CHAPTER VI
AUDIT REPORTS ON ENVIRONMENT MANAGEMENT SYSTEMS

Performance audit of Environmental Management by Mumbai Port Trust
Ministry of Surface Transport
Mumbai

Highlights

- The port did not have a documented Environmental Management Plan (EMP). It did not carry out environmental management audits despite regulatory requirements, which reduced its control over environmental matters.

- Adequate environmental protection measures to mitigate the adverse environmental effects of new projects were not taken.

- Shortage of qualified manpower coupled with failure to maintain mandatory equipments purchased for environmental monitoring, combating oil spillage etc., constrained the working of the Pollution Control Cell.

- Old pipelines abandoned six years back were yet to be removed and were posing risk to the environment.

- Hazardous waste management was neglected as Mumbai Port Trust (MbPT) failed to take adequate measures to mitigate the adverse effects of sludge, slop and dirty ballast.

- MbPT did not properly monitor air and water quality and failed to control pollution in harbour waters. The methodology adopted by it for testing air pollutants level was not as per regulatory guidelines.

- MbPT did not monitor the activities of ship-breaking despite clear directives of the Supreme Court.

- MbPT did not attend to its responsibilities relating to the National Oil Spill isaster Contingency Plan (NOS-DCP).

Recommendations

- MbPT should formulate its environmental management plan appropriate to the nature and scale of its operations.

- The Port should regularly conduct environmental management audits which may help the port to identify areas of concern and assess the efficacy of its environmental management practices.

- The old pipelines which constitute a safety hazards may be removed at the earliest to avert any possible adverse environmental impact.

- The air sampling may be done as per the guidelines of CPCB and all relevant parameters of air quality may be monitored.

- The Port should pursue with MPCB/MCGM authorities to arrange for treatment of all sewage before discharge in harbour waters.

- The experimental mangroves area may be developed. A physical survey may be undertaken.

- The oil water separator may be revamped and put to use; the matter may be pursued with the oil industry for removal of sludge.

- Regular visits with officials of MPCB/Maritime Board may be conducted to contain pollution due to ship breaking activities. Gas detectors may be procured and made mandatory for ship breakers to use before entering the sensitive area and taking up any 'hot work' in order to prevent untoward hazards.

- The Port may ensure regular attendance at annual NOS-DCP preparedness meetings. The minimum equipments as specified in NOS-DCP may be kept ready for operation by the Port and necessary training may be given to personnel under the guidance of the Coast Guard.

3.1 Introduction

The ports and harbours straddle the interface between land and sea. Port development and operations have the potential to impact environment. The environment may be impacted due to vessels and vehicular traffic, handling and storage of materials and shore based facilities. The Mumbai Port under the administrative control of Ministry of Surface Transport (MOST) is located on the western side of a long and part-mangrove lined tidal channel that delineates Mumbai Island from the mainland and is linked to various creeks and coastal drainages. The Port is governed primarily by the Major Port Trusts Act, 1963 and to a certain extent by the Indian Ports Act, 1908 as amended and is managed by Mumbai Port Trust (MbPT). Mumbai Port has marked 133 years of its existence in 2006 as a port serving traditional cargo carriers.

3.2 Scope of audit

The performance audit of management of environment-related activities of MbPT was conducted for the period 2000-01 to 2005-06 with focus on management of air quality monitoring, water quality monitoring and waste disposal.

3.3 Audit objectives

The audit was carried out with the objective to assess the following:

- Whether the port has an appropriate Environmental Management Plan to address its environment related responsibilities and whether it carried out Environmental Management Audit regularly and according took necessary remedial measures.
- Whether the port has been carrying out Environmental Impact Assessment (EIA) and taking mitigation measures in accordance with the relevant guidelines and directives.
- Whether the port has taken adequate measures for monitoring and controlling air water pollution.
- Whether the port managed disposal in a manner as to minimize environment impact.

3.4 Audit criteria

Audit criteria were derived from the various obligations placed on MbPT in accordance with the following:

- Major Port Trusts (MPT) Act, 1963.
- The Indian Ports Act (IPA), 1908 as amended.
- Water (Prevention and Control of Pollution) Act, 1974.

- Air (Prevention and Control of Pollution) Act, 1981
- Environment (Protection) Act (EPA), 1986 and rules made there under such as Hazardous Waste (Management and Handling) Rules, 1989.
- Conditions stipulated in Environmental Clearances (EC) granted for major projects during the period 1994-2005
- Environment protection measures stipulated by Ministry of Environment and Forests (MOEF) from time to time.
- Best practices regarding environmental management for port as suggested by American Association of Port Authorities Handbook.

3.5 Audit methodology

Audit examined the documents of MbPT relating to environmental management activities and held discussion with Port management. In addition detailed questionnaires were issued and replies examined. Audit also examined relevant records of regulatory authorities viz. Maharashtra Pollution Control Board (MPCB), Mumbai and Regional Office of the MOEF, Bhopal. Organisation-specific questionnaires were also issued to Indian Coast Guard and Maharashtra Coastal Zone Management Authority (MCZMA) and their responses were taken into consideration.

Audit findings

3.6 Broad framework for management of environment

Environmental Management Plan (EMP), Environmental Management System (EMS), Environmental Management Audit and Environment Impact Assessment (EIA-in respect of new projects) would constitute broad framework for management of environment. Audit Scrutiny in this regard brought out the following:

3.6.1 Absence of Environmental Management Plan (EMP)

MOEF had directed (April 1989) the Port to develop an EMP. According to the Environmental Impact Assessment Guidelines for Ports and Harbours (EIAGP&H) issued by MOEF under the provisions of EIA Notification, 1994 issued under EPA, 1986, "an EMP is an implementation plan to mitigate and offset adverse environmental impacts of a project and to protect and where possible, improve the environment.

Based on the potential impacts identified, it sets out in detail, the process of implementing mitigation and compensatory measures, the timing of these measures and indicative costs. EMP should be viewed as a legal commitment on the part of proponent to control environmental impacts."

It was noticed that the Port did not have a documented EMP despite directives of MOEF and

EIA guidelines. The Port accepted the audit observation and stated (May 2006) that the EMP would be developed with the help of a consultant.

Recommendation: ***MbPT should formulate its environmental management plan appropriate to the nature and scale of its operations.***

3.6.2 Environmental Management Systems (EMS)

An Environmental Management System (EMS) is a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency. In other words, EMS is a systematic approach towards implementation of EMP.

A study by American Association of Port Authorities (AAPA) suggested that direct labour costs of only an average of eight to ten hours per employee per year could help integrate EMS activities into a ports daily activities without any additional employees or specialists on the workforce. This study states that investment in EMS means money saved, reduced insurance premiums, regulatory incentives as well as improved management confidence in handling environmental issues. AAPA recommends that one of the best practices of public ports is the integration of EMS into an organizations decision-making structure to provide a healthy environment as well as to meet public demands thereby ensuring steady economic growth.

MbPT did not implement an EMS in a systematic manner. The Port accepted audit observations and stated (March 2006) that it would take steps to implement EMS and obtain ISO 14001 certification.

Recommendation: *The port should evolve a properly documented EMS in order to systematically implement its EMP.*

3.6.3 Absence of Environment Management Audit

Rule 14 of Environment (Protection) Rules, 1986, stipulates that "every person carrying on an industry, operation or process requiring consent under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) or under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) or both or authorization under the Hazardous Wastes (Management and Handling) Rules, 1989 issued under the EPA, 1986 (29 of 1986) shall submit an environmental audit report for the financial year ending with 31 March in Form V to the concerned State Pollution Control Board on or before the 30 September every year, beginning 1993." The requirement was made compulsory vide Gazette Notification dated 13 March 1992 [GSR 329 (E)].

MOEF had prescribed in its EIA guidelines, an eight-step environmental audit to be carried out by the management. The steps included *inter alia* water and energy consumption audit, inventory of materials handled, enlisting of resultant pollution, quantity of pollution, hazardous waste audit, impact of pollution control measures on the conservation plans, additional investment proposals for environmental protection and other activities like tree

plantation *etc.* The guidelines require all the ports to arrange for conducting environmental management audits to determine whether environmental management procedures conform to planned arrangements to avoid any mishap, litigation and liability.

It was noticed that MbPT did not carry out any environmental management audit and therefore could not submit any environment audit report as of March 2006.

Recommendation: *The Port should regularly conduct environmental management audits which may help the Port to identify areas of concern and assess theefficacy of its environmental management practices.*

3.6.4 Working of Pollution Control Cell

As per the suggestions of MOEF (June 1982), MbPT set up a Pollution Control Cell in 1983. The objectives of the cell were to devise and implement the measures for prevention and control of pollution, particularly oil pollution in the harbour. The cell was responsible for maintenance of monitoring equipments, air and water monitoring, prevention of oil pollution in outer harbour and garbage collection from vessels, public relationship and plantation work.

3.6.4.1 Deployment of inadequate Human Resources

As per the requirement of cell, the posts of one director, one deputy director, three pollution control officers, one junior assistant, five chemists, one cleaner and five „lascars" were to be operated. MOEF in condition B (iv and x) of EC of Stage III insisted on deployment of qualified manpower including marine biologist and senior executive in the cell.

It was noticed that the Cell was not properly manned. The charge of director was being looked after by Senior Dock Master as additional charge. The post of deputy director, two out of three posts of pollution control officers, three out of five posts of chemists, the only post of cleaner and all five posts of lascars were not filled up till August 2006. The posts of marine biologist and senior executive as stipulated by MOEF were also not filled up.

3.6.4.2 Poor maintenance of pollution control equipments

In order to comply with the conditions of an earlier environmental clearance (April 1989), MbPT had procured equipments or facilities, as given in the table below, to monitor and implement the programmes relating to pollution control and environmental conservation.

Pollution Control facilities

(Rupees in lakh)

Name of the equipment/ facility	Cost	Year of purchase
Marine Pollution Equipment	114.00	1991
Laboratory equipment	18.00	1991
Incinerator plant	14.16	1993
Oil water separator plant at M Shed, P&V Docks	39.90	1993
Oil water separator plant at Marine oil Terminal (MOT)	54.60	1995
APM	22.00	1992
Total	**262.66**	

In the absence of full complement of staff and non-functioning of equipment/ non-availability of equipments, the effectiveness of the pollution control cell remained questionable.

Recommendation: *Working of the pollution control cell should be streamlined so as to achieve intended objective of the cell.*

3.7 Environmental Impact Assessments and Mitigation measures

MbPT sought Environmental Clearance (EC) from MOEF for four projects from August 1994 to 2005-06 and received EC and executed three projects as given below. The EC in respect of offshore container terminal is yet to be received.

(Rupees in crore)

Name of the Project	Date of Application	Date of Receipt of EC	Date of Completion	Expenditure
Replacement of submarine pipeline **(Stage I)**	August 1994	21/9/1994	9/6/2000	274.81
Modernisation of MOT Berths **(Stage II)**	March 1995	26/12/1995	28/12/2004	207.27
Replacement of Common user shore pipeline **(Stage III)**	May 2001	26/9/2001	4/6/2004	35.68
Offshore container terminal	May 2005	Yet to be received	Not applicable	1228 (estimated)

Audit noticed as follows:

3.7.1 Deficient mitigation measures

Condition (A)) of EC of September 2001 for Replacement of Common user shore pipeline stipulated that "the environmental safeguard measures and the environmental management plan as given in project documents shall be effectively

implemented". Audit scrutiny brought out the following:

- There was requirement for Laboratory-cum pollution control cell with necessary pollution control equipments for analysing water and waste water including sewage, air pollution monitoring and for oil matching . As mentioned in paragraph 3.6.4.2, only 10 of 30 equipments for air, water and oil monitoring were in working condition (May 2006). The air samples were being collected through gas sampler and analysis made at port hospital at Wadala as the relevant equipments were not in working condition (September 2006).

- The Port was also required to have an incinerator plant at south end of Timber Pond, Sewree for the incineration of oily sludge. As mentioned in paragraph 3.6.4.2, an incinerator plant purchased (1993) ceased to operate from February 1996 due to mechanical snags and was subsequently sold in August 2002, without replacement as of March 2006. Due to this, oily sludge has been accumulating at an island in the harbour waters (MOT).

- The Port was also to be equipped with reception facilities with oil water separator microprocessor attachment. As mentioned in paragraph 3.6.4.2, though the two oil separator plants were installed in 1993 and 1995 for treatment of dirty ballast and slop generated by ships, these were never put to use and MbPT continued to treat dirty ballast and slop in conventional way of decantation.

- The Port had proposed to convert an existing tug into a "Tug of Opportunity" fitted with pollution control equipments and also to develop oil-eating bacteria (Super Bug) in replacement of dispersant chemicals, in order to avoid the use of chemicals in destruction of molecular composition of oil.

- Audit observed that no action had been taken with regard to these proposed measures.

In response to audit observation, the Port stated (May 2006) that the matter would be examined.

3.7.2 While seeking (May 2005) environmental clearance for the Offshore Container Terminal project, MbPT had stated that the Port had a variety of pollution control equipments and infrastructure in place. The list included Oil water separators at MOT, Ferry Wharf, APM van to measure air quality, various types of pollution control equipments, and necessary infrastructure including trained personnel. Scrutiny of documents of pollution control cell revealed that oil water separators at MOT and Ferry Wharf had never been put to use and that the APM had already been decommissioned in 2001, without replacement as of August 2006. Further as mentioned in paragraph 3.6.4.2, only 10 out of 30 equipments with pollution control cell of MbPT

were in working condition. Further, no documents supporting training to staff could be produced to audit.

3.7.3 Old decommissioned pipelines not removed

The conditions of EC for the project relating to Replacement of submarine pipeline had stipulated that once the new pipelines are laid, the existing pipelines are to be decommissioned.

Though the new pipelines had been laid in June 2000, old and disused pipelines which approximately run for four kilometres and had been declared as a safety hazard by the Port, were not removed as of June 2006.

Recommendation:

The old pipelines which constitute a safety hazards may be replaced at the earliest to avert possible adverse environmental impact.

3.7.4 Funds earmarked for environmental protection measures

Conditions of ECs had stipulated that the funds earmarked for environmental protection measures were to be maintained in a separate account and utilised for the sole purpose of environmental safeguards. Diversion of fund was prohibited for other purposes and year-wise expenditure was to be reported to the MOEF.

MbPT had made provisions of Rs. 66 lakh and Rs. 41 lakh in respect of two projects - Replacement of Submarine Pipeline and Modernisation of MOT Berths respectively towards environmental protection fund and had spent Rs. 31.81 lakh and Rs. 8.54 lakh respectively. In respect of Replacement of Common user shore pipeline a separate fund was not provided but expenditure on environmental safeguards was made from contingency fund of the project.

Audit scrutiny revealed that the balance amounts of Rs. 34.19 lakh and Rs. 32.46 lakh in environmental protection funds were not reflected in a separate head in the annual accounts.

Recommendation: *Funds for environmental protection measures in future may be earmarked and accounted for separately and should be used for realising the targeted objectives.*

3.8 Environmental Monitoring

Condition 2(xiii) of EC for Stage I, condition 2.2 of EC for Stage II and condition

B(iv) of EC of Stage III required the Port to regularly monitor quality of air and water in Port area and to submit reports periodically to Regional Office, Bhopal and MPCB. The ECs for Stage II and III had been made enforceable under EPA, 1986 and hence were binding and non-dilutable. Monitoring in the Port area is the responsibility of the Pollution Control Cell of MbPT.

3.8.1 Monitoring of air quality

Central Pollution Control Board (CPCB) issued National Ambient Air Quality Standards (NAAQ) under Environment Protection Rules, 1986 and prescribed methodology for collection of air samples and its analysis. Air quality monitoring suffered from following deficiencies:

Air sample testing was to be done twice a week at regular interval, but it was done twice or thrice a month at irregular interval

The parameters like SO2, NOx, NH3, SPM, RPM, Pb and CO were to be assessed for 24- hour samples but only SO2, Nox and NH3 were assessed and that too for 2-4 hour samples only.

- The Pollution Control Cell had also not so far (March 2006) collected air quality samples from the actual project areas, though this was consistently stated as a condition of environmental clearances in each stage. CPCB guidelines prescribed methods of management as well as corresponding equipment in respect of various parameters like SO2, NO2, SPM, RPM and CO. Though an Air Pollution Monitoring van (APM van), equipment for laboratory and other ancillary facilities were procured in July 1992 at a total cost of Rs. 22 lakh, MbPT did not procure prescribed equipments required for monitoring purposes.

- The APM van was not in working condition since November 2001 and air monitoring reports were not submitted during the period December 2001 to December 2003.

- From December 2003, air quality monitoring was done by collecting and analysing air samples by gas samplers with testing at the Port Trust hospital. The Port submitted air monitoring reports to MOEF from 2004 onwards but report sent to MOEF did not specify the equipments used for either collection or analysis of samples.

- MPCB authorities had also not monitored air quality independently in the Port area, as per records furnished to audit.

MbPT stated (May 2006) that efforts would be made to procure an APM van.

Recommendation:

The air quality should be monitored in respect of all relevant parameters by adequate sampling as per the guidelines of CPCB.

3.8.2 Water pollution control

As per Chapter III of Indian Ports Act, 1908, the responsibility for controlling and monitoring pollution within harbour waters rests with the Conservator of the Port. The ports have to maintain the standards of effluents as fixed under the category "SW IV for harbour waters" as per CPCB guidelines. The norms for BOD as fixed by CPCB is <5 mg/L. Norm for COD had not been fixed by CPCB. Audit considered the norm of <180mg/L as fixed by NEERI as standard. As per EC of Stage I (1994), the Port authorities were to monitor the water quality in the harbour and send reports to the ministry, MPCB and NGOs. Following deficiencies were noticed:

3.8.2.1 Non-identification of sources of water pollution

In pursuance of condition 2(xvi) of EC of 1994, MbPT had commissioned a study in the year 2000 through National Remote Sensing Agency (NRSA), Hyderabad to gauge the levels of pollution in the harbour waters. NRSA reported (2000) higher amount of TSS and BOD due to outfalls of sewage in harbour area and suggested to investigate the sources of pollution. MbPT had also collected samples from 27 places and tested in its laboratory and analysis reports were sent to MOEF, Bhopal. MOEF observed in December

2000, February 2001, May 2001 and April 2003 that certain water pollution parameters like TSS, BOD and COD etc. were on the higher side. The Port informed MOEF (April 2002) of its inability to identify sources of pollution. MOEF further directed the Port (June 2002) to take help of MPCB to identify the sources of pollution and intimate the action taken. Audit noticed that the Port failed to identify source of pollution as of August 2006. There was nothing on record to show that assistance of MPCB was taken to mitigate the effects of pollution in the harbor waters.

3.8.2.2 Presence of Water pollutants beyond safety limits

Annual report of MPCB indicated that during 2005-06, Municipal Corporation of Greater Mumbai (MCGM) generated 2568 MLD of sewage of which only 973 MLD which constituted 37.89 *per cent* of total sewage, was collected through the sewerage network and processed in Sewage Treatment Plants at Ghatkopar, Bhandup, Versova and Malad. A quantity of 1595 MLD which constituted 62.11 *per cent* of total sewage, was discharged untreated through

three marine outfalls at Colaba, Worli and Bandra.

As per annual report of MPCB for 2005-06 average COD and BOD levels in samples of harbour waters collected from MbPT Jetty at Chembur and Gateway of India, were in excess of safe limits as follows.

Pollutant	Safe limit	Actual observed	
		Chembur	Gateway of India
COD	180mg/l (norm of NEERI)	224mg/l	198mg/l
BOD	5mg/l	15.5mg/l	14.36mg/l,

Besides samples collected from Colaba, which falls within the harbour waters, were found to be excessive on parameters of BOD and COD as compared to standards–375mg/l (MPCB standard–5 mg/l) and 627 mg/l (NEERI standard–180mg/l), respectively.

According to Chapter III of Indian Ports Act, 1908, the responsibility for monitoring pollution within harbour waters rests with the Conservator of the Port. However, the monitoring reports submitted by MbPT to MOEF revealed that from 2003 onwards the port authorities continuously reported water pollution levels within prescribed acceptable limits.

Thus, non-identification of sources of pollution and reporting of water pollution level that was in conflict with the findings of MPCB puts question mark on the reliability of reports submitted by MbPT to MOEF. MbPT did also not send the monitoring reports to MPCB, despite directions to do so.

Impact of water pollution on marine flora and fauna, mangroves, *etc.* could not be ascertained in the absence of specific studies in this behalf.

Recommendation: *The port should pursue with MPCB/MCGM authorities to arrange for treatment of all sewage before discharge in harbour waters.*

3.8.3 Monitoring ecological stress on harbour

EC for Stage I required the Port to "conduct study of the flora and fauna in the MbPT area". In response a study was conducted (1999) of flora and fauna in MbPT area by National Institute of Oceanography (NIO), which concluded that there was a considerable ecological stress on harbour, deterioration of environmental quality in docks, accumulation of metals and considerable

destruction of mangroves due to port activities. NIO suggested implementation of remedial measures like identification and treatment of anthropogenic (human related) discharges, avoidance of land reclamation on eastern shores, afforestation of mangroves, enforcement of MARPOL provisions, monitoring and preparation of inventory of marine flora and fauna. It also recommended reassessment of the same every two years. A report of MOEF suggests that in the Gujarat and Orissa cyclones, devastation was reported to have been lesser where sufficient mangrove buffers were present.

MbPT took action to implement provisions to collect garbage under MARPOL Convention to which India is a signatory, but subsequent reassessment every two year was not carried out. The Port also stated (March 2006) to have planted 11300 mangrove seedlings at Trombay region, Jawahar Dweep Island, Sewree Mud Flat and behind IOC. These included about 2.5 acres of area at Timber Pond (Sewree Mud Flat) stated to have been developed as Mangrove Park.

Audit scrutiny brought out the following:

- The Port could not furnish the relevant records showing the areas of experimental mangroves (macro benthos type) at Sewree Mud Flat and monitoring of the health of plants.

- There was no record to show survey of existing or newly planted mangroves conducted by Port. It was reported by Water and Power Consultancy Services (WAPCOS) (January 2006), a government agency that the mangroves were being extensively harvested for fuel.

- The other suggestions like identification and treatment of anthropogenic (human related) discharges, monitoring and preparation of inventory of marine flora and fauna were not implemented by the Port.

Recommendation: *The experimental mangroves area may be developed. A physical survey may be undertaken and measures may be initiated for preventing illegal harvesting of mangroves.*

3.8.4 Monitoring of oil sludge at Marine Oil Terminal

As per rule 3 and 4 of the Hazardous Waste (Management and Handling) Rules, 2000, oil sludge is covered under categories of hazardous waste.

Though MbPT installed an oil separator plant at MOT in 1991 it was never put to use. Instead, oil tankers discharge their oil, slops and dirty ballast , which are taken through pipelines to specified tanks. Here, the mixture is passed through a decantation method after which the water is discharged into the sea and oil sent to refineries for reprocessing.

As of April 2006, it was seen that due to accumulation over several years, 431 cu. M of sludge was found lying in the tank farm sump, oil water separator and oil collector. Though the oil industry collected useful materials like oils and slops through pipelines, no action was taken to collect unsafe materials like sludge, which was left in the Port premises leading to an environmental hazard. The possibility of fire hazard at MOT was referred to in an internal note of the staff at MOT in 2005. It was also pointed out that accumulated rain water during monsoon in these tanks was released into sea and that the

Mangroves consist of a number of species of trees and shrubs that are adapted to survival in the inter-tidal zone. They play an important role as sediment repository and shoreline stabilizer. The mangrove swamp harbours a complicated community of animals. They extend to the marine areas and many productive fishing grounds of the world are found adjacent to mangrove areas. Petroleum hydrocarbon mixtures recovered and skimmed from spills and washing of equipment Seawater taken into and discharged from empty fuel tanks to maintain the stability of the vessel possibility of oil sludge also getting washed away into the sea could not be ruled out.

As per Good Practice Guidelines for ports and harbours prepared by UK Marine Special Areas of Conservation Project, oil can impact marine life and habitats and a coating of oil on *prop roots* of mangroves could be fatal to mangrove trees.

The port did not reply to the audit queries in regard to the measures initiated for control of the oil sludge.

Recommendation: *The oil water separator may be revamped and put to use; the matter may be pursued with the oil industry for removal of sludge.*

3.8.5 Non-monitoring of noise levels

While clearing a project for Modernisation of Ship Repairs Facilities in the Port(August 1989) MOEF stipulated that the noise levels arising out of ship repairing activities in the repair yards should be monitored in the port area and steps should be taken to maintain it within the prescribed limits. As per conditions of EC for Modernisation of MOT Berths, adequate provision for protection of workers from noise pollution was to be made by the Port and decibel levels were not to exceed 85 dBA. Scrutiny revealed that noise levels were not monitored despite repeated requests by MOEF. In July 2003, it was intimated by MbPT to MOEF that noise monitoring was not done due to non-availability of required facility at the port. Non-monitoring of noise levels posed a threat to the Port staff as well as its tenants. Port did not reply to audit query regarding current status of monitoring for noise pollution in relevant areas.

3.8.6 Oil Industry Safety Norms

As per section 9 and 10 of Oil Industry Safety Directorate (OISD) Standard 129, the calibration and hydraulic testing of the tanks except water tank is required to be carried out once in five years externally and once in ten years internally.

MbPT had nine tanks for storing oil and related products at MOT. Out of these, two tanks were earmarked for disposal. Similarly BPCL had got six oil tanks at MOT.

It was noticed that the Port did not carry out any testing of its oil tanks since 1994 and had no information regarding the testing of the BPCL tanks.

Recommendation: *The calibration and hydraulic testing of oil tanks may be carried out as prescribed. Similarly, it may be ensured that such testing is carried out by BPCL for their oil tanks installed in the Port premises.*

3.8.7 Ballast Water Management

Introduction of harmful marine species through ballast ater was identified as one of the four greatest threats to world oceans. International Maritime Organisation, under its „GloBallast Programme" sponsored pilot studies in six locations throughout the world during 2002-03, including Mumbai Harbour cover Mumbai and Jawaharlal Nehru Ports. The report covering JNPT and MbPT was submitted in October 2003. The study identified a few species introduced in the Mumbai Harbour region due to uncontrolled ballasting. In order to formulate policies to contain the threat, the study identified the inadequacy of data as a major hindrance. In order to overcome the problem of data omission, inaccuracies therein and to effectively identify the threat to environment, suggestions like modifications in the Ballast Water Reporting Form (BWRF) putting extra care in information gathering, up-to-date information of Port officials and training to port personnel were made in the GloBallast study.

Audit noticed that the BWRF as filled in by the Ship-Master was collected and sent monthly to the Director General of Shipping, Mumbai without identifying action points for the Port. In reply the Port stated (May 2006) that the matter involved policy decision and a decision on the same would be taken in due course.

3.9 Other related issues

3.9.1 National Oil Spill-Disaster Contingency Plan

The National Oil Spill Disaster Contingency Plan (NOS-DCP) was approved by the Government of India in November 1993 and promulgated in July 1996, within Coast Guard Act, 1978 to combat the pollution arising from oil spillage. The Coast

Guard was designated as Central Co-ordinating Authority for NOS-DCP. The Ports were also made stakeholders in the plan to act independently or in co-ordination with the Coast Guard in an oil response scenario in the maritime zones of India. The responsibility of monitoring and combating of oil pollution in the port areas was entrusted to each port. It was stipulated that minimum equipments such as inflatable booms, dispersant spraying equipment, suitable dispersant chemicals, oil skimmers equipment, surface craft mounted with these equipments were required to be kept ready by the Ports. It was further stated that the necessary training was to be imparted for the occasion and periodical exercises arranged under the guidance of Coast Guard to keep equipment and personnel ready for operations.

Scrutiny of records (February 2006) brought out the following:

- The equipments already procured by Port during 1991-94 were not maintained properly. The Coast Guard in their inspection report on the equipments maintained by the port observed (June 2003) damage, corrosion and deterioration to all equipments *inter alia* self-inflatable boom, multipurpose oil recovery system, dispersant spray system and mobile surface cleaning system. In spite of this report, Audit could not find any corrective action taken by the authorities to replace equipments or overhaul them adequately to meet the needs of the Port. As a result, they had been rendered unusable as of August 2006.

- The Coast Guard citing (1999) slow progress in implementing the NOS-DCP had suggested that personnel from the Coast Guard be taken on deputation till the Port officials were able to operate and maintain the equipment. However, no action was taken in this regard.

- The Port was not attending to the annual NOS-DCP preparedness meetings organised by the Coast Guard. This indicates non-compliance of the directives of NOS-DCP.

The port stated (May 2006) that the verification of position of equipments was in progress and remedial measures would be taken accordingly in due course.

Recommendation: *The Port may ensure regular attendance at annual NOS-DCP preparedness meetings. The equipments as specified in NOS-DCP may be kept ready for operation by the Port and necessary training may be given to personnel under the guidance of the Coast Guard.*

3.9.2 Ship breaking activities in MbPT

An Inter Ministerial Committee meeting held in January 2005 to discuss directives of the Supreme Court relating to ship breaking activities, placed certain obligations on Port Trusts, Pollution Control Boards and State Maritime Boards. These included the following:

i. The waste generated in the ship breaking process should be classified into hazardous and non-hazardous categories and their quantities should be known to the Port authorities and State Pollution Control Board (SPCB).

ii. The Port officials should visit the ship breaking sites along with SPCB and Maritime Board officials at regular intervals.

iii. The meeting also directed that since gas free certificates obtained by operators before commencement of activities had remained unmonitored during the activity period, authorities at Mumbai Port should procure good quality gas detectors. These should be made mandatory for use before entry of operators to sensitive areas for undertaking hot work.

It was noticed that the Port did not procure the stipulated gas detectors nor did it have records to show compliance with directives of the Supreme Court.

In reply the Port stated (March 2006) that the primary responsibility of disposing of hazardous waste lies with the ship breakers and the responsibility of monitoring and disposal of the waste in safe manner rests with MPCB. Further it was stated that the Port officials visit the sites regularly and impress upon the ship breakers regarding the implementation of the directives. It was also mentioned that it was not clear from the minutes of the meeting whether gas detectors were to be procured by the Port or ship breakers themselves.

The reply is not tenable as the directives of the Supreme Court were made applicable to the MbPT by the Committee. Supreme Court directives specifies that port officials should visit the sites along with MPCB/Maritime Board officials at regular intervals and reports submitted. However, no such joint visits were undertaken at any time. Similarly, the procurement of gas detectors was entrusted to the Port and there was no ambiguity in the directives.

Recommendations: *Regular visits with officials of MPCB/Maritime Board may be conducted to monitor ship breaking activities and reports submitted. Gas detectors may be procured and made mandatory for ship breakers to use before taking up any 'hot work' in order to prevent untoward hazards.*

3.9.3 Non-compliance with provisions of Batteries (Management and Handling) Rules, 2001

According to the definition given in the rules, the Port is covered as "Bulk Consumer and Auctionee" in respect of batteries. The duties of bulk consumer include ensuring that the batteries are disposed off in auction to registered recyclers only and a six-monthly compliance report in Form VIII is submitted to the MPCB. Similarly, the auctioneer has to maintain a record of such auctions and make these

records available to the State Board for inspection and submit six-monthly compliance reports in Form IX to the MPCB. Though the Port auctioned batteries to registered recyclers, it did not send the reports in prescribed forms to MPCB, either in its capacity as bulk consumer or auctioneer.

In reply the Port stated (May 2006) that the instructions would be strictly complied with.

3.9.4 Operation without 'Consent to Operate'

As per the provisions contained in Section 26 of Water (Prevention and Control of Pollution) Act, 1974, Section 21of Air (Prevention and Control of Pollution) Act, 1981 and Rule 5 of Hazardous Waste (Management and Handling) Rules, 2000, the Port is required to obtain a consent to operate from the Maharashtra Pollution Control Board. MPCB asked (January 2001 and August 2001) the Port to obtain Consent to operate as required by law. MOEF also in February 2001 had opined that MPCB should take appropriate action under Section 33 and 33(A) of Air and Water Acts if the port failed to get the consent.

Audit observed that the Port had not obtained a valid 'Consent to Operate' as of May 2006. The Port accepted the audit observation and replied (May 2006) that Consent to Operate would be obtained from MPCB.

3.9.5 Non-payment of water cess by MbPT

According to Section 3 of the Water (Prevention and Control of Pollution) Cess Act, 1977 as amended a water cess shall be payable by every person carrying on any industry and every local authority, and shall be calculated on the basis of the water consumed. Industry included any operation or process, or treatment or disposal system, which consumes water or gives rise to sewage effluent or trade effluent, excluding hydel-power units. Consumption of water includes supply of water. According to Section 10 of the Act, interest at the rate of two *percent* for every month or part of a month comprised in the period from the date on which such payment is due till such amount is actually paid. Similarly, as per section 11 of the Act, penalty not exceeding the amount of cess in arrears is also leviable.

It was noticed that the Port had never paid water cess as of May 2006.

3.9.6 Role of Regulatory Authorities

MPCB and MOEF are two main regularity authorities which have the responsibility of ensuring that the Port adequately attends to its environment related responsibilities.

3.9.6.1 MPCB

It was seen from the records that MPCB authorities did not adequately monitor environmental parameters in MbPT premises though ports come within the red category classification. Independent sampling of air quality was not done by MPCB in the Port areas till 2006. Also, though two water stations (MbPT jetty at Chembur and Gateway of India) in the harbour waters were monitored by MPCB, the monitoring programme did not coverthe rest of area of the Port.

3.9.6.2 MOEF

The clearance to various projects of the port was given by the MOEF based on mitigation plans and other environmental protection measures stated to be available with the Port. The MOEF officials conducted inspection visits but did not monitor and verify the implementation of mitigation measures committed by the Port. Further, though periodical reports of air sampling were sent to the Regional Office, MOEF did not comment on the monitoring methodologies that were not in accordance with relevant CPCB guidelines

3.10 Conclusion

Considering its location in the heart of the financial capital of the country and increased public concerns over sustainable development, a concerted effort from the Port with respect to continuous vigilance over environmental issues was warranted. The Port did not have a systematic documented environmental management plan and did not conduct environmental management audits. The Port's pollution control cell was not adequately equipped. The port also failed to control pollution of harbour waters.

The Port needs to attend to its environmental responsibilities through a concerted action plan with particular focus on compliance with the environmental legislative requirements. A comprehensive EMP along with periodical Environmental Audit, coordination with MPCB and MCGM to ensure treatment of sewage and use of improved disposal methods for oil slops and dirty ballast may help improve environmental conditions.

3.11 Acknowledgement

The audit plan and audit objectives were discussed in January 2006 with the Dy. Conservator, who is primarily responsible for environmental matters at the Port. Meetings with the top management as well as departmental heads were also conducted. We acknowledge the cooperation of the management during the course of audit

The matter was referred to the Ministry of Shipping and Environment and Forests

in October 2006; their reply was awaited as of December 2006.

Performance audit of Project Implementation, Manpower Analysis, Fund Management and environmental planning in Mahanadi Coalfields

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.

3.13 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 200607 (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).

Performance audit of EMS of Rajasthan State Ganganagar Sugar Mills Limited

Introduction

4.10.1 An Environment Management System (EMS) is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of business management. An EMS ensures that environmental considerations are a priority, along with other concerns such as cost, product quality, investments, productivity and strategic planning.

An EMS generally makes a positive impact on a company's bottom line. It increases efficiency and focuses on customer needs and market place conditions, improving both the company's financial and environmental performance. By using an EMS to convert environmental problems into commercial opportunities, companies usually become more competitive.

The Rajasthan State Ganganagar Sugar Mills Limited (Company) was selected for scrutiny of EMS because it has a sugar unit, distillery unit and reduction centers which are prone to environment hazards. Moreover, the Company is engaged in the activities such as: -production and sale of sugar in its factory at Sriganganagar, having a cane crushing capacity of 1,000 MT per day; production of rectified spirit in its distillery of Sriganaganar, having a capacity of 17,250 bulk liters (BL) per day; and manufacture and sale of country liquor through 22 reduction-cum-filling centers and 28 storage warehouses.

4.10.2 In order to provide for prevention and control of Water and Air Pollution and to restore wholesomeness of water and air, GOI enacted the Water (Prevention & Control of Pollution) Act, 1974 effective from March 1974 and the Air (Prevention and control of Pollution) Act, 1981 effective from May 1981. GOI further notified the Environment Act, 1986 (EP Act) covering all major attributes effecting the environment. In exercise of powers conferred under Section 4 of the Water and the Air Act, the State Government constituted (February 1975) Rajasthan State Pollution Control Board (RSPCB) as a regulatory body to prevent and control environmental pollution.

The RSPCB under its policy and procedure divided industrial units into three categories namely: Red, Orange and Others. The Sugar and Distillery being highly polluting are categorized as Red industrial units. Under Section 25 and 26 of Water Act and Section 21 of Air Act, industrial units under Red category are required to obtain prior consent of RSPCB to operate the unit. In case of operation of any unit without such consent, the RSPCB has power to impose penalties under Section 43 and 44 of the Water Act and 37 of the Air Act.

Section 277 of Indian Penal Code provides that "whoever voluntarily corrupts or fouls the water of any spring or reservoir so as to render it less fit for the purpose for which it is ordinarily used, shall be punished with imprisonment upto to three months or with fine upto Rs.500 or with both".

Under provisions of EP Act, the RSPCB has prescribed the general standards for emission or discharge of environment pollutants from sugar as well as distillery units.

As per the general conditions of the Water Act, 1974, Red category Industries shall submit monthly analysis reports for the required parameters of the treated/untreated effluent to the RSPCB. Further, the RSPCB has power to inspect Red category Industries once in a month and to take samples of the trade effluents once in two months. It was, however, observed that the company had not submitted the required monthly reports and RSPCB had neither monitored receipt of monthly reports nor conducted periodic inspections.

4.10.3 Environment Audit

The GOI had notified Rule 14 issued under EP Act under which the statutory Environment Audit of sugar and distillery units have been made mandatory from 1 April 1992. The Company, however, has not got Environment Audit of the sugar factory and distillery unit conducted since April 1992.

4.10.4 Sources of pollution and control measures

Sugar and distillery units are highly polluting industries. Water is polluted by discharge of trade effluents containing excess organic and inorganic effluents. The organic matter contains excess BOD* and COD** particles which decompose by utilizing the available dissolved oxygen and thus endangering aquatic life and proliferation of aquatic weeds. The air is polluted by emission of flue gases containing excess Suspended Particulate Matter (SPM) from the boilers. The norms prescribed by RSPCB for BOD, COD, TSS*** and SPM$ are as follows:-

Sl. No.	Parameters	Limit
1.	BOD	Not to exceed 30 mg/lit
2.	COD	Not to exceed 250 mg/lit
3.	TSS	Not to exceed 100 mg/lit
4.	SPM-Stack	Not to exceed 150 mg/NM3
5.	SPM Ambient Air	Not to exceed 200 µg/m3

Company did not have arrangement for measuring emission level of Air.

4.10.5 Emission of excessive air pollutants

The sugar factory and distillery unit at Sri Ganganagar have two sets of boilers. One boiler of 25 MT/ hour capacity is of spreader stroke type installed in 1983. The other two boilers have capacity of 8 MT/hour each and are of natural draught type. Both sets of boilers are bagasse/coal fired and emit flue gases containing excess SPM in stack and ambient air than the prescribed limit.

Due to burning of coal and bagasse, small solid particles, known as 'particulates' are emitted which contaminate air and could cause health hazards. In addition lethal gases such as sulphur di-oxide and carbon di-oxide are also produced which adversely affect the health of factory workers and nearby inhabitants. The adverse impact could not be assessed in audit due to lack of information/records.

The Company did not have any arrangement for measuring the emission level of air in the sugar factory. The RSPCB observed (22 September 2000) that SPM in ambient air was 980 µg/m^3 against the standard norm of 200 µg/m^3

To Control air pollution, the Company installed Air Pollution Control (APC) equipment on 15 January 2002, at the sugar factory at a total cost of Rs.32.08 lakh.

The APC equipment stopped working on 30 January 2002 due to bursting of boiler tubes. The sugar factory was run without APC equipment for the remaining cane season of 2001-02 upto 18 March 2002 causing high air pollution. The APC equipment was modified and started working on 8 March 2003. The level of pollution was also not checked by RSPCB during failure of APC equipment.

The actual emission levels measured by RSPCB after working of APC equipment on different dates against standard norms are given below:-

Parameters	Standard Norm	2 April 2003	31 January 2004	26 February 2004	23 March 2004	25 February 2005
SPM - Stack	150 mg/ Nm3	165	148	138	128	118
SPM Ambient air	200 µg/m3	471	268	240	255	221

The SPM in ambient air was still in excess of the norm. Thus, the higher emission of SPM in ambient air than the permissible limit caused air pollution in the near by area of the sugar factory. It was noticed during audit that the Company did not take or

consider action to bring down the emission within permissible limits. The RSPCB also did not impose any penalty as prescribed under section 37 of the Air (Prevention and control pollution) Act 1981.

Further, the emission level of other air pollutants like SO2 [*], NOXwere not measured either by RSPCB or the Company to evaluate quality of air. The adverse health impact as a result of SO2 which is a strong allergen can not be ruled out as it causes mucosa infection.

4.10.6 Effluence of excessive water pollutants

Water is used in the sugar factory for the production of steam and in imbition [@] process. Though most of the water is re-circulated after cooling it by sprinkling method, yet some quantity of water containing excess BOD, COD and TSS particles is discharged by mixing with the discharged effluent of distillery.

In the process of manufacture of rectified spirit, the distillery discharges red coloured spent wash which is a highly polluting effluent containing excess BOD and COD and highly acidic in nature. To lower down its BOD and COD particles and to neutralize its acidity, it is treated in the Effluent Treatment Plant (ETP) Phase-I, by anaerobic oxidation process wherein BOD and COD particles are reduced by 90 *per cent* and 70 *per cent* respectively and effluent is also made neutral by increasing its pH [$] value. BOD and COD of treated effluent is further reduced by keeping it in open lagoons before pumping it into nearby farm of the factory. Before 1996 the company supplied the treated effluent to the farmers for fert irrigation. As this discharged water still contains excess BOD and COD, it causes water pollution.

The alcohol vapours in the distillery along with other poisonous gases can cause detrimental effect on various vital parts of human body. The impact, however, could not be quantified in audit.

To control the water pollution, Effluent Treatment Plant (ETP) Phase I was installed at the Sugar factory and the distillery at Sri Ganganagar in December 1993 at a total cost of Rs.1.40 crore.

The first phase ETP reduced the BOD and COD by 90 *per cent* and 71.5 *per cent* as envisaged in the performance guarantee schedule. The Company did not have effluent level measuring arrangements. The officers of RSPCB, however, visited the factory from time to time and observed the effluent level as under:-

(In mg/litre)

Parameter	Standard Norms	Actual as on 22 July 99	Actual as on 24 February 2000	Actual as on 22 September 2000	Actual as on 17 April 2002	Actual as on February 2004
TSS	100mg/litre	364	617	1000-1500	1304	2492
BOD	30 mg/litre	280	196	5000-5500	2200	3600
COD	250 mg/litre	832	1600	10000-25000	10400	11200

Since the actual effluent levels were much higher than the standard norms, the RSPCB issued show cause notices on 21 January 1999, 4 March 2003 and 17 December 2003 to bring the parameters within permissible limits. The Company, however, did not make any efforts to bring the parameters within permissible limit by installing the II phase of ETP plant after 1993.

The sugar factory/distillery has been discharging highly polluted waste water and polluting the environment. This has also resulted in non availment of 25 *per cent* rebate in water cess under the Water Cess Act 1977.

4.10.7 Performance of Liquor Reduction Centers

After washing of empties and floor of the unit, the water which contains excess BOD and COD is discharged and causes pollution of water. Reduction centers have been categorized in Orange category as they cause less pollution.

Reduction centers not applied for consent to operate.

During the test check of 13 reduction centres (out of 22) in audit, it was noticed that except Jaipur centre, none of the other 12 reduction centres had applied for the consent to operate nor had the RSPCB officers inspected these reduction centres to ascertain whether the pollutants discharged by these reduction centres were within the prescribed parameters. RSPCB inspected the Jaipur centre on 6 April 1998, 31 October 2003 and 16 February 2004. The table below indicates the polluted particles observed in waste water discharged by the Jaipur reduction centre.

Parameter	Standard	Actual as on 6 April 98	Actual as on 16 February 04
TSS mg/litre	100	76	137

COD mg/litre	250	64	305
BOD mg/litre	30	20	87

The samples were not drawn during inspection on 31 October 2003 due to non discharge of waste water at the reduction centre. The pollutants which were within norms in April 1998 increased beyond norms in the test on 16 February 2004. The Company, however, did not make any effort to bring the pollutants within standard norms.

4.10.8 Impact of Environmental Pollution

The sugar factory and distillery units at Sri Ganganagar emitted and discharged air and water effluents respectively containing excess pollutants than the prescribed standards and continued polluting the environment since 1984 to date (March 2005).

A Research work of University of Rajasthan done in 2001 showed that polluted air discharged by the Company unit at Sri Ganganagar was injurious to human, animal and plant life and affected the health of the workers and staff of the factory. Polluted water stored in the factory caused growth of pathogenic microorganisms, which caused diseases like jaundice, cholera, typhoid, skin infection, amoebiosis, anemia and poliomyelitis etc. High BOD and COD in water is harmful for growth of plants due to decomposition of organic material under anaerobic conditions (stagnant water). The research study also observed that salinity patches were found on land, deficiency symptoms like stunted growth, yellow leaves, inverted rolling of leaves and spots on leaves and toxicity symptoms like spotting and dead tissues were also observed in the plants.

Company neither ascertained impact of pollution on human health nor took steps to control**.**

The Company, however, neither conducted any study/survey to ascertain the impact of environment pollution on the human health on the plant life in area nor took steps to control the pollutants in discharged wastewater. The impact cannot be quantified but this certainly has a deleterious effect in all spheres of life.

Performance audit of Compliance with Environmental Regulations by State public sector undertakings in Tamil Nadu

4.20.1 The Government of India has enacted various Acts to enforce effective environmental protection and establishment of regulating bodies to monitor and enforce the provisions of the Act and rules, *viz*.,

- The Water (Prevention and Control of Pollution) Act, 1974;
- The Air (Prevention and Control of Pollution) Act, 1981;
- The Environment (Protection) Act, 1986;
- The Hazardous Waste (Management and Handling) Rules, 1989;
- The Noise Pollution (Regulation and Control) Rules, 2000.

Tamil Nadu Pollution Control Board (TNPCB) formed under the provisions of said Act, prescribed norms for control of various kinds of pollution in thermal power stations (TPS) and other industries. The disposal of natural wastes/effluent into the atmosphere/water from the cement plant, sugar industries and TPS is identified as a major source of pollution.

4.20.2 The following units were reviewed for the compliance with the provision of these Acts and Rules by the Public Sector Undertakings (PSUs) in the State of Tamil Nadu;

- Four* units of two State PSUs;
- Two Thermal Power Stations (TPS)♦ out of four TPS of Tamil Nadu Electricity Board (TNEB); and
- Two# State Transport Undertakings (STUs) out of seven STUs were scrutinised.

The Audit findings are discussed in the succeeding paragraphs.

* Alangulam and Ariyalur cement plants of Tamil Nadu Cements Corporation Limited (TANCEM) and Arignar Anna Sugar Mills (AASM) and Perambalur Sugar Mills Limited (PSM) of Tamil Nadu Sugar Corporation Limited.

♦ Toothukudi Thermal Power Station (TTPS) and Mettur Thermal Power Station (MTPS) of Tamil Nadu Electricity Board.

Air pollution

Air Pollution at stack

Thermal Power stations

4.20.3 Air pollution is caused by emission of gases like Sulphur Dioxide (SO_2) and Nitrogen Oxide (NO_2), and Suspended Particulate Matter (SPM). Audit noticed that the maximum emission of SPM in stack was 455.83 mg/m^3 to 617 mg/m^3 in TTPS and 347 mg/m^3 to 1,144 mg/m^3 in MTPS during the last five years ended 31 March 2005 as against the prescribed standard of 150 mg/m^3 (maximum). The high

emission of SPM was due to usage of coal having high ash content of 46 *per cent*. The Ministry of Environment and Forest (MOEF), GOI prescribed (June 2002) not to use coal containing more than 34 *per cent* ash but the TPS were using coal containing more than the prescribed ash content.

The excess emission levels of pollutants due to usage of high ash content coal in TPS could have been brought down by ensuring that the flue gases pass through the Electro Static Precipitator (ESP)♣ and suitably regulating the strength of current supplied to the ESP. As this was not ensured the pollution levels could not be kept within the norms.

Cement Plants

4.20.4 The normal pollutants in the cement industry are SPM, SO_2, NO_2 and fugitive emission (emission of cement and fly ash particles). The cement plants of TANCEM never recorded emission level though as per the requirement of Environment (Protection) Rules, 1986, emission level was required to be recorded twice a week. Audit analysis of emission levels recorded by TNPCB once a year revealed that the SPM level was mostly higher in ambient air than in the stack.

Audit further noticed that:

- Alangulam plant frequently tripped. As periodical emission levels had not been recorded by TANCEM, the effect of the ESP tripping on pollution could not be assessed.
- TANCEM had not created facilities to contain fugitive emission like provision of stacker cum reclaimer, dust collector and covered storage of coal, limestone and clinker, which was contrary to the stipulations of the Corporate Responsibility for Environmental Protection (CREP), which required the fugitive emission to be brought under control by December 2003.
- Alangulam and Ariyalur plants adopt 'wet' and 'dry' process respectively for cement production. A comparative study of emission levels in these two plants revealed that the same were lower in Ariyalur (which adopts dry process). TANCEM had not switched over to dry process due to financial constraints, though this was proposed in August 1996.

Sugar industries

4.20.5 In case of sugar units, neither the conventional method of taking periodical readings of emission (as specified in the consent order by the TNPCB) was adopted nor online monitoring facilities provided for the purpose. As per the annual stack monitoring report of TNPCB, non-installation of the ESP in Perambalur Sugar Mills Limited (PSM) led to SPM emission level ranging from 248 mg/m^3 to 315 mg/m^3, which was far in excess of the prescribed norm of 150 mg/m^3. Stack emission level readings had not been taken in Arignar Anna Sugar Mills (AASM) during the last five years.

Pollution in ambient air

Thermal Power Stations

4.20.6 Central Pollution Control Board (CPCB) prescribed National Ambient Air Quality (NAAQ) Standards for SO_2, NO_2, SPM, Respirable Particulate Matter (RPM), Lead (Pb), and Carbon Monoxide (CO) to protect public health, vegetation and property.

A comparison of the annual average of ambient air quality in TTPS and MTPS for 2004-05 vis-a-vis standards prescribed by the CPCB revealed that the concentration of SPM ranged from 197 to 492 and from 210 to 232 mg/m^3 respectively against the norm of 150 mg/m^3.

Scrutiny of emission details taken by TTPS and by TNPCB within a gap of two or three days revealed that there were huge variations between these two sets of readings giving room for doubt on reliability of these data.

Cement plants

4.20.7 As per the CREP for cement industries, cement plants located in critically polluted or urban areas should meet 100 mg/m^3 limit of SPM by December 2004 and continue working to reduce the emission further to 50 mg/m^3. Audit, however, noticed that SPM emission in ambient air ranged from 136 mg/m^3 to 184 mg/m^3 for the four years ended 2004-05 in Alangulam and from 172 mg/m^3 to 256 mg/m^3 for the four years ended 2003-04 in Ariyalur, thus, violating the CREP norms/stipulations.

Sugar Industries

4.20.8 In respect of PSM, the maximum SPM level recorded during 2001-02, 2003-04 and 2004-05 were 295 mg/m^3, 268 mg/m^3 and 236 mg/m^3 respectively against the norm of 150 mg/m^3. For 2000-01 and 2002-03, neither PSM nor TNPCB conducted any test to measure the pollution level in ambient air. In AASM, though SPM level came down from 427 mg/m^3 in 2000-01 to 191 in 2002-03, it was still high compared to the norm of 150 mg/m^3. After 2002-03, emission level readings had not been taken by AASM.

Transport

4.20.9 Pollution caused by vehicular emission is a serious form of environmental pollution. The Green Bench of The Supreme Court, which monitors the pollution caused by vehicles, observed that the State Transport Undertakings (STU)s were the main offenders on two counts i.e., levels of emission and sound. Audit noticed that:

- Bharat Stage-II (BS-II) norms, comparable to Euro-II, for all vehicles were implemented in a phased manner starting with New Delhi and extended to other cities like Mumbai, Kolkatta and Chennai in 2001. Metropolitan Transport Corporation Limited (MTC), Chennai introduced 411 vehicles up to February 2005, out of which only 246 vehicles conformed to BS-II standards.

- The Ministry of Surface Transport, Government of India requested (December 1998) the Government of Tamil Nadu to replace the existing old vehicles held by the STUs within a period of three years. MTC, Chennai and Tamil Nadu State Transport Corporation (Madurai) Limited (TNSTC), operated 2,773 and 3,617 vehicles respectively as on March 2005; out of which, 1,195 vehicles (43 *per cent*) and 1,243 vehicles (34 *per cent*) were more than eight years old indicating that the State Government did not take effective steps to replace the old vehicles.
- As per the provisions of the Motor Vehicles Act, it is mandatory for the vehicles to get Pollution Under Control (PUC) certificate and to produce the same to the concerned authorities every time vehicles are sent for Fitness Certificate (FC). MTC, Chennai sent 32,074 vehicles during the period from 2000-01 to 2004-05 for FC and out of which, 2,476 vehicles failed due to excess emission of pollutants during the emission checks conducted by the Motor Vehicles Authority. This points to the fact that PUCs were issued without conducting emission test properly.

Water pollution

Thermal power stations

4.20.10 Discharge of inadequately treated industrial effluent into the water bodies causes water pollution. In TTPS, 75 *per cent* of the waste water generated was recycled and utilized in the plant and the balance 25 *per cent* was let out into the sea. In MTPS, 10.8 lakh kilolitre (KL) waste water per month (32 *per cent* of waste water generated) was let out into the river Cauvery. The extent of pollution in the discharged water is measured in terms of Total Suspended Solids (TSS), Bio Chemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). Audit noticed that these parameters in the discharged water of TTPS were in the range of 150 to 2,027 mg/litre (TSS) and 164 to 1,010 mg/litre (COD); whereas in MTPS it was 94 to 318 mg/litre (TSS) and 21 and 29 mg/litre (BOD) during the last five years period ended 31 March 2005. In respect of other parameters, TTPS and MTPS did not take any reading during the above period.

Further, there were wide variations between the above readings taken by TPS and TNPCB during the same period.

As per the Water (Prevention and Control of Pollution) Cess Act, 1977, water cess at higher rates than those prescribed is payable to the TNPCB on the basis of water consumed, if the conditions/norms prescribed by TNPCB are not followed.

Audit noticed that TTPS and MTPS paid Rs.16.98 lakh and Rs.57.33 lakh respectively as water cess at higher rates, as they failed to comply with pollution control standards prescribed by TNPCB during the five-year period ended 31 March 2005.

Cement plants

4.20.11 Effluent Treatment Plant (ETP) has not been installed in the Ariyalur cement plant of TANCEM, Pollutants in the discharged water, therefore, exceeded

the prescribed norms and the percentage of variation was between 47 and 76.64, in 2002-03 when compared with the norms.

Sugar industries

4.20.12 TSS, BOD and COD in discharged water were in the range of 198 to 418 mg/litre, 328 to 843 mg/litre and 1,120 to 4,065 mg/litre respectively during the five years ended 2004-05, in PSM, which were far in excess of the prescribed norms of less than 100, 30 and 250 mg/litre respectively. This was due to non-installation of the ETP by PSM.

Hazardous waste

4.20.13 A hazardous substance is one that endangers the life of human beings and other living creatures. Under the Hazardous Waste (Management and Handling) Rules, 1989, the person generating hazardous waste shall take all practical steps to ensure that such waste was properly handled and disposed of without any adverse effect. The transportation of hazardous waste should be in accordance with the provisions of the rules framed by the Central Government under the Motor Vehicles Act, 1988 and other guidelines issued from time to time.

Thermal Power Stations

4.20.14 As per the consent order issued by TNPCB under the above rules, a maximum quantity of 25 MT of such waste should alone be generated/handled per annum and a maximum quantity of 10,000 Kgs or a truck load, whichever was less, should alone be stored on site for a maximum period of 90 days. Audit, however, noticed that 2,02,890 Kgs of oil sludge (sediments at the bottom of the furnace oil tank), a hazardous and inflammable substance, was stored by TTPS for more than two years and the same was yet to be disposed off (September 2005). Similarly, 40,000 litres of used oil drained annually by the thermal stations, was stored for longer periods (three to 10 months) than the stipulated 90 days before they were disposed off. Audit also noticed that provisions relating to disposing off of such hazardous waste to the authorised re-processor possessing a valid consent order from TNPCB was not ensured by the TPS.

Sugar Industries

4.20.15 Molasses is a by-product generated during extraction of sugar from sugarcane and the same is mostly sold to distilleries, where it is used in the manufacture of liquor. As per pollution control norms, molasses has to be stored in covered steel tanks. Audit noticed that 8,218.048 MT of molasses remains stored in open pits against pollution control norms by PSM since 1992 causing environmental pollution.

Noise pollution

Thermal Power Stations

4.20.16 GOI notified (February 2000) the Noise Pollution (Regulation and Control)

Rules 2000 with a view to maintaining the ambient air quality standards in respect of noise by regulating and controlling noise producing/generating sources, such as generator sets, vehicular movement, etc. A maximum level of 75 decibels has been fixed for industrial areas.

Noise pollution inside the plant area in MTPS and TTPS was beyond the prescribed limits, and ranged from 92 to 117 decibels in 2003-04 and 2004-05 in TTPS whereas in MTPS it ranged from 96 to 99 decibels during the last five years.

Cement plants

4.20.17 Noise pollution inside the plant area in cement plants in Alangulam and Ariyalur was 98 decibels to 99 and 66 decibels to 80 respectively.

Sugar Industries

4.20.18 Noise level inside the plant area in PSM was up to 73 decibels whereas in AASM, it was measured only once in 2000-01 and the same was 87 decibels.

Other deficiencies

Non-monitoring of other pollutants in ambient air

4.20.19 Though the NAAQ monitoring programme required the readings of RPM, lead and carbon monoxide to be taken and such emissions monitored and controlled, the State PSUs and thermal power stations had not taken any action to measure, monitor and control these emissions.

Non-provision of Inter-locking system to control Industrial Pollution

4.20.20 CPCB instructed (November 1995) the State PCBs to ensure that arrangement for interlocking the production system with pollution control devices had been made in the industries which had installed those devices. Such a facility would ensure that during the period pollution control devices did not function, production would be automatically stopped. Absence of such a facility would enable production to continue even if the pollution control devices were not functioning, thus, leading to higher pollution. Audit noticed that the State PSUs had not provided such interlocking facility in their units.

Green Belt for Pollution Control

4.20.21 Plantation is one of the effective means of controlling air pollution. TNPCB stipulated that TTPS and TANCEM should plant 1,00,000 and 3,60,000 plants respectively in and around their plant area so as to minimise the effect of pollution. TNEB and TANCEM, however, planted only 20,644 and 19,000 plants, thus not fully complying with the directions (September 2005).

Environmental Management System

4.20.22 Environmental Management System (EMS) is required to meet the environmental obligations by the industries and reduce the impact of their operations on the environment. Audit noticed that none of the State PSUs have formulated EMS. This deprived them of a valuable tool to improve their environmental

performance, increase the use of pollution prevention methods and ensure compliance with statutory requirements.

Environmental Audit Reports

4.20.23 Environmental auditing, now renamed as Environmental Statement, is a tool comprising systematic documentation and periodical evaluation of performance of a unit with reference to waste management and assessment of compliance with other environmental regulatory requirements. Though preparation and submission of EAR was mandatory under Environment Protection Rules 1986, (second amendment) since March 1992, the State PSUs submitted EAR to TNPCB, which were not even scrutinised by an environmental auditor. Instead, they submitted only routine reports, in Form-V, which defeated the objective of Environmental Audit.

To sum up

Environment Management System did not exist in any Public Sector Undertaking (PSU). PSUs failed to comply with many of the statutory provisions on air, water and noise pollution, solid waste management and handling of hazardous waste. Environment Audit Reports were being submitted without any scrutiny by the environmental auditor, thereby defeating the objective of Environment Audit.

The matter was reported to the companies/Board/Government in July 2005; their replies had not been received (September 2005).

4.21 Additional administrative cost

Incorporation of too many companies with similar objectives resulted in additional administrative cost of Rs.27.93 crore.

As on 31 March 2005, the State had 66 Government companies out of which 52 companies were working. An analysis of the objectives and activities of these companies, as laid down in their respective memorandum of associations, revealed that two or more companies were functioning in the same sector with similar objectives. Particulars of 10 such companies functioning in four different sectors are detailed in the **Annexure-16**.

Details in the Annexure revealed the following:

- In the industry sector, three companies were established for promotion and setting up of industries. Though Tamil Nadu Industrial Development Corporation Limited was established in 1965 for the stated purpose, two more companies were established subsequently for similar objectives.
- In the forest sector, Tamil Nadu Forest Plantation Corporation Limited was incorporated for raising plantations for the purpose of development of industries based on their produce. Tamil Nadu Tea Plantation Corporation Limited and Arasu Rubber Corporation Limited were incorporated mainly for raising tea and rubber plantation respectively.
- While Tamil Nadu Construction Corporation Limited existed to take care of the

construction activities entrusted to it by the State Government, another company, Tamil Nadu Police Housing Corporation Limited was established in 1981 to undertake construction activities mainly for the Police Department.

- In the Infrastructural Development Sector, while Tamil Nadu Urban Finance and Infrastructure Development Corporation Limited was established in March 1990 for providing financial assistance to the local bodies for development schemes, Tamil Nadu Power Finance and Infrastructure Development Corporation Limited was incorporated in the succeeding year for financing infrastructure development schemes of Tamil Nadu Electricity Board.

Audit noticed that functioning of multiple companies with similar objectives involved substantial administrative expenditure on Directors, Chairman and staff, besides expenditure on infrastructure for separate office buildings, etc. Excluding the administrative expenditure of the major companies in the respective sector (Serial Numbers 1, 4, 7 and 9), functioning of multiple companies with similar objectives resulted in additional administrative cost of Rs.27.93 crore during the latest year for which accounts have been finalised as detailed in the **Annexure-16**.

It is recommended that Government may examine the nature of activities of all the companies with similar objectives and explore the possibility of merging these companies so that administrative expenditure could be reduced and better co-ordination could be ensured in the implementation of various schemes.

The matter was reported to the companies/Government in June 2005; their replies had not been received (September 2005).

Performance audit of Environmental Management System in State Public Sector undertakings, Uttar Pradesh.

3.26.1 Development process is an essential constituent for economic growth, employment generation and betterment in the quality of life. On the other hand, developmental activities are known to cause pollution and associated problems, if carried out without proper precautionary measures for environmental protection. The increasing trend of industrialisation, urbanisation, exploitation of natural resources and pollution growth have created enormous stress on the environment and damaged the basic elements of environment such as water, air and land. The damages caused to these essential elements have, in fact, adversely affected the ecological balance and resulted in an unquantifiable loss to the natural resources.

3.26.2 The Government of India has enacted various Acts to enforce effective environmental protection and established regulatory bodies to monitor and enforce the provisions of the Acts. Among the various legislations, following enactments have greater importance in environmental management in India:

• Water (Prevention and Control of Pollution) Act, 1974 and Rules, 1975.

• Air (Prevention and Control of Pollution) Act, 1981 and Rules, 1982.

• Environment Protection Act, 1986 and Rules, 1986.

• Hazardous Waste (Management and Handling) Rules, 1989.

• Water (Prevention and Control of Pollution) Cess Act, 1977.

For monitoring and implementation of the pollution control policy, rules and regulations, Central Pollution Control Board (CPCB) and State Pollution Control Boards have been established in the country.

In the State, Uttar Pradesh Pollution Control Board (UPPCB) is looking after the implementation of pollution control policy. It is responsible to ensure that specified standards of pollutant emissions and effluents are complied with in

Emission of SPM exceeded the norm in power sector

various types of industries in the State. The Board is empowered to take necessary preventive action for controlling the pollution including imposition of penalty and even closure of the industrial unit. Ministry of Environment and Forests, Government of India and CPCB are also vested with powers under different statutes to issue directions to the pollution causing industries/bodies directly.

3.26.3 The units of auditee organisation in various sectors were selected for audit:

- In the Power sector, three thermal power stations (TPSs-Anpara, Obra and Panki) out of five TPSs of U.P. Rajya Vidyut Utpadan Nigam Limited (UPRVUNL) were selected;
- In the Sugar sector, five sugar mills (Amroha, Bijnor, BulandShahar, Chandpur, and Chhata) of U.P. State Sugar Corporation (UPSSC) were selected for audit and records of Baitalpur, Pipraich and Bhatni mills were also test checked to ascertain the pollution from storage of molasses.
- In the Textile sector, Jaunpur mill of U.P. State Yarn Company Limited (UPSYC) and two mills (Barabanki and Raibarely) of U.P. State Spinning Company Limited (UPSSCL) were selected.
- In the Transport sector, U.P. State Road Transport Corporation (UPSRTC) was selected for audit.

It was noticed during audit that appropriate and adequate policies and procedures for protection of environment were in place. Monitoring and follow up mechanism also sufficiently existed in the system at the Governments' level. As regards implementation of pollution control programmes and measures the approach of the Management was not very satisfactory, particularly with respect to corporate responsibility as discussed in the succeeding paragraphs:

Power Sector

3.26.4 The UPPCB prescribed emission norm of Suspended Particulate Matter (SPM) at 150 mg per normal cum for thermal power projects. Audit examination revealed that, despite having Electrostatic Precipitators (ESP) installed in all the three TPSs, the actual emission of SPM far exceeded the prescribed norm during the period from April 2000 to November 2004 as given in the table below:

Name of TPS	Period of tests conducted	Emission range (mg/nm3)
Anpara A&B	11/2003 to 9/2004	159.12 to 2336.5
Obra A&B	4/2000 to 3/2004	680 to 10650
Panki	5/2002 to 11/2004	161.20 to 345

Audit noticed that ESPs were not installed in eight Units of Obra TPS to control emission level of the SPM and two TPSs had not installed flue gas monitoring system/ capacity meter required for checking the emission levels of air pollutants. This indicated an unsatisfactory approach of the Management towards implementation of the environmental protection and control measures.

3.26.5 Dust Extraction System was not installed in Obra TPS and eight out of 10 systems were not functional in Panki TPS. This contributed towards environmental pollution inside the Power Houses causing health hazards to the workers.

Sugar Sector

3.26.6 UPPCB prescribed norms for emission of SPM at 250 mg per normal cum where Fly Ash Arrestors were installed in sugar mills. Audit examination revealed that the UPPCB, during their inspection, found the emission level of SPM in excess over the prescribed norm of 250 mg per normal cum in Bijnore, Chandpur and Chhata Mills as depicted in the table given below:

Name of Mill	Date of inspection by UPPCB	Test Results		
		Stack-I		Stack-II
Bijnore	20.04.1998	280.72		270.16
	15.04.1999	295.02		300.83
	19.02.2002	322.69		290.91
Chandpur	11.04.2000	296.88		284.96
	19.02.2002	344.41		384.88
Chhata	11.02.2004	968		867.9

Audit further noticed that Fly Ash Arrestors installed during 1995-96 at Bijnor mill were not running regularly and were found closed during various inspections carried out by UPPCB. Emission of excessive SPM in surroundings had been as the fly ash had been affecting the crops adversely. The Management did not take effective steps to control massive spreading of fly ash in the adjacent habitat in spite of frequent reporting regarding its adversities by the District Administration of Bijnore.

The Management stated (July 2005) that efforts were made to operate the Fly Ash Arrestors regularly and it was also stated by the Management that sometimes during crushing season, the UPPCB officers found the Fly Ash Arrestors in-operative due to unexpected mechanical/electrical faults. The reply is not acceptable as proper maintenance of the equipment to make it operative is a statutory responsibility of the Management.

Transport Sector

3.26.7 The Motor Vehicles Act, 1939 prescribes the following emission norms for motor vehicles:

Pollutants Smoke density Mass of Carbon mono oxide Mass of Hydrocarbons Mass of Nitrogen oxides	**Norms** 65 Hartridge unit 14 Gram per kwh 3.5 Gram per kwh 18 Gram per kwh

The State Government issued (August 2004) directions for strict compliance to obtain Pollution under Control Certificate (PUC certificate). As the validity of **Control** PUC certificate is for six months, it was necessary that vehicles are checked **Certificate** twice in a year for achieving the norm prescribed under the Motor Vehicles

Audit examination revealed that the UPSRTC had not got its vehicles checked for pollution control in accordance with the provisions of the Motor Vehicles Act, 1939 and the Government instructions.

Thus, the UPSRTC, disregarding the provision of Motor Vehicles Act and Government's instructions, continued to operate its vehicles without ensuring that the emission of pollutants from their vehicles is within the prescribed limits and contributed thereby to air pollution which was more concentrated and harmful, at least, in urban areas.

The Management stated (February 2005) that instructions had been issued to the Regional Offices for obtaining PUC certificates from the authorised testing centers. As already mentioned the instructions were issued belatedly which was not justified in a matter relating to environmental protection.

3.26.8 Norms for effluence of water pollutants: pH (alkalinity, acidity), temperature, chlorine, suspended solids, oil and grease, copper, iron, zinc, chromium and phosphate were fixed under Rule-3 (Schedule-F) of the Environment Protection Rules, 1986.

Power Sector

Audit examination of the TPSs revealed that these were not carrying out test of all pollutants required under the above mentioned Rules. The tests for pH and temperature revealed that these pollutants slightly exceeded the prescribed norms. The suspended solids, however, far exceeded the prescribed norm of 100 mg/l. The range of actual discharge levels of suspended solids during the period from 2001-02 to 2004-05 is given in the table below:

Name of TPS	Test period	No. of test conducted	Range (mg/l)
Anpara (A and B)	2001-02 to 2002-03	11	106-256
Obra (A and B)	2001-02 to 2003-04	36	1260-6832
Panki	2003-04 to August 2004	4	232-2886

Audit noticed that reasons for excessive water pollutants were that the Obra TPS had not installed ETPs and ETPs installed in Anpara and Panki TPSs were not effective

enough to control the water pollutants due to their inadequate capacity despite maintenance expenses of Rs.24.84 lakh incurred during 1999-2000 to 2004-05. As such, these Power Houses contributed towards health hazards through discharge of polluted water.

3.26.9 The residential colonies of Obra and Panki TPSs were constructed in phases. The Management had, however, not installed Sewage Treatment Plants for treatment of sewage of these colonies and continued to drain out untreated sewage.

Sugar Sector

3.26.10 Audit examination revealed that ETPs were installed in all the five mills at a cost of Rs.1.13 crore and had been incurring an average expenditure of Rs.10.13 lakh per annum on maintenance. Despite incurring of this much of expenditure presence of water pollutants in effluents, like Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Suspended Solids (SS) and Oil and Grease could not be controlled. Average discharge levels of these pollutants during the last five years up to 2004 were as below:

Pollutants	Norms of UPPCB (Mg/l)	Amroha	Bijnore	Buland Shahar	Chandpur	Chhata
BOD	30	83	93	150	80	104
COD	250	717	712	417	686	338
SS	30	93	142	1030	118	157
Oil and Grease	10	11	13	7	10	4

Source: Testing Reports of the recognised laboratories

It is clear from the above that all the ingredients of water pollutants except oil and grease far exceeded the prescribed norms. These excessive water pollutants affect the physical, chemical and biological characteristics of the water, thereby causing health hazards to human beings besides adverse effects on the lives of animals and plants.

Prolonged storage of molasses in kuchha pit being harmful for human and animal life

The Management stated (July 2005) that the UPPCB had fixed norms for BOD and SS as 100 mg/l in 1993. The required equipments were accordingly installed up to 1997 to achieve this norm. Later on, the norms were revised to 30 mg/l by the UPPCB which could not be achieved with the operation of old equipment. The Government is yet (July 2005) to provide a sum of Rs.2.28 crore for modification of the old equipment. The reply is not acceptable as the norm of even 100 mg/l in respect of BOD and SS could not be achieved during the entire period of five years (except for Amroha). Efforts for getting the funds from the Government were also not made sincerely.

3.26.11 Molasses, one of the by-products of sugarcane is sold to distilleries and other industries for making alcohol and ethanol etc. As a standard practice, molasses should be stored in steel tanks and covered masonry tanks. Storage of molasses in open *kuchha* pits not only leads to environmental pollution by way of decay of organic solids and clogging of soil pores but also results in degradation in its quality.

Examination of records relating to storage of molasses in Baitalpur, Piparaich and Bhatni mills revealed that these mills had dumped 18,064 quintal molasses in open *kuchha* pits during 1999-2000 and 2002-2003 seasons out of which 9,069 quintal of molasses was lying undisposed of (March 2005). Such prolonged storage of molasses was unsafe for environment. Due to natural evaporation of its harmful ingredients in the air and physical absorption in the earth and water; apart from the adverse effects of alcoholic and polluted water on animals who consume the same as would be seen from the photograph given below:

(Molasses dumped in open pit at Baitalpur unit)

The Management stated (July 2005) that molasses was stored in *kuchcha* pits only, as the steel tanks and *pucca* pits were full and molasses was not lifted and construction of steel tanks/*pucca* pits was not practically possible for these sick units which were being run only in the interest of the farmers. The reply is not convincing as disposal of molasses should have been made during the crushing season so as to store the fresh molasses or otherwise, proper arrangement should have been made to comply with the statutory requirement for pollution control.

Textile Sector

3.26.12 For protecting and improving the quality of the environment, Section 3 (1) of the Environment (Protection) Rules 1986 prescribes the following standards for discharge of environmental pollutants in the case of textile industries:

Pollutants	Standards
PH	5.5 to 9.0
Suspended solids	100 mg/litre
Bio-chemical oxygen demand (BOD)	30 mg/litre
Oil & grease	10 mg/litre
Zinc	5 mg/litre

Audit noticed that the Jaunpur mill had not maintained operational records of the ETPs installed therein. Examination of operational records of Raibareily and Barabanki mills revealed that ETPs of the capacity of 120 KL and 60 KL **Discharge** per day respectively installed in these mills were not sufficient for treatment of [of] the waste water generated therefrom. These ETPs were not functioning properly due to poor maintenance. As a result, 25,688 KL of waste water could not be treated and was discharged during three years from 2001-02 to **health** 2003-04 having high concentration of pollutants (BOD: 664.70 mg/l, SS: 343 **hazards** mg/l and Oil and Grease: 23.63). Discharge of untreated water is a health hazards to living beings apart from damaging and scaling down the agricultural productivity due to saline water. The Management in its reply (August 2005) did not furnish justification for discharge of untreated 25,688 KL of waste water while the local Management of these Mills had accepted (December 2004) the deficiencies of the existing ETPs and committed to enhance its capacities so as to make them compatible with the requirement.

Power Sector

3.26.13 All the TPSs have conventional ash disposal system where ash slurry is being carried through pipelines to ash ponds where it is stored. In the ponds, ash settles down and water is siphoned out through inbuilt filter system.

Audit noticed that none of the TPSs had installed sprinkling system so that the blown ash is settled down in the ponds. As a result, immeasurable hazardous air pollution continued in the adjacent habitat and in the atmosphere. Ash slurry was generally discharged into river due to overflow of the ash pond of Obra TPS. Ash slurry outflow into sewage system in Panki TPS had been causing water pollution thereby contributing towards health hazards besides public outcry and demand of compensation from civil authorities.

As an effective control measure for prevention of pollution from ash ponds, even plantation of green tree belts around the ash ponds was not considered (March 2005) indicating lack of initiatives towards pollution control.

3.26.14 According to the Government of India Notification (No.563 dated 14.9.1999), 20 *per cent* of total ash produced was to be utilised within 3 years in agricultural activities, road construction, cement and bricks manufacturing etc. Audit noticed that the actual disposal of ash in these TPSs ranged up to 5 *per cent* per annum of the ash produced during the period of last five years up to 2003-04.

Power Sector

3.26.15 All the three TPSs could not obtain consent from UPPCB for operating the power plants under sections 25 and 26 of Water (Prevention and Control of

Pollution) Act and section 21 of Air (Prevention and Control of Pollution) Act, as these TPSs failed to keep the effluents and emissions of pollutants within the prescribed norms. These were, however, operated without consent of UPPCB during the years from 1999 to 2004.

The Management stated that consent was not granted as prescribed norms were not achieved by the TPSs.

Sugar Sector

All the five sugar mills had been applying every year to obtain consent from UPPCB. The UPPCB did not give consent to these mills, as these mills were not able to control the pollution within prescribed norms. The Management, however, continued to operate all these five mills without the consent of UPPCB.

The Management stated (September 2005) that the norms have been revised and for achieving the revised norms modification in the old equipment is required. The reply is evasive as the Company was not able to achieve the earlier norms.

Power Sector

3.26.16 Section 10 of Water (Prevention and Control of Pollution) Cess Act 1977 provides for levy of interest at the rate of two *per cent* per month if the amount of cess is not paid within the stipulated period. Audit noticed that the Management failed to make payment of cess within the stipulated period, which resulted in levy of interest amounting to Rs.10.41 crore up to March 2004.

The Management stated (July 2005) that payment could not be made due to shortage of funds and request for waiver is pending at Government level. The reply is not acceptable as the payment of statutory dues can not be avoided in any case.

Non-adherence to the Charter of CPCB

3.26.17 The CPCB issued (March 2003) Charter on corporate responsibility for environment protection. The charter, *inter alia*, prescribed time bound action plan and control measures for Thermal Power Houses and Sugar Industry. Audit noticed that action plan and control measures as prescribed in the Charter were not followed in the power and sugar sectors as discussed below:

Power Sector

3.26.18 U.P. Rajya Vidyut Utpadan Nigam Limited had accorded (March 2003) approval to implement the action plan at an estimated cost of Rs.532 crore. As per action plan, materials were to be procured by September 2003 and works were to be completed by December 2005. The scheduled programme could, however, not get a

required momentum due to reasons not intimated by the Management. This indicated slackness in implementing the pollution control measures.

Sugar Sector

3.26.19 The Charter prescribed the following pollution control measures for the sugar industry:

- To start ETP one month before commencement of crushing season to meet prescribed standards from the first day of operation.
- To reduce generation of waste water to 100 liters per tonne of cane crushed by April 2004.
- To achieve zero discharge in inland surface water bodies, by December 2004
- To provide 15 days storage capacity for treated effluent in case of no demand for irrigation, by April 2004.
- Installation of ESP, Bag filters, Venture Scrubbers to achieve less than 150 mg per normal cum emission norm of SPM. Scrutiny of records of all the five mills revealed that these mills had not taken steps to implement the pollution control measures prescribed in the charter.

The Management stated (July 2005) that the UPPCB had the norms for air and water pollution which could not be achieved with operation of the old equipment. A sum of Rs.2.28 crore was asked from the Government for modification in the old equipment which had not been given so far (July 2005). The Company, however, neither made further efforts to obtain fund from the Government nor executed the work by investing its own fund to discharge its social responsibility. Thus, non-adherence in this respect indicated an unsatisfactory approach towards corporate responsibility for environmental protection.

Transport Sector Initiative for adopting alternate pollution control measures

Switching over the diesel vehicle to CNG operated vehicles is stronger effective measure for control of pollution in transport sector this needs developing infrastructure at State level and attracts huge investments as well as suitability of fuel resource provider. This effective measure can be implemented with the assistance of Central and State Governments.

Audit noticed that the Corporation has drawn up action plan with respect to 'State Policy for Environment 2001' for uses' of CNG as an alternative fuel in phased manner.

3.26.20 All the three TPSs and five sugar mills test checked in audit had not

submitted Environment Audit Statement to UPPCB during the period from 1999-2000 to 2004-2005 as required under Rule-14 of Environment Protection Rules, 1986 to obtain consent under Air and Water Acts on or before 30 September every year.

The Management of U.P. State Sugar Corporation stated (July 2005) that instructions were being issued to the Management of the mills to send Environment Audit Statement regularly to UPPCB.

However, UPPCB had not taken any action on the defaulting industries/power houses.

To sum up

Environment Management System did not exist in any public sector undertakings (PSUs). PSUs failed to comply with many of the statutory provisions on air, water and solid waste management and handling of hazardous waste. Environment Audit Reports were not being submitted.

The matter was reported to the Companies/Government in May 2005; their replies had not been received (September 2005).

Performance audit of Environment Management Systems including the energy conservation at state owned enterprises

West Bengal

2.1.1 Pollution causes damage to the environment and adversely affects the ecological balance resulting in an unquantifiable loss to natural resources. An Environment Management System (**EMS**) is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of business management.

2.1.2 The Ministry of Environment & Forests (**MOEF**), Government of India has enacted various statutes to enforce environmental protection as well as to ensure sustainable development and established regulatory bodies like Central/ State Pollution Control Boards and Bureau of Energy Efficiency to monitor and enforce the provisions of these statutes. The important enactments and rules made there under are The Water (Prevention and Control of Pollution) Act, 1974, The Water (Prevention and Control of Pollution) Cess Act, 1977, The Air (Prevention and Control of Pollution) Act, 1981, The Energy Conservation Act, 2001, The Environment (Protection) Act, 1986, The Environment Protection Rules, 1986 and The Hazardous Waste (Management and Handling) Rules, 1989.

2.1.3 EMS including energy conservation covers five thermal power stations (TPS) of West Bengal Power Development Corporation Limited (WBPDCL) and The Durgapur Projects Limited (DPL); coke/ chemical - manufacturing at DPL and Durgapur Chemicals Limited (DCL); as well as vehicle fleet and workshop operations at Calcutta State Transport Corporation (West Bengal Surface Transport Corporation Limited (WBSTC).

2.1.4 WBPDCL, with four TPS at Bandel (BTPS), Kolaghat (KTPS), Santaldih (STPS) and Bakreswar (BkTPS), had only nine officials to look after EMS against the sanctioned strength of 15 officials at these TPS. In DPL, a Senior Manager-in-charge of the Environment Cell was assisted by a Junior Manager, while EMS was headed by an Environment Engineer in DCL. In CSTC, NBSTC and SBSTC, EMS was looked after by the Chief Mechanical Engineer, the Additional Chief Engineer and the Works-in-charge respectively, while WBSTC and CTC had no designated EMS officer.

A review on installation and performance of Electrostatic Precipitators (ESPs) at BTPS and STPS, included in the Report of the Comptroller and Auditor General of India 1998-99 (Commercial), was discussed by the Committee on Public Undertakings (COPU). COPU recommended in its 58 Report the need for regular monitoring of emission levels, compliance of pollution control norms, measurement

of levels of respirable particulate matter (RPM) and need to increase stack height to comply with the statutory requirements. These recommendations are yet to be implemented and are highlighted in the relevant paragraphs.

2.1.5 The present review, conducted between 21 February and 24 May 2005, covers EMS including energy conservation at WBPDCL, DPL, DCL, CSTC, NBSTC, SBSTC, CTC and WBSTC for the period 2000-05. The audit findings are based on a test check of records relating to all the five TPS (aggregate capacity-3,301 MW) of WBPDCL and DPL (Annexure – 10), coke-oven plant of DPL, DCL and 38 out of 54 depots of CSTC, NBSTC, SBSTC, CTC and WBSTC with a serviceable fleet of 2,186 buses (87 *per cent*).

2.1.6 Audit Review was undertaken to ascertain whether-

- these organisations were sensitive to the risk and statutory requirements of environmental pollution control and complied with the environmental laws and rules;
- the implementation of pollution abatement measures was successful in reducing emissions, effluents, noise and hazardous wastes to the prescribed limits;
- Environment Management System was adequate and reliable and was operational, effective and efficient;
- safer, cleaner and energy efficient technology/ processes were adopted; and
- processes/ operations were reviewed to reduce waste of energy thereby contributing to cost savings and improved productivity.

2.1.7 The criteria adopted for the Audit Review were : (a) the actual level of emissions, effluents, noise and hazardous chemicals *vis-à-vis* the permissible standards specified by the Central Pollution Control Board (CPCB) for the thermal power stations, coke/chemical manufacturing units as well as for the vehicles; (b) implementation of pollution control measures at a reasonable cost within a specific time frame; and (c) norms/ industry parameters for consumption of energy per unit of output as well as reduction in energy costs.

Even after replacement of ESPs at a cost of Rs 70.39 crore, PM emissions were high in 18 out of 19 units resulting in loss of generation of 33.616 Mkwh valued at Rs 5.61 crore.

2.1.8 Based on the Pilot Study conducted in July 2004, it was noticed in audit that pollution control norms were exceeded while abatement measures were delayed. The thrust was on examination and evaluation of the efficacy and effectiveness of EMS and economy of energy conservation measures.

The methodology consisted of the examination of Environment Impact Analysis (EIA) reports for new projects for compliance with the Statutory requirements; Environment Statements and monthly analysis reports to assess levels of emissions, effluents etc.; consent to operate as obtained from the West Bengal Pollution Control Board (WBPCB) under the Environment (Protection) Act, 1986 as well as an authorisation under Hazardous Waste (Management and Handling) Rules, 1989; and actual energy consumption per unit of output, norms/ industry trends for energy usage and auxiliary consumption levels.

The Audit findings, reported to the Government/ Managements in June 2005, were discussed with the Government/ Managements on 19 July 2005 at the meeting of the Audit Review Committee for Public Sector Enterprises (ARCPSE), where the Government was represented by the Principal Secretaries and Managements by their Chief Executives/ Senior Officers. The report was finalised after considering the views of the Government/ Managements. Audit findings are discussed in the succeeding paragraphs.

Compliance to stack height and stack emission level of particulate matter (PM)

2.1.9 Combustion of coal in thermal power station (TPS) emits pollutants like suspended particulate matter (SPM), sulphur dioxide (SO2) and oxides of nitrogen (NO_x). Pulverised coal fired boilers produce approximately 80 *per cent* fly ash and 20 *per cent* bottom ash. Electrostatic Precipitators (ESPs) reduce SPM in flue gases.

The norms prescribed by CPCB (150 mg/Nm^3) *vis-à-vis* actual emissions of particulate matter (PM) during 2000-05 are detailed at Annexure - 11. It was observed that even after the replacement/ renovation and modernisation of ESPs between March 1994 and September 2003 at a cost of Rs 70.39 crore[1], PM emissions remained high in 18 out of 19 units (WBPDCL – 14, DPL - 5). Excessive PM not only increases atmospheric pollution but also caused corrosion of Induced Draft (ID) fan impellers which in turn necessitated operation of generating units at reduced load leading to loss of generation of 33.616 Mkwh at BTPS, KTPS and STPS valued at Rs 5.61 crore.

2.1.10 Against an effective norm of 150 mg/Nm^3 since January 1989, KTPS commissioned (July 1984 - September 1990) three units with stack emission of 750 mg/Nm^3. Consequently, WBPCB periodically directed WBPDCL to either upgrade the ESPs or install environment monitoring system to comply with the pollution norm. WBPDCL had to submit bank guarantee for Rs 10 lakh to WBPCB till compliance.

2.1.11 The designed capacity of ESPs (Units - I to IV) at BTPS, retro-fitted between March 1994 and October 1996, was 300 mg/Nm^3. As the stack emission norm of 350 mg/Nm^3 for units of capacity between 62.5 MW and 210 MW was reduced

(May 1993) to 150 mg/Nm^3, WBPCB directed (May 2004) WBPDCL either to restrict stack emission to 350 mg/Nm^3 by derating installed capacity to 60 MW or by installing new units. WBPDCL submitted (August 2004) a proposal to Central Electricity Authority (CEA) for derating of the units, which was not approved so far (September 2005).

Similarly, the emission from Unit - V continued to exceed the norm in most of the months during 2000-05 and consequently, WBPDCL had to submit (August 2001) bank guarantee of rupees five lakh to WBPCB till compliance. In September 2003, WBPCB directed WBPDCL to install an Ammonia-based Flue Gas Conditioning (AFGC) system by March 2004 to limit emissions. But, WBPDCL installed the system in July 2004 due to its delay in placement of order by four months leading to penalty on cess as discussed in paragraph 2.1.36.

Compliance to Ambient Air Quality norms

2.1.12 The stack height of eighteen units of WBPDCL and DPL was below CPCB norms and had an adverse impact on the ambient air quality as determined by the presence of SPM and respirable particulate matter (RPM) in the area adjacent to the TPS. The norms *vis-à-vis* actual emissions of SPM, RPM, sulphur dioxide (SO2) and Nitrogen oxides (NO_x) at the five TPS.

during 2000-05 (**Annexure – 12**) indicated that SPM, RPM, SO_2 and No_x emissions were within the norms for 27 to 206 months and were in excess of the norms for 16 to 173 months; in 68 to 179 months they had not been tested. The reasons for not testing the emission parameters for these months, though called for in audit, were not furnished. This indicated that compliance in respect of SPM, RPM, SO_2 and No_x was deficient.

While accepting the facts, Government stated (August 2005) that besides TPS there are other sources contributing to pollution load in the ambient air quality.

Status of renovation and modernisation schemes of ESPs

2.1.13 Units- I to III at KTPS were designed (June 1973) for stack emission level of 750 mg/Nm^3, when CPCB norms had not been notified. The actual stack emissions were significantly in excess of the norm (150 mg/Nm^3) of January 1989. To comply with the standard, KTPS replaced (1998-99) the electronic controllers of their ESPs with semi pulse controllers at Rs 3.01 crore, thereby reducing emissions from these units to 450 mg/Nm^3.

Meanwhile, KTPS learnt (December 1998) that HWB, had developed Ammonia Based Flue Gas Conditioning (AFGC) system technology appropriate for reduction of PM level to less than 20 mg/Nm^3. Despite obtaining encouraging results in

experiment and testing (July 2002), KTPS delayed placing[4] orders for AFGC systems for all three Units to May 2003/ January 2004 for Rs 4.12 crore. Against scheduled completion by November 2004, the systems and ammonia storage facility were commissioned in March 2005.

It was observed that despite KTPS being aware (December 1998) of the technology developed by HWB and operating under bank guarantee, it delayed testing of the system by 42 months which led to additional expenditure of Rs 1.04 crore (being the difference in actual expenditure of Rs 4.12 crore incurred in March 2005 and Rs 3.08 crore being the cost as of December 1998) besides continued environmental degradation.

Even after an expenditure of Rs 7.13 crore, KTPS continued to remain noncompliant. As a result, WBPCB forfeited rebate and levied cess at penal rates as discussed in paragraph 2.1.36.

Government stated (August 2005) that by installing semi pulse controller system the emission level could be reduced. The fact, however, remains that despite incurring expenditure of Rs 7.13 crore, TPS remained non-compliant.

2.1.14 To comply with the emission norms at STPS, West Bengal State Electricity Board[5] (WBSEB) issued (June 1996/ October 1997) letters of intent (LOI), for supply and erection of ESPs and Ash Handling System (AHS) for all the four units within February 1999 at a cost of Rs 43.53 crore.

WBSEB committed[6] (September 2000) to WBPCB that the work would be completed by July 2001, based on which WBPCB issued a conditional consent to operate after obtaining a bank guarantee of rupees five lakh.

Audit scrutiny revealed that due to delay in handing over the sites, approving drawings and releasing payments the system was commissioned after time overrun of 42 to 57 months. The Management's contention (January 2004) that delay arose from financial crisis was not tenable, as loan from Power Finance Corporation (PFC) for the project was sanctioned in April 1995 and fund was drawn accordingly. The Management did not, however, analyse the reasons for delays in conducting the performance guarantee (PG) tests. Since commissioning of the ESPs was delayed, there was an accumulation of ash in the ESP hoppers, which led to complete shut down of the units for 4,189 hours to facilitate manual evacuation of ash, resulting in loss of generation of 137.633 Mkwh valuing Rs 27.28 crore during 2001-04. The contractor rectified the problems in Units - I and II only in December 2002 and March 2004 respectively.

The Management stated (January 2004) that the generation loss would be taken care of at the time of closing the contract. There is, however, no provision in the contract

for recovery of generation loss. No action was also taken to close the contract (August 2005).

2.1.15 According to the action plan (May 2003) for reducing stack emission of unit - VI, **DPL** placed (August 2003) an order for AFGC at a cost of Rs 54.83 lakh. Although the AFGC system would reduce the SPM level to 140 mg/ Nm^3, **DPL** placed another order (September 2003) for a semi-pulse controller system (cost : Rs 23.13 lakh) on the pretext that this would reduce the emission level to below 150 mg/ Nm^3. Even after commissioning of both the systems (March 2004) at a cost of Rs 77.96 lakh, the emission level did not come down to the norm of 150 mg/ Nm^3. Government/ Management stated (July 2005) that the matter had been taken up (March 2005) with the original manufacturer of ESP to suggest action to improve the performance. Further developments were awaited (August 2005).

Air pollution due to abandoned ash pond, excavation of ash pond and transportation of ash by open truck

2.1.16 BTPS built (1994-95) two concrete silos for collection of fly ash from Units - I to IV. Although WBSEB proposed (June 1998) to construct facility for transportation of fly ash from Unit - V to these silos, it was not taken up for reasons not on record. Subsequently, WBPDCL placed (November 2002) an order for supply and erection of Dry Fly Ash Handling System (DFAHS) within November 2003. The work had not yet been completed due to delay by the contractor. Consequently, WBPDCL was compelled to dispose of fly ash from the ash pond at an extra expenditure of Rs 71.52 lakh. Moreover, BTPS was penalised by WBPCB by being asked to furnish a bank guarantee of rupees five lakh, pay water cess at penal rates and by forfeiture of rebates as discussed in paragraph 2.1.36.

2.1.17 KTPS awarded (July 2002) work for supply and erection of DFAHS (value : Rs 24.25 crore) by October 2003. KTPS committed (August 2004) to complete DFAHS by November 2004. Till March 2005, WBPDCL spent Rs 6.70 crore, but the work was still in progress (March 2005) due to delay in submission of drawings by the contractor, lack of manpower and change in the scope of work. Consequently, WBPDCL incurred additional expenditure of Rs 5.95 crore on the disposal of fly ash and was categorised as non-compliant due to its failure to complete the DFAHS by November 2004. Government stated (August 2005) that extra-expenditure would be taken care of at the time of closing the contract.

Improper maintenance of ash pond dyke

2.1.18 Proper preventive maintenance of dyke of ash pond is critical to the smooth running of the power units. Though WBPDCL observed existence of distress in the dyke as early as in November 2002, it failed to undertake ameliorative measures. It was noticed that improper maintenance and scooping out of a part of the

embankment while excavating ash led to the failure of the dyke resulting in closure of the unit for a day (4 August 2003). This resulted in loss of generation of 3.019 Mkwh valuing Rs 43.97 lakh.

While accepting the facts, Management stated (June 2004) that proper care of ash pond was taken round the clock by deploying contractors for maintenance of the embankment. The effect of soil erosion had not been envisaged earlier as the toe of the embankment always remained under two metres deep water. The contention is not acceptable since WBPDCL failed to take preventive measures though distress in the dyke was observed in November 1992.

Delay in construction of ash pond

2.1.19 To keep the pollution levels at STPS within the limits by augmenting ash settling capacity, WBSEB engaged (December 1994) a consultant at Rs 25 lakh. Even though WBSEB received the specifications in April 1998 from the consultant, it placed order only in February 1999 on a State-Government utility for construction of second ash pond at Rs 5.46 crore by September 1999. Due to local resistance, the contractor started the work only in October 2001.

Subsequently, WBPDCL enhanced (April 2002) the volume of earth work to 15 lakh M^3 from 11.29 lakh M^3 to accommodate the proposed Unit -V and extended time upto June 2003 at a revised cost of Rs 8.01 crore. The work was completed (June 2004) for which Rs 7.05 crore were paid till date (March 2005). But the pond could not be utilised so far (March 2005) due to delay in taking action to connect the pond with existing pipe line, thereby leading to locking up of fund of Rs 7.05 crore.

Government stated (August 2005) that the construction work of pipe line was at an advanced stage.

Pollution control initiatives in the transport sector

2.1.20 Pollution in the transport sector, primarily arises from the combustion exhaust containing oxides of sulphur and nitrogen, carbon-monoxide, unburnt hydrocarbons and SPM present in unburnt fuel in the smoke emitted from buses and hazardous wastes in the workshop as well as sound pollution.

2.1.21 Five State Transport Undertakings (STUs) *viz.*, CSTC, NBSTC, SBSTC, CTC and WBSTC provide public transport services throughout West Bengal. As of March 2005, their combined fleet strength was 2,507 serviceable buses operating from 54 depots. In addition, they operated 12 workshops at Central, divisional and depot levels. The number of depots, serviceable fleet, age profile and vintage of buses of each STU as on March 2005 are given in **Annexure - 13.**

2.1.22 In view of the high emissions, WBPCB directed (February 2001) all the STUs

to submit monthly smoke testing reports by the first week of next month. None of the STUs except CSTC had, however, complied, with this directive.

The High Court, Kolkata directed (April 2003) the Government of West Bengal (GoWB) to enforce from April 2004, BS-II compliant engines for all buses plying in Kolkata Metropolitan Area (KMA). The High Court while extending (March 2004) the deadline to October 2004 made it applicable to the entire State. The West Bengal Human Rights Commission also criticised (January 2004) GoWB for emission of black smoke from buses and failure to submit auto emission test reports of buses belonging to STUs.

Absence of auto emission testing (AET) of buses

2.1.23 Since March 1990, all diesel driven buses had to fulfil two[8] parameters for maximum emission norms while BS-II compliant buses are to be tested with regard to four[9] more parameters, at least twice annually.[10] None of the STUs tested all specified parameters, although four[11] STUs received (1994-2004) 18 Auto Emission Testing (AET) machines (cost : Rs 44.43 lakh) to undertake testing. It would be seen from the table below that during 2000-05, while CSTC conducted the requisite tests, the other four STUs conducted four to 20 *per cent* of the required tests. The percentage of tests where emission of Hartridge Smoke Units (HSU) exceeded the norm of 65 HSU ranged between eight to 33 *per cent*.

Particulars	CSTC	NBSTC	SBSTC	CTC	WBSTC
Minimum number of tests required to be conducted	11,200	8,466	3,190	3,020	330
Number of tests conducted	72,615	1,683	213	133	14
Percentage of tests conducted over requirement	648	20	7	4	4
No. of tests failed	5,928	NA	18	44	4
Percentage of tests failed	8	-	8	33	29

CSTC also did not issue Pollution Under Control (PUC) certificates in 53,888 instances (74 *per cent*) where readings were within the norms, as authorised (June 1995) by GoWB.

Failure to issue Certificate of Fitness (CF)

2.1.24 GoWB authorised (October 1998/ July1999)[12] all the STUs to inspect and annually grant/ renew certificates of fitness (CF) for their buses. Buses not in receipt of CF caused more pollution.

At three depots of CSTC[13], CF was wanting for 409 out of 1,118 buses (37 *per cent*)

buses leading to higher levels of pollution during 2004-05. NBSTC issued CF only while inducting new buses, which were never renewed on expiry. In SBSTC, CTC and WBSTC, there was no system of issuance of CF. CSTC, NBSTC, SBSTC and WBSTC assured (July 2005) remedial action.

Age profile including condemnation and induction of new buses

2.1.25 According to the norm fixed by ASTRU[14]/ STUs[15], buses that are more than eight years old or had run four lakh Kms /six lakh Kms, whichever is earlier should be condemned. With age, the extent of pollution caused by buses increases. It would be seen from Annexure - 13 that CSTC, NBSTC, SBSTC, CTC and WBSTC had 37, 61, 6, 63 and 73 *per cent* condemnable buses in their fleet strength causing pollution to the environment.

2.1.26 Moreover, as of 31 March 2005, only 16 *per cent* of SBSTC's fleet was BS-II compliant, whereas at NBSTC and CSTC it was lower at 11 and 9 *per cent*. In CTC and WBSTC the corresponding percentage was 20 and 24 respectively.

During 2000-05, while these STUs condemned 1,799 buses, they inducted only 919[16] new buses. Consequently, these STUs had been operating 1,096 overaged buses as indicated in Annexure - 13 leading to excessive pollution of the environment. NBSTC, SBSTC and CTC stated (July 2005) that only on receipt of fund from the Government could more BS-II complaint buses be purchased, while CSTC stated that 100 more BS-II compliant buses would be added by October 2005.

2.1.27 It was observed in audit that against the permissible limit of 65 HSU, the emissions from BS-II buses was lower by 7 to 56 *per cent* as tabled below :

Particulars	CSTC	NBSTC	SBSTC	CTC	WBSTC
Period of testing	January-	November	October	September	August 1998
	March 2005	2004	2004	2004	– May 2005
No. of tests	2,008	73	213	82	27
Average HSU					
- Non BS	52.75	68	51.69	56.97	59.64
- BS-II	43.17	57	39.20	34.42	25.97

[12] Based on compliance of 18 aspects of operational fitness including nine associated with environmental pollution [13] Howrah – 150, Paikpara – 97 and Taratala - 162 [14] Association of State Road Transport Undertakings [15] For NBSTC [16] Non-BS - 11, BS – I - 612 & BS – II - 296

Particulars	CSTC	NBSTC	SBSTC	CTC	WBSTC
Percentage of lower emissions by BS-II buses	18	16	24	40	56

No. of non-BS-II buses	600	536	169	197	24
Incidence of excess HSU (in lakh)	20.98	21.52	7.70	16.21	2.95

Thus, the operation of 1,526 non-BS-II buses resulted in higher incidence of 69.36 lakh HSU, indicating excess pollution.

The reason for slow induction of BS-II buses was the allotment of plan fund of only Rs 19.80 crore during 2000-05 for purchasing new buses against the requirement of Rs 35.63 crore. CTC, however, never approached the State Government for any fund. The cost of conversion[17] of all the 1,526 non-BS and 676 BS-I to BS-II would be approximately Rs 109.67 crore. CSTC, SBSTC, CTC and WBSTC stated (July 2005) that they lacked financial resources to effect makeover of all buses to BS-II compliance.

2.1.28 TPS also utilise a large volume of water for generation of steam, cooling purposes and formation of ash slurry generating effluent at (i) Condenser cooling water, (ii) De-mineralisation (DM) plant neutralisation water, (iii) Ash pond overflow and (iv) Township sewage. The levels of pH[18], Total Suspended Solids (TSS), oil and grease in the effluent actually discharged during 2000-05 are shown in **Annexure – 14**.

Effectiveness of effluent disposal system in TPS

2.1.29 In the absence of an effluent treatment plant (ETP), KTPS persistently failed to comply with the norms. Hence, WBPCB issued (May 2001) conditional consent to operate KTPS during 2000-01 after taking a security of Rs 10 lakh, to be forfeited if ETP was not installed.

WBPDCL invited (August 2002) tenders for erection and installation of **ETP** based on incorrect pollution parameters. On realising the lapse (June 2003), it again invited bids (November 2004). The work was delayed, resulting in noncompliance with the pollution norms. Government stated (August 2005) that the ETP was under construction.

Improper desilting of Denan Canal

2.1.30 KTPS discharges effluent from ash pond, township etc. into three irrigation canals *viz.* Midnapore, Denan and Banpur. The TPS continued to discharge water containing ash into Denan canal leading to siltation and pollution. WBPDCL carried out de-silting of the canal on several occasions engaging local panchayat/ Zilla Parishad or Irrigation Department. WBPCB was, however, not satisfied as the desilting was not done as required. The last phase of the work had been completed in

February 2005. The total expenditure incurred during April 2000 to March 2005 was not furnished to Audit, though called for. As per the available records **WBPDCL** paid (January 2004) Rs 72.08 lakh to the Irrigation Department for de-silting this canal.

Overflow of water from ash ponds containing ash, could have been avoided had the ponds been excavated on time to allow decantation of the ash slurry to ensure that only clean water was discharged into the canal and the expenditure of Rs 72.08 lakh on de-silting could have been avoided besides saving the canal water from pollution.

Government attributed (August 2005) the delay in de-silting to the delayed response of the Irrigation and Waterways Department. The fact, however, remains that de-silting was not done properly.

2.1.31 At STPS, WBPDCL was required to commission the new ETP before 31 October 2002 to comply with WBPCB's instructions (August 2002). WBPDCL, however, did not act and STPS failed to adhere to the norms.

Government stated (August 2005) that the delay was due to failure to trace the original document of the TPS required to prepare the design. Better record keeping could have avoided the forfeiture of security besides compliance with the norms.

2.1.32 The waste water from the TPS and Coke Oven Plant in DPL contains toxic chemicals like phenol, ammonia, cyanide etc. as well as oxides of aluminium, iron and magnesium. After these chemicals are absorbed by the *Nalkhagra*[19] plants in the Root Zone Bed, the effluent water is discharged into Damodar River through Tumla Nullah. Since TSS in the discharged effluent was more than the permissible limit (100 mg/litre), WBPCB had on several occasions instructed **DPL** not to discharge effluent in Damodar River.

Though DPL received (November 2001) loan of Rs 3.12 crore from the Government of West Bengal for setting up ETP to detoxify waste water, it did not take any action so far (March 2005). As DPL persistently failed to comply with the criteria for waste water discharge and SPM, WBPCB took (May 2001) security of rupees five lakh in the form of bank guarantee. Government stated (July 2005) that IIT, Kharagpur had been entrusted with preparation of a feasibility report.

Failure to maintain the norm of effluent discharge in DCL

2.1.33 DCL was set up in 1963 as a wholly owned Government company and manufactures austic soda lye, liquid chlorine, mono chlorobenzene, stable A type of bush that grows in shallow water whose roots are capable of absorbing metals bleaching powder, hydrogen gas, sodium pentachlorophenate *etc.* DCL is classified under grossly polluting industries. Moreover, the mercury cell process followed by

DCL causes three types of pollution *viz.* air, water and soil. Though air and soil pollution was within the norms, **DCL**, however, failed to control water pollution as discussed below.

2.1.34 The most serious threat arises from the contamination of surface water with mercury. Besides mercury, DCL monitors pH factor and the presence of phenolic compounds in the effluent discharged. Audit analysis of effluent reports of 31 days from August 2003 to February 2005 (**Annexure - 15**) revealed that pH fluctuated from 1.92 to 12.92 against the permissible standard of 5.5 to 9.0 while mercury ranged from 0.01 to 0.035 mg per litre against the norm of 0.01 mg per litre. Moreover, 83 and 90 *per cent* of the pH and mercury discharge readings respectively were beyond the admissible limits. Consequently, DCL had to pay (January 2000 to December 2004) additional water cess of Rs 1.24 lakh and penalty of Rs 0.50 lakh, besides forgoing rebate of Rs 0.35 lakh. Further, DCL had to keep a security of rupees five lakh with the WBPCB.

MOEF and CPCB recommended (September 2002) to adopt the improved and less polluting technology by 2005 or close down operation. DCL, however, despite spending Rs 13.62 lakh failed to attain the standards.

Government assured (July 2005) that remedial measures would be taken up.

Excessive discharge of pH and mercury caused pollution.

Thermal Power Stations were operated without the environment clearance.

2.1.35 Environment Protection Rules, 1986 require that all the TPS shall obtain consent from WBPCB to operate and to annually submit the environment statement (ES) to WBPCB within six months of preceding financial year. It was observed in audit that during 2000-05 WBPDCL and DPL operated various TPS without consent/ authorisation for periods ranging from 298 to 4,668 days.

While accepting the facts, Government stated (August 2005) that bank guarantees were submitted as assurance for complying with commitment.

WBPDCL also failed to submit ES for 2000-01 and 2001-02 (up to December 2001) for STPS, while it submitted part ES for January to August 2002 in December 2002. Similarly, BkTPS submitted (November 2002) ES for 2001-02 one month behind schedule. Government attributed (August 2005) the delay at BkTPS to change of agency to monitor environment parameters. Similarly, DPL submitted (December 2002) ES for 2001-02 after delay of almost three months.

Failure to comply with the emission and effluent standards led to additional expenditure of Rs 5.55 crore towards water cess.

Financial burden due to non-compliance of pollution control norms

2.1.36 During 2000-05, all the four TPS of WBPDCL failed to comply with the emission and effluent standards and consequently, WBPDCL incurred additional expenditure of Rs 5.16 crore towards water cess at penal rates and forfeiture of rebate at KTPS[20] (Rs 40.17 lakh), BTPS[21] (Rs 4.64 crore), STPS[22] (Rs 10.31 lakh) and BkTPS[23] (Rs 1.07 lakh) besides forfeiture of bank guarantee of rupees five lakh[24]. Similarly, DPL failed to maintain emission norms during September 2002 to March 2005 and consequently paid penalty of Rs 31.46 lakh on water cess in addition to a loss of rebate of Rs 8.28 lakh.

2.1.37 All industries handling hazardous substances or generating hazardous wastes[25] should publicly provide **(i)** information regarding facility, specific consent for establishment and consent for operating condition; **(ii)** information on release of pollutants – air emission, water discharge and solid substance and **(iii)** nature and quality of hazardous chemicals handled. They should submit Annual Return and Environment Audit Report (EAR) to West Bengal Pollution Control Board (WBPCB).

Only after receipt of notice/ show cause notice from WBPCB; CSTC, NBSTC (Coochbehar depot), SBSTC (Belghoria depot), CTC and WBSTC applied (September 2003 – December 2003) to WBPCB for authorisation to handle hazardous wastes.

During 2000-05, CSTC, CTC and SBSTC submitted[26] their Annual Returns for each calendar year to WBPCB, after delays ranging from 23 to 60 days. NBSTC did not submit any return. WBSTC submitted (March 2005) incomplete return for only two[27] depots that was rejected by WBPCB. WBSTC submitted (May 2005) the revised return for only Salt Lake depot. None of the STUs, however, had submitted the EAR.

2.1.38 Eleven depots of CSTC, NBSTC, SBSTC and WBSTC stored burnt engine oil in uncapped and mostly damaged barrels under open sky polluting the adjoining areas. Further, CSTC, NBSTC and SBSTC sold 1.23 lakh litres of burnt engine oil to eight private parties not authorised by either CPCB or MoEF. It was noticed in audit that at Howrah depot of CSTC, against accumulation of about 9,000 litres of burnt oil during 2000-05, only a quantity of 1,025 litres was sold in September 2000. The Managements stated (July 2005) that steps would be taken for the safe storage and sale of burnt engine oil only to the authorised firms.

2.1.39 To prevent sound pollution, the Calcutta High Court directed (March/ May 1997) immediate removal of air horns from all buses to comply with the noise limit of 89 decibels embodied in Schedule-I, Rule-3 of Environment Protection Rules, 1986. Test check of 211 buses of three STUs (CSTC : 85, NBSTC : 81, SBSTC : 45)

conducted during March/ April 2005 revealed that these STUs continued using air horns in their buses, the percentages of which were 100 *per cent* (NBSTC), 66 *per cent* (CSTC) and 40 *per cent* (SBSTC).

Thus, in contravention of the legal provisions, air horns were used by CSTC, NBSTC and SBSTC causing sound pollution. While SBSTC stated (July 2005) that it had discontinued the purchase of air horns and was replacing them with electric horns, CSTC and NBSTC stated that the drivers of the buses purchased and fitted air horns at their own risk/ cost. This indicated the absence of effective supervision by the Managements.

2.1.40 Pollution adversely affects the biosphere and all living creatures inhabiting it. This translates into higher incidence of gastro-enteric/ respiratory ailments, deafness, occupational/ industrial health hazards etc. leading to higher morbidity and mortality. The trends indicated that during the calendar years 2000-04, the incidence of gastro-enteric and respiratory ailments in West Bengal had increased by 132 and 162 *per cent* respectively, while mortality had also increased by 45 and 62 *per cent* respectively.

While these undertakings were not the sole sources of pollution in West Bengal, they had no doubt contributed to the deterioration in the environment.

2.1.41 Energy conservation has significant impact on sustained development and pollution control. For conservation of energy, consumers are required to optimise their utilisation of coal, oil, electricity *etc.* The utility-wise performances in this regard were as follows :

2.1.42 The Energy Conservation Act, 2001[29] designated West Bengal State Electricity Board (WBSEB) as the agency to co-ordinate, regulate and enforce the provisions of this Act as well as recommended that WBSEB should ask all the consumers with a connected load of 5,000 KW for commercial use to appoint energy auditors for the verification, monitoring and analysis of energy consumption for improving energy efficiency and reducing energy consumption.

WBSEB, however, not only delayed obtaining the list of the accredited energy auditors but also requested only five out of 55 such consumers to appoint the energy auditors. No appointment had, however, been made so far. Government stated (September 2005) that WBSEB would develop a road map for the smooth implementation of this Act.

Transmission and distribution loss in WBSEB

2.1.43 The transmission and distribution (T&D) losses in the system of **WBSEB** were 37.9 *per cent* in 2000-01. West Bengal Electricity Regulatory Commission

(WBERC), however, allowed 30 *per cent* T&D losses in 2000-01, which was to be reduced by 2.5 *per cent* annually during 2001-05, so as to bring it down to 20 *per cent* by the end of 2004-05.

For reducing T&D losses in the system, the WBSEB took up schemes like 100 *per cent* metering, energy audit, streamlining of the transmission and distribution system etc. But the benefits of such steps were yet to be reaped by the Board. **WBSEB**, thus, not only failed to reduce T&D losses resulting in excessive pollution due to excess fuel combustion but also lost Rs 686.87 crore disallowed by **WBERC** and unquantifiable amounts due to losses in excess of the norms.

Government stated (July 2005) that the losses were being gradually reduced and would be close to 20 *per cent* within the next two to three years.

Consumption of heat in excess of norm in TPS

2.1.44 Government of India/ WBERC fixed norms for consumption of heat per kwh of power generation. BTPS, KTPS and STPS of WBPDCL and DPL, however, consumed heat in excess of the norms valuing Rs 545.65 crore during 2000-05 as detailed in **Annexure – 16**. The main reasons for such excess consumption were : a) backing down of generation due to low system demand, b) non availability of load bearing equipment, c) frequent desynchronisation of units due to tube leakage, outages of the auxiliaries, fuel feeding problems etc. and d) load reduction during de-synchronisation and load pick up after synchronisation.

Excess auxiliary consumption in TPS

2.1.45 Central Electricity Authority/ WBERC fixed the norms for the auxiliary consumption of electricity for the different TPS. BTPS, KTPS and STPS of WBPDCL and DPL, however, had auxiliary consumption of 556.871 Mkwh electricity in excess of the norms valuing Rs 94.44 crore (Annexure – 17). In the absence of details of auxiliary consumption at the different locations of TPS, the reasons for excess consumption could not be analysed in audit.

Higher consumption of power compared to other manufacturers led to extra expenditure of Rs 7.52 crore.

Operation of non-BS buses resulted in excess consumption of 34.81 lakh litres of diesel valuing Rs 9.05 crore.

Consumption of power in DCL

2.1.46 Audit scrutiny revealed that DCL consumed about 24 *per cent* more electricity for the production of caustic soda resulting in excess power consumption of 332.72 lakh Kwh worth Rs 7.52 crore during 2000-05. The Energy Audit Report[30], *inter alia*,

recommended (December 2003) measures for reducing annual energy consumption by 16 *per cent* (Rs 1.43 crore) at an investment of Rs 1.13 crore. DCL stated (July 2005) that the power consumption had since been reduced. The fact, however, remains that though power consumption during 2000-05 showed a declining trend yet it continued to be higher than the consumption of the other manufacturers.

Excess consumption of diesel in State Transport Undertakings (STUs)

2.1.47 Adherence to BS-II norms indicates an effective engine system that attains higher fuel combustion, enhanced fuel efficiency and lower emission. The table below indicates average fuel consumption of non-BS and BS-II buses, distance covered and consequent excess consumption of 34.81 lakh litres of high speed diesel valuing Rs 9.05 crore by these STUs during 2004-05.

Name of the STU	Fuel efficiency (in Km/ litre)		Mileage of non-BS buses (in lakh Km)	Fuel consumption by non-BS-II buses (in lakh litres)	Possible consumption by BS-II buses (in lakh litres)	Excess fuel consumption (in litres)	Value (Rupees in lakh)
	Non BS	BS-II					
(1)	(2)	(3)	(4)	(5)	(6)	(7=5-6)	(8)
CSTC	3.13	3.46	300.54	96.02	86.86	9.16	238.16
NBSTC	3.61	4.20	303.95	84.20	72.37	11.83	307.58
SBSTC	3.71	4.64	209.32	56.42	45.11	11.31	294.06
CTC	3.30	3.47	101.07	30.63	29.13	1.50	39.00
WBSTC	3.09	3.85	15.80	5.11	4.10	1.01	26.26
						34.81	**905.06**

Had the STUs replaced their non-BS-II buses with BS-II compliant buses, they could have effected savings of 34.81 lakh litres in fuel consumption.

Conclusion

There was a significant gap between the requirement and the achievement, leading to pollution in excess of the norms, thereby adversely affecting the health of all life forms. Installation of pollution abatement measures like ESPs, AFGC systems, ETPs, etc. were inordinately deferred or delayed. Adoption of cleaner and safer technology was not envisaged even when the compliance requirements were made progressively more stringent. Moreover, inspections were not undertaken regularly to

monitor compliance with the regulations. Some of these PSUs failed to designate an officer for supervising the environmental compliance. The review of processes/ operations was not undertaken to improve the energy efficiency and minimise the energy consumption thereby effecting cost saving.

Recommendations

These undertakings should –

- Install the pollution abatement measures effectively and efficiently;
- Adopt cleaner and safer technology;
- Undertake periodic inspections to monitor compliance;
- Designate the environment compliance officers; and
- Review the processes/ operations to improve energy efficiency.

Performance audit of Environment Management System in thermal power stations of the Gujarat Electricity Board

4.14 Environment management system in thermal power stations of the Board

4.14.1 Pollution is the contamination of soil, water or air by the discharge of potentially harmful substances. Ministry of Environment and Forests, Government of India is the nodal agency for formulating and implementing the policies and instruments for environmental protection.

Environment Protection Policy and its follow up

4.14.2 Pollution control is being enforced through various Acts and Rules framed in this regard, *viz* Air (Prevention and Control of Pollution) Act, 1981, Water (Prevention and Control of Pollution) Act, 1974 and Hazardous waste (Management and Handling) Rules 1989, framed under the Environment (Protection) Act 1986.

Gujarat Pollution Control Board (GPCB) oversees the implementation of the pollution control policy in the State. It is responsible to ensure that specified standards of pollutant emissions and effluents are complied with in various types of industries in the State. GPCB issues air and water Consents to the industries subject to maintenance of laid down parameters at all times. Industries have to send test results of approved laboratories in respect of the parameters fixed and Environment Audit Report to GPCB. GPCB is empowered to inspect all pollution related records and take preventive actions for controlling the pollution including imposition of penalties and/ or closure of industrial units.

Audit analysed the extent of compliance with the laid down rules, regulations and procedures as well as effectiveness of the programmes and other measures devised to control pollution in three out of five thermal power stations (TPS) of the Board. All the TPS have one environment cell each consisting of six officials including an environmental engineer and a chief chemist to attend the work relating to pollution issues of TPS. Audit noticed the following points:

Sources of pollution control measures

Air Pollution

4.14.3 Combustion of coal in the process of electricity generation results in heat energy, ash and gases. The smoke (flue gas) is removed through Induced Draft Fans (ID fans) and let out through the stack. This flue gas, if directly let out in the atmosphere creates serious pollution problems. Electrostatic Precipitators (ESPs) are installed between ID fans and Air breakers to collect the suspended particulate matter (SPM) and drop it in the hoppers. From the hoppers the dry ash is either

collected in Silos for sale to brick manufacturers or converted into ash slurry and discharged into ash dykes through ash handling system.

The flue gas that comes out through stack also contains oxide of sulphur (SO2) and oxides of nitrogen (NOx) because of the presence of these elements in the coal. Stack heights have to ensure dispersal of these gases at higher levels in the atmosphere to mitigate harm to the environment. The combustion of coal, besides effecting the atmosphere as discussed above also affects the ambient air quality[#]. Water sprinkling system, dust extraction system and ash handling system are installed to minimise pollution of the ambient air.

Water Pollution

4.14.4 Water pollutants come out with wastewater discharged from condenser, cooling water (through cooling system) boiler blow downs, cooling tower blow downs and ash ponds. Effluent treatment plants are installed to ensure that the industrial effluents that are let out into the rivers conform to the prescribed parameters.

4.14.5 The three coal based TPS (total installed capacity of 3,190 MW) comprising 17 units consume around 37,403.85 MT coal *per* day. Considering the ash content of 33 *per cent* the total ash generation per day in these three units is around 14,213.46 MT. The presence of this huge quantity of ash was a major cause of air, water and soil pollution in and around the units.

Emission of excessive air pollutants

GPCB, under the Environment Protection Act 1986, had prescribed (January 1989) a norms of 150 mg/ nm^3[*] of SPM emission at stack of boiler for thermal power units in protected area[$], under which all the three TPS fall. Every year the GPCB issues air consent to the TPS with the condition not to allow SPM, SO2 and NOX in excess of 150 mg/ nm^3, 100 ppm[∝] and 50 ppm respectively in the flue gas let out from the stack of boilers.

***Annexure*-14** gives the actual average SPM, SO2 and NOX levels in the stack emissions of the three TPS during 2000-05. The average SPM levels exceeded the norms in most of the years. During 2000-05 the average SPM level above 150 mg/ nm^3 recorded in TPS at Ukai, Gandhinagar and Wanakbori ranged from 154 to 410 mg/ nm^3, 155 to 998 mg/ nm^3 and 166 to 383 mg/ nmrespectively. The excess SPM in terms of percentage ranged from 2.67 to 173, 3.33 to 565 and 10.67 to 155 respectively in the three TPS.

Ukai and Wanakbori TPS had complied with the norms laid down for SO2 and NOX levels but the Gandhinagar TPS exceeded SO2 norms during 2000-01, 2002-