Chapter-II

2. Performance review relating to Government Company

Haryana Power Generation Corporation Limited

2.1 Construction and performance of Stage V (Units VII & VIII) of Panipat Thermal Power Station

Highlights

The Company, in award of contract, incurred avoidable expenditure of Rs. 52.47 crore due to incorrect evaluation of alternative offer of BHEL.

(Paragraph 2.1.14)

Excess time allowed for construction of units VII and VIII resulted in extra burden of price escalation and interest of Rs. 12.27 crore during construction.

(Paragraph 2.1.15)

Premature synchronisation of the Units without ensuring completion of pending works resulted in prolonged period of commercial commissioning entailing excess consumption of fuel oil valuing Rs. 4.93 crore.

(Paragraph 2.1.9)

Liquidated damages of Rs. 29.30 crore as per the terms of the contract for delay in commissioning of the Units had not been recovered.

(Paragraph 2.1.8)

The Company incurred extra expenditure of Rs. 17.98 crore due to incorrect computation of price variation by inclusion of components of steel and cement on which price escalation had already been paid.

(Paragraph 2.1.18)

The Company incurred extra expenditure of Rs. 7.91 crore due to irregular payment of service tax, which was not payable on turnkey contracts.

(Paragraph 2.1.19)

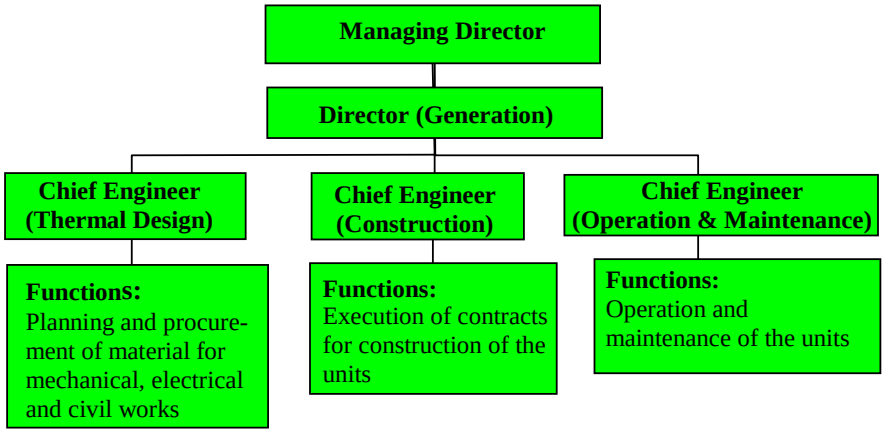
Cost of generation of power was as high as Rs. 3.69 per unit (Unit VII) and Rs. 2.62 per unit (Unit VIII) against projected cost of Rs. 2.54 per unit. The high cost of generation was due to forced shut downs of the Units and excessive consumption of coal and oil. The value of excessive consumption of coal and oil worked out by Audit amounted to Rs. 64.27 crore.

(Paragraphs 2.1.20, 2.1.21 and 2.1.22)

Introduction

2.1.1 Panipat Thermal Power Station (PTPS) of Haryana Power Generation Corporation Limited (Company) had an installed capacity of 860 MW from six generating Units. In order to meet the increased demand of power in the State, the Company installed two more Units of 250 MW each under stage V (Units VII and VIII), which were commissioned on 29 December 2004 and 8 April 2005, respectively.

Organisational set-up relating to construction and operation of these generating Units is given below:



Performance of Units I to V and construction of Unit VI was last reviewed in the Report of the Comptroller and Auditor General of India for the year ended 31 March 2001 (Commercial) – Government of Haryana.

Scope of Audit

2.1.2 The present review, conducted during December 2005 to March 2006, covers project planning, award of contracts, execution of works, commissioning and performance of the Units.

Records of the office of the Chief Engineer (Thermal Design) at the headquarters of the Company and Chief Engineers (Construction and Operation & Maintenance) at project site for the years 2001-06 were test checked in audit.

Audit objectives

2.1.3 The audit objectives of the review were to ascertain whether:

- the management was efficient to safeguard against risks to the economy and efficiency of the project in planning and award of contracts;
- the work for construction of the Units was awarded at the most competitive rates;
- the project was completed and commissioned within the time schedule as stipulated in the project reports/contracts and there was no cost/time overrun, sequencing of stages was well planned and executed to eliminate avoidable stoppages/excessive consumption of inputs;
- construction work meets the desired quality standards;
- performance of the generating Units was consistent with the standards envisaged in the project reports; and
- actual cost of generation was as per the norms envisaged in the project report.

Audit criteria

2.1.4 The following audit criteria were adopted:

- standard procedures followed for award of contract with reference to principles of economy, efficiency, effectiveness and transparency;
- norms/guidelines of the Central Electricity Authority (CEA) regarding planning and implementation of the project;
- terms and conditions of the contract and the extent to which contract provisions safeguarded Company's financial interest; and
- norms for performance of the Units envisaged in the project report/contract.

Audit methodology

2.1.5 Audit followed the following mix of methodologies:

- analysis of project report, loan documents etc. relating to the project;
- scrutiny of tenders/bid documents, award of work and payments made to the contractors; and
- analysis of data relating to the consumption of inputs for generation of power.

Audit findings

2.1.6 The audit findings were reported to the Government/management in May 2006 and discussed in the meeting of the Audit Review Committee for State Public Sector Enterprises (ARCPSE) held on 19 July 2006 which was attended by Financial Commissioner and Principal Secretary, Power Department and Managing Director of the Company. Views of the Government/management have been incorporated in the review. The audit findings are discussed in the succeeding paragraphs.

Planning and implementation

2.1.7 Expansion of PTPS was envisaged in April 2001 for implementation during Tenth plan (2002-07). Accordingly, the State Government accorded (June 2001) administrative approval to augment generation capacity by setting up two Units (VII and VIII) of 250 MW each at PTPS.

Initially (April 2001) the Company had proposed to set up these Units departmentally on split package basis with main steam generator and turbo generator equipment from Bharat Heavy Electricals Limited (BHEL), being proprietary items, and balance of plant and civil works from other contractors through competitive bidding. Accordingly, the Company invited (April 2001) offer from BHEL for supply of main equipment of steam generator and turbine generator which was received in June 2001. While this offer was being considered, BHEL, at its own initiative, submitted an offer in October 2001 for execution of the project on turnkey basis. Thereupon, the Special High Power Purchase Committee (SHPPC), headed by the Chief Minister of the State, awarded the construction of the Units on turnkey basis and placed (26 March 2002) letter of intent (LOI) with BHEL. CEA approved (August 2002) the project cost at Rs. 1785.36 crore on the basis of award of contract.

Time and cost over run

Time over run

Delay in erection and commissioning

2.1.8 Construction of the Units was taken up by BHEL on 26 March 2002 (zero date) with commissioning date of 25 October 2004 for Unit VII and 25 February 2005 for Unit VIII. As per the terms and conditions of the contract, the contractor was liable to pay liquidated damages at 0.25 *per cent* of the contract price for each week of delay in commissioning subject to a maximum of five *per cent*. Audit noticed that the Units were commissioned on

29 December 2004 and 8 April 2005 after delays of 65 and 42 days respectively.

View of units VII and VIII of Panipat Thermal Power Station

The Company did not recover liquidated damages of Rs. 29.30 crore from BHEL for delay in commissioning of the Units.

Erection and commissioning of the Units was delayed mainly due to delay in readiness of coal mills and tripping of the Units due to boiler tube leakages. The Company, however, did not recover (June 2006) the liquidated damages of Rs. 29.30 crore for delay.

The management stated (June 2006) that an amount equivalent to liquidated damages had been withheld from BHEL payments pending contract closing. During the ARCPSE meeting the management stated that actual completion period was shorter than the other contemporaneous projects in West Bengal and Rajasthan. The reply is not relevant as it was an independent agreement and LD was required to be recovered as per the agreed terms and conditions. Further, withholding of the amount was not sufficient as BHEL should have been intimated about the recovery.

Pre-mature synchronisation

2.1.9 As per network schedule, Units VII and VIII were to be synchronised on 20 September 2004 and 25 January 2005 and commercially commissioned within 35 days (25 October 2004) and 31 days (25 February 2005) respectively. Though coal mills were not available and works of important equipments of boiler like feed pumps, induced draft/forced draft/primary air fans etc. were not complete, the Units were synchronised prematurely on 28 September 2004 and 28 January 2005 respectively. These were commercially commissioned on 29 December 2004 and 8 April 2005 after 92 and 70 days against stipulated period of 35 and 31 days from the date of actual synchronisation respectively.

Premature synchronisation entailed excess consumption of fuel oil valued at Rs. 4.93 crore.

The premature synchronisation of the Units without completion of pending works had resulted in prolonged period of commercial commissioning which in turn entailed excess consumption of fuel oil during that period. Audit noticed that consumption of fuel oil by the Units during this period was 34.25 ml/kwh[*] (Unit VII) and 28.86 ml/kwh (Unit VIII) as against the norm of 3.5 ml/kwh. The excess consumption of oil resulted in extra expenditure of Rs. 4.93 crore (Unit VII: Rs. 3.53 crore and Unit VIII: Rs. 1.40 crore).

The management stated (June 2006) that oil consumption is usually on the higher side during testing and commissioning period for which no norms have been prescribed. The reply is not acceptable as excessive consumption of oil worked out in audit relates to the period beyond scheduled date of commissioning.

During the ARCPSE meeting, the management, while admitting the fact of excess consumption of oil during prolonged synchronization, assured that the penal provision for recovery on account of excess consumption of oil during excess time taken by the contractor in commercial commissioning after synchronisation of the Units would be taken care of in future contracts.

Trial operation

2.1.10 The contract with BHEL provided that the Units would be accepted for commercial operation on completion of continuous satisfactory trial operation for 14 days. Readiness of each item of equipment was a pre-requisite for trial operation.

Commissioning of the unit without completion of pending works resulted in non-recovery of liquidated damages of Rs. 1.95 crore.

Audit noticed that though all pending works had not been completed, the Company allowed trial operation of Unit VII from 15 December 2004 and, after trial operation for 14 days, declared the date of commercial commissioning of the Unit as 29 December 2004. For completion of the pending works, the Company had to shut down the Unit for 189 hours during 13-21 February 2005 just within two months of its commissioning. The shut down after start of the commercial operation (29 December 2004) resulted in non-recovery of liquidated damages of Rs. 1.95[#] crore.

The management stated (June 2006) that shut down was allowed to enable BHEL to undertake preparatory works necessary for conducting performance guarantee (PG) test and that BHEL also utilised this period for completing pending works. The reply is not tenable because the terms and conditions of the contract did not provide for any shut down for conducting PG test and completion of pending works.

During the ARCPSE meeting, the management stated that in the subsequent contract for Yamuna Nagar thermal power station, completion of PG test is stipulated prior to provisional taking over of the units so that the guaranteed performance parameters of the Units are verified before the provisional taking over.

[*] Millilitre/Killowatt hour.

[#] Total project cost Rs. 1562.47 crore ÷ 2 Units x 0.25 *per cent* LD per week x 1 week.

Cost over run

2.1.11 The project cost of Rs. 1785.36 crore as approved by CEA included interest component of Rs. 209.60 crore during construction. Actual expenditure on interest during construction was Rs. 150.59 crore which was lower due to availability of funds at lower cost from the Power Finance Corporation (PFC). Against the remaining project cost of Rs. 1575.76 crore, the actual expenditure incurred was Rs. 1633.04 crore indicating cost over run of Rs. 57.28 crore. The excess expenditure was mainly on account of avoidable payment of price escalation as brought out in paragraphs (2.1.14 and 2.1.18).

Cost over run of Rs. 57.28 crore was mainly on account of avoidable price escalation.

Award of contract for turnkey construction

Lack of competitive bidding

2.1.12 Government had accorded administrative approval in June 2001 for construction of Units VII and VIII and the contract was awarded in March 2002. Thus, there was sufficient time for preparing bid documents and inviting tenders. The Company, however, did not invite tenders for construction to ensure competitive prices. There were irregularities in award of contract to BHEL for turnkey construction resulting in extra and avoidable expenditure as discussed in the succeeding paragraphs.

Award of contract at more than the justifiable price

2.1.13 On the basis of a single offer obtained from BHEL, the Special High Power Purchase Committee decided (26 March 2002) to award the contract on turnkey basis at a variable[$] price of Rs.1438.70 crore (supply of plant and equipment: Rs. 1080 crore, service contract including freight & insurance, erection, testing, commissioning and civil works: Rs. 358.70 crore). After taking into account the impact of escalation estimated at Rs. 43.16 crore, the contract price worked out to Rs. 1481.86 crore. TCE Consulting Engineers Limited in their detailed project report, which was submitted (June 2001) by the Company to CEA, had worked out justifiable price for this work at Rs. 1444.68 crore (including escalation of Rs. 40.49 crore). Thus the contract price exceeded the justified price by Rs. 37.18 crore.

Despite wide variation between the justifiable price and the offer of BHEL, reasonableness of the price was not ensured by the Company through competitive bidding. Revised cost estimates were submitted (28 March 2002) to CEA only after issue of LOI to BHEL. There was, therefore, lack of transparency in the award of work.

The management stated (June 2006) that negotiation route instead of tendering process for award of contract was adopted keeping in view expeditious implementation of the project to meet shortage of power in the State. The reply is not acceptable as tendering process, for which the management had sufficient time (nine months), would not have delayed the speedy implementation of the project in any way.

[$] Variable price means rate variation in respect of components required for execution of the contract.

During the ARCPSE meeting, the management informed that the tendering process had been adopted in subsequent projects.

Incorrect evaluation of alternate offer

2.1.14 BHEL had quoted two rates: one with fixed price (Rs. 1510 crore) and the other with variable price (Rs. 1438.70 crore) without any ceiling on price variation. Purchase Regulations of the Company provide that offers which do not quote ceiling on price variation should be loaded at the standard rate of 10 *per cent*. After loading the offer of BHEL with 10 *per cent* price escalation, the quoted variable price worked out to Rs. 1582.57 crore. Though the quoted fixed price of Rs. 1510 crore was lower than the equivalent of variable price of Rs. 1582.57 crore, the Company did not consider placement of order on fixed price. Without safeguarding against risk of escalation by putting a ceiling on the variable price against fixed price offer of BHEL, SHPPC decided (March 2002) to award the contract at variable price of Rs. 1438.70 crore with base indices of December 2000.

The Company incurred avoidable expenditure of Rs. 52.47 crore due to contravention of codal provisions for evaluation of offers.

It was noticed during audit that the Company paid price escalation of Rs. 123.77 crore (8.60 *per cent*) over and above the base contract price of Rs. 1438.70 crore. Thus, evaluation of the offers in contravention of the codal provisions had resulted in avoidable expenditure of Rs. 52.47[$] crore.

The management stated (June 2006) that decision to award the work on variable price was taken in view of lower escalation trend (0.84 *per cent* during December 2000 to October 2001). The reply is not tenable because BHEL in its offer had indicated that it normally provides 10 *per cent* towards price escalation. Moreover codal provisions of the Company also provide for loading the variable price offers with 10 *per cent* price escalation.

During the ARCPSE meeting, the Financial Commissioner (Power) and Principal Secretary to the State Government informed that the subsequent contracts had been given on fixed price to avoid complexities of the contracts on variable price.

Excess time allowed to the contractor

2.1.15 In the absence of competitive bidding, the Company lost the opportunity to negotiate the time schedule for commissioning the Units. CEA had recommended (January 2002) commissioning of Units VII & VIII in 30 and 33 months respectively from the date of LOI. While awarding (26 March 2002) the contract, SHPPC negotiated for commissioning schedule of 31 and 35 months for these Units. Even this schedule was not adhered to and the Units were actually commissioned after delays of 65 and 42 days respectively. It was noticed that while floating (May 2004) tender enquiry for turnkey construction of two similar Units of 250 MW each at TPS Yamuna Nagar, the Company had prescribed commissioning schedule of 30 and 33 months and BHEL as well as Reliance Energy Limited (to whom the contract was awarded in September 2004) had accepted this commissioning schedule.

[$] Variable contract price Rs. 1438.70 crore + escalation actually paid Rs. 123.77 crore – fixed price = Rs. 1510 crore.

The Company allowed excess time in construction of Units, resulting in avoidable expenditure of Rs. 12.27 crore.

Taking into account the commissioning schedule of 30 and 33 months, excessive time allowed resulted in extra expenditure of Rs. 12.27 crore on account of price escalation (Rs. 5.54 crore) and additional interest liability/burden (Rs. 6.73 crore) during the construction period.

The management stated (June 2006) that CEA had given an aggressive commissioning schedule which was pursued by the Company but BHEL did not agree to it. The reply is not tenable as this situation could have been avoided through competitive bidding. During the ARCPSE meeting, the management stated that CEA's recommendations were being observed in subsequent contracts.

Execution of the contract

Deficiency in coal handling plant

2.1.16 The coal handling plant (CHP-III) for the Units comprised two wagon tipplers, apron feeders, roller screens, crushers and stacker cum re-claimer with a design capacity of 770 tonnes coal per hour and provision of coal stockyard for stacking of crushed coal required for 30 days (1.80 lakh tonnes) operation. As per the specifications of CHP-III, BHEL was fully responsible for providing a trouble free system. The plant was commissioned on 16 October 2004.

The Company observed (March 2005/July 2005) that operational performance of CHP-III was poor in feeding coal to both the Units because the system at wagon tippler was capable of handling sized (300 mm) coal only and it could not handle slightly oversized coal due to size and design of wagon tippler grizzly, and that there was no mechanised system available at wagon tippler grizzly to take out stone boulders. Further, roller screens were very sensitive and broke down frequently even with small quantity of coal. The Chief Engineer (O&M) recommended (July 2005) design modification of wagon tippler grizzly and apron feeders for making them similar to the existing plants for Units I to VI. The Company, however, had not rectified the deficiencies so far (March 2006) for which reasons were not available on record.

Audit scrutiny revealed that while approving the design of the coal handling plant, the Company overlooked the ground realities regarding poor quality of coal available which adversely affected its functioning. Due to these deficiencies, the plant could handle a maximum of 269 tonnes of coal per hour during October 2004 to March 2006 as against the designed capacity of 770 tonnes coal per hour. Resultantly, the plant failed to build up the requisite stock of crushed coal. During April-June 2005, the plant could build up stock of crushed coal ranging between 0.64 lakh and 0.50 lakh tonnes which dwindled to 0.02 lakh tonnes in July 2005 as against the designed capacity of 1.80 lakh tonnes. Due to non-availability of coal in bunkers, the Units had to be shut down for 92 hours (Unit VII: 25 hours and Unit VIII: 67 hours) during July 2005 resulting in generation loss of 23.07 MUs valued at Rs. 2.11 crore in

The Company suffered generation loss of Rs. 2.11 crore due to deficiency in coal handling plant.

terms of contribution towards fixed cost[#]. In addition, the Company incurred expenditure of Rs. 19.19 lakh on shifting of 85,723 tonnes crushed coal from CHP-I to CHP-III during May 2005 to March 2006 through private contractors. Deficiencies in CHP-III also resulted in detention of rakes beyond the period permitted by Railways. The Company paid total demurrage charges of Rs. 3.06 crore during November 2004 to March 2006. The specific amount of demurrage charges out of this payment, due to deficiency in this coal plant, could not be identified as no separate accounts had been maintained for different plants.

In its reply (June 2006) and during the ARCPSE meeting, the management/ Government stated that the CHP is of latest technology and designed for a higher capacity than the requirement as coal rakes are generally despatched by Railways in bunches but also admitted that some design problems had been faced by the project in the coal handling system for which the matter had been taken up with BHEL for remedial action. The reply is not tenable as the CHP failed to handle the designed quantity of coal.

Delay in commissioning and poor operation of dry fly ash system

2.1.17 Ash handling plant, common to both the Units, consisted of two systems- one for dry fly ash (80 *per cent*) with two silos[*] outside the plant area so as to collect the dry fly ash and issue the same to cement manufactures who had signed memorandum of understandings (MOUs) in this regard and the other for bottom ash (20 *per cent*) collection and its disposal in slurry form to the ash pond.

It was seen in audit that though Unit VII and VIII were commissioned on 29 December 2004 and 8 April 2005 respectively, dry fly ash collection system was commissioned only on 3 May 2005 after a delay of 124 days and 25 days respectively. Due to delay in commissioning of fly ash system, 1.30 lakh tonnes fly ash generated in Unit VII and Unit VIII was dumped in ash pond during 29 December 2004 to 30 April 2005.

It was also noticed that performance of the fly ash disposal system was not as per the designed parameters. Due to this deficiency actual fly ash collected and delivered to cement manufacturers was 0.76 lakh tonnes as against fly ash generation of 4.33[$] lakh tonnes by these Units during May 2005 to March 2006. This also resulted in excess dumping of 3.57 lakh tonnes fly ash in the pond. Thus, delay in commissioning and poor operation of dry fly ash system resulted in loss of Rs. 1.33[@] crore due to decrease in the life of the pond.

The management stated (June 2006) that change in location and design of the system delayed its commissioning and that initially authorised agencies did

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[#] Fixed cost represents total cost minus variable cost on account of consumption of coal and oil.

[*] Silos are chambers for storage of fly ash.

[$] 15.92 lakh tonnes coal consumed x 0.34 ash content in coal x 0.80 day fly ash component in the total ash generate.

[@] (Cost of construction of ash pond Rs. 7.03 crore x 4.87 [1.30 + 3.57] lakh tonnes fly ash excess dumped) ÷ (Projected annual coal consumption 21.59 lakh tonnes x 0.34 ash content in coal x 3.5 years life of pond) = Rs. 1.33 crore.

not lift adequate fly ash. The fact, however, remains that the delay in commissioning could have been avoided by proper planning, design and implementation of the system and there was no demand constraint. The authorised agencies could not lift adequate dry fly ash as the Company could not make available the same as per design parameters.

Incorrect computation of price variation for civil works

2.1.18 The contract for supply of plant and equipments (Rs.1080 crore) included supply of cement and steel (Rs.74.20 crore) and price variation on the value of steel and cement was payable according to specified formulae applicable for supply of equipment. Accordingly, the Company allowed price escalation of Rs.4.05 crore on supply of cement and steel.

The service contract (Rs 358.70 crore) included civil work (Rs.215.18 crore), which did not involve supply of cement and steel, as these were covered under supply of equipment. As per price variation formula for civil works, however, cement component was to be reckoned as 10 *per cent*, steel as 25 *per cent*, labour as 25 *per cent*, diesel as 5 *per cent*, other material as 15 *per cent* while remaining 20 *per cent* was to be treated as fixed element (profit) with no price variation. Since price variation on steel and cement utilised in the civil work had already been paid under a separate contract for supply of plant and equipment, the components of steel and cement in the service contract were to be treated as fixed and the price variation was payable for labour, diesel and other material only. Audit scrutiny, however, revealed that the price variation formulae for civil works was incorrectly applied to include indices of steel and cement resulting in excess payment of Rs. 17.98 crore.

Due to incorrect computation, the Company paid extra price variation of Rs. 17.98 crore on civil works.

The Company stated (June 2006) that steel and cement were included by BHEL in the supply portion though these were vital parts of civil works but, with this arrangement, the Company gained financial advantage as escalation paid was less on steel and cement based on price variation formula of supply. The reply is not acceptable, as the price escalation on steel and cement, forming part of the supply contract, had already been paid under the supply contract. Therefore, price escalation under the works contract was payable on labour, diesel and other material only.

Irregular payment of service tax

2.1.19 The contract with BHEL provided for advance payment of 12.5 *per cent* of the contract price, which was paid in April-May 2002 (6 *per cent*) and September 2002 (6.5 *per cent*). Balance 87.5 *per cent* was payable progressively on monthly pro-rata basis for the actual work done during the month (85.5 *per cent*) and on commissioning of each unit (2 *per cent*). The two Units were scheduled to be commissioned on 25 October 2004 (Unit VII) and 25 February 2005 (Unit VIII).

Government of India levied (1 July 2003) service tax on installation and commissioning charges. In September 2004 Government levied service tax on erection charges also and clarified that advance payment received by service provider prior to 10 September 2004 was exempt from service tax. Audit scrutiny revealed that the Company, without examining the relevant statutory

provisions, made avoidable payment of service tax to BHEL as discussed below:

- The Company paid (September 2004 to March 2006) service tax of Rs. 6.64 crore to BHEL on the gross amount of erection charges of Rs. 65.05 crore without excluding the advance payment of Rs. 8.13 crore resulting in excess service tax payment of Rs. 0.83 crore.

- Central Excise and Service Tax Appellate Tribunal Delhi in its decision (2003) had observed that a work contract cannot be vivisected and part of it subjected to tax. This decision was upheld (2004) by the Supreme Court also. Thus, the turnkey contract for supply of plant and machinery, erection, installation and commissioning at Rs. 1438.70 crore, could not be vivisected into supply and service parts for payment of service tax. Contrary to this, BHEL raised bills for payment of service tax amounting to Rs. 7.91 crore on Rs. 77.53 crore (including price variation: Rs. 12.47 crore) for work of erection, installation and commissioning done and paid for during 10 September 2004 to March 2006. In view of the decision ibid, payment of service tax on turnkey project lacked justification. It was further noticed that in cases of turnkey construction of sub-stations and transmission lines by HVPNL, the contractors had neither demanded nor been paid service tax.

The Company made avoidable payment of service tax of Rs. 7.91 crore.

During the ARCPSE meeting, the management/Government stated that statutory provisions for applicability of service tax would be examined and recoveries, if any, made from BHEL.

Performance of Units VII and VIII

Excessive cost of generation

Consumption of coal and fuel oil in excess of norms/design had resulted in extra expenditure/excess cost of generation.

2.1.20 As per the project report, the cost of generation was estimated at Rs. 2.54 per unit for the first year. The actual cost, however, was as high as Rs. 3.69 (Unit VII) and Rs. 2.62 (Unit VIII) during the year 2005-06.

Reasons for excess cost of generation and steps taken to bring the generation cost within project estimates, though called for (March 2006), were not intimated. Causes, which contributed to high cost of generation as analysed in audit, have been discussed in the succeeding paragraphs.

Excess consumption of coal

2.1.21 Consumption of coal required as per the norms for generation, actual consumption and excess consumption for the period from starting commercial operation on 29 December 2004 (Unit VII) and 8 April 2005 (Unit VIII)

to March 2006 was as follows:

Sl. No.	Particulars	2004-05 Unit VII	2005-06	
			Unit VII	Unit VIII
1.	Average calorific value of coal consumed (Kcal \ Kg)	4091	4109	4109
2.	Stipulated heat rate as per standard design (Kcal \ kwh)	1983.5	1983.5	1983.5
3.	Stipulated heat rate at 87.27 *per cent* boiler efficiency (Kcal \ kwh) item 2 X 100 / 87.27)	2273	2273	2273
4.	Standard consumption of coal as per design (Kg \ kwh) (item 3 / item 1)	0.556	0.553	0.553
5.	Actual generation (MUs)	430.595	921.448	1832.581
6.	Standard consumption of coal for actual generation (Tonnes) (item 4 X item 5)	239411	509560	1013417
7.	(a) Actual consumption of coal (Tonnes) (b) Kg \ kwh	273526 0.635	583316 0.633	1158863 0.632
8.	Heat rate of coal consumed (Kcal\kwh) (item 1 X Item 7(b)	2598	2601	2597
9.	Excess consumption of coal (Tonnes) (Item 7(a) – item 6)	34115	73756	145446
10.	Average procurement cost of coal (Rs. per tonnes)	2176.73	2356.39	2356.39
11.	Cost of excess coal consumed (Rs. in crore)	7.43	17.38	34.27

It would be seen from the above table that operation of the Units at higher heat rate (ranging between 2597 and 2601 Kcal/kwh) as compared to design value of 2273 Kcal/kwh resulted in excess consumption of 2.53 lakh tonnes coal valued at Rs. 59.08 crore and consequent higher environmental degradation.

The management stated (June 2006) that coal consumption is largely dependent upon the quality of coal. As specific operating conditions are not always available and actual heat rate is more than the design heat rate, normative heat rate up to 2500 Kcal/kwh is recognized by the CEA. The reply is not tenable as the heat rate of 2500 Kcal/kwh is the upper limit and the actual heat rate was even more than this limit. Further, the loss has been worked out taking into consideration the quality of coal actually consumed.

Excess consumption of oil

2.1.22 Fuel oil is used for start-up and flame stabilisation at low loads. The Project Report envisaged a norm of 3.5 ml/kwh for consumption of fuel oil. Compared with this norm, actual consumption of fuel oil during the period from 29 December 2004 (Unit VII) and 8 April 2005 (Unit VIII) to

March 2006 ranged between 3.87 to 6.19 ml/kwh as detailed below:

Sl. No.	Particulars	2004-05	2005-06	
		Unit-VII	Unit-VII	Unit-VIII
1.	Total consumption of oil (KL)	2663.78	5076.30	7093.09
2.	Generation (MUs)	430.595	921.448	1832.581
3.	Consumption of oil per kwh (ml/kwh)	6.19	5.51	3.87
4.	Consumption of oil as per norms (ml/kwh)	3.5	3.5	3.5
5.	Excess consumption (ml/kwh)	2.69	2.01	0.37
6.	Excess consumption of oil (KL) (Sr. No. 2 x Sr. No. 5)	1158.30	1852.11	678.05
7.	Average procurement cost per KL (Rs. Per KL)	11223.60	15382.60	15382.60
8.	Cost of excess oil consumed (Rs. in crore) (Sr. No.6 x Sr. No.7)	1.30	2.85	1.04

The table above would reveal that during the period from 29 December 2004 to March 2006, the Units consumed 3688.46 KL excess oil valued at Rs. 5.19 crore.

The Company stated (June 2006) that the Units were under stabilisation and excess consumption of oil was due to teething problems during stabilisation period and due to excessive oil support required to avoid flame failure in boiler on account of poor quality of coal. The reply is not tenable as excess consumption of fuel has been worked out after commercial production of the Units was started and taking into consideration the quality of coal received at the power station.

Forced outages

2.1.23 During the period from 29 December 2004 (Unit VII) and 8 April 2005 (Unit VII) to 2005-06, there were forced outages of 6046 hours mainly due to frequent trouble in boiler and related equipment (970 hours), fault in turbo generator (126 hours), fault in electrical equipments (4422 hours), shortage of coal (92 hours) and miscellaneous reasons (436 hours) resulting in generation loss of 1511.5 MUs valuing Rs. 129.56 crore in terms of contribution of fixed cost.

A few cases of forced outages analysed in audit are discussed below:

Failure of generator stator

2.1.24 As per the terms of the contract, BHEL was liable to repair/replace all defective parts damaged during warranty period of 12 months from the date of commissioning. The contract, however, did not provide for repair/replacement of damaged equipment within reasonable time and compensation for loss of generation due to delay in repairs. Unit VII, commissioned on 29 December 2004, was shut down on 29 July 2005 on account of damage of generator stator due to earth fault. The Company immediately requested (31 July 2005) BHEL to repair/replace the damaged generator stator. BHEL dismantled the generator and despatched the stator (24 August 2005) and rotor (27 August 2005) to their works at Haridwar. After repair of the equipment, the Unit was synchronised on 19 January 2006 and thus remained shut down for 4175 hours (174 days). Total loss of generation due to the closure of the

Failure of generator during warranty period resulted in generation loss of Rs. 88.72 crore.

unit worked out to 1043.79 MUs valued at Rs. 88.72 crore in terms of contribution towards fixed cost. In the absence of any provision for seeking compensation for the loss of generation, the Company could not lodge any claim for the loss.

The Company stated (June 2006) that time taken for repair of any equipment depends upon the type and extent of damage and that time limit cannot be prescribed in the contract for such repairs and that there was no practice of consequential compensation/damages. The fact, however, remains that due to abnormal delay in replacement/repair of equipment damaged during warranty period, the Company had to suffer loss of generation.

Non-provision of adequate spares in control and instrumentation system

2.1.25 The Detailed Project Report envisaged provision of adequate spares for complete instrumentation and control system. In Units VII and VIII, microprocessor based distribution control system with state-of-art Man-Machine interface was installed to provide a comprehensive integrated instrumentation and control system including the functions of data acquisition system to operate, control and monitor the boiler, turbo generator and other plant systems.

Due to non-availability of spares for control and instrumentation system, Unit-VII was shut down resulting in generation loss of Rs. 3.55 crore.

Distributed processing unit (DPU) with its input/output card of Unit-VII failed because of damage of one of its racks. As control of water drum level and boiler feed pump was through DPU and no spare rack was provided by BHEL, the unit was shut down on 22 June 2005. After replacement of the damaged rack by BHEL, the unit was synchronised on 29 June 2005. Thus, due to non-provision of adequate spares by BHEL, the Unit remained shut down for 167 hours (7 days) resulting in generation loss of 41.80 MUs valued at Rs. 3.55 crore in terms of contribution towards fixed cost.

The management /Government stated (June 2006) that standby DPU had been provided with each primary unit but in this case on failure of rack, standby DPU failed to come into service. During the ARCPSE meeting, the Financial Commissioner also acknowledged that the inventory of spares required 'relooking' as the availability of spares would have reduced shut down time.

Acknowledgement

2.1.26 In addition to examination of records and documents, a number of issues were deliberated for conducting this performance audit by the audit team. Audit acknowledges the co-operation and assistance extended by different levels of management at various stages of conducting the performance audit.

Conclusion

The performance of the Company with regard to construction of the two additional units was found to be deficient due to lack of competitive bidding, incorrect evaluation of alternative offer of BHEL, excess time

allowed for construction, incorrect computation of price variation on civil works and irregular payment of service tax resulting in cost over run. Design deficiency in coal handling plant resulted in under utilisation of capacity.

There was excess consumption of coal and oil, which had a bearing on generation cost. Forced shut down of the Units resulted in substantial loss of generation.

Recommendations

The Company may:

- **ensure that contracts are awarded only after inviting competitive bids so that benefit of competitive rates is derived.**
- **ensure strict compliance with the provisions of Purchase Regulations for evaluation of offers.**
- **ensure that the time schedule for construction of Units is reasonable so as to avoid extra expenditure on account of price escalation and interest during construction.**
- **release the claims for price escalations and statutory levies only after proper examination of relevant provisions.**
- **take steps to bring the consumption of fuel within the prescribed norms.**
- **ensure preventive maintenance and upkeep of the plant equipments to avoid forced shut down of generating Units.**

During the ARCPSE meeting the management/Government noted the recommendations and assured to implement the same in future.