

## MINISTRY OF PETROLEUM AND NATURAL GAS

### CHAPTER: VI

#### GAIL (India) Limited

#### Telecom-Business

#### Highlights

The Company commenced the GAIL Tel project without Detailed Project Report and implemented subsequent phase (Phase IIB) without considering the actual performance of the previous phase.

*(Paras 6.5.1 and 6.5.3)*

The Company lost projected revenue of Rs.442.19 crore due to delays ranging from nine to 19 months in the completion of various phases of the project.

*(Paras 6.5.1, 6.5.2 and 6.5.4)*

Internal delays in the processing of tenders and placement of orders was one of the reasons for project delay.

*(Paras 6.5.1, 6.5.2 and 6.5.4)*

Investment of Rs.36.66 crore on DWDM equipment, Rs.11.48 crore on the OFC and Rs.12.99 crore on second duct could not be put to fruitful use.

*(Para 6.6.1, 6.6.2 and 6.6.3)*

#### *Gist of Recommendations*

- In view of the current scenario in telecom sector there is a need for the Company to strengthen its internal systems to avoid further delays in Phase III
- To explore the possibility of leasing the unused fibres
- To formulate achievable market strategy based on available infrastructure and implement it strictly as per plan to avoid negative margin in future
- There was also a need for a proactive action by the Company to assess marketability of GAIL-Tel.
- Rationalisation of GAIL Tel assets may again be reviewed.

#### *6.1 Introduction*

**6.1.1** GAIL (India) Limited (Company) had developed a network of five pipelines\* in the country for transporting Natural Gas, Liquefied Petroleum Gas and Regasified-Liquid Natural Gas for various consumers.

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\* *Hazira Bijaipur Jagdishpur (HBJ) Pipeline, Gas Rehabilitation and Expansion Project (GREP) Pipeline, Jamnagar Loni (JL) Pipeline, Dahej Vijaipur (DV) Pipeline and Vizag Secunderabad (VS) Pipeline.*

**6.1.2** The Company had its telecommunication systems along the pipelines for Communication and Supervisory Control and Data Acquisition (SCADA) to ensure their smooth operation. The initial facilities were predominantly created for captive use but had unutilised capacities. Their further capacity augmentation was possible at a relatively low investment. National Telecom Policy (NTP) 1999 permitted the Company to use its existing telecom network for the purpose of national long distance data and voice communications. The Company decided (January 2000) to conduct a detailed study within two-three months covering market assessment, technology evaluations, entry options, potential strategic partners, compatibility and reliability aspects with captive communication requirements.

**6.1.3** The Company engaged M/s Tata Consultancy Services (TCS) (March 2000) as consultants for evaluation of options for the Company's entry into Telecom sector. Considering the recommendations of M/s TCS, the Company decided (June 2000) to take up the project in three phases and completed (December 2003) two phases of the project at a cost of Rs.262.95 crore.

**6.1.4** As a result of implementation of the project up to two phases the Company developed about 8494 km Optical Fiber Cable (OFC) based network equipped with Telecom system having Synchronous Transport Modules\* (STMs) and Dense Wavelength Division Multiplexing† (DWDMs) equipment of which 3614 km was on pipeline routes and 4880 km on non-pipeline routes. The network had 128 nodes‡ (66 on pipeline routes and 62 on non-pipeline routes) at different locations. The designed capacity of the system was 160 Gbps§, the installed capacity was 10 Gbps and the activated capacity was 2.5 Gbps.

## **6.2 Organization set up of GAIL-Tel**

The GAIL-Tel (Telecom Business unit of the Company) is headed by a General Manager (GAIL-Tel) at NOIDA under the overall control of Executive Director and Director (Marketing). General Manager (GAIL-Tel) is assisted by Dy General Manager (O&M) who looks after the operation and maintenance (O&M) work of the network. For marketing of GAIL-Tel business, the Company recruited 11 marketing officers during May 2002 and March 2004. The Company's Telecom market related activities were undertaken by ten Zonal Offices (ZO) and their accounts are maintained at three accounting units at NOIDA, Baroda and Mumbai.

## **6.3 Objectives of Audit, Audit criteria and Acknowledgements**

**6.3.1** A Performance Audit of GAIL-Tel business was taken up to review the implementation of the project and the performance of the business. The performance was evaluated in terms of the projections and internal targets fixed by the Company for time and cost of completion of the project, capacity sales and sales revenue.

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

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\* *equipment using standard technology for synchronous data transmission*

† *A fibre optic transmission technique that employs the parallel transmission of multiple data streams using light stream of different wavelengths over an optical fibre.*

‡ *A place where telecom equipment are installed to cater telecom services*

§ *Giga bytes per second*

#### **6.4 Scope of Audit**

In order to review the overall performance of GAIL-Tel, audit reviewed the records for the period 2000-01 to 2004-05 relating to: –

- i. procurement / laying of Telecom system, Optical Fibre Cables (OFC) and High Density Poly-ethylene (HDPE) ducts used in the development of ‘OFC based Telecom Network’
- ii. marketing activities undertaken by eight out of ten zonal offices of the Company located at Ahmedabad, Bhopal, Chandigarh, Delhi, Hyderabad, Jaipur, Lucknow and Mumbai. Two Zonal offices at Chennai and Bangalore were not covered as GAIL-Tel had no business at these stations for want of telecom network.

#### **6.5 Audit findings**

##### ***Deficiencies in the execution of GAIL –Tel project***

##### ***6.5.1 Delay in Phase-I***

After considering the initial recommendations of M/s TCS the Company decided (April 2000) to prepare a Detailed Project Report (DPR) through an external consultant, on the primary market survey and the strategy for the market entry, capacity sales, Operations & Maintenance and detailed financial projections.

The DPR was to be prepared in three phases, as below:

- i. Phase-I: Connecting Mumbai to Jamnagar-Loni Network for creating a Delhi-Mumbai interconnection.
- ii. Phase-II: Upgradation of HBJ network to OFC based network to create a reliable network in the North-Western part of the country and extend the network towards North.
- iii. Phase-III: Implementation of OFC network along the Company’s LPG pipeline networks in the Southern part of the country and their integration through Chennai and interconnection with North-Western network through Mumbai.

The Company took up Phase-I Project work without preparation of the DPR. Phase I of the project was approved (June 2000) at a cost of Rs.60 crore, further enhanced to Rs.96.55 crore in December 2000, with scheduled completion date of June 2001. The work involved obtaining licences from the authorities for conducting business, Right of Use of land for laying ducts, purchase of OFC and HDPE ducts, laying of ducts, splicing of OFC and purchase of telecom equipment. Phase I was actually completed in April, 2002 at a cost of Rs.96.58 crore.

It was observed in audit that the delay was due to lack of planning on the part of the Company as detailed below:

- i The purchase order for procurement of OFC was placed in December 2000 as against September 2000 (as per plans) and the procurement was completed in September 2001 resulting in overall delay of three months in the project.
- ii Though the scheduled completion date was June 2001, the detailed engineering work for Phase-I was awarded to M/s Telecommunications Consultants India Limited only in May 2001.

- iii The procurement of Telecom System was to be completed by March 2001 but the Company invited tenders only in March 2001 and opened them in April 2001. The work was awarded in August 2001.

Apart from the above, the delays in receipt of permissions for Right of Use (ROU) of land also resulted in delay of the project which resulted in loss of revenue of Rs.58.17 crore to the Company during July 2001 to March 2002 based on the projections of M/s TCS.

The Management stated (November 2005/December 2005) that:

- i. Going by the advantages pointed out by M/s TCS and to derive the benefits of being the first company to operate in this sector, the Company did not wait for the DPR.
- ii. The Company had timely and pro-actively taken steps to complete the work and delay was almost entirely caused by the long time taken by the authorities in according the ROU permissions and issuance of Infrastructure Provider-II licence.
- iii. M/s TCS was primarily engaged to suggest how the Company should position itself in the Telecom Business. As regards, the revenue and growth of business, M/s KPMG was subsequently engaged to draw the detailed business plan and their projection would be more relevant to make any comparisons of actual with projected revenues for delayed completion of Phase I.

The reply of the Management is not tenable because:

- i. Absence of DPR indicated lack of proper planning in going ahead with the project.
- ii. Delay in getting ROUs was in addition to the Company's own delays as pointed out above.
- iii. The delay in the receipt of Infrastructure Provider –II Licence was due to clause 21 inserted by the Company (September 2000) in its Memorandum and Articles of Association which was not in conformity with the Indian Telegraph Act 1885. Further the delay in obtaining the licence also resulted in delay in getting ROUs because ROU clearance was linked with issuance of licence.
- iv The Company decided to execute Phase I of the project based on the report of the consultants M/s TCS and at that time M/s KPMG had not been engaged.

#### ***6.5.2 Loss of revenue due to delayed completion of Phase IIA Project***

M/s TCS recommended that the work of Phase-II be taken up by end 2000 and completed by mid-2001. The Company decided to take up Phase II in two parts IIA and IIB. Phase IIA mainly involved connecting Vadodara-Vijaipur through upgradation of HBJ and GREP pipelines to complete a ring for reliability of network. While Phase-I work was in progress, the Company decided (February 2001) to take up Phase-IIA and complete it by February 2002 (revised to May 2002) at an estimated cost of Rs.99.60 crore. Phase-IIA was completed (December 2003) at a cost of Rs.87.22 crore, with delay of 19 months for the reasons indicated below:

- i. The work of laying of OFC scheduled to be awarded in November 2001 was actually awarded in March 2002.
- ii. The Company included the responsibility of obtaining ROU permissions from authorities as well as payment of restoration charges in the scope of the work of

contractors. The contractors did not deposit the restoration charges timely resulting in delay in obtaining the ROU permissions and the contracts had to be terminated and re-awarded. In Phase I, the Company itself arranged ROUs and the phase was delayed by nine months as against 19 months in Phase II A.

The Management stated (November 2005/December 2005) that

- i. the delay in release of order for laying work was due to receipt of 45 bids which resulted in long time for bid analysis. The bid qualification criteria had subsequently been made more stringent in Phase II B and many modifications in the contract and purchase procedure were introduced to reduce the ordering cycle.
- ii. The contractors to whom the incomplete work was off loaded did not face difficulty in discharging their responsibility relating to ROU permission in their scope. Similarly in Phase IIB, all contractors had ROU permission in their scope and no work was delayed inordinately.
- iii. There was no loss of business opportunity and not a single order was lost. The Company bagged the first order as early as June 2001. The inadequacy in the network was addressed by bandwidth swap with Rail Tel at an expenditure of Rs.74 lakh.

The reply is not tenable because

- i. Deficiency in the contract and purchase procedure (including absence of dedicated contract & procurement and finance personnel in different working groups, non-preparation of DPR and development of appropriate bid qualification criteria) shows lack of proper planning before taking up the work
- ii. The scope of work of the contractors to whom the incomplete work of the original contractor (M/s Supreme Telecom) was offloaded was curtailed as they were not required to pay restoration charges to obtain ROU permission. Phase IIB was also delayed by 12 months.
- iii. M/s Bharti Telesonic, a customer had asked for the capacity of 10 E1\* (20 Mbps) on Delhi-Vijaipur route, 10 E1 on Delhi-Jaipur, 20 E1 for Delhi-Rajkot-Jamnagar by January 2001, which the Company could not provide due to delayed completion of network. The connectivity on Delhi-Vijaipur to Bharti Telesonic was provided in June 2001 and on Delhi-Mumbai in June 2002. The delay in completion of network thus resulted in loss of business to the Company during January 2001 to June 2001. The Company also incurred an additional expenditure of Rs.74 lakh for inadequacy in the network.

Thus, delay in award of works and including payment of restoration charges for obtaining permission for ROU in the scope of work of the contractors resulted in delay in project and consequent loss of revenue of Rs.270.12 crore for the period June 2002 to December 2003 based on the projections made by TCS.

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\* 1E1=2Mbps

**6.5.3 *Decision for implementing Phase II B without considering actual performance in earlier phases***

The Company appointed (March 2001) M/s KPMG to provide consultancy services for detailed business plan for GAIL Tel, financial feasibility, operations & expansion strategy alongwith revised pricing strategy for Phase I and Phase II. M/s KPMG submitted their reports during May 2001 to January 2002.

M/s KPMG projected a revenue of Rs.8.30 crore for the year 2001-02 for the project after completion of Phase IIB which mainly involved upgradation of Vijaipur-Kanpur and creation of an alternate path to GREP. It was, however, noticed that as against the projected net revenue of Rs.8.30 crore for 2001-02, the actual revenue earned by the Company during April 2001 to December 2001 (including advance billed for the quarter October-December 2001) was only Rs.1.29 crore. The Company did not consider the actual revenue earned vis-à-vis the KPMG projections at the time of deciding (November 2001) to proceed with the Phase IIB at a cost of Rs.99.30 crore.

The Management stated (November 2005/December 2005) that

- i. The deliberation by Board of Directors on the actual realization not matching KPMG's projection in the initial period was not warranted because initial experience of few months could not have been so significant as to influence a major decision of going ahead with Phase IIB.
- ii. Phase IIB was a complementation of Phase IIA in the sense that only Phase IIB completion would lead to the completion of redundancy in the Delhi-Mumbai route. As such the project could not have been left incomplete after Phase IIA.

The reply of the Management is not tenable as the Company went ahead with the project without deliberating on further remedial steps required to be taken before committing funds for the next stage when the actual revenue earned was only one fifth of the projections.

**6.5.4 *Delayed execution of Phase IIB of the Project***

Phase II B of the GAIL-Tel Project estimated to cost Rs.99.30 crore was scheduled to be completed in December 2002 but was actually completed in December 2003 at a cost of Rs.79.15 crore. Audit noticed the following reasons for the delay:

- i. The Company invited bids for OFC purchase in April 2002 but due to time taken in tender processing the work was awarded in October 2002 as against the schedule of June 2002, resulting in delay of four months.
- ii. The order of procurement of HDPE duct was scheduled to be awarded in June 2002 but was actually placed in August 2002. The supply of the HDPE duct was completed in March 2003 as against the target date of October 2002. The delay in completion of work was due to delay on the part of the Company to supply granules for duct, supply of the bank guarantee format and issue of Form-31 to the contractor apart from the delay on the part of contractor.
- iii. The work of laying of OFC was scheduled to be awarded in July 2002 but was actually awarded in October 2002. The laying of OFC work was planned to be completed by January 2003, whereas it was actually completed in December 2003

(except some minor works) for the following reasons mainly attributable to the Company:

- Delay of seven months (after issue of Notice Inviting Tenders for the work of laying of HDPE duct and OFC) in signing of agreement to lay network by the Company with Government of Maharashtra,
  - Delay of up to 39 days in paying fees or bank guarantees to authorities for obtaining ROU/ROW\* clearance
  - Delay in issue of the OFC/HDPE duct to the contractors.
  - Delay in finalization of nodes by 143 days.
- iv. The order of telecom equipment was scheduled to be awarded in August 2002 but it was actually placed in March 2003. The supply of the equipment was completed in May 2005 as against the scheduled date of February 2003.

The Management stated (November 2005) that:

- i. The delay in the project to some extent was caused by delay in placement of order. The Company had taken many initiatives such as independent and dedicated staff in the Contract & Procurement and Finance working groups (July 2004) in order to reduce the ordering cycle. As a result the Company had succeeded in completing the tendering and award process of Phase III in 49 days.
- ii. There were other reasons which led to the delay in completion of Duct/OFC laying works, such as hiring of node accommodations and signing of agreement with State Government. These were not entirely due to reasons attributable to the Company but were attributable to availability in market and priorities of State Government.

The reply of the Management is not tenable because:

- i. There were internal delays in the system of placement of orders.
- ii. Despite facing tender processing delays in Phase IIA during November 2001 to March 2002, the Company allocated the strength of Contract and Procurement and Finance working groups exclusively for Telecom work only in July 2004 after completing Phase II B in December 2003.
- iii. Despite the completion schedule approved by the Board of Directors and also the problems faced during the implementation of Phase I & IIA project work, the Company did not initiate the project work for Phase IIB in time.
- iv. Signing of agreement with Government of Maharashtra was delayed by the Company. After issue of notice inviting tenders for the work of laying the ducts (March 2002) the Company requested Government of Maharashtra for agreement after seven months in October 2002 which was signed within two months (December 2002).

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\* *Right of Use/Right of Way*

On account of delays in completion of the Phase IIB the Company suffered a loss of revenue of Rs.113.90 crore during January 2003 to December 2003 as projected by M/s KPMG.

**6.5.5 *Payment of Rs.1.80 crore to M/s TCIL for construction management without commensurate benefits***

The work of engineering consultancy services including supervision for Phase-IIA of GAIL-Tel Project was awarded (February 2002) to Telecommunication India Limited, New Delhi (TCIL) on single nomination basis with the approval of Executive Purchase Committee of the Company for Rs.2.50 crore (Service Tax extra).

After issuance of the letter of award to TCIL the Company modified the scope of contract from construction supervision to construction management and increased the fees by an amount of Rs.1.80 crore (Service tax extra). This was done to ensure total responsibility of construction management by TCIL to achieve completion targets and minimize problem in coordination, ensure smooth and timely completion of construction activities by contractors and prompt decision making at site including those related to any contingency measures.

It was observed that the work for laying of HDPE duct was awarded to six contractors (March 2002) with a scheduled completion date of September 2002. The contractors could not complete their work as per schedule. The works awarded to three contractors had to be terminated by the Company due to non-starting of the work or non-completion of the work within scheduled or extended time and the left over works were awarded to other parties. The works were actually completed by the contractors in December 2003.

Thus, TCIL could not manage the work with the contractors or other concerned agencies for timely completion of the Project as per schedule.

The Management stated (November 2005/ December 2005) that Phase-IIA project got delayed mainly due to poor performance of the contractors which was beyond the control of TCIL and the Company. The project management role was played by TCIL and progress of works was continuously monitored by them for which extra fees of Rs.1.8 crore was paid to them.

The reply of the Management is not tenable because the additional payment of Rs.1.80 crore was made to TCIL with a view to entrust total responsibility of construction management to them and ensure timely completion of construction activities by contractors. TCIL was not able to minimize the problem of coordination, smooth and timely completion of construction activities with contractors. The payment of the additional fees of Rs.1.80 crore to TCIL for construction management work could not produce the desired results.

**6.6. *Development of excess capacity in the network***

**6.6.1 *Excess capacity due to procurement of high capacity DWDMs***

For developing the GAIL-Tel network the Company procured Telecom system from Nortel, Singapore (for Phase-I and Phase-II-A) and from M/s Fibcom India (for Phase-IIB). The Telecom system comprised four types of DWDM\*s and three types of

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\* DWDM (1 channel)= 10 Gbps



STMs<sup>♦</sup>. By using DWDM/STM equipment, the Company created a network having designed capacity of up to 160 Gbps. Out of this, the capacity installed was only 10 Gbps and the capacity activated was 2.5 Gbps (2500 Mbps<sup>♥</sup>) (September 2005). It was noticed in audit that the Company did not utilize (March 2005 and September 2005) even the activated capacity of 2500 Mbps, indicating that the high capacity equipment were not fruitfully utilized.

Further scrutiny of the capacity sold in E1s/DS3<sup>♠</sup>/STMs (September 2005) revealed that in one link the Company sold the capacity to the maximum of one STM-1, in four links the capacity sold ranged between one DS3 to two DS3 and in other 162 cases the Company sold the capacity ranging between one E1 to 23 E1s.

Thus the capacity so far utilized for commercial usage and captive usage by the Company never exceeded the capacity of STM-16 and the expenditure on DWDMs valuing Rs.36.66 crore incurred by the Company could not be fruitfully utilized.

The Management stated (November 2005/ December 2005) that:

- i. the system as designed and installed was on the basis of estimation of traffic projections. On the basis of the projections from the Consultants and market, it was considered reasonable to go for a DWDM system initially equipped for 2.5 Gbps capacity (equivalent to STM-16) and upgradable to 10 Gbps with minimum expenditure, the ultimate capacity being 160 Gbps.
- ii. The network capacity had to be determined from the maximum aggregated traffic flowing in any leg. Right from the very beginning, the aggregated traffic (actual and projection) was more than STM-4. In the Gas Rehabilitation and Expansion Project (GREP) pipeline section, there was the need to enhance capacity beyond STM-16 (2.5 Gbps) to cater to total requirement of commercial and captive traffic. Therefore, the decision of having a minimal DWDM–STM-16 system was quite correct and the installed capacity of the systems was necessary for the amount of traffic to be handled.
- iii. The investment was made for capacity of only 2.5 Gbps and not for 10 Gbps or 160 Gbps.

The reply of the Management is not acceptable because:

- i. Out of the activated capacity of 2.5 Gbps the Company was able to utilize only 2091 Mbps (2.091 Gbps) (March 2005) and 2256 Mbps (2.256 Gbps) (September 2005).
- ii. Even in GREP link, the total traffic ranged between the capacity of STM –4 and STM-16 from December 2003 to December 2005. The actual total traffic in December 2005 in GREP link was only 13.2 STM-1.
- iii. With the present business scenario it might not be possible for the Company to utilize even the installed capacity of 10 Gbps whereas the system was designed for a capacity of 160 Gbps.

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<sup>♦</sup> STM-1 (155 Mbps), STM-4 (622 Mbps) and STM-16 (2.5 Gbps)

<sup>♥</sup> Mega bytes per second

<sup>♠</sup> DS3= 45Mbps

- iv. The DWDM system had a provision for handling the capacity of 10 Gbps per channel and 160 Gbps in all for which the Company had already made an investment of Rs.36.66 crore

Thus, the GAIL-Tel network was developed with high capacity equipment (DWDMs) at a cost of Rs.36.66 crore but were not fruitfully utilized.

#### **6.6.2 Avoidable expenditure on procurement of 24 core Optical Fibre Cable**

For the purpose of creating the GAIL-Tel network, the Company procured OFC and other equipment. The Company purchased OFC for 6440 km (5250 km of 24 core and 1190 km of 12 core) during the period December 2000 to November 2002.

Out of 12 or 24 core OFC laid in the network, the Company used (December 2004) only four to eight fibers for both commercial and captive usage. Even with a 100 *per cent* backup for the fibres in use i.e. for every pair of fibre used for creating the network, one additional pair kept as standby, the spare fibres available all across the network ranged between four to 16 (except GREP route where the Company had only six fibre network). The Company had thus laid excess core OFC which was not utilised. The Company could have saved Rs.11.48 crore if it had procured only 12 core OFC.

The Management in their reply (November 2005) stated that

- i. Though at that point of time i.e. four years earlier, the difference in cost was more significant, in the present scenario, the cost of the OFC, duct and equipment had significantly got reduced. The cost differential between 12 fibre to 24 fibre was only Rs.7 per meter at present with saving to the extent of not more than Rs.2 to 3 crore.
- ii. Number of fibers required along the trunk route might vary from two to eight in different sections. Considering that some fibres went bad and became unworthy of use, 12 fibre should be necessary for captive use.
- iii. Exploitation of the cable infrastructure applications like lease of fibre (which could fetch handsome returns) would only be possible through a higher cable size than 12 fibre.
- iv. It was the prevailing practice of all operators including probably BSNL and Oil and Gas sector to lay OFC of minimum 24 fibres.

The reply of the Management is not tenable as:

- i. at the time of procuring the cable (October /November 2002) for the network there was a difference of Rs.21.88 per metre between the rates of the 12 fibre and 24 fibre OFC
- ii. the Company while taking a decision to obtain Infrastructure Provider-I license (December 2004) noted that it had 16 spare fibers in more than 3700 km of network laid along the highways and up to eight spare fibers in the spur routes (approximately 1000 km). This indicated that the Company was using eight fibres in 24 fibre and four fibers in 12 fibre OFC.
- iii. The Company had not so far (November 2005) leased its fibre.
- iv. Indian Oil Corporation had also laid OFC up to a maximum of 12 fibres for its pipelines communication and SCADA.

Thus, expenditure of Rs.11.48 crore on the procurement of 24 fibre OFC was avoidable.

### **6.6.3 Wasteful expenditure on laying of Second (spare) duct**

The Company decided (December 2000) to lay a spare duct to

- i. enable laying of higher grade OFC in future without disturbing existing system.
- ii. avail optimum utility of the trenching work which had a significant cost element (30 per cent of the project cost) and
- iii. improve the reliability of the system in case of interruption due to cable failure.

The Company laid a spare duct on the 5600 Km network at a cost of Rs.12.99 crore (December 2001 to March 2003)

It was, however, noticed that the second duct was not utilized till November 2005 by the Company as the need did not arise due to availability of four to sixteen spare fibres out of the OFC laid in the first duct. Accordingly, in view of the spare fiber availability the chances of utilization of second duct laid at a cost of Rs.12.99 crore were remote and the expenditure of Rs.12.99 crore incurred on laying of spare duct was not gainfully utilised.

The Management stated (November 2005 /December 2005) that

- i. There was no plan to use second duct but under IP-I license the duct might be required to be used in the future. It could be leased out or sold at profit.
- ii. At any time in future the second duct might need to be used when the main duct or OFC therein became unserviceable. The Company already faced such a situation in Delhi-Meerut section when OFC became faulty and the main duct was unserviceable because of sludge. New OFC was blown in the affected section and traffic to customer was restored.

The reply of the Management is not tenable because

- i. After obtaining IP-I license (June 2005) the Company was not able to execute any business under this license (November 2005) and nor did it have any future plan to use the second duct.
- ii. The incident indicated by the Management was an isolated incident that did not justify the investment of Rs 12.99 crore over the second duct. The affected section could be replaced to rectify the defect instead of laying a spare duct on the entire network.

## **6.7 Operational Performance**

### **6.7.1 Performance analysis vis-à-vis targets for sales and revenue**

The position of business undertaken by the Company vis-à-vis the projections made by the consultant KPMG and internal targets of the Company during the last four years ended March 2005 were as under:

Year	Capacity Sales (Mbps)				Sales revenue (Rs. in Crore)			
	2001-02	2002-03	2003-04	2004-05	2001-02	2002-03	2003-04	2004-05
KPMG Targets	650	1316	2369	3453	9.8	87.80	122.60	149.20

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Company's Internal Targets	-	1550	1772	2107	3.5	29.50	28.50	35.22
Actual	20	627	1149	1347	1.83	11.71	20.51	18.92
Percent of Actual vis-à-vis KPMG Projected Targets	3.07	47.64	48.50	39	18.67	13.33	16.72	12.68
Percent of Actual vis-à-vis Company's Internal Targets	-	40.45	64.84	63.9	52.28	39.69	71.96	53.71
Profit/Loss (-)					1.00	0.99	(-) 9.02	(-) 1.43

From the above, it was observed that:

- i. The Company could neither achieve the KPMG targets nor its own internal targets in terms of capacity sales and sales revenue during any of the last four years ended March 2005.
- ii. Financial performance of GAIL-Tel was not satisfactory during 2003-04 as the Company suffered a loss of Rs.9.02 crore.

The main reasons for decline in losses during 2004-05 were:

- i. rationalization and transfer of the GAIL-Tel business assets valuing Rs.203.63 crore to Company's gas business and
- ii. apportionment of common expenditure on O&M in GAIL-Tel business and other business segments in the ratio of usage of OFC with effect from April 2004 which was earlier apportioned between GAIL-Tel and other businesses in equal ratio.

Even after rationalization, there were losses from GAIL-Tel business amounting Rs.1.43 crore during 2004-05 and Rs.0.57 crore (during 2005-06 upto September 2005). Audit observations on rationalization of accounting are separately dealt with in Para 6.8.1 below.

The Management stated (November 2005/December 2005) that:

- i. they had set targets based on the network readiness, prevailing competition and the available manpower in the region.
- ii. The slippage was due to delay in launch of services by cellular service providers in new circles, Bharti and VSNL were building their own OFC network for meeting captive requirements, delay in receipt of permission by the customers from BSNL to load capacity in the Company's network, reversal of Government decision to grant National Long Distance licence to Mahanagar Telephone Nigam Limited.

The reply of the Management is not tenable because:

- i. despite fixing of internal targets keeping in consideration various factors as stated above, the Company was not able to achieve them.
- ii. Reasons for non-achievement of targets cited by the Company are factors faced in a dynamic business scenario and need to be addressed by appropriate strategic planning.

### 6.7.2 Zone/Accounting unit-wise performance of GAIL Tel business

The position of business executed by zones/accounting units during the last three years ended March 2005 was as under:-

Year	Zone/ Accounting unit	Actual		Targets		Staff deployed
		Capacity Sold (Mbps)	Revenue earned (in crore)	Capacity (Mbps)	Revenue (in crore)	
2002-03	Noida	286.664	5.53	600	-	6
	Mumbai	267.640	6.05	600	-	2
	Baroda	72.704	0.34	350	-	1
	<b>Total</b>	<b>627.008</b>	<b>11.92</b>	<b>1550</b>	<b>-</b>	<b>9</b>
2003-04	Noida	260.352	4.69	678	9.20	7
	Mumbai	730.592	13.55	777	13.54	2
	Baroda	157.888	2.16	317	4.81	1
	<b>Total</b>	<b>1148.832</b>	<b>20.40</b>	<b>1772</b>	<b>28.55</b>	<b>10</b>
2004-05	Noida	530.012	5.25	887	14.82	8
	Mumbai	381.048	9.03	694	11.60	3
	Baroda	435.904	4.21	526	8.80	3
	<b>Total</b>	<b>1346.964</b>	<b>18.49</b>	<b>2107</b>	<b>35.22</b>	<b>14</b>

It was observed that:

- i. Neither the capacity nor the sales revenue targets were achieved by any accounting unit (except Mumbai where revenue target was achieved during 2003-04).
- ii. Further analysis disclosed that during 2004-05 the zonal offices at Hyderabad, Chennai and Bangalore did no business. Chandigarh and Bhopal zonal offices sold capacity of 2 Mbps only and the revenue earned was only Rs.0.13 lakh and Rs.7.00 lakh respectively against the target of Rs.82 lakh and Rs.1.00 crore respectively.
- iii. Three Marketing Officers deployed at Chandigarh, Chennai and Bangalore could not execute any business for GAIL-Tel as such the expenditure of about Rs.49 lakh on account of staff cost proved unfruitful.
- iv. Further the following marketing constraints were intimated to Audit (July 2005 to November 2005) by the zonal offices:
  - The Company's OFC network was available in the outskirts and not within the major cities like Hyderabad, Vijayawada and Visakhapatnam. The Company had limited coverage of Western Madhya Pradesh and Rajasthan.
  - No presence of the Company's network in cities like Kota, Ganganagar, Jaisalmer, Bikaner, Barmer, Bhilwara, Hanumangarh, Dholpur, Karauli Mohali, Panchkula, Yamuna Nagar, Rewari, Baddi which had good business potential.
  - Competitors like Bharti, VSNL, BSNL, Shyam Telelink, Reliance and RAIL-Tel were already having their presence in most of the cities.
  - There was non-availability of ring network in Thane-Pune-Solapur section of Maharashtra region, Delhi-Chandigarh network, Andhra Pradesh region, Bhopal, Indore and Gwalior in Madhya Pradesh.

The Management stated (November 2005/December 2005) that:

- i. the Marketing Officers at Chandigarh, Chennai and Bangalore had been deployed for other jobs like Gas/Polymer Marketing, MIS, IT, getting Bandwidth connectivity. The Chandigarh Zonal office in 2005-06 had acquired business of more than 30 E1s (60 Mbps). The officers at Chennai and Bangalore Zonal Offices were doing the preparatory work in view of the Southern expansion.
- ii. There was delay in completion of Phase I & II network and the Company lost the first mover advantage. Further the Company was a new entrant in the field. The telecom operators who were taking bulk capacity had built their own network. The glut in Bandwidth market led to fall in demand.
- iii. Addressing the shortcomings in network such as point of presence in outskirts, linearity of network, absence of network was a continuing process.

The reply of the Management indicated that delays in execution of projects had affected the Company's business and the Company's network was not yet broad-based enough to meet the market requirements.

#### **6.8. Accounting and control aspects**

##### **6.8.1 Rationalization of telecom assets and related expenses**

Based on the recommendations of consultants M/s Mckinsey, the Company decided (April 2005) to rationalize GAIL-Tel assets and related expenses between GAIL-Tel and other segments of the Company on the basis of usage with retrospective effect from April 2004 which had the following salient features:-

- i. All DWDM equipment were booked in GAIL-Tel.
- ii. All assets (OFC network and equipment up to STM 16) along the gas pipelines and linkages with Company's offices were booked in Gas/LPG business.
- iii. Common expenses related to the assets and their maintenance were booked in the Gas/LPG and GAIL-Tel business in the ratio of fibres allocated (5:1) on the basis of technical estimates.
- iv. Accordingly, the Company segregated the total assets of GAIL-Tel valuing Rs.262.95 crore as on April 2004 into Gas Business of Rs.203.63 crore and GAIL-Tel Business of Rs.59.32 crore. The expenses of the Gail Tel were also accordingly segregated.

It was observed that:

- i. The allocation and rationalization of assets and expenditure was done by the Company with an objective of re-aligning the telecom assets and expenditure between gas business and GAIL Tel based on actual usage pattern so that the respective business segments reflected the true and fair view of their performance. At the time of allocation, the Company noted that the actual usage between gas business and GAIL-Tel was 7:13 (i.e.0.54:1) but it allocated the assets in the ratio of 203.63 : 59.32 (i.e.3.43:1) due to allocation of high capacity equipment to gas business.
- ii. The actual capacity usage for captive purposes on various links ranged between 1 E1 to 16 E1s (32 Mbps) (September 2005) which could have been met by STM-1 (155 Mbps) and did not require high capacity equipment like STM-4 (622 Mbps)

or STM-16 (2.5 Gbps). Thus, the Company allocated high capacity equipment (STM-4/STM-16) to gas business where these were not required.

- iii. Network created for linking the Company offices, also formed part of GAIL-Tel business project because the network was created for marketing GAIL-Tel business and earning revenue. The Company's offices did not require high capacity equipment for linking.
- iv. The Company was utilizing four to eight fibres (including standby) (December 2004) OFC both for captive as well as commercial usage. Accordingly, the allocation of 20 fibres for gas business out of total 24 fibres was not justified as these were not being used there.

The Management stated (November 2005) that:

- i. Even before the Company's entry in telecom business, OFC with six fibers in GREP and subsequently 12 fibers in Jamnagar-Loni Pipeline had been used for networks for entirely captive use by the Company. As per the practice followed in oil sector, 24 fibres OFC were used in new pipelines after Jamnagar-Loni Pipeline. The cable size would be 24 fibers notwithstanding any consideration of its use only for the Company's internal applications or dual use (internal and business).
- ii. Even in Jamnagar Loni Pipeline, which was established much earlier to the entry of the Company in telecom business, STM-16 equipment were used to meet increasing possibilities of new applications like video conferencing, and ERP applications.
- iii. Based on allocation as suggested by Audit the loss would be Rs.20.77 crore as on March 2005.

The justification given by the Management was not tenable because:

- i. For the purpose of captive usage, the requirement of 24 fibres OFC and high capacity equipment like STM-16 was not necessary as even before going for telecom business the Company was meeting its requirements in the case of GREP with six fibres OFC and microwave system. The high capacity STMs/DWDMs were required keeping in view the projected business of the GAIL Tel and not for captive usage. Even after implementation of video conferencing for all offices and the Enterprise Resource Planning system (August 2005), the actual capacity usage for captive purposes for any link did not exceed STM-1 (September 2005). Accordingly, allocation of telecom assets like STM-4/STM-16 to gas business appeared to be without adequate justification.
- ii. Installation of STM-16 with 12 fibers OFC on Jamnagar Loni Pipeline created high capacity on the pipeline which had not been utilized (September 2005).
- iii. Indian Oil Corporation Limited had also installed only STM-1/STM-4 for their pipelines with 12 core OFC for monitoring and communication systems.

#### **6.8.2 *Doubtful recovery of outstanding dues***

As of March 2005 debts of Rs.1.21 crore were outstanding from six customers out of which five had closed the business links with the Company as per details below:

S.No.	Name of the party	Debts outstanding (March 2005) (Rs. in lakh)	Date of closures of links
1.	VSNL	51.90	Not closed
2.	D2V	7.75	01.09.2003
3.	Data Access	58.37	14.12.2004
4.	Exatt net	1.51	13.12.2004
5.	Emsons	0.05	01.01.2004
6.	KVM	1.33	04.11.2004
<b>Total</b>		120.91	

It was noticed that

- i. Out of five customers who had stopped business terms with the Company, the dues of three customers (Data Access, Exatt net and D2V) were under litigation, one customer (Emsons) refused to pay and one customer (KVM) had withheld the payment due to their financial problems.
- ii. An amount of Rs.51.90 lakh was due to be recovered from VSNL owing to non-reconciliation of accounts by the Company with them (November 2005).

The Management stated (November 2005) that:

- i. For the amount of Rs.69.01 lakh remaining outstanding against five customers petitions had already been filed in Telecom Disputes Settlement and Appellate Tribunal and their legal department was pursuing the cases.
- ii. Out of the total outstanding amount from VSNL the Company accepted and treated Rs.29.62 lakh as non-recoverable. Another Rs.19.90 lakh was owing to downtime mismatch and the data was to be reconciled with VSNL. The balance amount of Rs.2.38 lakh was fully recoverable from VSNL.

On the facts accepted by the Management it is added that the Company was required to obtain the monthly/quarterly advance payments from the customers as per the agreed terms. The outstanding in these cases could have been avoided by obtaining advance payments.

### **6.9 Conclusions**

The Company was not able to achieve its targets from Telecom business even after making investment of about Rs.263 crore on the development of its 8494 kms OFC based network and it suffered a loss of Rs.9.03 crore since its entry till September 2005. Further: -

- i. The Company lost projected revenue of Rs.442.19 crore due to delayed implementation of various phases of the project.
- ii. The Company commenced the project without DPR and implemented subsequent phase (Phase IIB) without considering the actual performance of the previous phase.



- iii. There were internal delays in the processing of tenders and placement of orders.
- iv. The Company made investment of Rs.36.66 crore on high capacity DWDM equipment, Rs.11.48 crore on the high capacity OFC and Rs.12.99 crore on second duct without any fruitful use.
- v. The Company could not achieve targets in terms of capacity sales and revenue during any of the last four years ended March 2005.

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

## **CHAPTER: VII**

### **Oil and Natural Gas Corporation Limited**

#### **Availability and Utilisation of Critical Equipment of offshore installations**

##### ***Highlights***

The system availability in all the assets in Mumbai Offshore was satisfactory and there was an overall improvement in the last three years. However, equipment availability was lower than the targets due to old aged equipment, maintenance related problems and absence of maintenance/replacement policy of equipment.

***(Para 7.5)***

The Company did not adhere to its plan of overhaul/preventive maintenance leading to high number of unplanned shutdowns and tripping of critical equipment. Deferment of production/revenue due to maintenance reasons amounted to Rs.61 crore during 2003-04 in Mumbai High Asset. There was shortage of manpower and waiting time for spares was more than the norm prescribed, reflecting that due importance was not given to maintenance activities. Coordinated efforts were intensified recently to ensure timely completion of the maintenance work and a replacement policy for old aged equipment was also under finalisation.

***(Para 7.6)***

There was under utilisation of critical equipment but the requirement of operating and standby critical equipment was not reassessed to ensure their optimum utilisation. The Company was working on hiring of 'Domain Expert' to assess the condition of equipment and reassess the operational requirement in order to minimise the operating cost. Turbine generators were operated on low load factors resulting in higher rate of fuel gas consumption compared to norms prescribed by manufacturer and the Company had initiated a project study for improving the load factor by an under-water electric network and supply of excess power to the shore. Actual utilisation of crude oil handling and gas compression facility was also much below the installed capacity, except gas compression facility at Neelam field where the Company flared gas worth of Rs.126.39 crore during 1998 to 2005 for want of sufficient gas compression facility.

***(Para 7.7)***

**Gist of recommendations:**

- Policy for revamping/replacement of equipment should be completed urgently to ensure the reliability of the system.
- ONGC should follow original equipment manufacturer's (OEM) norms for overhauling of critical equipment. Specific extension to overhaul schedules, if warranted, should be spelt out clearly for maintaining the reliability of the system and for the longevity of the equipment. Preventative Maintenance Schedule should be adhered to and monitored regularly to reduce the instances of unplanned shutdown and tripping. Documentation of the same should be ensured for reference and corrective action.
- Operational and Maintenance contracts for equipment maintenance should be resorted to only after cost-benefit analysis of outsourcing *vis-a-vis* in-house maintenance through additional manpower.
- Lead-time for procurement of maintenance spares should be streamlined so as to avoid delays in finalisation of purchase order and curtail downtime of critical equipment.
- The requirement of the equipment should be reassessed urgently so as to ensure their optimum utilisation and reduction in operating expenditure on the equipment. The Company should make all efforts for utilisation of excess power capacity available in various assets.

**7.1 Introduction**

**7.1.1** Oil and Natural Gas Corporation (ONGC) discovered hydrocarbon in Mumbai offshore in 1974 and started production in Mumbai High in 1976. Subsequently other western offshore fields were discovered and production from these fields started between 1983 and 1999\*.

**7.1.2** ONGC's share of crude oil and natural gas production to the country's production for the last three years ending 2004-05 was about 78 and 75 *per cent* respectively. Out of the total production of ONGC, production of crude oil and natural gas from offshore fields during the same period was about 68 and 76 *per cent* respectively making it a sizeable portion of the country's hydrocarbon production.

**7.1.3** In Mumbai High Offshore there were three fields (assets) in total *viz.* Mumbai High (MH), Neelam & Heera (NH) and Bassein & Satellite (B&S) having total 12 process complexes\*, 25 production platforms♦ and five well-cum process platforms^.

The major equipment installed on these offshore facilities were broadly classified by

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\* *Details of various fields and years in which production started is given in Annexure-16.*

♦ *Process Complexes are those platforms where well fluids from the connected production platforms are collected, processed and segregated into crude oil, natural gas and water. The crude oil and natural gas is then transmitted through separate trunk lines/tanker to onshore terminal(s). In such complexes the water injection and living quarter facilities are also available.*

♦ *Production Platforms are those platforms where well fluids from all connected wells are collected and transported through flow lines to the nearby process platform for segregation into crude oil, natural gas and water.*

^ *Well-cum process platform is a production cum process platform where well fluid is processed from the same platform constructed on a well.*

ONGC into two categories, viz., critical equipment and essential equipment. Critical equipment were those equipment, which directly contributed to oil and gas production and were meant for un-interrupted operation. Essential equipment were those equipment, which did not directly contribute to oil and gas production but were essential for supporting operations relating to it. The graphical presentation of a typical processing of well fluid at offshore process platform is given at **Annexure-17**.

**7.1.4** In the Mumbai Offshore of ONGC the category-wise total number of critical equipment as on 31 March 2005 and its function were as under:

Table-1

Critical equipment	Function	Total population
Turbine Generator (TG),	Generate power to run the platform	42
Process Gas Compressors (PGC) / Booster Pumps (BP) #	Injection of lift gas and dispatch gas to shore/ To increase the pressure of gas from well head for transmission to shore terminal	38
Main Oil Pumps/ Crude Transfer Pumps (MOLP/CTP), including condensate oil pump	Dispatch oil to shore	34
Main (Water) Injection Pumps (MIP),	Inject treated water into reservoir (s) to boost oil production	34
Sea Water Lift Pump (SWLP)	Service pump for water injection and other utility	27
Total (including 57 nos. as standby)		175

# BP were installed at B&S Asset so as to increase gas pressure

## 7.2 Scope and Objective of audit

**7.2.1** The purpose of this performance audit was to review the availability, maintenance and utilisation of critical equipment in Mumbai Offshore of ONGC covering the period of three years ending 31 March 2005. Audit was conducted during the period from May 2005 to July 2005.

**7.2.2** Performance Audit was undertaken with the objective of examining the following issues with reference to essentiality of the critical equipment in the production of crude oil and natural gas.

- The extent to which the 'system availability'<sup>\*</sup> and 'equipment availability'<sup>♦</sup> of critical equipment did not meet the targets and resulted in loss of crude/gas production.

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<sup>\*</sup> The term 'system availability' of any critical equipment denoted 'availability of equipment (both operating and standby) for uninterrupted flow of production'.

<sup>♦</sup> The term 'equipment availability' of any critical equipment denoted 'the availability of that particular equipment for operating purposes'.

- Whether there existed appropriate policies in regard to overhaul/maintenance and replacement of critical equipment and how far the same were effectively implemented to bring economy and efficiency in production.
- The extent of adherence of planned overhaul/maintenance and the impact of non-adherence in terms of tripping/breakdown/premature failure of critical equipment.
- How far the shortage of manpower and the delay in procurement of spares affected the maintenance work and availability of critical equipment.
- Whether the requirement of critical equipment was reviewed/reassessed for their optimum utilisation and what was the extent to which there was under-utilisation of critical equipment resulting in increased operating cost.

### **7.3 Audit Criteria**

The 'system availability' and 'equipment availability' of critical equipment was examined with reference to the target fixed by the Company and analysis of the achievement and shortfall was made so as to ascertain the reasons and verify the action, if any, taken during the period of audit coverage. The existence of various polices viz. overhauling, preventative maintenance & replacement, and its implementation were generally examined. Various Management Information Systems/Reports and production profile were also examined for verification of utilisation of critical equipment with reference to the specific planned capacity.

### **7.4 Audit Methodology and Acknowledgement**

**7.4.1** A meeting was held with the Management representatives (March 2005) for apprising the purpose of the Performance Audit and to understand the functioning and importance of critical equipment in offshore production activities. The monthly performance and activity reports of each asset for the last three years containing the equipment-wise data of availability under various profiles were collected. This data was fed manually in excel sheets and interrogated with the help of CAAT (Computer Aided Audit Technique) tool Excel by way of filtering the data from the monthly reports. The audit team also visited one of the offshore platforms for witnessing the running of the critical equipment, understanding its functioning, record maintenance and reporting procedures. The team scrutinised the records of repair/overhaul cases and investigation/enquiry reports related to premature failures. It also visited the Equipment Management Cell at Dehradun and discussed various issues/polices relating to maintenance activities of critical equipment. The in-house Technical, Energy, Safety, Environmental and Internal Audit Reports, Agenda/Minutes of Board of Directors and the minutes of the meetings of the Executive Committee of the Company were examined and wherever relevant, the issues were discussed with the Management representatives. The draft audit report containing the audit observations on various issues was issued to the Management in August 2005. The Management reply to the draft audit report was received in January 2006 and the draft audit report, incorporating the Management's views thereon, was issued to the Ministry of Petroleum and Natural Gas in January 2006.

**7.4.2** Audit acknowledges the co-operation and assistance extended by all levels of Management at various stages for timely completion of the Performance Audit.

### 7.5. Audit findings on availability of critical equipment

7.5.1 System availability of critical equipment was of vital importance as the chain of equipment required for uninterrupted flow of production needed to be in operating condition throughout the year. While setting the production targets the system availability of 100 per cent was assured to the extent that the equipment down time was less than equipment standby time. Equipment availability was taken care of by the standby equipment during the period of its maintenance and repairs. Considering this philosophy, ONGC had set the target of 100 per cent for system availability and 95 per cent for equipment availability.

7.5.2 The following table indicates the overall system and equipment availability of critical equipment of all three assets in Mumbai Offshore of ONGC for the last three years ending March 2005.

**Table -2**

(Figures in per cent)

Year	Target		Mumbai High (MH)		Neelam Heera (NH)		Bassein & Satellite (B&S)	
	System	Equip	System	Equip	System	Equip	System	Equip
2002-03	100	95	99.20	86.18	97.75	NA	99.50	NA
2003-04	100	95	99.78	87.37	99.80	92.4	100.00	86.40
2004-05	100	95	100.00	91.01	99.58	89.3	100.00	88.02

Source: Compilation of monthly data provided by the Company

It may be seen from above that in all the assets of Mumbai Offshore there was overall improvement in system availability during the last three years, attaining the targeted level of 100 per cent in MH and B&S by 2004-05. However, during 2002-03 and 2003-04 all the assets, except B&S in 2003-04, could not attain the system availability of 100 per cent that adversely affected production. The overall equipment availability was lower than the target of 95 per cent in all the assets and showed a downward trend in NH Asset during the last three years.

The equipment-wise availability of critical equipment of each asset during the last two years was as given below:

**Table-3**

(Figures in per cent)

Critical Equipment	MH		NH		B&S	
	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05
TG	91.47	97.16	92.5	88.2	87.26	81.12
PGC	86.57	92.99	93.6	94.1	99.79	97.24
MOL	88.9	92.34	99.7	98.8	78.83	91.89
MIP	77.85	84.27	81.9	99.6	*	*
SWLP	92.39	85.42	94.2	64.8	79.72	81.82

\* Equipment not installed

It may be seen from the above that the equipment availability during these two years was largely below the target of 95 *per cent*. However, there was an overall improvement in the equipment availability of critical equipment in 2004-05 in MH except in case of SWLP. In NH and B&S Assets, there was a mixed trend in the equipment availability.

For system availability, the Management of MH Asset stated (January 2006) that while setting the production target the assumption of system availability of nearly 100 *per cent* was considered as long as the estimated equipment down time was less than the equipment standby provision. The Management of NH Asset stated (January 2006) that if there were four equipment in a system and if running of two equipment fulfilled the system availability even though the other two equipment were down, still the system availability was 100 *per cent* but the equipment availability was less.

It was observed in audit that the high system availability could be achieved either by maintaining the targeted availability of the equipment or by putting in higher than the required number of equipment in the production system. As discussed in subsequent para 7.7, there was significant under utilisation of the available equipment, as compared to their minimum operating run hours requirements. This indicated that the system availability was maintained due to existence of higher than the required number of equipment, which, in turn, led to increased operating cost.

For lower equipment availability, the Management of MH and B&S Assets stated (January 2006) that 95 *per cent* equipment availability was expected to be achieved by the year 2007-08. The Management of NH Asset stated that equipment availability in NH was down due to considerable lead-time in procurement of spares and that major capital overhauls of critical equipment were taken in the year 2004-05. The Management of B&S Asset also stated that most of the equipment were outsourced from different companies and different places and equipment were very old. As a consequence, all the major equipment were becoming due for major overhauling. It was predominantly due to this reason that down time of critical equipment had increased. During the recent past there had been a change in process of procurement and hiring of services as a consequence of implementation of SAP (System Application and Programming for data processing) system. Once the system matured the spares procurement and the equipment down time would be reduced. In addition, to achieve the target of 95 *per cent* equipment availability in future, an exhaustive plan had been made for replacement and overhauling of equipment.

Audit noticed non-adherence to overhaul and preventative maintenance schedule of critical equipment, which caused high tripping/unplanned shutdown/pre-mature failure of the equipment. The delay in procurement of spares and shortages of maintenance manpower further led to high down time of equipment and consequent lower availability of critical equipment. There also did not exist any policy in regard to maintenance/revamping/replacement, though the Management had since initiated corrective actions in this regard, as discussed in the following paragraphs.

## **7.6. *Audit findings on maintenance activities***

### **7.6.1 *Maintenance Policies***

In 1999, ONGC initiated Project IMPETUS (Implementing Maintenance & Procurement Efforts Through Upgraded System) as a result of bench marking study conducted by M/s A.T. Kearney Limited in 1998. The study recommended development of maintenance

policy, redesign of procurement process and implementation of redesigned maintenance practices/systems. The aim of the Project IMPETUS was to improve upon operational efficiency and asset utilisation.

The overall objective of the maintenance policy was to provide a consistent set of guidelines in order to achieve superior operational effectiveness in terms of system availability, safety, equipment life and operating cost relative to production requirements. Project IMPETUS had been integrated with Project ICE (Information Consolidation for Efficiency) for ensuring organisation wide uniformity for maintenance and procurement for maintenance. The Maintenance Policy Module for specific Asset, Rig & Plant had been prepared and was being implemented in a phased manner. As the recently implemented IMPETUS was yet to stabilise, the effectiveness of the System could not be assessed in audit. Further, documented policies on the equipment of offshore installations were reported (October 2005) to be under preparation by constituting a special task force, the recommendations of which were still awaited.

### **7.6.2 Replacement policy**

Framing a policy for replacement of critical equipment was under consideration of the Management since 2002, when the issue of low availability of rotating equipment was discussed in Engineering Services Review meeting (November 2002). The entire maintenance activities were reviewed and an action plan was drawn up for replacement of equipment/floats for major assemblies. Approval of the Executive Committee was sought for procurement of floats/ replacement of equipment at an estimated cost of Rs.75.53 crore. Executive Committee desired (May 2004) that the criteria for replacement policy should consist of a need for replacement where average annual equipment availability was less than 75 per cent, increase of fuel energy consumption was more than 30 per cent during the last three years and the expenditure on overhaul exceeded 50 per cent of the estimated replacement cost. The replacement policy and these criteria were discussed in the Executive Committee held in July 2005, but the same was yet to be approved. As such, no replacement policy was in existence in the organisation.

The Management stated (January 2006) that a Committee had been constituted and policy for replacement/refurbishment would be worked out.

The reply reflected absence of systematic approach in the past in regard to the replacement of equipment with likely impact on the long-term interest of the Company.

### **Recommendation**

Policy for revamping/replacement of equipment should be completed urgently to ensure the reliability of the system.

### **7.6.3 Delay in carrying out overhaul**

The following table indicated the overhauling schedule of main components of the critical equipment and their implementation during 2004-05 in respect of all the three assets of Mumbai Offshore.

**Table-4**  
**Plan and actual overhaul in 2004-05**

(in numbers)

Asset		Gas Generator	Power Turbine	Gear Box	Low/High Pressure Compressor	High Tension Machine	Main Injection Pump	Total
MH	Overhaul due	12	7	14	15	16	9	73
	Overhaul carried	11	3	4	5	7	4	34
	Shortfall	1	4	10	10	9	5	39
NH	Overhaul due	6	4	4	8	3	9	34
	Overhaul Carried	5	3	0	2	1	5	16
	Shortfall	1	1	4	6	2	4	18
B&S	Overhaul due	1	1	0	3	1	6	12
	Overhaul carried	1	1	0	1	1	6	10
	Shortfall	0	0	0	2	0	0	2

It is evident from the above table that there had been substantial deviation in the plan and actual overhaul implementation. The MH and NH Assets had carried out only 47 per cent of planned overhaul whereas B&S Asset had carried out 83 per cent of planned overhaul. Further analysis of the pending cases where overhauling was not completed revealed that in MH Asset, out of 73 due cases, only in 34 cases the overhauling was carried out. Out of the balance 39 cases, 15 cases could not be released for overhaul due to operational reasons and in the remaining 24 cases action was initiated for overhaul. Similarly in NH Asset out of 18 due cases pending, 10 were still with the asset and not released for overhaul for operational reasons. Action was initiated in respect of the balance eight cases. The two pending cases of B&S Asset were not overhauled for want of spares. Instances of delays in overhauling of critical equipment were also brought out by the in-house technical audit of ONGC in its several reports. Technical audit had also suggested that the policy for overhaul and postponement of overhaul needed to be spelt out for reliability of the system.

The entire maintenance activities were reviewed by Executive Committee in April 2004 and an action plan was drawn up to improve equipment availability and it was decided that the recommendations of OEMs were to be followed for overhauling of equipment.

The Management of all the assets of Mumbai Offshore accepted (January 2006) that the maintenance performance in terms of major equipment overhauls was not satisfactory due to procedural delays and in operational interest. They further stated that it had intensified co-ordination effort for timely completion of the planned jobs to meet the overhaul target.

The fact however remained that there was significant deviation with the overhaul schedule, which adversely affected the equipment longevity and increased the risk in production process.



### **Recommendation**

ONGC should follow OEM norms for overhauling of critical equipment. Specific extension to overhaul schedules, if warranted, should be spelt out clearly for maintaining the reliability of the system.

#### **7.6.4 Preventative Maintenance Schedule (PMS)**

The scrutiny of planned *vis-a-vis* actual implementation of PMS in MH revealed that in most of the cases PMS had been followed. However, in case of NH and B&S Assets, audit observed the non-adherence of PMS in a number of cases. In B&S Asset at BPB platform adherence to planned overhaul schedule was limited to 85 to 90 *per cent* during the year 2002-03 and 2003-04.

The Management stated (January 2006) that manpower shortage was responsible for non-adherence to PMS schedule and that it had taken step to fill this gap by awarding the various operational and maintenance (O&M) contracts for equipment so as to maintain PMS schedule.

However, the Management did not explain the rationale for opting for O&M contracts instead of putting in adequate in-house maintenance resources.

### **Recommendation**

Operational and Maintenance contracts for equipment maintenance should be resorted to only after cost-benefit analysis of outsourcing *vis-a-vis* in-house maintenance through additional manpower.

#### **7.6.5 Premature failure\* of critical equipment**

The Equipment Management Cell (EMC) at ONGC's Headquarters at Dehradun had issued instructions to all the assets and Basin Managers to report cases of equipment failures for proper analysis of causes of failure with the objective of issuing guidelines/instruction to avoid recurrence of failure and dissemination of information to different users. Three cases of premature failure pertaining to Mumbai Region (two in MH and one in NH) during the years 1997 to 2005 were reported to EMC whereas the actual premature failure were nine in MH and two in NH during the last three years. This indicated that there was no proper reporting to Headquarters. Thus, proper analysis of causes of failure and dissemination of information to the different users with the objective of issuing guidelines/instruction to avoid recurrence of failures was defeated. It was also noticed that the three cases reported to EMC during 1997-2005 were on account of maintenance failure. Non-reporting of the cases to EMC had thus deprived the Management of an opportunity of taking corrective action.

The Management of MH Asset assured (January 2006) that as per recent instructions of EMC all major failures would be reported in time in future.

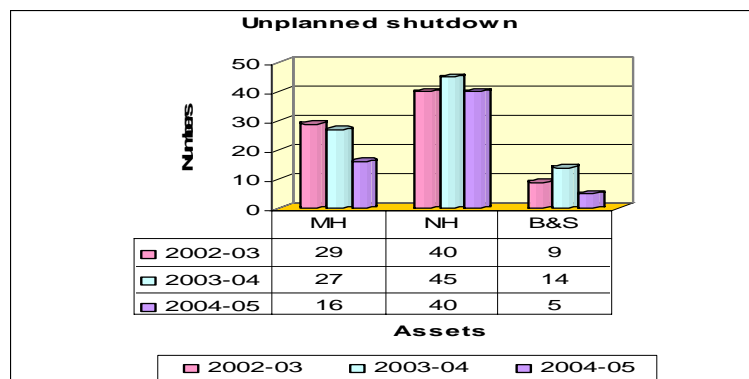
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\* Failure of an equipment/component before the expiry of life prescribed by Original Equipment Manufacturer.

### 7.6.6 Unplanned shutdown<sup>\*</sup>:

Proper maintenance systems should aim at uninterrupted operation of the plant without encountering any tripping or shutdowns. The efficiency of the maintenance system of an organization is gauged by number of shutdowns during a period. The graph below in respect of all three assets indicates the incidence of shutdown during the last three years:

Graph-1



The deferment of production and revenue due to maintenance reasons as presented by MH Asset in the Technical Meet of 2004 was as tabulated below.

Table-5

Year	2001-02	2002-03	2003-04
Gas Loss (MMSCM)	51.8	47.2	31.4
Oil Loss (in lakh bbls)	8.4	2.9	1.9
Daily Loss (Rs.in lakh)	38	21	17
Percentage of loss to sales revenue	0.85	0.65	0.50

It may be seen from above that though maintenance related production loss was reduced gradually over a period of time, the daily production loss (deferment of revenue) of Rs.17 lakh, which amounted to Rs.61 crore in the year 2003-04, was still a significant amount. Efforts needed to be made to reduce the same to the barest minimum.

The deferred revenue in terms of quantity and value due to unplanned shutdown in respect of NH and B&S Assets is given below:

Table-6

Year	NH		B&S	
	Quantity (oil/ barrels)	Rs. in crore	Quantity (gas/ MMSCM)	Rs. in crore
2002-03	3981	0.28	3.664	0.77
2003-04	3312	0.23	6.581	1.39

<sup>\*</sup> Shutdown of the plant/equipment because of any unexpected tripping due to process malfunction or control system or safety system malfunction/actuation by false alarm.

2004-05	125972	8.79	3.618	0.76
Total	133265	9.30	13.863	2.92

Note: One MT is equal to 7.5 barrels; Value of one MT was taken as Rs.5236 being the average net realisation price of 2003-04; Gas price was taken as Rs.2116/1000 cm of gas.

The Management of MH and NH Assets stated (January, 2006) that a key reason for unplanned shutdowns was the ageing of package peripherals. During the last three years considerable efforts in system revamp had been put in which resulted in significant reduction in equipment failures and the same trend of performance improvement would continue.

The Management had since initiated corrective action for formulating revamping/replacement policy for offshore equipment, which was under finalisation.

### **Recommendation**

Preventative Maintenance Schedule should be adhered to and monitored regularly to reduce the instances of unplanned shutdown and tripping. Documentation of the same should be ensured for reference and corrective action.

#### **7.6.7 Tripping of critical equipment:**

The details (numbers) of tripping of critical equipment during the last three years and target set for 2005-06 was as under.

**Table-7:**

Number of tripping

Year	MH	NH	B&S
2002-03	438	NA	9
2003-04	312	NA	14
2004-05	226	42	65
2005-06*	180	35	35

\*Target set as per internal service level agreement.

The number of tripping during the period from 2002-03 to 2004-05 were higher as compared to the target set up as per 'service level agreement' (2005-06) except in B&S Asset in 2002-03 and 2003-04. The number of tripping during 2002-03 and 2003-04 in respect of NH Asset though assured was not made available to Audit.

The Management stated (January, 2006) that number of tripping and associated loss was gradually reducing due to significant maintenance efforts in this direction and all efforts would be made to improve performance in this regard in future.

#### **7.6.8 Delay in procurement of spares**

Scrutiny of data on procurement of spares revealed that during the period from October 2003 to March 2005, the time taken for placement of supply order from the date of issue of purchase requisition was on an average 100 days whereas average time taken for receipt of goods from the placement of supply order during the same period was 19.07 days. Purchase Manual of ONGC stipulated finalisation of tender within 120 days from

the date of tender invitation. Analysis of the data revealed that the actual time taken in respect of 2489 cases was more than 120 days and in 1090 cases it took more than 180 days. This represented 31.19 and 14 per cent of the total number of purchase cases processed during October 2003 to March 2005. Audit reviewed sample cases of non availability of critical equipment of B&S Asset during 2003-04 and 2004-05 and observed that in the following cases waiting time for spares was responsible for non-availability of equipment for 18.63 to 100 per cent of total equipment hours in a year.

**Table-8**

Platform	Year	Equipment	Tag no.	Percentage of non availability of equipment to total equipment hours due to waiting time for spares
BPA	2003-04	CP	P2641 C	100
BPB	2003-04	TG	G1170D	55.74
BPB	2003-04	CP	P670A	26.77
BPA	2004-05	SWLP	P2611A	39.45
BPA	2004-05	SWLP	P2611B	29.06
BPB	2004-05	TG	G1170A	29.04
BPB	2004-05	TG	G1170B	18.63

The Management of B&S Asset stated (January 2006) that the delay in repairs to condensate pump number P2641-C and TG-G1170D was on account of revamping and further stated that all the equipment listed above were operational now and all efforts were being made to reduce the procurement cycle for spares.

The reply of the Management with regard to condensate pump and TG referred above was not acceptable as the audit observation was based on the data of 'waiting for spares' for these equipment as made available by the Management. However, Audit noted that the Management had since taken necessary steps to reduce lead-time of procurement of spares by entering into long term equipment overhaul contract on turnkey basis with OEM/OES\* and long term spare parts contracts with OEMs.

**Recommendation**

Lead-time for procurement of maintenance spares should be streamlined so as to avoid delays in finalisation of purchase order and curtail downtime of critical equipment.

**7.7. Audit findings on utilisation of critical equipment and production facilities**

**7.7.1 Utilisation of equipment**

**7.7.1.1** The utilisation of critical equipment in terms of percentage of running hours to the minimum operating run hours requirement during the last years 2003-04 and 2004-05 was as given in **Annexure-18**. It may be seen from the annexure that in MH and B&S the actual utilisation of critical equipment, as compared to minimum operating run hours

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\* Original equipment supplier

requirement, was considerably less in respect of all equipment except TG. In Neelam Asset, while the actual run hours of TG/PGC/MIP was higher than the minimum operating run hours requirement, the actual run hours of MOLP/SWLP was considerably less. However, the actual utilisation of critical equipment in Heera Asset was largely satisfactory being more than 96 *per cent* of the minimum operating run hours requirement in all the cases except SWLP.

The Management of MH stated (January 2006) that most of the critical equipment were over 12 to 21 years old. These equipment were originally installed as per field reservoir conditions during that time and that there had been a considerable difference in the field conditions, which determined the optimum utilisation of those equipment. Further, they proposed (June 2005) to hire the service of 'Domain Expert' to look into this aspect for optimum utilisation of existing equipment.

It was noticed in audit that in Mumbai Offshore there were 175 critical equipment in total consisting of 118 for minimum operating requirement and 57 as standby. These requirements were envisaged long back at the time of development of the respective fields but the same was never reassessed to ensure optimum utilisation of the equipment.

### **Recommendation**

The requirement of the equipment should be reassessed urgently so as to ensure their optimum utilisation and reduction in operating expenditure on the equipment.

**7.7.1.2** Though the TGs largely met the minimum operating run hours requirement in all the assets, these were operated at lower load factor compared to the installed capacity. During 2004-05, the TGs were operated on 8.13 to 70 *per cent* load at the various platforms of all the assets as detailed in **Annexure-19**. The utilisation of TGs on low load factor resulted in higher fuel gas consumption per unit of power generated and the total excess gas consumption, compared to OEM's norms, worked out to Rs.5.12 crore during 2004-05.

The Management stated (January 2006) that the TGs with higher capacity were required to meet the peak demand while starting high tension/low tension motors and that ONGC had since initiated (May 2004) a project study to have an underwater electric network (gas to wire project) to share the buffer power available with each platform and supply the excess power to shore, which was likely to increase the load factors of TGs and also reduce the fuel consumption rate.

Audit recommends that all action for supply of the excess power to shore needs to be taken expeditiously.

**7.7.1.3** In B&S Asset, ONGC had installed four condensate pumps (CP) in BPB field in 1989 having replacement value of Rs. six crore during 2002 and three booster compressor pumps (BCP) in 1999 at a cost of Rs.615.86 crore to pump the condensate and gas into trunk line. As the reservoir pressure of gas was adequate to push the production quantity without the use of these pumps, the same were not required till the year 2002. However, when the requirement of these pumps was felt in 2002-03 due to the decline in reservoir pressure, these could not be used due to various technical problems with CPs, and the BCPs could not be operated without running of the CPs. After rectification of CPs, ONGC started using these CPs and BCPs only in 2004-05. Thus critical equipment

(pumps and compressors) which were installed in 1989/1999 could not be utilised till 2003-04 and were also not kept well maintained affecting their availability.

### 7.7.2 Utilisation of oil handling and gas compression facilities

7.7.2.1 The utilisation of minimum operating crude oil handling facility and the gas compression facility in various assets is given below.

**Table-9  
Crude oil**

Complex	Insta lled capa city  (MM T)	Production  (MMT)			Utilisation  (percentage)			Past peak produc tion  (MMT)	Max. utilisati on at peak producti on (%)	Max. produ ction as per LTOP (MM T)	Max. utilisa tion in future  (%)
		02-03	03-04	04-05	02-03	03-04	04-05				
Neelam	6.252	1.335	1.280	1.143	21.35	20.47	18.28	3.807	60.90	1	16.00
Heera	6	2.429	2.489	2.268	40.48	41.48	37.8	3.842	64.03	2.54	42.33
MH	36.5	11.378	11.646	12.593	31.17	31.90	34.50	20.085	55.02	7.34	20.11

### Natural Gas

Asset/ Complex	Installed capacity  (MMS CMD)	Gas compression  (MMS CMD)			Utilisation  (percentage)			Past peak compre ssion (MMS CMD)	Max. utilisa tion at peak compre ssion (%)	Max. compre -ssion as per LTOP (MMS CMD)	Max. utilisa tion in future  (%)
		02-03	03-04	04-05	02-03	03-04	04-05				
MH	44.18	29.49	30.54	32.97	66.75	69.12	74.63	NA	NA	NA	NA
B&S	30	31.04	29.17	27.96	103.5	97.23	93.2	32.38	108	26.45	88.17
Neelam	3.84	3.12	3.66	3.68	81.25	95.31	95.83	3.00	78.12	NA	NA
Heera	4.8	4.21	4.29	4.37	87.70	89.37	91.04	4.766	99.29	NA	NA

It is evident from the above table that the utilisation of crude oil handling facility and gas compression facility during the last three years in all the assets, except B&S Asset, was much below the installed capacity, even after considering peak production/compression achieved in earlier years and future peak production envisaged in the Long Term Oil Production (LTOP) and Long Term Gas Production (LTGP) profile's drawn by ONGC in August 2000.

The Management of NH Asset stated (January 2006) that the facility was developed for maximum crude and gas handling. Presently the system was able to handle the crude and gas capacities from the field and the process gas compressors (PGCs) were upgraded.

From the reply it is evident that the actual utilisation of crude handling and gas compression facility was below the installed capacity. Considering the decline in the production the possibility of utilising the installed capacity in future was remote.

7.7.2.2 While the utilisation of gas compression facility during the last three years was below the installed capacity, since inception (1994) the gas from Neelam field and entire gas production from B-173A satellite field that was hooked up to Neelam field was being

flared for want of sufficient gas compression facility. Audit had already pointed out loss due to flaring of gas worth Rs 48.80 crore during the period from 1994-95 to 1997-98 in the Comptroller and Auditor General's Audit Report no.4 (Union Government-Commercial) of 2001. However, ONGC took action for up-gradation of gas compression facility in January 2001 and the up-gradation work was completed in 2004-05. ONGC continued to suffer gas-flaring loss, which worked out to Rs.126.39 crore during the years 1998 to 2005.

### **7.8 Conclusions**

- i. ONGC achieved the targeted system availability of critical equipment in Mumbai Offshore but could not achieve the targeted equipment availability during the period of audit due to old aged equipment, maintenance related problems and the absence of equipment maintenance/replacement policies
- ii. Though the equipment had become old, in the absence of laid down documented policies in respect of replacement/revamping, the work of major maintenance/up gradation/revamping was undertaken on a need basis and not in a systematic manner.
- iii. There was non-adherence to overhaul/preventative maintenance schedule of equipment mainly due to operational reasons and shortage of manpower. This caused high tripping/unplanned shutdown/pre-mature failure of the critical equipment, which adversely affected their longevity and resulted in deferment of production/revenue. Deferment of production/revenue in MH due to maintenance reasons amounted to Rs.61 crore in 2003-04. The delay in procurement of spares and shortages of maintenance manpower further led to high down time and consequent lower equipment availability.
- iv. The utilisation of most of the equipment was below the minimum run hours requirements due to changing behaviour/depletion of fields but the equipment requirements were not reassessed in time to ensure their optimum utilisation. The utilisation of TGs on low load factor revealed excessive fuel gas consumption as compared to OEM norms leading to extra fuel gas consumption valuing Rs.5.12 crore during 2004-05.
- v. In Neelam field, the installed capacity of gas compression was below the actual gas production since inception (1994). Delayed action for enhancement of gas compression facility resulted in flaring of gas valued at Rs 126.39 crore for the period 1998 to 2005.
- vi. The Company had since initiated steps for timely completion of planned maintenance, framing of the maintenance/revamping/replacement policy and the optimum utilisation of the critical equipment.

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