



**SPECIAL STUDY REPORT ON  
HIGH SPEED DIESEL  
UTILIZATION IN  
LOCOMOTIVES**

**Audit Year 2022-23**

**AUDITOR-GENERAL OF PAKISTAN**



## **PREFACE**

The Auditor-General of Pakistan conducts audit in terms of Articles 169 and 170 of the Constitution of the Islamic Republic of Pakistan 1973, read with sections 8 and 12 of the Auditor-General's (Functions, Powers and Terms and Conditions of Service) Ordinance, 2001. The "Special Study on High Speed Diesel Oil Utilization in Locomotives" was carried out accordingly.

The Directorate General of Audit Railways has conducted special study during Audit Year 2022-23 with a view to report significant issues to stakeholders. Audit examined the policies & procedures and data related to HSD oil utilization in locomotives. Audit also assessed, whether the management complied with applicable laws, rules & procedures and endeavored to identify the issues in HSD oil utilization with an aim to provide practical solutions and useful input for pragmatic policy formulation. This study indicates specific actions that, if taken, will help the management in efficient utilization of HSD oil in order to curtail operational cost. The study has been finalized in light of management replies as well as discussions in DAC meeting.

The special study report is submitted to the President of Pakistan in pursuance of Article 171 of the Constitution of the Islamic Republic of Pakistan 1973, for causing it to be laid before both houses of Parliament.

**Islamabad**  
**Dated: 18.07.2024**

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**(Muhammad Ajmal Gondal)**  
**Auditor-General of Pakistan**



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## **ABBREVIATIONS AND ACRONYMS**

AGM	Additional General Manager
BTO	Bogie Tank Oil
CBI	Computer Based Interlocking Signaling System
CCM	Chief Commercial Manager
CDWP	Central Development Working Party
CEN/OL	Chief Engineer Open Line
CEO	Chief Executive Officer
CME	Chief Mechanical Engineer
CMM	Chief Marketing Manager
COPS	Chief Operating Superintendent
CPEC	China-Pak Economic Corridor
CRR	Clear Railway Receipt
CTM	Chief Traffic Manager
DE Loco	Diesel Electric Locomotive
FA&CAO	Financial Advisor and Chief Accounts Officer
GEU-40	General Electric US – 40 Locomotives
GMU-30	General Motors Universal – 30 Locomotives
GTKM	Gross Tone Kilometer
HP	Horse Power
HSD	High Speed Diesel
IEA	International Energy Agency
IR	Indian Railways
KM	Kilometer
KWH	Kilowatt
LOMS	Locomotive on Miscellaneous Services
Ltr	Liter
ML-1	Main Line – 1
MoR	Ministry of Railways
NLC	National Logistic Cell
P&D	Planning and Development
PAO	Principal Accounting Officer
PARC	Pakistan Agricultural Research Council

POL	Petroleum Oil And Lubricants
PR	Pakistan Railways
PRACS	Pakistan Railway Advisory and Consultancy Services
PSDP	Public Sector Development Programme
RKM	Route Kilometer
SAI	Supreme Audit Institution
SOP	Standard Operating Procedure
ToRs	Term of References
UK	United Kingdom
ZCU-20	Ziyang China Universal - 20 Locomotives

## GLOSSARY OF TERMS

Crossing of trains	Passing of trains on a single track in opposite direction by diverting the one train from main line to loop line/passing sidings
Diesel Loco Shed	An industrial set up, where repair and maintenance works of diesel locomotive is carried out, so as to keep the loco working properly
Diesel traction system	A mode of traction in which diesel engine driven generators installed on the locomotive itself supply the electric power to move traction motors
DS-6 ledger	Locomotive, department and shed wise record regarding issuance and receipt of HSD oil
Electric traction system	A mode of traction in which the motive power which hauls the trailing load is propelled by electrical energy which is not generated in locomotive. Electric power derived from overhead wires to move traction motors
Fuel Balance Return (FBR) (OP-43/31)	Receipt and issuance position of HSD oil in a Shed
GM-31	Division-wise grand summary of receipt, issuance, consumption and balance of HSD oil
Heavy locomotive	Locomotives having engine capacity 3000 HP and above
Idle running of locomotive	Running a locomotive's engine while the locomotive is not in motion and standing idle
Light engine/locomotive	Operation of a locomotive without a train load for relocation or operational reasons
LOMS services	Working of locomotives within premises of Diesel Loco Shed
OP-1	Statement showing the detail of HSD oil supplied by PSO (supplied in oil tankers (BTOs))
OP-4 & 6	Summary of issuance of HSD oil to other sheds and other Departments
OP-27	Fuel form maintained by loco driver in respect of HSD oil Receipt, consumption and balance

OP-28	Monthly summary of issuance and consumption of HSD oil in respect of each locomotive
OP-73	Monthly statement showing the class wise/service wise (i.e. passenger locos, goods locos and shunting locos etc) consumption of HSD oil
OP-9	Statement showing the total issuance of HSD oil to locos and different departments
Precedence of trains	Passing of travelling trains in same direction by diverting the one from main line to loop line in standing position
Shed consumption	Burning of HSD oil by locomotives while working within the premises of Diesel Loco Shed
Shunting locomotives	A shunting loco is a small railroad locomotive usually having engine capacity up to 1500 HP intended not for moving trains over long distances but rather for assembling trains ready for a road locomotive to take over, disassembling a train that has been brought in, and generally moving railroad cars around a process usually known as shunting locomotive
Shunting services	The process of sorting items of rolling stock into complete trains, or the reverse
Trip ration	Trip ration is the quantum of section wise diesel consumption fixed in respect of diesel locomotive

## **EXECUTIVE SUMMARY**

The Directorate General of Audit Railways conducted special study on High Speed Diesel Oil Utilization in Locomotives. The main objectives of the study were to review the consumption pattern of HSD Oil in locomotives on train operations, locos on shunting, issues in refueling and repair and maintenance etc. The study also focused on the assessment of presence of sufficient effective controls in fuel management.

During the year 2021-22, Pakistan Railways (PR) operated 31,808 passenger trains and 6195 goods trains and carried 35.68 million passengers and 8.10 million tons freight. PR had 380 operational diesel electric locomotives and 14 loco sheds where locomotives were being refueled. The receipt, issuance and consumption of HSD oil is recorded manually in all loco shed except Lahore. During the year 2021-22, PR utilized 123.72 million liters HSD oil valuing Rs 17.38 billion in locomotives. PR consumed 25.56 million liters excess fuel valuing Rs 3,589.71 million in locomotives due to detention of locomotives/trains, idle running of locomotives, elongated shunting, refueling and miscellaneous services.

Audit used internationally recognized benchmark SFC (specific fuel consumption) for measuring the fuel efficiency in train operations. Unit of SFC used is in Liters/1000 GTKM (Quantity of fuel consumed measured in liters and work done in 1000 GTKM). The average consumption of fuel ranging from 4 to 4.5 liters/1000 GTKM for Passenger trains and for Goods trains it is 2.25 to 2.75 liters/1000 GTKM.

Since independence of Pakistan, PR has not formulated fuel consumption and monitoring policy which causes excess and wasteful consumption of fuel in locomotives every year. This special study suggests that fuel monitoring and consumption policy may be formulated by specifying reporting and responsibility of excess consumption. Standard Operating Procedures (SOPs) in respect of fixation of standard time for refueling of locomotives on train operations and locos on shunting of freight and passenger trains may be issued. Moreover, SOPs in respect of fixation of trip ration, fuel consumption by locomotives on

miscellaneous services, idle running of locomotives and shed consumption may also be issued. DAC meeting was held on 31.10.2023 to finalize the study.

**Key Audit Findings:**

- i. Absence of holistic policy for fuel consumption and monitoring.
- ii. Wasteful consumption of fuel due to delay in trains –Rs 1,614.83 million.
- iii. Excess consumption of fuel due to utilization of heavy locomotives on passenger train and shunting services – Rs 1,273.00 million.
- iv. Misappropriation of HSD oil due to non-accountal of fuel as per dispensing meters – Rs 1,210.85 million.
- v. Excess consumption of fuel due to speed restrictions – Rs 675.12 million.
- vi. Theft and fraudulent issuance of fuel – Rs 515.69 million.
- vii. Non-fixation of trip rations and irrational fixation of quota for LOMS resulting in excess consumption of HSD oil – Rs 339.21 million.
- viii. Avoidable excess consumption of fuel on shunting, refueling and idling of locomotives – Rs 84.91 million.

**Recommendations:**

- i. Fuel monitoring and consumption policy may be formulated by specifying reporting and responsibility of excess consumption.
- ii. The process of receipt, issuance and consumption of HSD oil in all loco sheds may be automated in analogy to loco shed, Lahore.
- iii. Locomotives be utilized for the purpose they were procured. The utilization of locos with passenger and freight trains may be according to their sanctioned load.

- iv. Shunting services at all sheds be made with the help of light locomotives and heavy locomotive (GEU-40) be utilized on freight services for optimum yield.
- v. Course corrective measures be adopted to avoid en-route detention on account of crossings, precedence, delay in closing of level crossing's gates and failure of signaling system to minimize excess consumption of fuel.
- vi. SOPs be issued in respect of fixation of standard/allowed time for refueling of locomotives, shunting of freight and passenger trains.
- vii. Book keeping regarding issuance of fuel as per dispensing meter at all fueling points be ensured.
- viii. Issues regarding excess consumption of fuel on shunting, refueling and locomotive idling be probed to fix the issue at acceptable level as per best practices in the world.
- ix. Minimize the temporary speed restriction over rail-network to avoid excess fuel consumption due to unnecessary detention of trains.
- x. Mis-appropriation, theft and fraudulent issuance of fuel be probed to fix responsibility against persons found at fault.
- xi. Trip ration be fixed on rational grounds by considering the survey of Loco Inspector to minimize the unnecessary margin and for better monitoring over fuel consumption.
- xii. Annual allocation of fuel for locomotives on account of miscellaneous services (LOMS) for all sheds be determined on rational basis. SOPs be framed to control and monitor the consumption of fuel on account of LOMS.
- xiii. Inquiries either directed by DAC or otherwise be processed and finalized at the earliest.

## **1. Introduction**

Pakistan Railways is a Federal Government department with the aim to provide a competitive, safe, reliable, market oriented, efficient and environment-friendly mode of transport. The transport sector is considered as one of the driving forces of economic growth and social development.

PR had a fleet of 380 operational DE locomotives consisting of 133 new locomotives and 247 special repaired/rehabilitated locomotives as on 04.10.2021. Over the last six years from 2016-17 to 2021-22, annual consumption of HSD oil in Pakistan Railways is about 144 million liters<sup>1</sup> and to meet this demand Pakistan Railways entered into a running contract for the supply of HSD oil with Pakistan State Oil. Pakistan Railways has 14 loco sheds with storage capacity equivalent to 16.46 million liters HSD oil which is sufficient for 52 days consumption as per average daily consumption of 321,070 liters. Pakistan Railways has no policy for maintenance of minimum inventory of HSD oil which is very perilous for healthy performance of PR. PR maintained only 01 to 03 days stock of HSD oil.

During 2021-22, PR procured 145.54 million liters HSD oil, out of which 125.77 million liters (85%) was issued to locomotives and 17.09 million liters (15%) was issued to power vans and other departments. Expenditure on HSD oil represents 60% at an average of the total operational expenditure of PR from 2017-18 to 2021-22. During 2021-22, PR consumed 123.72 million liters HSD oil valuing Rs 17,378.95 million which is 69% of operational expenditure. Annual average HSD Oil consumption was 3.98 liters per1000 GTKM in 2012-13 which gradually increased and it reached at 4.78 liters per1000 GTKM (20% increase) in 2021-22. Avoidable fuel consumption in locomotives of 25.56 million liters valuing Rs 3,589.71 million has been discussed in proceeding chapters of the study.

### **1.1 Purpose of organization:**

To provide a competitive, safe, reliable, market oriented, efficient and environment friendly mode of transportation.

## **1.2 Rules/ Regulations governing the organization:**

The legal framework for Pakistan Railways is Railways Act 1890. Subject to the provisions of this act, Ministry of Railways is the executive authority. By virtue of the delegation made under Section 4 of the Railways Board Ordinance 1959, all the functions and powers of the Federal Government, under the Railways Act, 1890, are exercised by the Ministry of Railways (Railway Board).

## **1.3 Layout of internal control system of organization:**

Internal controls refer to the policies, rules and regulations made within the organization to ensure that activities are being carried out efficiently and effectively resulting in safeguarding of the organizational assets and compliance with the relevant statutory requirements/standards and established rules and practices.

Strategic level management of Pakistan Railways, which includes Railway Board, Principal Accounting Officer, Chief Executive Officer, Financial Advisor & Chief Accounts Officer and other Principal Officers, is responsible for achievement of the objectives of the organization as stated in the mission statement. In pursuance of these objectives, various internal controls have been developed and their effective implementation provides reasonable assurance for achievement of the stated objectives. However, these controls at times remain ineffective resulting in accidental losses and operational inefficiencies.

Procurement, custody and issuance of HSD oil is the responsibility of MoR, Additional General Manager (Traffic) whereas Chief Operating Superintendent is the operational monitoring unit.

## **2. Salient Features of the Study**

This study will help to identify wasteful and excess consumption of HSD oil in locomotives and way forwarded to minimize the fuel losses.

## **2.1 Purpose of the study**

Study was intended to:

- i. examine the utilization of HSD oil in train operation (Passenger and Freight)
- ii. examine the utilization of HSD oil in locomotives during repair and maintenance
- iii. analyze the utilization of HSD oil in locomotives on miscellaneous services and trip ration
- iv. review any other significant issue related to HSD oil consumption

## **2.2 Scope of study**

The special study on High Speed Diesel Oil Utilization in Locomotives was conducted during the year 2022-23 for the period from July 2021 to June 2022. Due to resource constraints, the data/record at only two sheds/locations i.e. Lahore and Karachi Division was examined in detailed and at PR Headquarters office the summarized data/record of all sheds/locations was examined.

## **2.3 Beneficiary of Study**

Pakistan Railways, Ministry of Railways, Parliament, Passengers, Freight customers, HSD oil suppliers and general public.

## **3. Study Design**

### **3.1 Time Period**

This special study on HSD oil utilization covered the FY 2021-22.

### **3.2 Data**

Primary data regarding utilization/consumption of HSD oil in locomotives on train operation, consumption of HSD oil on shunting and miscellaneous services was taken from Pakistan Railways Headquarters office, Lahore and Karachi division. Published Year Books of Pakistan Railways and Financial Statements of PR were also consulted. However,

secondary data has been accessed through different studies on fuel economies and feasibility study on Railway Electrification (Peshawar to Karachi and Rohri to Quetta).

### **3.3 Methodology**

Audit used internationally recognized benchmark SFC (specific fuel consumption) for measuring the fuel efficiency in train operations. Unit of SFC used is in Liters/1000 GTKM (Quantity of fuel consumed measured in liters and work done in 1000 GTKM). Further, analytical procedures performed through data analysis of HSD oil consumption patterns. Examination of relevant record through site visits and discussions with the management was made. Gap analysis of consumption behaviors through sequential evaluation was also made.

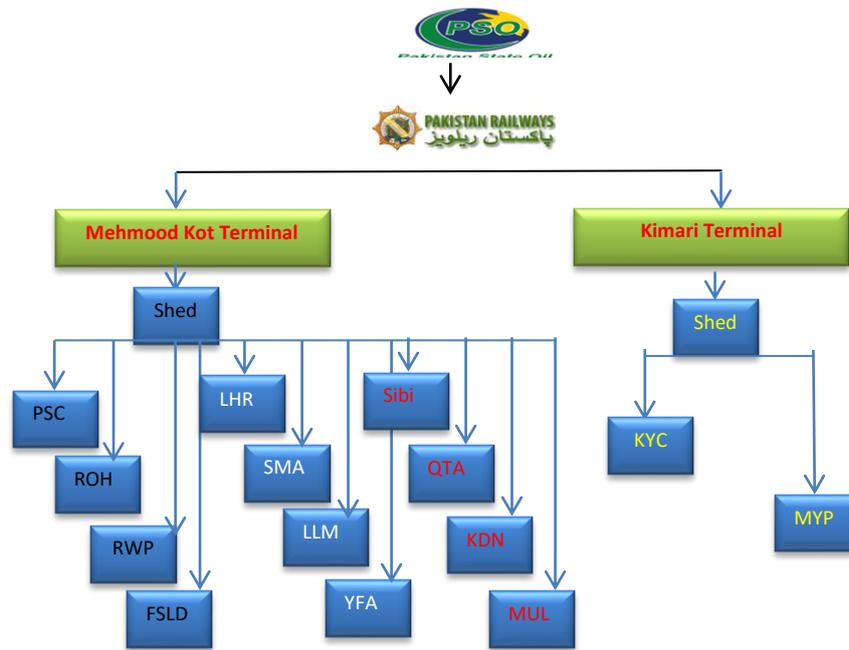
## **4. Data Analysis**

Causes of wasteful and excess consumption of HSD oil had been identified through inspection of record regarding oil receipt, issuance and consumption i.e. GM-31, OP-73, Fuel Balance Return, OP-28 of each locomotive by using analytical procedures. Data was analyzed and impact has been estimated with respect to different variables that included infrastructure, unmanned level crossings, rolling stock management.

## **5. Results**

### **5.1 Procurement and Consumption of HSD Oil (For passenger and freight trains operations)**

HSD oil is the most significant operational expense for Pakistan Railways. Properly managing and monitoring of fuel usage can lead to significant savings, reduced emissions and improved operational efficiencies. Pakistan Railways procured HSD oil only from Pakistan State Oil (PSO) from its two main depots i.e. Mehmood Kot terminal and Kemari terminal. HSD oil is disbursed from these terminals to Railway sheds as depicted below:



At present, Pakistan Railways has various vehicles/machines where HSD oil is consumed.

#### Vehicles available with Pakistan Railways

Sr. No	Description	Quantity
1.	DE. Locomotives	380
2.	Track Machines	14
3.	Material Lorries	18
4.	Ballast Cleaning Machines	01
5.	Karo Crane	07
6.	Light weight temping Machines	02
7.	Sleeper Exchange	03
8.	Crawler Machine	04
9.	Power Van and DG sets	243

Source: CME Office, Pakistan Railways

### **5.1.1 Fuel monitoring and consumption policy**

The absence of fuel monitoring and consumption policy is a major cause for excess and wasteful consumption of HSD oil. PR has no policy/SoP for idling working, fixation of ration, shunting working and LOMS consumption. However, Pakistan Railways invited Request for Proposals (RFP) for IoT Based Fuel Management System for proper monitoring and saving of HSD Oil in October 2023. Pakistan Railways consumes excess HSD oil of 4.7 million liters valuing Rs 660.08 million due to non-availability of fuel monitoring and consumption policy (Annex-A).

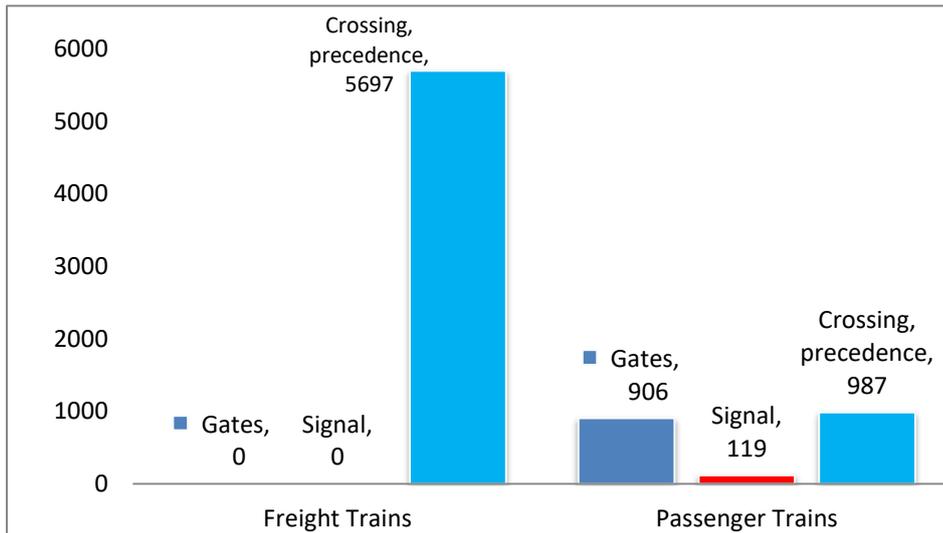
## **5.2 Operational inefficiencies**

Operational inefficiencies are also a contributing factor in wasteful and excess consumption of HSD oil. These inefficiencies are discussed below:

### **5.2.1 Delayed trains**

During the months of March and April 2022, on average 7 freight trains (Up) run daily between Karachi to Lahore and Peshawar. These freight trains reached at their destination points with delay of 15 hours on average. Due to delay in scheduled time these trains were detained for 5697 hours due to operational inefficiency on account of crossings/precedence.

### Delayed trains in hours



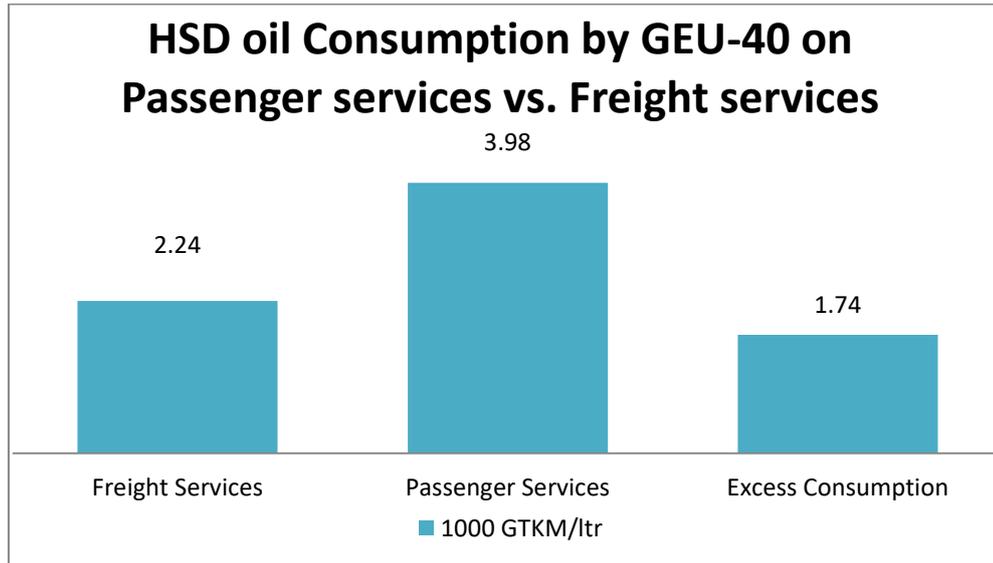
Source: Train Detention Register and Punctuality Position

Similarly, on average 72 passenger trains (Up & Down) run daily during the FY 2021-22. The overall punctuality of these trains was 59%. Due to delay in scheduled time these trains arrived late at their destination with detention of 3012 hours on account of crossings/precedence, delay in closing of level crossing's gates and failure of signaling system.

#### 5.2.2 Usage of heavy locomotives

Pakistan Railways used heavy locomotives (GEU-40), which were purchased for freight operations. Railway management utilized these heavy locomotives on passenger trains also which resulted in extra consumption of HSD oil. These locomotives on Passenger trains consumes 3.98 liters HSD oil per 1000 GTKM, whereas, the same class of locomotives yield efficient fuel consumption on freight services i.e 2.24 liters per 1000 GTKM.

## Excess consumption of fuel due to usage of heavy locos



Source: OP-73, OP-28

This action of PR management resulted in consumption of excess quantity of fuel by 6.28 million liters valuing Rs 881.78 million which could be avoided if 3000 HP locomotives that were available in 172 Nos. and in working position during the FY 2021-22, were used. These locomotives could haul up to 960 ton with 100 km speed up to 0.2% gradient between Lahore and Karachi (**Annex-C**).

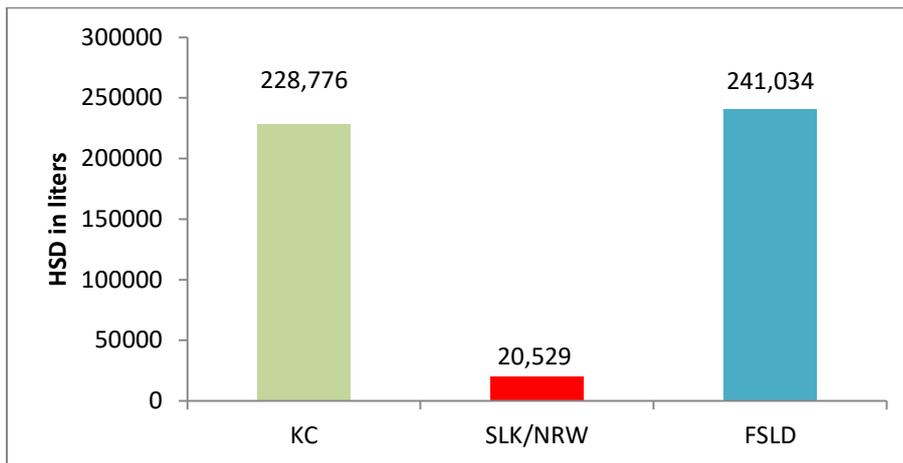
### 5.2.3 Speed restrictions

During the FY 2021-22, eighty seven (87) passenger trains detained for 3641 hours on account of engineering speed restriction and due to these detentions PR has to consume extra fuel of Rs 675.12 million. As regards efforts to overcome this aspect, Pakistan Railway launched a project “Immediate Track Safety” and under this project, total 78 engineering restrictions have been removed including 29 speed restrictions of Sukkur and Karachi Divisions.

#### 5.2.4 Excess consumption of HSD oil on shunting services

PR allocated 22 light shunting locomotives (950 HP to 1500 HP) in working condition to Lahore, Karachi and Mughalpura divisions during the FY 2021-22. These locomotives are fuel efficient than heavy locomotives. PR management showed their inefficiency by utilizing heavy locomotives (2000 HP to 4000 HP) on shunting services instead of light shunting locos in Lahore and Karachi. This action of PR management cost PR to the tune of 2.79 million liters HSD oil valuing Rs 391.22 million. Maximum time allowed for shunting and placing of a train before its departure was 30 minutes. Whereas, PR continuously kept the locomotives “ON” and showed their utilization on shunting services up to 24 hours. The excess fuel consumption on shunting services at three sheds is depicted below:

**Fuel consumption on shunting services**



Source: OP-73, OP-28

The above state of affairs resulted into wasteful consumption of 0.49 million litres fuel valuing Rs 68.88 million on shunting services. Moreover, the log books of locos were not maintained and hours/mileage meters were also out of order. In the absence of proper record and non-functioning of hours/mileage meter of shunting locos, Audit is unable to authenticate the utilization of HSD oil.

### **5.2.5 Failure of computer based interlocking system**

In order to improve the speed and safety, PR launched a project “Computer Based Interlocking (CBI) System” in 2010. An expenditure of Rs 15,994 million had been incurred up to February 2023 on the project. In spite of incurring heavy expenditure on CBI system, no significant improvement is seemed and passenger trains were detained for 1508 hours due to failure of CBI signaling system and 1.99 million litres fuel valuing Rs 279.61 million was consumed in excess by locomotives attached with passenger trains.

### **5.2.6 Idling locomotives before departure of trains**

Lahore based locomotives were remained in start condition at yard after leaving shed and till departure of trains for 4736 hours after allowing margin of 45 minutes. Similarly, yard detention of goods trains all over the Pakistan Railways for the months of March 2021 and March 2022 revealed that the locomotives remained idle at yard for 1694 hours unjustifiably till departure of goods trains. The above position showed that locomotives on passenger and freight services worked idle at yard for 6430 hours and consumed excess HSD oil valuing Rs 12.64 million due to negligence and slackness of Railway management.

### **5.2.7 Light running of locos**

Forty four (44) different types of Lahore based locos had relocated due to operational reasons and instead of attaching these locos as dead with any passing freight trains, these locos were moved in start condition at different sections of Lahore and Rawalpindi in violation of the fuel economy measures circulated by Chief Operating Superintendent dated 28.03.2022. This inefficiency of Railway management cost PR the consumption of 25,112 liters HSD oil.

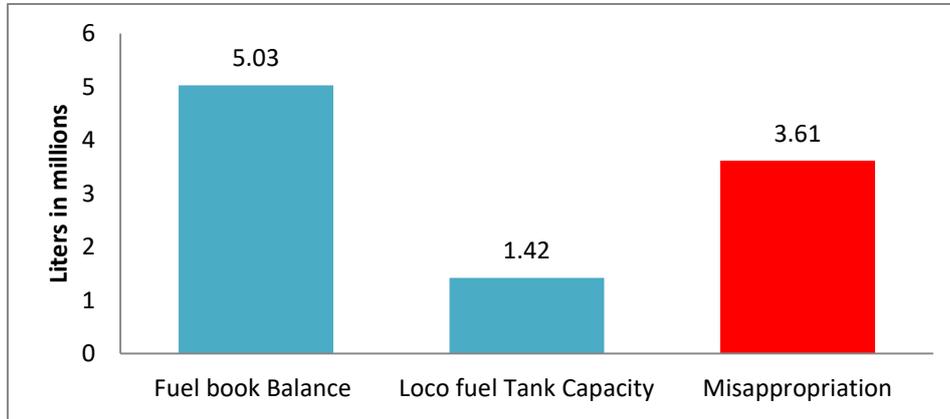
### **5.2.8 Unscheduled stoppage of passenger train**

Railway management halted passenger trains at Railway stations where scheduled stoppages were not allowed. This unpleasant action of Railway management damaging the goodwill of PR as passenger had to wait a long time to reach their destination.

### 5.2.9 Misappropriation of HSD oil

As per record (GM-31), a quantity of 5.03 million liters HSD oil was available in fuel tanks of 203 locomotives at Karachi, Rohri, Samasatta and Rawalpindi Shed. But the fuel tank capacity of these 203 locos was 1.42 million liters only.

**Misappropriation of HSD oil**



Source: GM-31

Audit apprehended that if the fuel tanks of these locomotives were filled to full capacity even then the quantity of 3.61 million liters HSD oil valuing Rs 506.63 million was in excess to available capacity and hence stands suspicious. This indicated that fuel valuing Rs 506.63 million was misappropriated and misreported in record as available in fuel tanks of locomotives.

Further, there is also a case of issuance and consumption of HSD oil to the deleted/non-operational locomotives. Railway management booked consumption of 14425 liters HSD oil to six locomotives in January 2022 and April 2022 to those locomotives that were temporarily deleted on 03.01.2022. This reflected clear misappropriation by collusive action of the employees.

### 5.3 Repair and maintenance of locomotives

This section deals with examination of HSD oil consumption in locomotives during repair and maintenance.

### **5.3.1 Theft of HSD oil**

Trip maintenance is the first line maintenance where locomotives are inspected, attended and regular interval/after trip. One hundred and seventy two (172) Lahore and Karachi based locomotives arrived in sheds for trip maintenance and have 723,436 liters fuel available in fuel tanks. During trip maintenance 7% fuel was consumed which is not justified as locomotive arrived for trip maintenance only and such a huge quantity of oil ranging from 28 to 3778 liters could not be consumed. The alleged consumption cost 50,046 liters fuel to PR which was actually theft.

### **5.3.2 Idling of locomotives**

It is a practice in PR to keep the locomotives in start position while refueling at sheds. 220 locomotives arrived at Lahore Shed for refueling and remained in start condition ranging from 1.27 to 27 hours after allowing margin of one hour. This inefficient management/idle working of locos resulted in burning of 24,116 liters fuel that was 4% of total refueled 655,056 liters. However, Railway management initiated a process of framing a proper SOP for efficient utilization of locomotives indicating time allocation, fixing fuel consumption etc. for refueling at all sheds.

## **5.4 HSD oil consumption on miscellaneous services**

This section deals with the utilization of HSD oil in locos on miscellaneous services i.e. on movement of locos within the jurisdiction of sheds.

### **5.4.1 Irrational fixation of trip ration**

Fixation of trip ration is a quantum of section wise diesel consumption fixed in respect of locomotives. Fixing of trip ration is a mechanism to fix and monitor consumption of diesel by locomotives on designated sections.

Pakistan Railways fixed fuel trip ration of passenger trains on historical pattern by taking the average of six month fuel consumption without observing actual consumption of fuel through trip survey and trials. Therefore, saving of 4.87 million liters was reported by Lahore and

Karachi Division. Whereas, comparative analysis of section wise fuel trip ration of Lahore and Karachi based locomotives revealed excess consumption of 2,098,153 liters fuel as compared to most economical trip of locos with the same fuel trip ration on the same sections as tabulated below:

**Excess consumption of fuel due to irregular fixation of trip ration**

Sr. No.	Period	Shed	Services	Quantity of excess fuel (ltr)	Amount Rs	Annex
1	2021-22	Lahore	Passenger	1,477,085	207,486,130	L
2	June 2022	Karachi	Passenger	440,493	61,876,052	L-1
3	June 2022	Karachi	Goods	180,575	25,365,370	L-2
<b>Total</b>				<b>2,098,153</b>	<b>294,727,552</b>	

Source: OP-73

The above position showed that the trip ration was fixed without observing actual consumption of fuel through trip survey.

Further, a number of locomotives consumed HSD oil in excess of fixed quota beyond 10% admissible limit as tabulated below. Railway management has not reported the excess consumption of fuel and net off the excess consumption with saving/less consumption trip.

**Excess consumption of fuel above the fixed ration**

Sr. No.	Period	Shed	Excess fuel (ltr)	Amount Rs
1	2021-22	Lahore	95,431	13,405,164
2	June 2022	Karachi	69,065	9,701,504
<b>Total</b>			<b>164,496</b>	<b>23,106,668</b>

Source: OP-73

#### **5.4.2 Missing SOPs for fixation of LOMS fuel quota**

Pakistan Railways has no standard operating procedure to control and monitor the consumption of HSD oil and fixation of fuel quota for locomotives on miscellaneous services. PR fixed LOMS fuel quota irrationally without observing the division-wise availability of running locos and work load. The fuel quota for Lahore Division was fixed @ 620 liters per loco per year, whereas, the quota of other divisions was excessively fixed ranging from 2,200 liters to 2,941 liters (72% to 79%) per loco per year.

#### **5.5 Other significant issues related to HSD oil consumption**

##### **5.5.1 Running of under load freight and passenger trains**

The success of Railway operations is squarely dependent upon the lesser consumption of fuel with maximum achievements of results i.e. transportation of masses and goods at the involvement of minimum cost and higher yield. The fuel economy can be achieved if trains carry full load because lesser the GTKM higher the consumption of fuel. As per record (gross ton kilometer (GTKM) hauled by locomotives/OP-73), Railway management operated passenger and freight trains below the sanctioned load by 24% and 58% respectively. This inefficiency has not only put the PR into financial loss on account of freight and fare but also caused extra consumption of fuel due to lesser GTKM that could have been avoided if trains were operated at full hauling capacity.

##### **5.5.2 Non-accountal of fuel as per dispensing meter**

In 2011, the Chief Operating Superintendent, PR instructed all operating officers of sheds to install dispensing meters at all fueling points. However, Railway management had not installed dispensing meters at fueling points except at Lahore and Karachi sheds where only 04 No. dispensing meters were installed and out of 04, only two meters were in working order one at Lahore and second at Karachi. PR was booking the issuance of fuel to locomotives as per locomotives fuel gauge. The installation of dispensing meters is necessary in order to record accurate issuance of HSD oil rather than relying on the fuel tank gauge of

locomotives. The fuel tank of locomotive report different figure of fuel balance due to uneven level of track at fueling point. Audit physically observed the refueling of 113 locomotives and found that 359,479 liters HSD oil was issued to locomotives as per dispensing meter reading, whereas, the issuance was accounted for as per locomotive's fuel gauge irregularly. Resultantly, 8.62 million liters HSD was issued either as excess or short. This reflected that the issuance was recorded inaccurately and all shortage and excess was net off by taking the reading of fuel gauge of locomotives by taking the plea that calibration of locomotives tanks is provided by OEM and every inch is calibrated, therefore, fuel handed over to outgoing driver by fuel tank gauge which is authentic internationally. Audit is of the view that fuel tank gauge can be used for measuring the issuance of fuel only where track is even but in PR track in all shed is uneven. Therefore taking the reading of locomotive fuel gauge is irrational decision and could not dispense with the installation of dispensing meters.

### **5.5.3 Utilization of HSD oil for road vehicles**

Pakistan Railways procured HSD oil only for train operations/operational purposes. The utilization of HSD oil for road vehicles is strictly prohibited by MOR/COPS and DG Fuel and directed that HSD oil requirement for non-operational functions may kindly be arranged from local market by using fleet card chargeable to POL head of relevant departments to avoid any inconvenience and strict monitoring of HSD Oil consumption for non-operational functions. The divisional management had not followed the instructions of higher ups and utilized 74,600 liters fuel for school busses, trucks, rescue trucks, lifters, ambulances and military tanks despite having a sufficient budget under the head POL.

### **5.6 Review of maintenance of record regarding HSD oil**

Pakistan Railways has not automated its method of compiling data, figures and information and storing it in a central database, raising doubts about reliability of data. Although it has an Information Technology Department, it has yet to enlarge its scope to the extent to which it can be used as a resource for research and introduce standard practices that are common elsewhere.

Moreover, there is a critical issue of access to such information. The information regarding utilization of HSD oil for any month of a year could not be obtained on real time basis and it would take more than a month to get it through normal channels. That is because the data is buried in files and whenever it is needed, it has to be compiled after extraction from files. Only in Lahore, the data regarding receipts, issuance and balance is computerized and all other 13 locations data is maintained manually. The manual system, which is mostly depending on clerks who are not IT literate, is inherently unreliable and has a significant margin of error.

The above fact was also pointed out in a JICA study done in 2010 which faced numerous delays in acquiring the accurate data. Currently, a foreign funded project is being executed called the MIS/FIS, though it has been ongoing for last ten years but it is yet to accomplish its task. Without timely accessibility to accurate data, one cannot identify factors behind problems and forecast future trends. It is therrefore recommended that PR may automate HSD Oil related data so that timely, accurate and reliable information is available to managers and stakehoders for taking decisions and policy making.

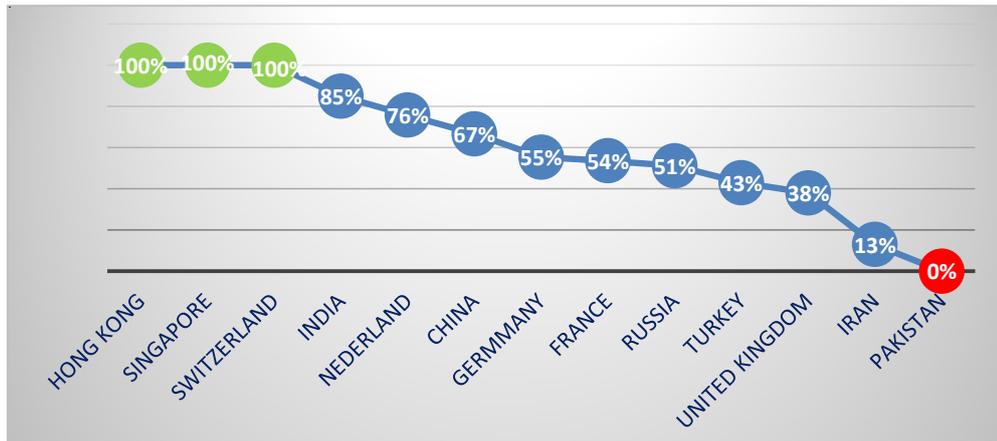
## **6. Best practices of fuel economy**

A detailed analysis is made on the strategies and practices adopted by Indian Railways for efficient utilization of HSD oil and to save fuel cost.

### **6.1 Alternative fuel options**

Different railway traction systems are currently prevalent in the world i.e. diesel traction, electric traction and mixture of both diesel and electric traction. Railways in Hong Kong, Singapore and Switzerland adopted 100% electrified mode of traction. Other nine countries i.e. India China and Iran etc are on the fast way of transformation towards complete electrification. PR track of 2.41% from Lahore to Khanewal Section was once electrified in 1970 which disposed-off during 2007-2009 and never revived. Presently PR is standing at zero percent of electric traction.

## Electric traction adoption in Railways



Source: Audit report on the accounts of PR Audit Year 2022-23

### 6.2 Indian Railways plan 2024 (A major shift to full electrification)

Indian Railways has been converted to electric traction of 52,247 route kilometers (RKM) out of 65,414 RKM in April 2022 and plan to achieve target of 100 % electrification by 2023-24.<sup>2</sup> Indian Railways is one of the largest railway networks in the world with 67,368 km of tracks and 22,550 trains, which carry 22.24 million passengers and 3.04 million tons of freight every day with electricity requirement of 2000MW. At present, the IR consumes 18.5 billion units of electricity every year. Out of this, 16 billion units are for running trains, while the remaining 2.5 billion units are for running other utilities such as railway stations, workshops and railways offices. It is setting up various energy power plants including 1,000MW of solar power and 200MW of wind power to cater the requirement of Indian Railways.<sup>3</sup>

### 6.3 Fuel efficiency apparatus of Indian Railways

Indian Railways adopted following strategic interventions for fuel efficiency and reduction in HSD oil cost.<sup>4</sup>

- i. Maintenance of minimum quantities of fuel at all fuel depots.
- ii. Trip ration reviewed at least twice during a year in order to tighten the slack trip rationing.

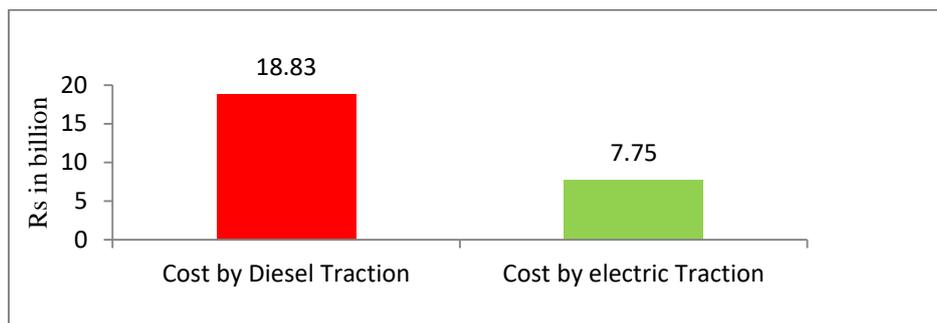
- iii. Monitoring the performance of loco drivers regularly.
- iv. Identification of good and bad runners on the basis of fuel consumption vis-a-vis trip ration. Bad runners should be monitored and their counseling be done.
- v. Shutting of locomotives in case of idling and monitoring of idling locomotive through “Remote Monitoring and Management of Locomotive and Trains” fitted in locomotive.
- vi. Withdrawal of all overage locos from main line.
- vii. Introduction of auxiliary power unit in locomotives for automatic shutting down of loco while standing idle.
- viii. Installation of retro-fitment of micro-processor control system in locomotives to achieve fuel efficiency.

#### 6.4 Comparison of diesel and electric traction of PR

Capital cost of the electrification project is high but in the long run benefits accrued by the projects are so useful, enormous and economical that it will bring back the whole investment within short span of time as pay back period of Lahore-Khanewal section was 8 years. Currently Paksitan Railways has no project in hand for electric traction.<sup>5</sup>

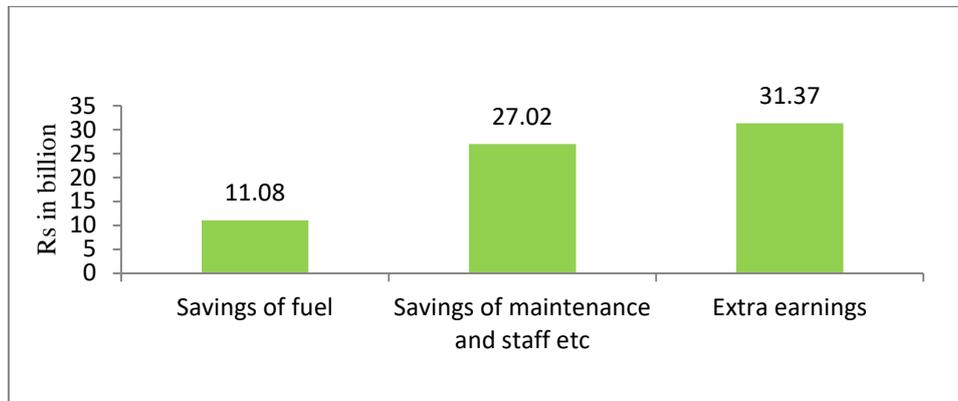
D.E locomotive having a capacity of 3000 horse power (HP) consumes 5.26 liters of HSD oil and small quantity of lube oil (2% of fuel consumed) at cost of Rs 774.59 for hauling a load of 1000 gross tone kilometers (GTKM).

**Cost of HSD oil Vs Electricity**



Whereas, electric locomotive having a capacity of 3000 HP, consume 14.5 KWH of electricity at the cost of Rs 319 for hauling the same load of 1000 GTKM. PR hauled 24.28 billion GTKM by 380 locomotives in the year 2021-2022. By shifting diesel traction to electric traction PR can save Rs 11.08 billion per annum on account of fuel.

### Savings by electric traction



. The capital cost of shifting diesel traction to electric traction is Rs 600 billion approximately which would be recovered in 12 years. Besides, PR can generate extra revenue of Rs 25.33 billion per annum on account of running of total air-conditioned trains and Rs 27.02 billion per annum on account of staff and maintenance etc. It will also aid to reduce carbon prints, low maintenance cost and higher useful life of electric locomotives.

### 6.5 Biodiesel-an alternative to fossil fuel

i. Excessive fuel demand pushes government to import large volume of fuel from foreign sources which creates negative effects on Pakistan's economy. Therefore, exploring an alternative to HSD oil is indispensable. Biodiesel is a form of diesel fuel derived from plants or animals fat. Biodiesel fuel is an environment friendly fuel and option for production of biodiesel from Jatropha plants and by utilizing excessive waste cooking oil, animal fat is available in Pakistan.<sup>6&7</sup> Biodiesel is a drop-in biofuel, meaning it is compatible with existing diesel engines and distribution

infrastructure. However, it is usually blended with diesel (typically to less than 10%) since most engines cannot run on pure biodiesel without modification.<sup>8</sup> But mixing the biodiesel with conventional diesel is resulted slight loss in power of engine.<sup>9</sup> A research study on “Cost Benefit and Risk Analysis of Biofuel Production in Pakistan” recommended producing Jatropha based biofuel in Pakistan which can give positive net returns of US\$ 0.47/litter.<sup>10</sup> Pakistan Railways has huge chunk of land that can be used to cultivate Jatropha and extract biodiesel to be used for train operations.

ii. In 2014, Indian Railways started to use alternative fuels like bio-diesel for powering vast fleet of over 4000 diesel locomotives. They initially attempted the blending HSD oil with bio-diesel extracted from the Jatropha plant.<sup>11</sup> Pakistan Railways can also use biodiesel on the strategies adopted by Indian Railways.

## **7. Audit Findings**

The results mentioned in the study in chapter-5 have been derived from following audit findings during execution of the assignment.

### **7.1 Wasteful consumption of fuel due to operational inefficiency- Rs 1,614.83 million**

According to para 1801 of Pakistan Railways General Code, means should be devised to ensure that every railway servant realizes fully and clearly that he will be held responsible for any loss sustained by government through fraud or negligence.

During special study, it was observed that train operations were not efficiently managed. Freight trains reached at their destination with a delay of 15 hours at an average and detained for 5697 hours during the month of March and April 2022. Similarly, the overall punctuality of Passenger trains was 59%. This delay contributed the detention of passenger trains for 3012 hours. This resulted in loss of Rs 1,614.83 million ( $8709\text{hr} \times 60 = 522540$  minutes  $\times$  22 liters/minute  $\times$  @ Rs 140.47/liter) on account of excess consumption of HSD oil due to slackness of Railway management (**Annex-B**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. PO informed the DAC that freight trains are placed at a lower rank in terms of priority vis-a vis mail express trains. The time given in time table of Pakistan Railways for freight trains was not meant for client commitment and was used only for availing time slots. Since freight trains are lower in priority as compared to mail express trains so they suffer the worst in case of system failures. Moreover, crossings/precedence is indispensable for safe train operation. Similarly level crossings gates closed late due to heavy rush in populated areas. The technical defects of signals are part of operation. DAC directed the PO (COPS) that comprehensive reply along with documentary evidence be furnished to Audit within two weeks. Compliance of DAC directives was awaited.

Audit recommends that matter be enquired to fix responsibility for excess consumption of fuel due to operational inefficiency. Effective steps be taken for punctuality of trains besides minimizing the detention of trains.

## **7.2 Utilization of heavy locomotives on passenger services- Rs 881.78 million**

According to PC-I of project titled “Procurement of 75 DE locomotives”, the 55 locomotives (4000 HP) and 20 locomotives (2000-2500 HP) would be used in freight services on main line to haul heavy freight traffic. Moreover, the fuel economy measures circulated by Chief Operating Superintendent dated 28.3.22 provides the success of Railway operations is squarely dependent upon the lesser consumption of fuel with maximum achievements of results i.e. transportation of masses and goods at the involvement of minimum cost and higher yield.

During special study, it was observed that fuel consumption of GEU-40 heavy locomotives on passenger services was 3.98 liters per 1000 GTKM, whereas, the same class of locomotives yield efficient fuel consumption on freight services i.e 2.24 liters per 1000 GTKM. Resultantly, 6.28 million liters excess quantity of fuel valuing Rs 881.78

million was consumed due to utilization of heavy locomotives that were entirely procured for freight operations, on passenger services (**Annex-C**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. PO informed the DAC that GEU-40 locomotive is more economical than other heavy locomotives on passenger services. All full load freight trains worked by GEU-40 locomotives and leftover GEU-40 locomotives were utilized on passenger trains which saved Rs 157.14 million as compared to other 3000 HP locomotives. DAC was of the view that the reply of the management was not in line with Audit observation and directed the PO (COPS) to resubmit comprehensive reply duly supported by documentary evidence, covering all aspects of audit observation to audit within two weeks. Compliance of DAC directives was awaited.

Audit recommends that matter be probed to fix responsibility for utilization of heavy locos on passenger services. Optimum utilization of locomotives be ensured in terms of cost and benefit.

### **7.3 Excess consumption of fuel due to speed restrictions - Rs 675.12 million**

According to para 1801 of Pakistan Railways General Code, means should be devised to ensure that every railway servant realizes fully and clearly that he will be held responsible for any loss sustained by government through fraud or negligence.

During special study, it was observed that the passenger trains were detained for 3641 hours on account of engineering speed restriction. This detention resulted in loss of Rs 675.12 million (3641 x 60 x 22 x Rs 140.47) on account of excess consumption of HSD oil.

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. PO informed the DAC that a project of Immediate Track Safety is being carried out in Sukkur and Karachi division under which 29 number engineering restrictions have since been removed/modified. Moreover, over the entire PR network total 78 engineering restrictions have been removed during last year. DAC

directed the PO (CEN/OL) that a comparative statement of ERs for the year 2021 and currently imposed over the system should be submitted. The comparative statement should focus on the improvement brought from 2021 to present times. DAC also directed to resubmit comprehensive reply along with documentary evidence within one week. Compliance of DAC directives was awaited.

Audit recommends that strenuous efforts be made to remove permanent and temporary speed restrictions over entire Railway network to avoid excess fuel consumption.

#### **7.4 Misappropriation of HSD oil - Rs 506.63 million**

According to clause 1 of chapter-III of Mechanical Manual of Pakistan Railways, the fuel being the largest item of expenditure on the Railway, it is essential that accurate accounts of all fuel received and issued must be kept and the strictest economy observed in its use. Any tendency towards waste must be checked and constant attention paid to the prevention of thefts. All arrangements in connection with the supply of fuel for the whole line are made on behalf of the Chief Operating Superintendent, Divisional Mechanical Engineers or others responsible officers who have fuel in their charge, will be held responsible for all details connected with receipt, issue and custody of same.

During special study, it was observed that as per record (**GM-31**) a quantity of 5.03 million liters HSD oil was available in fuel tanks of 203 locomotives at Karachi, Rohri, Samasatta and Rawalpindi Sheds, but the fuel tank capacity of these locos was only 1.42 million liters. Audit apprehended that if the fuel tanks of these locomotives were filled to full capacity even then the quantity of 3.61 million liters HSD oil valuing Rs 506.63 million was in excess to available capacity and hence stands suspicious. This indicated that fuel valuing Rs 506.63 million was misappropriated and misreported in record as available in fuel tanks of locomotives (**Annex-D**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. PO informed the DAC that shortage of HSD oil shown in GM-31 is correct. This shortage

accumulated over the years and mainly triggered due to missing of fuel consumption documents (OP-27A) and fuel oil leakage from damaged/broken locomotives during assassination of Mohtarma Benazir Bhutto on 27<sup>th</sup> December 2007. DAC took a serious view of the matter and constituted an enquiry committee headed by the AGM/Infra, FA&CAO/Revenue, COPS and CME/Loco to submit the enquiry report within one month to Audit. Further course of action shall be decided after the outcome of the fact-finding enquiry. Compliance of DAC directives was awaited.

Audit recommends that matter be probed to fix responsibility for misappropriation of HSD oil. Action be taken against those held responsible besides recovery of the amount involved under intimation to audit.

#### **7.5 Excess consumption fuel due to utilization of heavy locomotives on shunting services-Rs 391.22 million**

Fuel economy measures circulated by Chief Operating Superintendent dated 28.03.2022 provides the success of Railway operations is squarely dependent upon the lesser consumption of fuel with maximum achievements of results i.e. transportation of masses and goods at the involvement of minimum cost and higher yield. Moreover, para 1801 of Pakistan Railways General Code states that means should be devised to ensure that every railway servant realizes fully and clearly that he will be held responsible for any loss sustained by government through fraud or negligence.

During special study, it was observed that 22 light shunting locomotives (950 HP to 1500 HP) in working condition were allocated to Lahore, Karachi and Mughalpura divisions during the FY 2021-22. Despite utilization of these light locomotives, the Railway management utilized heavy locomotives (2000 HP to 4000 HP) for shunting services at Karachi and Lahore irregularly. This resulted in excess consumption of 2.79 million liters HSD oil valuing Rs 391.22 million irregularly and caused loss to Pakistan Railways (**Annex-E**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. DAC directed the PO (COPS) to resubmit comprehensive reply along with documentary evidence to Audit within one week. The compliance of DAC directives was awaited.

Audit recommends that matter be probed for utilization of heavy locomotives for shunting services. Railway management may allocate light locomotives for shunting services in all sheds.

**7.6 Excess consumption of fuel due to failure of computer based interlocking (CBI) signaling system - Rs 279.61 million**

According to para 1801 of Pakistan Railways General Code, means should be devised to ensure that every railway servant realizes fully and clearly that he will be held responsible for any loss sustained by government through fraud or negligence.

During special study, it was observed that a PSDP project for installation of CBI signaling system was commenced in May 2010 with the objectives to improve speed and safety. An expenditure of Rs 15,994 million had been incurred upto February 2023 on the said project. Despite improvement in speed and safety after installation of CBI system, the passenger trains were detained for 1508 hours due to failure of CBI signaling system and 1.99 million litres fuel was consumed in excess by locomotives attached with passenger trains. Resultantly Pakistan Railways suffered a loss of Rs 279.61 million (1508 x 60 x 22 x Rs 140.47) on account of excess consumption of HSD oil.

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. DAC directed the PO (CS&TE) that comprehensive reply along with documentary evidences be submitted to Audit within one week. Compliance of DAC directives was awaited.

Audit recommends that matter be probed to fix responsibility for excess consumption of fuel due to failure of CBI system. The CBI system be improved to avoid further loss of fuel and time.

## **7.7 Unjustified consumption of fuel on shunting services - Rs 68.88 million**

Fuel economy measures circulated by Chief Operating Superintendent dated 28.03.2022 provides the shunting engines be economically utilized and wastage be eliminated through actual analytical ways. Locomotives capable of re-starting without any trouble viz weak batteries/other starting problem must not be remain idling after reasonable period of ½ hour.

During special study, it was observed that as per time table for passenger trains dated 15.10.2021, maximum 30 minutes was allowed for shunting and placing of a train before its departure. Whereas, locomotives were persistently utilized on shunting services up to 24 hours excess than allowed time. Resultantly, a quantity of 0.49 million liters HSD oil valuing Rs 68.88 million was consumed unjustifiably on unproductive purpose (**Annex-F**). Detail facts of the matter are detailed below:

(a) Karachi division utilized 4.29 million liters HSD oil on account of shunting services during the FY 2021-22. The fuel consumption for the month of June 2022 on shunting services was test checked and it was observed that the Karachi based locos were persistently utilized on shunting services up to 24 hours daily. Resultantly, a quantity of 228,766 liters HSD oil valuing Rs 32.13 million was utilized in excess of the actual workings.

(b) Four Passenger Trains (UP and DN) were shunted at Sialkot and Narowal Railway Stations. Time allowed for shunting and placing of above four passenger trains @ 30 minutes each comes to two hours. However, the shunting locos worked up to 18 hours daily during FY 2021-22. Resultantly, excess quantity of 20,529 liters HSD oil valuing Rs 2.88 million was consumed.

(c) Faisalabad shed was allocated two shunting locomotives for shunting of 10 UP and DN trains (4 originating and 6 passing trains). Time allowed for shunting and placing of above 10 trains was 5 hours @ 30 minutes each. Whereas, locomotives were utilized on shunting services

from 8 to 18 hours daily in excess of allowed time. This resulted in extra ordinary consumption of 241,034 liters HSD oil valuing Rs 33.86 million.

The matter was taken up with management in June 2023 and also discussed in DAC meeting held on 31.10.2023. DAC directed the PO (COPS) that a SOP should be framed for efficient utilization of shunting locomotives. DAC constituted an enquiry committee comprising Dy: COPS/Power and Dy:CEN/North to conduct a fact-finding enquiry regarding the consumption of extra ordinary HSD for shunting purpose at Narowal/Faisalabad and all other similar instances/locations where the locomotives were made idle and kept running for long hours. The enquiry report should be submitted to Audit within two weeks along with SOPs of shunting locomotives. Compliance of DAC directives was awaited.

Audit recommends that matter be probed to fix the responsibility for avoidable excess consumption of fuel on shunting services. Actual working of shunting locos be recorded through mileage and hours meters.

#### **7.8 Wasteful consumption of HSD oil on idling of locomotives before departure of trains - Rs 12.641 million**

Para 204 of chapter-II of Operating Manual provides that the engine crew must be on duty at least 45 minutes before the booked departure of the engine from shed. Further, para-B of Fuel Economy measures circulated by Chief Operating Superintendent dated 29.03.2022 provides that unnecessary detention of trains/locomotives in the traffic yards and stabling of locos on way side stations be avoided.

During special study, it was observed during review of yard detention of Lahore based locos that locomotives were remained in start condition at yard after leaving the shed till departure of trains for 4736 hours after allowing margin of 45 minutes. Similarly, yard detention of goods trains over the entire system of Pakistan Railways for the month of March 2021 and March 2022 was examined and found the idling of locomotives at yards for 1694 hours unjustifiably till departure of goods trains. The idle working of locomotives resulted in wasteful consumption of HSD oil valuing Rs 12.64 million irregularly and caused loss to

Pakistan Railways due to negligence of Railway management (**Annex-G &G-1**).

The matter was taken up with management in June 2023 and also discussed in DAC meeting held on 31.10.2023. DAC took a serious view of the wasteful consumption of HSD oil on idle locomotives and directed the PO (COPS) to come-up with proper SOP for the idle locomotives within two weeks. DAC directed that comprehensive reply be resubmitted along with these SOPs. DAC also directed that the fuel management system which is about to begin and is in tendering process must address and resolve the issues pointed out in the special study report on HSD oil utilization in locomotives for audit year 2022-23. Compliance of DAC directives was awaited.

Audit recommends that matter be enquired to fix responsibility for idling of locomotives at yard before departure of trains. Course corrective measures be adopted to avoid recurrence.

#### **7.9 Theft of HSD oil from under repaired locomotives - Rs 7.03 million**

According to para 1801 of Pakistan Railways General Code, means should be devised to ensure that every railway servant realizes fully and clearly that he will be held responsible for any loss sustained by government through fraud or negligence.

During special study, it was observed that 723,436 liters fuel was available in fuel tanks of locomotives (Lahore and Karachi based) when arrived in shed for trip maintenance. During trip maintenance at sheds 7% fuel was consumed unjustifiably ranging from 28 to 3778 liters from fuel tank of locomotives after allowing margin of one hour consumption (as per record of OP-28). This indicated that 50,046 liters fuel valuing Rs 7.03 million was pilfered which caused loss to Pakistan Railways (**Annex-H**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. DAC directed the PO (COPS) to review the previous reply and resubmit fresh reply along with documentary evidence to Audit within two weeks. DAC also directed that

a fact finding inquiry be conducted by the DG/Fuel and the report be submitted within one month. Compliance of DAC directives was awaited.

Audit recommends that matter be enquired to fix responsibility for theft of HSD oil. Action be taken against those found at fault besides enhancing the scope of enquiry over entire system of Pakistan Railways.

#### **7.10 Excess consumption of fuel due to irregular fixation of trip ration valuing - Rs 294.73 million**

According to para 1801 of Pakistan Railways General Code, means should be devised to ensure that every railway servant realizes fully and clearly that he will be held responsible for any loss sustained by government through fraud or negligence.

During special study, it was observed that fuel trip ration of passenger trains was fixed on historical pattern with considerable margin/allowance without observing actual consumption of fuel through trip survey. Therefore, saving of 4.87 million liters was reported by Lahore and Karachi Division. Whereas, comparative analysis of section wise fuel trip ration of Lahore and Karachi based locomotives revealed excess consumption of 2,098,153 liters fuel as compared to most economical trip of locos with the same fuel trip ration on the same sections. This indicated that the trip ration was fixed without observing actual consumption of fuel through trip survey which caused loss of Rs 294.73 million to Pakistan Railway due to negligence of Railway management and poor internal controls (**Annex-I**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. DAC directed the PO (COPS) to execute the realistic study for rationing of fuel for locomotives over the entire network. The comparative study of rationing should be shared with Audit highlighting the saving pattern found out after the comparative study within two weeks. Compliance of DAC directives was awaited.

Audit recommends that matter be probed to fix responsibility for irregular fixation of fuel trip ration without physical inspection. Trip ration may be fixed on practical grounds.

### **7.11 Loss due to irrational fixation of fuel quota for LOMS without devising SOP - Rs 58.05 million**

According to para 1801 of Pakistan Railways General Code, means should be devised to ensure that every railway servant realizes fully and clearly that he will be held responsible for any loss sustained by government through fraud or negligence.

During special study, it was observed that Railway management fixed a quota of 746,000 litres for locomotives on miscellaneous services (LOMS) irrationally without assessing division wise availability of running locos and work load. The fuel quota for Lahore Division was fixed @ 620 litres per loco per year, whereas, the quota of other divisions was excessively fixed ranging from 2200 liters to 2941 liters (72% to 79%) per loco per year. Resultantly, 413,261 liters of HSD oil valuing Rs 58.05 million was consumed excessively at other sheds as compared to Lahore. Moreover, no Standard Operating Procedure (SOP) was framed to rationalize and monitor the consumption of HSD oil on account of LOMS (**Annex-J**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. PO informed the DAC that load test of Karachi based locomotives is performed on test bench, whereas, the Lahore based locos designed for self-load test. Therefore, the consumption of LOMS for each class is different. Moreover, Karachi shed also performs classified repairs and involved excessive consumption of fuel. DAC directed the PO (COPS) to revisit their previous reply and fresh comprehensive reply be submitted in the light rational fixation of fuel according to workload and allocation of locos to all sheds to the Audit within two weeks. Compliance of DAC directives was awaited.

Audit recommends that matter be probed to fix responsibility for irrational and excess fixation of fuel quota for LOMS. SOPs be devised to control and monitor the consumption of fuel on account of LOMS.

**7.12 Loss due to consumption of fuel above the fixed ration - Rs 23.10 million**

In terms of COPS office letter No. 39-FA/0-XV (P) dated 05.12.1991, to achieve economy in use of HSD oil, trip ration of HSD oil for each class of locomotive was fixed. All cases of excess consumption by 10% than the fixed ration be examined on merits, responsibility be fixed and disciplinary action be taken under the rules.

During special study, it was observed that 164,496 liters HSD oil valuing Rs 23.10 million was utilized by different class of locomotives (Lahore and Karachi based) in excess of fixed quota beyond 10% admissible limit from July 2021 to June 2022. This resulted in loss of Rs 23.10 million to Pakistan Railways due to excess consumption of fuel (**Annex-K**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. PO explained that Audit has mentioned excess consumption from computerized OP-28 which is not authentic due to certain problems in computer software. However, drivers found heavy than permissible limit have been regularly taken up and fuel trip ration of Lahore and Karachi has been revised in March 2022 to streamline the fuel consumption according to load. DAC directed the PO (COPS) to reconcile the data highlighted in audit report and fresh comprehensive reply be resubmitted to Audit within two weeks. Compliance of DAC directives was awaited.

Audit recommends that matter be probed to fix responsibility for utilization of HSD oil in excess of fixed ration.

**7.13 Loss of potential earning due to running of under load freight and passenger trains - Rs 41,041.00 million**

Fuel economy measures circulated by Chief Operating Superintendent dated 28.03.2022 provides the success of Railway operations is squarely dependent upon the lesser consumption of fuel with maximum achievements of results i.e. transportation of masses and goods at the involvement of minimum cost and higher yield. The fuel economy can be measured if all the trains carry full load.

During special study, it was observed that PR consumed 82.57 million liters HSD oil valuing Rs 11,598.61 million on passenger and freight train operation during the FY 2021-22. Scrutiny of gross ton kilometer (GTKM) hauled by locomotives as per record (OP-73) disclosed that Railway management operated passenger and freight trains 24% and 58% respectively below the sanctioned load and hauling capacity of locomotives. Due to operation of under loaded passenger and freight trains on different sections, Pakistan Railway deprived off from potential earning of Rs 41,041.00 million from passenger and freight trains. Moreover, Railway suffered loss of 31.21 million liters HSD oil valuing Rs 4.385 million on account of gross ton kilometers due to under loaded trains operation. This indicated that Railway management failed to achieve maximum yield with efficient and economical consumption of HSD oil **(Annex-L)**.

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. PO informed the DAC that figures mentioned in column 10 and column 11 needs more clarity about specific trains to enable this office to submit a proper reply. DAC directed the PO (COPS) to reconcile the data highlighted in audit report and fresh comprehensive reply be resubmitted to Audit within two weeks. The compliance of DAC directives was awaited.

Audit recommends that matter be probed to fix the responsibility for inefficient utilization of fuel and loss of potential earning due to running of under loaded trains. Trains operations be ensured according to sanctioned load to yield maximum revenue by minimizing operating cost.

#### **7.14 Suspected misappropriation of fuel due to non-accountal of fuel as per dispensing meters – Rs 1,210.85 million**

According to clause 1 of chapter-III of Mechanical Manual of Pakistan Railways, the fuel being the largest item of expenditure on the Railway, it is essential that accurate accounts of all fuel received and issued must be kept and the strictest economy observed in its use. Any tendency towards waste must be checked and constant attention paid to the prevention of thefts. All arrangements in connection with the supply of

fuel for the whole line are made on behalf of the Chief Operating Superintendent, Divisional Mechanical Engineers or others responsible officers who have fuel in their charge, will be held responsible for all details connected with receipt, issue and custody of same.

During special study, it was observed that two dispensing meters were installed at Karachi and Lahore Diesel Sheds to record issuance of HSD oil, rather than taking the reading from fuel tanks of locomotives because the fuel tank of locomotives report different balance due to uneven level of track at fueling point. During FY 2021-22 total 74.63 million liters HSD oil was issued to running locomotives from above two Sheds. The accuracy and proper accountal of refueling of 113 Nos. locomotives through dispensing meter from 03.05.2023 to 17.05.2023 was physically observed at Karachi diesel shed. It was observed that 359,479 liters HSD oil was issued to locomotives as per dispensing meter reading, whereas, the issuance was accounted for as per locomotive's fuel gauge irregularly. Resultantly, 10,729 liters (5.94%) HSD oil was accounted for excess and 9,585 liters HSD oil (5.61%) was accounted for short than the dispensing meter reading. Audit apprehend that 8.62 million liters (11.55%) HSD oil valuing Rs 1,210.85 million (8.62 x 140.47) was issued during the FY 2021-22 as excess and short, which reflects that the issuance was recorded inaccurately and the possibility of misappropriation of HSD oil could not be ruled out in both conditions (**Annex-M, M-1 & M-2**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. DAC directed the PO (COPS) to revisit the whole issue highlighted in para and physically visit the dispensing unit sites. The reply should be submitted after reconciliation of the facts highlighted by the Audit team along with documentary evidence within two weeks. The compliance of DAC directives was awaited.

Audit recommends that HSD oil management be improved and dispensing meters be installed at all fueling points. Accountal of HSD oil as per dispensing meters be ensured in future.

### **7.15 Un-authorized issuance of H.S.D oil for road vehicles - Rs 10.48 million**

As per Chief Operating Superintendent letter No.83-FA/50-XXII (Mech) dated 3.9.2019, MOR has directed the COPS to issue fuel only for operational purpose. The COPS also clarified vide his office letter of even No. dated 08.09.2019 that for vehicles relating to the Divisions, the Divisions will arrange HSD from their own source. Further, the DG/Fuel Monitoring P.R. Headquarters office vide letter No.DG/Fuel Monitoring/01/2020 dated 26-4-2021 stated that HSD oil requirement for non-operational functions may kindly be arranged from local market by using fleet card chargeable to POL head of relevant departments to avoid any inconvenience and strict monitoring of HSD Oil consumption for non-operational functions.

During special study, it was observed that Railway management issued 74,600 liters of HSD oil amounting to Rs 10.48 million was un-authorized issued for road vehicles of Pakistan Railway and Military tanks in violation of the orders of Ministry of Railways (**Annex-N**).

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. DAC directed the PO (COPS) to resubmit the reply along with documentary evidence to Audit within two weeks. Compliance of DAC directives was awaited.

Audit recommends that matter be inquired to fix responsibility for issuance of HSD oil for non-operational functions in violation of MoR's directions. Action be taken against those found at fault besides regularization of the amount involved.

### **7.16 Fraudulent consumption of HSD oil on account of deleted locomotives – Rs 2.03 million**

According to para 1801 of Pakistan Railways General Code, means should be devised to ensure that every railway servant realizes fully and clearly that he will be held responsible for any loss sustained by government through fraud or negligence.

During special study, it was observed that six ALU-95 locomotives working in Mughalpura Workshop were temporarily deleted on 03.01.2022. Despite temporary deletion of these locomotives the consumption of 14,425 liters HSD oil valuing Rs 2,026,280 was reported during the months of January 2022 and April 2022. This reflected that HSD oil was fraudulently issued and consumed on account of deleted locomotives and caused loss to Pakistan Railways due to connivance of Railway officials.

The matter was taken up with management in June 2023 and discussed in DAC meeting held on 31.10.2023. DAC took a serious view of the matter and directed that a fact-finding enquiry should be conducted by DG/Fuel and report should be submitted to Audit within two weeks. Compliance of DAC directives was awaited.

Audit recommends that matter be probed to fix responsibility for irregular issuance of HSD oil to deleted locomotives. Action be taken against those found at fault besides recovery of the amount involved.

## **8. Recommendations**

### **8.1 Recommendations for organization**

- i. Locomotives be utilized efficiently with passenger and freight trains according to their sanctioned load.
- ii. Effective steps be taken to avoid en-route detention on account of crossings, precedence, delay in closing of level crossing's gates and failure of signaling system to minimize excess consumption of fuel.
- iii. Light locomotives be allocated to all sheds for shunting services and heavy locomotive (GEU-40) be utilized on freight services for optimum yield.
- iv. Recording of issuance of fuel as per dispensing meter at all fueling points be ensured.

- v. The matter of excess consumption of fuel on shunting, refueling and locomotive idling be probed to fix the responsibility against persons found at fault.
- vi. Strenuous efforts be made to minimize permanent and temporary speed restriction over rail-network to avoid excess full consumption and unnecessary detention of trains.
- vii. Mis-appropriation, theft and fraudulent issuance of fuel be probed to fix responsibility against persons found at fault.
- viii. Trip ration be fixed on rational grounds to minimize the unnecessary margin and for better monitoring over fuel consumption.
- ix. Annual allocation of fuel for locomotives on account of Miscellaneous services (LOMS) for all sheds be determined on rational basis. SOPs be framed to control and monitor the consumption fuel on account of LOMS.

## **8.2 Recommendations for policy makers**

- i. Fuel monitoring and consumption policy may be formulated by specifying reporting and responsibility of excess consumption.
- ii. SOPs be issued in respect of fixation of standard/allowed time for refueling of locomotives, shunting of freight and passenger trains.
- iii. Excessive fuel demand pushes government to import large volume of fuel from foreign sources, which creates adverse effects on Pakistan's economy. Therefore, exploring an alternative to fossil fuels like bio-diesel is unavoidable. It is therefore suggested that government may formulate policies to promote production of bio-diesel in Pakistan to lessen the import of fuel from foreign source.
- iv. PR may incrementally shift from diesel traction to electric traction regime. PR can save Rs 13.08 billion per annum on account of fuel cost<sup>9</sup>.

## **9. Conclusion**

PR has no robust policy regarding fuel consumption and monitoring which caused excess and wasteful consumption of fuel in locomotives every year. The outdated fuel measuring devices also contributed negative impact on fuel issuance and utilization. The fuel efficacy cannot be achieved without transformation of PR i.e. utilization of modern locomotives, well established track, automated signaling system and procurement of HSD oil at competitive rates etc. It would not be feasible for PR to solely operate on HSD oil in long run and ultimately have to be shifted to electric traction. However, PR has not chalked out any plan for shifting from diesel traction to electric traction which is inevitable for operating as a going concern.

### **Acknowledgement**

Audit acknowledges the support of the Chief Operating Superintendent (COPS), Deputy COPS/Safety, DME/Karachi and Lahore for their cooperation and assistance in providing necessary information and record.

**Impact of absence of fuel consumption and monitoring policy/procedures**

Sr. #	Non-existence of Policy & procedures	Period	Delay/ Excess Hours	Impact		Remarks
				Litters	Amount Rs	
1	consumption of HSD oil on shunting services	2021-22	202,710	487,044	68,415,071	KC, SLK, NWR, Fslld
2	Issuance of fuel beyond the capacity locos fuel tanks	2021-22	-	3,610,000	507,096,700	
3	Idle running of loco	2021-22	6,430	89,477	12,568,834	
4	light running of locos	2021-22	1,843	25,112	3,527,483	
5	Consumption on trip maintenance	2021-22	-	50,046	7,029,962	Lhr, Kc after allowing 1h
6	consumption of HSD oil on refueling	2021-22	1,096	24,116	3,387,575	Lhr
7	irrational fixation of quota of HSD oil for LOMS	2021-22	-	413,261	58,050,773	No SOP
<b>Total</b>			<b>212,079</b>	<b>4,699,056</b>	<b>660,076,397</b>	

Note:

HSD oil average Rate Rs 140.47 (2021-22)

Source: OP-73, GM-31, LOMS

**Annex-B (Para 7.1)**

<b>Wasteful consumption of fuel due to operational inefficiency, detention</b>							
<b>Sr. #</b>	<b>Trains</b>	<b>Detention (hours)</b>	<b>Detention (minutes)</b>	<b>Fuel Consumption per minute (Ltr)</b>	<b>Total fuel Consumption (Ltr)</b>	<b>Value of Excess Consumption (Rs)</b>	<b>Detention on account of:</b>
	2	3	3x60=4	5	4x5=6	6x7=8	9
1	Freight	5697	341,820	22	7,520,040	1,056,340,019	Crossing & Precedence
2	Passenger	3012	180,720	22	3,975,840	558,486,245	Gates, Signal, Crossing and Precedence
<b>Total</b>		<b>8709</b>	<b>522,540</b>		<b>11,495,880</b>	<b>1,614,826,264</b>	
<u>Note:</u>							
HSD oil average Rate=Rs 140.47 (2021-22)							

Source: Detention Statements of PR (COPS Office)

**Annex-C (Para 5.5.2 & 7.2)**

**Excess consumption fuel due to utilization of heavy locomotives on Passenger trains**

Shed	Class of Loco	Description	GTKM	Fuel Consumption (ltr)	Fuel Per 1000/ GTKM (ltr)
Karachi	GEU-40	Fuel Consumption on Passenger Services	3,605,413,367	14,366,706	3.98
Karachi	GEU-40	Fuel Consumption on Freight Services	11,427,308,603	25,639,092	2.24
Excess Fuel consumption on Passenger (14,366,706x1.74/3.98)				6,277,354	1.74
Cost of excess consumption of fuel (6,277,357x140.47)				<b>Rs 881,780,337</b>	

Description	Passenger Service	Freight Service
Total Revenue	30,371,806,191	22,957,850,824
Passenger/Freight kilometer	17,969,246	8,179,832
Earning per KM	1,690	2,807
KM earned by GEU-40	4,424,319	3,698,983
Total Revenue of GEU-40	7,478,029,918	10,381,716,876
Difference	<b>2,903,686,957</b>	

Fuel Difference: 1000 GTKM x Difference of 1000/gtkm /  
 1000/GTKM: Fuel consumption/GTKM x 1000  
 GTKM: Gross tonne kilometer  
 HSD oil average Rate Rs 140.47  
 (2021-22) OP-73 of Lahore and Karachi  
 Source: Financial statement 2021-22  
 Financial Year 2021-22

## Misappropriation of HSD oil due to issuance of fuel to locos beyond their tanks capacity

Summary of GM-31 Shed wise								
Sr. #	Name of Shed	Available Locomotives as on 04.10.2021					Fuel balance on tender (as on last day of month) (Ltr)	Difference (Ltr)
		Class of Loco	No. of Loco	Tank Capacity Loco Class-wise (Ltr)	Tank capacity of all Locos (Ltr)	Shed wise total capacity (Ltr)		
1	Karachi	HAU-10	1	5,001	5,001	889,855	2,832,072	1,942,217
		GEU-40	53	8,000	424,000			
		GMU-15	10	3,782	37,820			
		GMU-30	34	7,501	255,034			
		HGMU-30	21	8,000	168,000			
2	Rohri	GRE-24	10	5,910	59,100	96,920	908,452	811,532
		GMU-15	10	3,782	37,820			
3	Sama-sata	GRE-24	9	5,910	53,190	56,972	92,686	35,714
		GMU-15	1	3,782	3,782			
4	Rwp	HBU-20	11	7,274	80,014	377,316	1,194,550	817,234
		PHA-20	23	7,274	167,302			
		DPU-20	20	6,500	130,000			
<b>TOTAL</b>			<b>203</b>		<b>1,421,063</b>	<b>1,421,063</b>	<b>5,027,760</b>	<b>3,606,697</b>

Note:

HSD oil average Rate      Rs 140.47 (2021-22)

Amount in Rs                506,632,728

Source: GM-31

## Excess consumption fuel due to utilization of heavy locomotives on shunting services

Shed	Class of Loco	No. of Locos	Kilo-meter	Fuel Consumption (Ltr)	Consumption Per Km (Ltr)	Difference (Ltr)	Excess Consumption (Ltr)	Amount (Rs)
	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6=(5/4)</b>	<b>7= (6-base)</b>	<b>8=(5x7/6)</b>	<b>9=(8x140.47)</b>
Lahore	GMCU-15	86	206,301	506,881	<b>2.46</b>	-	-	-
Lahore	AGE-30	65	21,016	62,106	2.96	0.50	10,470	1,470,685
Lahore	ZCU-30	9	5,134	15,243	2.97	0.51	2,629	369,264
Lahore	ZCU-20	261	49,758	141,734	2.85	0.39	19,479	2,736,177
Lahore	GEU-20	2	88	250	2.84	0.38	34	4,746
Lahore	GRU-20	65	216,948	695,586	3.21	0.75	162,545	22,832,745
Lahore	RGE-20	25	15,845	46,979	2.96	0.51	8,048	1,130,485
MGPR	ALU-95	50	45,008	93,110	<b>2.07</b>	-	-	-
MGPR	GMCU-15	24	30,335	68,855	2.27	0.20	6,100	856,821
Karachi	GMU-15		105,610	140,228	<b>1.33</b>	-	-	
Karachi	HGMU-30		17,320	48,439	2.80	1.47	25,442	3,573,838
Karachi	GMU-30		1,091,280	3,882,057	3.56	2.23	2,433,065	341,772,641
Karachi	GEU-40		76,592	218,960	2.86	1.53	117,262	16,471,793
<b>Total</b>				<b>5,413,547</b>			<b>2,785,073</b>	<b>391,219,195</b>

Note:

\*Benchmark Column 6 = 2.46, 2.07 and 1.33 liter/km

HSD oil average Rate Rs 140.47 (2021-22)

Source: OP-73, OP-28

**Annex-F (Para 7.7)****Unjustified consumption of fuel on shunting services**

<b>Sr. #</b>	<b>Period</b>	<b>Location</b>	<b>Type of Shunting</b>	<b>Excess Working (hours)</b>	<b>Excess Fuel Consumption (Ltr)</b>	<b>Value (Rs)</b>	<b>Ref:</b>
1	Jun-22	Karachi	Goods & Passenger	8,488	228,766	32,134,782	Detail Annex-D
2	2021-22	Sialkot & Narowal	Passenger	909	20,529	2,883,709	Detail Annex-D/1
3	2021-22	Faisalabad & Lahore	Passenger	295	241,034	33,858,046	Detail Annex-D/2
<b>Total</b>				<b>9,692</b>	<b>490,329</b>	<b>68,876,537</b>	

Note:

HSD oil average Rate = Rs 140.47 (2021-22)

Source: OP-28, Karachi and Lahore

## Wasteful consumption of HSD oil on locomotive idling before departure of trains

Sr. #	Period	Train	Excess Time taken (hour)	Per hour consumption (Ltr)	Excess Consumption (Ltr)	Amount (Rs)	Ref:
	2	3	4	5	6=(4x5)	8=(6x140.47)	
1	2021-22	Passenger	4,736	14	66,301	9,313,301	Annex-G
2	March & April 2022	Freight	1,694	14	23,716	3,331,387	Annex-G/1
<b>Total</b>			<b>6,434</b>		<b>90,017</b>	<b>12,644,688</b>	

Note:

HSD oil average Rate = Rs 140.47 (2021-22)

Source: OP-28, Karachi and Lahore

## Theft of HSD oil from under repair locomotives

No of Locos	Period	Shed	Fuel balance when arrived at shed (ltr)	Fuel balance when departed from shed (ltr)	Link	Fuel consumption at shed (ltr)	One hour consumption by 172 locos (ltr)	Theft (ltr)
1	2	3	4	5	7	8=(4-5)	9= (172*22)	10
172	2021-22	Lahore, Karachi	765,721	711,891	LOMS	53,830	3,784	<b>50,046</b>

**Amount Rs 7,029,962**

Note:

HSD oil average Rate = Rs 140.47  
(2021-22)

Source: OP-28 Lahore (FY 2021-22) and Karachi sheds (June 2022)

**Annex-I (Para 7.10)**

**Excess consumption of fuel due to irregular fixation of trip ration**

<b>Link</b>	<b>Period</b>	<b>Division</b>	<b>No of cases/trains</b>	<b>Trip Ration</b>	<b>Fuel on run (ltr)</b>	<b>Fuel as per economical trip (ltr)</b>	<b>Excess Consumption (ltr)</b>	<b>Ref:</b>
Passenger	2021-22	Lahore	7,676	10,067,884	9,927,741	8,450,656	1,477,085	L
Passenger	Jun-22	Karachi	6,410	1,663,879	1,611,721	1,171,228	440,493	L-1
Goods	Jun-22	Karachi	623	824,914	830,795	650,220	180,575	L-2
<b>Total</b>							<b>2,098,153</b>	

Note:

HSD oil average Rate = Rs 140.47 (2021-22)

Cost of HSD                      Rs 294,727,551

Source:    OP-28, Karachi and Lahore

## Irrational fixation of fuel quota for LOMS without devising SOP FY: 2021-22

Sr. #	Shed	LOMS Quota (ltres)	LOMS Consumption (ltres)	Allocation of locos (Nos)	Average consumption per loco per year (ltres)	Excess consumption than at S. No. 3. in Per-centage	Excess consumption (ltres)
1	2	3	4	5	3/5=6	7	4x7=8
1	Kundian	100,000	80,685	43	2326	73%	59,169
2	Rawalpindi	100,000	71,206	34	2941	79%	56,192
<b>3</b>	<b>Lahore</b>	<b>80,000</b>	<b>83,348</b>	<b>129</b>	<b>620</b>	<b>0</b>	<b>-</b>
4	Multan	25,000	12,498	10	2500	75%	9,398
5	Rohri	50,000	27,396	20	2500	75%	20,600
6	Quetta	55,000	39,695	25	2200	72%	28,505
7	Karachi	336,000	306,777	119	2824	78%	239,397
<b>Total</b>		<b>746,000</b>	<b>621,605</b>	<b>380</b>			<b>413,261</b>
<b>Amount =</b>		<b>(413,261 x 140.47) Rs 58,050,815</b>					

Note:

Allocation of locomotives as on 04.10.2021

HSD oil average Rate = Rs 140.47 (2021-22)

## Excess consumption of fuel above the fixed ration

Sr. #	Shed	Excess fuel (liters)	Amount Rs	Period	Annex
1	Lahore	95,431	13,405,164	2021-22	N
2	Karachi	69065	9701504	June 2022	N-1
<b>Total</b>		<b>164,496</b>	<b>23,106,668</b>		

Note:

HSD oil average Rate = Rs 140.47 (2021-22)

Source: OP-73

## Loss of potential earning due to running of under load freight and passenger trains

Train Service	Revenue (Rs)	GTKM	Revenue per GTKM (Rs)	GTKM as per sanctioned load	Under-load in %	Revenue at full load (Rs)	Loss of Revenue due to under-load (Rs)
1	2	3	4=(2/3)	5	6=(5-3/5)	7=(5x4)	8=(7-2)
Passenger	30,371,806,191	10,058,813,535	3.02	13,297,474,705	24%	40,150,692,045	9,778,885,854
Goods	22,957,850,824	14,218,905,773	1.61	33,581,043,755	58%	54,219,966,385	31,262,115,561
<b>Total</b>	53,329,657,015	24,277,719,308		46,878,518,461		94,370,658,431	<b>41,041,001,416</b>

Note:

Ref: Annex- O and O-1

Source: OP-73

HSD oil average Rate = Rs 140.47 (2021-22)

**Suspected misappropriation of fuel due to non-accountal of fuel  
as per dispensing meter**

No of Locos	Loco Shed	Test Check Dates	Fuel added Short (Ltr)	Fuel Issued Lahore & Karachi Shed 2021-22 (Ltr)	Total short & excess during 2021-22 (5.94% + 5.61%) (Ltr)	Ref:
1	2	3	5	6	7=(11.55% of column-6)	8
113	Karachi & Lahore	03.05.2023 to 17.05.2023	9,585	74,631,567	8,619,946	Annex-M, M-1, M-2
Percentage of fuel added			5.61%			

Excess/short in litres	8,619,946 liters
Rate per litre	Rs 140.47
<b>Value of fuel</b>	<b>Rs 1,210,843,813</b>
Fuel added excess	180,737 liters
Fuel added short	170,762 liters

Note:

Source: OP-9

HSD oil average Rate = Rs 140.47  
(2021-22)

## Consumption of fuel above the fixed ration

Sr. #	Shed	Period	Link	Fuel on run (ltr)	Trip Ration (ltr)	10% allowance (ltr)	Excess Consumption (ltr)	Ref:
	2	3	4	5	6	$7=(6 \times 0.1)$	$8=5-(6+7)$	9
1	Lahore	2021-22	Passenger	340,271	222,582	22,258	95,431	Annex-N
2	Karachi	22-Jun	Passenger & Goods	678,093	551,539	55,154	71,400	Annex-N/1
				1,018,364	774,121	77,412	166,831	

**Cost of fuel Rs 23,434,737**

Note:

Source: OP-28

HSD oil average Rate = Rs 140.47 (2021-22)

Excess Consumption (litres) 166,831

## Detail of HSD oil issued for road vehicles, school buses &amp; military tenks etc.

Sr. #	Office Name	Fuel Requisition No.	Dated	Issue to	Qty (liters)
1	HDTXR Goods/ Lahore	10188	24.09.2021	Rescue Truck No. LEG-2821 of Hd TXR Goods/LHR	200
2	IOW No.3 Lahore	2662	02.09.2021	Truck No. 1001	210
3	FO. Motor Shop/ C&W Shop MGPR	612	28.09.2021	All school buses Trucks, Lifter, Fir Station, Ambulance, MGPR	15,000
4	FO. Motor Shop/ C&W Shop MGPR	614	04.12.2021	All school buses Trucks, Lifter, Fir Station, Ambulance, MGPR	15,000
5	WM PAEMS	1281	20.11.2021	Military Tenks, Road Crane, Road Truck	2,550
6	FO. Motor Shop/ C&W Shop MGPR	615	11.01.2022	All school buses Trucks, Lifter, Fir Station, Ambulance, MGPR	15,000
7	IOW No.3 Lahore	2663	02.03.2022	Truck No. LEG-1001	290
8	M/WTSP Section/ Steel Shop MGPR	1052	12.02.2022	Truck, Tractor, Ambulance	1,050
9	M/WTSP Section/ Steel Shop MGPR	1053	13.05..2022	Truck, Tractor, Ambulance	900
10	FO. Motor Shop/ C&W Shop MGPR	616	02.03.2022	All school buses Trucks, Lifter, Fir Station, Ambulance, MGPR	11,000
11	FO. Motor Shop/ C&W Shop MGPR	617	09.05.2022	All school buses Trucks, Lifter, Fir Station, Ambulance, MGPR	11,000
12	WM PAEMS	1282	23.05.2022	Military Tenks, Road Crane, Road Truck	2,400
<b>TOTAL</b>					<b>74,600</b>

Source: Fuel Balance Return (FBR) Lahore Shed

Total issued in litres

74,600 Ltr

HSD oil average Rate = Rs 140.47 (2021-22)

**Value of Fuel Rs 10,479,062**

**Annex-O (Recommendation No. 8.2 (iv))**

<b>Sr. #</b>	<b>Description</b>	<b>Amount (Rs in billion per year)</b>
1	Saving on account of Fuel & Lube Oils.	11.08
2	Saving on account of maintenance cost of Diesel Locomotives v/s Electric Locomotives (150 Locomotives)	4.2
3	Extra revenue generation benefits on account of running total air-conditioned trains.	31.37
4	Saving on account of less staff.	0.97
5	Saving on account of elimination of Power Vans.	8.78
6	Saving due to non-transportation of Diesel Oil	0.85
7	Saving on account of long life of Electric Locomotives V/S diesel Locomotives.	3.51
<b>8</b>	<b>Total Saving:</b>	<b>59.79</b>
9	Maintenance cost of infrastructure and ET Locomotives.	9.675
10	<b>Net Saving= Total saving – Expenditure</b>	<b>50.115</b>

Source: Feasibility Study on Railway Electrification <sup>9</sup>

## Unjustified excess fuel consumption on refueling of Lahore based locos during 2021-22

No of Locos	Fuel from last trip (ltr)	Fuel Added (ltr)	Total Fuel (ltr)	Fuel consumption on refueling (ltr)	Fuel at end of trip (ltr)	One hour consumption by 220 locos @22 ltr per hour	Excess fuel consumption (ltr)
1	2	3	4=(2+3)	5	6=(4-5)	7	8=(5-7)
220	396,480	655,056	1,051,536	28,956	1,022,580	4,840	<b>24,116</b>

100%

4%

*Rate Rs 140.47***Amount Rs 3,387,574***Source: OP-28**Excess consumption is 4% of fuel added*

## References

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