सत्यमेव जयते

Report of the Comptroller and Auditor General of India on Supply Logistics Operations of MS, HSD and LPG in Oil Marketing Companies

भारतीय लेखापरीक्षा और लेखा विभाग ✦ INDIAN AUDIT AND ACCOUNTS DEPARTMENT

लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest

Union Government
Ministry of Petroleum & Natural Gas
No. 13 of 2022
(Performance Audit)

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Comptroller and Auditor General of India
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Preface

The Performance Audit Report on Supply Logistics Operations (MS, HSD and LPG) in Oil Marketing Companies has been prepared under the provisions of Section 19-A of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. The Audit has been carried out in line with the Regulations on Audit and Accounts, 2007 and Performance Audit Guidelines, 2014 of the Comptroller and Auditor General of India.

The Audit covered the period from 2014-15 to 2018-19. The Report is based on the scrutiny of documents pertaining to the Oil Marketing Companies, Petroleum Planning and Analysis Cell and Ministry of Petroleum and Natural Gas, Government of India.

This Report examines the effectiveness of Petroleum Logistics of MS, HSD and LPG in Oil Marketing Companies under various aspect of the system, including planning for logistics, scheduling and transportation of petroleum products, logistics infrastructure as well as health, safety and environment aspects of supply logistics during the period from 2014-15 to 2018-19.

The Public Sector Oil Marketing Companies predominantly (about 91 *per cent*) cater to the MS, HSD and LPG needs of the country. These products are sourced from domestic refineries as well as by imports. Primary transportation of the products from refineries to depots/ bottling plants, across the country, takes place by four transportation modes *viz.*, pipelines, rail, coastal and road. Secondary movement of these products *i.e.* from a depot/ bottling plants to the retail outlets is exclusively done by roads.

The Audit revealed deficiencies in planning and implementation such as modifying the optimised logistics plan by manual intervention, additional logistics expenditure due to variations in optimised plans, non-implementation of combined industry logistics plan for all public sector Oil Marketing Companies due to not reaching of amicable arrangement for settlement of inter-company dues and forgoing of consequent savings. Audit also observed deviations in optimised plans due to shutdowns of pipeline due to controllable reasons as well as detention of petroleum vessels due to insufficient port capacity as well as ullage at ports, delay in implementation of logistics infrastructure projects due to delay in obtaining statutory clearances and other controllable reasons.

Audit acknowledges the co-operation and assistance extended by the officers and staff of Ministry of Petroleum & Natural Gas, Government of India, Petroleum Planning and Analysis Cell, Indian Oil Corporation Limited, Bharat Petroleum Corporation Limited and Hindustan Petroleum Corporation Limited during the Performance Audit.

Executive summary

The retail marketing of petroleum products in the country is done by the Public Sector Oil Marketing Companies *viz*., Indian Oil Corporation Limited (IOCL), Hindustan Petroleum Corporation Limited (HPCL), Bharat Petroleum Corporation Limited (BPCL), Numaligarh Refinery Limited (NRL), Mangalore Refinery & Petrochemicals Limited (MRPL) and private companies like Reliance Industries Limited (RIL) and Nayara Energy Limited (NEL). The Public Sector Oil Marketing Companies predominantly (about 91 *per cent*) cater to the Motor Spirit (MS), High Speed Diesel (HSD) and Liquefied Petroleum Gas (LPG) needs of the country.

MS, HSD and LPG are sourced from domestic refineries as well as by imports by Oil Marketing Companies. Primary transportation of these products from refineries to depots/ bottling plants, across the country, takes place by four transportation modes *viz.,* pipelines, rail, coastal and road. Secondary movement of the products i.e., from depot/ bottling plants to the retail outlets (petrol pumps) and LPG dealers is done through roads.

The marketing infrastructure of the PSU Oil Marketing Companies as of March 2019 consists of 286 MS/ HSD installations to cater 57,944 retail outlets and 189 LPG bottling plants to cater 23,737 LPG distributers in the country.

A Performance Audit was conducted with a view to ascertain effectiveness of supply logistics system of MS, HSD and LPG in Oil Marketing Companies with the following objectives:

- soundness of logistics planning for transportation of MS, HSD and LPG with respect to the correctness of assessment and supply forecast,
- whether there was a proper system of scheduling and transportation of petroleum products (MS, HSD and LPG) by optimal utilisation of various modes of transport as envisaged in the logistics optimisation plan,
- whether new logistics infrastructure projects were implemented efficiently and economically and
- existence of the system, ensuring safety and security of manpower and environment in line with the statutory and industry norms.

Results in Brief

The optimised logistics plan is prepared using Linear Programming models. However, during actual implementation, the plan is modified with manual interventions. Oil Marketing Companies incurred additional cost due to deviation of optimised logistics plan during the period from 2014-15 to 2018-19. Audit observed that the modes of transportation of petroleum products are deviated due to shutdown of pipelines some of which are controllable and detention of petroleum vessels due to insufficient port capacity and storage capacity at ports. Further, Audit observed delays in implementation of logistics infrastructure projects, prominently due to delays in getting statutory clearances. Audit also noticed that Oil Marketing

Companies have not introduced technologies to enhance LPG production so that imports of LPG can be minimised. Under health, safety and environment, Audit observed delays of more than three years in settlement of some of recommendations made by Oil Industry Safety Directorate (OISD), during external safety audits.

Audit findings

Planning for logistics

Though the optimised Logistics Plan is prepared using Linear Programming, during actual implementation the plan is modified with manual interventions. Audit observed that Indian Oil Corporation Limited incurred an overall additional cost of ₹516.30 crore due to deviation of optimised logistics plan in case of transportation of MS/ HSD during the period 2014-15 to 2018-19 and ₹132.55 crore in case of LPG during the period 2015-16 to 2018-19. Bharat Petroleum Corporation Limited reported lower expenditure compared to planned expenditure by ₹43.69 crore due to variations from optimised logistics plan in transportation of MS/ HSD during the period 2014-15 to 2018-19. Hindustan Petroleum Corporation Limited incurred additional cost of ₹200.21 crore in movement of MS/ HSD during the period 2014-15 to 2018-19 and ₹73 crore on LPG during the period of 2017-18 and 2018-19.

(Para 3.1.1)

Hindustan Petroleum Corporation Limited and Bharat Petroleum Corporation Limited yet to implement suitable technology in its refineries as recommended by the Consultant appointed by Petroleum Planning and Analysis Cell (PPAC) to improve LPG yield and to reduce imports of LPG.

(Para 3.2)

Oil Marketing Companies entered (August/ November 2016) into Memorandum of Understanding (MoU) with Reliance Industries Limited (RIL) for a period of two years for purchase of MS, HSD and LPG and with Nayara Energy Limited in October 2019. Oil Marketing Companies did not insist for compensating the short supply of Liquified Petroleum Gas in any month by private refineries in the subsequent month through imports as provided in clause 4.6 of the agreement with Reliance Industries Limited.

(Para 3.3)

MoPNG advised (May 2014) Oil Marketing Companies that a combined Linear Programming model for three Oil Marketing Companies be operated on pilot basis and further directed (June 2015) to run the pilot model on continued basis with effect from August 2015. Oil Marketing Companies carried out a pilot run for movement of bulk LPG on Industry basis. Gain was estimated to be ₹52.52 crore during the pilot study period of three months. However, despite potential savings envisaged, the plan for MS/ HSD and LPG was not implemented due to not reaching an amicable arrangement for settlement of inter-company dues.

(Para 3.4.1)

With reference to Audit findings on Planning for supply logistics, Audit recommends that:

1. ***Oil Marketing Companies may strengthen the mechanism to periodically monitor the location wise deviation in quantity as well as the attendant costs along with the reasons for deviations.***
2. ***Oil Marketing Companies may consider implementation of suitable technology to improve yield of LPG in order to reduce import dependency.***
3. ***Oil Marketing Companies may insist on private refineries to supply LPG as per the clauses contained in the Memorandum of Understanding in order to safeguard their interest. In case of supply of MS/ HSD, a similar binding clause as in the case of LPG may be incorporated in place of 'best endeavor basis'.***
4. ***Oil Marketing Companies may formulate and agree to a robust profit sharing mechanism and the Ministry may ensure implementation of the industry wide logistics plan so that logistics costs are minimised.***

Transportation of petroleum products

Audit observed instances of pipeline shutdowns due to avoidable reasons, *viz.,* non-pigging of pipeline on annual basis resulting in pig getting stuck, entering of muck in pipeline during replacement work, non-availability of storage facility at marketing locations etc. This results in additional cost on transportation by other modes.

(Para 4.2.2)

Insufficient port capacity resulted in vessels waiting for berthing. In case of voyage charter vessels, Oil Marketing Companies incurred ₹2,227.20 crore toward demurrages. Audit reviewed 137 instances of demurrage payments and observed that only 37 *per cent* of the total cases reviewed were due to non-controllable reasons such as delay in berthing of vessel (51 instances) and remaining 63 *per cent* were due to non-availability of storage space, shut downs, etc., which were controllable.

(Para 4.3.1)

As per road transport agreement between Oil Marketing Companies and transporters, provision of vehicle tracking system in truck is mandatory. However, installation of system is yet to be completed by Oil Marketing Companies resulting in non-monitoring of trucks carrying hazardous petroleum products.

(Para 4.6)

With reference to Audit findings on Transportation of Petroleum Products, Audit recommends that:

5. ***Oil Marketing Companies may ensure optimum utilisation of MS, HSD and LPG pipelines by strengthening the maintenance and replacement of pipelines.***

6. ***Ministry of Petroleum & Natural Gas may take up the issue of priority berthing of LPG vessels at 12 ports with Ministry of Shipping.***
7. ***Ministry may issue guidelines for actions to be initiated to minimise payment of demurrages due to detention of vessels at ports and to monitor implementation of the same with close coordination between the Oil Marketing Companies.***
8. ***Oil Marketing Companies may augment storage and pipeline facilities at the ports so as to avoid vessel detention and payment of demurrages.***
9. ***Oil Marketing Companies may consider hiring of drivers for company owned trucks to reduce idle time of owned trucks.***
10. ***Marketing Companies may set a specific target for installation of vehicle tracking system and installation of vehicle mounted units on all bulk and packed trucks. Compliance to the same may be sent to the Board of Directors of the Company periodically till completion of successful implementation.***
11. ***Oil Marketing Companies need to consider taking time bound steps to ensure adherence to Industry Transport Discipline Guidelines including digitalising the entire process of booking of shortage by customer, reporting, monitoring of shortage and refund to the customer.***
12. ***Oil Marketing Companies may like to further strengthen compliance of Transport Discipline Guidelines for packed trucks by imposing monetary penalties on repetitive violators.***
13. ***Oil Marketing Companies may establish an effective system to ensure timely delivery of LPG Cylinders within the prescribed norm of 48 hours. A periodic report on delays of delivery with reasons for delays may be submitted to the Board of Directors of individual Companies with an annual return on the same to the Ministry of Petroleum & Natural Gas.***

Logistics infrastructure

Audit observed delays in implementation of projects relating to construction of installations/ bottling plants and ongoing pipeline projects. The prominent reasons for the delays were delay in getting environmental and other statutory clearances.

(Para 5.1 and 5.2)

Construction of import facility of Indian Oil Corporation Limited at Cochin was delayed due to delay in initiating construction activities of the jetty during the period 2009 to 2015 and due to local agitation subsequently. Similarly, completion of import terminal facility at Haldia of Bharat Petroleum Corporation Limited was also delayed due to defunct planning of the project without considering the likely constraints while implementing the project.

(Para 5.4.1 and 5.4.3)

With reference to Audit findings on Logistics infrastructure, Audit recommends that:

14. Oil Marketing Companies / MoPNG may look at escalating matter relating to delays in getting environment/ statutory clearances to concerned Ministries and State Governments.

15. Ministry of Petroleum & Natural Gas may sort out the differences among the Oil Marketing Companies so as to avoid idling of infrastructure facilities and incurring of additional expenditure.

Health, Safety and Environment

The Standing Committee on Petroleum & Natural Gas (2017-18) of 16th Loksabha in its Report No. 26 had recommended (January 2019) that the Safety Council under MoP&NG should ensure liquidation of all the pending recommendations made by Oil Industry Safety Directorate (OISD), in the safety audit reports in a fixed time frame. Audit observed that in respect of 19 OISD observations, PSUs took more than three years to take corrective actions.

(Para 6.2)

With reference to Audit findings on Health, Safety and Environment in POL and LPG supply logistics, Audit recommends that:

16. Oil Marketing Companies may establish a mechanism for compliance of all the observations/ recommendations made by OISD in a set period of time and compliance of the same to be reported to the Board of Directors and Ministry on periodic basis.

17. Oil Marketing Companies may report the aspects/ compliance of the safety requirements of pipelines to the Board of Directors and the Ministry of Petroleum & Natural Gas, on annual basis. The Oil Marketing Companies may also consider fixing responsibilities, in case of accidents occurring due to non-compliance of the Standard Operating Practices as well as Oil Industry Safety Directorate and other safety requirements.

CHAPTER 1 Introduction

The supply chain of oil and gas industry is divided into three segments. The upstream segment explores and produces crude oil and natural gas. The midstream segment handles the processing, storing, and transportation of energy commodities. The downstream segment encompasses oil refineries, retail outlets and natural gas distributions. The downstream segment also involves marketing of the refined products including Motor Spirit (MS, commonly known as petrol), High Speed Diesel (HSD, commonly known as Diesel) and Liquefied Petroleum Gas (LPG) as well as other petroleum, oil and lubricant products to various parts of the country. This Performance Audit is limited to downstream segment and reviews effectiveness of logistics operations of MS, HSD and LPG in Oil Marketing Companies (OMCs) for the period from 2014-15 to 2018-19.

Supply chain of Oil Marketing Companies to supply MS, HSD and LPG consists of primary transportation *i.e.*, supply of the products from refineries, import terminals to terminals/ depots[1]/ bottling plants[2] and secondary transportation *i.e.*, transportation of products from depots/ terminals/ bottling plants to retail outlets and LPG distributors.

The retail marketing of petroleum products in the country is mainly done by the public sector Oil Marketing Companies *viz.*, Indian Oil Corporation Limited (IOCL), Hindustan Petroleum Corporation Limited (HPCL), Bharat Petroleum Corporation Limited (BPCL), Numaligarh Refinery Limited (NRL), Mangalore Refinery & Petrochemicals Limited (MRPL) and private companies like Reliance Industries Limited (RIL) and Nayara Energy Limited (NEL). The public sector Oil Marketing Companies predominantly (about 91 *per cent*) cater to the requirement of MS, HSD and LPG of the country.

The public sector Oil Marketing Companies work under the overall control of Ministry of Petroleum & Natural Gas (MoP&NG/ Ministry). MoP&NG is the primary agency for regulating oil sector in the country and is entrusted with the responsibility of issuing policies related to refining, distribution and marketing, export and import and conservation of petroleum products.

1.1 Marketing set up of Oil Marketing Companies

The marketing set up of the three PSU Oil Marketing Companies is given below:

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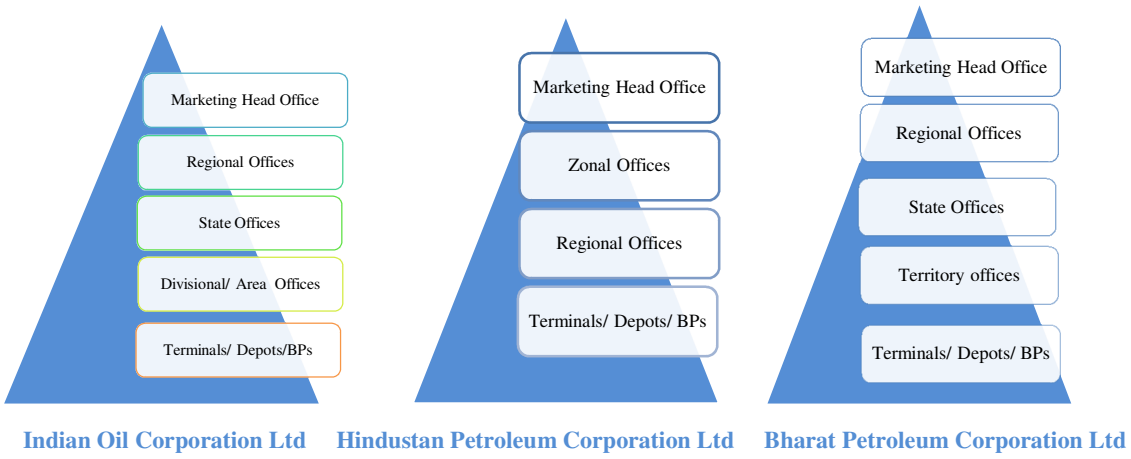
[1] ***Terminals and depots are locations where petroleum products are stored for re-distribution to the end consumers.***

[2] ***Plant where LPG is filled into cylinders for storage and distribution to LPG distributors.***

Fig 1.1: Marketing set up of Oil Marketing Companies



Indian Oil Corporation Ltd **Hindustan Petroleum Corporation Ltd** **Bharat Petroleum Corporation Ltd**

1.2 Production, Consumption and Import of MS, HSD and LPG

The primary source of supply of petroleum products *viz.,* MS, HSD and LPG, is refineries owned by Oil Marketing Companies and refineries of other PSUs. Oil Marketing Companies also receive LPG from fractionators[3] of Oil & Natural Gas Corporation Limited (ONGC), Oil India Limited (OIL) and GAIL (India) Limited (GAIL). The balance demand for the products after sourcing the same from public sector refineries is met from domestic private refineries. Production and consumption of MS, HSD and LPG during the period 2014-15 to 2018-19 is given in Table 1.1.

Table 1.1: Production and Consumption of MS, HSD and LPG (in Million Metric Tonnes)

Product	2014-15		2015-16		2016-17		2017-18		2018-19	
	Production	Consumption	Production	Consumption	Production	Consumption	Production	Consumption	Production	Consumption
MS	32.20	19.07	35.30	21.85	36.60	23.76	37.80	26.17	38.00	28.28
HSD	94.30	69.42	98.60	74.64	102.10	76.02	108.0	81.07	110.50	83.53
LPG	9.90	18.00	10.60	19.62	11.30	21.61	12.40	23.34	12.80	24.91

Source: Ready reckoner Petroleum Planning and Analysis Cell June 2018, November 2018 and November 2019

As can be seen from the table, India produces more MS and HSD than the domestic requirement and the balance production is exported during surplus months. However, during deficit months, the Oil Marketing Companies also resort to import of MS/ HSD. LPG production has increased over the years, but was not sufficient to meet the domestic requirement as seen in the table and hence India is heavily dependent on import of LPG.

[3] ***A processing plant that separates hydrocarbon mixtures based on the vapour pressures of its component molecules, either by adding heat (distillation) or removing heat (condensation); products such as propane, butane, and ethane are produced in this process.***

About 84 *per cent* of crude oil used for processing the petroleum products is sourced by imports. This Performance Audit report relates only to supply logistics of MS, HSD and LPG and not to crude oil.

1.3 Supply logistics of MS, HSD and LPG

Primary transportation of MS, HSD and LPG from refineries to depots/ bottling plants across the country takes place by four transportation modes *viz.,* pipelines, coastal[4], rail and road. Pipelines are the cheapest mode of transportation, followed by coastal, rail and road. Secondary movement of petroleum products i.e., from depots/ bottling plants to the retail outlets/ LPG dealers is done only by tank trucks by road.

Table 1.2 and 1.3 indicate comparison of average cost of transportation by various modes of transport *viz.,* pipeline, coastal, rail and road and percentage of quantity transported by various modes of transportation during the period 2014-15 to 2018-19.

Table 1.2: MS/ HSD Transport cost/ MT and percentage of quantity transported by various modes of transport

Year	MS/ HSD Transport cost/ Metric Tonne				Percentages of quantity transported by various modes of transportation			
	Pipeline ₹	Coastal ₹	Rail ₹	Road ₹	Pipeline (%)	Coastal (%)	Rail (%)	Road (%)
2014-15	551.22	747.89	1194.72	1253.60	51.67	14.94	30.64	2.76
2015-16	517.37	852.18	1183.96	1422.50	53.77	13.74	29.60	2.89
2016-17	539.60	884.93	1151.40	1348.23	57.26	11.14	29.08	2.52
2017-18	594.90	792.38	1118.84	1537.87	58.23	12.44	26.92	2.41
2018-19	582.90	779.77	1089.61	1380.46	59.05	12.90	25.68	2.36
Average	**557.20**	**811.43**	**1147.70**	**1388.53**	**56.15**	**13.00**	**28.27**	**2.58**

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

Table 1.3: LPG transport cost/ MT and percentage of quantity transported by various modes of transport

Year	LPG Transport cost/ Metric Tonne			Percentages of quantity transported by various modes of transportation		
	Pipeline (₹)	Rail (₹)	Road (₹)	Pipeline (%)	Rail (%)	Road (%)
2014-15	1368.52	1736.60	2310.00	27.44	7.86	64.69
2015-16	1214.85	1479.13	2533.43	26.85	7.75	65.39
2016-17	1171.51	1728.47	2636.38	27.66	6.90	65.44
2017-18	1018.56	1755.58	2964.96	30.52	5.57	63.90
2018-19	974.79	1701.56	2827.85	33.27	6.07	60.66
Average	**1149.64**	**1680.27**	**2654.52**	**29.46**	**6.72**	**63.82**

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

[4] ***Movement of products by ships.***

It can be seen from the table 1.3 that despite transportation cost per Metric Tonne for LPG by pipeline being less as compared to other modes of transport, the average volume of LPG transported by pipeline was only 29.46 *per cent* of the total LPG transported during the period from 2014-15 to 2018-19 and 63.82 *per cent* of LPG was transported by road, which is the costliest mode of transport of petroleum products.

CHAPTER 2 Scope, Audit Objectives and Methodology

The Performance Audit Report on 'Supply logistics operations of MS, HSD and LPG in Oil Marketing Companies' has been prepared under the provisions of Section 19-A of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971. The Audit has been carried out in line with the Regulations on Audit and Accounts, 2007 and Performance Audit Guidelines, 2014 of the Comptroller and Auditor General of India.

2.1 Scope and Audit objectives

The scope of Audit is to review effectiveness of logistics operations of MS, HSD and LPG in Oil Marketing Companies for the period from 2014-15 to 2018-19 (with backward and forward linkages).

The objectives of the Audit were to assess:

1. soundness of logistics planning for transportation of MS, HSD and LPG with respect to the correctness of demand assessment and supply forecast,
2. whether there was a proper system of scheduling and transportation of petroleum products (MS, HSD and LPG) by optimal utilisation of various modes of transport as envisaged in the logistics optimisation plan,
3. whether new logistics infrastructure projects were implemented efficiently and economically and
4. existence of the system, ensuring safety and security of manpower and environment in line with the statutory and industry norms.

2.2 Audit criteria

The sources of Audit criteria to assess efficiency and economy in supply logistics operations in Oil Marketing Companies include:

- **Policy, Rules and Regulations:** Related Acts, Policy guidelines/ instructions issued by MoPNG, Petroleum Planning and Analysis Cell etc., Regulation of transportation rates for common carriers and contract carriers fixed by Petroleum and Natural Gas Regulatory Board, office orders and circulars related to the subject issued by Oil Marketing Companies, Agenda/ Minutes of the Board of Directors meetings, Set norms/ standards *viz.,* Standard Operating Practices of Oil Marketing Companies,

Industry Transportation Disciplinary Guideline (ITDG)[5] issued by the Oil Marketing Companies, Health Safety and Environment (HSE) policy of Oil Marketing Companies etc.

- **Plan documents** prepared by individual Oil Marketing Companies**:** Logistics plans of Oil Marketing Companies, Tonnage studies[6] of Oil Marketing Companies.

- **Infrastructure Requirement:** Material Management/ Purchase Manual of Oil Marketing Companies.

- **Safety guidelines** prescribed by Oil Marketing Companies for supply logistic operations including inventory of petroleum products, guidelines/ circulars issued by the Oil Industry Safety Directorate (OISD) and MoPNG, Petroleum & Natural Gas Rules etc., Technical standards and specifications including safety standards in construction and operation of pipeline issued by Petroleum & Natural Gas Regulatory Board.

2.3 Audit methodology

An Entry Conference was held with Managements of Oil Marketing Companies on 24 April 2019 in which Audit objectives, scope and methodology were discussed. Entry conferences were also conducted at regional levels of Oil Marketing Companies on 24 April 2019 and 12 July 2019.

Field audit was undertaken from July 2019 to December 2019. The field Audit included review of information/ documents, discussions with Management and visits to State/ Regional/ Zonal offices and to terminals/ depots/ installations and bottling plants of Oil Marketing Companies selected on random sample basis. The draft report was issued to Management of respective Oil Marketing Companies in March 2020. Audit findings were discussed with Management at an Exit Conference held on 29 May 2020 and Oil Marketing Companies furnished additional responses during July/ August 2020. The draft Report was issued to the Ministry on 31 August 2020 and its response was received on 19 November 2020. An Exit Conference with MoP&NG and Oil Marketing Companies to discuss the Audit findings and recommendations of the Report was held on 14 July 2021, during which the Ministry gave an assurance to suitably implement the Audit recommendations.

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[5] ***Oil Marketing Companies formulated (2007 and revised in 2016) guidelines for transportation of bulk petroleum products by road to ensure that i) petroleum products are filled in Tank Truck in accordance with Industry Quality Control Manuals ii) petroleum products are transported and delivered to dealers/direct customers and receiving locations in good condition conforming to the specifications. iii) A well-defined system of checks exists at various stages of handling of petroleum products. ITDG envisages installation of vehicle tracking system to monitor route deviations, un-authorised stoppages/ delay, over speeding and TT would not be considered fit for loading, in case of Vehicle Mounded Unit found not in working condition.***

[6] ***The planning process for requirement of vessels takes into account the tonnage requirement for total quantity to be imported and available vessels under time charter.***

2.4 Sampling methodology

2.4.1 Sample selection for scheduling, depot/terminal operations

A sample of two months from each year was selected as sample by using IDEA software[7]. Accordingly, 10 months data out of 60 months was selected for detailed verification of annual demand projection, hiring and utilisation of trucks for secondary logistics, adequacy of storage of petroleum products in the depot, analysis of stock loss/ gains in the transportation of products, and Health, Safety and Environment (HSE) compliance by the depot/ terminals.

2.4.2 Sampling of depots/ terminals

Total number of MS and HSD depots/ terminals[8] as on 31 March 2019 were 286 (Bharat Petroleum Corporation Limited: 78, Hindustan Petroleum Corporation Limited: 83 and Indian Oil Corporation Limited: 125) and Bottling Plants as on 31 March 2019 were 189 (Bharat Petroleum Corporation Limited: 51, Hindustan Petroleum Corporation Limited: 49 and Indian Oil Corporation Limited: 89).

- Detailed audit was carried out in 20 *per cent* sample selected for each region.
- Within each region, installations[9]/ depots and bottling plants were arranged in high, medium and low category based on tankage capacity, terminal throughput[10] and bottling capacity. Samples from high, medium and low category were selected in the ratio of 3:2:1 using IDEA software.
- Detailed Audit was carried out at the selected 20 *per cent* of MS/ HSD installations and LPG bottling plants.

Total number of samples of each Oil Marketing Company selected for detailed verification is given in table 2.1 (refer **Annexure 1** for details of samples).

Table 2.1: No. of samples of MS/ HSD installations and LPG bottling plants of each Oil Marketing Company

Region	Depot/ Terminal			Bottling plants			Total
	Indian Oil Corporation Limited	Bharat Petroleum Corporation Limited	Hindustan Petroleum Corporation Limited	Indian Oil Corporation Limited	Bharat Petroleum Corporation Limited	Hindustan Petroleum Corporation Limited	
Eastern	5	3	4	5	2	2	21
Western	7	3	4	3	3	3	23
Northern	7	5	7	6	3	3	31
Southern	7	4	6	4	2	3	26
Total	**26**	**15**	**21**	**18**	**10**	**11**	**101**

Source: Sample selection by using IDEA software.

[7] ***Software being used for audit and accounts for data analysis.***
[8] ***The actual sample is drawn based on the list received from Oil Marketing Companies.***
[9] ***Installation is a hub of petroleum products which cater to many depots.***
[10] ***Amount of petroleum products moves through a particular facility during a given period of time.***

2.5 Acknowledgement

Audit acknowledges the co-operation and assistance extended by the officers and staff of Ministry of Petroleum & Natural Gas, Government of India, Petroleum Planning and Analysis Cell, Indian Oil Corporation Limited, Bharat Petroleum Corporation Limited and Hindustan Petroleum Corporation Limited during the Performance Audit.

CHAPTER 3 Planning for supply logistics

Planning for logistics of MS, HSD and LPG involves analysis of demand for these products, availability and arranging of supply from owned/ other PSU/ private refineries and fractionators, as well as planning for imports.

3.1 Planning for demand of products

A. Annual plan for supply-demand

Annual plan for supply-demand balance is finalised by individual Oil Marketing Company at the beginning of the year. Annual import plan on industry basis is finalised by Oil Marketing Companies considering availability of products from refineries, fractionators, opening stock of products etc. Import requirement of products is determined by Oil Marketing Companies to fill the gap between demand and supply of each product. Annual demand of the industry is finalised in advance between June to September for the next calendar year.

B. Preparation of monthly logistics plan

Demand numbers, finalised at the beginning of the year, are reviewed on monthly basis during the monthly demand planning cycle with the help of demand planner software. Different Oil Marketing Companies use different software/ ERP systems for MS, HSD and LPG demand forecasting. This forecast is reviewed by area offices/ divisional offices/ territory offices/ regional offices/ state offices/ zone offices and marketing head office. Finalised numbers are provided to corporate office for optimisation and further planning. Firm demand for the next month and rolling demand for future two months is finalised by mid of the current month.

C. Optimisation of monthly distribution plan

Distribution plan is made using optimisation software module based on Linear Programming. The plan is optimised by the optimisation software based on availability at each source *viz.,* refineries, fractionators, import terminals and requirement at each location/ plant through different modes like road, rail and pipeline. The optimised plan[11] is reviewed continuously and changes are made with the objective of maintaining a smooth supply line and to avoid variation in optimal cost. Though the optimised plan is prepared using Linear Programming models, it is modified based on actual demand and supply requirements and constraints in availability of modes of transports. These post modifications are done manually without using the optimisation software.

[11] ***The Optimised monthly plan for MS/ HSD is called 'Monthly Distribution Plan' (MDP) whereas for LPG it is called 'Industry Logistic Plan' (ILP).***

3.1.1 Variations in actual movement of MS, HSD and LPG *vis-à-vis* planned movement and its cost impact

Audit reviewed the data related to actual *versus* planned logistics movements for the selected 10 months during the period from April 2014 to March 2019 and observed wide variations in quantity planned for logistics movement *vis-à-vis* actual quantity uplifted. The location wise ranges of variation in quantity (in percentage) of MS/ HSD and LPG actually transported *versus* planned movement during selected 10 months in three Oil Marketing Companies are given in table 3.1.

Table 3.1: Location wise ranges of variation in quantity of MS/ HSD and LPG transported - Plan v/s Actual during selected 10 months (in percentage)

OMCs	Range of variation (in percentage)	
	MS/ HSD	LPG
IOCL	Data is not available	(-) 100 to 117.18 *per cent*
BPCL	(-) 100 to 1979 *per cent*	(-) 100 to 4024 *per cent*
HPCL	(-) 100 to 1365 *per cent*	(-) 100 to 397 *per cent*

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

As can be observed from the table 3.1 above, variations in quantity of MS/ HSD and LPG actually transported *vis-à-vis* planned movement were substantially high at some of the locations in all three Oil Marketing Companies during the 10 selected months.

Oil Marketing Companies had incurred total expenditure of ₹42,869.31 crore and ₹22,647.42 crore on movement of MS/ HSD and LPG respectively during the period from 2014-15 to 2018-19. Audit observed that Oil Marketing Companies had incurred additional cost towards movement of MS/ HSD and LPG due to variation in the optimised plan for movement of products. During the period 2014-15 to 2018-19, additional expenditure incurred by the Oil Marketing Companies is given in Table 3.2.

Table 3.2: Additional logistics cost on movement of MS, HSD and LPG during 2014-15 to 2018-19 (₹ in crore)

OMCs	MS/ HSD	LPG	Total	Remarks
IOCL	516.30	132.55	648.85	Data of LPG related to 4 years only (except 2014-15)
HPCL	200.21	73.00	273.21	HPCL started maintaining the data for LPG since 2017-18 onwards only
BPCL	(-) 43.69	Data not available with the company	(-) 43.69	Lower expenditure as claimed by BPCL could not be verified in Audit since location wise data was not shared citing reasons of confidentiality.
Total	**672.82**	**205.55**	**878.37**	

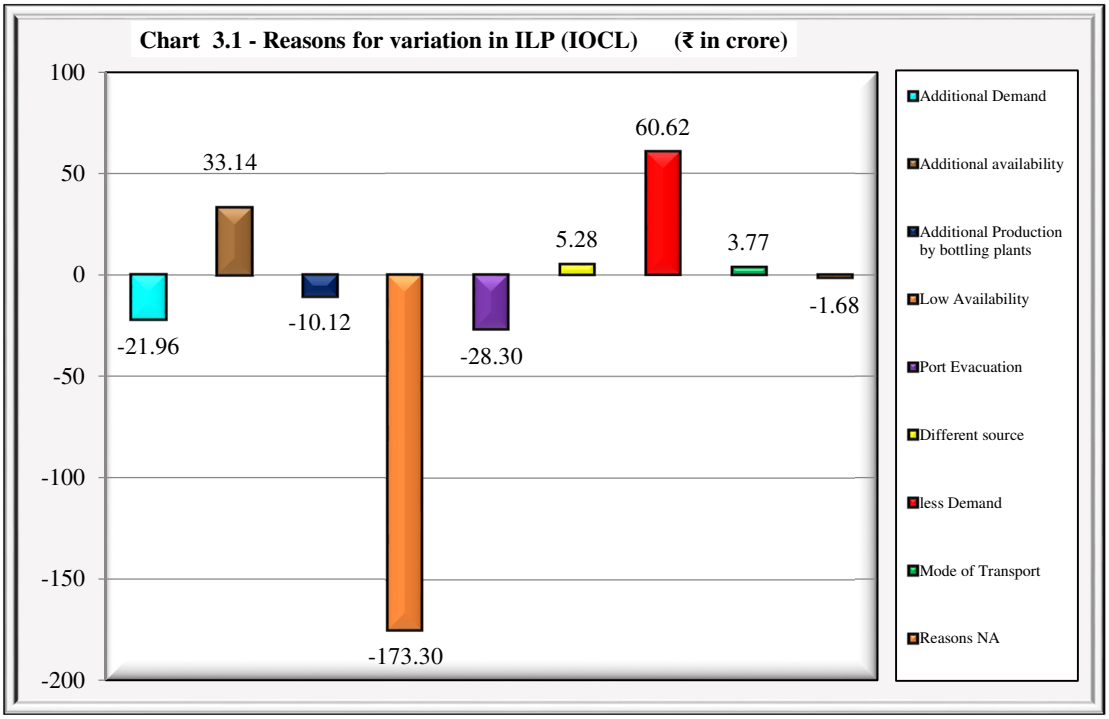
Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

As can be seen from table 3.2 above, Indian Oil Corporation Limited incurred an overall additional cost of ₹516.30 crore due to deviation of optimised logistics plan on transportation of MS/ HSD during the period 2014-15 to 2018-19 and ₹132.55 crore

on LPG during the period 2015-16 to 2018-19. Bharat Petroleum Corporation Limited reported lower expenditure compared to planned expenditure by ₹43.69 crore due to variations from optimised logistics plan on transportation of MS/ HSD during the period 2014-15 to 2018-19. Hindustan Petroleum Corporation Limited incurred additional cost of ₹200.21 crore in movements of MS/ HSD during the period 2014-15 to 2018-19 and ₹73 crore on LPG during the period of 2017-18 and 2018-19.

Audit observations on Oil Marketing Companies, in this regard, are detailed below:

i) Indian Oil Corporation Limited: Audit analysed the reasons for variation in logistics cost of ₹132.55 crore due to variation in LPG logistics movements during the four-year period from 2015-16 to 2018-19, as compared to the optimised logistic plan, based on data provided by Indian Oil Corporation Limited (chart 3.1).



It can be observed from Chart 3.1 that the major reasons for additional expenditure on movement of LPG were less availability of product, delay in port evacuation and additional demand as compared to the Plan which were controllable and could have been avoided through better demand estimation and scheduling of transportation. Major reasons for savings in expenditure on movement of LPG were less demand and additional availability of product which also showed the need for better planning. Audit could not analyse reasons for cost variation on account of deviation in plan as compared to actual movements of MS/ HSD due to unavailability of data with the company.

Indian Oil Corporation accepted (July 2020) that there was no system to monitor location wise variation in logistics monthly plan of MS and HSD. The Company further stated that on account of disruptions in availability at sources due to various unforeseen circumstances *viz.*, unplanned shutdowns, natural calamities, delayed

berthing of vessels etc., supplies had to be realigned manually on immediate basis after considering the least cost from next source of availability.

The reply may be viewed from the fact that in absence of location wise analysis of reasons for variation, Company would not be able to take timely corrective action till development and implementation of suitable system.

ii) Hindustan Petroleum Corporation Limited: Hindustan Petroleum Corporation Limited started tracking additional logistic cost due to deviation in plan in case of LPG with effect from 2017-18. The company incurred additional cost of ₹28 crore and ₹45 crore during 2017-18 and 2018-19 respectively. Audit observed that centralised mechanism to monitor the location wise deviation in logistic plan along with the reasons for deviations does not exist in the Company.

Hindustan Petroleum Corporation Limited stated (March 2020) that in comparison to the rail freight incurred for the last five years, the additional logistics cost was around 1.37 *per cent*. The company further stated that the additional cost of ₹28 crore and ₹45 crore incurred during 2017-18 and 2018-19 respectively was only 1.12 *per cent* and 1.84 *per cent* of the total transportation cost of the respective years.

Management contention may be viewed from the fact that the company started tracking the deviations in logistics cost on LPG from 2017-18 onwards only. Besides, though the overall amount of variation is minimum *vis-à-vis* total transportation cost, location wise variation in terms of quantity was substantial as brought out in Table 3.1 above.

iii) Bharat Petroleum Corporation Limited: Bharat Petroleum Corporation Limited expressed its inability to provide location wise planned v/s actual cost data for MS/ HSD citing reasons of confidentiality. However, as intimated by the company, BPCL incurred lower expenditure of ₹43.69 crore during the period 2014-15 to 2018-19 due to variations in planned movements of MS and HSD. In absence of data related to MS and HSD, Audit could not analyse the effectiveness of monitoring system that existed at locations of the Company.

As regards to the deviation in cost with respect to LPG, the system manual of Bharat Petroleum Corporation Limited stipulated that business intelligence report can be used for checking deviation between plan and actual. It also stated that result should be periodically analysed and corrective action should be taken in next planning stage in case of any significant deviation noticed between plan and actual. Audit, however, observed that the mechanism to check the deviation in cost along with the reasons for deviations periodically does not exist in the Company for LPG.

Bharat Petroleum Corporation Limited stated (February 2021) that the variation in cost in planned *v/s* actual in percentage ranges between (-) 5.6 to (+) 1 *per cent* on an annual basis and for the period from 2014-15 to 2018-19, total variation worked out to (-) 0.81 *per cent* of total transportation cost by rail and road.

The reply should be viewed in the light of the fact that the location wise variations in quantity were substantial as compared to the optimised Plan. Further, the Company

does not have a mechanism to monitor the deviation in cost with respect to LPG. In absence of the mechanism to analyse cost variations, as stipulated in system manual of Bharat Petroleum Corporation Limited, the Company may not be able to analyse reasons for deviation between plan and actual and minimise the deviations due to controllable reasons.

The Ministry stated (November 2020) that:

- Indian Oil Corporation Limited is in the process of developing software for monitoring logistics cost.
- Hindustan Petroleum Corporation Limited critically reviews movements of petroleum products and takes suitable action wherever there are variations from the plan. The variations between plan and the actual movement are recorded in the monthly variation statement with reasons.
- The variation between finalised demand and actual demand materialisation of Bharat Petroleum Corporation Limited worked out to an average of 0.70 *per cent* for MS and 1.5 *per cent* for HSD for the period 2014-15 to 2018-19, which was negligible considering the overall quantity involved.

The Ministry's contention that the additional cost is negligible compared to total logistics cost needs to be viewed in the light of the fact that there were wide variations in the quantity actually supplied to each location by various supply points compared to the plan. Thus, location wise variances were substantially high. Further, Audit is of the view that in many instances the reasons for deviations such as less supply from refinery, non-availability of planned mode of transport, port evacuation etc., were controllable and the deviations could have been avoided by timely planning of various factors like refinery supplies, transportation, storage and other infrastructure capacities etc.

Ministry's response in case of Hindustan Petroleum Corporation Limited could not be substantiated as all Oil Marketing Companies during Exit Conference stated that they did not maintain centralised data on logistics variations. Audit is also of the view that non-maintenance of data relating to reasons for variation in logistics cost indicates absence of control mechanism to identify avoidable reasons and taking corrective actions.

Overall, though the optimised Logistics Plan is prepared using Linear Programming, during actual implementation the Plan is modified with manual interventions. As the modifications were done manually, it could not be assured that variation due to modified plan is minimum. Oil Marketing Companies incurred an additional expenditure of ₹878.37 crore due to variation in the optimised logistics plans. Audit observed that the reasons for variation in logistics plan were controllable and could have been avoided by better demand-supply estimation and scheduling of transportation. Further, Audit is also of the view that non-maintenance of data relating to reasons for variation in logistics cost indicates absence of control mechanism to identify avoidable reasons and taking corrective actions.

Recommendation 1

Oil Marketing Companies may strengthen the mechanism to periodically monitor the location wise deviation in quantity as well as the attendant costs along with the reasons for deviations.

Instances/ reasons for deviation in logistics plan due to deviation in supply of products from various sources *viz.,* owned refineries, standalone refineries and hospitality arrangements noticed by Audit are discussed in paragraphs 3.2 to 3.4.

3.2 Technology to enhance LPG production from Refineries

LPG production from the domestic refineries varies from 3.5 to 4.5 *per cent* of total refinery throughput[12]. Indian Oil Corporation Limited developed 'IndMax technology' to increase the annual production of LPG from refineries. Indian Oil Corporation Limited successfully installed the technology in two refineries, *viz.,* Guwahati refinery in 2003 and Paradip refinery in 2016. Besides maximisation of LPG, the technology enabled the refineries to upgrade its residual products to high value distillates. During 2020-21, this technology was installed at Bongaigaon refinery of the company leading to increased production of around 15-16 Thousand Metric Tonnes (TMT) per month from earlier 5.0-5.5 TMT per month of LPG in the refinery. Thus, out of total nine refineries owned, Indian Oil Corporation Limited has so far installed IndMax technology in three refineries.

The consultant, M/s. CRISIL[13], had stated (August 2016) that adoption of this technology will result in increase in LPG production at refineries thereby reducing import dependence to certain extent. The consultant had also recommended that MoPNG should constitute an expert panel to examine technology available to increase LPG production. The recommendation was to be implemented within a period of three years i.e., by July 2019, from the date of recommendation. However, action initiated by MoPNG in this regard was not available on the records provided to Audit.

Indian Oil Corporation Limited stated (July 2020) that Residue Fluid Catalytic Cracker Unit (RFCCU) at Panipat refinery and Fluid Catalytic Cracker (FCC) Unit at Mathura refinery are already revamped for capacity and LPG maximisation. Further, Ind Max unit is under implementation at Barauni refinery whereas revamping project at Gujarat refinery is under consideration.

During the Exit Conference (May 2020), Hindustan Petroleum Corporation Limited and Bharat Petroleum Corporation Limited confirmed that a suitable new technology would be implemented in new refineries.

The Ministry stated (November 2020) that there would be increase in LPG production than the current levels, post commissioning of projects at Mumbai Refinery

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[12] ***Amount of petroleum products that moves through a particular facility during a given period of time.***

[13] ***As directed by MoPNG (January 2015), Petroleum Planning and Analysis Cell appointed M/s CRISIL as consultant to prepare comprehensive master plan to increase LPG usage in India.***

Expansion Plan (MREP) and Visakh Refinery Modernisation Plan (VRMP) of Hindustan Petroleum Corporation Limited.

Ministry's reply is silent on whether any new suitable technology is being introduced in new and existing refineries for augmentation of LPG production so as to reduce dependency on LPG import. The reply is also silent on the action taken on consultant's recommendation regarding constitution of expert panel to examine technologies for augmentation of existing LPG production.

Thus, due to non-implementation of available technology and consequent adverse impact on indigenous LPG production, LPG would continue to be imported to that extent with consequent logistics issues.

Recommendation 2

Oil Marketing Companies may consider implementation of suitable technology to improve yield of LPG in order to reduce import dependency.

3.3 Purchase of products from private oil companies

Oil Marketing Companies entered into Memorandum of Understandings (MoU) for purchase of LPG and MS/ HSD with the two private oil refineries *viz.*, M/s. Reliance Industries Limited (RIL) and M/s. Nayara Energy Limited (NEL).

As per clause 4.6 of the MoU for supply of LPG, in case of any shortfall for any particular month, on advice of the Oil Marketing Companies, the seller should meet the shortfall through imports during the same or subsequent month. Further, as per MoU for supply of MS/ HSD, the products were to be supplied by the stand-alone refineries on best endeavor basis.

In this regard, Audit observed that the suppliers could not fulfill the supply commitments in the following cases:

- During the period 2015-16 to 2017-18, Indian Oil Corporation Limited received less quantity of 139.35 TMT of MS and 83.38 TMT of HSD from Reliance Industries and 79.12 TMT of MS and 363.76 TMT of HSD from Nayara Energy.

  Indian Oil Corporation Limited had to import 223 TMT of HSD and 89 TMT of MS in May 2016 due to the fact that Reliance Industries and Nayara Energy were not offering products by coastal mode of transportation on inter-state basis. Further, due to less supply by stand-alone refineries, Indian Oil Corporation Limited imported 120 TMT of HSD in February 2017.

- Similarly, during the period from April 2017 to March 2019, Bharat Petroleum Corporation Limited received less quantity of 100.47 TMT of LPG from Reliance Industries Limited over the agreed quantity and Nayara Energy supplied 20.50 TMT of LPG less than the agreed quantity.

- Audit also observed that during the selected 10 months of five-year period, Hindustan Petroleum Corporation Limited received less quantity of 22.06 TMT of MS from Nayara Energy.

Audit observed that Oil Marketing Companies did not insist on compensating the short supply of LPG by private refineries in the subsequent month as provided in clause 4.6 of the agreement signed with Reliance Industries Limited in 2016.

Indian Oil Corporation Limited stated (March 2020) that in case of lower demand materialisation, especially during the lean seasons, upliftment from stand-alone refineries had to be reduced to control the inventory and upliftment to meet shortfall of private refineries is therefore, based upon supply demand scenario in the subsequent months. The company further stated (July 2020) that if there was any reduced requirement/ additional availability from own refineries, stand-alone refineries are informed in advance on revision in monthly upliftment quantity with mutual consent. Indian oil Corporation further stated that during execution of import plan, import quantity is regulated in line with actual demand and actual indigenous availability and hence it is not possible to quantify import volume specifically due to non-receipt of product from stand-alone refineries.

Hindustan Petroleum Corporation Limited stated (July 2020) that the shortfall in supply of product by stand-alone refineries is sourced during subsequent month, only in case of shortfall in supply by PSU Oil Marketing Companies, which is a more economical option. Bharat Petroleum Corporation Limited stated (July 2020) that whenever there was shortfall in availability from Reliance Industries Limited, shortfall was met from the overall imports planned during the month and indigenous production plus available inventory.

The Ministry stated (November 2020) that the matter will be taken up with stand-alone refineries on industry basis.

The reply may be viewed from the fact that despite provision in the MoU signed in 2016/ 2019, the Oil Marketing Companies have not insisted on compensating the shortfall of LPG in subsequent months. Uncertainty in supplies from stand-alone refineries adds to the uncertainty in logistics planning of the Oil Marketing Companies, with consequent unplanned deviations in logistics of petroleum products.

Recommendation: 3

Oil Marketing Companies may insist on private refineries to supply LPG as per the clauses contained in the Memorandum of Understanding in order to safeguard their interest. In case of supply of MS/ HSD, a similar binding clause as in the case of LPG may be incorporated in place of 'best endeavor basis'.

3.4 Hospitality arrangements among PSU Oil Marketing Companies

In order to reduce the cost of transportation, Oil Marketing Companies enter into hospitality arrangement to exchange products by supplying to depots/ terminals of other PSUs which are nearer to the oil refineries of the Oil Marketing Company. The supply and demand position for exchange of product is decided in the monthly distribution plan meeting before the start of the month. The balance requirement of the product is sourced from private oil companies and imports.

3.4.1 Non-implementation of Industry Logistics Plan

MoPNG advised (May 2014) Oil Marketing Companies to operate combined Linear Programming model with all sources and all bottling plants of the three Oil Marketing Companies on pilot basis so as to arrive at saving due to overall optimisation of linkage. Accordingly, Oil Marketing Companies had run a model by using SAND module of Indian Oil Corporation Limited for common industry logistics plan for bulk LPG for the months of May 2014 and December 2014. The savings estimated under various scenarios by Indian Oil Corporation Limited was ₹10 crore and ₹24 crore per month (May and December 2014).

After review of the plan for industry logistics, the Ministry directed (February 2015) that the hospitality arrangements should be worked out on pan India basis and a clear road map should be worked out for its implementation. Similarly, the initiative of transportation of MS, HSD, Kerosene and LPG on industry basis should be firmed up at the earliest and implemented in a time bound manner. Further, as per Ministry's directions (June 2015), Oil Marketing Companies carried out a pilot run for movement of bulk LPG from source to bottling plants on Industry basis. The net savings during the pilot study of three months for the three companies was ₹52.52 crore[14].

The Ministry further directed (April 2016) Oil Marketing Companies to run the model for MS/ HSD and advise the saving potential by May 2016 so that the model could be implemented with effect from July 2016. Even after a lapse of more than five years, the Petroleum Planning and Analysis Cell and Oil Marketing Companies were not able to implement the directions of the Ministry.

Audit observed that despite potential savings envisaged, the plan for MS/ HSD and LPG was not implemented due to not reaching an amicable arrangement for settlement of inter-company dues.

Indian Oil Corporation Limited stated (February 2020) that the savings projected during pilot run was fictitious and industry logistic plan has not much relevance in today's scenario considering the increased capacity of logistics infrastructure.

Indian Oil Corporation Limited's statement that the savings projected during pilot run was fictitious is contradictory to the Ministry's decision and calculation of share of each Oil Marketing Company was worked out by Petroleum Planning and Analysis Cell (PPAC).

Bharat Petroleum Corporation Limited stated (March 2020) that pilot industry logistics plan was kept in abeyance due to various other reasons related to infrastructure capacities.

The reply needs to be seen in the light of the fact that the plan was kept in abeyance only for a limited period of five months (from November 2015 to March 2016) due to

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[14] ***Gain/ Loss due to Industry Logistics Plan is IOCL: (+) ₹41.26 crore, BPCL: (+) ₹38.26 crore and HPCL: (-) ₹27 crore.***

disagreement relating to settlement of claims of Hindustan Petroleum Corporation Limited. The Ministry had directed to run a model for MS/ HSD and implement the plan with effect from July 2016.

Hindustan Petroleum Corporation Limited stated (April 2020) that the exercise benefitted only companies which had inadequate infrastructure and the company which had adequate infrastructure had to suffer. In the absence of robust sharing mechanism, the plan could not be pursued further.

The Ministry has not offered any comment on the observation.

Thus, due to not formulating a robust cost/ profit sharing mechanism for implementing the industry logistics plan, Oil Marketing Companies had to forgo an estimated potential savings of ₹17.50 crore per month.

Recommendation: 4

Oil Marketing Companies may formulate and agree to a robust profit sharing mechanism and the Ministry may ensure implementation of the industry wide logistics plan so that logistics costs are minimised.

3.4.2 Extra transportation cost in Bharat Petroleum Corporation Limited due to delay in resuming supply of MS and HSD from Marketing terminal of Indian Oil Corporation Limited, Patna

Indian Oil Corporation Limited brings MS and HSD from its Barauni refinery to Patna Terminal. MS and HSD from Patna Terminal of the company were further supplied to Patna depot of Bharat Petroleum Corporation Limited under hospitality arrangements.

As per Bihar Entry Tax Act 1993 (BET), entry tax was payable on specified goods entering into Bihar from outside the State. Petroleum products were brought under purview in the year 2003. The Act was amended in 2006 and it was stipulated that entry tax would be payable on such specified goods entering into a local area from outside such area within the State.

Thus, Indian Oil Corporation Limited was required to pay entry tax at 16 *per cent* in Bihar under the provisions of Bihar Entry Tax Law for the assessment year 2011-12 and 2012-13 on the quantities sold to Bharat Petroleum Corporation Limited at Patna. This resulted in additional financial implications to Bharat Petroleum Corporation Limited. In view of this, the product supplies to Bharat Petroleum Corporation Limited ex-Indian Oil Corporation Limited, Patna was suspended (June 2014) and the entire area of Patna was re-aligned to Bharat Petroleum Corporation Limited terminal/ depot in Barauni and Muzaffarpur.

Subsequently, Bharat Petroleum Corporation Limited proposed (February 2015) to buy product from Barauni refinery instead of Patna Marketing terminal of Indian Oil Corporation Limited and move the same through Indian Oil Corporation Limited pipeline with payment of pipeline transportation charges and take delivery at Patna. In this arrangement, Bharat Petroleum Corporation Limited was eligible to set off the

entry tax against payment of Value Added Tax (VAT) paid on subsequent sale to dealers and hence this arrangement was more economical.

The delay in resuming the supply from Indian Oil Corporation Limited marketing terminal at Patna resulted in extra return trip kilo meters (RTKM) to extent of 180 kms. per round trip. This has led to additional logistics cost of ₹14.25 crore (approx.) to Bharat Petroleum Corporation Limited during 2017-18 to 2018-19.

Bharat Petroleum Corporation Limited stated (March 2020) that Indian Oil Corporation Limited did not accept Bharat Petroleum Corporation Limited proposal of buying product at Barauni and moving to Patna in BPCL account, in view of various technical issues like transportation of multiple products through pipelines and batch size etc.

Ministry stated (November 2020) that the issue had arisen due to interpretation by the State Govt. that Barauni and Patna are two different localities and hence inter oil company sales of MS and HSD attract entry tax. However, post implementation of GST with effect from July 2017, entry tax issue does not exist and product sharing by Indian Oil Corporation Limited at Patna has been started.

The reply is not tenable as Bharat Petroleum Corporation Limited continued to source the products from its Muzaffarpur Depot till November 2019 though the issue relating to entry tax was resolved in July 2017.

3.5 Summing up

Demand numbers finalised at the beginning of the year are reviewed on a monthly basis during the monthly demand planning cycle. Oil Marketing Companies prepare distribution plan using optimisation software module based on availability at each source *viz.,* refineries, fractionators, import terminals and requirement at each plant through different modes like road, pipeline and rail. Though the optimised plan is prepared using Linear Programming models and is modified considering all constraints, during actual implementation the plan is modified with manual interventions. As post modifications were done manually, it could not be assured that cost variation due to modified plan is minimum.

Oil Marketing Companies incurred an additional cost of ₹878.37 crore due to variation in the optimised logistics plan. Major reasons for additional expenditure on movement of petroleum products were less availability of product, delay in port evacuation, non-availability of planned modes of transportation, planning deficiencies etc., which could have been avoided through better planning.

Oil Marketing Companies did not maintain centralised data on logistics variations. Non-maintenance of data relating to reasons for variation in logistics cost indicates absence of control mechanism to identify avoidable reasons and taking corrective actions.

Oil Marketing Companies uplift products from private refineries without valid agreement. In the absence of valid agreement, Oil Marketing Companies could not

enforce the MoU clause for compensating the shortfall in supply of products in any month in the subsequent period.

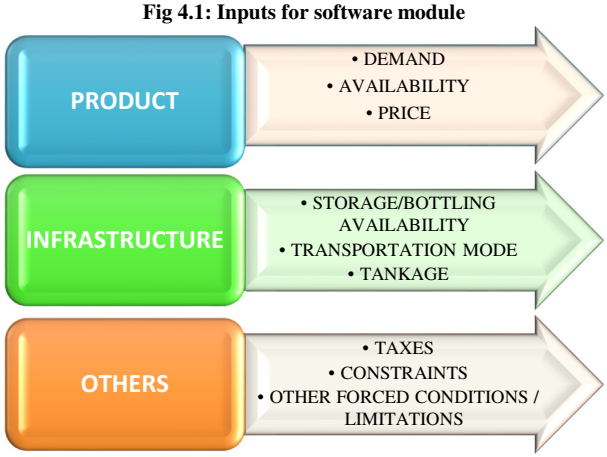
Indian Oil Corporation Limited developed 'IndMax technology' to increase the annual production of LPG in refineries and installed the technology in Guwahati, Bongaigaon and Paradip refineries. The consultant appointed by Petroleum Planning and Analysis Cell, CRISIL recommended (August 2016) to improve production of LPG by implementation of suitable technology in Oil Marketing Company refineries. CRISIL had also recommended MoPNG to constitute an expert panel to examine technologies and to implement the best technology in upcoming refinery projects or for augmentation of existing refinery capacity. The recommendation was to be implemented within three years (June 2019), which is pending at Oil Marketing Companies.

Oil Marketing Companies, at the behest of the Ministry, had run a combined optimisation model by using SAND module of Indian Oil Corporation Limited (May 2014 and December 2014). A pilot run conducted by Oil Marketing Companies for movement of bulk LPG on Industry basis for three months with effect from August 2015 resulted in savings of ₹52.52 crore. However, despite instructions of Ministry, the same could not be continued due to disagreement among the Oil Marketing Companies relating to sharing of savings in cost.

CHAPTER 4 Transportation of Petroleum Products

The logistics plan is prepared and optimised by using Linear Programming software, which considers variables such as market-wise projected demand, availability of bulk products, achievable capacities of Oil Marketing Companies bottling plants/ depots, linking of each destination with various sources. The distribution plan for movement of Motor Spirit, High Speed Diesel and LPG is discussed in distribution plan meetings.

Fig 4.1: Inputs for software module

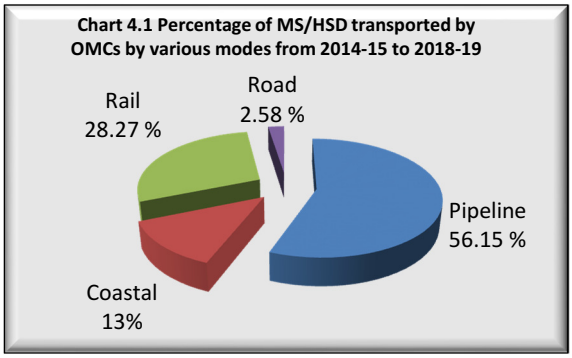


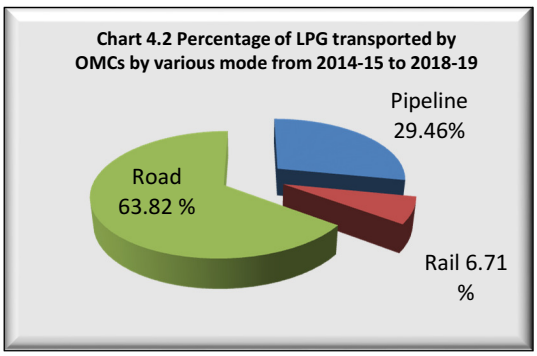
Based on the distribution plan, requirement of trucks, placement of rail rake indent, sequence etc., is decided by Oil Marketing Companies. Product movement of cross-country pipelines is monitored by individual Oil Marketing Companies. Despite the above, the actual scheduling may vary from the plan due to variation in demand-supply as well as other variables.

4.1 Modes of transportation of petroleum products

Primary supply logistics of petroleum products (MS, HSD and LPG) involves transportation of products from a refinery to terminals/ depots/ bottling plants whereas secondary logistics of petroleum products refers to the supply of products from terminals/ depots/ bottling plants to retail outlets (petrol pumps) and LPG dealers.

Primary transportation of MS and HSD takes place by four transportation modes *viz.*, pipelines, coastal[15], rail and road whereas primary transportation of LPG takes place by three transportation modes *viz.*, pipelines, rail and road. Percentage of MS, HSD and LPG transported by Oil Marketing Companies by various modes is depicted in chart 4.1 and 4.2.





[15] ***Movement of products by ships.***

As stated in para 1.3, Table 1.2 and 1.3, average cost of transportation by pipeline is substantially lower than the other modes of transport *viz.,* coastal, rail and road. Though road transport is the costliest mode of transport, maximum quantity of LPG is transported by this mode. Secondary movement of MS, HSD and LPG is done exclusively by tank trucks by road.

On being pointed out the lesser movement of LPG by pipeline mode of transport, Indian Oil Corporation Limited stated (February 2020) that apart from road transportation through bulk LPG tank trucks, all other modes of primary transportation *viz.*, rail and pipeline are having longer construction period. The company further added that in order to meet LPG demand growth, dependency on road movement till development of pipeline infrastructure was the only option and the company has planned adequate pipeline infrastructure, which are in different phases of construction. However, this would impact continued dependence on transport of LPG by road entailing continued higher costs.

Reply needs to be seen in the light of fact that Audit observed instances of under utilisation of existing pipelines due to controllable reasons and movement of petroleum products through other modes of transport despite availability of pipeline capacity as mentioned in Para 4.2. Audit also observed instances of delay in implementation of pipeline projects as discussed in Para 5.2.

Audit reviewed the scheduling and transportation operations of MS, HSD and LPG through various modes of transportation during the period from 2014-15 to 2018-19 as discussed in paragraphs 4.2 to 4.7.

4.2 Transportation through pipelines

4.2.1 Utilisation of capacity of petroleum product pipelines

As on 31 March 2019, Oil Marketing Companies owned 35 pipelines of MS/ HSD and four pipelines of LPG. The details of utilisation of MS, HSD and LPG pipelines are given in table 4.1 and 4.2 below. The percentage of utilisation of MS/ HSD and LPG pipelines is 84.14 and 57.05 *per cent* respectively (refer **Annexure 2** for details).

Table 4.1: Details of MS and HSD pipelines utilisation

Owner	No of Pipelines	Length (KM)	Capacity (MMT)	Throughput as on 31.03.2019 (MMT)	% of utilisation
IOCL	18	7876	42.95	35.145	81.83
BPCL	9	2213	25.68	21.597	84.10
HPCL	8	2957	28.78	25.214	87.61
Total	**35**	**13046**	**97.41**	**81.956**	**84.14**

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

Table 4.2: Details of LPG Pipeline utilisation

Owner	No of Pipelines	Length (KM)	Capacity (MMT)	Throughput as on 31.03.2019 (MMT)	% of utilisation
IOCL	2	959	1.97	1.26	63.96
BPCL	1	28	0.4	0.238	59.50
HPCL	1	356	1.94	0.961	49.54
Total	**4**	**1343**	**4.31**	**2.459**	**57.05**

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

As can be seen above, the utilisation of LPG pipelines is less *vis-à-vis* capacity of the pipelines.

Though the average capital cost per km of new pipelines is significant, about in the range of ₹4 crore - ₹6 crore/km, once the pipeline is commissioned, it becomes the cheapest available mode of transportation of MS/ HSD and LPG. Thus, it is essential that after investing in laying of pipelines, the capacity should be fully utilised by the Oil Marketing Companies. Instances of non-utilisation of available capacity of pipelines due to various controllable reasons are discussed in the following paragraphs.

4.2.2 Avoidable shutdown of pipelines due to controllable reasons

Audit verified 26 instances of shutdowns in various pipelines across all three Oil Marketing Companies. Reason wise analysis of 26 instances of unplanned shutdowns is given in table 4.3.

Table 4.3: Analysis of unplanned shutdown of pipelines out of 26 cases reviewed

Reason for unplanned shutdown	No. of instances
Non availability of ullage	11
Disagreement between OMCs	3
Maintenance issues	3
Non-insertion of dosing of drag reducing agent	2
Pig getting stuck	2
Non availability of Booster pump	2
Non availability of sufficient product	1
Low demand	1
Reason not specified	1
Total instances	**26**

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

As can be seen from the table, non-availability of ullage[16] at marketing locations led to shutdown of pipeline in maximum number of cases followed by low maintenance like delay in pigging[17], non-insertion of drag reducing agent[18] etc. Detailed analysis

[16] ***Ullage is the unfilled space in a container, particularly with a liquid or the empty space between the liquid and the top of a container. Thus, ullage can be stated to be the space available for storage.***

[17] ***Pipeline pigging refers to the practice of using devices or implements known as 'pigs' to perform various cleaning, clearing, maintenance, inspection, dimensioning, process and pipeline testing operations on new and existing pipelines.***

[18] ***Drag-reducing agents (DRA) are additives in pipelines that reduce turbulence in a pipe. Usually used in petroleum pipelines, they increase the pipeline capacity by reducing turbulence and increasing laminar flow.***

of reasons for instances of unplanned shutdowns is given in **Annexure 3**. Some of the prominent instances are:

(i) Out of the two instances of pig getting stuck, one was in Panipat-Jalandhar pipeline of Indian Oil Corporation Limited. This was due to not pigging the line for four years since commissioning as against Oil Industry Safety Directorate (OISD) standard and Petroleum and Natural Gas Regulatory Board (PNGRB) regulations which stipulate annual pigging of pipelines. The second incident was in Koyali-Sanganer pipeline (KSPL) of Indian Oil Corporation Limited due to muck entering in the line during replacement of a section which resulted into pig getting stuck.

In respect of Panipat-Jalandhar pipeline, Indian Oil Corporation Limited stated that the bulk moved by road for Jalandhar Bottling Plant during shutdown period was 7,928 MT with additional cost of ₹71 lakh approximately. Further, Indian Oil Corporation Limited stated that procedures were followed during construction and commissioning of Koyali-Sanganer pipeline.

The reply need to be seen in light of the fact that Indian Oil Corporation Limited has not stated reasons for accumulation of muck entered while replacing Koyali-Sanganer pipeline section if the Standard Operating Procedures were followed. The fact remains that the pipeline utilisation was affected due to accumulation of muck and pig getting stuck during pigging of pipeline.

Thus, non-adherence of safe pipeline operation management relating to frequency of pigging resulted into additional expenditure.

(ii) Mahul-Uran pipeline - Audit observed that Mahul-Uran pipeline for transportation of LPG was put up jointly (2014) by Hindustan Petroleum Corporation Limited and Bharat Petroleum Corporation Limited. However, Hindustan Petroleum Corporation Limited could not utilise the pipeline due to dispute between the companies on storage charges and the constraints at Uran in tank trucks loading. As against Hindustan Petroleum Corporation Limited's share of capacity of 300 Thousand Metric Tonne Per Annum (TMTPA) of Mahul-Uran pipeline, the throughput achieved was 6.6 TMT, 51.9 TMT, 75.5 TMT and 124.8 TMT during 2015-16, 2016-17, 2017-18 and 2018-19 respectively. Thus, the pipeline utilisation was in the range of 2.2 *per cent* to 41.6 *per cent* during the period since commissioning. Despite having pipeline capacity to transport LPG from Mahul to Uran, Hindustan Petroleum Corporation Limited continued to transport the product by road. The Company transported bulk LPG ranging from 171.91 TMT to 233.81 TMT during the period 2014-15 to 2018-19 by road despite availability of pipeline capacity.

Hindustan Petroleum Corporation Limited stated that there was no additional cost involved in the movement of bulk LPG from Mahul to various destination plants of Hindustan Petroleum Corporation Limited. As regards the envisaged objectives of this pipeline in respects of safety aspects of Chembur area and environmental issues, it could not be addressed fully until commissioning of the extension of this pipeline from Uran to Chakan, Pune. Ministry stated that agreement for Mahul-Uran pipeline

is being pursued by Hindustan Petroleum Corporation Limited and Bharat Petroleum Corporation Limited.

Thus, the objective to avoid truck movements in Mahul for safety reasons was defeated. Further, the investment in the pipeline by Hindustan Petroleum Corporation Limited also remained under utilised during the period from 2014-15 to 2018-19 due to disagreement between the two PSU Oil Marketing Companies.

(iii) Audit also observed that in some of the instances, during April 2016 to March 2019, though Indian Oil Corporation Limited had planned to transport MS/ HSD by pipelines, the same were supplied by other modes of transport due to unplanned shutdowns of the existing pipelines, delays in re-commissioning of the pipeline, lower pumping due to defective pumps etc. Consequently, Indian Oil Corporation Limited had to incur an additional expenditure of ₹16.70 crore **(Annexure 4)**.

Thus, it could be seen from the above that the pipelines remained under utilised due to controllable reasons which could have been avoided by periodic maintenance of pipelines and better co-ordination among the three Oil Marketing Companies.

Indian Oil Corporation Limited stated (February 2020) that the company accords top priority for effective utilisation of pipeline infrastructure since it is the cheapest mode of transport. However, the company admitted that due to unplanned shutdown of the pipeline, which is beyond their control, the throughput of the pipeline was affected. In order to ensure uninterrupted supplies, the company resorted to movement by road from the most economical source.

Replies of Oil Marketing Companies and the Ministry on instances of unplanned shutdown and Audit rebuttal are mentioned in **Annexure 3**. Reply of the Ministry/ Oil Marketing Companies should be viewed in the light of the fact that the reasons for under utilisation of pipelines, were controllable and avoidable *viz*., non-maintenance of pipeline, non-availability of products, non-following of SOPs, non/ inadequate availability of infrastructure, reduced/ non mixing of drag reducing agent etc.

Overall, the utilisation of LPG pipelines is significantly less in Oil Marketing Companies. Unplanned shutdowns of pipelines led to its under utilisation. Audit analysed the reasons for unplanned shutdown in 26 instances and observed that reasons for unplanned shutdown in all 26 instances, were controllable. Movement of petroleum products were carried out through alternate mode of transport due to unplanned shutdowns which led to additional expenditure.

Recommendation 5

Oil Marketing Companies may ensure optimum utilisation of MS, HSD and LPG pipelines by strengthening the maintenance and replacement of pipelines.

4.3 Import and coastal movement of products by vessels

Oil Marketing Companies hire vessels for domestic movements of petroleum products. In case of shortage of domestic supply of products or to cater higher demand, Oil Marketing Companies import petroleum products. Excess domestic production over demand is exported by Oil Marketing Companies. Import and export of products also requires hiring of vessels.

4.3.1 Payment of ₹2,227.20 crore towards demurrage charges

Demurrage is the penalty imposed due to over detention of the vessel. Demurrage paid by the Oil Marketing Companies in respect of import and coastal movements of MS/ HSD and LPG during the period 2014-15 to 2018-19 is given in table 4.4.

Table 4.4: Payment of demurrages (₹ in crore)

OMC	Particulars	2014-15	2015-16	2016-17	2017-18	2018-19	Total
IOCL	Freight paid	2301.04	2764.00	2078.55	1442.16	1529.35	10115.10
	Demurrage	324.19	785.69	131.99	131.41	77.93	1451.21
	Percentage	14.09	28.43	6.35	9.11	5.14	14.35
BPCL	Freight paid	941.53	1216.13	648.19	527.56	615.12	3948.53
	Demurrage	163.75	238.79	32.19	52.92	15.98	503.63
	Percentage	17.39	19.64	4.97	10.03	2.60	12.75
HPCL	Freight paid*	822	854	684	564	568	3492
	Demurrage	87.49	167.03	6.42	8.62	2.8	272.36
	Percentage	10.64	19.56	0.94	1.53	0.49	7.80
Total	Total Freight	4064.57	4834.15	3410.74	2533.72	2712.47	17555.63
	Total Demurrage	575.43	1191.51	170.60	192.95	96.71	2227.20
	Percentage	14.16	24.65	5.00	7.62	3.57	12.69

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd

(in case of HPCL, freight amount is given only for LPG as data for MS/ HSD was not made available.)*

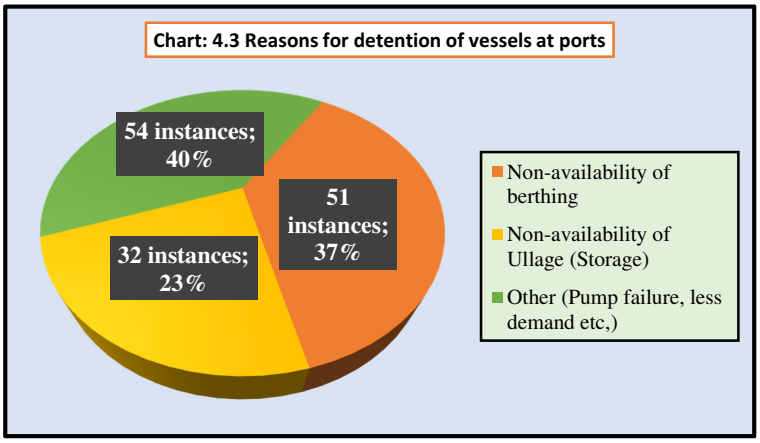
As can be seen from the table, the payment of demurrages is on reducing trend since 2015-16. Expense on demurrage was considerably low during the year 2018-19 as compared to the years 2014-15 and 2015-16. During the year 2015-16, the demurrage payments were high by all three Oil Marketing Companies mainly on account of higher demurrage rates due to higher demand for the vessels in the market.

During the five year period from 2014-15 to 2018-19, Oil Marketing Companies paid total demurrage of ₹2,227.20 crore which is 12.69 *per cent* of the total freight of ₹17,555.63 crore paid during the same period. The average demurrage paid is highest in Indian Oil Corporation Limited which was 14.35 *per cent* of total freight paid, whereas, Hindustan Petroleum Corporation Limited paid the least demurrage of 7.80 *per cent*.

Audit verified 87 voyages[19] of chartered vessels for import as well as coastal movements of the products in the selected 10 months during 2014-15 to 2018-19.

[19] ***56 voyages relating to Indian Oil Corporation Limited, 21 relating to Bharat Petroleum Corporation Limited and 10 voyages relating to Hindustan Petroleum Corporation Limited.***

Reasons for detention of vessels at ports in 87 instances are given in Chart 4.3.



It was observed that in most cases, detention of vessel was on account of more than one reason due to movement of vessels from one port to other[20].

It can be observed that only 37 *per cent* of the total cases reviewed were due to non-controllable reasons by Oil Marketing Companies *viz.,* delay in berthing of vessel (51 instances) and remaining 63 *per cent* of cases were due to various reasons *viz.,* non-availability of storage space, shutdowns, demand forecast issues etc. which were controllable. The payment of demurrages in these cases could have been avoided by creation of sufficient storage facilities at port, timely evacuation of products received by earlier vessels, proper upkeep and maintenance of equipment at ports etc.

Indian Oil Corporation Limited stated (February 2020) that inaccuracy in demand projection due to uncontrollable factors like customer's price sensitiveness and unpredictable price trend in international market coupled with two months' advance action required for deferment of cargo sometime leads to excess cargo in system, which results into ullage constraint and vessel detention. Redressal of such issues cannot be planned by constructing additional tankage, as there is no fixed pattern of projected *v/s* actual demand. Though priority berthing is available at Haldia, the facility is limited to only LPG vessel.

Hindustan Petroleum Corporation Limited stated (February 2020) that heavy detention of vessel took place due to disruption in import location like leakage of propane tank at Jawaharlal Nehru Port and consequent import realignment with import of additional Butane cargo. Maximum demurrage is incurred due to two factors, less materialisation of demand leading to bunching of vessels and insufficient ullage due to slow evacuation. Bharat Petroleum Corporation Limited did not offer its comments on the issue.

Ministry stated (November 2020) that coordination among Oil Marketing Companies is continuing to minimise demurrages.

Reply may be viewed in the light of the fact that the detention of vessels due to factors like inaccuracy in demand projection, insufficient ullage etc., were controllable.

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[20] ***The imported products are evacuated at different ports by the same vessel for example, the same vessel will evacuate part of the quantity at Kandla then Jawaharlal Nehru Port and further at Mangalore port. At each port there may be detention for different reasons.***

Some of the prominent reasons for detention of vessels and consequent payment of demurrages are discussed in the following paragraphs.

(i) Detention of vessels due to insufficient port capacity

Out of 87 voyages, as shown in chart 4.3 above, 37 *per cent* cases of detention of vessels at ports were due to delay in berthing of vessel. At present, there are 15 ports available for petroleum products movement. Of these 15 ports, only two ports give priority berthing for LPG tankers of Indian Oil Corporation Limited and one port for LPG tankers of Bharat Petroleum Corporation Limited. The actual LPG cargo handled by the ports is substantially higher than the capacities of the jetties at ports. Some of the ports do not have sufficient facilities to handle very large containers and night vision facilities. Limited berthing capacity at various ports often results in waiting of vessels for evacuation of products and consequently payment of demurrages for detention of voyage charter vessels.

The Consultant, CRISIL recommended (August 2016) to create import infrastructure by finalising locations for new import terminals and recommended a time frame of one year. Audit observed that no new LPG import facility has been planned after the date of recommendations of the consultant (August 2016). Moreover, two facilities planned prior to August 2016 by Indian Oil Corporation Limited at Cochin and Paradip were yet to be completed.

Thus, it could be observed that various constraints at ports are the major reasons for detention of vessels and consequent payment of demurrage by the Oil Marketing Companies. Further, no action was taken on CRISIL recommendation to create import infrastructure.

Oil Marketing Companies stated (March/ April 2020) that despite inherent constraints at various ports, handling of LPG imports at various ports have been increasing. The replies also reiterated the Audit findings that non-availability of night navigation facilities at Kandla and Haldia resulted in idling hours of vessels arriving late evening. Storage capacity restrictions at Pipavav, Porbandar, Tuticorin, Jawaharlal Nehru Port and Kandla ports resulted in bringing only medium gas carrier (MGC) vessels which unload the parcel in single berthing. It was further stated that new LPG import terminals were coming up at Paradip, Cochin and Haldia and capacity of LPG import terminal at Kandla is also being augmented. It was also stated that the matter relating to berthing priority for LPG vessels was taken up (April/ September 2019) by Oil Marketing Companies with Ministry of Shipping.

Ministry did not offer any comment on this observation.

Since LPG is a deficit product and needs regular imports, berthing priority for LPG vessels at all ports may reduce detention time of vessels. Oil Marketing Companies through MoP&NG should have vigorously pursued the matter of priority berthing for LPG vessels and insufficient port facilities with port authorities/ Ministry of Shipping

to get priority. Non-availability of blending facility[21], tankage constraints, night navigation and priority berthing were the constraints which needed to be sorted out by Oil Marketing Companies with the ports.

(ii) Demurrages due to insufficient storage and evacuation facilities at import terminals

Besides the port capacity, non-availability of ullage is the prominent cause of detention of vessels. Out of 87 voyages, as shown in chart 4.3 above, 23 *per cent* cases of waiting of vessel for evacuation were due to insufficient storage and evacuation facilities at terminals. The Consultant, CRISIL, recommended for mandatory pipeline connectivity from all upcoming ports to nearest bottling or storage facility for evacuation of products. However, Oil Marketing Companies turned down the recommendation citing high capital cost of construction of pipelines.

Though the capital cost of laying pipelines is in the range of ₹4 crore - ₹6 crore/km, which is substantially high, laying of pipelines from ports to nearest bottling plants may facilitate early evacuation of products and reduce payment of demurrages.

Indian Oil Corporation Limited stated (February/ March 2020) that the import terminals owned by Oil Marketing Companies and major private parties have adequate storage infrastructure. Hindustan Petroleum Corporation Limited stated (February 2020) that pipeline evacuation has been provided/ planned from all major import terminals. Bharat Petroleum Corporation Limited did not provide comments on the Audit observation.

The Ministry stated (November 2020) that close coordination among the industry have been continuously carried out to reduce detention of LPG vessels and the same would be continued in future also.

Evidently the reply confirmed that in spite of coordination among the industry, demurrages on account of ullage constraints still persisted. Despite the recurring expenditure on demurrage payment due to ullage constraints at various ports, Oil Marketing Companies have not planned augmentation of tankage facilities at necessary ports. Moreover, Ministry has not given any specific comment on the ullage constraints and the resultant detention of vessels.

(iii) Payment of ₹147 crore towards demurrage due to non-availability of sufficient storage facility

Bharat Petroleum Corporation Limited owned an import terminal at Jawaharlal Nehru Port at Uran, Mumbai. Bharat Petroleum Corporation Limited commissioned (January 2012) refrigerated storage facility at Uran, which included two LPG mix/ propane storage tank with 8 TMT capacity each. The Company decided to convert this facility to storage of propane and butane separately and blend them to produce LPG. This work was completed in May 2013. However, due to abnormal increase in liquid level in annular space, the Propane tank was de-commissioned in July 2015.

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[21] ***LPG is produced with a blend of propane and butane. The process of blending of propane and butane is done with LPG Blending system/ facility.***

Audit observed that LPG mixing was being carried out at Uran plant till de-commissioning of one propane tank in July 2015. After de-commissioning of one tank, the mixing was required to be carried out on vessels, resulting in detention of vessels.

Further, due to de-commissioning of one tank, the storage capacity available at port was also reduced to 8 TMT. Thus, ullage constraints at the port resulted in payment of demurrages of ₹147 crore during the period from 2014-15 to 2018-19.

The Ministry stated (November 2020) that the incidence of majority of demurrage happened in 2014-15 to 2017-18 when only cryogenic tank[22] of 8 TMT was available for operations. With the re-commissioning of tanks in May 2018, cryogenic storage capacity enhanced to 16 TMT. Post commissioning, the incidence of demurrage has been reduced to negligible level.

Despite ullage constraint and consequent detention of vessels and payment of demurrages, Bharat Petroleum Corporation Limited did not take timely action to re-commission the tank. The tank that was de-commissioned during June 2015 could be re-commissioned only during May 2018 due to which Oil Marketing Company had to incur substantial amount on demurrages.

(iv) Payment of demurrages due to other avoidable reasons of detention of vessels

Oil Marketing Companies paid demurrages due to other controllable reasons including failure of pumps, slow discharge rate by the pumps installed at port etc. Some of such cases are highlighted in table 4.5.

Table 4.5: Other reasons for detention of vessels

Oil Marketing Company	Vessel	Period	Demurrage period	Demurrage ₹ in crore	Reasons
Indian Oil Corp. Ltd.	Nisyros	March 2017	199 hrs.	1.71	Break down/ Failure of pumps at import facility
	Aurora Taurus	July 2015	1015 hrs.	72.15	Failure of propane tank of BPCL at Jawaharlal Nehru Port
	Oriental Queen		648.41 hrs.		
	Mistral		422 hrs.		
	Ontario	Sept 2017	94.17 hrs.	0.38	Slow discharge rate
	Cougar tanker	Sept.2015	17 days	9.90	
Bharat Petroleum Corp. Ltd	Jag Amisha	April - May2017	14 days	1.33	Sent prior to laycan[23] date
Total				**85.47**	

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

[22] ***A cryogenic tank is a tank used to store material at very low temperatures.***

[23] ***'Laycan' is the period within which the vessel must be presented at the agreed port or place.***

Indian Oil Corporation Limited stated (February 2020) that:

i) In case of Vessel Nisyros, breakdown of pump was an uncontrollable event. After revamping of the plant, new pumps had been installed and commissioned in April 2016 which were special cryogenic pumps. No abnormal signals/ parameters of the pump were observed at the time of breakdown and the breakdown was totally unexpected,

ii) Handling of propane imports at Jawaharlal Nehru Port terminal of Bharat Petroleum Corporation Limited was suspended due to leakage in the propane tank w.e.f. 1 July 2015. This reduced import handling from 70 TMT to 50 TMT per month at the Port.

iii) As regards to slow discharge rate, the terminals at Mangalore and Pipavav having pressurised storage, average discharge rate achievable is normally 250-280 MT per hour only. Average discharge rate achieved was 284 MT per hour as against normal rate of 250-280 MT per hour and total vessel discharge time at Mangalore was around 34 hrs and thus demurrage was not due to slow discharge rate.

The reply should be viewed in the light of the fact that (i) Indian Oil Corporation Limited has not intimated reasons for breakdown of the new butane pump (March 2017) within one year from the date of purchase (April 2016) and whether investigation was conducted to find the cause of break down, (ii) Indian Oil Corporation Limited accepted the fact relating to leakage in propane tank at Jawaharlal Nehru Port terminal and (iii) the reply that the vessels were not delayed due to slow discharge rate at both Mangalore and Pipavav terminals is factually incorrect as the records indicated detention due to slow discharge rate. Thus, detention of vessel and consequent payment of demurrages were controllable and could have been avoided by proper monitoring and maintenance of equipment.

The Ministry assured (November 2020) close coordination among Oil Marketing Companies to reduce detention of LPG vessels.

Overall, during the period from 2014-15 to 2018-19, three Oil Marketing Companies paid total demurrage of ₹2,227.20 crore which is 12.69 *per cent* of the total freight paid during this period. Considering that in 63 *per cent* of the cases, detention of vessels was due to controllable reasons, there is an urgent need to reduce the incidences of demurrages. Cost of demurrages not only represents penalties/ fines, apart from being avoidable, but also reflected delayed transport of petroleum products.

Recommendation 6

MoPNG may take up the issue of priority berthing of LPG vessels at 12 ports with Ministry of Shipping.

Recommendation 7

Ministry may issue guidelines for actions to be initiated to minimise payment of demurrages due to detention of vessels at ports and to monitor implementation of the same with close coordination between the Oil Marketing Companies.

Recommendation 8

Oil Marketing Companies may augment storage and pipeline facilities at the ports so as to avoid vessel detention and payment of demurrages.

4.4 Transportation of petroleum products (MS, HSD and LPG) by rail

4.4.1 Rake planning and materialisation

Bharat Petroleum Corporation Limited acts as a coordinator with Railways on behalf of Oil Marketing Companies for hiring of rail rakes. A meeting is held at the beginning of each month between the representatives of Oil Marketing Companies and Railway Board to decide the requirement of rail rakes at each supply point for MS, HSD and LPG products based on the projected demand and supply of the industry.

In this regard, Audit observed that actual rake materialisation was ranging from 99 to 101 *per cent* in all the five years. The rake utilisation was high in case of MS, HSD and LPG transportation.

The utilisation of rail rakes for transportation of MS, HSD and LPG products by the Oil Marketing Companies was generally commendable.

4.5 Transportation by trucks

4.5.1 Utilisation of own trucks

Of the three Oil Marketing Companies, Bharat Petroleum Corporation Limited and Hindustan Petroleum Corporation Limited operate company owned trucks for transportation of petroleum products. Indian Oil Corporation Limited does not have own trucks and all trucks are hired on contract basis for transportation of MS, HSD and LPG products. Out of the total 101 number of locations selected among Oil Marketing Companies by Audit, only seven locations were operating company owned trucks. As intimated by Bharat Petroleum Corporation Limited (February 2021), annual capacity of owned tank lorry is based on kilo liters (KL) delivered and the target fixed for its capacity utilisation is 8,400 KL per annum. As against this, details of utilisation of trucks owned by Bharat Petroleum Corporation Limited and Hindustan Petroleum Corporation Limited are given in table 4.6.

Table 4.6: Number of own trucks

OMC	2014-15	2015-16	2016-17	2017-18	2018-19
Bharat Petroleum Corporation Ltd					
No. of trucks	103	87	72	40	21
Total capacity (8400 KL/ tank truck/ annum)	8,65,200	7,30,800	6,04,800	3,36,000	1,76,400
KMs covered	10,19,245	8,08,672	5,84,206	2,48,353	1,29,887
Average KM/ month/ tank truck	825	775	676	517	515
Quantity transported	6,51,955	5,56,902	4,02,077	1,93,133	1,04,676
Average quantity (KL)/ year/ tank trucks	6,329	6,401	5,584	4,828	4,984
Hindustan Petroleum Corporation Ltd#					
No of trucks	NA	122	122	122	122
KMs covered	NA	9,93,234	8,83,065	826,822	7,89,558
Avg. KM / month	NA	678	603	565	539
Qty Transported	NA	4,42,121	3,87,622	4,20,654	3,74,882
Avg. qty (KL)/ year	NA	3,624	3,177	3,448	3,073

Source: Data provided by Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

 # As intimated by Hindustan Petroleum Corporation Limited (August 2020), the company does not have owned LPG trucks, all owned trucks are MS/ HSD trucks

(i) As can be seen from the above table, the average quantity transported by Bharat Petroleum Corporation Limited owned trucks was in the range of 6,329 KL per truck (2014-15) to 4,984 KL per truck (2018-19) as against the target of 8,400 KL per annum. Audit observed that during the selected 10 months, Tondiarpet depot of Bharat Petroleum Corporation Limited (selected on sample basis) utilised only 48 trucks out of 70 trucks available (69 *per cent* utilisation).

Bharat Petroleum Corporation Limited stated (March 2020) that higher cost of operations due to old age of tank trucks and salary component of own employees, reduction in throughput of installation due to shifting of market to Karur and Ennore Tank Terminal Private Limited were the main reasons for under utilisation of owned tank trucks.

The reply should be viewed in the light of the fact that the tank trucks were under utilised in comparison to the target set during the period 2014-15 to 2018-19 for tank trucks.

(ii) Hindustan Petroleum Corporation Limited has not fixed any target for owned trucks utilisation. As can be seen from the above table, the average utilisation of the owned trucks of Hindustan Petroleum Corporation Limited was in the range of 3,624 KL/ annum (2015-16) to 3,073 KL/ annum (2018-19); considering annual capacity of 8,400 KL (as determined by Bharat Petroleum Corporation Limited), the average capacity utilisation of Hindustan Petroleum Corporation Limited owned trucks was only 43.14 *per cent* to 36.58 *per cent* during the period 2015-16 to 2018-19. Audit observed that Vizag and Hasan terminals of Hindustan Petroleum Corporation

Limited (selected on sample basis) utilised only 42 *per cent* and 55 *percent* capacity of owned trucks respectively.

Hindustan Petroleum Corporation Limited stated (March 2020) that the utilisation of six trucks at Vizag terminal was more than 100 *per cent* for all months in the sample period. Audit has not considered weekly offs/ Sundays/ holidays for tank trucks crew in any given month and usually there are 25 working days for a month.

The Ministry reiterated (November 2020) the response of Bharat Petroleum Corporation Limited and Hindustan Petroleum Corporation Limited.

The reply should be viewed in the light of the fact that the owned trucks are available for 365 days in a year. Further, even after excluding Sundays the trucks were idle at Vizag terminal for a period of 251 days. During this period of 251 days, hired trucks were used to transport 33,655 KL of product in 2,181 trips. Similarly, at Hasan terminal, even after excluding the Sundays, there were 42 days on which the truck was idle and on these idle days, hired trucks were used for 116 trips to deliver 1,696 KL of the product within free delivery zone (FDZ)[24] at transportation rate of ₹114 per KL and ₹89 per KL to outlets from Vizag terminal and Hassan terminal respectively. This clearly indicated under utilisation of logistics assets.

Despite having owned trucks, Hindustan Petroleum Corporation Limited and Bharat Petroleum Corporation Limited do not fully utilise own trucks to their optimum capacity due to internal reasons like leave period of company drivers, non-availability of drivers on holidays etc. These manpower issues could be addressed by outsourcing the drivers to deploy the trucks on holidays and during leave period of company drivers for better utilisation of existing assets.

Recommendation 9

Oil Marketing Companies may consider hiring of drivers for company owned trucks to reduce idle time of owned trucks.

4.6 Delay in installation of vehicle tracking systems required to be installed on tank trucks

Oil Marketing Companies formulated (2007 and revised in 2016) Industry Transport Discipline Guidelines (ITDG) which envisaged installation of vehicle tracking system[25] to monitor route deviations, unauthorised stoppages/ delay and over speeding. Tank trucks would not be considered fit for loading, in case of vehicle

[24] ***As per terms of transportation contracts, outlets within 39 round trip kilometers (RTKM) are designated as outlets within Free Delivery Zone (FDZ). The transportation rate for all outlets falling in FDZ is at a fixed rate per KL of product being transported irrespective of distance from the outlet. The transportation charges for products are being recovered from outlets.***

[25] ***Vehicle Tracking is a system including vehicle mounted unit installed on the trucks as well as software to track and report movements of the trucks through GPS.***

mounted unit[26] found not in working condition. Further, in view of high number of road related accidents[27], the 26th Standing Committee of Parliament on Petroleum & Natural Gas (2018-19) recommended to enforce strictly various measures like provision of vehicle tracking system to ensure safe transportation of petroleum products. Bulk trucks carry the products from refinery/ ports or other sources to depots/ bottling plants and the distance involved is more. The packed LPG trucks are used for secondary transportation to carry the products from the bottling plants to LPG dealers, which are situated in the same area. Thus, distance travelled by packed LPG trucks used for secondary transportation is less as compared to bulk tank trucks.

Percentage completion of installations of vehicle mounted units on both trucks for primary logistics and secondary logistics of MS/ HSD/ LPG is given in table 4.7.

Table 4.7: Installations of Vehicle Mounted Units

Oil Marketing Company	MS/ HSD	LPG	Total
Percentage of Tank Trucks for primary logistics on which VMU installed (Trucks carrying bulk LPG)			
Indian Oil Corporation Limited	90.04	79.22	86.47
Bharat Petroleum Corporation Limited	100	87.43	96.82
Hindustan Petroleum Corporation Limited	94.85	0	57.42
Total	**94.01**	**54.63**	**81.09**
Percentage of Tank Trucks for secondary logistics on which VMU installed (Trucks carrying packed LPG)			
Indian Oil Corporation Limited	Not Applicable #	56.51	56.51
Bharat Petroleum Corporation Limited	Not Applicable #	0*	0
Hindustan Petroleum Corporation Limited	Not Applicable #	67.6	67.6
Total	Not Applicable #	46.38^	46.38^

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

Note: # Not Applicable as for MS/ HSD movements, Oil Marketing Companies do not have trucks separately specified as trucks for primary and Secondary logistics. The trucks engaged for primary transport are also used for secondary transport from installation/ depot to retail outlets.
****Tender was awarded by Bharat Petroleum Corporation Limited for Packed Trucks during March 2019***
^Packed Trucks of Bharat Petroleum Corporation Limited not included.

It can be observed from the table that though installation of system to track movements of the trucks carrying petroleum products is essential to prevent malpractices, Oil Marketing Companies have not so far completed installation of VMUs on all trucks. Audit observed that movements of 13,337 numbers of bulk tank trucks and 15,253 of packed LPG trucks are not being monitored by the Oil Marketing Companies. Monitoring of movement of petroleum products was better for primary logistics as compared with Secondary logistics in three Oil Marketing Companies.

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[26] ***Vehicle mount unit is a microprocessor-controlled device, which employs the extended features of the Global Positioning System (GPS) to determine the position of the vehicle in terms of longitude and latitude with the date and time stamp.***

[27] ***During the period from 2016-17 to 2018-19, there were 177 accidents/ incidents reported and they are categorised as per criticality i.e., major, minor and others.***

A) Primary Logistics – Three Oil Marketing Companies together have installed VMUs on 94 *per cent* of MS/ HSD bulk trucks and 54.63 *per cent* of LPG bulk trucks.

- Indian Oil Corporation Ltd has completed installation of VMUs on 90.04 *per cent* of MS/ HSD bulk trucks and on 79.22 *per cent* of LPG bulk trucks.
- Bharat Petroleum Corporation Ltd has installed VMUs on 100 *per cent* MS/ HSD trucks and on 87.43 *per cent* of LPG trucks.
- Hindustan Petroleum Corporation Ltd has though completed installation of VMUs on 94.85 *per cent* of the MS/ HSD trucks, none of the trucks carrying bulk LPG is fitted with VMU.

B) Secondary Logistics

Oil Marketing Companies use the same bulk trucks engaged for primary transport for secondary logistics from installation/ depot to retail outlets. Therefore, separate trucks are used only for secondary logistics for delivery of the packed LPG cylinders from bottling plants to LPG dealers.

- Indian Oil Corporation Ltd. has completed installation of VMUs on 56.51 *per cent* of total number of packed LPG trucks.
- Bharat Petroleum Corporation Ltd. has floated tender enquiries only during March 2019 for installation of VMUs on packed LPG trucks. Therefore, none of the packed LPG trucks used for secondary transportation of LPG cylinders are fitted with VMU to monitor truck movements.
- Hindustan Petroleum Corporation Ltd has completed installation of VMUs on 67.6 *per cent* of the packed LPG trucks.

Thus, Indian Oil Corporation Ltd is not monitoring around 43.50 *per cent* of LPG packed movement. Whereas LPG packed movement of trucks hired by Bharat Petroleum Corporation Limited was not being monitored (till March 2019) as none of the packed LPG trucks was fitted with VMU. Hindustan Petroleum Corporation Limited has not installed vehicle mounted units in any of the LPG bulk tank trucks.

Indian Oil Corporation Limited stated (March 2020) that vehicle tracking system installation in tank trucks is an ongoing process and due to voluminous work, the implementation is taking time. It was also stated that due seriousness is accorded to ensure early completion of this work. Bharat Petroleum Corporation Limited stated (January/ March 2020) that priority for installation of vehicle tracking system in bulk tank trucks was given considering the long-distance haulage of bulk tank trucks and exposed to greater risk as compared to packed LPG trucks. Hindustan Petroleum Corporation Limited stated (February 2020) that in respect of Raipur and Hazarwadi bottling plants, provision of Industry Transport Disciplinary Guidelines and speed limits are proposed for inclusion in the new transport tender (with effect from March 2020). In case of ongoing contracts, similar deviations are monitored by plant and caution letters are issued to transporters.

Ministry stated (November 2020) that tender for provisioning of vehicle tracking system for all packed LPG trucks and bulk LPG tankers is under technical evaluation.

Replies contrast with the Industry Transport Disciplinary Guidelines which stipulated installation of vehicle tracking system on all tank trucks. Oil Marketing Companies are yet to complete its installation on all tank trucks. In absence of VMUs, primary and secondary movement of around 20 *per cent* and 40 *per cent* of trucks carrying hazardous products *viz.*, MH/ HSD and LPG respectively are not being monitored by the Oil Marketing Companies. Ministry has not intimated the actions initiated to monitor the implementation of recommendations of 26th Standing Committee on Petroleum & Natural Gas (2018-19) in a time bound manner.

Recommendation 10

Marketing Companies may set a specific target for installation of vehicle tracking system and installation of vehicle mounted units on all bulk and packed trucks. Compliance of the same may be sent to the Board of Directors of the Company periodically till completion of successful implementation.

4.6.1 Industry Transport Disciplinary Guidelines (ITDG)

(i) Violations observed in the sample Depots/ Terminals/ Bottling plants on primary transportation

Oil Marketing Companies formulated Industry Transport Disciplinary Guidelines (ITDG) for transportation of bulk petroleum products by road to ensure that i) petroleum products are filled in Tank Trucks in accordance with Industry Quality Control Manuals, ii) petroleum products are transported and delivered to dealers/ direct customers and receiving locations in good condition conforming to the specifications and iii) a well-defined system of checks exists at various stages of handling of petroleum products.

Audit noticed violations of Industry Transport Disciplinary Guidelines at 63 out of 101 depots/ terminals/ bottling plants selected, details of which are furnished in table 4.8:

Table 4.8: Locations reported Industry Transport Disciplinary Guidelines violations

Oil Marketing Company	Total no. of samples (depots/ terminals/ bottling plants)	No. in which Industry Transport Disciplinary Guidelines violations noticed	Information not available
Indian Oil Corp. Ltd.	44	23	9
Bharat Petroleum Corp. Ltd.	25	11	4
Hindustan Petroleum Corp. Ltd.	32	29	Nil
Total	**101**	**63**	**13**

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

Audit observed that penalties were levied as per ITDG on the transporters in five depots/ bottling plants of Hindustan Petroleum Corporation Limited and have recovered an amount of ₹1.02 crore from the transporters due to short distance travelled as compared to Round Trip Kilo Meter. Action as per disciplinary

guidelines was taken against 23 tank trucks by blacklisting them due to malpractice/ irregularities, like submission of forged documents, non-standardised fittings. Further, from vehicle tracking system provided on the packed trucks at Hazarwadi, four cases of route diversion were observed and necessary recoveries were made as per provisions of the transportation contract.

Non-implementation of ITDG guidelines in locations may result in malpractices while transporting MS, HSD and LPG products from one location to other.

Indian Oil Corporation Limited stated (March 2020) that the shortages observed during delivery of petroleum products as acknowledged by the customers are automatically being debited from the transporter and is credited to the customer account. The loaded tank trucks are halting sometimes due to the traffic and timing restrictions and interstate supplies to Government consumers with fixed time for unloading causing frequent night halts at unloading points in that section effecting losses.

Hindustan Petroleum Corporation Limited stated (April 2020) that the supply distance data from installations/ bottling plants to market is being integrated with the ERP system which will enable the company to analyse distance travelled by each tank truck.

Ministry stated (November 2020) that Indian Oil Corporation Limited established a new system with effect from September 2020 digitalising the entire process of booking of shortage by customer, reporting, monitoring of shortage and credit of the refund to the customer.

It is implied from the reply of the Ministry that digitalising process for monitoring ITDG violations and imposition of penalty has been initiated only in IOCL. BPCL and HPCL were yet to implement the digitalisation process.

Recommendation 11

Oil Marketing Companies need to consider taking time-bound steps to ensure adherence to ITDG including digitalising the entire process of booking of shortage by customer, reporting, monitoring of shortage and refund to the customer.

(ii) Transport Disciplinary Guidelines for secondary transportation

Oil Marketing Companies formulated two different guidelines for transportation of petroleum products by bulk and packed movement[28]. In case of bulk movement, the provisions of Industry Transport Disciplinary Guidelines are applicable. Packed LPG cylinder trucks are governed by provisions of Packed Transport Disciplinary Guidelines by Indian Oil Corporation Limited. The guidelines provide for imposition

[28] ***Bulk trucks carry the products from refinery/ ports or other sources to depots/ bottling plants. The distance involved is longer. Whereas the packed trucks carry the products to LPG dealers/ petrol pumps from the depots/ bottling plants which are situated in the same area. Thus, distance travelled by packed tank trucks less as compared to bulk tank trucks.***

of penalties for malpractices such as route deviation, unauthorised stoppages, established case of pilferage/ non-delivery of product etc. In repetitive cases of malpractices, the guidelines provide for blacklisting of trucks of the contractor.

Industry Transport Disciplinary Guidelines (ITDG) also provide for more stringent monetary penalties in cases of repetitive violation of rules and blacklisting. In the first instance of blacklisting of a transporter, as per the above provisions, damage of ₹1 lakh will be imposed on the transporter apart from blacklisting of the involved tank truck. On each subsequent instance of blacklisting, higher damages will be imposed on the transporter and a greater number of remaining TTs will be blacklisted.

Packed Transport Disciplinary Guidelines however, does not prescribe the above stringent monetary penalties for violation of provisions of guidelines by packed LPG trucks, as prescribed by Industry Transport Disciplinary Guidelines.

Audit is of the view that unless stringent provisions are included in disciplinary guidelines and are strictly imposed, the transport contractors may indulge malpractices while transporting LPG from bottling plants to LPG dealers.

Indian Oil Corporation Limited stated (March 2020) that bulk LPG transportation in tankers involved greater risk as compared to packed cylinder transportation in trucks and hence the guidelines for bulk LPG transportation is more stringent. Further, the capital investment and earnings per trip are also much higher for bulk tank trucks as compared to packed trucks. Thus, the provisions of penalties are also stringent in case of bulk trucks.

The reply should be viewed in the light of the fact that the good industry practices for 'LPG Cylinders in the Distribution Channel' issued by the World LPG Association discusses the importance of control over the cylinder after it leaves the filling plant. According to it, 'it is a challenge for LPG companies, and the control over the cylinders diminishes as it moves through the distribution chain; it is in everyone's interest to ensure the LPG cylinder reaches the end user in the same condition that it was in when it left the cylinder filling plant'.

Overall, Oil Marketing Companies are not monitoring primary and secondary movement of total 20 *per cent* and 40 *per cent* (approx.) of trucks carrying hazardous products *viz.*, MS/ HSD and LPG respectively in violation of Industry Transport Discipline Guidelines and 26th Standing Committee of Parliament on Petroleum & Natural Gas (2018-19) recommendation. Industry Transport Disciplinary Guidelines are violated at 63 out of 101 Depots/ Terminals/ Bottling plants selected for audit. BPCL and HPCL were yet to implement the digitalisation of monitoring ITDG violations and imposition of penalty. Packed Transport Disciplinary Guidelines does not prescribe stringent monetary penalties for violation of provisions of guidelines by packed LPG Trucks, as prescribed by Industry Transport Disciplinary Guidelines.

Recommendation 12

Oil Marketing Companies may like to further strengthen compliance of Transport Discipline Guidelines for packed trucks by imposing monetary penalties on repetitive violators.

4.7 Outcome of an efficient logistics system

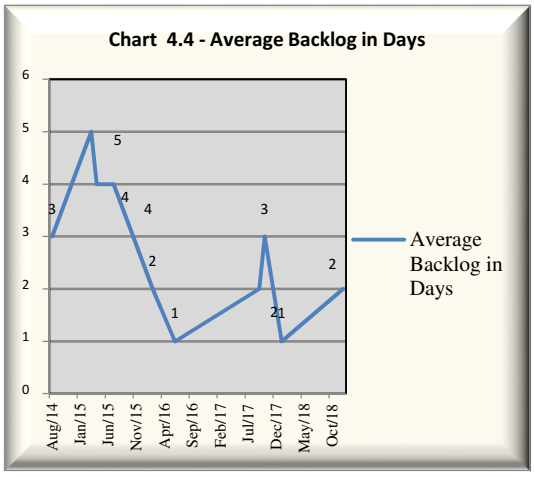
The outcome of the supply logistics system is to deliver products to the ultimate customers in optimal time. The output of the petroleum logistics system thus includes (i) make the desired stock of MS and HSD available at petrol pumps to avoid dry out situations and (ii) deliver LPG cylinders to end consumers in optimum time from the time of placement of order with the dealers.

4.7.1 Delays in delivery of cylinders

As per the citizen charter of Oil Marketing Companies (October 2014), on marketing of petroleum products, the time prescribed to deliver the cylinder is seven days. It further states that endeavor to deliver within two working days, except in the circumstances beyond control *viz.,* natural calamities, strikes, absenteeism, shortage of products, Govt. directives, transport break downs etc. Thus, normal time for delivery of LPG cylinder to customers is two working days (48 hours) at all times except in circumstances beyond control.

Audit however, observed delays in delivery of LPG cylinders beyond 48 hours as discussed below:

a) Indian Oil Corporation Limited: Audit analysed data related to Maharashtra State office of the Indian Oil Corporation Limited for the selected months in each year. The average backlog of delivery (in days) of the State over and above the norm of 48 hours is as given in the Chart 4.4. Audit observed that out of 36 districts under the Maharashtra State offices, there was a backlog of more than 48 hours in 32 districts. Further, during March-April and July 2015, the average delivery time in Thane and Yawatmal districts was more than one week. The State office did not analyse the reasons for delay in delivery of cylinders. It was also observed that the backlog was highest in Thane district, with a range of three to ten days in 10 months, followed by Dhule and Yawatmal districts, where the backlog ranged from four days to eight days during the period 2014-15 to 2018-19.



b) Hindustan Petroleum Corporation Ltd. Audit also observed delays (**Annexure 5**) in delivery by LPG dealers under two bottling plants *viz.* Cherlapalli

and Rajahmundry out of 11 bottling plants of Hindustan Petroleum Corporation Limited selected on sample basis. It was noticed that during the period from April 2014 to March 2019, cylinders delivered within the norm of two days were 55.81 *per cent* at Cherlapalli under Hyderabad LPG Regional Office and 72.20 *per cent* at Rajahmundry under Visak LPG Regional Office. There were instances of delivery of cylinders after one year from the date of order. The delivery was made on the day of order to 563 days from the date of order in 2014-15 in respect of markets catered by Rajahmundry plant. No delays were observed in other nine selected bottling plants.

c) Bharat Petroleum Corporation Ltd did not provide detailed data relating to delays in delivery of cylinders by the dealers of the Company.

Indian Oil Corporation Limited stated (February 2020) that the backlog was high in Maharashtra from the year 2014 to 2016 as the capacity was not sufficient to meet the peak demand of customers. In order to overcome this problem, the Company undertook expansion plan of LPG bottling plants and additional carousal was installed at Chakan and Dhanaj Plants, which were commissioned in February 2017 and March 2018 respectively. The company further stated (March 2020) that as per Citizen Charter, the timeline to provide refill delivery to the consumers is within 'seven working days' though Indian Oil Corporation Limited endeavors to deliver within two working days.

Hindustan Petroleum Corporation Limited stated (April 2020) that from March 2019, system check has been introduced so that bookings are automatically cancelled once they are more than 365 days old. This provision has led to lesser customer complaints of booking cancelled without intimation by distributor. Every effort is made by distributor to finish delivery within two days.

The Ministry stated (November 2020) that in order to ensure timely delivery to the customers, system generated reports are available to distributors. Distributors are also provided alert messages for all un-attempted open bookings beyond five days.

Reply of Indian Oil Corporation Limited may be viewed in the light of the fact that Citizen Charter of the company provides for delivery within two working days (48 hours) at all times except in circumstances beyond control.

Recommendation 13

Oil Marketing Companies may establish an effective system to ensure timely delivery of LPG cylinders within the prescribed norm of 48 hours. A periodic report on delays of delivery with reasons for delays may be submitted to the Board of Directors of individual companies, with an annual return on the same to the Ministry of Petroleum & Natural Gas.

4.8 Summing up

Though pipelines are cheapest modes of transport, the capacity of the pipelines are not being fully utilised. Unplanned shutdowns resulted into under utilisation of pipelines.

Out of 26 instances of unplanned shutdowns of pipelines, except in one instance, reasons for unplanned shutdowns were controllable. Major reason was due to non-availability of ullage at the marketing locations. Other reasons for low utilisation were non-adherence to timely pipeline maintenance activities, pipeline replacement work, infrastructure bottlenecks on operation of multi product pipeline etc. Movement of petroleum products were carried out through alternate mode of transport due to unplanned shutdowns, which led to additional expenditure.

LPG is a deficient product and 50 *per cent* of the requirement is met through import in the country. During the period from 2014-15 to 2018-19, three Oil Marketing Companies paid total demurrage of ₹2,227.20 crore which is 12.69 *per cent* of the total freight paid during this period. In respect of 63 *per cent* of the cases, detention of vessels was due to reasons *viz.*, non-availability of storage space, shutdowns, demand forecast issues etc. which were controllable by the Oil Marketing Companies. The major reason for detention of vessels was insufficient port facilities; however, Oil Marketing Companies and MOP&NG did not make adequate efforts to sort out the issue relating to capacity constraints.

Oil Marketing Companies formulated (2016) Industry Transport Discipline Guidelines for transportation of bulk petroleum products by road. ITDG envisaged installation of vehicle tracking system to monitor route deviations. 26th Standing Committee on Petroleum & Natural Gas (2018-19) recommended enforcing various measures like provision of vehicle tracking system. However, installation of vehicle tracking system on trucks is yet to be completed by Oil Marketing Companies. Hindustan Petroleum Corporation limited and Bharat Petroleum Corporation limited has not installed Vehicle Monitoring Units on any of bulk LPG trucks and packed LPG trucks respectively. Besides, these two companies were yet to implement the digitalisation of monitoring ITDG violations and imposition of penalty. Further, Packed Transport Disciplinary Guidelines does not prescribe stringent monetary penalties for violation of provisions of guidelines by packed LPG Trucks, as prescribed by Industry Transport Disciplinary Guidelines.

As per the Citizen Charter of Indian Oil Corporation Limited (October 2014) on marketing of petroleum products, Oil Marketing Companies should deliver LPG cylinders within two working days (48 hours) at all times except in circumstances beyond control. On analysis of data related to Maharashtra State office of Indian Oil Corporation Limited for two selected months in each year, Audit observed that the average backlog of delivery in 32 districts of 36 districts in Maharashtra ranged from two to five days.

CHAPTER 5 Logistics infrastructure

The basic infrastructure required for supply logistics of MS, HSD and LPG products is the availability of sufficient storage facility at depots/ terminals, availability of bottling capacity for LPG and transportation modes. Transportation mode infrastructure includes pipelines for transportation of petroleum products, port facility for domestic coastal movements of the products and import of LPG, availability of railway rakes and availability of trucks/ tankers for primary and secondary movement of the products.

5.1 Marketing infrastructure of MS/ HSD installations and LPG bottling plants of Oil Marketing Companies

The marketing infrastructure of PSU Oil Marketing Companies is given in table 5.1.

Table 5.1: Marketing infrastructure of Oil Marketing Companies as on 1 April 2019

Particulars	Indian Oil Corp. Ltd.	Bharat Petroleum Corp. Ltd.	Hindustan Petroleum Corp. Ltd.
Terminal/ Depots (Nos.)	125	78	83
Retail outlets (Nos.)	27,702	14,802	15,440
LPG bottling plants (Nos.)	89	51	49
LPG bottling capacity (TMT per annum)	9,666	4,182	4,317
LPG distributors (Nos.)	11,964	5,970	5,866

Source: Petroleum Planning and Analysis Cell Ready Reckoner March 2019

In addition to own bottling plants, Oil Marketing Companies hire private bottlers to enhance bottling capacity.

5.1.1 Delays in augmentation of infrastructure projects relating to MS/ HSD installations and LPG bottling plants

Oil Marketing Companies augment the infrastructure for marketing MS, HSD and LPG by constructing depots/ terminals and bottling plants. Normally, these projects are required to be completed within 24-36 months from the date of environmental and other statutory clearance for the project. The period of obtaining environmental and other statutory clearances is not fixed; approximately 12 months from date of approval is considered for environmental clearance, land procurement and other statutory clearances while scheduling the timeline of the projects.

Audit reviewed the projects undertaken by the Oil Marketing Companies during the period 2014-15 to 2018-19 to augment the existing infrastructure relating to terminals/ depots and LPG bottling plants with emphasis on reasons for delays in completion and commissioning of such projects. Analysis of reasons of delays of the projects is given in table 5.2.

Table 5.2: Analysis of reasons of delay in Infrastructure Projects

Sl. No.	Reasons	No. of incidences	%
1.	Statutory clearance	19	33
2.	Delays by contractor	13	22
3.	Natural calamities	2	3
4.	Delay in acquisition of land	5	9
5.	Delay in internal approvals/ facilities	5	9
6.	Revision in scope due to OISD requirements	3	5
7.	Delays due to Covid lockdown	10	17
8.	Reasons not available	1	2
	Total	**58**	**100**

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

It could be seen from above that out of 58 incidences of delays, in 33 *per cent* cases, the delays in completion of projects were due to delays in receipt of environmental and other clearances from the local Government authorities. Apart from the delays in getting statutory clearances, some of the delays in completion of projects, as observed by Audit were due to controllable reasons *viz*., delays in purchase of land for the projects, delays in internal approvals etc., which are discussed in the following paragraphs:

i) Delays in acquisition of land

As stated in the above table, nine *per cent* of the delays in completion of projects could be attributed to delays in acquisition of land for construction of infrastructure Projects. The Oil Marketing Companies have issued Land Acquisition Policies prescribing Standard Operating Practices (SoP) to be followed for acquisition of land. Audit observed that there were delays in acquisition due to non-adherence to the provisions of the policies as given below:

As per the Land Acquisition Policy of Indian Oil Corporation Limited, selection of land should be based on the recommendations of a committee consisting of competent members, including officials from user and engineering departments. Further, inspection of the site should be carried out by the head of the user as well as engineering departments. Besides, in case of purchase of private land, approval of the regional legal department is also required to be obtained.

Some of the illustrative instances of time and cost overrun due to acquisition of land related issues in Indian Oil Corporation Limited and Hindustan Petroleum Corporation Limited are discussed below:

a) **Construction of terminal at Vallur: Indian Oil Corporation Limited** purchased (year 2000) 102 acres of land at Vallur near Ennore based on single valid offer against a public tender. The land had been changed in the revenue records in the name of the Company to the extent of 71.73 acre only.

Indian Oil Corporation Limited decided (November 2006) to construct a grass root terminal on this land at Vallur by re-sitement of terminals in Chennai at Kurukkupet

and Tondiarpet as these terminals were in congested areas. The project of construction of terminal at Vallur was expected to be completed within 36 months from the date of administrative approval. However, on initiation of implementation of the project, many villagers in Vallur claimed ownership of the land. The Company, therefore, filed a complaint (2008) against the seller of the land, however, the same was quashed by the Hon. Madras High Court.

Indian Oil Corporation Limited decided (September 2016) to negotiate and settle the claims of landowners. The settlement amount as estimated by the Company was ₹24.48 crore, of which the company paid (November 2020) an amount of ₹15.76 crore. The construction of terminal at Vallur thus, could not be initiated (till March 2020) due to not verifying the clear title of land before purchasing the same.

Indian Oil Corporation Limited stated (March 2020) that Board approval was obtained (September 2016) to enter into out of court settlement with landowners in dispute on ownership of the land with the Company.

Ministry stated (November 2020) that the Company informed that all the laid down procedures were followed. However, as this land was being procured through tendering process and the shortlisted party defaulted while handing over the possession of the land.

Thus, due to not identifying clear title of the land before acquisition, the construction of terminal at Vallur could not be commenced. The Company had to incur an additional expenditure of ₹15.76 crore as payment for settlement of the dispute relating to the title of the land.

b) **Construction of Tap of Point at Pekhubella:** Indian Oil Corporation Limited decided (February 2016) to construct a Tap of Point (ToP) at Pekhubella, Himachal Pradesh on the land allotted (November 2014) to the Company by the State Government. The proposed tap of point was to be completed within 36 months (January 2019) from the date of statutory approvals (received in January 2016). However, it was observed that the allotted land was on i) river bed which required land filling, ii) a nallah and iii) Seismic Zone requiring extra care for proper stratification of the tankages. This resulted in expenditure amounting to ₹48.09 crore on site development. The project was completed in March 2019.

Indian Oil Corporation Limited stated (March 2020) that Government of HP had allotted land to construct a tap of point at Pekhubella at a nominal lease rental of ₹1 per annum on as is where is basis. The Ministry reiterated (November 2020) the reply given by the Company.

The reply should be viewed in the light of the fact that not acquiring a suitable land for construction of tap of point resulted in additional expenditure of ₹48.09 crore on site development.

c) **New LPG plant by Hindustan Petroleum Corporation Limited at Warangal:** The Committee of Functional Directors of Hindustan Petroleum

Corporation Limited approved (October 2014) the project with scheduled completion within 18 months from the commencement. The Company estimated a saving of ₹1,161 per ton on transportation cost after completion of the LPG Plant. The land was handed over by Government of Telangana to the Company on 7 August 2015. The land in possession, due to its irregular shape, was not sufficient for construction of LPG bottling Plant. However, balance land was not allotted due to objection raised by Sri Rama Sagar Project. After a series of negotiations, private landowners land was taken into possession on 25 January 2017. Environmental clearance for the project was received in May 2017 and the project work was initiated after around 30 months (June 2017) after approval of the Committee of Functional Directors (CFD) of the Company. The Plant was completed in February 2019.

Ministry stated (November 2020) that CFD approval for construction of LPG Plant at Warangal was obtained in October 2014 with completion period of 18 months from the date of receipt of all statutory approvals. Environmental clearance for the project was received in May 2017 and work commenced from June 2017 with completion period as December 2018.

Thus, the initial delay in commencement of the project was due to acquisition of land of smaller size than required for the plant. This resulted in delay in initiation of the project and forgoing of projected saving of average transportation cost of ₹1,161 per ton (as estimated by the Company) for a period of 17 months. Though the Ministry has stated that the work commenced from June 2017 with completion period as December 2018, the Plant was completed only in February 2019.

(ii) Other instances of avoidable delays

a) Delay in revival of Tankage facility at Butcher Island, Mumbai: On 6 October 2017, Bharat Petroleum Corporation Limited's Tank No.13 used for storage of HSD at Butcher Island caught fire on the roof due to lightning strike at the tank farm during heavy rain. From the date of fire incident, the HSD storage capacity of 86,000 KL (three tanks) was lying idle for a period of almost five years. Bharat Petroleum has to incur a monthly expenditure of ₹6.8 lakh from November 2017 on rent of the leased land of this idle facility.

Bharat Petroleum Corporation Limited stated (March 2020) that approval has been obtained for an investment proposal to revive the facility. The revival plan is expected to be completed by 30 September 2020. Ministry stated (November 2020) that the tanks are expected to be commissioned in October 2020.

The Ministry reply may be viewed in light of the fact that out of three idle tanks, revival of only one tank is completed and pending for Petroleum and Explosives Safety Organisation license as on January 2022. Tank No.13 has been removed and third tank is expected to be completed only by May 2022.

Thus, delay in revival of the storage facility by Bharat Petroleum Corporation Limited resulted in idling of the storage facility for a period of five years with recurring

unfruitful expenditure of ₹6.8 lakh per month towards payment of lease rent of the land on which this idle facility is situated.

(b) Idling of facility due to non-synchronisation of completion of related project: To facilitate the movement of LPG evacuation through Kochi-Coimbatore-Erode-Salem pipeline, Bharat Petroleum Corporation Limited decided to put up a storage terminal at Palakkad. The project was started in December 2015 and mechanical completion was achieved in December 2017. Commissioning of the terminal is still pending because of non-availability of KSPPL[29] pipeline hook-up from Kochi. The pipeline from Kochi to Palakkad is still under construction and is expected to be completed by March 2020. Thus, non-synchronising the completion of pipeline with the terminal has resulted in idling of the terminal facilities and foregoing of savings in bulk LPG transportation freight charges.

Bharat Petroleum Corporation Limited stated (March 2020) that the project was delayed mainly due to stoppage of right of use (RoU) acquisition by landowners up to September 2018 which was released in January 2019 and thereafter from June 2019 to October 2019 the work was affected due to heavy rain and floods in state of Kerala. The revised expected date of commissioning of KR-Palakkad section is June 2020, as against September 2019. The Ministry has not offered (November 2020) any comments on the observation.

As per PNRGB approval (February 2014), the KSPPL project was scheduled to be completed by February 2017. Thus, the reasons for delays in completion of pipeline given by BPCL *viz.*, stoppage of RoU and flooding due to rains, were after the scheduled completion date of the pipeline. The expected completion of pipeline has been extended to February 2022 by PNGRB.

Overall, there were delays in completion of the augmentation of marketing infrastructure (depots/ terminal and bottling plants) projects prominently due to delays in getting statutory clearances. However, some of the projects were also delayed due to reasons that were controllable by the Oil Marketing Companies including acquisition of land without adhering to the laid down procedure, delay in re-construction of tanks, non-synchronisation of pipeline hook up activities etc. Delay in project implementation led to time and cost overrun, excess expenditure as well as forgo of estimated saving.

5.2 Pipeline infrastructure

The pipeline network of Oil Marketing Companies as on 31 March 2019 for transportation of MS, HSD and LPG products is given in the following tables:

[29] ***Kochi Salem Pipeline Private Limited (KSPPL) is a Joint Venture of Bharat Petroleum Corporation Limited and Indian Oil Corporation Limited with a 50 per cent equity shares each. The Kochi-Coimbatore-Erode-Salem LPG pipeline (KCESPL) is being constructed by KSPPL.***

Table 5.3 Pipeline network of Oil Marketing Companies

A. MS/ HSD pipelines

Owner	No. of pipelines	Length (KM)	Capacity (MMT)	Throughput 2018-19 (MMT)
IOCL	18	7876	42.95	35.145
BPCL	9	2213	25.68	21.597
HPCL	8	2957	28.78	25.214
Total	35	13046	97.41	81.956

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd, Hindustan Petroleum Corporation Ltd and PPAC ready reckoner.

B. LPG pipelines

Owner	No. of Pipelines	Length (KM)	Capacity (MMT)	Throughput 2018-19 (MMT)
IOCL	2	959	1.97	1.260
BPCL	1	28	0.40	0.238
HPCL	1	356	1.94	0.961
Total	4	1343	4.31	2.459

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd, Hindustan Petroleum Corporation Ltd and PPAC ready reckoner.

The details of pipelines of each Oil Marketing Company have been given in **Annexure 2**. In addition to the existing pipelines, Oil Marketing Companies have undertaken construction of new pipelines for transportation of MS/ HSD and LPG. Audit analysed the reasons for delays in respect of 30 ongoing pipeline projects as detailed in table 5. 4.

Table 5.4: Delays in completion of product pipelines

OMC	No. of pipeline project	Dropped	Undertaken during 2014-15 to 2018-19	Reasons for Delays					Delayed projects (%)
				Statutory clearance	Covid lockdown	Extension of scope	Court cases	Total	
IOCL	17	2	15	9	1	0	0	10	66.67
BPCL	4	0	4	2	0	0	0	2	50.00
HPCL	9	0	9	5	1	1	1	8	88.88
Total	30	2	28	16	2	1	1	20	71.43

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.

It can be seen from the above table that 71 *per cent* of the construction projects of new pipelines undertaken by Oil Marketing Companies during the period from 2014-15 to 2018-19 were delayed. The major reasons for delays in implementation of projects were delay in getting environmental and other statutory clearances from respective State Governments and other statutory authorities. Delays in completion of pipeline projects observed by Audit due to avoidable reasons are discussed in the following paragraphs:

(i) Cost over-run of Mangalore-Hasan-Mysore-Sollur Pipeline (MHMSPL) - LPG pipeline project

The Petroleum & Natural Gas Regulatory Board (PNGRB) approved (November 2012) the Mangalore-Hasan-Mysore-Sollur LPG pipeline project for implementation by Hindustan Petroleum Corporation Limited. The completion target for the project was 36 months from the date of PNGRB authorisation *i.e.,* by November 2015 at project cost of ₹701 crore.

As per PNGRB approval, the pipeline was planned to be laid upto Sollur bottling plant of Bharat Petroleum Corporation Limited. It was expected that Bharat Petroleum Corporation Limited would commit an offtake of 300 TMTPA of LPG. However, Bharat Petroleum Corporation agreed for offtake of only 120 TMTPA of LPG at Sollur, as it was argued by Bharat Petroleum Corporation that sourcing LPG directly from Kochin Refinery to Sollur was more economical than transporting through pipeline. As Bharat Petroleum did not commit offtake of products, Hindustan Petroleum Corporation decided to terminate the pipeline at Yediur without completion of the additional section up to Sollur.

Completion of the Project was further delayed due to delay in land acquisition, delay in forest diversion approval by MoEF/ Government of Karnataka, delay in critical ghat section construction. The pipeline was completed in October 2016 at a cost of ₹745.45 crore.

Thus, due to non co-operation amongst the two PSU Oil Marketing Companies, the pipeline had to be terminated without completion of the entire planned length. PNGRB while approving (May 2019) termination of pipeline at Yediyur expressed its displeasure by commenting on non-cooperative attitude of Bharat Petroleum Corporation Limited.

The Ministry accepted (November 2020) that the cost overrun has occurred mainly due to two reasons, *viz.,* (i) ₹54.65 crore increase in land/ right of use compensation as determined by State Government to address the severe resistance from the affected villagers and coffee growers association and (ii) ₹29.60 crore increase in interest during construction.

Thus, due to non-cooperation between two PSU Oil Marketing Companies, entire planned length of the pipeline could not be completed and Bharat Petroleum Corporation Ltd continued to transport the hazardous LPG by road from Kochi to Sellur bottling Plant. As stated by the Ministry, there was time overrun of 11 months and cost overrun by ₹84.25 crore on the project.

(ii) Delay in completion of Uran-Chakan-Shikrapur pipeline

The Uran–Chakan-Shikrapur LPG pipeline was planned to move the product from Uran to Pune and further by road to Wai, Solapur and Goa. This project was to be executed by Hindustan Petroleum Corporation Limited (jointly owned by Bharat Petroleum Corporation Limited). The PNGRB approval for the Uran-Chakan-

pipeline was received in November 2012 with scheduled commissioning in October 2015.

The pipeline laying contract was awarded after a period of 12 months from the date of PNGRB approval to M/s. Kalpataru Power Transmission Limited in November 2013. Thus, against 36 months of approved period for completion, only 24 months were available for implementation of the pipeline project. However, due to delays in getting statutory licenses and RoU issues, PNGRB approved (March 2016) extension of completion period of the project up to 31 March 2017. Hindustan Petroleum Corporation Limited terminated the initial contract in August 2016 due to slow progress of work. New contracts were placed for laying of pipelines in February 2017 i.e., only one month before the revised schedule completion date of pipeline as per PNGRB approval.

Severe resistance to lay pipeline in villages on the route of the pipeline further delayed the progress of the work and with the help of State administration, the pipeline could be mechanically completed in August 2019 and after obtaining various statutory approvals, the main line was commissioned on 14 November 2019.

Thus, apart from delays in getting RoU approvals for the project, the project was also delayed due to initial delay in award of contract for laying of pipeline, termination of contract due to slow progress of work and delay in award of subsequent contract. This resulted in delay in completion of the Uran Chakan Pipeline project by a period of two years and eight months from the revised completion date approved by the PNGRB.

Overall, 71 *per cent* of the construction projects of new pipelines undertaken by Oil Marketing Companies during the period from 2014-15 to 2018-19 were delayed. The major reason for delays in implementation of projects was delay in environmental and other statutory clearances but some of the projects were also delayed due to non co-operation among Oil Marketing Companies and poor contract management.

Recommendation 14

Oil Marketing Companies/ MoPNG may look at escalating matter relating to delays in getting environment/ statutory clearances from concerned Ministries and State Governments.

5.3 Rail infrastructure

5.3.1 Delay in delivery of rakes resulting in deferring of savings by Bharat Petroleum Corporation Limited

Bharat Petroleum Corporation Limited proposed (February 2017) to procure new eight bogie Liquefied Petroleum Gas tank wagon rakes under liberalised wagon investment scheme of Railways of 2012. Savings of ₹74.2 crore per annum was envisaged by undertaking rail movement against road movement. The work was awarded for four rakes (August 2018) to L1 party, M/s. Cimmco Limited, at a cost of

₹95.63 crore with expected delivery of first rake in April 2019, second in June 2019, third in September 2019 and fourth rake in January 2020.

Audit observed that the first rake which was scheduled for delivery in April 2019, was delivered to Bharat Petroleum Corporation Limited by the contractor during November 2019 *i.e.,* after a delay of eight months. Delay in delivery of rakes resulted in deferring of envisaged savings as detailed in table 5.5.

Table 5.5: Deferment of savings due to delay in delivery of rakes by the contractor

Rake	Expected date of delivery of rake	Actual date of delivery of rake	Delay in days	Deferred saving ₹ crore
Rake-1	01.04.2019	08.11.2019	222	9.69
Rake-2	30.06.2019	08.07.2020	373	16.70
Rake-3	28.09.2019	19.12.2020	448	21.09
Rake-4	31.01.2020	16.03.2021	409	19.78
Total				**67.27**

Source: Data provided by Bharat Petroleum Corporation Ltd.

Bharat Petroleum Corporation Limited stated (January/ April 2020) that the reason for delay in delivery was attributed to M/s. CIMMCO and an amount of ₹4 crore recovered from the supplier as per the contract. Ministry has not offered its comments.

Thus, the delay in delivery of rakes resulted in net deferring of savings of ₹63.27 crore after considering recoveries of liquidated damages from the contractor. It is pertinent to mention that the recovery made as per the contract is substantially less compared to the impact of delay in delivery on the company.

5.3.2 Delay in completion of rail siding by Hindustan Petroleum Corporation Limited resulted in cost over-run and loss of savings

Hindustan Petroleum Corporation Limited sent a proposal (January 2011) to Eastern Railways for construction of two spurs siding at its installation near Budge Budge station at an estimated cost of ₹68 crore with scheduled completion time of 24 months from date of approval. A savings of ₹10.76 crore was envisaged considering volume of 292 TMT for the year 2015-16 in product placement cost at Budge Budge through rail movement ex-Haldia *vis-à-vis* coastal movement ex-Visakhapatnam. The Chief Traffic Planning Manager (CTPM), Eastern Railway initially approved (January 2011) construction of two spur siding, however, subsequently in April 2012, requested Hindustan Petroleum Corporation Limited to opt for a single spur siding at a suitable location. However, since sufficient land was not available at Budge Budge, the Company again requested Eastern Railways to give permission for construction of two spur[30] siding instead of single spur. Railways requested to provide certain clarifications relating to proposed two spur siding. Hindustan Petroleum Corporation after carrying out detailed survey submitted compliance of all observations

[30] ***Spur is a stub track that diverges from main or other tracks which provides access to industrial or commercial areas. It usually dead ends within an industry area. Single spur means one full rake with 50 tank wagons can be placed on one single line. Two spur siding means 1 rake of 50 tank wagons will be placed on two lines of 25 tank wagons each. Usually 2 spur sidings are adopted where sufficient space/land is not available for single spur siding.***

(February 2014). In-principle approval to the proposal was given by Eastern Railway during May 2014. The project was completed in August 2019 with a cost of ₹97.58 crore.

Thus, not conducting extensive survey by HPCL and Railways prior to preparation of initial feasibility study had resulted in delay of more than 3 years and cost escalation by ₹29.58 crore. Further, Hindustan Petroleum Corporation Limited lost opportunity of saving on transportation cost of ₹43.04 crore approx. (₹10.76 crore per annum for four years i.e., from 2015-16 to 2018-19).

Hindustan Petroleum Corporation Limited stated (April 2020) that due to land constraint in the port area, full single spur siding was not feasible and hence revised in-principle approval was received from Railways in May 2014. The project was completed within revised approved scheduled time and the project cost was escalated mainly due to construction of additional facilities. Ministry stated (November 2020) that the additional cost was mainly due to construction of additional facilities and hence there was no actual loss.

The reply of the company/ Ministry may be viewed from the fact that defective planning not only resulted in time and cost overrun but also loss of savings in transportation cost by ₹43.04 crore. This was reflective of poor planning on the part of Hindustan Petroleum Corporation Limited and the Railways.

5.4 Ports infrastructure

As discussed in Chapter 4, the port capacity to handle the imports of petroleum products and coastal movement of products is limited and is not sufficient considering limited availability of indigenous LPG. Some of the major port infrastructure projects undertaken by Oil Marketing Companies which were not executed as per the plan is discussed in the following paragraphs:

5.4.1 Import facilities at Cochin Port

Indian Oil Corporation Limited approved the proposal for construction of 600 TMT per annum LPG import terminal facility at Cochin in Kerala in December 2007. Chronology of events in implementation of import facility at Cochin port is as follows:

Chronology of events
December 2007: Proposal for construction of 600 TMT per annum LPG import terminal facility at Cochin in Kerala was approved by Indian Oil Corporation Limited.
December 2009: After negotiations with local fishermen and local administration, the land was handed over to Indian Oil Corporation Limited.
Year 2011: The company completed initial land development work and construction of wall.
December 2012: Indian Oil Corporation Limited entered into Memorandum of Understanding with Cochin Port Trust, under which construction of Jetty was to be funded by Indian Oil Corporation Limited and the facility was to be constructed by Cochin Port Trust in return for operational concession to the company.
April 2014: Concession agreement was entered between Cochin Port Trust and Indian Oil Corporation Limited.

Chronology of events
July 2015: The Board approved the revised cost of the project at ₹714.25 crore (as against the original cost of ₹607 crore) with a completion time of 24 months.
February 2016: Site work started after receipt of environmental clearance.
February 2017: The site activities were stopped due to agitations by local people.

As can be seen from the chronology of events, there were delays at every stage of project execution. Some of the delays were within the control of the management. After getting the land for construction, the Company took three years to enter into Memorandum of Understanding with Cochin Port Trust, due to delays in initiating land development and other related works. The project is yet to be completed; meanwhile project cost increased by ₹107 crore.

Indian Oil Corporation Limited stated (February 2020) that all the works were suspended since February 2017 due to agitation from local people. Site has been recently made accessible under police protection from December 2019.

The reply may be viewed from the fact that the construction of facility was decided in 2007 and land was handed over in 2009. However, the company took two years to complete land development and three years to enter into MoU with Cochin Port Trust for construction of jetty.

Thus, there was delay in initiating construction activities of the jetty during the period 2009 to 2015, which resulted in delay in construction as well as cost escalation of the project by ₹107 crore. The work at the site was subsequently delayed due to agitation of local people resulting in non-completion of LPG import terminal facility at Cochin.

5.4.2 Delay in commissioning of Ennore coastal installation and idling of facilities

Bharat Petroleum Corporation Limited used to store the products received at Ennore port in tanks hired from Ennore Tank Terminal Pvt. Limited. Bharat Petroleum Corporation decided (July 2014) to construct its own coastal terminal at Ennore (ECT) at a cost of ₹393 crore. The terminal was expected to be commissioned in 2016-17. During industry meeting held in October 2009, it was agreed that Hindustan Petroleum Corporation Limited would be laying the dock lines from Ennore Tank Terminal Pvt. Limited to Hindustan Petroleum Corporation Limited, Ennore on behalf of the industry and all members would share the cost. It was also decided that Bharat Petroleum Corporation Limited and Indian Oil Corporation Limited would lay their independent dedicated product pipelines to their terminal from the exchange pit at Hindustan Petroleum Corporation Limited, Ennore. Hence, Bharat Petroleum Corporation Limited did not consider laying independent lines from Ennore Tank Terminal Pvt. Limited manifold to its Ennore coastal terminal.

The ECT was mechanically completed in April 2018 and commissioned in February 2019 with a total tankage capacity of 116,835 KL.

Subsequently, Hindustan Petroleum Corporation Limited refused to share their pipeline facility with Bharat Petroleum Corporation Limited. As a result, all three MS

tanks and three HSD tanks of BPCL were kept idle. Bharat Petroleum Corporation Limited continued to store the product at Ennore Tank Terminal Pvt. Limited by incurring ₹20 crore for the period February 2019 to September 2019 despite having its own tankage facilities.

Thus, lack of coordination between two Oil Marketing Companies resulted in idling of tankage facilities of BPCL and the company incurred additional expenditure of ₹20 crore for storing the products with private terminal company.

Bharat Petroleum Corporation Limited stated (March 2020) that after receipt of full-fledged loading at ECT from May 2020, dependence on Ennore Tank Terminal Pvt. Ltd. would be nil from June 2020. Ministry stated (November 2020) that Bharat Petroleum Corporation Limited is in the process of laying two new pipelines from Ennore Tank Terminal Pvt. Limited to Bharat Petroleum Corporation Limited, Ennore Coastal terminal.

Hindustan Petroleum Corporation Limited stated (February 2021) that dock lines from Port to Hindustan Petroleum Corporation Limited were planned to be laid by the company on behalf of industry upto industry exchange pit at Hindustan Petroleum Corporation Limited and all industry members were required to share the cost. This arrangement was agreed in the industry meeting held in October 2009. It was agreed that Indian Oil Corporation Limited and Bharat Petroleum Corporation Limited would lay their lines up to Hindustan Petroleum Corporation Limited siding and cost of common tank wagon loading/ unloading facilities would be shared by three Oil Marketing Companies. However, Bharat Petroleum Corporation Limited did not adhere to the understanding reached in the industry meeting.

The reply may be viewed from the fact that though Bharat Petroleum Corporation Limited started receiving product, the terminal was idle for a period of 8 months due to disagreement between Oil Marketing Companies for use of pipeline and Bharat Petroleum Corporation Limited had to incur additional expenditure on hiring of Ennore Tank Terminal Pvt. Ltd. tanks till completion of its own pipelines.

Recommendation 15

Ministry of Petroleum & Natural Gas may sort out the differences among the Oil Marketing Companies so as to avoid idling of infrastructure facilities and incurring of additional expenditure.

5.4.3 Delay in completion of import terminal by Bharat Petroleum Corporation Limited resulted in deferment of projected savings in logistic costs

Bharat Petroleum Corporation Limited approved (February 2015) an import terminal at Haldia with a capacity of 1 MMT per annum at a cost of ₹694 crore with a mechanical completion within 24 months from the date of obtaining all approvals/ NOCs for the project.

The company initially planned laying an above ground pipeline while it was aware (July 2015) that (a) the route went through six railway crossings, 15 road crossings,

two canals, three drains, two pipelines and six kachcha roads and (b) the stretch along the existing corridor is thickly populated and was not advisable to lay above ground pipeline through these areas considering safety of the pipeline.

The decision to lay the pipelines underground was taken only after rejection by National High Authority of India (July 2015) and Haldia Municipality (January 2016). In May 2018, the date of completion of the project was revised to December 2018 mainly due to delay in obtaining approval of Haldia Municipality which affected the laying of pipeline work. The Haldia terminal has been commissioned in November 2020.

Thus, ignoring the known facts relating to existence of railway crossings, road crossings, canals, pipelines etc. in the initially planned pipeline corridor having cascading effect resulted in delay in completion of projects by 23 months.

Ministry has not offered any response.

5.5 Summing up

Delay in getting statutory clearance was the prominent reason of delays in completion of the infrastructure projects of the Oil Marketing Companies. However, some of the factors were controllable by the Oil Marketing Companies *viz.,* lack of coordination amongst the Oil Marketing Companies, defective project planning and delays in decision making etc. All these led to cost and time overruns as well as loss of savings to Oil Marketing Companies. These reasons for delay in completion of the logistics infrastructure projects were controllable and could have been avoided by better planning and monitoring of the project implementation of the projects.

Audit noticed that 71 *per cent* of new pipelines construction projects undertaken by Oil Marketing Companies during the period from 2014-15 to 2018-19 were delayed. The major reasons for delays in implementation of projects were delay in getting environmental and other statutory clearances from respective State Governments and other statutory authorities. Besides, the port capacity to handle the imports of petroleum products and coastal movement of products is limited and is not sufficient considering limited availability of indigenous LPG. Infrastructure projects for improving the port capacity were also delayed due to lack of proper coordination among various agencies involved in developing such facilities.

CHAPTER 6 Health, safety, and environment in supply logistics

Oil Marketing Companies are committed to conduct business with environment conscience ensuring sustainable development, safe workplaces and enrichment of quality of life of the community. In order to regulate safety related matters, Government of India enacted safety regulations and constituted Oil Industry Safety Directorate[31] (OISD) as discussed below:

6.1 Safety Regulations in India

The Government of India designated Oil Industry Safety Directorate (OISD) as competent authority to exercise powers and functions as stipulated in Petroleum and Natural Gas (Safety in Petroleum Operations) Rules 2008.

OISD formulates various safety standards/ guidelines and coordinates implementation of a series of self-regulatory measures aimed at enhancing the safety in the oil and gas industry in the country. Oil Industry Safety Directorate conducts audits to ensure compliance to standards, maintains continuous follow-up on compliance to action points and investigates accidents in the oil and gas industry. OISD issued various standards/ guidelines, of which 21 are specifically applicable to the petroleum logistics operations of the Oil Marketing Companies.

To ensure effectiveness of safety system, external safety audit by OISD, internal safety audit by Multi-Disciplinary Teams (MDTs) and surprise inspection by Oil Marketing Companies' officials are in place. External safety audit by OISD at refineries and marketing locations is taken up once in 4-5 years and internal safety audit by MDTs of Oil Marketing Companies take place every year. Audit reviewed the status of pending audit observations of OISD audit and details of which in respect of Oil Marketing Companies are discussed in the succeeding paragraphs:

6.2 External safety audits by Oil Industry Safety Directorate

Oil Industry Safety Directorate *inter-alia* conducts external safety audit of refineries, pipelines and marketing locations and suggests necessary corrective actions in the safety systems and procedures. The Standing Committee on Petroleum & Natural Gas (2018-19) of Sixteenth Loksabha in its Report No. 26 on Safety, Security and Environment aspects in Petroleum Sector had recommended (January 2019) that the Safety Council under MoP&NG should ensure liquidation of all pending recommendations made by Oil Industry Safety Directorate in fixed time frame.

In response to the recommendation of the Standing Committee on Petroleum & Natural Gas (2018-19), the Ministry stated that in the meeting held in July 2018, Oil Public Sector Undertakings were instructed to fix responsibilities for delay in

[31] ***OISD (Oil Industry Safety Directorate) is a technical directorate under the Ministry of Petroleum and Natural Gas that formulates and coordinates the implementation of a series of self-regulatory measures aimed at enhancing the safety in the Oil & Gas industry in India.***

implementation of Oil Industry Safety Directorate recommendations pending for more than three years.

The status of implementation of Oil Industry Safety Directorate recommendation/ observations in the three Oil Marketing Companies as of March 2021 is given below.

- **Indian Oil Corporation Limited** - Four observations relating to Depots/ Terminals were pending for more than three years.
- **Bharat Petroleum Corporation Limited** – Five observations relating to LPG bottling plant and seven observations relating to Depots/ Terminals observations were pending for more than three years.
- **Hindustan Petroleum Corporation Limited**- Three observations relating to Depots/ Terminals were pending for more than three years.

Thus, it can be observed from the above that despite the concerns expressed by the Standing Committee on Petroleum & Natural Gas (2018-19) of Sixteenth Lok Sabha during January 2019, the Oil Marketing Companies have 19 observations/ recommendation of Oil Industry Safety Directorate are pending for more than three years **(Annexure 6)**.

Recommendation 16

Oil Marketing Companies may establish a mechanism for compliance of all the observations/ recommendations made by OISD in a set period of time and compliance of the same to be reported to the Board of Directors and Ministry on periodic basis.

6.3 Accidents and major incidences

Numbers of accidents/ incidents reported as per criticality *viz.,* major and minor during the period 2014-15 to 2018-19 are as given in table 6.1.

Table 6.1: Accidents/ major incidences

Year	IOCL		BPCL*		HPCL	
	Major	Minor*	Major	Minor	Major	Minor
2014-15	6*	40	22	136	1	174
2015-16	16	29	26	165	5	193
2016-17	27	13	4	23	4	173
2017-18	34	11	7	69	2	172
2018-19	30	4	6	38	6	112

Source: Data provided by Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd and Hindustan Petroleum Corporation Ltd.
**Data is only for LPG*

Though the trend of major accidents in Bharat Petroleum Corporation was decreasing over the years, the number of accidents had substantially increased in Indian Oil Corporation Limited. The number of accidents reported by Hindustan Petroleum Corporation Limited was significantly less as compared to other two Oil Marketing Companies.

Audit analysed major road accidents reported in Indian Oil Corporation Limited on movement of bulk and packed LPG. The major reasons of road accidents were negligence of drivers or tank truck crew, over speeding, night and early morning driving, lack of training as per Oil Industry Safety Directorate requirements, loose electrical fittings, etc. The reasons for major accidents at locations were un-organised parking, not wearing Personal Protective Equipment (PPEs) by drivers and unauthorised entry of trucks in plant etc.

Audit also analysed some of the instances of accidents reported in depots/ Terminals/ Bottling Plants of the Oil Marketing Companies which are briefed below:

i) Fire accident at LPG bottling plant of Hindustan Petroleum Corporation Limited at Cherlapalli due to non-adherence to Oil Industry Safety Directorate requirements, which stipulates discarding the hoses after every three years.

ii) Fire at Budge Budge terminal of Bharat Petroleum Corporation Limited due to opening of both sides manhole covers of tank-22 without following the laid down procedure, which caused accumulation of MS vapors in the vicinity of tank.

iii) Fire incidence during MS loading operation at Bahadurgarh terminal of Hindustan Petroleum Corporation Limited due to non-shifting of the insulation joint as recommended by Oil Industry Safety Directorate.

Thus, as can be seen above, these reasons were avoidable and could have been monitored and controlled by Oil Marketing Companies by strictly following Standard Operating Practices and other internal/ External safety norms.

Indian Oil Corporation Limited stated (March 2020) that road transport safety policy to reduce road accidents has been introduced with extensive checklists, which is reviewed by safety officer of location. Bharat Petroleum Corporation Limited stated (December 2019/ May 2020) that no major incident involving fatality/ fire occurred in LPG plants; all truck accidents have been investigated and corrective measures implemented across all bottling plants. Hindustan Petroleum Corporation Limited, in case of fire accident at Bahadurgarh terminal, stated (April 2020) that the replacement of the insulation joint was required to be carried out by Railways and not within the jurisdiction of Hindustan Petroleum Corporation Limited. Post incident, the matter was repeatedly taken up with Railways. However, response received from Railways (July 2018) that insertion of glued joints is feasible and accordingly work was awarded by the Company. Railways executed the work and completed in November 2018.

The Ministry reiterated (November 2020) Indian Oil Corporation Limited and Hindustan Petroleum Corporation Limited replies to the observation. In case of Bharat Petroleum Corporation Limited, the Ministry informed (November 2020) that learning arising out of the recommendations of Budge Budge Fire incident has been shared and implemented at all other operating locations.

The reply of Oil Marketing Companies may be viewed from the fact that majority of the reasons were controllable. All the accidents occurred due to not following

Standard Operating Practices as well as not adhering to the safety guidelines recommended by Oil Industry Safety Directorate.

6.4 Health, safety, and environment of petroleum pipelines

Pipelines are cheapest, reliable, uninterrupted mode for transportation of petroleum products. Nevertheless, there are inherent hazards associated with transportation of hydrocarbons through pipeline from leaks, spills, fires, etc. While examining economic viability of pipelines for business proposal or for facilities planning, the industry considers economic life of pipelines as 25 years. The regulatory body, Petroleum and Natural Gas Regulatory Board (PNGRB) has also specified economic life of 25 years for pipelines. However, with proper maintenance and upkeep, pipelines can operate for more period than its economic life. Audit observed that -

- About 22 *per cent* of pipelines in the country are operating for more than economic life of 25 years as specified by Oil Marketing Companies.
- Any failure/ burst/ rupture of pipeline not only poses safety risk but also hampers logistical planning resulting in financial loss.

In this regard, Audit reviewed the pipeline maintenance and safety compliances by Indian Oil Corporation Limited and observations are summarised in table 6.2.

Table 6.2: Safety issues in pipelines in Indian Oil Corporation Limited

Pipeline	Safety issues	IOCL reply (March 2020)
Non-compliance of OISD recommendations		
Non-installation of remotely operated sectionalising valves	OISD devised a Standard Operative Procedure with the objective of minimising failures and to sustain pipeline operations. One of the parameters is to reduce distance of sectionalising valves and to make it remotely operable. However, 21 pipelines either have lower number or do not have remotely operated sectionalising valves.	As regards to non-compliance of OISD requirements, some compliance has already been completed and others are at various stage of implementation.
Koyali Ratlam pipeline	OISD (September 2014) recommended for installation of rim seal protection in trans-mix[32] tank. Audit noticed that automatic fire detection system for rim seal is pending (December 2019) installation even after five years.	
Paradip-Haldia Section of PHBPL pipeline	OISD Standard 141 requires installation of corrosion monitoring facilities[33] (corrosion coupons and ER probes), UT sensors etc., in liquid pipelines as internal corrosion has been classified as integrity threat for pipeline. OISD observed that corrosion coupon data is not available for pipeline and the Company is yet to award the work order for corrosion probe and installation of corrosion coupon.	

[32] ***In a multi product pipeline, various petroleum products are pumped back to back and interface material resulting from the pumping batches of different grades one after another is typically mixed with the lower grade batch, thereby reducing the batch size of the higher quality product. Moreover, the interface between the two different products, like gasoline and a distillate produces a mixture, the so-called trans-mix. In this case, the trans-mix is cut out and sent to separate tanks and reprocessed subsequently.***

[33] ***Electrical Resistance (ER)/ Electrochemical Noise Technique (ECN)/ Linear Polarisation Technique (LPR) probes measure corrosion rates.***

Pipeline	Safety issues	IOCL reply (March 2020)
Sidhpur-Sanganer section -Koyali-Sanganer Product Pipeline	OISD observed (October 2018) that in line inspection[34] by Intelligent pigging[35] has not been carried out for the section. Non-compliance should be further viewed in light of the fact that in another section (Sidhpur Kota section) of this pipeline, OISD had observed indication of mostly internal corrosion at bottom.	
Koyali Dahej Pipeline	During the safety audit conducted in September 2014, it was pointed out that output of the surge relief valve[36] should have been connected to a suitable surge relief tank as per surge analysis report. Although after five years from the date of Audit, the company completed shifting of tank from Kota to Dahej, additional 8 KL surge relief tank was pending for installation at Dahej and application for consent of the Petroleum and Explosives Safety Organisation for the surge relief tank is also pending.	
Non-Compliance to Ministry's directives		
Barauni-Kanpur pipeline	Ministry of Petroleum (August 2014) had directed to convert all Hand operated Valves (HOVs) in older pipelines into Motor Operated Valve (MOVs)[37]. Conversion of such HOVs to MOVs would serve for better functioning of Leak Detection System and integration of pipeline data in case of any mainline emergency. In this regard, OISD noticed (March 2019) all the mainline valves in the Allahabad-Kanpur section of BKPL are HOVs and pending for conversion to MOV/ ROV despite the fact that the pipeline is passing through many populated areas across city locations/river crossings.	A centralised SCADA is being procured for monitoring of pressure cycling.
Other Reasons		
Frequent pipeline failures Kandla Bhatinda pipeline	OISD STD 141[38] and Petroleum and Natural Gas Regulatory Board T4S[39] guideline states that design of pipeline system shall be based on evaluation of nature or properties of petroleum product like sweet or sour[40] liquid, Kandla Bhatinda pipeline (KBPL) was commissioned (1996) for transportation of refined petroleum products. In 2006, the pipeline was converted for transportation of crude oil. OISD attributed probable reasons of failure to	Kandla Bhatinda Pipeline service to crude, first failure had occurred in 2016 i.e. after 10 years from conversion from refined product to crude service and

[34] ***Clause 14.4.4 of OISD Standard 141 mandates carrying out of In-line inspection (Intelligent Pigging Survey)***

[35] ***Intelligent pigging survey is an internal inspection of pipeline to detect corrosion, stress corrosion cracking (only for oil pipelines).***

[36] ***Surge relief valves are designed to have an adjustable set point that is directly related to the max pressure of the pipeline/system. When the product on the inlet of the valve exceeds the set point it forces the valve to open and allows the excess surge to be bled out into a breakout tank or re-circulated into a different pipeline. So in the event of the surge, the majority of the pressure is absorbed in the liquid and pipe, and just that quantity of liquid which is necessary to relieve pressures of unsafe proportions is discharged to the surge relief tank.***

[37] ***Sectionalising Valve (SV) is used in the cross country pipeline system for isolation of a particular pipeline section whenever required. This valve is also referred as Main Line valve (MLV). These valves are either motor operated valve or in case of older pipelines such valves are operated by hand i.e., Hand operated Valves (HOVs).***

[38] ***Design, construction and inspection requirements for cross country liquid hydrocarbon pipelines***

[39] ***Technical Standards and Specifications including Safety Standards for Petroleum and Petroleum Products Pipelines.***

[40] ***Liquid hydrocarbon that contains H2S under partial pressure and / or presence of elemental sulphur 0.5 per cent by weight.***

Pipeline	Safety issues	IOCL reply (March 2020)
	poor quality of pipes and change of service from product to crude oil.	various mitigation measures were undertaken.
Mundra – Panipat Pipeline	Pigging of Mundra Churwa Section of pipeline as well as installation of offshore surge relive valve at Mundra and SPM to crude tank delivery is pending since 2012.	No reply.

Source: Data provided by Indian Oil Corporation Ltd.

As can be seen from the table, there were non-compliance of Oil Industry Safety Directorate recommendations and Ministry's directives regarding safety issues of pipelines. As stated by Indian Oil Corporation Limited, some of the recommendations are still being implemented and not completed.

Ministry stated (November 2020) that all actions are taken to comply with Oil Industry Safety Directorate.

Reply of Indian Oil Corporation Limited may be viewed in the light of the fact that Oil Industry Safety Directorate attributed probable reasons of failure *viz.,* poor quality of pipes, corrosion of pipe due to change of service from product to crude oil (Kandla Bhatinda Pipeline), fatigue failure of pipe on account of cyclic loading. Kandla Bhatinda Pipeline failures occurred in quick succession after first failure post conversion of pipeline. Oil Industry Safety Directorate during investigation of Mundra Panipat pipeline attributed probable reasons of failure *viz.,* poor quality of pipes. Further, internal committee constituted for investigating the failure observed that change of service from product to crude oil and the increasing throughput of crude in Mundra Panipat pipeline were common factors for both the pipeline failures in quick succession.

Thus, the conversion of pipeline from product to crude line resulted in repeated ruptures of the pipeline.

Recommendation 17

Oil Marketing Companies may report the aspects/ compliance of the safety requirements of pipelines to the Board of Directors and the Ministry of Petroleum & Natural Gas, on annual basis. The Oil Marketing Companies may also consider fixing responsibilities, in case of accidents occurring due to non-compliance of the Standard Operating Practices as well as Oil Industry Safety Directorate and other safety requirements.

6.5 Summing up

The Standing Committee on Petroleum & Natural Gas (2018-19) of Sixteenth Loksabha in its Report No. 26 on Safety, Security and Environment aspects in Petroleum Sector had recommended (January 2019) that the Safety Council under MOP&NG should ensure liquidation of all pending recommendations made by Oil Industry Safety Directorate in fixed time frame. In response to the recommendation of the Standing Committee on Petroleum & Natural Gas (2018-19), the Ministry stated that in the meeting held in July 2018, oil PSUs were instructed to fix

responsibilities for delay in implementation of Oil Industry Safety Directorate recommendations pending for more than three years. However, Audit observed that in respect of 19 observations, Oil Marketing Companies have not completed action on OISD safety recommendations pending for more than three years.

Reasons for majority of accidents occurred during transportation of petroleum products or at installations during 2014-15 to 2018-19 were controllable *viz.,* not following Standard Operating Practices as well as not adhering to the safety guidelines recommended by Oil Industry Safety Directorate.

About 22 *per cent* of pipelines in the country are operating for more than economic life of 25 years as specified by Oil Marketing Companies. There were non-compliance of Oil Industry Safety Directorate recommendations and Ministry's directives regarding safety issues of pipelines. Any failure/ burst/ rupture of pipeline not only poses safety risk but also hampers logistical planning resulting in financial loss.

CHAPTER 7 Conclusion

The Public Sector Oil Marketing Companies predominantly (about 91 *per cent*) cater to Motor Spirit, High Speed Diesel and Liquefied Petroleum Gas (LPG) needs of the country. Primary supply logistics of petroleum products involves transportation of petroleum products from refinery to terminals/ depots/ bottling plants and movement takes place by four transportation modes *viz.,* pipelines, rail, coastal and road. Secondary logistics of petroleum products refers to the supply of products from terminals/ installations/ depots/ bottling plants to retail outlets and the movement takes place by roads only.

Performance Audit on 'Supply Logistics of petroleum products (MS, HSD and LPG) in Oil Marketing Companies' was taken up with the objectives to examine (i) soundness of logistics planning for transportation of MS, HSD and LPG (ii) system of scheduling and transportation of products by optimal utilisation of various modes of transport as envisaged (iii) new logistics infrastructure projects were implemented efficiently and economically and (iv) system to ensure safety and security of manpower and environment in line with the statutory and industry norms.

Audit observed that demand numbers finalised at the beginning of the year are reviewed on a monthly basis, using forecasting software of Oil Marketing Companies. Also, the Oil Marketing Companies prepare distribution plan using optimisation software modules. Despite existence of a robust process for planning and use of sophisticated software, there were wide variations in quantity planned for logistics movement *vis-à-vis* actual quantity transported resulting in extra cost to Oil Marketing Companies. This led to additional logistics cost of ₹878.37 crore on movement of MS, HSD and LPG during 2014-15 to 2018-19.

Though Indian Oil Corporation Limited developed a technology to increase the annual production of LPG in refineries and installed this technology in three of its refineries, other Oil Marketing Companies had not installed similar such technologies at their refineries, despite India being a net importer of LPG.

The hospitality arrangements, by which Oil Marketing Companies exchange products by supplying to depots/ terminals of other PSUs which are nearer to the oil refineries of Oil Marketing Company, at pan India level to reduce the logistic cost did not yield the desired result due to disagreement among the three Oil Marketing Companies relating to sharing of savings in cost. This was despite demonstrated savings of ₹52.52 crore on a pilot project for movement of bulk LPG from source to bottling plants on Industry basis for three months and clear instructions of the Ministry.

There was scope for improvement in the capacity utilisation of pipelines, the cheapest modes of transport of petroleum products. Out of 26 instances of pipeline shutdowns, 11 were due to non-availability of ullage at the marketing locations. Other reasons observed for low utilisation were non-adherence to timely pipeline maintenance activities, pipeline replacement work, infrastructure bottlenecks on operation of multi product pipeline etc., which were controllable by Oil Marketing Companies.

Though LPG demand to the extent of 50 *per cent* is being met through imports, there were capacity constraints at the Ports. This led to delay in receipt of products and resultant payment of demurrages. During the period 2014-15 to 2018-19, Oil Marketing Companies incurred demurrages of ₹2,227.20 crore. Apart from non-availability of berthing, the other major reason for detention of vessels was non-availability of sufficient storage capacity at ports, shutdowns, demand forecast issues etc., which were controllable.

As regards the transport of the petroleum products, only 71 *per cent* of the trucks carrying petroleum products had the vehicle tracking system installed on them. Thus, movements of a large number of trucks carrying hazardous petroleum products were not trackable in real time. This also led to non-compliance of recommendations of 26th Standing committee of Parliament on Petroleum & Natural Gas to enforce strictly various measures to ensure safe transportation of petroleum products.

Delay in getting statutory clearance was the prominent reason of delays in completion of the infrastructure projects of the Oil Marketing Companies. However, some of the factors were controllable *viz.,* lack of coordination amongst the Oil Marketing Companies, defective project planning and delays in decision making etc. All these led to cost and time overruns as well as loss of savings to Oil Marketing Companies.

Though Standing Committee on Petroleum & Natural Gas (2018-19) of Sixteenth Loksabha in its Report No. 26 on Safety, Security and Environment aspects in Petroleum Sector had recommended (January 2019) that the Safety Council under MOP&NG should ensure liquidation of all pending recommendations made by Oil Industry Safety Directorate in fixed time frame, it was noticed that these could not be

liquidated during the Audit period under review. About 22 *per cent* of pipelines in the country are operating for more than economic life of 25 years as specified by Oil Marketing Companies. In addition, there were non-compliance of Oil Industry Safety Directorate recommendations and Ministry's directives regarding safety issues of pipelines.

(R.G. Viswanathan)
Deputy Comptroller and Auditor General
(Commercial) and Chairman, Audit Board

New Delhi
Dated: 02 May 2022

Countersigned

(Girish Chandra Murmu)
Comptroller and Auditor General of India

New Delhi
Dated: 02 May 2022

ANNEXURES

Annexure 1

(as referred to in Para 2.4.2)

A. Sample of depots and bottling plants selected on a random basis in IDEA software

DEPOTS

Bharat Petroleum Corporation Limited

Sl. No.	Location	State	Region
1.	Muzaffarpur	Bihar	Eastern
2.	Patna	Bihar	Eastern
3.	Paradeep	Odisha	Eastern
4.	Karari (Jhansi)	Uttar Pradesh	Northern
5.	Baitalpur	Uttar Pradesh	Northern
6.	Shahjahanpur	Uttar Pradesh	Northern
7.	Mathura	Uttar Pradesh	Northern
8.	Jobner	Rajasthan	Northern
9.	Coimbatore	Tamil Nadu	Southern
10.	Desur	Karnataka	Southern
11.	Tondiarpet	Tamil Nadu	Southern
12.	Mangalore	Karnataka	Southern
13.	Akolner	Maharashtra	Western
14.	Hazira	Gujarat	Western
15.	Kandla	Gujarat	Western

Hindustan Petroleum Corporation Limited

Sl. No.	Location	State	Region
1.	Barauni IOC Tap of Point (TOP)	Bihar	Eastern
2.	Kolkata Terminal	West Bengal	Eastern
3.	Paradeep Terminal	Orissa	Eastern
4.	Baitalpur Inland Relay Depot (IRD)	Uttar Pradesh	Northern
5.	Bharatpur IRD	Rajasthan	Northern
6.	Bareilly new IRD	Uttar Pradesh	Northern
7.	Mathura Installation	Uttar Pradesh	Northern
8.	Rewari IRD	Haryana	Northern
9.	Ajmer terminal – MDPL	Rajasthan	Northern
10.	Kanpur terminal RKPL	Uttar Pradesh	Northern
11.	Bahadurgarh Terminal	Haryana	Northern
12.	Tirunelveli IRD	Tamil Nadu	Southern
13.	Kozhikode IRD	Kerala	Southern
14.	Kadapa new IRD	Andhra Pradesh	Southern
15.	Suryapet Terminal	Telengana	Southern
16.	Visakha new Terminal	Andhra Pradesh	Southern

Sl. No.	Location	State	Region
17.	Hassan Terminal	Karnataka	Southern
18.	Wadala Terminal	Maharashtra	Western
19.	Vadodara IRD	Gujarat	Western
20.	Raipur IRD	Chattisgarh	Western
21.	Loni Terminal	Maharashtra	Western

Indian Oil Corporation Limited

Sl. No.	Location	State	Region
1.	Budge budge Terminal	West Bengal	Eastern
2.	Balasore Depot	Odisha	Eastern
3.	Haldia Terminal	West Bengal	Eastern
4.	Jharsuguda Terminal	Odisha	Eastern
5.	Barauni marketing Terminal	Bihar	Eastern
6.	Kullu Depot	Himachal Pradesh	Northern
7.	Mathura marketing Terminal	Uttar Pradesh	Northern
8.	Jammu Depot	Jammu Kashmir	Northern
9.	Ambala Terminal	Punjab	Northern
10.	Jodhpur Terminal	Rajasthan	Northern
11.	Kanpur Terminal	Uttar Pradesh	Northern
12.	Panipat Terminal	Haryana	Northern
13.	Guntakal Depot	Andhra Pradesh	Southern
14.	Karwar bunkering Terminal	Karnataka	Southern
15.	Korukkupet Terminal	Tamil Nadu	Southern
16.	Vijayawada terminal	Andhra Pradesh	Southern
17.	Madras Fuel station	Tamil Nadu	Southern
18.	Cochin mktg. Terminal	Kerala	Southern
19.	Visakhapatnam Terminal	Andhra Pradesh	Southern
20.	Jabalpur Depot	Madhya Pradesh	Western
21.	Vasco(Goa) Terminal	Goa	Western
22.	Rajkot Depot	Gujrat	Western
23.	Sidhpur Terminal	Gujrat	Western
24.	Hazira Terminal	Gujrat	Western
25.	Ratlam Terminal	Madhya Pradesh	Western
26.	Ahmedabad TOP	Gujrat	Western

B. BOTTLING PLANTS

Bharat Petroleum Corporation Limited

Sl. No.	Bottling plant	State	Region
1.	Uluberia	West Bengal	Eastern
2.	Raiganj	West Bengal	Eastern
3.	Udaipur	Rajasthan	Northern

Sl. No.	Bottling plant	State	Region
4.	Jaipur	Rajasthan	Northern
5.	Lalru	Punjab	Northern
6.	Kurnool	Andhra Pradesh	Southern
7.	Mangalore	Karnataka	Southern
8.	Goa	Goa	Western
9.	Pithampur	Madhya Pradesh	Western
10.	Hariyala	Gujarat	Western

Hindustan Petroleum Corporation Limited

Sl. No.	Bottling plant	State	Region
1.	Jatni	Orissa	Eastern
2.	Paharpur	West Bengal	Eastern
3.	Kota	Rajasthan	Northern
4.	Jind	Haryana	Northern
5.	Bahadurgarh	Haryana	Northern
6.	Rajahmundry	Andhra Pradesh	Southern
7.	Gummudipundi	Tamil Nadu	Southern
8.	Cherlapalli	Telangana	Southern
9.	Nashik	Maharashtra	Western
10.	Hazarwadi	Maharashtra	Western
11.	Raipur	Chattisgarh	Western

Indian Oil Corporation Limited

Sl. No.	Bottling plant	State	Region
1.	Guwahati (Sarpara)	Assam	Eastern
2.	Silchar	Assam	Eastern
3.	Sekmai	Manipur	Eastern
4.	Kalyani	West Bengal	Eastern
5.	Jamshedpur	Jharkhand	Eastern
6.	Una	Himachal	Northern
7.	Haridwar	Uttaranchal	Northern
8.	Ajmer	Rajasthan	Northern
9.	Nabha (Patiala)	Punjab	Northern
10.	Kanpur	Uttar Pradesh	Northern
11.	Jalandhar	Punjab	Northern
12.	Myladaturai	Tamil Nadu	Southern
13.	Chenglepet	Tamil Nadu	Southern
14.	Calicut	Kerala	Southern
15.	Vijaywada	Andhra Pradesh	Southern
16.	Guna	Madhya Pradesh	Western
17.	Akola (Dhanaj)	Maharashtra	Western
18.	Gandhar	Gujarat	Western

Annexure 2
(as referred to in Para 4.2.1 and 5.2)
Pipeline capacity utilisation

Sl. No.	Name of the pipeline	Owner	length (KM)	Year of commission	Capacity (MMT)	Throughput (MMT)				
						2014-15	2015-16	2016-17	2017-18	2018-19
POL pipelines										
1.	Barauni- Kanpur	IOCL	1125	1966	3.5	NA	2.401	2.519	2.257	2.769
2.	Guwahati- Siliguri	IOCL	435	1964	1.4	NA	1.877	1.953	1.832	1.818
3.	Haldia - Barauni	IOCL	526	1967	2.6	NA	3.151	3.212	3.309	3.722
4.	Haldia – Mourigram - Rajbandh	IOCL	277	1972	0	NA	0	0	0	0
5.	Koyali- Ahmedabad	IOCL	79	1966	1.1	NA	0.758	0.822	0.153	0.169
6.	Koyali- Sanganer	IOCL	1644	2003	5	NA	3.283	3.541	4.351	4.405
7.	Koyali- Ratlam	IOCL	265	2009	2	NA	1.388	1.463	1.452	1.487
8.	Koyali- Dahej Pipeline	IOCL	197	2006	2.6	NA	0.577	0.505	0.938	1.058
9.	Mathura- Tundla	IOCL	56	2003	1.2	NA	0.384	0.416	0.426	0.424
10.	Mathura- Bharatpur	IOCL	21	2010	0	NA	0.537	0.255	0.165	0.113
11.	Mathura- Delhi	IOCL	147	1982	3.7	NA	2.333	2.644	2.763	2.984
12.	Panipat - Ambala- Jalandhar	IOCL	495	1982	3.5	NA	2.761	2.964	3.06	3.172
13.	Panipat- Delhi	IOCL	189	1982	3	NA	1.618	1.153	1.1	1.311
14.	Panipat- Bathinda	IOCL	219	1996	1.5	NA	1.4	1.505	1.546	1.488
15.	Panipat- Rewari	IOCL	155	2004	2.1	NA	1.582	1.634	1.69	1.582
16.	Chennai - Trichy- Madhurai	IOCL	683	2005	2.3	NA	2.611	2.765	2.841	2.959
17.	Chennai- Bengaluru	IOCL	290	2010	2.45	NA	1.229	1.475	1.715	1.845
18.	Paradip Raipur Ranchi	IOCL	1073	2016	5	NA	0.014	0.912	3.169	3.839
	Sub-total IOCL		**7876**		**42.95**		**27.904**	**29.738**	**32.767**	**35.145**
1.	Mumbai-Manmad-Bijwasan	BPCL	1389		The pipeline is divided into i) Mumbai Manmad ii) Manmad Manglia and iii) Manglia Kota which are listed below hence utilisation is not separately given.					
2.	Mumbai-Manmad	BPCL	Na	1998	6	6.227	6.74	6.654	7.015	7.557
3.	Manmad-Mangaliya	BPCL	Na	2003	3.5	1.933	2.082	1.986	1.973	2.524
4.	Mangliya-kota	BPCL	Na	2007	2.2	0.681	0.781	0.734	0.915	1.216

Sl. No.	Name of the pipeline	Owner	length (KM)	Year of commission	Capacity (MMT)	Throughput (MMT)				
						2014-15	2015-16	2016-17	2017-18	2018-19
5.	Bina-Kota	BPCL	259	2011	4.4	2.548	2.88	2.966	3.387	3.049
6.	Kota-Piyala	BPCL	Na	2007	4.4	2.536	2.861	2.735	3.118	3.139
7.	Piyala-Bijwasan	BPCL	Na	2007	1	0.478	0.605	0.537	0.551	0.73
8.	Kota- Jobner	BPCL	211	2015	0.88	Not operational	0.144	0.394	0.579	0.593
9.	Cochin-Coimbatore-Karur	BPCL	293	2002	3.3	2.457	2.716	2.777	2.651	2.789
	Sub-total BPCL		**2213**		**25.68**	**16.86**	**18.809**	**18.783**	**20.189**	**21.597**
1.	Mumbai-Pune-Solapur	HPCL	508	1985	4.3	3.565	4.445	4.134	4.329	4.265
2.	Visakh-Vijaywada-Secunderabad	HPCL	572	2002	5.38	4.353	4.426	5.025	5.751	5.916
3.	Mundra- Delhi	HPCL	1054	2007	5	3.424	2.26	2.506	3.487	2.8
4.	Ramanmandi-Bahadurgarh	HPCL	243	2007	4.7/7.1	2.904	4.475	4.725	4.34	6.126
5.	Ramanmandi-Bathinda	HPCL	30	2011	1.1/2.1	0.638	0.84	0.867	0.852	1.013
6.	Awa- Salawas	HPCL	93	2014	2.3	0.019	0.684	0.602	0.722	0.737
7..	Bahadurgarh – Tikrikalan	HPCL	14	2015	0.7	0.008	0.532	0.537	0.528	0.435
8.	Rewari-Kanpur Pipeline	HPCL	443	2015	4.3/7.9	0	0.161	1.911	2.672	3.922
	Sub-total HPCL		**2957**		**28.78**	**14.911**	**17.823**	**20.307**	**22.681**	**25.214**
LPG Pipelines										
1.	Paradip-Haldia-Durgapur	IOCL	679	2017	1.27	Not operational			0.04	0.47
2.	Panipat-Jalandhar	IOCL	280	2008	0.7	0.71	0.77	0.78	0.74	0.79
	Sub-total IOCL		**959**		**1.97**	**0.71**	**0.77**	**0.78**	**0.78**	**1.26**
3.	Mumbai - Uran Pipeline*	BPCL	28	2014	0.4	0.056	0.288	0.314	0.261	0.238
4.	Mangalore-Hassan-Mysore Bangalore	HPCL	356	2016	1.94	0	0	0.115	0.783	0.961
5.	Jamnagar-Loni	GAIL	1414	2001	1.275	1.21	1.05	1.31	1.4	1.275
6.	Vizag-Secunderabad	GAIL	618	2004	0.29	0.28	0.27	0.35	0.39	0.43
	Sub-total GAIL		**2032**		**1.965**	**1.546**	**1.608**	**1.974**	**2.051**	**1.943**
	Total LPG Pipelines		**3369**		**5.875**	**2.256**	**2.378**	**2.869**	**3.641**	**4.164**

Annexure 3
(as referred to in Para 4.2.2)
Pipeline Shutdown - Analysis of reasons

Sl. No.	Pipeline	OMC	Period	Reasons
1.	Panipat Jalandhar Pipeline (PJPL)	IOCL	February to March 2015	Pigging was done on pipeline after four years as against annual basis as required by OISD Standard and PNGRB regulations resulting in pig getting stuck due to high quantity of muck. IOCL stated (March 2020) that the bulk moved by road for Jalandhar bottling plant during the shutdown period was 7,928 MT with additional logistic cost of ₹71 lakh (approx.). Non-adherence to safe pipeline operation management relating to frequency of pigging resulted into expenditure of ₹71 lakh on additional logistic cost.
2.	Koyali-Sanganer Pipeline (KSPL)	IOCL	2017	Non-evacuation of two segments of Koyali-Sanganer pipeline (KSPL) during replacement (2017) as required under Standard Operating Procedure for Pipe Cut and Replacement. The pig got blocked in pipeline due to the presence of muck which entered in the pipeline. IOCL stated (March 2020) that procedures were followed during construction and commissioning of KSPL. IOCL has not stated reasons for accumulation of muck entered while replacing pipeline section if the SOP was followed. The pipeline utilisation was affected due to accumulation of muck and pig getting stuck during pigging of pipeline.
3.	Haldia Barauni Pipeline/ Haldia Maurigram Rajbandh Pipeline (HBPL/ HMRL) Chennai Trichi Madurai Pipeline (CTMPL) Panipat Bhatinda Pipeline (PBPL) Chennai Bangalore Pipeline (CBPL) Guwahati Siliguri Pipeline (GSPL) Koyali Ratlam Pipeline (KRPL) Barauni Kanpur	IOCL	Various period during selected 10 months	Non-availability of ullage at marketing locations led to shutdown of pipeline, change in refinery production plan and deviation of monthly distribution plan. IOCL stated (March 2020) that IOCL had been making all efforts to maintain smooth operations of pipelines considering the fluctuations of demand at various Tap of Points. Further, efforts were also made to create ullages in spite of lower demand materialization by offering pipeline transfers to OMCs. Reply should be viewed in light of the fact that MDP numbers are decided in advance on the basis of demand forecasting. However, ullage constraints were found to be very frequent at many marketing locations. Non-availability of Ullage at marketing locations resulted in lower utilisation of pipeline.

Sl. No.	Pipeline	OMC	Period	Reasons
	Pipeline (BKPL) Panipat Ambala Jalandhar Pipeline (PAJPL) Koyali Dahej Pipeline (KDPL)			
4.	Viramgam-Kandla branch product pipeline (VKPL)	IOCL	Since 2012	Viramgam-Kandla branch product pipeline (VKPL) was laid (February 2009) to evacuate surplus products ex-Koyali Refinery (KR). During 2012-13 to 2016-17 the pipeline facility was near idling due to less availability from KR. The Company explored use of VKPL in the reverse direction by feeding the product from Kandla end with coastal inputs and pumping up to Viramgam and the reverse pumping facilities at Kandla was completed in March 2017. However, the facility remained idle due to non-availability of surplus products in Koyali Refinery for onward coastal movement. IOCL stated (March 2020) that this branch pipeline was never meant for handling consistent throughput. This pipeline was meant for use in exigencies, taking care of shortfall/ surplus products of Koyali Refinery and it fulfils the said requirement. The reply should be seen in the light of the fact that the average utilisation of pipeline was less than 10 *per cent* of the capacity. The Company had incurred ₹91 crore on installation of reverse pumping which also remain idle due to not precisely assessing of surplus capacity of Koyali Refinery while exploring use of VKPL in the reverse direction. Non-availability of sufficient product resulted in under utilisation of pipeline capacity.
5.	Vadinar-Kandla Pipeline (VKPL)	IOCL	N.A	VKPL pipeline is not in use since long and reason for non-utilisation is not provided to Audit. IOCL stated (March 2020) that Pipeline may be revived for operation subject to its integrity assessment and the integrity assessment work has been started. The Company has not provided reasons for not utilising the line.
6.	JNPT-Vashi Pipeline (JVPL)	IOCL	N.A.	JVPL pipeline was commissioned in April 2004. Since commissioning the supplies through this pipeline were not taking in full-fledged manner. Reasons for non-utilisation of pipeline were not given to Audit. IOCL stated (March 2020) that the prime source of receipt of product at Vashi Terminal is from HPCL Vashi. Hence, JVPL is a strategic pipeline being used to meet the demand of Vashi Terminal to the extent of requirement over and above the deficit from the exchanges from HPCL. The reply does not provide reasons for underutilisation of capacity of the pipeline, despite the same being strategic pipeline being used to meet the demand of Vashi Terminal.

Sl. No.	Pipeline	OMC	Period	Reasons
7.	Haldia-Maurigram-Rajbandh Pipeline (HRMBPL)	IOCL	March 2019	Throughput of HMRBPL was on lower side (around 17.4 *per cent*) due to discontinued dosing of Drag-reducing agent (DRA)[1]. Further, in spite of reduced flow rate, injection of drag reducing agent was not explored due to non-availability of booster pump at Guwahati Refinery. IOCL stated (March 2020) that no injection (mixing) of DRA is done at present, trials to resume soon. Regarding non-injection of DRA, management stated that during MS pumping, trial was taken with DRA, however, pumps tripped in low suction. Fact remains that non injection of drag reducing agent has reduced the pipeline efficiency.
8.	Mahul-Uran Joint Venture LPG pipeline, HPCL	BPCL/ HPCL	2014-15 to 2018-19	Due to dispute between HPCL & BPCL over storage charges and its Operation and Maintenance charges towards provision of additional storage for HPCL, signing of the agreement is delayed. Ministry stated that the full utilisation of company's share of MUPL capacity was also dependent on completion of extension of UCSPL pipeline, which was commissioned in November 2019. The signing of agreement for MUPL/ UCSPL pipeline systems is being pursued with BPCL for early conclusion. However, it does not affect pipeline capacity utilisation. The capacity of the pipeline was being under utilised prominently due to disputes between the two public Sector Oil Marketing Companies.
9.	HSD line between IOC Panipat to BPC Panipat	BPCL	14.10.2016 to 23.12.2016	The pipeline was under repair for the period from 14.10.2016 to 23.12.2016 for the leakage in HSD underground pipeline section. BPCL did not provide reply to the observation.
10.	Kota Jobner pipeline	BPCL	1.4.2015 to 13.7.2015	Due to non- availability of product and non-availability of storage tanks at Jobner, the pipeline could not be used 104 days and was idle; BPCL continued to supply the product to Jobner by road/ rail. BPCL stated (March 2020) that during April 2015 to June 2015 there was severe product crisis for entire Oil Industry and HSD, SKO tanks were completed on 30 June 2015. Thus, it is evident that BPCL could not use the pipeline due to non - availability of Ullage at Jobner Terminal.

[1] ***Drag-reducing agents (DRA) are additives in pipelines that reduce turbulence in a pipe. Usually used in petroleum pipelines, they increased the pipeline capacity by reducing turbulence and therefore allowing the oil to flow more efficiently.***

Sl. No.	Pipeline	OMC	Period	Reasons
11.	MDPL & ASPL	HPCL	2014-15 to 2018-19	The pipeline was underutilised to range from 45 to 70 *per cent* during 2014-15 to 2018-19. Further, the pipelines were shut down for maintenance works for 85.16 hrs during the period 2014-15 to 2018-19. HPCL stated (March/ April 2020) that MDPL was designed to deliver product to Rewari and Bahadurgarh. However, after commissioning of RBPL, these two locations are fed from HMEL Refinery through RBPL leading to lower throughput in MDPL. Ministry stated that after JV refinery, HMEL Bathinda, was commissioned, the supply deficit requirement for northern market thru MDPL has reduced. HMEL Refinery capacity utilisation has also been increasing more than the name plate capacity during the past 5 years. From the reply of HPCL it can be seen that under utilisation was due to availability of alternative pipeline to deliver the product to the same market. The Ministry as well as HPCL did not provide specific reasons relating to shutdown of pipelines for maintenance works for 85.16 hrs during the period 2014-15 to 2018-19.
12.	Manglore Hassan Mysore Sulur Bangalore pipeline (MHMSPL)	HPCL	2016-17 to 2018-19	The pipeline was under utilised to range from 40 to 50 *per cent* during 2016-17 to 2018-19. Further, this pipeline was shut down for 36.07 hrs from 2016-17 to 2018-19 due to maintenance work. HPCL stated (March/ April 2020) that Pipeline was designed considering BPCL requirements till Solur, however due to non-execution of Offtake agreement with BPCL, Pipeline was terminated till Yediyur only. Ministry stated that BPCL is not utilising the pipeline. Even without offtake agreement, HPCL is utilising the line for its full requirement. HPCL has also taken up 700 Km branch line work from Hassan to Cherlapalli. The pipeline capacity utilisation will further improve upon commissioning of this branch pipeline. The 36.07 hrs maintenance shutdown hours is nominal and are required for maintaining 24x7 running equipment. It can be observed that disagreement between two OMCs resulted in under utilisation of the pipeline.
13.	Mangalore to Bangalore section	HPCL	April 2014 to March 2019	The pipeline was under utilised and only HSD was transported through pipeline. HPCL stated (March/ April 2020) that though the pipeline was designed for transfer of MS also from Mangalore to Bangalore, only HSD was received through pipeline and MS was received through tank wagons. Ministry stated that IOCL and BPCL reduced their participation in Hassan–Bengaluru section and started meeting their Bengaluru requirement with their own/ JV refinery products ex Chennai, Kochi etc. Line fill quantity of this section is 38

Sl. No.	Pipeline	OMC	Period	Reasons
				TKL and HPCL Bengaluru HSD demand is around 34 TKL per month. Thus, continuous displacement of HSD line fill and accommodating the interface generated with HPCL lone MS requirement has not been found feasible. Hence, MS had to be moved using next economic alternative of Rail. It can be observed that reduced participation by IOCL and BPCL in the pipeline project resulted in under utilisation.
14.	Bahadurgarh-Tikrikalan Pipeline (BTPL)	HPCL	2018-19	The pipeline was under utilised in 2018-19. HPCL stated (March/ April 2020) that utilisation of BTPL came down in 2018-19 by 70,831 MT (MS/ HSD) as compared to previous year due to low demand at Tikrikalan. Ministry agreed with the Audit comment and stated that the reduction in Industry demand is observed to be due to relative changes in Delhi/ adjoining state auto fuel tax rates, environmental restrictions & promotion of greener fuels like CNG etc. Thus, it could be observed that lower utilisation of pipeline was due to low demand than the quantity that could be transported through the pipeline.
15.	Barauni-Kanpurpipeline	IOCL	March 2019 & June 2019	Actual flow rate of Barauni-Kanpur pipeline (BKPL) of IOCL remained 454 KL/ hour against planned flow rate of 472.44 KL/ hr during March 2019. Similarly, in June 2019, BKPL could achieve pumping of only 229.5 TMT against MDP of 242.61 TMT, which was mainly due to simultaneous non-operation of both pipelines (12" and 20") of BKPL on account of ullage constraints at Patna and Mughalsarai. IOCL has not commented on the issue. Thus, due to ullage constraints, the utilisation of pipeline was low.
16.	Lines to Haldia Barauni and Haldia-Mourigram-Rajbandh manifold	IOCL	NA	Product density variation due to layering of products in Haldia Refinery tanks led to frequent shutdown of pipeline. In view of deteriorating and poor condition of the incoming marketing lines to Haldia Barauni and Haldia-Mourigram-Rajbandh manifold, it was essential to repair and maintain such lines by marketing division to avoid any safety hazard. However, in spite of long perusal for the matter by pipeline division for more than a year, no action has been taken till date. IOCL stated that all repairing work of incoming marketing lines at Haldia Barauni has been completed now. Thus, due to low maintenance of marketing lines there was lower utilisation of the pipeline capacity.

Sl. No.	Pipeline	OMC	Period	Reasons
17.	Guwahati Siliguri Pipeline	IOCL	NA	At Guwahati pump station of IOCL, frequent chocking of booster pump with metal particles, chips and foreign particles was being noticed in pipeline (ex-Guwahati Refinery). Resultantly, due to ingress of such foreign particles, impeller, carbon bushing, seal of Booster pumps got damaged. Such instances frequently hampered pipeline operation resulting in unplanned shutdowns and throughput loss and same was communicated to refinery however, same remained unresolved. IOCL stated (March 2020) that tank maintenance activities are being taken up by Refinery division and strainers might be installed in outlet of those identified tanks through which these foreign particles are coming. The lower utilisation of the pipeline was due to non-availability of booster pump.
18.	Barauni Kanpur Pipeline	IOCL	NA	HSD pumping towards Amlekhgunj could not be achieved in Barauni Kanpur Pipeline (BKPL) due to non–availability of adequate pumping/ boosting infrastructure at Barauni and Patna station. In this regard, Eastern Region of Pipeline division was requested to expedite replacement of old engine at Barauni as well as installation of boosting pump at Patna Station to resolve the constraint and to enable HSD. IOCL has not intimated status of the same. The lower utilisation of the pipeline was due to non-availability of booster pump.

Annexure 4
(As referred to in Para 4.2.2 (iii))
Variations in movement of MS and HSD in Indian Oil Corporation Ltd. as against planned movement due to sourcing of product from other sources because of non-availability of pipeline

Date/ Year	Location	Product	Planned	Actual	Qty (TMT)	Expenditure incurred on alternative modes (₹ in crore)
			Source/ Mode	Source/ Mode		
April 2016	Kanpur	HSD	Barauni BKPL	Haldia Rail	2.7	0.31
April 2016	Najibabad	BS IV MS	Panipat MJPL	Panipat Rail	1.2	0.08
April 2016	Najibabad	SKO	Panipat MJPL	Panipat Rail	1.3	0.07
June 2016	Baitalpur	HSD	Barauni BKPL	Haldia Rail	5.1	0.09
July 2016	Jalandhar	HSD	Panipat PAJPL	Panipat Rail	7.7	0.48
August 2016	Mughalsarai	MS	Barauni BKPL	Barauni Rail	2.0	0.14
August 2016	Mughalsarai	HSD	Barauni BKPL	Barauni Rail	0.5	0.03
August 2016	Rajbandh	HSD	Siliguri Rail	Bongaigaon Rail	5.4	0.02
October 2016	Ajmer	HSD	Koyali KSPL	Bharatpur Road	2.3	0.57
October 2016	Ajmer	BS IV HSD	Koyali KSPL	HPC Ajmer Road	0.5	0.03
December 2016	Shankari	BS III MS	Chennai CTMPL	BPC Kochi Rail	3.1	0.21
December 2016	Shankari	BS III MS	Chennai CTMPL	Chennai Rail	2.7	0.21
December 2016	Shankari	BS III MS	Chennai CTMPL	BPC Karur Road	0.5	0.06
December 2016	Shankari	BS III MS	Chennai CTMPL	Koyali Rail	2.4	0.92
December 2016	Shankari	BS IV MS		Paradeep Rail	2.5	0
June 2017	Najibabad	BS IV MS	Panipat PAJPL	Panipat Rail	2.6	0.16
July2017	Jaipur	BS IV MS	Koyali KSPL	Jodhpur Road	4.2	0.68
July2017	Jaipur	BS IV MS	Koyali KSPL	Bharatpur Road	0.9	0.15
July 2017	Jaipur	BS IV MS	Koyali KSPL	BPC Jaipur Road	0.4	0.03
July 2017	Jaipur	BS IV MS	Koyali KSPL	Rewari Road	0.6	0.09
July2017	Jodhpur	BS IV MS	Koyali KSPL	Koyali Rail	1.2	0.31
July 2017	Jodhpur	BS IV MS	Koyali KSPL	Kandla Rail	4.9	0.24
July 2017	Jodhpur	BS IV MS	Koyali KSPL	Panipat Rail	1.2	0.31

Date/ Year	Location	Product	Planned	Actual	Qty (TMT)	Expenditure incurred on alternative modes (₹ in crore)
			Source/ Mode	Source/ Mode		
July-17	Jodhpur	BS IV MS	Koyali KSPL	Ratlam Rail	2.0	0.33
July 2017	Jodhpur	HSD	Koyali KSPL	Ratlam Rail	3.2	0.54
July 2017	Jodhpur	MS	Koyali KSPL	Mathura Rail	2.5	0.55
July 2017	Jodhpur	HSD	Koyali KSPL	Mathura Rail	2.5	0.56
July 2017	Mughalsarai	HSD	Barauni BKPL	BPC Rangapani Rail	5.2	0.69
July 2017	Mughalsarai	MS	Barauni BKPL	Mathura Rail	2.8	0.38
July 2017	Mughalsarai	HSD	Barauni BKPL	BGR Rail	1.8	0.23
July 2017	Mughalsarai	MS	Barauni BKPL	BGR Rail	0.7	0.09
July 2017	Chittorgarh	MS	Koyali KSPL	Ratlam Road	0.8	0.1
July 2017	Rajbandh	HSD	Haldia HMRPL	Paradeep Rail	8.0	0.78
September 2017	Chittaurgarh	MS	Koyali KSPL	Ratlam Road	0.2	0.02
September 2017	Jodhpur	BS IV HSD	Koyali KSPL	Ratlam Rail	5.3	0.94
September 2017	Jodhpur	HSD	Koyali KSPL	Panipat Rail	6.0	1.45
April 2018	Partapur	HSD	Mathura MJPL	Mathura Rail	2.7	0.12
April 2018	Partapur	HSD	Mathura MJPL	Panipat Rail	5.2	0.28
May 2018	Partapur	HSD	Mathura/ MJPL	Mathura Rail	2.6	0.11
June 2018	Rajbandh	HSD	Siliguri Rail	BGR Rail	5.1	0.02
July 2018	Partapur	HSD	Mathura-IOC MJPL	Panipat Rail	4.8	0.26
July 2018	Barauni	HSD	Haldia Ref-IOC HBPL	Halida Ref Rail	5.3	0.63
August 2018	Chittorgarh	MS	Koyali KSPL	Jodhpur Road	0.2	0.05
October 2018	Partapur	HSD	Panipat MJPL	Panipat Rail	23.3	0.93
November 2018	Partapur	HSD	Panipat MJPl	Panipat Rail	2.7	0.11

Date/ Year	Location	Product	Planned	Actual	Qty (TMT)	Expenditure incurred on alternative modes (₹ in crore)
			Source/ Mode	Source/ Mode		
December 2018	Partapur	HSD	Panipat Rev-MJPL	Panipat Rail	2.6	0.09
March 2019	Lucknow	MS	Barauni BKPL	Mathura Rail	5.2	0.39
March 2019	Rajbandh	HSD	Haldia HMRPL	Siliguri Rail	5.3	0.94
March 2019	Kandla	HFHSD	Koyali KSPL	Koyali Rail	10.9	0.92
					Total	**16.70**

BKPL	Barauni-Kanpur Pipeline
CTMPL	Chennai-Trichi-Madurai Product Pipeline
HBPL	Haldia-Barauni Product Pipeline
HMRPL	Haldia-Mourigram-Rajbandh Pipeline
KSPL	Koyali-Sanganer pipeline
MJPL	Mathura-Jalandhar Product Pipeline
PAJPL	Panipat-Ambala Jalandhar Pipeline

Annexure 5
(as referred to in Para 4.7.1 (b))
Delay in delivery of cylinders at Cherlapalli and Rajamundry Bottling Plants

Cherlapalli Bottling Plant				Rajamundry Bottling Plant			
Year	**Total number of cylinders delivered**	**Details of cylinders delivered within the norm of two days**		**Total number of cylinders delivered**	**Details of cylinders delivered within the norm of two days**		
		No. of cylinders	***Per cent***		**No. of cylinders**	***Per cent***	
2014-15	11727637	5854132	49.92	7169296	3001764	41.87	
2015-16	11777154	6915855	58.72	7680919	6005176	78.18	
2016-17	12528797	8029002	64.08	8246384	6664648	80.82	
2017-18	13498949	7060361	52.30	8893700	6661202	74.90	
2018-19	14235125	7729914	54.30	9247839	7439512	80.45	
Total	**63767662**	**35589264**	**55.81**	**41238138**	**29772302**	**72.20**	

Cylinders delivered by dealers under LPG bottling plant

Year	**Cherlapalli**						**Rajamundry**					
	No. of cylinders delivered between						**No. of cylinders delivered between**					
	3 – 30 days	**31 – 60 days**	**61 – 90 days**	**91-180 days**	**181 -365 days**	**More than 365**	**3 – 30 days**	**31 – 60 days**	**61 – 90 days**	**91-180 days**	**181 -365 days**	**More than 365**
2014-15	5852718	19472	994	262	52	7	4086931	79821	690	81	6	3
2015-16	4849460	10174	1327	303	34	1	1674926	672	102	40	2	1
2016-17	4489033	8607	1466	549	99	41	1580651	738	186	125	35	1
2017-18	6418955	17391	1484	649	93	16	2218816	9075	2574	1965	67	1
2018-19	6470054	28677	4133	2116	231	0	1806473	1569	138	144	3	0
Total	**28080220**	**84321**	**9404**	**3879**	**509**	**65**	**11367797**	**91875**	**3690**	**2355**	**113**	**6**

Annexure 6

(as referred to in Para No. 6.2)

Recommendations of external safety audits by Oil Industry Safety Directorate which are pending for more than three years as on 31 March 2021

Sl. No.	Installation/ bottling plant	Pending observations of external safety audits by Oil Industry Safety Directorate
Indian Oil Corporation Limited		
1.	Allahabad Terminal	Damage to life and equipment because of thermal radiation. Mitigation measures to be implemented.
2.	Jatni Depot	Unauthorised entry to the Depot area and hence Depot applied district authorities to declare the area as restricted entry area. The same to be expedited.
3.	Vizag Terminal	Over spilling possibility during receipt of products and hence auto level gauges as per OISD Standard to be provided.
4.	Patna	Resitement of the terminal with fixed target date due to absence of sprinkler and foam systems in tanks, High Volume Long Range (HVLR), Medium Expansion Foam Generator (MEFG), Hydro-Carbon Detector (HCD), automation etc.
Bharat Petroleum Corporation Limited		
1.	Mughalsarai	Swivel joint type roof drain is prone to failure and to be replaced by pivot master flexi pipe system.
2.	Ranchi	Non conformity to OISD standard. Purchase Order has been placed for MOV.
3.	Ranchi	Non conformity to OISD standard. Purchase Order has been placed for Radar Gauge.
4.	Dhanbad	Non conformity to OISD standard. Due to space constraints not possible to provide fall arrestor at existing TWD siding. BPCL is constructing new depot at Bokaro and will be commissioned in 2020-21.
5.	Dhanbad	Non conformity to OISD standard. No space is available and not possible in existing TWD siding.
6.	Dhanbad	Non conformity to OISD standard. MOVs shall be provided in all Tanks which will be looped with HLS (AOPS). PO has been placed.
7.	Dhanbad	Non conformity to OISD standard. Purchase Order has been placed for Radar Gauge.
8.	Udaipur	Lightning protection system as per clause 6.1.1 and 8.3 of OISD-GDN-180 has not been provided on the plant sheds e.g. Filling shed, TLD, LPG Pump House. Draft Report received from EIL is under discussion with OISD.

Sl. No.	Installation/ bottling plant	Pending observations of external safety audits by Oil Industry Safety Directorate
9.	Bareilly	Inter distances are not as per OISD standard, clause 5.8 for the followings: - (A) Distance between TLD and fire water storage tank is 52 meters only against requirement of 60 meters. (B) Distance between filling shed and the fire pump house is only 25 meters against requirement of 60 meters. (C) Distance between fire water storage tank and filling shed is only 36 meters against requirement of 60 meters. (D) Distance between filling shed and air compressor shed (non FLP) is only 25 meters against requirement of 30 meters. Project work is in progress.
10.	Sinner	Lightning protection not provided for the facilities inside the hazardous area as per OISD-GDN-180. Plant has submitted e-mail communication stating the decision of removal of Lightning arrestors. Draft Report received from EIL is under discussion with OISD.
11.	Lalru	Sheds earthing system (lighting protection system) is not in line with OISD standard. Draft Report received from EIL is under discussion with OISD.
12.	Jhansi	Sheds earthing system (lighting protection system) is not in line with OISD standard. Draft Report received from EIL is under discussion with OISD.
Hindustan Petroleum Corporation Limited		
1.	Manglia	Conversion of two external floating roof tanks (TK01, TK14) to internal floating roof. Work is in progress.
2.	Manglia	Sprinkler system to be provided at Tank Wagon Siding. IOC is the siding co-ordinator and they are in the process of executing the job. Purchase order placed by IOC for execution of the job.
3.	Manglia	Compliance of one pending recommendation of QRA related to relocation of fire water tank. Dismantling of existing firewater tanks and construction of new Firewater tank is undertaken in the Depot Revamp project.