineer (Generation).

In addition, records at the Headquarters of the Board were also scrutinised.

Audit objectives

3.3 The audit was conducted with a view to ascertain whether:

- the project was implemented efficiently;
- an adequate and effective monitoring mechanism was in existence;
- funds were arranged economically and were utilised economically; and
- the execution of work was as per the terms of the contracts and agreement entered into.

Audit criteria

3.4 The audit criteria considered for assessing the achievement of audit objectives were:

- The estimated cost of the project envisaged in the Detailed Project Report (DPR);
- Scheduled date of commencement and commissioning of the project;
- PERT charts/CPM* prescribed for monitoring of the project;
- The terms and conditions of grant of loans by the lenders; and
- The terms and conditions of various contracts/agreements entered into by the Board for execution of the works.

Audit methodology

3.5 Audit reviewed the records relating to the projects in the seven offices as mentioned in Paragraph 3.2. The methodology adopted for attaining the audit objectives were:

- examination of DPR and PERT charts/CPM prepared for monitoring the progress of the project;
- examination of loan agreements entered into with the lenders;
- examination of records relating to tendering, evaluation and award of contracts;
- examination of documents relating to execution of the contracts; and
- issue of audit observations and interaction with the management.

Audit findings

Audit findings emerging from the performance review were reported to the Board/Government in June 2006 and discussed in the meeting of the Audit Review Committee on Public Sector Enterprises held on 8 August 2006. The

*PERT-Programme Evaluation and Review Technique
CPM-Critical Path Method

Under Secretary, Energy Department, Government of Tamil Nadu and the Member (Generation) and Member (Accounts) of the Board attended the meeting. The views expressed by the management and Government during the said meeting have been taken into consideration while finalising the review.

Audit findings are discussed in the succeeding paragraphs.

Project monitoring

3.6 Inspection of the field offices by the higher officers of the Board and monitoring of the project using the Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), etc are some of the controls commonly used to monitor progress of work. In this particular project, the Chiefs of the executing wings connected with the project carried out inspection of the project work relating to their respective areas of work only without coordinating with the others. For instance, the Chief Engineer (Civil Designs) monitored the civil works only and the Chief Engineer (Projects) monitored the electrical and machinery works. The Chief Engineer (Hydro Projects) confined himself to monitoring the execution part of the project work. An overall coordinating mechanism was absent throughout the full period of implementation of the project, resulting in abnormal delays in completion of the works.

The DPR prepared by the Board in 1995 included a "Bar Chart" indicating the various milestones commencing from "preliminary works and land acquisition" to "testing and commissioning of the generating equipment", besides setting up of the facilities for transmission and distribution of the power generated. The entire project which consisted of seven major packages, *viz*., Barrage civil works, Barrage gate works, IT-DT gates, Power House sub-structure, Power House super structure, Generating machinery and Electrically operated Overhead Travelling (EOT) crane, was to be completed within 36 months. However, due to ineffective supervision of the work, the Board had to convert (May 1999) the Bar chart into PERT chart and revised the completion time to 54 months. Subsequently, the PERT chart was revised three times in October 2004, December 2005 and March 2006 correspondingly increasing the completion schedule to 76, 90 and 96 months respectively. The Board could not adhere to these revised schedules indicating lack of effective control over the execution of work and at no stage were the reasons for the delays analysed at the Board level. Absence of effective project management and monitoring was also evident from the fact that none of the seven major packages was completed within the time schedule envisaged in the DPR as discussed in the subsequent paragraphs.

The Government stated (August 2006) that during actual execution, the co-ordination among the various functionaries of the Board as contemplated could not be achieved cent *per cent*. The Board stated that the improbabilities occurred during tendering, legal problems cropped up during finalisation of tenders and site problems encountered during actual execution of work led to extension of time for each package, which occurred inadvertently.

Time overrun

3.7 The DPR for the composite project of 90 MW was sent to CEA in March 1984 for clearance, suggesting location of the power house on the right flank of the Cauvery River considering the aspect that the major District Road ran on the right flank and also due to the logistical reasons for the transport of heavy duty machines during the execution of the project. The Board, after sending the DPR of the composite project to CEA, obtained a soil survey report from the Geological Survey of India (GSI) in 1985. The soil survey report indicated the left flank of the river as the preferred location of the power house. In spite of this report, the Board retained the location of the power house at the right flank while preparing the DPR in 1995-96 for the split project of 30 MW and commenced the execution of the project as such.

Despite the recommendation of the Geological Survey of India to locate the power house at the left flank of the river, the Board continued with preliminary works to locate the power house at the right flank, which was ultimately changed to the left flank.

During the execution stage, the Board again obtained a report from GSI in September 2000, which reiterated their earlier recommendation to locate the power house at the left flank. Consequently, the Board decided (September 2000) to change the location of power house to the left flank. This decision to change the location of the power house rendered the efforts made till then redundant. All the preliminary works of geo-technical investigations, survey, *etc*., were to be done afresh resulting in a time overrun of more than three years.

The following table indicates the scheduled and actual dates of completion of the seven major packages in the execution of the project and the time overrun.

(In months)

Sl. No	Package		Time scheduled as per DPR	Actual time taken	Time overrun
1.	Barrage civil works	Award	6	28	22
		Execution	15	47	32
2.	Barrage gate works	Award	6	36	30
		Execution	9	22	13
3.	Intake and draft tube gates	Award	9	58	49
		Execution	15	24	9
4.	Power House sub-structure	Award	6	32	26
		Execution	12	46	34
5.	Power House super structure	Award	6	41	35
		Execution	6	25	19
6.	Generating machinery	Award	9	36	27
		Execution	18	60	42
7.	EOT crane	Award	9	9	---
		Execution	12	16	4

As could be seen from the above table, there were abnormal delays in execution of the works some of which are discussed in the succeeding paragraphs.

Barrage civil works

- The commencement of work relating to framing of the Draft Tender Specification (DTS) and award of the contract was delayed by 22 months as against the target of six months.
- The execution of the work was completed in 47 months as against the target of 15 months. The delay was due to non-release of drawings by the CE (Civil Designs) for two piers, non-release of drawings for hold-on-top for all the piers, non-release of work front by the other agencies *viz.*, Barrage Gate works and IT-DT gate works contractors and delay in approval of the design drawings of Road Bridge Girder.

Barrage gate works

- As against six months prescribed 13 months were taken to initiate the work on the preparation of DTS and a further 23 months were taken to award the contract.
- The execution of the work was delayed by five months due to non-release of work fronts by other executing agencies and eight months due to the excess time schedule allowed in the agreement for which no justification was available.

Intake and Draft Tube gates package (IT/DT package)

- There was a delay of 29 months in the initiation of preparatory works. After initiation, further 29 months as against nine months were taken to award the contract.
- There was delay of nine months in the execution of the work due to non-release of the work front by the barrage civil works contractor.

Power House sub-structure

- The time overrun in this package was 26 months due to delays in decision to split the work (16 months), finalisation of drawings (seven months) and in awarding of contract (three months) as against the target of six months. As the Board had adequate experience in constructing four similar hydro electric projects in the same river course, the delay of 26 months in taking decision on awarding the work either on a composite basis for the three packages (*viz.*, sub-structure, super structure and EOT crane works) or on split up basis cannot be justified.

Power House super structure

- There was a time overrun of 35 months in the award of contract due to delay in taking a decision to split the work (26 months) as discussed in

the previous paragraph, preparation of DTS (nine months) and evaluation and award (six months) of the contract by various authorities of the Board.

- There was delay in release of work fronts for 16 months due to delay in the execution of power house sub-structure.

Supply of generating machinery

- 11 months were taken to approve the DTS and a further 25 months were taken for finalising the technical aspects and hydraulic details as against the target of nine months for awarding the contract by the Board.
- During the execution, 14 months were taken by the Board to approve the civil drawings and 20 months for opening of the Letter of Credit (LC) for import of machinery and witnessing the model test. The contractor delayed the supply of stay rings, a vital component, by 10 months and took 16 months to erect the generating equipment as against the target of 18 months.

These delays occurred despite the fact that the executing agencies of the Board [CE(Civil Designs) and CE (Project-Electrical and Machinery)] were in an advantageous position after having executed four such similar up-stream projects, *viz*., LMHEP[#]-I to IV and were also familiar with the terrain details/conditions. Delay in the commissioning of the project, deprived the State of 394.41 MU of potential generation during the period 2000-01 to 2005-06 (computed with reference to the actual quantum of water discharged from LMHEP-I to IV during this period).

In spite of inordinate delays in the initiation of work, award of contracts and execution of works, the Board did not, at any stage, evaluate the status of work with reference to the time schedule prescribed in the DPR and initiate corrective action for speeding up the work. This was evident from the fact that the revisions of PERT chart, warranted by the delays in completing the project work, were neither approved by the Member (Generation) nor brought to the notice of the Board.

The Government stated (August 2006) that the major reasons for time overrun were shifting of power house from right to left flank, bottlenecks in land acquisition, problems faced in tendering, problems posed by steel suppliers and problems in supply of generating machinery.

The reply is not acceptable as the Board did not conduct the soil survey before the preparation of DPR. Instead, the Board followed the past practice of having the power house located at the right flank as in the other four similar projects (LMHEP I to IV) in the same river course. On receipt of subsequent soil survey report from the GSI, it had to shift the location of the power house from right flank to left flank. The other reasons adduced by the Board were

[#] Lower Mettur Hydro Electric Project

controllable in nature, and could have been avoided with proper planning and monitoring.

3.8 Thus, there was an overall time overrun of six years in the execution of this project. This time overrun led to cost overrun, non-availability of interest subsidy, extra expenditure on account of exchange rate variations, escalation, etc. as discussed in the succeeding paragraphs.

Cost overrun

The project suffered a cost overrun of Rs.125.63 crore resulting in increase in cost of power generation from the envisaged 203 to 439 paise per unit, and in the per MW cost from Rs.3.02 crore in 1995-96 to Rs.7.21 crore in 2005-06.

3.8.1 As per the initial estimates, the project was estimated to cost Rs.90.62 crore at 1995-96 price level. The Board revised the project cost three times to Rs.143.53 crore (1998-99 price level), Rs.194.53 crore (2002-03 price level) and Rs.203.47 crore (2004-05 price level). As against these estimates, an expenditure of Rs.216.25 crore had been incurred up to March 2006 (including interest during construction) on the execution of the project. The inordinate time overrun in the execution of the project increased the envisaged cost of generation from 203 paise in 1995-96 to 439 paise in 2005-06. The per MW cost had also increased from Rs.3.02 crore in 1995-96 to Rs.7.21 crore in 2005-06, which is very expensive for a hydro electric project. Also the benefit cost ratio of this project, which was 0.74 at DPR stage (1995) decreased to 0.67 in 1998 and to 0.66 in 2006 against the preferred level of unity.

The estimated cost of the various packages of the contract, the cost escalation and the percentage increase in the cost are tabulated below:

(Rupees in crore)

Sl. No	Components	Estimated cost as per DPR	Actual expenditure as on 31 March 2006	Expenditure over and above estimate (4)=(3-2)	Percentage increase as compared to DPR (5)=(4)/(2)
	(1)	(2)	(3)	(4)	(5)
1.	Land	2.61	5.55	2.94	113
2.	Barrage civil works	10.00	12.86	2.86	29
3.	Barrage gate works	5.54	11.11	5.57	101
4.	Power House sub-structure	6.75	21.82	15.07	223
5.	Super structure	2.50	2.57	0.07	3
6.	Generating Machinery	46.35	96.40	50.05	108
7.	Electrically operated Overhead Travelling crane	0.74	1.50	0.76	103
8.	In Take and Draft Tube gates	1.52	4.33	2.81	185
9.	Buildings/Roads	2.03	4.75	2.72	134
10.	Cost of Power House transformer/ transmission and distribution	3.09	1.81	---	---

Sl. No	Components	Estimated cost as per DPR	Actual expenditure as on 31 March 2006	Expenditure over and above estimate (4)=(3-2)	Percentage increase as compared to DPR (5)=(4)/(2)
11.	Tools and plants	0.85	0.06	---	---
12.	Establishment and miscellaneous	8.64	19.29	10.65	123
13.	Interest During Construction	---	34.20	--	---
	TOTAL	**90.62**	**216.25**	**125.63**	**139**

The major reasons for increase in cost were:

- Delay of two to six years (from the date of commencement) in awarding the major works *viz*., Barrage civil works, Power house sub-structure, Power house super structure and supply of generating machinery.
- Lack of effective control over the completion of various packages (as discussed in Paragraph.3.6).
- Payment on account of exchange rate variation (Rs.8.91 crore) due to delay in opening of Letter of Credit by the Board (refer Paragraph.3.11.1).
- Extra expenditure (Rs.2.18 crore) due to excess use of steel (discussed in Paragraph.3.15)
- Additional item of work "River course training work" not envisaged in the DPR was executed at a cost of Rs.2.53 crore.
- Interest during construction to the tune of Rs.34.20 crore was not estimated in the DPR.

Project funding

3.9 The Board decided (July 1997) to avail loan assistance from Power Finance Corporation Limited (PFC). PFC sanctioned (August 1999) Rs.77.60 crore, being 50 *per cent* of the then estimated cost of Rs.155.34 crore (1999-2000 price level). The Board decided to meet the remaining project cost from its own funds.

Extra expenditure due to non-availability of subsidy

3.10 The Board availed (August 1999) financial assistance of Rs.77.60 crore from PFC for the execution of this project at an interest rate of 15 *per cent per annum*. As per the loan agreement entered into by the Board with PFC, the project was to be completed in all respects by 31 December 2002. PFC informed (July 2000) the Board that the project would be eligible for interest subsidy of four *per cent per annum* under the Government of India's (GOI) Accelerated Generation and Supply Programme (AG&SP),

provided the same was completed within the committed time schedule *viz*., by December 2002. GOI reduced (April 2002) the interest subsidy under this scheme to three *per cent* with effect from 1 April 2002 and also imposed pro-rata reduction in subsidy for delays in commissioning. As per the GOI notification, the projects that were delayed beyond 85 *per cent* would not be eligible for interest subsidy under AG&SP and the reduction/withdrawal of interest subsidy would be effective from the actual date of commissioning or the date of 85 *per cent* of delay, whichever event occurred earlier.

PFC was extending the interest subsidy of four *per cent* (up to 31 March 2002) and three *per cent* (from 1 April 2002) to the Board on the financial assistance availed by it. It was noticed during audit that the delay in the execution of this project had exceeded 85 *per cent* in November 2005 and as such the Board would not be eligible for any further interest subsidy under the AG&SP scheme on the loan amount outstanding as on 1 January 2006.

The Government stated (August 2006) that the effective rate of interest for the loan amount was 6.25 *per cent* after availing the subsidy at 3 *per cent* and that the interest had been paid at this rate only till March 2006. The reply is not relevant as the Government has not commented about the non-availability of subsidy (of Rs.6.33 crore) from 1 January 2006 till the completion of the project due to delay in commissioning of the project.

Extra expenditure on exchange rate variation

3.11.1 The Board awarded (July 2001) the work of design, manufacture, supply, erection, testing and commissioning of 2X15 MW generating units to the consortium of Litostroj and Koncar at a lump sum price of Euro 1,49,94,528 plus Rs.20.25 crore equivalent to Rs.85.86 crore in all, at an exchange rate of one Euro=Rs.43.75. The supply and erection of the equipment were to be completed by 29 January 2003 and 29 July 2003 respectively. As per provisions in the purchase order, the Board would bear exchange rate variation (ERV) up to a maximum of five *per cent* of cost, insurance, freight (CIF) value of the imported components.

Delay in commissioning of the project led to extra expenditure of Rs.8.91 crore on account of exchange rate variation.

Due to delay in opening of operative LC because of ignorance of the procedural formalities in obtaining clearance from the Ministry of Surface Transport and delay in witnessing of model test by the representatives of the Board**,** the consortium could not start manufacture of the machinery and supply the same by the due date. As the delay was on its part, the Board extended the delivery schedule for supply to 29 October 2003 and the consortium supplied the entire machinery, except stay rings, within this extended delivery schedule. Because of the steep increase in the exchange rate of Euro currency during this period, the Board paid an ERV of Rs.11.48 crore as against Rs.2.57 crore provided in the purchase order (being five *per cent* of CIF value of imports). This resulted in avoidable extra expenditure of Rs.8.91 crore.

3.11.2 The machinery supply contract included model test of the machinery in the presence of the Board officials and this was a pre-requisite to manufacture the machinery. The contractor intimated (September 2001) the Board of its

readiness to perform the model test and requested the Board to witness the model test in the last week of October 2001. The Board witnessed the model test on 13 December 2001 only because of the delay in the completion of the formalities like obtaining of 'No Objection Certificate' from Government of Tamil Nadu, Passport, Visa of the officers of the Board, etc. for trip to Slovenia. The contractor submitted (February 2002) the invoice for Euro 10.23 lakh, equivalent to Rs.4.47 crore for the model test. Due to delay in opening of the operative LC for the above payment and its protracted correspondence with the machinery supplier over the admissibility of ERV, the Board paid (July 2002/June 2005) Rs.4.99 crore (based on exchange rate prevalent on the date of payment).

The Government stated (August 2006) that the extra expenditure on exchange rate variation was due to its regulation as per the contract and due to steep increase in exchange rate of EURO, which were beyond the control of the Board. The reply is not tenable as the delays were mainly procedural in nature and, therefore, the Board could have avoided the extra payment of Rs.52 lakh.

Payment of escalation

3.12 The Board awarded the execution of contracts of Power House Sub-structure (July 2002), Power House Super structure (April 2003) and IT-DT gates (May 2003) on a firm price basis. Because of the delay on the part of the Board like belated issue of excavation drawings, delay in issue of steel and non-release of work fronts, the execution of these works got delayed and could not be completed within the scheduled date of completion. The Board had to pay escalation aggregating to Rs.45.11 lakh (including undue benefit of Rs.34.06 lakh to a contractor as discussed in para 3.13) despite the fact that these contracts were awarded on firm price basis.

3.13 In contracts that are awarded on firm price basis, if any escalation is to be paid for the delayed period, the same should be paid based on the price index difference between the date of scheduled completion and the actual date of completion. The Board, however, paid escalation in respect of the above three works based on the price index difference between the tender date and the actual date of completion. This resulted in an undue benefit of Rs.34.06 lakh to the contactors.

The Government accepted (August 2006) that the Board paid escalation taking the tender date as the base date and stated that it would be advantageous to the Board cost-wise and time-wise instead of going in for termination and re-tendering. The reply is not acceptable as the payment of escalation with reference to tender date resulted in undue benefit to the contractor since the contractor would have taken into account the possible escalation during the scheduled period of execution of work, while quoting for the work.

Execution of works

Extra expenditure on River Training Works

3.14 In order to counter the site specific problems and to achieve the installed capacity of 30 MW, the Board decided to conduct a complete physical model study of the project and entrusted (September 2000) this study to the Centre for Water Resources (CWR) of Anna University, Chennai. This item of work was not envisaged in the DPR. CWR submitted its final report in November 2003 and recommended execution of tail race channel for an additional stretch of 1,140 meters. The project office prepared an estimate of Rs.2.81 crore (2003-04 price level) for this work and the Board accorded administrative approval and technical sanction in March 2004.

Based on the above approval and sanction, the Board called for open tenders (July 2004) for the above work. The Board received three offers but the Board Level Tender Committee (BLTC) rejected the offers and advised re-tendering on the ground that the estimation of tender value was not done properly by the civil wing.

Based on this directive, the project office prepared (February 2005) a new estimate for Rs.1.85 crore (based on the 2004-05 price level) and sent it to the Headquarters of the Board for approval. The Headquarters revised this estimate to Rs.1.94 crore and returned it to the project office for sanction, though the power of the project office for sanctioning of estimates was rupee one crore only. The project office awarded (June 2005) the work to Rajagopalan and Company at Rs.2.53 crore on face value enhancement basis, instead of awarding this work for Rs.1.94 crore, the estimated cost approved by the Headquarters.

In this connection, the following are observed:

- The Board justified the award of work at Rs.2.53 crore on the ground that the same was less than Rs.2.81 crore, which was the estimated cost based on 2003-04 schedule of rates. This cost of Rs.2.81 crore had been earlier (January 2005) rejected by BLTC as not having been estimated properly.
- As this item of work was not envisaged in the DPR, it should have been treated as a new item of work and awarded based on the current schedule of rates (2004-05) *viz.*, Rs.1.94 crore instead of the escalated rate of Rs.2.53 crore.

Thus, improper award of work resulted in an undue benefit of Rs.59 lakh to the contractor.

The Government stated (August 2006) that due to time constraints and to avoid loss to the Board for the tender processing period of at least three months, it entrusted the work to the power house contractors by enhancing the face value of the agreement. However, it is not clear from the reply as to why

the work was not awarded as a new item based on the current schedule of rates.

Additional expenditure due to use of excess steel

3.15 The Board awarded the work of power house sub-structure with a provision that the steel and cement required for the execution would be supplied by the Board to the contractor. The Board estimated the requirement of steel for this work as 2,240 MTs. It was, however, noticed during audit that a total quantity of 3,249 MTs of steel was used in the execution of the work. The use of steel in excess of the requirement estimated resulted in an additional expenditure of Rs.2.18 crore. The Board has not investigated the reasons for increase in the quantity of steel used.

Extra expenditure on defective drawings

3.16.1 The major package "Power House Sub-structure" included the construction of left flank abutment wall-cum-pier. The Board, in the approved drawings, indicated (April 2002) the width of the abutment wall as 2.81 meters. Subsequently, when the generating machinery supplier furnished the civil drawings (February 2003), the width of the wall was reduced to 0.50 meter. By this time, the Power House sub-structure contractor had completed the excavation and the extra gap of 2.31 meters had to be filled up. The excavation and refilling had cost the Board Rs.13 lakh. Thus, due to the defective design of drawings, the Board suffered an avoidable extra expenditure of Rs.13 lakh.

The Government stated (August 2006) that the excavation estimate sent to the field was only tentative and any gap between excavated rock and concrete structure should be filled up and as such there was no extra expenditure. The reply is not tenable as the expenditure was necessitated due to excavation before the receipt of final drawings.

3.16.2 Similarly, in the excavation drawings for Power House sub structure, the Board indicated (December 2002) the slope (slope is provided to protect the excavated earth from slipping) as one-in-eight and revised the slope as one-in-15 in January 2003. As the contractor had already carried out excavation work based on one-in-eight slope, this revision necessitated filling up of the extra gap with concrete at a cost of Rs.8 lakh. Thus, due to the defective design drawings, the Board suffered an avoidable extra expenditure of Rs.8 lakh.

The Government stated (August 2006) that the excavation at the bank side had already been completed adopting the side slope of one-in-eight. Subsequently, to minimise the cost of excavation and filling up, the Board revised the side slope as one-in-fifteen. The reply is not tenable as the side slope should have been finalised before excavation.

Acknowledgement

3.17 Audit acknowledges the co-operation and assistance extended by the staff and management of the Board and the concerned officers of the State Government at various stages of conducting the performance review.

Conclusion

Inspite of adequate experience in the execution of the similar Lower Mettur Hydro Electric Project I to IV and its familiarity with the terrain , the Board could not commission the Bhavani Kattalai Barrage-I Hydro Electric Project within the time schedule envisaged in the Detailed Project Report viz., June 2000. The time overrun in this project had already exceeded six years. The project was delayed due to lack of a centralised effective monitoring system, absence of coordination among the various executing agencies of the Board associated with the execution of the project, non-conducting of survey of the soil before embarking on the project formulation, avoidable delays in finalising the tender specifications, approving the drawings, awarding of contract and delay in release of work fronts to the contractors. The time overrun has already led to cost overrun of Rs.125.63 crore resulting in increased cost of power generation.

Recommendations

The Board, while executing hydro electric projects in future, needs to take effective steps to:

- **put in place an effective system of monitoring ensuring coordination of all the agencies associated with the project.**
- **conduct all necessary surveys such as soil survey before embarking on project and preparation of the Project Report.**
- **prepare the DPR and PERT chart on a realistic basis after taking into account all relevant factors and utilise the same as effective tools for project monitoring.**
- **eliminate/minimise delays due to avoidable reasons like delays in the finalisation of Draft Tender Specifications, evaluation and finalisation of tenders, making available drawings and work fronts.**