

DEPARTMENT OF COAL

CHAPTER III

Mahanadi Coalfields Limited

Project Implementation, Performance of HEMM, Manpower Analysis, Fund Management and Environmental Planning

Highlights

Implementation of Advance Action Plan for seven projects could not be completed even after one to 10 years from the scheduled date of completion, with likely adverse impact on the project completion schedule. The Company would require additional funds of Rs.66.29 crore over and above the original sanctioned estimates in implementation of these Plans because of the delays.

(Para 3.6.1.1)

Due to resistance from land oustees, the Company could not produce coal valued at Rs.118.25 crore during 2004-05 in six projects of Talcher Coalfields.

(Para 3.6.1.4)

The Company incurred avoidable extra expenditure of Rs.4.46 crore in 2002-03 by awarding the contract of hiring of surface miner at a higher rate.

(Para 3.6.1.7)

The Kalinga project completed in March 2000 had a poor record in coal production and over burden removal. The backlog in overburden removal stood at 10.46 M cum as on March 2005 and would further affect the working of the mine.

(Para 3.7.1.1)

The underground mines incurred persistent losses over the years. The Company was yet to take steps for phasing out of unviable mines.

(Para 3.7.2.1)

The Company had a workforce of 21,298 out of which 66 *per cent* was in unskilled category at the end of March 2005. There was no scientific assessment of manpower requirement.

(Para 3.11.1)

The Company's control on 'over time' remained ineffective. Despite the negative growth in OB removal, there was increase in over time payments by Rs.8.73 crore and Rs.13.96 crore in 2003-04 and 2004-05 respectively over the preceding year.

(Para 3.11.2)

Despite holding surplus fund (monthly) ranging between Rs.29.37 crore and Rs.97.10 crore from April 2002 to February 2004, the Company did not invest the same with Coal India Limited (CIL) and lost an interest of Rs.4.04 crore approximately.

(Para 3.12.1)

The Company could not recover loading charges of Rs.17.34 crore up to March 2005 in the absence of any agreement with the customers.

(Para 3.12.2)

Crushing charges of Rs.8.12 crore could not be recovered from customers on coal produced through surface miner for the period from June 2000 to January 2001 due to delay in approaching CIL for issuing the necessary notification.

(Para 3.12.3)

Gist of Recommendations

- The requirement of land for mining and other infrastructure facilities should be periodically reviewed considering the fast depletion of existing mines and the lead time in taking possession of land.
- After introduction of new technology i.e. surface miner and improved version of HEMM, the target of coal production as well as over burden removal should be assessed on realistic basis.
- Phasing out programme for closure of unviable mines should be chalked out and completion of ongoing underground mines should be expedited.
- History Sheets for each HEMM containing data regarding cost, operation and major repairs should be maintained.
- A comprehensive policy for introduction of surface miner should be devised for present and future workings as well as for projects to be covered.
- Rejects produced should be evaluated and reclaimed wherever possible both on financial and environmental considerations.
- The requirement of HEMM should be re assessed and surplus CHP should be shifted to other places for gainful utilisation.
- Steps should be taken for scientific assessment of manpower especially in view of introduction of new technology, outsourcing of coal production, OB removal and closure of mines.
- The incidence of surplus funds should be monitored at unit level also so that these are promptly transferred to Head Office.
- Suitable agreement should be entered into with the customers for recovery of loading charges at Belpahar OCP.
- The Company should revise EMPs and mining plans as desired by MOEF.

3.1.1.Introduction

Mahanadi Coalfields Limited (Company) was incorporated in April 1992 as a wholly owned subsidiary of Coal India Limited (CIL) by transferring two important Coalfields (IB Valley and Talcher) of Orissa from erstwhile South Eastern Coalfields Limited (SECL), also a subsidiary of CIL. IB Valley and Talcher Coalfields are spread over 2,723 Sq. Km and endowed with very thick quarryable seam.

Against India's total reserves (January 2005) of 248 billion tonnes, these coalfields account for 60.98 billion tonnes ^{*}(25 per cent). About 91 per cent of the coal produced in these coalfields is of thermal power grade, ranging from E to G category [♦] with corresponding Useful Heat Value (UHV). The ash content in coal varies from 37 to 48 per cent. Coal is extracted through Open Cast Projects (OCP) and Underground (UG) mines.

After incorporation, the Company completed 16 mining-projects, 13 projects were 'on-going' and five were under 'Advance Action Plan' as on March 2005. The Company outsourced almost its entire coal production and transportation in OCPs and only overburden (OB) removal and operation of UG mines was done departmentally. There had been an influx of Heavy Earth Moving Machinery (HEMM) with higher configuration funded through World Bank loan between 1999 and 2001. New technology of coal mining through surface-miner [▲] on hire basis was introduced in a number of big OCPs.

The Company made a total investment of Rs.2,113.41 crore in these projects. It recorded a profit (before tax) of Rs.1,604.70 crore on a record production of 66.08 MT in 2004-05.

3.2 Scope of Audit

The scope of the performance audit was to assess the extent to which the coal sector reforms and thrust areas as identified by the Planning Commission (IXth and Xth Five year plans) as well as the Ministry of Coal through its various directives had been implemented by the Company.

3.3 Audit Objectives

The performance audit of the Company was conducted with a view to assessing whether

- (i) There was timely and realistic formulation and implementation of the Advanced Action Plan (AAP) and preparation of Project Reports (PR).
- (ii) The projects were implemented as per the Project Report in terms of costs, time period, infrastructure development, selection of technology etc.
- (iii) The performance of the mines was as planned.
- (iv) The equipment functioned as per the stipulated performance standards fixed by Central Mine Planning and Design Institute Limited (CMPDIL).
- (v) Manpower analysis was conducted.
- (vi) Coal beneficiation (washing) was properly carried out in accordance with the directives of the Ministry of Environment and Forest (MOEF).
- (vii) The funds were optimally utilised.

^{*} *IB valley and Talcher accounted for 22.33 billion tones and 38.65 billion tones of coal reserves respectively.*

[♦] *E, F and G grade coal have UHV ranging from 3360 to 4200, 2400 to 3360 and 1300 to 2400 Kilo calorie /Kg respectively*

[▲] *Surface miner technology provided for selective mining of coal by eliminating shale /stone in bands (as rejects) during the process of extraction. Drilling and blasting were not required thus making it environment friendly.*

3.4 Audit Criteria

The fundamental criterion used for assessing the performance was whether corporate objectives were fulfilled by utilising the Company's technical and financial resources judiciously. The performance was further assessed with reference to the:

- (i) Mission Statement and Corporate Plan of the Company;
- (ii) Targets of coal production and removal of OB as fixed by the Company;
- (iii) Project Report and the norms for utilisation of HEMM as fixed by the Company;
- (iv) The norms fixed by World Bank for recovery of Burnt Oil;
- (v) Optimal utilisation of funds allocated for financing projects and related activities and
- (vi) The Environment Management Plan (EMP) as approved by the Government of India and circulars issued by the MOEF from time to time.

3.5 Audit Methodology and Acknowledgement

3.5.1 Performance audit was conducted by test check of records of the projects' Planning, Excavation, Commercial, Marketing and Electrical and Mechanical departments for the last five years ending March 2005. The coverage was extended to earlier years also wherever deemed necessary. The main records studied in audit are listed at **Annexure-6**.

The audit team made field visits to all projects and underground mines of the Company. Physical inspection in association with the concerned officials of Lakhanpur, IB valley Area on the working of surface miner, dragline and coal handling plants was also undertaken. The data collected was classified, grouped and variations from applicable standards/ norms adopted by CIL were analysed.

3.5.2 Audit takes this opportunity to thank the management and staff of the Company for their co-operation and assistance in the conduct of this performance audit.

Audit Findings

3.6 Formulation and Implementation of Projects

The Company's project profile as on 31 March 2005 was as under:

Table I

Description	Capacity (in MT) ^ψ		Capital Outlay (Rs. in crore)		Number of Mines		Exp. On completion (Rs. In crore)		Exp. up to 31.03.2005 (Rs. in crore)	
	OCP	UG	OCP	UG	OCP	UG	OCP	UG	OCP	UG
Completed Projects	42.90	0.33	1696.54	17.95	15	01	1323.72	9.12	1975.65	29.81
Existing mines	-	1.77	-	-	-	07 *	-	-	-	149.23
Total (Completed project)	42.90	2.10	1696.54	17.95	15	08	1323.72	9.12	1975.65	179.04

^ψ Million Ton

* These mines i.e. Orient and Talcher were under private ownership long before the formation of MCL. As such, the sanctioned capital outlay was not available.

3.6.1 Project Planning Procedure:

Coal companies make plans to meet the requirement of coal by formulating new projects or expanding the existing projects. The work of projects formulation for the Company was entrusted to CMPDIL, a subsidiary of CIL. All projects costing Rs.50 crore and above were approved in two stages. The first stage consisted of approval of the AAP. At the second stage the PR was approved by the Government. The activities at the stage of AAP were as follows:

- (i) carrying out land survey in the mine area;
- (ii) acquisition of land including forest land and payment of compensation to the land oustees;
- (iii) rehabilitation of land oustees including cost of resettlement;
- (iv) collection of environmental data and preparation of EMP;
- (v) construction of access road, power line, water line, temporary sheds for site office; and
- (vi) purchase of HEMM

Expenditure under AAP was limited to Rs.20 crore in respect of projects costing Rs.100 crore and above. The time for implementation of AAP was 30 months. The PR was forwarded to the Empowered Sub-committee (ESC) of CIL Board, which considered the project after substantial progress was made in forest and EMP clearance. After approval by ESC, the PR was put up to CIL board for approval and thereafter to the Government for approval. The lead time for approval of draft PR from the Board of Directors of MCL to CIL (ESC) and the Ministry of Coal (MOC) ranged generally from three to five years. Thereafter till the project achieved 80 *per cent* production the same was treated as an 'on going project'. After this stage, a project was treated as completed.

Audit noted the following regarding the planning and implementation procedure.

3.6.1.1 Delay in implementation of AAP

The lead-time for approval of AAP from MCL Board to CIL (ESC) and the Ministry of Coal ranged from one to two years. Against the norm of 30 months in the implementation of AAP, there had been a time overrun of one to 10 years (March 2005) with consequential additional fund requirement of Rs.66.29 crore in seven OCPs* since inception. Despite time overrun of seven years and five years in Bhubenswari and Garjanbahal OCPs, the Company was yet to incur Rs.23.25 crore out of Rs.38.45 crore on their respective AAPs. It was observed in audit that in Bhubaneswari OCP time overrun was due to non settlement of land oustees and delay in creation of Railway siding. In respect of Garjabahal there was delay in obtaining forest and environment clearance. The AAP of Basundhara (W) OCP was completed in December 2003 after a time overrun of 10 years.

* Basundhara(W), Bhubenswari, Garjanbahal, Kaniha, Kulda, Gopalprasad and Talabira-III

The Management stated (July 2004) that although 30 months had been given for implementation of AAP for land acquisition, forest clearance etc. but it actually took more than 30 months. The reply of the Management was not tenable as the period of 30 months had been determined by the MOC and should have been adhered to.

3.6.1.2 Recasting of Project Reports

PRs lay down the road map and critical activities with detailed specifications and schedules for implementation of projects. These are used as tools for planning and monitoring the implementation of the projects. It was observed that changes in technology and other operational developments could necessitate major deviations from the PR. In order to maintain cohesiveness in the project activities and to monitor them effectively, it becomes necessary to recast the PR in the absence of which adhoc decisions may be taken that may result in wasteful expenditure and delays in implementation of the project as discussed in para 3.6.1.6 (iii). However, the Company had no system of recasting the PRs though this practice was adopted by other subsidiaries of CIL.

The Management stated (July 2004) that PRs were prepared by CMPDIL and there was no recasting of projects.

3.6.1.3 Deficiencies in determination of the completion cost of a project

As has already been mentioned earlier the project was considered complete after achieving 80 *per cent* of the targeted production. However, the Company did not have any system to ascertain the stage of 100 *per cent* physical completion of the project and actual investment there against. The capital outlay of 16 completed projects was Rs.1,714.49 crore (at 80 *per cent* production) as against the actual expenditure of Rs.2,005.46 crore as on 31 March 2005. Of these 16 projects declared complete, the completion reports were prepared in respect of Kalinga and Lakhampur OCP only. For remaining projects, though declared complete long back from 1991 to 1995 (seven projects), 1996 to 2000 (five projects) and 2001 to 2005 (one project), completion reports had not been prepared. One project declared complete in March 1984 had since been closed in 2004-05. In none of the above projects 100 *per cent* completion had been declared (2005). Thus, the actual expenditure incurred to achieve the 100 *per cent* completion stage could not be ascertained with accuracy.

The Management stated (July 2004) the completion reports were being prepared as per the guidance of the MOC. The reply of the Management was not tenable as the completion reports were prepared as soon as 80 *per cent* of the targeted production was achieved and the 100 *per cent* completion stage and expenditure there against was not identified.

3.6.1.4 Land acquisition

Acquisition of land and rehabilitation of displaced persons inter-alia are critical for implementation of major projects. The status of land acquisition as on 31 March 2005 was as follows:

Table II

(Land in Hectares)

Description	No. of Projects	Total requirement of land	Land acquired	Land to be acquired	Percentage of land to be acquired to total requirement
Completed Projects	16	11,621.223	6,504.174	5,117.049	44.03
On going Projects	14	3,950.567	605.831	3,344.736	84.66
Advance action proposals	3	1,731.010	181.130	1,549.880	89.54
Total	33	17,302.800	7,291.135	10,011.665	

It is evident from above that performance of the Company in this area was extremely poor. For the completed projects, the Company was yet to acquire 44 *per cent* of total requirements even after 13 to 22 years from the date of sanction and three to 14 years from the date of completion of projects.

The Management stated (July 2004) that the total land requirement for the life of the project was notified/acquired under Coal Bearing (Acquisition & Development) Act, 1957 at a time whereas physical possession was taken as and when the concerned land was required for mining operation. Generally, processing for taking physical possession of required land was undertaken in every five years.

Although the Company reviewed the requirement of land for mining purposes every five years, in practice, almost all the OCPs produce coal much more than the capacity determined by CMPDIL, resulting in faster depletion of land. In view of this, the Company was required to keep sufficient land physically available in advance. As on March 2005, out of land requirement of 15572 Ha for completed and 'on going projects', the Company could take possession of 7110 Ha and 8462 Ha was yet to be taken possession of. It was noticed in audit that in six projects[^] at Talcher Coalfields (OCP) due to resistance from land oustees/villagers which led to delays in acquisition of land, the Company could not produce 2.79 MT coal valued at Rs.118.25 crore during 2004-05. Delays in taking physical possession of land also led to consequential delays in development of infrastructural facilities with consequential cost overruns and avoidable expenditure as discussed in para 3.6.1.5. The Company stated (March 2005) that it was difficult to acquire large area of land.

[^] Jaggannath, Ananta, Kalinga, Bharatpur, Hingula and Lingaraj OCPs.

3.6.1.5 Inadequate infrastructure development

Project formulation and implementation remain incomplete without a time bound programme for development of various infrastructural facilities needed for running a project. The infrastructure consists mainly of railway siding, coal handling plants (CHP), workshops, procurement of HEMM and induction of new technology.

(i) Belated development of Railway Siding Network

For evacuation of coal, the PR of Kalinga OCP envisaged construction of a railway siding scheduled to be completed in September 2000 at a cost of Rs.19.65 crore. Due to land dispute, the date of completion was rescheduled to December 2005. Apart from time overrun of about five years, the delay resulted in a cost overrun of Rs.5.12 crore. Further, due to the delay in completion of this railway siding, the coal was dispatched through the railway siding of Jagannath Area. This led to an additional expenditure of Rs.13 crore annually that could have been avoided had timely action been taken to complete the sidings.

Again, delay in acquisition of land, approval of necessary drawings etc. contributed to time overrun from one year to four years and total cost overrun of Rs.4.30 crore in Basundhara (Rs.2.85 crore) and Jagannath Area (Rs.1.45 crore) in developing the railway infrastructure (March 2005).

The Management stated (July 2004) that railway siding works got delayed due to non release of forest land in time. It was observed that CIL/subsidiaries have a Memorandum of Understandings (MOU) with the MOC to assist the Coal Companies in getting clearance for forest land by taking up the matter with the MOEF and the respective State Governments so that the land acquired under Land Acquisition /Coal Bearing Act is handed over to the Company under a time bound programme. Although the Committee on Public Undertakings (COPU) urged CIL (April 1992) for coordination between State Government, Central Government and the Coal Companies, there were delays in acquisition of land indicating more concerted action will have to be taken by the Company.

(ii) Setting up of Central Workshop (CWS)

For the purpose of major repair and overhaul of HEMM and sub assemblies of Dragline, Shovel, Drill etc., the Company decided to set up Central workshops at IB Valley and Talcher coalfields in 1989 with scheduled dates of completion as June 1993. While the Talcher workshop was officially declared complete in 1996 at a cost of Rs.16.16 crore, procurement of required machinery was yet to be completed. Similarly the IB valley workshop also became functional in 1993-94. Subsequently, augmentation works on these workshops were undertaken and completed in March 2004 with total cost capitalised on IB valley and Talcher Central Workshop being Rs.21.04 crore and Rs.36.48 crore respectively. However, the Company was yet (March 2005) to build up the required skilled manpower to absorb the technical know-how for changed technology necessary for repairing upgraded HEMM. This resulted in opting for outsourcing of repair work by both the workshops. The Company incurred Rs.19.67 crore on outsourcing during the last five years ending March 2005.

The Company stated (July 2004) that even if all infrastructure were available it was not possible to carry out the entire job departmentally due to lack of skilled manpower,

change of technology of HEMM, cost effectiveness, lack of technical know-how etc. The reply of the Company was not tenable in view of the fact that having created an infrastructure at a substantial cost of Rs.57.52 crore, the Company should have ensured development of matching manpower capabilities necessary for carrying out repairs in its own Workshops.

3.6.1.6 Injudicious purchase of HEMM

Audit noted the following instances of injudicious purchases of defective/ incompatible HEMM:

(i) Terex Dumper: The Company purchased three Terex Dumpers in August 1998 at an aggregate cost of Rs.3.96 crore for Kalinga OCP (one of 85 T capacity) and Lingaraj OCP (two of 50 T capacity). As a result of intermittent break down of these equipment, the average working hours for 85T Dumper was 18 *per cent* of the shift hours, while that of 50 T Dumpers ranged from 16 to 18 *per cent*. While the Company recovered Rs.21 lakh from the suppliers as performance guarantee for poor performance in respect of 85 T Dumper, it did not take similar action against the supplier in respect of 50 T Dumpers despite existence of performance guarantee as the Company could not use these machines effectively due to non availability of adequate numbers of compatible equipment and also non-availability of spares.

The Management stated (May 2004) that the Dumpers were imported and spares availability was poor and many of them were uneconomical. The efforts to dispose them off to CCL and NCL did not materialise.

(ii) Sparr Drills: The Company purchased five Sparr drills between March 1991 and September 1993 at a cost of Rs.1.87 crore from M/s Sparr Equipments Ltd. The drills had extremely poor performance since commissioning. The Company could not effect any recovery from the supplier for such unsatisfactory performance as the supplier closed its operation in April 1995. Thus, the entire expenditure of Rs.1.87 crore proved unfruitful. The Company had written off one drill in 1999-2000 due to uneconomic repairs and non-availability of spares.

The Company stated (July 2004) that orders for five Sparr drills were placed by CIL/SECL. The overall performance of the machines was found to be poor in other subsidiaries also and further purchases of this type of drills were stopped.

However, the fact remains that for the drills already purchased, the Company could not recover any sum from the supplier towards performance guarantee despite poor performance of the equipment.

(iii) Procurement of incompatible shovels and dumpers: Basundhara (W) OCP, an 'on going project' whose AAP was completed in December 2003, ordered one 1.8 Cum capacity shovel, six 85 tons capacity dumper and one 250 mm[♦] diesel drill. As the shovel did not match the 85 tons capacity dumpers, the Company had to transfer the dumpers to Kalinga OCP for utilisation. Thereafter, the Company proposed to outsource the work of overburden removal for a period of three years initially at a cost of Rs.14.15 crore. Due to such indecisions and non-availability of requisite equipment, the coal production fell

♦ *Milli Metre*

short by 0.94 Mt and 0.84 M cum respectively during the period from December 2003 to March 2005.

3.6.1.7 Hiring of surface miner

The Company has given contracts for production of coal through surface miners at the rate of Rs.50.70 per cum. and Rs.50.90 per cum. for 2002-03 for Bharatpur and Lingaraj OCP respectively. In June and August 2002 it invited tender for the work of extraction of 5.50 M cum. coal removal through surface miner at rates ranging between Rs.50.70 and Rs 50.90 per cum. from different contractors. For similar work CCL had received (May 2002) offer from a contractor at the rate of Rs.30 per cum. against their tender. Based on the above, the Board of the Company decided (June 2003) to float open tenders to bring down the rates to Rs.30 per cum. The offered rates for 2003-04 for such work came down drastically to Rs.21.99 and Rs.26 per cum as a result of floating open tenders, indicating lack of initiative by the Company and lack of coordination amongst the subsidiaries of CIL. The Company incurred an avoidable additional expenditure of Rs.4.46 crore for two works awarded for 2002-03 at Lingaraj and Bharatpur OCP.

The Company stated (July 2004) that the reduced rates in CCL were not a restrictive parameter for tender process for it. The Company further stated that the Industrial Engineering Department (IED) had conducted a study for ascertaining the operating cost of surface miner and was under process of finding out a workable value.

Recommendations

- The Company should devise a mechanism to ascertain the 100 *per cent* completion stage of a project and expenditure thereagainst.
- The requirement of land for mining and other infrastructure facilities should be periodically reviewed considering the fast depletion of existing mines and the lead time in taking possession of land.
- A time bound programme for railway infrastructure should be undertaken for evacuation of coal.
- Skilled manpower should be deployed in the central workshops to minimise outsourcing.
- Procurement of HEMM should be need based and compatible with other equipment.

3.7 Production

3.7.1 Open Cast Projects

The table below indicates the target and achievement of production of coal, removal of OB and output per man shift (OMS) during the last five years ending March 2005:

Table III

Particulars	2000-01		2001-02		2002-03		2003-04		2004-05	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Coal	41.40	43.18	42.80	46.39	46.20	50.47	51.20	58.00	64.06	63.90

(MT)										
OB (MM ³)	46.60	49.61	50.00	50.56	53.00	54.05	55.60	52.70	63.00	49.81
OMS (tonne)	13.98	15.72	16.04	17.32	16.32	19.59	17.75	19.89	20.39	19.51

It would be seen that the targets fixed by the Management in respect of coal production and OMS in all the years were not done realistically and were lower than the actual achievement. For removal of OB, the Company failed to reach the target for the years 2003-04 and 2004-05, a factor that was likely to affect the future workings of the Company. Out of six mega projects, records of three mega projects viz. Kalinga, Lakhanpur and Belpahar were examined in audit. While the performance of Lakhanpur and Belpahar was satisfactory, it was below the target in Kalinga OCP. The audit findings in respect of Kalinga OCP are discussed in the succeeding paragraph.

As regards coal production, the Company stated (July 2004/March 2005) that targets were not fixed on the lower side but the actual achievements were higher than the targets. The reasons for negative growth of the overburden removal during 2003-04 were mainly due to ageing HEMM, land problem, rainfall and injunction from the Court for procurement of dumpers.

The reply of the Company was not tenable in view of the fact that the Company had been putting more emphasis on production through surface miner, which could be worked out with accuracy and the Company should have revised the target of production accordingly. As for ageing of HEMM despite the introduction of 13 HEMM at the cost of Rs.76.86 crore during 2004-05, there was a further fall of OB removal by 2.89 M cum in 2004-05.

3.7.1.1 Kalinga OCP

The Project was declared complete in March 2000 on achieving coal production of 6.41 MT (80 per cent of capacity) after incurring an expenditure of Rs.232.47 crore. The mineable reserve had been estimated at 165.79 MT with projected life of 27 years. Against yearly production of eight MT of coal and removal of 12 M cum of OB as envisaged in the PR, the annual target fixed by the Company and actual production for the last five years ending 31 March 2005 was as under:

Table IV

Year	Coal (MT)		OB (M cum)	
	Target	Actual	Target	Actual
2000-01	7.200	4.900	9.600	8.420
2001-02	6.000	5.276	11.000	7.737
2002-03	8.000	5.201	11.000	8.511
2003-04	7.800	4.028	10.000	8.000
2004-05	7.500	4.831	9.200	7.671

The project was not able to reach the targeted production of either coal or OB removal in any of the listed years, though the targets were revised downwards from time to time.

This was despite the fact that production of coal was done generally by outsourcing through surface miner. In the removal of overburden (done departmentally), there was gross underutilization of all categories of HEMM. There was backlog in OB removal of 10.46 M cum during the last five years ending 31 March 2005 with likely impact on the production of mine in future.

The Company stated (July 2004) that performance of the project had suffered due to land problem which was being sorted out and the project would produce at its targeted capacity in the near future.

The reply indicates that the Company went ahead with the project without resolving the land acquisition issues. These problems should have been taken into account at the time of AAP stage of the project.

3.7.2 Underground Mines

3.7.2.1 Performance of Under Ground (UG) Mines

As on 31 March 2005, the Company had eight completed underground (UG) mines. The aggregate capacity of these mines was 2.10 MTY[^] and the total investment in UG mines was Rs.179.04 crore. While the capacity was kept constant at 2.10 MTY, the target of production of coal set by the Management was 2 MT. There was no significant move for proper mechanisation of the existing mines.

The mines were incurring loss ranging from Rs.300 to Rs 516 per tonne during the four years ending March 2005. The total loss during the year 2004-05 alone was Rs.23.54 crore. It was observed in audit that UG mines workforce constituted 78 *per cent* of the total productive manpower of OCPs and was a major contributing factor for incurring heavy losses. The performance of the UG mines was reviewed by the Board in March 2004, wherein it was stated that Himgir Rampur Colliery and Duelbera Collieries were incurring huge cash losses and were not economically viable.

The Company stated (July 2004) that UG mines were allowed to continue despite losses from the point of conservation and to recover the fixed costs. The reply of the Company was not tenable as operation of unviable mines resulted in losses to the Company.

3.7.2.2 Opening of new UG mines

Of the eight UG mines that the Company had, only one had been developed by it (Refer Table I, Para 3.6) since its formation. It was observed in audit that while there was a global trend to opt for highly mechanized UG mines with economies of scale on the grounds of quality and environmental consideration, it was only between January 2001 and February 2003 that three UG mine projects*with aggregate capacity of 1.83 MTY were sanctioned. These were expected to be completed between March 2008 and March 2010 although it was anticipated that Nataraj UG itself would start production from 2005-06.

[^] *Million Tons per year*

^{*} *Jagannath, Talcher and Nataraj*

Recommendations

- After introduction of new technology ie. surface miner and improved version of HEMM, the target of coal production as well as over burden removal should be assessed on realistic basis.
- Phasing out programme for closure of unviable mines should be chalked out.
- Completion of ongoing underground mines should be expedited.
- The possibility of developing economically viable underground mines should be explored.

3.8 Capacity utilisation, productivity and performance of HEMM

Utilisation of a mine's capacity is a very critical factor affecting productivity and profitability of mining operations. Mine capacity is the annual material handling capacity of an OCP expressed in million cubic metres (M cum). Capacity of a mine to produce is a function of inputs which include, inter-alia, machines, manpower, technology etc. Optimum utilisation of HEMM plays a vital role in the overall functioning of the mines. Instances of under utilisation of HEMM were noticed in audit and are discussed in subsequent paragraphs.

3.8.1 Under utilisation of HEMM

The dragline, shovel, dumper, dozer and drill are the HEMM mainly used in open cast mines for removal of overburden and production of coal. These equipment work in a combination in coal mines. As on March 2005, the Company had seven draglines, 652 shovels, 354 dumpers, 93 dozers and 91 drills valued at Rs.980.55 crore.

Status of major HEMM in different projects of the Company revealed (March 2005) higher population of HEMM as compared to the projections in the PRs, both with regard to number and configuration of HEMM. There was excess deployment of 29 equipment in Lilari, Lajkura, Hingula-II and Basundhara (East) OCPs.

The Company adopted CMPDIL's methodology of assessment of performance and utilisation of HEMM. Availability percentage of equipment was worked out considering idle hours plus working hours to shift hours and utilisation percentage was based on working hours to shift hours. While availability of HEMM generally conformed to the norms prescribed by CMPDIL, the utilisation was far below the norms as detailed below:

Table V

(in percentage)

Item	CMPDIL Norm of utilisation	Utilisation				
		2000-01	2001-02	2002-03	2003-04	2004-05
Dragline	73	62	58	62	62	64
Shovel	58	33	35	36	35	37
Dumper	50	22	23	26	27	28
Dozer	45	20	20	21	21	26
Drill	40	16	16	16	17	20

As is evident from Table V, the utilisation of HEMM was always lower than the norm. The Company stated (July 2004) that the utilisation was hampered due to proximity of mines to residential areas, delay in clearance of land and frequent interruption of work by villagers. Although there were some improvements in utilisation, there was further scope of improvement which was impeded due to non availability of work front for working of dragline at Balanda, ageing of shovels resulting in frequent breakdown, land constraints in Jagannath, Ananta and Kalinga OCP, extreme climatic conditions in summer seasons etc.

The contention of the Company was not tenable as the extreme climatic conditions in summer were also experienced by other subsidiaries of CIL but their performance was better than the Company. Availability of work front for the dragline should have been considered before its deployment. Breakdown of ageing shovels and other HEMM could have been prevented through timely repairs and efficient management of spare parts could ensure better availability of the equipment. In the Chairman cum Managing Directors' meeting in September 2004 also it was noted that the Company always ranked lowest amongst CIL subsidiaries in utilization of HEMM.

The Standing Committee on Energy*, in its Report also commented (February 2004) on the poor utilisation of HEMM equipment as against the liberal norms of CMPDIL and asked for an explanatory statement for such poor utilisation. The Committee recommended that major equipment should be transferred from one subsidiary to another for optimal utilisation. The suggestion also included that before procurement of HEMM, the expected utilisation should be considered specifically while working out cost benefit ratio. However, the Company had not drawn up any plan to implement the recommendations of the Committee (December 2005).

3.8.2 POL consumption vis-à-vis usage of HEMM

Petrol, oil and lubricants (POL) constitute a major element of expenditure for extraction of coal and removal of OB in OCPs. The Company had been following the Kapilla Committee norms for the consumption of POL. Despite direction from CIL (July 2001) and the Audit Committee (June 2004) to make in-depth study, the Company had not been able to fix the normative consumption of POL so far (May 2005), though the mine conditions had improved and higher capacity equipment had been introduced in the mines. Three sectoral studies on the subject were conducted by Industrial Engineering Department (IED) in June 2002, November 2004 and March 2005 but no concrete solution had emerged so far. The Company accepted the suggestion of Audit that there was a need to fix norms for consumption of POL for effective control and monitoring.

3.8.3 Recovery of burnt oil of HEMM

Extraction of coal in OCP is done by deploying hydraulic shovels, drills, dozers, dumpers, dragline etc. Lubricating oil is used in engines of the above equipment and is required to be drained out after certain hours of run. The burnt oil so drained out has disposable value and the Company has been selling it regularly. The World Bank Mission visited (November 1999) one Project of Northern Coalfields Limited, a Coal India subsidiary, and observed that there was wide gap between the consumption of lubricant oil and recovery of burnt oil.

* A departmentally related Standing Committee set up by the Parliament

The recovery of burnt oil was important both from financial and environmental considerations. The Company made (March 2004) a study on burnt oil and fixed the percentage of recovery at 50 and 55 *per cent* for the years 2004-05 and 2005-06 respectively. Based on the above norm, the loss due to non recovery of burnt oil for the last five years ending March 2005 worked out to Rs.3.04 crore.

3.8.4 Injudicious maintenance contract for 10 cum shovel at Kalinga Project

Coal India Ltd. entered into an agreement (August 1997) with M/S Harnischfeger GmbH, Germany for purchase and maintenance of three electric rope shovels for Kalinga Area of the Company. As per agreement, the manufacturer was to maintain the equipment for a period of seven years from the date of commissioning with minimum guaranteed availability of 85 *per cent*. For this the Company would pay for supply of spares at the rate of US \$ 60.87 per hour of actual utilisation from the initial year and labour and overhead charges at the rate of US \$ 20.15 per hour of actual availability. The equipment were commissioned between July and September 1998.

It was noticed in audit that the Company did not maintain (except for Lingaraj OCP) machine-wise record of coal production and OB removal nor did it work out the economics of introduction of such equipment. Despite incurring Rs.20.65 crore towards spares and Rs.14.36 crore for labour from July 1999 to 31 March 2005 and the availability of the equipment from 86 to 96 *per cent*, the utilisation of the machinery ranged between 43 and 55 *per cent*. There was no recorded reason for underutilisation of the machines.

The Company stated (December 2003) that the purchase of shovel was done by a high power committee of CIL and its subsidiaries considering the techno-commercial assessment of purchase.

Recommendations

- History Sheets for each HEMM containing data regarding cost, operation and major repairs should be maintained.
- A conditioning monitoring cell should be set up to assess the health and condition of equipment.

3.9 Use of surface miners

3.9.1 Introduction of new technology

Production of coal by surface miner technology was initially adopted in coal industries by the Company in its two projects e.g. Lakhanpur and Lingaraj OCP in June 1999. The technology provided for selective mining of coal by eliminating shale /stone in bands (as rejects) during the process of extraction. Drilling and blasting were not required thus making it environment friendly. Besides being cheaper to conventional production of coal, it was also expected to benefit the Company by bringing down the ash content of coal to less than 34 *per cent* which would enable the Company to supply coal to power houses situated more than 1000 KM from pit head.

The target of coal production in 2005-06 and 2006-07 was fixed at 72 MT and 80 MT respectively and it was expected that the major share of incremental production would come from surface miner.

3.9.2 Cartelisation by contractors

Although the surface miner technology was first introduced for selective mining of coal in two OCPs* in June 1999 and the Company inducted this mining procedure increasingly in its operations over the years, it had so far not reviewed its impact on requirement of manpower, utilisation of existing HEMM etc. in its projects. Besides, the Company continued to be dependent on contractors for providing this service and had not been able to procure the equipment or absorb the technology amongst its own work force. This could lead to a monopoly situation where the contractors could quote a higher rate, as discussed in paragraph 3.6.1.7. The Board of Directors also apprehended (June 2005) that contractors might develop an understanding among them and form a cartel which might put the Company in a disadvantageous position, even paralysing the coal production if their rates were not acceded to.

3.9.3 Performance of surface miner

Surface miners were in operation in six mines i.e. Kalinga, Belpahar, Hingula, Bharatpur, Lakhanpur and Lingaraj OCPs. Except Lakhanpur, other OCPs were using surface miner in combination with conventional mining method.

The production by surface miner vis-à-vis conventional method from 2000-2001 to 2004-05 was as under:

Table VI

Year	Production of Coal (in MT)			Percentage of surface miner production to total production
	surface miner	Conventional	Total	
2000-01	6.08	38.72	44.80	13.57
2001-02	7.80	40.00	47.80	16.32
2002-03	16.19	36.04	52.23	30.99
2003-04	22.54	37.51	60.05	38.03
2004-05	29.23	36.85	66.08	44.23

One of the main advantages of surface miner was improvement in quality of coal extracted. But the Company was not able to bring down the ash percentage of coal produced through surface miner to 34 per cent except in Kalinga OCP.

3.9.4 Failure in reclamation of saleable coal rejects

The Company did not explore the possibility of reclamation of saleable coal, if any, from the rejects produced through surface miner. Test check of data of rejects in audit at Lakhanpur OCP revealed that the rejects had Gross Calorific Value (GCV) ranging from 2,778 to 3,024 Kcal /Kg. Had the Company tried appropriate technology to recover the saleable coal in the rejects thrown in dump, it could have earned some revenue.

* Lakhanpur and Lingaraj

The Company stated (July 2004) that there was no notified price for such coal (ungraded coal). As such, there was no possibility of sale of rejects. However, the Management agreed (March 2006), in principle, to explore the possibility of selling mining rejects on experimental basis.

Recommendations

- A comprehensive policy for introduction of surface miner should be devised for present and future workings as well as projects to be covered. If required, a strategic plan for procurement of surface mining equipment and developing necessary manpower should be formulated and in the interim, close interaction with other subsidiaries of CIL should be maintained in order to get competitive rates for surface mining contracts.
- Rejects produced should be evaluated and reclaimed wherever possible both on financial and environmental considerations.

3.10. Under utilisation of Coal Handling Plants (CHP)

The year wise performances of CHP for the last five years ending 31 March 2005 was as under:

Table VII

Year	Shift hours	Maintenance hours	Idle time		Break Down time		Working hours	Percentage	
			Hours	Percentage of Shift. Hr.	Hours	Percentage of Shift. Hr.		Availability 2-(6+3)	Utilisation (8/2)
1	2	3	4	5	6	7	8	9	10
00-01	278048	38545	78386	28.19	24394	8.77	137236	77.36	49.36
01-02	353400	47078	135250	38.27	30982	8.76	131503	77.91	37.21
02-03	391328	49196	152579	38.99	42522	10.87	127800	76.56	32.65
03-04	384288	46977	161935	42.13	40806	10.62	131015	77.16	34.09
04-05	396576	44245	175051	44.14	42521	10.72	130651	78.12	32.94

It would be evident from above that the performance of the CHP was unsatisfactory as the utilisation showed a downward trend despite slight increase in availability over the years.

Due to introduction of surface miner in some OCP, there was gross under utilisation of CHP capacity since surface miner had an inbuilt arrangement for crushing of coal and no further crushing of coal by the CHP was required. However, no concrete program was drawn for effective deployment of these CHP or their transfer to other projects/subsidiaries. Despite having spare capacity of CHP, the Company incurred an expenditure of Rs.2.16 crore for construction of the fifth CHP at Lakhanpur project, which was commissioned in November 2000. The work order for the said plant was issued on September 1999 by which time two surface miners were already deployed (June 1999). This new CHP was declared surplus (November 2004). Although mechanical and structural portion was transferred to SECL (Gevra Project), the civil works valued at Rs.1.06 crore proved infructuous due to defective planning.

Despite having one feeder breaker of 2.4 MT capacity installed in June 2000, the Company installed another feeder breaker at a cost of Rs.2.35 crore in March 2001 at

Hingula Project. The latter had a poor performance since installation and became inoperative in November 2004. The procurement of the equipment thus proved infructuous as the existing facility was sufficient for the requirement.

Recommendations

- The CHP should be optimally utilised.
- The requirement should be re assessed and surplus CHP should be shifted to other projects/ subsidiaries for gainful utilisation.

3.11 Manpower Analysis

3.11.1 Manpower policy

The Company did not have a structured manpower policy. As on March 2005, the Company had workforce of 21,298 as against 21,658 in the year of its formation. The Company outsourced the entire work of coal winning and transportation in mid nineties and decided (2004-05) to outsource the OB removal also in new projects. Despite these developments, there was recruitment of 2,121 persons since 1998-99. The Company stated (July 2004) that such recruitment was necessary for its expansion and growth. The Company had not made any scientific assessment of manpower so far considering changed technology of mining, use of higher configuration of equipment, faster depletion of coal reserves due to intensive mining in existing projects, technical and geological constraints and above all, outsourcing of production of coal and OB removal. The deployment pattern of workforce was based on the age-old practice in a mine and was mine specific. The norms for deployment of workers were yet to be devised by the Company through its IED although a study had already been conducted (February 2005) revealing surplus deployment of 152 executives. Considering average emoluments of Rs.20,000 per month per executive, the Company would pay Rs.3.65 crore annually towards salaries to the executives identified as surplus. Further, Human Resource Department of the Company identified (March 2004) excess manpower of 627 employees who would be paid Rs.7.52 crore annually towards salaries at an average of Rs.10,000 per month.

As on 31 March 2005, 66 *per cent* of the workforce belonged to unskilled category. Since inception, it had recruited 6,027 persons (1,550 under NCWA[♦], 3,219 under land looser scheme and 86 as replacement against VRS of female workers and outside recruitment 1,172). However, the Company was experiencing difficulties in deployment of manpower in respect of new recruits appointed from land oustees or through NCWA and also from existing manpower working in OCP as they were unwilling to work in the underground mines.

The manpower profile of the Company indicated that there was a shortage of operating personnel i.e. HEMM operators and statutory personnel like mine surveyor, sirdar, electrical supervisor and multi-skilled workers. The Company admitted that capacity utilisation was not up to the mark due to acute shortage of operating personnel and connected jobs pertaining to maintenance of HEMM. The Company proposed (March 2004) to fill up the shortage of 59 statutory personnel such as mining sirdar, junior overseer and deputy surveyor.

[♦] *National Coal Wage Agreement*

The Company *inter alia* stated (July, 2004) that the piece rated workers had been converted into multi-skilled category following rapid mechanization of under ground mines and the Company was seriously trying to balance shortage /excess manpower through various training schemes.

However, the fact remained that no scientific assessment of manpower vis-à-vis requirement of skilled work force had yet been carried out.

3.11.2 Increase in Overtime

The Company's workforce was mainly engaged in removal of overburden and about 650 persons (50 persons per OCP for 13 OCPs) were engaged in preparation of coal face. Coal winning and transportation was outsourced except for various operations in UG mining and OB removal in OCPs. The OB removal during the last two years ending 31 March 2005 was 52.70 M cum and 49.81 M cum as against 54.05 M cum in 2002-03 (refer Table III). Despite negative growth in OB removal in 2003-04 and 2004-05, the expenditure towards overtime payment for both OCP and underground production was Rs.46.19 crore, Rs.54.92 crore and Rs.60.15 crore in 2002-03, 2003-04 and 2004-05 respectively. There were no recorded reasons for the increase of Rs.8.73 crore and Rs.13.96 crore in 2003-04 and 2004-05 over the preceding year. As reported by the Directors in the Annual General Meeting (August 2005), operators of HEMM were paid unrealistic overtime allowance without having worked for such duration as revealed in a study conducted in one project.

The Company had not fixed any norms for overtime so far. Despite the COPU's recommendation in April 1992, no perceptible reduction in overtime cost had been achieved though negative growth in OB removal was noticed during the last two years and 98 *per cent* coal production was achieved through contractual labour.

Recommendations

- Immediate steps should be taken for scientific assessment of manpower especially in view of introduction of new technology, outsourcing of coal production, OB removal and closure of mines.
- Training programme for unskilled worker should be expedited.
- Norm for over time should be fixed, overtime cost should be reduced and supplemented by incentives scheme.

3.12 Management of funds

Though the Company earned substantial profits over the years despite shortfalls in production performance as discussed in the preceding paragraphs, Audit noted deficiencies in the management of funds in certain cases which are discussed in the succeeding paragraphs.

3.12.1 Injudicious management of funds

Surplus funds of subsidiaries are invested with CIL at different rates of interest as fixed by CIL from time to time. From the monthly cash flow statements of April 2002 to February 2004, Audit noticed that the Company had surplus funds ranging from Rs.29.37 crore to Rs.97.10 crore after meeting all probable expenditure. In spite of having

significant surplus fund, the Company did not invest the funds with CIL or its subsidiaries and, thereby, suffered loss of interest of Rs.4.04[^] crore from April 2002 to February 2004 even after setting aside a sum of Rs.20 crore for meeting essential time bound payments. From March 2004, the Company started investing the surplus fund in current accounts, either with CIL or outside.

The Management stated (July 2004) that the Company's current accounts were tied up with Corporate Liquidity Term Deposit Scheme of different commercial banks from March 2004 for earning interest varying from 4.5 to 5.25 *per cent* depending upon the period of balance.

However, the fact remained that the Company could have invested surplus fund with CIL till March 2004. The Company also needed a proper fund management programme at Area level. Test check revealed that Kalinga Area had kept bank balance of Rs.3 crore to Rs.10 crore on a number of occasions during 2004-05.

3.12.2 Non recovery of loading charges

The Unit Train Load System (UTLS) was constructed (September 2001) in Belpahar OCP at a total cost of Rs.42.25 crore for automatic loading of coal into wagons. The Project Report stipulated recovery of loading charges of Rs.21.33 per tonne from the customers for automatic loading of wagons. However, Audit noted that the Company did not enter into any agreement for recovery of loading charges and as such, could not recover Rs.17.34 crore on loading of 8.13 MT of coal up to March 2005 from customers.

The Management accepted (July 2004) the audit observation.

3.12.3 Non recovery of crushing charges

The Company, while justifying the introduction of surface miner in November 1998, proposed recovery of Rs.21 per tonne as crushing charges from customers for supply of coal of (-) 100 mm size. The Company introduced the surface miner at Lakhanpur and Lingaraj OCPs in June 1999 and December 1999 respectively, but did not approach CIL for notification of revised price of coal. The loss to the Company stood at Rs.8.12 crore for the period from June 2000 to January 2001 for not billing the crushing charges in respect of Lakhanpur and Lingaraj OCPs.

The Company stated (July 2004) that notification for levying sizing charges for (-) 100 mm coal was issued in February 2001 and charges were levied from that date. Factors such as customers' reluctance, market competition, change in adoption of methods and technologies, etc. affected the decision for revision of price earlier.

The reply of the Company was not tenable as it could have approached CIL for issue of the notification well in time to safeguard its financial interest.

3.12.4 Non recovery of penalty for over size coal

The agreement with the contractors included a clause for sizing of coal to (-) 100 mm for which Rs.50 per tonne was payable. However, there was no provision for penalty for production of oversized coal. About 21 *per cent* of coal produced in Lakhanpur OCP by surface miner did not conform to the size as revealed in a screening test of coal in 2002-

[^]calculated @ 7.5 *per cent* up to March 2003 and @ 6.25 *per cent* thereafter up to February 2004

03. Though in the absence of a penalty clause no action could be taken against the contractor, the Management had to pay Rs.43.75 lakh to the contractor for sizing of coal as per agreement.

3.12.5 Discrepancies in the work of OB removal at Balanda

The Company did not generate daily report for maintaining/ supervision of work done by the contractors in respect of OB removal. It transpired from records that in the year 1996-97, alleged overpayment to a contractor at Balanda OCP for an amount of Rs.95.10 lakh was made for OB removal in excess of quantities actually removed by the contractor. Although a Bank Guarantee of Rs.50 lakh (revalidated) was obtained from the contractor, the Company leveled charge against the contractor in 2003 after a period of over seven years from the date of event. The party filed suit in the Court of Civil Judge (Senior Division) Sambalpur restraining the Company from encashing the Bank Guarantee. The case was sub-judice (October 2004).

Recommendations

- The incidence of surplus funds should be monitored at unit level also so that these are promptly transferred to Head Office.
- Suitable agreement should be entered into with the customers for recovery of loading charges at Belpahar OCP.

3.13 Environmental Planning and Management

Exploitation of minerals creates enormous environmental challenges. The Government of India formulated the National Mineral Policy in 1993, emphasising the need to minimise adverse effect of mineral development on forest, environment and ecology. It also directed implementation of afforestation programme concurrently with acquisition of land and comprehensive programme for backfilling and biological reclamation of the mining areas. Accordingly, Environment Management Plan (EMP) was prepared by CMPDIL for each coalfield separately.

3.13.1 The Ministry of Environment and Forest (MOEF) made (June 1998) it mandatory that from June 2001 onwards thermal power stations located beyond 1000 KM from pit head or located in an urban area or critically polluted area or sensitive area, irrespective of their distance from the pit head, must use coal with less than 34 *per cent* ash. The total coal requirement for less than 34 *per cent* ash for distant power houses for the year 2006-07 (terminal year of X Plan) would be 17.38 MT. Against that, the Company could supply 3 to 4 MT of coal annually during the last three years ending 31 March 2005. It would be difficult for the Company to meet such obligation in the absence of proper beneficiation (washing) programme.

The Company stated (July 2004) that power houses were tailor made to use coal having ash content of more than 34 *per cent* also. The contention of the Company was not tenable as the Ninth and Tenth Five Year Plan emphasised on beneficiation of coal (washing) for compliance with MOEF directives.

3.13.2 The Company was required to take a number of measures to protect and improve the environment which included afforestation and land reclamation. From the annual statement submitted by the Company to the State Pollution Control Board, it was seen that as against the excavated area of 2429.54 Ha as on 31 March 2005, area reclaimed was only 1518.75 Ha (63 *per cent*) while biological reclamation was in 1044.89 Ha (43

per cent) only. This indicated that mine management did not proceed as desired by the environment laws and rules.

The Company stated (July 2004) that because of low stripping ratio in MCL, the volume of overburden to be backfilled was less in relation to total volume of excavation. Moreover, a minimum area of de-coaled void was required to be left open at pit bottom for safety and operational infrastructure like sump, haulage etc. As such, it was contended that mine management proceeded as desired by the environment laws and rules.

The fact remained that the EMP did not progress as per the project reports, resulting in disproportionate removal of overburden vis-à-vis area reclaimed biologically. The Company was yet to submit revised EMPs and mining plans in this respect as desired by the MOEF.

3.13.3 The Company did not have a structured organisational set up for mine closure which could be properly built in the Environment Management Plan itself with cost estimates. It had not framed any comprehensive programme for filling up the ultimate void of OCPs which were on the verge of exhaustion e.g. Balanda, Lilari etc.

The Company stated (July 2004) that mine closure plans were under preparation for the mines to be closed within a few years. There had not been any major deviation from the stipulation of Project Reports of any mine including Balanda OCP except in the residual voids of the mines to be filled up with ash from power plants for which MOU between the Company and National Aluminium Company and National Thermal Power Corporation was under implementation.

Recommendations

- The Company should revise EMPs and mining plans in this respect as desired by MOEF.
- Setting up of coal beneficiation plant either by the company or by its consumers for transportation of coal with less than 34 *per cent* ash to distant power houses should be considered.

Conclusion

Advance Action Plans of seven projects remained incomplete even after periods of one to ten years from the scheduled dates of completion, which is likely to have a cascading effect on completion of the Projects. During implementation of projects, there were delays in development of related infrastructure resulting in avoidable expenditure. These were primarily due to problems in taking physical possession of land required for mining operations. These resulted in loss of coal production and revenue.

There was gross under utilisation of HEMM and Coal Handling Plants. The Company was yet to absorb new technology of surface miner in its HEMM and in the meantime, had not devised a mechanism for ensuring that it hired the equipment at a reasonable economic rate. No policy regarding reclamation of coal rejects produced from surface miner had been formulated. Underground mines were incurring persistent losses. The Company had not chalked out any plan for closure of unviable mines. Scientific assessment of manpower was not made. Despite poor production/removal of over burden and insignificant increase in coal production, the Company made sizeable payments for overtime to its workers. The performance of the Company in refilling of open pits was short of targets and it was still to revise the EMP.

The review was issued to the Company/ Ministry in November/December 2005; their reply was awaited (February 2006).

CHAPTER: IV

NEYVELI LIGNITE CORPORATION LIMITED

BUCKET WHEEL EXCAVATORS

Highlights

Neyveli Lignite Corporation Limited did not fix fresh norms for technically advanced Bucket Wheel Excavators (BWEs) procured after 1983 but adopted achievable capacities already fixed for old BWEs.

(Para 4.6.2.2)

HRC did not fix norms for achievable hourly output or annual effective working hours for BWEs deployed in lignite bench. BWEs deployed in the lignite bench thus worked without norms.

(Para 4.6.2.3)

Annual average shortfall of lignite extracted worked out to 5.10 MT (Mine I including Expansion) and 5.12 MT (Mine II) when actual output of BWEs was compared with normative output.

(Paras 4.6.3.1 and 4.6.3.2)

The transportation of lignite from Mine-I to Thermal Power Station II at a cost of Rs.21.61 crore during the period from 2000-01 to 2004-05 to meet the shortage of lignite in Thermal Power Station II could have been avoided.

(Para 4.6.3.3)

Excess consumption of power and teeth was Rs.17.73 crore in Mine I including Expansion and Rs.24.99 crore in Mine II. M/s MECON conducted the Energy Audit of Mines II and gave its recommendations (November 2003), which were yet to be implemented.

(Para 4.7.1.1 and Para 4.7.1.2)

A total of 93,677 hours were consumed in excess over norms for the maintenance of BWEs during the period from 2000-01 to 2004-05 resulting in short excavation of 24.27 MT lignite in both Mine I including Expansion and Mine II.

(Para 4.8.1)

The downtime due to forced outages in respect of BWE Nos. 1420 & 1421 was around 20 *per cent* of the calendar hours during 2000-01 to 2004-05 due to non-execution of overhaul in time.

(Para 4.8.3)

Boom head modification in BWEs MAN I and MAN II at a cost of Rs.20.53 crore did not produce the desired hourly output.

(Para 4.8.4)

Gist of Recommendations

- Norms have to be fixed for old and new BWEs separately. For the BWEs working in Bottom Bench/Lignite Bench, HRC did not fix norm for achievable hourly output as well as annual effective working hours for different capacities of BWEs. The Corporation may fix norms for them for assessing the performance of different BWEs in BB/LB.
- As there was shortfall in production of OB and lignite vis-à-vis achievable capacities, the Corporation may analyse the variance in the actual production to identify the reasons for adverse performance and initiate corrective action.
- Norms for hourly output and annual effective working hours should be reviewed periodically and should conform to the actual working hours of the BWEs.
- Depending on parameters for hard and soft strata of soil, the norms for teeth consumption should be fixed separately for hard/soft strata. The actual consumption of teeth should also be recorded for hard and soft strata separately. These norms should be reviewed periodically.
- Energy Audit needs to be conducted in Mine I. After implementing the recommendations of the Consultant in Mine II, the energy consumption should be reviewed periodically in both the mines.
- Allocation of hours for forced/planned stoppages made as per HRC should be studied afresh and norms re-fixed. The norms should be reviewed periodically with reference to the working conditions.

4.1 Introduction

4.1.1 Neyveli Lignite Corporation Limited (Corporation) was incorporated in November 1956 with the main objective of excavating lignite from the lignite deposits available in the Neyveli area and generating power there from. The Corporation at present has three mines with lignite excavating capacity of 24 million tonne per annum (MTPA). The capacities and the year of attaining commercial production of these mines are given below:

Table 1
Capacities of Mines

Sl No	Mines	Capacity (MTPA)		Year of commercial Production
1	Mine-I	4.5	10.5	1962
2	Mine-I First Expansion	2.0		1984
3	Mine-I Second Expansion	4.0		2003
4	Mine-IA	3.0	3.00	2003

5	Mine-II Stage I	4.7		1991
6	Mine-II Stage II	5.8	10.5	1997
	Total Capacity		24.0	

The lignite excavated from Mine-I including expansion and Mine-II of the Corporation is exclusively meant for power generation in TPS-I and TPS-II respectively.

4.1.2 For mining operations, the Corporation deploys a system of Specialised Mining Equipment (SMEs) consisting of Bucket Wheel Excavators (BWEs), Mobile Transfer Conveyors (MTCs), Conveyor System and Spreaders for stripping of overburden and excavation of lignite. Conventional Mining Equipment (CMEs) like dozers, dumpers, pipe-layers, tipper lorries, trench cutters for executing preparatory and auxiliary works viz. front preparation, shifting equipments/materials from one place to another are also used.

4.1.3 Overburden (OB) is removed in four stages called surface bench (SB), top bench (TB), middle bench (MB) and bottom bench (BB). Lignite is removed in the final stage called lignite bench (LB). One more stage called 'New Surface Bench' (NSB) was also introduced in Mine I Expansion in August 2000. Each bench has one / two sets of SMEs and required number of CMEs as decided by the management. The Corporation makes forward preparation of mines by using explosives for blasting at required levels to loosen the hard strata before commencement of excavation.

BWEs excavate the OB / lignite and transport it to the conveyor system in the bench. Every BWE has a cutting portion i.e., buckets with teeth fixed in a wheel which extract OB / lignite and drop it on the in-built small conveyor. The machine conveyor transports the OB/lignite to the independent conveyor system, which transports the OB/lignite to the dump yard/ground storage bunker. The performance of BWEs has a direct bearing on the lignite production and ultimately power generation in the downstream Thermal Power Stations (TPS) with a total installed capacity of 2490 MW.

4.2 Scope and Objectives of Audit

A review of the performance of the Bucket Wheel Excavators used in Mine I including expansion and Mine II was taken up to ascertain whether:

- (i) BWEs functioned efficiently with reference to the norms fixed;
- (ii) Production performance was planned and achieved;
- (iii) Norms were fixed for the consumption of utilities and the actual consumptions were within the norms; and
- (iv) Maintenance programme for each BWE was drawn up annually as per norms and executed without any deviation.

The review was made with reference to production planning, actual working hours of BWEs, actual output and maintenance of BWEs for the years from 2000-01 to 2004-05. This review does not cover the performance of BWEs deployed in Mine IA as the mine was opened only in April 2003.

The performance of BWEs 1400 and 700 only has been studied as these were deployed in Mines I & II.

4.3. Audit Methodology

The following methodology for the review of the performance of BWEs was adopted.

- (i) Discussion and interaction with concerned officers of the Corporation
- (ii) Review of the documents such as Board minutes and agenda papers, Bucket wheel Excavator wise production reports, etc., theoretical and achievable capacity from Hanumantha Rao Committee Report, Annual Performance Review of the production units and monthly production statements, overhaul related files, breakdown reports, Industrial Engineering Wing records
- (iii) Data relating to stoppages of BWEs was obtained from the Corporation and analysed.

4.4 Audit Criteria

The Corporation has four types of Bucket Wheel Excavators (BWEs) viz., 1400 litre, 700 litre, 500 litre and 350 litre with theoretical capacity of excavating 3766 M³/Hour, 1847 M³/Hour, 1086 M³/Hour, 782 M³/Hour respectively. The list of BWEs in the Corporation with their location in the mines is given in **Annexure-7**. Based on these capacities and actual data, Hanumantha Rao Committee had fixed the achievable capacities, which have been used in audit as norms for comparison of actual performance.

4.5 Acknowledgement

In addition to examination of records and documents, a number of issues were deliberated on 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.

4.6 Performance of Bucket Wheel Excavators

4.6.1 The performance of the BWEs is discussed below after mine-wise grouping of the 22 BWEs working in different benches of each mine.

4.6.2 Fixation of achievable capacity

4.6.2.1 Hanumantha Rao Committee (HRC) was constituted in September 1982 to determine bench-wise achievable capacities of the BWEs. HRC conducted a detailed study of Mine I and the operational constraints faced by BWEs during the period from 1969 to 1982 while determining the achievable capacity of each type of BWE. The theoretical and achievable capacities of OB removal of the BWEs as fixed by the HRC are given below:

Table 2
Theoretical and Achievable capacities of BWEs

S.No.	Type of BWE (Litre)	No. of BWEs		Effective working hours per annum	Theoretical Capacity (M ³ /Hr) per BWE	Achievable capacity* per BWE (M ³ /Hr)
		Mine I	Mine II			
1	1400	6	5	4000	3766	2250
2	700	5	6	4000	1847	739

4.6.2.2 The HRC fixed (1983) norms for operation of BWEs based on the data available for the period 1969 to 1982. After the norms were fixed, new BWEs with advanced technical features were procured. Instead of determining the theoretical/achievable capacities of these new BWEs afresh, the Corporation adopted achievable capacities fixed by HRC for old BWEs procured prior to 1980. The technical superiority, which enhanced the designed capacity, was thus ignored.

4.6.2.3 Further, HRC had not fixed any norms for BWEs for extraction of lignite from the lignite bench. As the Corporation also had not fixed any norms, it could not assess its own performance in the LB. For the purpose of this study, Audit adopted norms, based on the formula adopted by HRC for BWEs on the OB bench, of 1425 MT[♦] per hour for BWE 700 litre and 2272 MT[♦] per hour for BWE 1400 to assess the performance of BWEs deployed in the LB.

4.6.3 Shortfall in Production with reference to Normative Output

4.6.3.1 Mine I including Expansion

The total hours worked by the BWEs, OB removed, OB that should have been removed as per norms for the actual hours worked (achievable capacity) and shortfall in OB removal is given in Table 1 of **Annexure-8**. It was seen that 1400 Litre BWEs worked for more hours than the norms but the output was less than the normative level as the hourly output of the BWEs was less than the norm. The average annual shortfall in OB removal was 11.59 Mm³ resulting in short exposure of lignite to the extent of 2.11 MTPA.

The Corporation stated (July 2004) that due to hard strata conditions prevailing at Mine I especially during the last few years the strain on the structural members would be more if

* Achievable capacity had been calculated by HRC by multiplying Bucket size with ring factor, number of discharges per minute and bench factor divided by swell factor. (Ring factor: Since the speed of the 700 Litre BWE is higher the discount factor of .75 was adopted by HRC for covering the possibility of buckets not getting filled fully. This was applicable to BWE 700 only. Bench factor: Discount factor given by the HRC on the output of the machine to cover the various operational and geological constraints during operation. Swell factor: The discount factor given by HRC in each filling to cover the void occurring due to presence of boulders/lumps.)

♦ Norms for achievable capacity for excavation of lignite has been calculated by Audit on the same basis as adopted by HRC and mentioned at above footnote. The bench factor as calculated by HRC for LB has been applied in the formula.

the BWEs worked at the rate fixed by the HRC which would lead to more forced outages. The Corporation also stated that to tide over the problem and to achieve the desired output, the BWEs were used for increased hours with marginal reduction in output per hour.

The reply of the Corporation is not acceptable because HRC had considered all geological and operational constraints while fixing the achievable capacity of BWEs. The contention of the Corporation that the reduction in hourly output of BWEs was marginal is not acceptable as the average annual shortfall in production of lignite worked out 2.11 MTPA based on HRC norms for hourly output.

Table 2 of **Annexure-8** depicts the details of short production of lignite due to performance of BWEs below their achievable capacity in LB. The annual average production of lignite for the five years from 2000-01 to 2004-05 was 8.59 MT only whereas the BWE had the normative capacity of excavating 13.69 MT. Against this, the requirement of lignite for the downstream plants worked out to 9.2 MT considering the PLF achieved in five years from 2000-01 to 2004-05. Therefore, surplus capacity of BWEs was available in Mine I including Expansion. Considering the average annual shortfall of 5.10 MT in production of lignite with available BWEs, the total production of Mine I including expansion could go up to 13.69 MT, thereby minimizing the losses of generation suffered by TPS I due to shortage of lignite.

The Management stated (July 2004) that face length, bench height and width along with geo-mining conditions decided the excavation output. They further stated that out of two alternatives of either having more working hours with less output rate or operating at normative level the Corporation opted for the former option to prevent strain on the machines.

The reply is not acceptable as the strength of the critical components of the SMEs was determined in view of the terrain and other prevailing conditions of the mining area. Hence, production should not be affected by the terrain. Further, working of BWEs for more hours had the effect of substantially increasing power consumption.

4.6.3.2 MINE II

Though BWEs engaged in Mine-II worked for more than 4000 hours, the actual output was less than the achievable output rate, resulting in shortfall in the removal of OB. Due to performance of BWEs below their achievable capacity, the average annual OB removal fell short by 9.96 Mm³ resulting in short exposure of lignite to the extent of 1.90 MT as detailed in Table 1 of **Annexure-9**. The shortfall in production of lignite due to lower output rate per hour in Mine II has been depicted in Table 2 of **Annexure-9**. The average annual lignite production during the period 2001-02 to 2004-05 fell short by 5.12 MTPA. The average lignite output for the five years period under review was 9.28 MT. Considering the average annual shortfall in production of 5.12 MT of lignite with available BWEs, the total production of Mine II could go up to 14.40 MT which would be sufficient to meet the lignite requirement of 11.90 MT in TPS II even at a higher plant load factor of 85 per cent. This potential was not exploited and TPS II suffered loss of generation of power due to shortage of lignite.

4.6.3.3 To meet the actual shortfall of lignite at TPS II, the Corporation transported 6.21 MT lignite from Mine I to TPS II and incurred transportation cost of Rs.21.61 crore during the five-year period ending March 2005, which could not be recovered as a part of

power tariff. Had the Corporation achieved the normative rate for lignite extraction, the transportation of lignite from Mine I to TPS II to meet the shortage of lignite at a cost of Rs.21.61 crore during the period from 2000-01 to 2004-05 could have been avoided.

The Corporation stated (July 2004) that BWEs worked for longer hours at lower output rate to avoid any stress on the components and to improve productivity.

The reply is not tenable because HRC fixed the normative hourly rate after considering various operational constraints that were duly accepted by the Corporation. Further, working of BWEs for more hours had the effect of substantial increase in power consumption.

Recommendations

- The Corporation adopted old norms for the new BWEs procured subsequent to 1983 and thus ignored the technical superiority of new machines. The norms for new BWEs may be fixed separately.
- HRC did not fix norms for achievable hourly output as well as annual effective working hours for different capacities of BWEs working in BB/LB. The norms need to be fixed for these also for the Management to be able to realistically assess the performance of BWE deployed in these benches.
- Variance in the actual output to norms needs to be extensively analysed to identify reasons for adverse performance and for initiating rectificatory action.

4.7 Consumption of Utilities by BWES

4.7.1.1 Consumption of Power

Power is consumed for operating Specialized Mining Equipment /other equipment and other activities including Ground/Storm Water control and maintenance. The Industrial Engineering Wing of the Corporation had fixed the overall Specific Energy Consumption (SEC) at 31.79 kwhr / tonne of lignite for Mine I and at 33.66 kwhr / tonne of lignite for Mine II for the year 2002-03. The additional cost of production on account of excess power consumption over the above norms worked out to Rs.10.50 crore in Mine I including Expansion and Rs.21.79 crore in Mine II as detailed in **Annexure-10**.

The Corporation stated (July 2004) that the specific power consumption increased during the period 2000-01 to 2002-03 since power was consumed for development of Mine-I Expansion. In Mine II, the Corporation replied (July 2004) that the norm fixed for power consumption was only a broad objective and that it depended on mine movement, pumping lift involved etc. Further no scientific norms could be determined in view of too many variables and complexity involved.

The reply of the Corporation is not acceptable since norms fixed should have been adhered to and the deviations minimised through suitable control over consumption of power. Further, though M/s MECON conducted Energy Audit of Mine II and recommended (November 2003) certain measures for energy conservation that would result in substantial savings in energy cost, the Corporation was yet (August 2005) to implement the recommendations. Energy Audit had not been conducted (August 2005) in respect of Mine I including expansion.

4.7.1.2 Consumption of Teeth

The working life of teeth in the BWEs mainly depends upon the soil condition coupled with the forward preparation of the ground by effecting systematic blasting programme. The Corporation fixed the norms of 94.90 teeth per Mm^3 during the year 2000-01. The extra expenditure due to excess consumption of teeth during the five years has been depicted in **Annexure-10** and worked out to Rs.7.23 crore in Mine I and Rs.3.20 crore in Mine II.

The Corporation stated (July 2004) that the consumption of teeth depended on the strata conditions, sudden occurrence of rocks etc. and that there were bound to be variations according to the geological conditions.

The reply is not tenable because the Corporation prescribed suitable technical specifications for the quality of teeth depending on the geological conditions.

Recommendations

- Depending on parameters for hard and soft strata of soil, the norms for teeth consumption should be fixed separately to judge the efficiency. The actual consumption of teeth should also be recorded for hard and soft strata separately. These norms should be reviewed periodically.
- Energy Audit has to be conducted in Mine I. After implementing the recommendations of the Consultant in Mine II, the energy consumption should be reviewed periodically in both the Mines.

4.8 Maintenance of BWEs AND DOWNTIME ANALYSIS

4.8.1 The Corporation planned stoppage of SMEs for both preventive maintenance apart from breakdown stoppages. Hours estimated for Daily/Weekly/planned maintenance, inspection & overhaul, conveyor shifting and vulcanizing of conveyor belts were classified under planned stoppages. All other categories of stoppages such as machine mechanical, conveyor mechanical, electrical, operational and auxiliary stoppages were classified as breakdown stoppages.

The ceilings of stoppages, machine wise / year wise as fixed by the Management were not made available to Audit. Hence Audit took the recommendations of HRC for reference and downtime analysis was done on that basis.

The stoppages under both the planned and the breakdown categories were in excess over the norms during the period from 2000-01 to 2004-05 in respect of both Mine I including Expansion and Mine II. It may be seen from **Annexure-11** that excess hours over the norms worked out to 93,677 and excavation of OB to the extent of $131.27 Mm^3$ could not be carried out. This resulted in short excavation of lignite to the extent of 24.27 MT.

The Corporation stated (July 2004) that excess stoppages under one head would be compensated by curtailing stoppages under other heads and that as the achievable capacity as recommended by HRC was reached there was no loss to the Corporation.

The reply is not tenable as excess stoppages had been worked out after applying the overall ceiling for all categories of stoppages.

The Corporation further stated (July 2004) that they were following the recommendations of HRC in all the years after taking into account operating conditions, OB to lignite ratio, availability of machines and requirement of downstream units.

The reply of the Corporation is not acceptable as it had not followed the ceilings prescribed by HRC for different categories of stoppages. This resulted in short excavation of lignite to the extent of 24.27 MT and avoidable loss of generation for want of lignite in TPS II.

4.8.2 Analysis of the stoppages of BWEs for more than 24 hours for maintenance / repairs showed that on a number of occasions the repair/maintenance of the same component had to be attended to within two days to eight months indicating the repairs were not attended to properly, and 5,997 hours were lost due to such stoppages. A list of such stoppages is given in **Annexure-12**.

4.8.3 Overhauls of BWEs have to be carried out normally after 20,000 hours or after five years. During an analysis of breakdown of machineries for the past five years ending March 2005, it was observed that no major overhaul was conducted in respect of 1400 litre BWE Nos. 1420 and 1421. In respect of BWE No. 1421, though major overhaul was planned to be carried out during 2000-01 and 2001-02, no such overhaul was actually carried out. While in respect of BWE No. 1420, no overhaul was planned in any of these five years. It may be seen from **Annexure-13** that the average forced stoppages of both the BWEs hovered around 20 per cent of the calendar hours (8,760) during all the five years.

The Corporation stated (July 2004) that due to production constraints the BWEs could not be released for overhaul. The Corporation further stated that the working hours were well above the norm of 4,000 hours and that the working hours of the BWEs depended on various operating conditions.

The reply of the Corporation on production constraints is not tenable as the Corporation allotted 1470 hours every year for each BWE towards overhaul before arriving at the targets.

4.8.4 Boom Head modification in MAN BWEs

The BWEs MAN I and MAN II were required to perform at the rate of 2250 m³/hour for 4,000 effective hours per annum as per norms. Against this, they were giving average output of 1500 m³/hour. The work of Boom Head modification in these BWEs was proposed during the year 1998-99 and was to be completed within two years. The proposal for modification envisaged an incremental increase in the output by 750 m³/hour for each BWE i.e., equal to the hourly output fixed by HRC. The modifications were carried out at a cost of Rs.20.53 crore in the BWEs in 2002-03 (MAN II) and 2003-04 (MAN I) and the Performance/ Load Tests (Take Over Tests) of BWEs MAN I and MAN II were conducted in July 2004 and December 2003 respectively which gave outputs of 2565 m³/hour and 2507 m³/hour respectively. However, on deployment in Mine II, these BWEs gave reduced outputs of 1600 m³/hour (Man I) and 1760 m³/hour (Man II) during 2004-05. The expected hourly output rate of 2250 m³/hour as envisaged in the proposal was not achieved.

The Corporation stated (July 2005) that the rate per hour achieved was 1204 m³/hour for MAN I and 1313 m³/hour for MAN II before modification and that the rate had increased to 1700 m³/hour after modification.

The reply is not acceptable because the average performance at the time of planning the modification was around 1500 m³/hour and the execution of modification during 2000-01 and 2001-02 was to result in output of 2250 m³/hour as envisaged in the proposal. The modification work was actually carried out only after further deterioration of output due to delay in taking up the work and the output further decreased to around 1200 m³/hour. The modification resulted in only marginal improvement but failed substantially to attain the targeted level. Thus, the expenditure of Rs.20.53 crore had not brought out the results projected in the proposal.

Recommendation

Allocation of hours for forced/planned stoppages made as per HRC should be studied afresh and norms re-fixed. The norms should be reviewed periodically with reference to the working conditions.

4.9 Conclusion

The achievable capacities for OB removal by BWEs were fixed by HRC after considering the actual performance data of the BWEs, which had taken care of technical and operational constraints. The Corporation, however, could not adhere to these norms and there was shortfall in the production of OB and extraction of lignite. The Corporation had not analysed in detail the variance in the actual output from the norms to identify the reasons for adverse performance and initiate corrective action. Further, norms had also not been fixed for the BWEs working in the BB/LB. In the absence of norms, the Corporation could not judge the efficiency of performance of BWEs. The consumption of power and teeth in operating the BWEs also exceeded the norms and needed to be controlled.

The review was issued to the Ministry in January 2006; its reply was awaited (February 2006).