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Report of the Comptroller and Auditor General of India

on

Induction of bio-toilets in Passenger Coaches in Indian Railways

Union Government (Railways)
No. 36 of 2017

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for the year ended March 2017

Laid in Lok Sabha/Rajya Sabha on _____

Union Government (Railways)

No.36 of 2017

Preface

This Report has been prepared for submission to the President of India under Article 151 of the Constitution of India.

This Report of the Comptroller and Auditor General of India contains the results of audit review of 'Induction of bio-toilets in passenger coaches in Indian Railways'. The instances mentioned in this Report are those which came to the notice during the course of test audit for the period 2014-15 to 2016-17 as well as those which came to the notice in earlier years, but could not be reported in the previous Audit Reports.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

Audit wishes to acknowledge the co-operation received from Ministry of Railways at each stage of the audit process.

Contents

Abbreviations

Abbreviation	Full form
AMOC	Annual Maintenance and Operating Contract
CDTS	Controlled Discharge Toilet System
CME	Chief Mechanical Engineer
CR	Central Railway
DEMU	Diesel Electric Multiple Unit
DHMU	Diesel Hydraulic Multiple Unit
DMA	Dual Mounting Arrangement
DRDE	Defence Research and Development Establishment
DRDO	Defence Research and Development Organization
DRL	Defence Research Laboratory
ECR	East Central Railway
ECoR	East Coast Railway
ER	Eastern Railway
ICF	Integral Coach Factory
JWG	Joint Working Group
LHB	Linke Hofmann Busch (type of coaches)
MCF	Modern Coach Factory
MLR	Mid-Life Rehabilitation
NCR	North Central Railway
NEFR	North East Frontier Railway
NER	North Eastern Railway
NR	Northern Railway
NWR	North Western Railway
PAC	Public Accounts Committee
PMO	Prime Minister's Office
POH	Periodic Overhauling
RDSO	Research, Design and Standards Organisation
RCF	Rail Coach Factory
SCR	South Central Railway
SECR	South East Central Railway
SER	South Eastern Railway
SR	Southern Railway
SWR	South Western Railway
UNICEF	United Nation's Children Fund
WCR	West Central Railway
WR	Western Railway

Executive Summary

Indian Railways (IR) operates 13,313 passenger trains with a large fleet of 54,506 coaches (including Diesel Electric Multiple Unit/ Diesel Hydraulic Multiple Unit) carrying 22.21 million passengers daily throughout its network of 1,19,630 track kilometers. The toilet system conventionally used in passenger coaches of IR is flush-type. This involves untreated human waste (night soil) being discharged directly onto the tracks and platform aprons. As a result, there is organic pollution and un-hygienic environment at Stations causing inconvenience to passengers and difficulty in proper maintenance of tracks.

In November 2009, Railway Board set up a Core Group to decide suitable environment friendly toilets for use in IR by carrying out feasibility studies, techno-economic analysis and drawing up an Action Plan for implementation of environment friendly toilets. The Core Group recommended (January 2010) adoption of the bio-digester technology for development of suitable bio-toilets to be fitted in passenger coaches. The 'bio-digester' is a technology developed by Gwalior-based Defence Research and Development Establishment (DRDE) and Tezpur-based Defence Research Laboratory (DRL) for disposal of human waste in an eco-friendly manner. A 'bio-toilet', (using bio-digester technology) is an eco-friendly waste management solution which reduces solid human waste to bio-gas and water with the help of a bacterial inoculum through biological degradation of human waste. It eliminates direct discharge of human waste from coach toilets onto railway tracks and platform aprons in stations; and help avoid manual scavenging while keeping the platform aprons and trains clean.

The Audit was conducted with a view to review the achievement of targets for induction of bio-toilets in passenger coaches by Indian Railways and to evaluate the adequacy of infrastructure in Coaching Depots and Workshops to ensure proper maintenance and upkeep of bio-toilets.

Some of the important Audit findings are given below:

- Different variants of bio-toilets were installed in seven trains on a trial basis during January 2011 to April 2012. However, before the test results in respect of these rakes could be analysed, IR decided to undertake large scale proliferation of 10,000 bio-toilets in passenger coaches in November 2011.

Para 2.1

- Against a target of turning out 100 *per cent* passenger coaches with bio-toilets, three Production Units in IR turned out 5.7 *per cent* coaches without bio-toilets in 2016-17. Linke Hofmann Busch (LHB) coaches were also turned out without bio-toilets in 2016-17 to the extent of 6.7 *per cent.*

Para 2.3

- The percentage utilistaion of funds allotted for retrofitment of bio-toilets remained between 34 *per cent* and 71 *per cent* during 2014-15 to 2016-17. For the year 2016-17, Minister of Railways announced a target of induction of 30,000 bio-toilets, of which 20,000 bio-toilets were to be inducted through retrofitment. Railway Board fixed an internal target of induction of 60,000 bio-toilets during 2016-17, of which target for retrofitment was 50,000. As against the target of 20,000 bio-toilets and internal target of 50,000 bio-toilets, various Zonal Railways could achieve induction of 22,198 bio-toilets through retrofitment. While CR, ER, ECoR, NER, SR, SCR, SWR and WCR surpassed the targets fixed and monitored by Prime Minister's Office, there was a shortfall of 01 to 67 *per cent* in achievement of targets by other Zonal Railways. The shortfall was more than 30 *per cent* in ECR (67 per cent), NCR (49 *per cent*), NR (42 *per cent*), SER (44 *per cent*) and WR (43 *per cent*).

Para 2.4

- In 2016-17, as against a target of 16,800 bio-toilets for retrofitment during periodical overhaul in Carriage Workshops, various Zonal Railways could induct 12,828 bio-toilets. Due to delays in procurement of bio-tanks, bio-toilets could not be fitted in coaches as targeted.

Para 2.4.2

- The concept of Green Train Station and Green Corridors was introduced by IR. In Green Train Stations, all the originating, terminating, bypassing and platform return trains were required to have 100 *per cent* bio-toilet fitted coaches. The tracks on the Green Corridor were also to be made free from human waste discharge. However, the nominated stations and corridors did not adhere to these conditions.

Para 2.5

- Due to inadequate progress of retrofitment of bio-toilets in passenger coaches by Zonal Railways, Railway Board decided to place bulk order for supply, installation and commissioning of approximately 80,000 bio-toilets in in-service coaches. Out of the nine firms on which orders were placed by Railway Board, seven firms, had complaints pending against them regarding quantity and quality of material supplied against Purchase Orders placed by the Zonal Railways during 2015-16 and 2016-17. As against

33,783 bio-toilets which were to be supplied to 16 Zonal Railways up to March 2017, only 14,274 bio-toilets were supplied by the firms. Out of these, 12,016 bio-toilets were fitted in coaches up to March 2017.

Para 3.1.1.2

- Adequate storage space for bio-tanks and bacteria inoculum and other infrastructure facilities such as hydraulic/fork lifts, ramps for loading/unloading of bio-tanks, evacuation systems, bio-toilet aprons etc. were not available in most of the selected Carriage Workshops of various Zonal Railways. Inadequate supply/quality of supply of bacteria inoculum was also a constraint and installation/augmentation of bacteria generation facility in SECR, ECoR and ECR needed to be geared up.

Para 3.2 and Para 3.3

- Analysis of data on instances of defects/problems such as choking/foul smell, non-availability of dust-bins, and mugs etc. in 15 Zonal Railways in selected 30 Coaching Depots for 2016-17 showed that out of 613 trains being handled in these Coaching Depots, 160 trains did not have any bio-toilets fitted. In remaining 453 trains having 25080 bio-toilets (either full complement or partial), 199689 instances of deficiencies /complaints were noticed. There was an increase in cases of choking per bio-toilet in the year 2016-17 as compared to 2015-16. Non-availability of evacuation machines led to difficulties in removing biodegradable waste from the bio-tanks. Annual Maintenance and Operating Contracts were yet to be awarded in 12 Coaching Depots of nine Zonal Railways. Instructions regarding storage and handling of bacteria inoculum and use of cleaning agents were not being followed properly by the Coaching depots.

Para 4.1.1 and Para 4.1.2

- Only 36.62 *per cent* Supervisory and 23.21 *per cent* non-Supervisory staff were trained in maintenance of bio-toilets, since May 2013, when the orders for imparting training were issued.

Para 4.3

- None of the Zonal Railway except Southern Railway conducted any specific Passenger Awareness Drive to educate the public by distributing pamphlets, making announcements or arranging display on display boards/LED screens.

Para 4.4

Recommendations

1. ***The issues relating to standardisation of design may be effectively addressed. This will also help in effective handling of maintenance issue of bio-toilets.***
2. ***Issues of quality and quantity in supply of bio-toilets by private firms may be addressed urgently and the process streamlined so as to ensure achievement of ambitious targets of fitment of bio-toilets in the next few years.***
3. ***The checks prescribed by Research, Design and Standards Organisation for visual inspection and testing of effluent discharge from the bio-toilets fitted may be exercised regularly, so as to monitor the performance of bio-toilets effectively. Checks prescribed for bio-toilets during periodical overhaul should be exercised and scheduled maintenance of bio-toilets may be carried out for their smooth operation in trains.***
4. ***Augmentation of capacity for in-house production and procurement of bio-tanks from private firms for supply of adequate number of bio-tanks needs to be ensured to facilitate achievement of the target set for fitment of bio-toilets in all coaches.***
5. ***Adequate facilities for bacteria generation needs to be installed urgently.***
6. ***Zonal Railways may consider adequate provision of infrastructure such as fork lifts, storage facilities and evacuation machines etc. in Workshops and Coaching Depots on priority to ensure timely retrofitment and proper maintenance of bio-toilets.***
7. ***Training to adequate number of non-Supervisory staff in the Workshops and Coaching Depots entrusted with the responsibility of upkeep and maintenance of bio-toilets and their retrofitment may be ensured.***
8. ***Annual Maintenance and Operations Contracts may be finalised for all Coaching Depots.***
9. ***Passenger Awareness Drives may be organised at regular intervals to create awareness about proper usage and working of the bio-toilets, by utilising electronic and print media and short films displays at major stations. Railways may consider highlighting elimination of manual scavenging through use of bio-toilets to make these drives more effective.***

Chapter I: Introduction

1.1 Introduction

Indian Railways (IR) run about 13,313 passenger trains with a large fleet of 54,506 coaches (including Diesel Electric Multiple Unit/ Diesel Hydraulic Multiple Unit) carrying 22.21 million passengers daily throughout its network of 1,19,630 track kilometers[1]. The toilet system conventionally used in passenger coaches of IR is flush-type. This involves untreated human waste (night soil) being discharged directly onto tracks and platform aprons. As a result, there is organic pollution and un-hygienic environment at Stations causing inconvenience to passengers and difficulty in proper maintenance of tracks.

IR started efforts in 1993 with limited trials with biological toilet system imported by Integral Coach Factory (ICF) from the United States of America (USA), fitted in six Broad Gauge/ General Sleeper and two AC II tier coaches in Southern Railway (SR). Controlled Discharge Toilet System (CDTS) was introduced on IR in May 2000 with design of bottom slide valve. This valve opens and discharges waste on the run when the train speed reaches 30 kmph. Discharge takes place away from the stations, thus helping in keeping the stations clean.

In November 2009, Railway Board set up a Core Group to decide suitable environment friendly toilets for use in IR by carrying out feasibility studies, techno-economic analysis and drawing up an Action Plan for implementation of environment friendly toilets. The Core Group recommended (January 2010) amongst others[2], adoption of the bio-digester technology for development of suitable bio-toilets to be fitted in passenger coaches. The *'bio-digester*' is a technology developed for disposal of human waste in an eco-friendly manner. This technology was developed by Gwalior-based Defence Research and Development Establishment (DRDE) and Tezpur-based Defence Research Laboratory (DRL). A *'bio-toilet'*, (using bio-digester technology) is an eco-friendly waste management solution which reduces solid human waste to bio-gas and water with the help of a bacterial inoculum through biological degradation of human waste. The advantages of bio-toilets are:

- Elimination of direct discharge of human waste from coach toilets onto railway tracks and platform aprons in stations; and
- Avoiding manual scavenging while cleaning platform aprons and trains

[1] As on 1 April 2016, Source: IR Year Book 2015-16
[2] Zero Discharge Toilet System, Vacuum toilet system, trial of new technologies/products not tried in past

In March 2010 IR entered into a Memorandum of Understanding with Defence Research and Development Organization (DRDO) to work jointly for development of a bio-toilet system for use in passenger coaches. The bio-toilets developed by IR and DRDO, have a colony of anaerobic bacteria[3], kept in a container under the lavatories that convert human waste into water and a small amount of gases. These gases are released into the atmosphere and the water is discharged on to the track after disinfection. A Joint Working Group (JWG) comprising of IR Engineers and DRDO bio-technologists was formed in March 2010 for joint development of technology using DRDE bio-digester for toilet system on coaches of IR. First prototype rake, fitted with IR-DRDO bio-toilets (hereafter called *bio-toilets*) turned out from Rail Coach Factory (RCF), Kapurthala was put in service in January 2011 in the Gwalior-Varanasi Bundelkhand Express.

Campaigns against open defecation have gained momentum the world over. International organizations advocate immediate eradication of open defecation. The Government of India (GoI), aided by partners like UNICEF, is looking at the challenge of open defecation very seriously. GoI launched the Swachh Bharat Mission, a cleanliness drive in the country on 2nd October 2014. GoI has a target to make India 'Open Defecation Free' by 2019. Speeding up the process of induction of eco-friendly toilets in passenger coaches would improve cleanliness and the image of IR. Taking forward, the momentum on 'Swachh Rail, Swachh Bharat', IR has given a commitment to induct bio-toilets in all coaches by the Year 2019, for which every year minimum 50,000 bio-toilets have to be fitted in passenger coaches.

1.2 Earlier Audit coverage

A comment on providing environment friendly coaches with CDTS was included in C&AG's Report No. 6 of 2007, Chapter 2 'Cleanliness and Sanitation on IR'. The Public Accounts Committee (PAC) in their 83rd report (2008-09) recommended expediting the process of up-gradation of toilets in trains. In their Action Taken Note (ATN), Ministry of Railways (MoR) stated (October 2013) that field trials were being conducted with different designs/ types of environment-friendly 'Green Toilets' and based on those trials, a final view would be taken.

A comment on delay in developing a suitable model of toilet for passenger trains for the Indian environment was made in C&AG's Report No. 11 of 2013. In the Action Taken Note, MoR (September 2014) stated that IR-DRDO type bio-toilets were found to be the most promising to suit IR's service conditions.

[3] Bacteria which does not require oxygen to work

Based on the performance, these IR-DRDO bio-toilets were being proliferated over IR. Ministry further stated that total 7295 bio-toilets had been fitted in 2,774 coaches till 31 December 2013 for trial purposes and the following strategies were adopted by IR to increase the pace of fitment of bio-toilets:

- Fitment of bio-toilets in all new coaches manufactured by ICF, RCF and Bharat Earth Movers Limited (BEML),
- Speeding up fitment of bio-toilets during Mid-Life Rehabilitation (MLR),
- Gear-up for retro fitment of bio-toilets during Periodic Overhauling (POH) of passenger coaches, and
- Streamlining the supply chain of bio-toilet materials, etc.

Subsequently, evolution of environment friendly toilets was highlighted in C&AG's Report No. 21 of 2012-13 - 'Environment Management in IR', Chapter 4 Waste Management. In their Action Taken Note (ATN), MoR stated (October 2013) that a Joint Working Group (JWG), consisting of IR's Mechanical Engineers and DRDO's bio-technologists was dedicated to the successful development of bio-toilets. Ministry further stated that from 2016-17 onwards, all new coaches would be inducted with bio-toilets and they would cover the entire fleet by 2021-22. Earnest efforts were being made to eliminate direct discharge system from passenger coaches. MoR also added that teething problems of this new technology were being regularly addressed and the pace of fitment of bio-toilets was being accelerated.

Minister of Railways (MR) in his Budget speech in July 2014 stated that bio-toilets would be increased in sufficient numbers in trains in order to mitigate the problems of direct discharge of human waste on the tracks and platform aprons at Stations. In his Budget speech in February 2015, MR further stated that the condition of toilet facilities in our stations and trains needed major improvement for which bio-toilets are being fitted in coaches. In his Budget speech in February 2016, the MR stated that in pursuance of our mission 'Swachh Rail Swachh Bharat', 17,000 bio-toilets would be provided in trains before the close of this financial year 2015-16 and 30,000 in the next financial year i.e. 2016-17.

1.3 Organizational Structure

At the apex level, Mechanical Directorate of Railway Board is responsible for introduction of appropriate technology for bio-toilets and monitoring induction of bio-toilets in passenger coaches. Research, Design and Standardisation Organisation (RDSO) is responsible for development and finalization of suitable bio-toilet designs and required accessories thereof and to address design/maintenance issues brought out by Production Units (PUs)

and Zonal Railways. General Managers of PUs are responsible for ensuring induction of bio-toilets in new coaches as per the targets set. General Managers and Chief Mechanical Engineers (CMEs) of Zonal Railways are responsible for ensuring retro fitment of bio-toilets in existing in-service passenger coaches in Workshops and Coaching Depots.

1.4 How bio-toilets works

A bio-toilet is a complete waste management solution which reduces solid human waste to bio-gas and water, with the help of a bacterial inoculum. Human waste is biologically decomposed in bio-digester tanks with the help of anaerobic bacteria. Bio-toilet disposes solid human waste in an eco-friendly, economical and hygienic manner. The residual water from bio-toilet is odourless and devoid of any solid particles, requires no further treatment / waste management.

The working of bio-toilets being inducted in passenger coaches in IR is explained below:

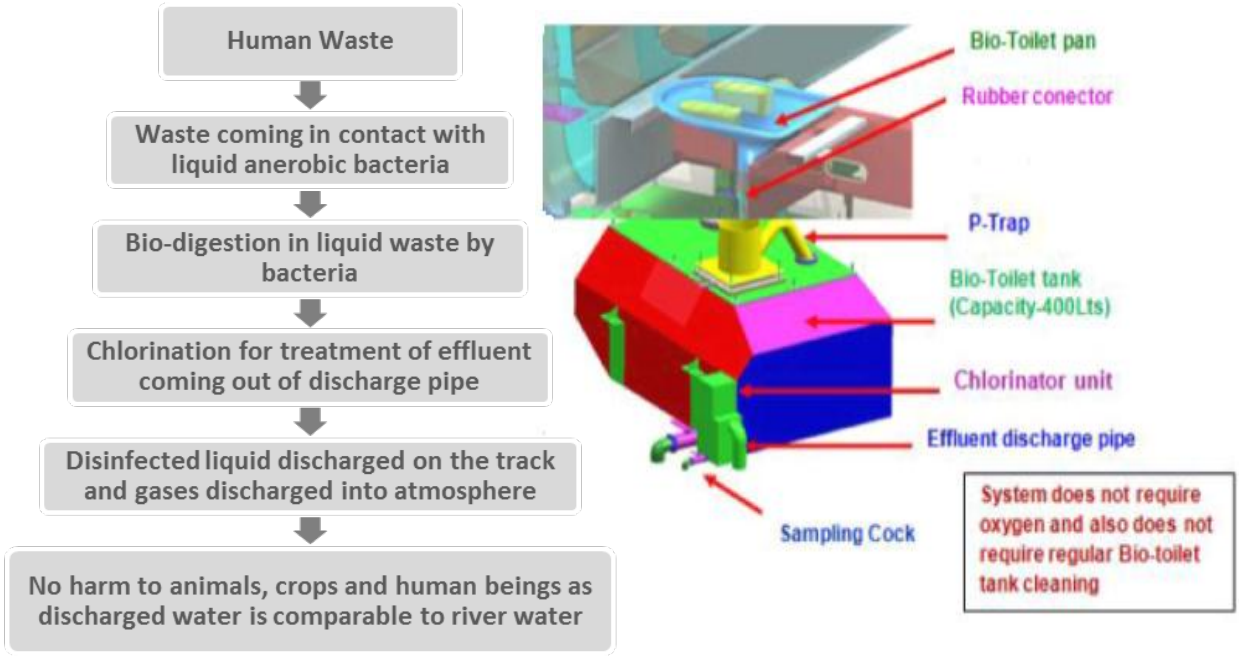

Figure 1: Working of bio-toilets

As can be seen, the faecal matter passes from lavatory pan having diameter of 150/100mm, to bio-tank via rubber connector and P or S trap. Anaerobic bacteria already filled into bio tank, converts faecal matter into water and gas (Co2+ Methane).Water gets discharged on the track after disinfection and gases released into the atmosphere through outlets provided on bio-tanks.

Bio-tank is fitted below the headstock with the help of J/C type of bracket or direct mounting. The following variations in design of bio-toilets are currently in use in IR:

A. On the basis of clamping mechanism for fixing the bio-tank below the lavatory pan
   (i) Direct welding – 'J' brackets
   (ii) Direct welding – 'C' brackets
   (iii) Direct mounting Bolted design – Bio-tank with integral brackets is mounted directly on headstock
B. On the basis of the passage for discharge of faecal matter from the pan to bio-tank
   (i) 'P' trap type
   (ii) 'S' trap type
C. On the basis of ball-valve opening mechanism, provided to facilitate direct discharge in case of choking of the toilet.
   (i) Lever
   (ii) Rack & pinion
   (iii) Wire rope & pulley arrangement
D. On the basis of size of discharge diameter of the lavatory pan
   (i) 150mm
   (ii) 100mm

While recommending large scale proliferation of bio-toilets in passenger coaches in November 2011, JWG also recommended that all the units (PUs and workshops) should follow the same standardized design of bio-toilets, so that universality may be ensured. For bio-digester procurement, RCF drawing developed on the basis of key design drawings issued by RDSO may be followed. It was seen that JWG in July 2013 suggested that RDSO may standardize the opening size of pan and P-trap, ball valve design, dust bin and opening and closing mechanism. However, a variety of designs with respect to pan size, ball valve, opening/closing mechanism of valve, design of connector between pan and p trap etc. continue to be deliberated in various monitoring meetings and are yet to be standardized. Provision of dustbin inside the toilet was recommended by JWG in 2ndmeeting held in April 2011. In 7th meeting held in October 2012, JWG recommended that RCF and ICF were to prepare design of dustbin inside the lavatory as per guidelines issued by Railway Board and submit to RDSO for standardization. The design of dustbin could be finalized only by November 2013.

As of March 2017, the design and development of bio-tanks was yet to be finalized for BEML coaches, coaches of tourist trains like Maharaja Express and Deccan Odyssey, SLRs/Railway Administration coaches, MEMU/TC,

retrofitment of LHB coaches and LHB Double decker coaches, DEMU and DHMU, and retrofitment of ICF types coaches fitted with CBC and CDTS.

1.5 Audit Objectives

The Audit was conducted with a view to assess:

1. Whether IR has been able to adhere to the Action Plan and achieve the targets set for induction of bio-toilets in passenger coaches and implementation of Green Stations and Corridors? and
2. Whether the supply of bio-tanks and other materials and infrastructure required for induction of bio-toilets was adequate?
3. Whether Coaching Depots and Workshops were able to ensure proper maintenance and upkeep of bio-toilets in passenger coaches?

1.6 Audit Criteria

The various sources from where we derived the Audit Criteria for this review are as follows:

- Budget speeches of Minister of Railways,
- Recommendations of Public Accounts Committee on related topics,
- Railway Board Orders/Circulars on introduction, development, induction, maintenance and upkeep of bio-toilets and its accessories,
- Handbook brought out by CAMTECH[4] on IR-DRDO bio-toilets for Open Line maintenance,
- Guidelines for POH of coaches fitted with Bio-toilets issued by CAMTECH
- Compendium on IR-DRDO bio-toilets for IR issued by CAMTECH,
- Guidelines on bio-tank for IR brought out by RDSO,
- Orders/Instructions issued by Zonal Railways on implementation/ induction/ retrofitting of bio-toilets; and
- Minutes of the meetings held by the Joint Working Group.

1.7 Audit Scope, Methodology and Sample Size

The audit review covered a three-year period from 2014-15 to 2016-17. Audit methodology included examination of records at Railway Board, Zonal Railway Headquarters, Workshops undertaking periodic overhauling of passenger coaches and Coaching Depots, where coaches with bio-toilets are being maintained. Joint Inspections of selected trains and Green Train Stations were undertaken with Railway officials to study the status on ground. A Passenger Survey Questionnaire was also administered to selected passengers to record user perception and experience of bio-toilets fitted in passenger coaches.

[4]Centre for Advanced Maintenance and Technology, Gwalior

Relevant records of three PUs, 27 Carriage Workshops, 32 Coaching Depots, RDSO and six Green Train Stations were examined. Further, joint inspections with Railway Officials on-board 33 selected Mail /Express trains were conducted and passenger survey carried out to ascertain their opinion about the bio-toilets fitted in passenger coaches.

Table 1 - Details of sample selected for review

S. no	Details of units	Total population over IR	Sample size	Sample selected
A	B	C	D	E
1	Production Units	Three	100 *per cent*	1. Rail Coach Factory, Kapurthala, 2. Integral Coach Factory, Perambur 3. Modern Coach Factory, Raebareli
2	Mid-life rehabilitation Workshops	Three	100 *per cent*	1. Bhopal (WCR) 2. Jhansi (NCR) 3. Parel (CR)
3	Carriage Workshops	25	100 *per cent*	25 POH Workshops
4	Coaching Depots	--	2 Major Depots per Zonal Railway	32 Coaching Depots
5	Joint Inspection of Green train stations	Six	100 *per cent*	Six stations – Sri Mata Vaishno Devi Katra, Rameswaram, Machilipatnam, Mysuru, Okha and Porbandar
6	Joint Inspection of trains having bio-toilets	--	Two trains having 100 *per cent* bio-toilets	33 Trains

Details of units selected in the sample are given in **Annexure 1**. Entry and Exit conferences were held in all Zonal Railways. Audit findings and recommendations were discussed with the Ministry of Railways during an Exit Conference in July 2017. Their responses have been duly incorporated in the Audit Report.

1.8 Acknowledgement

Audit acknowledges the co-operation extended by the Railway Board and the Zonal Railway Administrations during the field audit as well as joint inspections conducted.

Chapter 2: Induction of bio-toilets in passenger coaches and implementation of Green Stations and Corridors

Audit Objective 1: Whether IR has been able to adhere to the Action Plan and achieve the targets set for induction of bio-toilets in passenger coaches and implementation of Green Stations and Corridors?

2.1 Decision for induction of bio-toilets in passenger coaches in IR

The JWG comprising of IR Engineers and DRDO bio-technologist for joint development of technology using DRDE bio-digester for toilet system on coaches of IR was formed by the Railway Board in March 2010. The JWG met every quarter, received feedback from the Zonal Railways and deliberated on various issues relating to design, induction, maintenance and upkeep of bio-toilets in passenger coaches.

In January 2011, 43 bio-toilets (three variants) were installed on 23 coaches in the Gwalior-Varanasi Bundelkhand Express on a trial basis. Based on tests/trials on these bio-toilets, JWG in their meeting (April and August 2011) suggested wide scale proliferation of two of the variants[5] on six rakes[6] with different types of coaches. Bio-toilets in these rakes were installed during February to April 2012.

For proper monitoring of the bio-toilets fitted in various coaches, a trial test scheme was issued by RDSO (after various amendments) in April 2013. This scheme was divided mainly into two parts viz. visual inspection and quality check of the effluent discharged from bio-toilets. The scheme required monitoring of trains fitted with bio-toilets for two POH periods i.e. 36 months and consolidated test/trial reports in the prescribed proforma were required to be submitted to RDSO by Zonal Railways on a half yearly basis. Monitoring parameters included inspection of mounting/securing arrangements of bio-digester tanks, leakage in joints and water pipe lines, adequacy of the provisions made for segregation of non-bio degradable items, functionality of flush buttons and levers, problem regarding foul odour, overall cleanliness, notices for users, emergency operations mechanism, performance of ejection system etc. and also quality parameters for effluents.

It was seen that details of feedback of performance of bio-toilets fitted in coaches were not documented/ maintained and reported to RDSO in the prescribed manner by any of the nominated Zonal Railways except NCR.

[5] Variant 2 (manual slider and P-trap) in five rakes and Variant 4 (solid-liquid separator design and with PLC) in one rake

[6] Indore-Gwalior Express, Lucknow-Mumbai Pushpak Express, Jammu Tawi-Indore Malwa Express, Nizamuddin-Indore Intercity Express, Mumbai-Varanasi Mahanagri Express and Guwahati-Chennai Egmore Express, these trains pertained to seven Zonal railways - CR, NR, NCR, NER, NFR, SR and WR

However, before the test results in respect of these rakes could be analysed, JWG in their 4th meeting (November 2011) recommended large scale proliferation of 10,000 bio-toilets to be planned in the near future. Of these, the responsibility of induction of 2,500 bio-toilets each was assigned to ICF and RCF and the remaining were to be retrofitted by the Workshops. Railway Board also communicated (18 November 2011) an Action Plan for induction of IR-DRDO bio-toilets in passenger coaches in IR.

2.2 Action Plan for induction of bio-toilets in passenger coaches

IR has planned to induct bio-toilets in passenger coaches through the following means:

I. Fitment of bio-toilets in newly manufactured coaches by RCF, Kapurthala, ICF, Perambur, Modern Coach factory (MCF), Raebareli and BEML(a Central PSU, supplier of coaches)

II. Retrofitment of bio-toilets in in-service passenger coaches during
   a. Mid-life Rehabilitation[7] (MLR), which is done at three designated workshops in IR viz. Bhopal (WCR), Parel (CR) and Jhansi (NCR).
   b. POH (POH) of coaches in Carriage Workshops in various Zonal Railways; and
   c. Regular maintenance of coaches in the Coaching Depots.
   d. Where bio-toilets have not been fitted in new coaches, but dual mounting arrangement[8] has been done i.e. a bracket has been provided on which bio-toilets can be fitted by Zonal Railways in Workshops, bio-toilets were to be retrofitted by the Zonal Railway Workshops.

Over the years, Railways have taken various steps towards induction of bio-toilets in passenger coaches, to be implemented by PUs and Zonal Railways. Year-wise Action Plan and action taken against the same are tabulated below:

Table 2 - Implementation of Action Plan since 2011-12

Year	*Action plan*	*Audit findings*
2011-12	--	Bio-toilets were provided in 44 and 23 coaches by RCF and ICF respectively.
2012-13	2,500 coaches planned for fitment of bio-toilets 1. Fitment of 2,400 bio-toilets – 1,200 by RCF and 1,200 by ICF in two phases (600 in each phase). Fitment to be made after review of	1307 bio-toilets in 546 coaches

[7] In MLR of coaches, major structural repairs and complete refurbishing of interiors are carried out with better quality material, once they have completed 12 - 15 years in service.
[8] RCF developed a design for dual mounting arrangement on which chute as well as Bio-tank can be mounted without altering the coach. In this design the coach is equipped with bolted chute mounted bracket and welded retention tank mountings. When the bio-toilet is to be fitted, only bolted chute mounting bracket will be required to be removed.

Table 2 - Implementation of Action Plan since 2011-12		
Year	**Action plan**	**Audit findings**
	performance in first phase. 2. Retrofitment of 100 bio-toilets at Bhopal Workshop	30 bio-toilets retrofitted
2013-14	1. RCF and ICF to turn out all ICF type conventional coaches with bio-toilets. 2. All conventional passenger coaches except General Sleeper (GS) coaches are to be turned out with full complement of bio-toilets. 3. MLR – All 840 conventional ICF type passenger coaches undergoing MLR 4. RCF to expedite the provision of bio-toilets for trials in LHB coaches at war footing. 5. Fitment of bio-toilets in 1460 DMA coaches by Workshops	1. Not achieved. 2. Not achieved. 3. 222 bio-toilets in 77 coaches 4. Progress very slow. Fitment of bio-toilets in LHB coaches gained momentum in 2016-17. 5. 432 bio-toilets in 120 coaches
2014-15	Target –to induct 10,500 bio-toilets (say 2625 coaches)	No specific targets for PUs, ZRs and Workshops were given. However, number of bio-toilets inducted were: PUs: 1731 (coaches where full complement of bio-toilets fitted) 852 (coaches fitted with bio-toilets partially) Retrofitment in ZRs: 2,456 bio-toilets
2015-16	Target –to induct 17,000 bio-toilets All coaches to be turned out with bio-toilets Retrofitment in ZRs: 12,308 bio-toilets	Number of bio-toilets inducted: PUs: 2517 out of 3344 coaches turned out were fitted with full complement of bio-toilets, 130 coaches partly and 697 with no bio-toilets. Retrofitment in ZRs: 7,083 bio-toilets
2016-17	Target –to induct 30,000 bio-toilets PUs: 10,000 (2,500 coaches) Retrofitment in ZRs: 20,000 bio-toilets	Number of bio-toilets inducted: PUs: 13,776 bio-toilets (3,439 coaches) Retrofitment in ZRs: 22,198 bio-toilets

Railway Board while conveying (January 2015) the targets for fitment of bio-toilets in coaches during 2015-16 instructed all Zonal Railways to furnish an achievable 'Action Plan' for the year 2015-16. Railway Board further instructed (April 2016) all Zonal Railways to give the detailed action plan for retrofitment of bio-toilets for the year 2016-17.

It was observed that none of the Zonal Railways prepared a specific documented Action Plan including significant elements such as identification of action to be taken, milestones, scheduled date of completion, monitoring responsibilities etc. taking into account crucial aspects such as number of trains/coaches/toilets in each coach.

During Exit conference, Ministry stated (July 2017) that the main reasons for shortfall in targets was non-supply/delayed supply of bio-tanks by the vendors.

2.3 Fitment of bio-toilets in new coaches by PUs

There are three PUs manufacturing new passenger coaches in IR viz. ICF, Perambur, RCF, Kapurthala and MCF, Rae Bareli. Railway Board instructed (March 2013 and April 2013) RCF, Kapurthala and ICF, Perambur that all conventional ICF design coaches (except General Sleeper (GS) coaches) being turned out by PUs should invariably be fitted with full complement of four bio-toilets before turning them out. All GS coaches were to be provided with two bio-toilets only fitted diagonally, till the new improved suspension arrangement for GS coaches was approved and cleared for fitment of four bio-toilets. ICF started fitment of four bio-tanks in GS coaches from August 2014 and RCF from November 2014. In January 2015, Railway Board instructed all the three PUs to eliminate provision of direct discharge toilets in new coaches by end of 2016-17.

Audit examined the status of provision of bio-toilets in passenger coaches manufactured in these three PUs. It was seen that during 2010-11 to 2013-14, 2,953 coaches were turned out with 6,991 bio-toilets (either full or part complement) by RCF and ICF. In addition, BEML supplied 601 coaches fitted with 2,398 bio-toilets during 2013-15.

Induction of bio-toilets in newly built coaches by RCF, ICF and MCF during the period of review is given below:

Table 3 - Fitment of bio-toilets in new coaches manufactured by PUs

Year	*Production Unit*	*Number of coaches turned out*	*Number of coaches turned out with bio-toilets*	*Number of coaches turned out with bio-toilets partly*	*Number of coaches turned out without bio-toilets*
A	*B*	*C*	*D*	*E*	*F*
2014-15	RCF, Kapurthala	1449	482	575	392
	ICF, Perambur	1629	1237	277	115
	MCF, Raebareli	140	12	0	128
	Total	**3218**	**1731**	**852**	**635**
2015-16	RCF, Kapurthala	1506	1123	58	325
	ICF, Perambur	1553	1253	72	228
	MCF, Raebareli	285	141	0	144
	Total	**3344**	**2517**	**130**	**697**
2016-17	RCF,	1411[9]	1322	0	89

[9] 80 coaches to be supplied to Bangladesh Railways excluded

Table 3 - Fitment of bio-toilets in new coaches manufactured by PUs					
Year	*Production Unit*	*Number of coaches turned out*	*Number of coaches turned out with bio-toilets*	*Number of coaches turned out with bio-toilets partly*	*Number of coaches turned out without bio-toilets*
A	*B*	*C*	*D*	*E*	*F*
	Kapurthala				
	ICF, Perambur	1679	1595	0	84
	MCF, Raebareli	558	522	0	36
	Total	**3648**	**3439**	**0**	**209**
Grant total		***10210***	***7687***	***982***	***1541***

As can be seen that during 2014-15 to 2016-17,

- Out of 10,210 coaches turned out by three PUs, full complement of bio-toilets was provided only in 7,687 coaches (75.28 *per cent*).
- In 982 coaches, all the four toilets were not fitted with bio-toilets.
- 1,541 coaches were turned out without bio-toilets. However, the number of coaches tuned out without bio-toilets came down to 209 in 2016-17, as against 635 and 697 during 2014-15 and 2015-16 respectively.
- Of the 1,541 coaches turned out without bio-toilets, in 489[10] coaches provision for Dual Mounting Arrangement (DMA) was made. Zonal Railways were required to fit bio-toilets on the same in Workshops/Coaching Depots, but bio-toilets were not fitted.

It was further observed that

- In ICF, Perambur, bio-toilets were provided in all SLR and DSLR coaches turned out except in Guard cabins as the design of bio-toilets for Guard cabins was approved only in June 2015. Bio-toilets were not provided in Guards cabin of 170 and 72 SLR and DSLR coaches during 2014-15 and 2015-16 respectively. However, in 2016-17 all 101 SLRD coaches manufactured were fitted with bio-toilets in Guard cabin also.
- The design of bio-toilets for MEMU/DEMU coaches was approved in October 2015. However, out of 150 and 90 such coaches manufactured in ICF, Perambur during 2015-16 and 2016-17, bio-toilets were not provided in 89 and 42 coaches respectively. Overall 312 DEMU/MEMU coaches were received by Zonal Railways during the period of review, of which only 103 were fitted with bio-toilets.

[10] Up to September 2016

- Delay in finalization of design of bio-toilets for different type of coaches, non-materialization of supply orders for bio-tanks as well as decision to exhaust the stock of CDTS toilets already procured earlier were the reasons for non- fitment of bio-toilets in coaches manufactured by ICF, Perambur during the review period.

The design of bio-toilets for LHB coaches was approved by RDSO in 2012-13. RCF, Kapurthala was instructed by Railway Board (March 2013) to expedite the provision of bio-toilets for trials in LHB coaches on war-footing so as to eliminate direct discharge toilet system in new coaches at the earliest. Railway Board directed (14 January 2015) that bulk fitment of bio-toilets in LHB coaches was must to achieve the target set for 2015-16 and a step ahead towards the target of 2016-17. Railway Board directed all the three PUs to speed up fitment of bio-toilets in LHB coaches after resolving issues/problems faced by the Zonal Railways during in-service trials. The position of fitment of bio-toilets in LHB coaches was as follows:

Table 4 - Fitment of bio-toilets in new LHB coaches manufactured by PUs

Year	*Production Unit*	*Number of coaches turned out*	*Number of coaches turned out*	
			with bio-toilets	*without bio-toilets*
A	*B*	*C*	*D*	*E*
2014-15	RCF, Kapurthala	349	30	319
	ICF, Perambur	65	1	64
	MCF, Raebareli	140	12	128
	Total	**554**	**43**	**511**
2015-16	RCF, Kapurthala	469	187	282
	ICF, Perambur	230	92	138
	MCF, Raebareli	285	141	144
	Total	**984**	**420**	**564**
2016-17	RCF, Kapurthala	457	398	59
	ICF, Perambur	400	400	0
	MCF, Raebareli	558	522	36
	Total	**1415**	**1320**	**95**
	Grand Total	***2953***	***1783***	***1170***

As can be seen, 92 *per cent* of LHB coaches were turned out without bio-toilets in 2014-15, 57 *per cent* in 2015-16, while in 2016-17 only 6.7 *per cent LHB coaches were turned out without bio- toilets*.

Thus, against a target of turning out 100 per cent passenger coaches with bio-toilets, three PUs in IR turned out 5.7 per cent coaches without bio-toilets in 2016-17. 6.7 per cent LHB coaches were also turned out without bio-toilets in 2016-17.

During Exit conference Ministry stated (July 2017) that considering their earning potential, priority was given to the situation that the coaches are not kept idle just for want of fitment of bio-tanks due to short supply by the vendors. They stated that, in such cases it was ensured that coaches were turned out with Dual Mounting Arrangements so that bio-tanks could be easily retrofitted by Zonal Railways.

2.4 Retro fitment of bio-toilets in existing coaches

Railway Board issued instructions from time to time (August 2012, November 2012, August 2014 and April 2015) to accelerate the process of retrofitting bio-toilets. Retrofitment of bio-toilets in existing coaches is to be done at various stages, during MLR of coaches in MLR workshops at Bhopal, Jhansi and Parel, during POH of coaches in 27 POH Workshops and in various Coaching Depots during maintenance of coaches. Looking to the slow pace of work by Zonal Railways (only 33.52 *per cent*), till the end of September 2015, Railway Board directed (December 2015) all Zonal Railways to put in earnest efforts to ensure achievement of target and even one bio-toilets less than the target would not be acceptable.

As on 1 April 2016, there are 54,506 passenger coaches in service in IR. Railway Board fixed a target for induction of 17,000 bio-toilets in coaches during 2015-16 and 30,000 bio-toilets during 2016-17. Audit examined the status of retrofitment of bio-toilets in passenger coaches by Zonal Railways as per target assigned by Railway Board during the past three years as detailed below:

Table 5 - Zonal Railway wise targets and achievement for retrofitment of bio-toilets during the review period

	2014-15		2015-16		2016-17		
Zonal Railway	Target by RB	Achievement	Target by RB	Achievement	Target monitored by PMO	Internal targets by RB	Achievement
A	B	C	D	E	F	G	H
CR	no target	632	1412	1028	2000	4300	2222
ER	no target	210	352	193	1200	3300	1287
ECoR	no target	528	620	509	850	2450	968
ECR	no target	0	324	88	1200	3250	396
NCR	no target	34	268	84	500	1150	252
NFR	no target	0	396	71	850	2350	841
NWR	no target	119	560	165	850	2350	777
NER	no target	137	412	501	800	2200	1542
NR	no target	0	800	848	1800	5050	1048
SR	no target	0	1376	605	1950	5750	3189
SECR	no target	0	244	258	400	1000	336
SCR	no target	74	776	304	1400	3900	2122

Table 5 - Zonal Railway wise targets and achievement for retrofitment of bio-toilets during the review period							
	2014-15		2015-16		2016-17		
Zonal Railway	Target by RB	Achievement	Target by RB	Achievement	Target monitored by PMO	Internal targets by RB	Achievement
A	B	C	D	E	F	G	H
SER	no target	0	568	24	1050	3050	589
SWR	no target	172	232	242	850	2350	1829
WCR	no target	356	3188	2091	2850	3600	3977
WR	no target	194	780	72	1450	3950	823
Total	**no target**	**2456**	**12308**	**7083**	**20000**	**50000**	**22198**

It was observed that

- Railway Board had not fixed any specific Zone wise target for retrofitment of bio-toilets in 2014-15 despite allotting funds for this purpose. 2456 bio-toilets were fitted in 762 coaches during the year. The retrofitment was nil for ECR, NFR, NR, SR, SECR and SER. Against allotment of ₹ 50.58 crore, only ₹ 17.05 crore was utilized for induction of bio-toilets on all Zonal Railways (in respect of SR, the information was not made available).
- A target of retrofitment of 12308 bio-toilets for the year 2015-16 was fixed by Railway Board in April 2015. Against this, 7083 bio-toilets (57.54 *per cent*) were retrofitted by various Zonal Railways.
- For the year 2016-17, MR announced a target of induction of 30,000 bio-toilets. Of this, 20,000 bio-toilets were to be inducted through retrofitment. Railway Board fixed an internal target of induction of 60,000 bio-toilets during 2016-17, of which target for retrofitment was 50,000.
- As against the target of 20,000 bio-toilets and internal target of 50,000 bio-toilets, various Zonal Railways could achieve induction of 22,198 bio-toilets through retrofitment. While CR, ER, ECoR, NER, SR, SCR, SWR and WCR surpassed the targets fixed and monitored by PMO, there was a shortfall of 01 to 67 *per cent* in achievement of targets by other Zonal Railways. The shortfall was more than 30 *per cent* in ECR (67 per cent), NCR (49 *per cent*), NR (42 *per cent*), SER (44 *per cent*) and WR (43 *per cent*).
- Delay/non-supply and non-availability/shortage of bio-tanks, etc. were the main reasons for non-achievement of target for fitment of bio-toilets.

Regarding shortfall in retrofitment of existing coaches against the internal targets of Railway Board of 50000 for the year 2016-17, Ministry during Exit Conference stated (July 2017) that the fixing of targets on higher side was to

build pressure on Zonal Railways and to accelerate the pace of fitment of bio-toilets.

About the targets for induction of bio-toilets for the next few years, Ministry stated that targets for the next three years were 40,000 (2017-18), 60,000 (2018-19) and 30,000 (2019). It was also stated that the coaches completing their codal life and likely to be condemned by 2019 were not planned for retrofitment of bio-toilets.

Details of allotment vis-à-vis utilization of fund for retro fitment of bio-toilets over IR for the period 2014-15, 2015-16 and 2016-17 was as under:

Table 6 - Year wise funds allotted and utilised for fitment/retro fitment of bio-toilets (₹ in crore)

Year	Funds allotted	Fund utilized	% Underutilization
A	B	C	D
2014-15	50.58	17.05	66.29
2015-16	94.30	66.65	29.32
2016-17	221.11	108.65	50.86

While funds were made available for induction of Bio-toilets during the above period, the same could not be spent and there were savings of 29 to 66 *per cent*.

Zonal Railway wise review of allotment and utilisation of funds **(Annexure 2)** revealed that:

- Funds allotted were fully utilized by ER only during 2014-15 to 2016-17.
- Nine Zonal Railways (CR, NR, NCR, NER, NFR, NWR, SER, SWR and WR) had not utilized funds allotted to them and variation was more than 10 *per cent*.
- The main reasons for non-utilization of funds during the relevant years were non availability/ non- procurement of bio-tanks and other related accessories required for fitment/retrofitment of bio-toilets.
- In WR, out of ₹ 8 crore allotted during 2015-16, only ₹ 0.85 crore (10.62 *per cent*) was utilized and the balance amount of ₹ 7.15 crore (89.38 *per cent*) was surrendered. ECR utilised only ₹ 0.69 crore (17.35 *per cent*) out of ₹ 4 crore allotted to them in 2015-16.
- In SER, an amount of ₹ 3.99 crore (19 *per cent*) only was utilised for fitment of bio-toilets, out of allotted funds of ₹ 20.91 crore during the period from 2014-15 to 2016-17.

Thus, the percentage utilistaion of funds allotted for retrofitment of bio-toilets remained between 33 per cent and 71 per cent during the past three

years. Zonal Railways did not utilise funds allotted to them and could not achieve the targets set by Railway Board for retrofitment of bio-toilets.

Ministry agreed that most of the Zonal Railways could not utilise funds allotted for bio-toilets, due to non-supply/delay in supply of bio-tanks by vendors.

2.4.1 Retrofitment of bio-toilets during Mid-Life Rehabilitation (MLR)

Three workshops namely Parel, CR, Jhansi, NCR and Bhopal, WCR undertake MLR of coaches. Railway Board from time to time (October 2012, March 2013 and April 2015) directed concerned Zonal Railways to accelerate retro fitment of bio-toilets during MLR by inducting bio-toilets in all eligible coaches[11] undergoing MLR in the Workshops. The number of coaches and bio-toilets retrofitted during MLR in the last three years was as follows:

Table 7 - Retrofitment of bio-toilets in coaches during MLR

Year	*Mid- life rehabilitation (MLR) workshops*	*Number of coaches targeted for fitment of bio-toilets during MLR*	*Actual number of coaches which underwent MLR*	*Number of coaches fitted with bio-toilets*	*Number of bio-toilets fitted*	*Number of coaches fitted with bio-toilets*		*Number of coaches not provided with any bio-toilets*
						With full complement	*Partly*	
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*
2014-15	Parel (CR)	No targets	113	36	72	0	36	77
	Jhansi (NCR)	No targets	0	0	0	0	0	0
	Bhopal (WCR)	No targets	579	96	356	82	14	483
	Total	**0**	**692**	**132**	**428**	**82**	**50**	**560**
2015-16	Parel (CR)	202	127	41	111	15	26	86
	Jhansi (NCR)	40	12	10	40	10	0	2
	Bhopal (WCR)	692	587	448	1673	407	41	139
	Total	**934**	**726**	**499**	**1824**	**432**	**67**	**227**
2016-17	Parel (CR)	192	145	124	442	111	13	21
	Jhansi (NCR)	39	39	38	147	37	1	1
	Bhopal (WCR)	642	650	614	2249	553	61	36
	Total	**873**	**834**	**776**	**2838**	**701**	**75**	**58**
	Grand total	***1807***	***2252***	***1407***	***5090***	***1215***	***192***	***845***

Railway Board fixed targets for fitment of bio-toilets during MLR in April 2015 and April 2016 for the years 2015-16 and 2016-17 respectively. No targets were fixed for the year 2014-15. It was observed that

- During the period of review, 2,252 coaches underwent MLR in the three MLR Workshops at Parel, Jhansi and Bhopal. Of these, only 1,407 coaches (62.47 *per cent*) were fitted with bio-toilets including 1,215 with full complement and 192 were partly fitted with bio-toilets.

[11]Type of coaches for which clearance for fitting bio-toilets was given by RDSO

- In Bhopal Workshop of WCR, out of 1816 coaches which underwent MLR during the period of review, 658 coaches (36.23 *per cent*) were not fitted with bio-toilets.
- In Parel workshop of CR, out of 385 coaches which underwent MLR during the period of review, in 184 coaches (47.79 *per cent*), bio-toilets were not fitted.
- In Jhansi Workshop of NCR, (MLR activities started only from 2015-16 onwards) three out of 51 coaches were not fitted with bio-toilets.
- Further, design for bio-tanks to be fitted on ICF/RCF built SLRD coaches were received only in March 2016 and subsequently the same was incorporated in the tender for supply, fitment and commissioning of bio-toilets retention tanks. As a result, in CR only 13 SLRD coaches were fitted with bio-toilets during the review period. In WCR, 186 SLR/DSLR coaches underwent MLR, of which 114 coaches were turned out without bio-toilets.

There has been an improvement in number of coaches fitted with bio-toilets during MLR and the percentage of coaches in which bio-toilets were retrofitted during MLR increased from 19 per cent in 2014-15 to 93 per cent in 2016-17. However, non-achievement of targets in 2014-15 and 2015-16 was mainly due to limited availability of bio-tanks.

2.4.2 Retrofitment of bio-toilets during POH in Carriage Workshops

For retrofitment of bio-toilets during POH of coaches received in various Carriage Workshops, coaches provided with Dual Mounting Arrangement (DMA) i.e. coaches already provided with mounting brackets by PUs and turned out without bio-tanks were required to be provided with bio-tanks during POH in Zonal Railways. Also coaches in which headstocks of both sides were replaced during POH were to be fitted with bio-toilets. It was estimated that only one to two *per cent* of the coaches POHed would require replacement of headstock of both sides. Further, partly fitted coaches (coaches initially turned out by PUs with less than four toilets) were also required to be provided with the full complement of bio-toilets during POH.

It was seen that Railway Board fixed targets only in terms of budget allocation and expenditure for the year 2014-15 and an amount of ₹ 40 crore was distributed to Zonal Railways (August 2014). For the year 2015-16, Railway Board (April 2015) fixed Zonal Railway wise targets in terms of coaches fitted with Dual Mounting Arrangement (DMA) and coaches eligible for head stock replacement as 2143 coaches. For 2016-17, targets were fixed (April 2016) in terms of bio-toilets, as 16,800 bio-toilets.

The year-wise targets and achievement for the retrofitment of bio-toilets during POH for 25 Workshops of 14[12] Zonal Railways **(Annexure 3)** were as follows:

Table 8 – Targets and achievement of retrofitment of bio-toilets in Carriage Workshops

Zonal Railway	*Target for 2014-15 (in terms of allotted funds (₹ in crore)/bio-toilets[13])*	*Bio-toilets retrofitted by Workshop*	*Target for 2015-16 (in terms of coaches/ bio-toilets[14])*	*Bio-toilets retrofitted by Workshop*	*Target for 2016-17 (in terms of bio-toilets)*	*Bio-toilets retrofitted by Workshop*
A	*B*	*C*	*D*	*E*	*F*	*G*
CR	2.0/80	86	151/604	110	1300	908
ECR	1.0/40	0	81/324	0	1200	260
ECoR	2.0/80	56	155/620	83	850	968
ER	2.5/100	210	88/352	193	1200	893
NCR	1.0/40	No Workshop	27/108	No Workshop	400	No Workshop
NER	2.0/80	87	103/412	246	800	864
NFR	1.5/60	0	99/396	25	850	669
NR	2.5/100	0	200/800	196	1800	859
NWR	3.5/140	89	140/560	135	850	410
SCR	3.5/140	74	194/776	302	1400	2122
SECR	6.0/240	No Workshop	61/244	No Workshop	400	No Workshop
SER	2.0/80	0	142/568	24	1050	383
SR	3.0/120	143	344/1376	407	1950	2043
SWR	2.0/80	172	58/232	242	850	2128*
WCR	2.0/80	0	105/420	0	450	0
WR	3.5/140	194	195/780	72	1450	321
Total	***40.0/1600***	***1111***	***2143/8572***	***2035***	***16800***	***12828***

(*) figure includes retrofitment of 299 bio-toilets in coaches of Central Railway

It was observed that

- In the year 2014-15, Workshops of five Zonal Railways viz. ECR, NFR, NR, WCR and SER had not done any retrofitment work during POH of coaches. Workshops of two Zonal Railways achieved the targets to the extent of 63.57 *per cent* (NWR) and 52.86 *per cent* (SCR) only.
- The overall achievement of 25 Workshops for the year 2015-16 against the target of Zonal Railways was 23.76 *per cent* only.
  - Workshops of ECR and WCR did not undertake any retrofitment work.
  - Workshops of three Zonal Railways viz. NFR, SER and WR could achieve less than 10 *per cent* of targets set for them.

[12] NCR and SECR do not have any Carriage Workshops
[13] The number of bio-toilets have been arrived at by dividing total funds allotted by ₹10 lakh (rate per coach/4 bio-toilets)
[14] Number of bio-toilets arrived at by multiplying number of coaches with four

- In Workshops of four Zonal Railways viz. CR, ECoR, NR and NWR the achievement was below 25 *per cent* of the targets.

- As regards the achievement for the year 2016-17,
  - Workshops of ECR and WR achieved less than 25 *per cent* of the target set by Railway Board for Zonal Railways.
  - Workshops of NR and SER could achieve less than 50 *per cent* of their targets.
  - Workshops of SWR, SCR, NER, ECoR and SR achieved more than 100 *per cent* of their target for retrofitment work.
- None of the Workshops of Indian Railway had carried out scheduled maintenance of bio-toilets.
- While reviewing (June 2014) the performance of bio-toilets fitted in passenger coaches, Railway Board instructed (August 2014) all MLR/POH Workshops to put in earnest efforts for retrofitment and ensure that no coach having headstock of both sides replaced was turned out without bio-toilets. However, in eight Zonal Railways (CR, ER, NR, NER, SR, SCR, SER and SWR) 303 coaches were provided with Dual Mounting Arrangement (DMA) at the time of replacement of head stock during POH, but none of these were retro fitted with bio-toilets.

Thus, in 2016-17, as against a target of 16800 bio-toilets for retrofitment during POH in Carriage Workshops, various Zonal Railways could induct 12828 bio-toilets. Due to delays in procurement of bio-tanks, bio-toilets could not be fitted in coaches as targeted. Non-standardization of design by the Railway Administration also led to non- provision of bio-toilets in coaches as targeted. There is a need to streamline the procurement process to ensure receipt of material on time and achievement of targets set.

On the issue of POH in the carriage workshop and scheduled maintenance not being carried out by any of the Zonal Railways, Ministry during Exit Conference stated (July 2017) that during the first POH after inductions of bio-toilets, there may not be a need for any maintenance work. Audit however stated that CAMTECH guidelines have specifically prescribed schedule maintenance of bio-tanks during POH and this should be followed. Ministry stated that the guidelines of schedule maintenance of bio-toilets during POH were being revised by CAMTECH in consultation with DRDO.

As regards standardization of design of bio-toilets, Ministry stated that as of now the design S-trap with 100 mm pan dia is standardized, but as and when improved versions would come, the design would undergo changes.

The concept of Green Train Stations and Green Corridors was introduced by the Railways to minimize the impact on environmental hygiene through elimination of direct discharge of human waste from toilets in coaches onto tracks and aprons, thereby avoiding corrosion and increase the life of track. As per norms of Green Train Station all the originating, terminating, bypassing and platform return trains should have 100 *per cent* bio-toilet fitted coaches. The tracks on the Green Corridor are to be made free from human waste discharge. Railway Board in its agenda for CME's conference held on 24 and 25 April 2015 had advised Zonal Railways to nominate at least one station as Green Train Station or a section as Green Corridor in their Railway. Further, Zonal Railways were advised to consolidate bio-toilet fitted coaches in Rakes for better monitoring of performance of bio-toilets. All concerned Railways were required to take necessary action to convert /replace coaches having direct discharge toilets with bio-toilets in all trains bound for Green Train Stations/moving in the Green Corridor.

During November 2014 to August 2015, six stations were identified for development as Green Train Stations. Five sections were also nominated for Green Corridors. These are given in the table below:

Table 9 - Stations and Sections identified for Green Train Station and Green Corridor on Zonal Railways

Zonal Railway	Name of Green Stations notified	Date of notification	Target date of implementation	Name of Green Corridor notified, if any			Actual date of implementation
				From	*To*	*Distance in kms*	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
NR	Sri Mata Vaishno Devi, Katra	07/08/2015	30/01/2016	Jammu Tawi	Sri Mata Vaishno Devi, Katra	78	Not yet implemented
SR	Rameswaram	07/08/2015	02/10/2015	Rameswaram	Manamadurai	114	24/07/2016
SCR	Machilipatnam	25/05/2015	Not available	Gudivada	Machilipatnam	37	Not yet implemented
SWR	Mysuru	24/11/2014					Not yet implemented
WR	Okha	07/08/2015	15/10/2015	Okha	Kanalus	141	19/10/2016
	Porbandar	07/08/2015	02/12/2015	Porbandar	Wansjaliya	34	19/10/2016

It was observed that

- Implementation of the concept of Green Train Station were initiated only on three stations so far, except Sri Mata Vaishno Devi Katra (NR), Machilipatnam (SCR) and Mysuru (SWR). Though identified for development as Green Train station in 2014-15 and 2015-16, due to lack of adequate number of coaches fitted with bio-toilets, the concept of Green Train Station was yet to take off on these three stations as on 31 March 2017.

- In NR, out of the total 14 pairs of trains originating, terminating, bypassing and platform return trains from Sri Mata Vaishno Devi, Katra, only three trains were fully equipped with bio-toilets while nine trains were partially equipped with bio-toilets and the remaining two trains did not have any bio-toilets fitted. Sri Mata Vaishno Devi, Katra thus, did not fulfill the criteria for Green Train Station.
- In SR, Railway Board proposed to extend Rameswaram to Manamadurai Green corridor up to Tiruchchirappalli covering a total distance of 264 km and action was initiated (October 2016) by SR Administration to ensure that all the trains passing through Tiruchchirappalli-Manamadurai section had coaches fitted with bio-toilets. However, not all originating and terminating trains at Rameswaram Station were those equipped with 100 *per cent* bio-toilets despite the station having been declared as a Green Train Station.
- In SCR, 89 coaches with bio-toilets were to be inducted to run on the Green Corridor as identified in May 2015. Due to change in rake composition/ conversion of rakes with conventional coaches as 'DEMU' as on 31 March 2017, 97 coaches were run on the Green Corridor and out of these, 84 coaches (86.6 *per cent*) were fitted with bio-toilets and remaining 13 coaches (13.4 *per cent*) were run without bio-toilets in the notified Green corridor.

During the joint inspections of the nominated Green Train Stations and Green Corridors, it was observed that

- In NR, Train No. 14033 Jammu Mail jointly inspected on arrival at Sri Mata Vaishno Devi Katra terminating station. Bio-toilets had been provided only in six out of 23 coaches. Nine bio-toilets were found chocked and foul smell was emanating from 14 bio-toilets.
- In SR, Train No.16101 Chennai Egmore-Rameswaram Express was jointly inspected on arrival at Rameswaram station. One coach (Coach No.95106) of this train had conventional toilet, though instructions had been issued by Railway Board that toilets in all coaches of trains dealt with at Green Train Station should be fitted with bio-toilets. Human waste was found on the cement concrete (CC) apron at the station.
- In SCR, bio-toilets were not provided in coaches of all the trains originating and terminating at nominated Green station or passing through the identified Green Corridor 'Machilipatnam-Gudivada-Machilipatnam'.

Fig 2: Faecal matter flowing from non-functional bio-toilet at Coaching Depot/Rameswaram in Southern Railway (09/12/2016)

Fig 3: Faecal matter on tracks at Rameswaram Railway station in Southern Railway (09/12/2016)

- In WR, two bio-toilets of Train No. 19573 Jaipur-Okha Express inspected at Okha and 11 bio-toilets in Train No. 19264 Delhi Sarairohila-Porbandar Express inspected at Porbandar were found in bypassed condition. Further, 12 bio-toilets in Jaipur-Okha Express and six bio-toilets in Delhi Sarai Rohila-Porbandar Express inspected at Okha and Porbandar respectively were found choked. Dustbins were not available in 39 bio-toilets of Jaipur-Okha Express at Okha, whereas, in Delhi Sarairohila-Porbandar Express dustbins were not available in 34 bio-toilets. Stickers were found pasted in all the coaches in the train inspected at Okha except 12 bio-toilets, whereas in train inspected at Porbandar, stickers were found torn and illegible in 20 bio-toilets. In WR, at Okha station, during joint inspection, coach No.14443GS of Train No.15636 Guwahati-Okha Dwarka Express was found being run without full complement of bio-toilets. At Porbandar station coach No.920040, 920058 and 940082 of Train No.19216 Porbandar to Mumbai Central, Saurashtra Express were found being run only with conventional toilets. Further, several bio-toilets in trains remained in bypassed position without being set right for repeated trips on the Green Corridor.

Thus, the nominated stations and corridors did not adhere to the necessary conditions laid down for Green Train Stations and Green Corridors.

During Exit Conference Ministry stated (July 2017) that Zonal Railways having Terminus stations (last Railway station) were to be identified as Green Train Stations. These have been identified and Zonal Railways were working on the plan. As regards, the issue of non-adherence of 100 *per cent* bio-toilets fitted trains running on Green Corridors, Ministry stated that sometimes due to operational constraints, coaches with conventional toilets are attached in replacement of coaches with bio-toilets marked sick, as per the availability of rolling stock in the concerned Coaching Depot at that time.

Chapter 3: Management of material and infrastructure

Audit Objective 2: Whether the supply of bio-tanks and other materials and infrastructure required for induction of bio-toilets was adequate?

3.1 Supply of bio-digester tanks for fitment/retrofitment of bio-toilets

3.1.1 Procurement of bio-digester tanks from private parties

On 18 November 2011, Railway Board approved the Action Plan for induction of bio-toilets for 2012-13. Initially, RCF was instructed to supply 100 tanks to Carriage Workshop, Bhopal in first phase. In August 2012, Railway Board advised RCF and ICF to procure bio-tanks (RCF: 1164, ICF: 1332) for the DMA coaches being supplied to Zonal Railways. To accelerate pace of fitment, Railway Board (October 2012) directed MLR Workshops viz., Bhopal and Parel to procure bio-tanks with associated material for 250 and 50 coaches respectively. In November 2012, five[15] Zonal Railways were also instructed for one time procurement of 200 bio-toilet material. During the same month, Railway Board also advised RCF and ICF to procure and supply bio-toilet material to Zonal Railways, for retrofitment of bio-toilets in in-service coaches as well as for fitment in coaches provided with DMA as per quantities assessed in August 2012.

In June 2014, Railway Board, authorized Zonal Railways to procure bio-toilets and material as per approved drawings of RDSO/ICF/RCF. Zonal Railways were also required to ensure quality of material procured. However, Zonal Railways found it difficult to procure bio-toilet material, only a few Purchase Orders were issued and many demands for procurement were pending. Given the target for induction of 17000 bio-toilets in 2015-16, Railway Board advised (July 2015) all Zonal Railways to expedite the procurement process and start installation of Bio-toilets. After the target of 30,000 bio-toilets was fixed and internal target of 60,000 bio-toilets was assigned to the Zonal Railways for the year 2016-17, Stores Directorate of Railway Board awarded a rate contract for procurement of bio-tanks for all Zonal Railways and planned for distribution of 80,000 bio-tanks among Zonal Railways (August 2016).

The position of supply of bio-tanks and related material in various Zonal Railways during the review period was checked and the following was observed:

[15] CR, ER, NFR, WR and SCR

3.1.1.1 Pending indents for bio-tanks and related material

It was observed that as on 30 September 2016, 27 indents pertaining to requirements of eight Zonal Railways in 2014-15 and 2015-16 for bio-toilets and related material were pending. In the absence of adequate material and accessories, fitment of bio-toilets was held up in workshops at Gorakhpur (NER), Tirupati (SCR), Kharagpur (SER), Bhavnagar (WR), New Bongaigaon (NFR) and Nishatpura (WCR). It was further observed that

- In CR, indent for 228 bio-tanks was placed on ICF in December 2012 by Matunga workshop. These were received from ICF between December 2013 and August 2014. The work of fitment of bio-toilets was completed in September 2016. A target for POH of 43 eligible coaches (i.e. coaches in which headstock of both sides are replaced during POH) was set by Railway Board in April 2015 for Matunga workshop. This work was proposed in two parts i.e. departmentally and through a contract at an estimated cost of ₹ 3.50 crore. Fixing of bio-tanks was proposed through contract and replacement of headstocks along with associated heavy corrosion repairs to coaches and furnishing of toilet area was proposed to be carried in-house. The contract was yet to be finalized in September 2016.
- In Bhopal Workshop, 11 indents for 834 bio-toilets were pending as non-stock demand as on 31 March 2017.
- In SER, three indents were placed on 28 September 2015 and 09 October 2015 for 532 sets of bio-tanks, of which 482 sets were yet to be supplied from Motibagh Workshop, SECR.
- Indents for 50,000 and 12,000 liters of inoculum for Workshops in Hubli and Mysore, though indented in April 2016 were pending.

3.1.1.2 Pending supply against Purchase Orders for bio-tanks and related material

In 11 Zonal Railways (CR, ER, ECoR, NR, NFR, NWR, SR, SCR, SER, WCR and WR), shortfall in achievement of targets for retrofitment was mainly due to non-supply/short supply /delay in procurement of bio-tanks and other related material during the review period. As per directions given by Railway Board in June 2014 meeting, complaints regarding failure and reluctance of vendors to attend warranty claims were to be registered on the web portal by CRSE of respective Zonal Railways. It was observed that there were several instances of short supply of bio-tanks by a number of firms against purchase orders issued for the years 2014-15 and 2015-16 in various Zonal Railways. However, Zonal Railways did not utilize the complaint mechanism to effectively address the problems of short supply, non-supply, defective supply, non-attending of

warranty claims etc. by the firms on which orders were placed. It was observed that

- The bio-tanks supplied by various firms have a warranty of 36 months from the date of supply or 24 months from the date of installation in the coaches. A review of records of RCF, Kapurthala showed that during 2014-15 to 2016-17, 158 complaints relating to 903 bio-tanks supplied by 15 firms for improper working under warranty were received. The main reasons for improper working were choking, ball valve jammed/leakage, non-working of pedal mechanism and failure of wire rope/clutch etc. Of these 58 complaints relating to 351 bio-toilets were pending as on 31 March 2017. Out of these, 55 complaints relating to 345 bio-toilets pertained to eight[16]firms.
- There were 50 warranty claims pending on CR (23), NWR (15) and SWR (12) as on 30 September 2016 in respect of defective material received in Carriage Workshops. Warranty claims were not registered on the web portal by CRSE/NWR in respect of 15 defective bio-tanks in Ajmer and Jodhpur Workshops. The mechanism was thus not being used for follow-up and replacement of defective material. No such registration was made in SR.
- In WR, a contract for 'Supply of 51 sets of bio-tanks was awarded to M/s Omax Autos Limited on 31 December 2015 and the material was received on 5 and 6 August 2016. During inspection of the material by the consignee i.e. Workshop at Lower Parel/WR, deficiencies such as change in the specification of items, non-receipt of few items etc. were noticed and reported to RITES on 3 September 2016 by Chief Workshop Manager, Lower Parel. Thereafter, the firm agreed to replace the material (pre-inspected by RITES) without any Joint Inspection. However, the defective material was replaced only in January 2017, resulting in delay in fitment of allotted bio-toilets in the coaches.

Fig 4: New bio-tanks received from supplier lying unutilized at Lower Parel Workshop, WR

[16] M/s Mohan Rail Components, M/s Rail Fab, M/s MK Precision Metal parts, M/s JSL Life Style Ltd., M/s Amit Engineers, M/s Omax Auto Ltd., M/s Rail Tech, M/s Oriental Veneer Products Limited

- In CR, several cases of warranty period failure of bio-toilets were also noticed. The response of vendors in attending to warranty claims was not satisfactory. During the check of records of Divisional Mechanical departments of Mumbai and Solapur, it was noticed that there were 18 complaints pertaining to Solapur division for the period April 2015 to July 2015 and 148 complaints pertaining to Mumbai division for the period August 2014 to October 2016, regarding defects in bio-toilets under the warranty period. Online complaints were registered by Railway Administration on ICF/RCF portal. However, no action was taken by ICF, RDSO and concerned firms for rectification of defective bio-toilets. CR Administration in their reply stated that RCF and ICF were required to pursue the matter with vendors for attending the warranty issues and impose warranty claims, if defects were not attended in time. The defective coaches were not detached from the rake, but were allowed to run with temporary attention.
- In ER, one purchase order was placed on M/s Banka Bioloo Pvt. Ltd, Hyderabad in January 2016 for supply of bio-tanks. No material was received from the firm till March 2017.

Due to inadequate progress of retrofitment of bio-toilets in passenger coaches by Zonal Railways for the year 2015-16 (33.52 *per cent* up to September 2015), Railway Board decided to place bulk order for supply, installation and commissioning of approximately 80,000 bio-toilets in in-service coaches. Member Mechanical directed (29 December 2015) to float the tender and finalize the same within three months, indicating zone-wise consignees. Mechanical Directorate requested (29 January 2016) Store Directorate to start the process. Stores Directorate sought (2 February 2016) details of description of the items, scope of work, consignee details with quantity breakup, quarter wise requirement for the next three years, sanctioned rolling stock programme, provision of funds, inspecting authority and whether the description, specification, drawing would be applicable uniformly to all Zonal Railways. Finally, the tender was floated in June 2016.Railway Board awarded the contract on 17 to 19 August 2016 with nine[17] different firms for supply, installation and commissioning of 80,000 bio-tanks (20,000 coach sets) in various Zonal Railways.

It was observed that out of the nine firms on which orders were placed by Railway Board for supply of 20,000 coach sets, seven firms viz. M/s JSL Life Style Limited, M/s Omax Auto Limited, M/s Mohan Rail Components Private

[17] M/s Victora Auto Private Limited, Faridabad, M/s JSL Lifestyle Limited, Bahadurgarh, M/s Hindustan Fibre Glass Works, Vadodara, M/s Mohan Rail Components Private Limited, Kapurthala, M/s Rail Fab, Kapurthala, M/s Omax Autos Limited, Gurgaon, M/s Amit Engineers, Mohali, M/s Oasis Fabrications, Jagadhari, M/s Rail Tech, Kapurthala

Limited, M/s Rail Fab, M/s Amit Engineers, M/s Hindustan Fibre Glass Works and M/s Rail Tech, had complaints pending against them regarding quantity and quality of material supplied against Purchase Orders placed by the Zonal Railways during 2015-16 and 2016-17. It was seen that

- In NWR, M/s JSL Lifestyle short supplied 360 bio-tanks, which were to be delivered by April 2016 and a risk & cost PO had been issued by NWR.
- In NCR, M/s Hindustan Fibre Glass, M/s Mohan Rail Components Private Limited and M/s Omax Auto Limited had not supplied any quantity as against 510 bio-tanks up to 31 March 2017.
- In WR, M/s Omax Auto Limited replaced 51 sets of bio-tanks in WR after a gap of five months.
- In RCF, 58 complaints relating to 351 bio-toilets due to ball valve Jammed, clutch wire rusted, choking, leakages etc. were pending mainly against M/s JSL Life Style Limited, M/s Omax Auto Limited, M/s Mohan Rail Components Private Limited, M/s Rail Fab, M/s Rail Tech, M/S Oriental Veneer Products Limited, M/s M.K.P Metal Parts and M/s Amit Engineers as on 31 March 2017.

Status of supplies against the Railway Board order was reviewed and it was observed that,

- As of March 2017, 33,783 bio-toilets were to be supplied to 16 Zonal Railways but only 14,274 bio-toilets were supplied by the firms. Out of these, only 12,016 bio-toilets were fitted in coaches up to March 2017.
- In WR, M/s Rail Tech, supplied 600 bio-toilets to be fitted in 150 coaches, of which 168 were found to be defective (having welding cracks) during inspection by RITES and the whole lot was rejected. Similarly 44 bio-tanks supplied to Lower Parel Workshop for fitment in 11 coaches by M/s Hindustan Fibre Glass Works, Vadodara were also having welding defects and were rejected by the consignee. Further, 124 defective bio-tanks fitted in 31coaches were also dismounted from various coaches.
- Out of 712 bio-toilets and 800 bio-toilets to be supplied by M/s Mohan Rail Components to ER and SCR respectively, no supply has been made by the firm till 31 March 2017.
- Similarly, out of 1,000 bio-toilets to be supplied to ECoR by five firms i.e. M/s JSL Life Style Limited, M/s Rail Fab, M/s Rail Tech, M/s Cercon Casting Limited and M/s PD Steels, not a single bio-toilet has been supplied till 31 March 2017.
- Of the 444 and 300 bio-toilets supplied by M/s Rail Fab, 68 and 24 bio-toilets were rejected by NR and NWR respectively, due to defects.

As such, as on 31 March 2017, 304 bio-toilets supplied by various firms were found defective and thus rejected/could not be installed. Delay in supply and defective material supplied by the suppliers has adversely affected retrofitment activity of bio-toilets.

As regards the slow progress of retrofitment of bio-toilets by the vendors in Zonal Railways against rate contract awarded by Railway Board, Ministry during Exit Conference stated (July 2017) that out of nine, three defaulting firms viz. M/s Rail Tech, M/s Rail Fab and M/s Hindustan Fibre have been de-listed. Further, performance of one more contractor (M/s Mohan Rail) was extremely poor and the Rate Contract has been proposed for cancellation. They further stated that the existing supply was being managed through the remaining five firms, for the current tender. They added that 24 vendors have been identified for supply of bio-toilets to the Zonal Railways for future requirement.

3.1.1.3 Supply of bio-tanks for coaches where provision of DMA was made

During the review period, PUs were required to supply bio-tanks to the Carriage Workshops for retrofitment of bio-toilets in coaches where provision of DMA had been made. It was noticed that bio-tanks and material required for Dual Mounting were not supplied by PUs to the Carriage Workshops at Liluah and Kanchrapara (ER), Harnaut (ECR), Mancheswar (ECoR), Jagadhri (NR), Izzatnagar (NER), New Bongaigaon (NFR), Ajmer and Jodhpur (NWR). It was observed that

- In ECoR, no material was supplied by PUs for DMA. For Direct mounting of bio-toilets, Railway Board set a target of 255 numbers for Mancheswar Workshop, however, material for the same were yet to be received (March 2017).
- In ER, in Liluah Workshop, during POH, DMA were provided in 58 coaches but no bio-toilets were fitted in these coaches.
- In SCR, there were 219 coaches with DMA in August 2014. However, bio-toilets were fitted only in 116 coaches, till March 2017.
- In SER, no passenger coaches were fitted with bolted design bio-toilets directly mounted during POH. Eight coaches were fitted with dual mounting arrangement at the time of replacement of head stock during POH, but bio-toilets were not fitted. There were 56 passenger coaches having dual mounting arrangement but not fitted with bio-toilets.
- In Bhavnagar Workshop (WR), instances came to notice wherein due to mismatch between 'J' brackets and 'C' channels, stock of J' brackets remained unused and on other hand coaches received with DMA of 'C'

channels were turned out unattended. As against the target of 195 coaches, WR was able to fit bio-toilets only in 29 coaches in 2015-16, due to delay in procurement of bio-tanks.

Thus, supply of adequate numbers bio-toilets for retrofitment in Workshops and Zonal Railways against the orders placed by the Railway Board needs to be ensured to achieve the ambitious targets of fitment of bio-toilets in the next few years.

3.1.1.4 In-house manufacturing of bio-digester tanks in Motibagh Workshop, Nagpur

A proposal for creation of facilities for manufacture of bio-tanks at Motibagh Workshop, Nagpur of SECR was initiated during 2011-12[18] at an estimated cost of ₹ 14.63 crore. Railway Board further directed (August 2014) SECR to start in-house manufacturing of bio-digester tanks at Motibagh Workshop, Nagpur by procuring sub-assemblies in knocked-down condition. The plant and machineries were received and commissioned in February 2015 at a cost of ₹15.86 crore. However, production of bio-tanks commenced only in November 2015. Delay in commencement of production was attributed to delay in procurement of material for bio-tanks.

Table 10 - Production vis-à-vis installed capacity for manufacture of bio-tanks in Motibagh Workshop

Year	*Installed capacity*	*Actual production*	*Quantity supplied to ZRs/PUs*
A	*B*	*C*	*D*
2014-15	2500	Nil	Nil
2015-16	2500	610	602
2016-17	2500	2550	1289
Total		***3160***	***1891***

In Motibagh Workshop, SECR, bio-tanks are being manufactured under Rolling Stock Programme (RSP) and subsequently Zone wise allotment is made by Railway Board. It was seen that

- Motibagh Workshop was not able to manufacture bio-tanks as per installed capacity in 2014-15 and 2015-16. However, they manufactured more bio-tanks than their installed capacity in 2016-17.
- Despite acute demand of bio-digester tanks from various Zonal Railways, eight bio-tanks manufactured in 2015-16 and 1261 bio-tanks manufactured in 2016-17 were yet to supplied (March 2017) to Zonal Railways. As regards reasons for non-supply of bio-tanks Railway Administration stated that the allotted Zonal Railways are responsible for collection of bio-tanks from

[18] Pink Book item No. 320 of 2011-12

Motibagh Workshop.

- As on December 2016, demand from various Zonal Railways for 770[19]bio-tanks for DSLR coaches, 88[20]bio-tanks for Guard Vans and 775[21] bio-tanks for passenger coaches (Total 1633 bio-tanks) was pending with Motibagh Workshop.
- Quality control checks in respect of bio-tanks manufactured in Motibagh Workshop were yet to be prescribed.

Thus, there is a need to ensure that bio-tanks manufactured in Motibagh Workshop are dispatched to consignee Zonal Railways on time. Quality control checks for bio-tanks manufactured by Motibagh Workshop also needs to be laid down.

Regarding in-house production of bio-tanks at Motibagh Workshop/Nagpur, Ministry during Exit Conference stated (July 2017) that the same was now commissioned. Special type of bio-tank used in Guard van etc. were being manufactured by Motibagh workshop.

3.2 Bacteria generation facilities

Bio-toilets work on the principle of biological degradation of human waste by bacterial inoculum. Anaerobic bacteria inoculums used in the bio-toilets digest human waste converting it into water and gases (Methane and Carbon dioxide). Presence of bacteria in sufficient numbers in the bio-digester tanks is crucial for efficient functioning of the bio-toilets. Keeping this in mind and to ensure uninterrupted supply, Railway Board in its Action Plan (November 2011) directed ICF and RCF to create bacteria generation facilities for bio-toilets within power of GMs. Further, in a Review Meeting (February 2012), DRDO was requested to assist in supply of bacterial culture till the facilities were established.

Railway Board directed (November 2011) that bacteria generation plants may be set up at RCF, Kapurthala and ICF, Perambur within the powers of General Manager. However, these were not setup till date. In fact, JWG in its 8th meeting (December 2012) suggested that for the time being RCF and ICF may not pursue with in-house bacteria generation plant for the time being and continue procurement from private firms.

In this regard, action was initiated to set up bacterial generation facilities in Motibagh Workshop of SECR and facility was created in March 2014 with

[19] CR-60, ECoR-42, ECR-67, ER-41, NCR-10, NER-41, NFR-39, NR-79, NWR-46, SCR-76, SECR-06, SER-50, SR-116, SWR-42, WCR-15, WR-40

[20] ECoR-25, ECR-40, NFR-23

[21] Against target of 850 bio-toilets, 75 have been despatched so far

installed capacity of 30,000 liters per month. The major raw material for generation of bacteria is water and cow dung. During the period of review, Motibagh Workshop has been able to produce bacteria as per its installed capacity. Bacteria are supplied to Zonal Railways as per their demand. Audit noticed that sample of bacteria was occasionally[22] sent to DRDE/Gwalior to check the specified parameters. No adverse reports came from the DRDE/Gwalior.

Keeping in view increased demand for bacteria from Zonal Railways, a proposal for installation of two more plants of 100 cum capacity (Total capacity of 2.3 lakh liters per month) at a cost of ₹ 0.66 crore was sanctioned by General Manager/SECR in October 2016. Though the work was proposed to be completed by March 2017, detailed estimate was yet to be sanctioned (March 2017).

Another proposal for construction of 100 cum capacity RCC inoculum generation plant at Rajendra Nagar Coaching Depot (ECR) was approved by General Manager/ECR during 2015-16 on out of turn basis. However, the same could not be executed due to the exhaustion of limits for sanctioning of such works by the General Manager. Setting up of bacteria generation plant at Coaching Depot/Rajendra Nagar was under process as on 31 May 2017.

JWG in their 21st meeting (September 2016) expressed concern over inadequate supply/quality of supply of bacteria inoculum and stated that there is a need to expedite installation/augmentation of bacteria generation facility in SECR, ECoR and ECR.

The proposal for creation of facility for bacteria inoculums was mooted in February 2016 and sanctioned by GM/ECoR at a cost of ₹69.55 lakh with a capacity of 100 cum. The LOA for construction of Bacteria inoculums plant was issued (June 2016) and contract awarded to M/s Super flow Engineering Corporation, Gwalior with instructions to complete the work by 26 June 2017. The plant was commissioned on 23 February 2017.

In view of the ambitious target for induction (fitment as well as retrofitment) of bio-toilets in the next few years, bacteria generation facilities needed to be installed/ augmented early.

Ministry during Exit Conference stated (July 2017) that at present DRDO approved suppliers of bacteria (inoculums) were available, who were supplying to the Railways. They further stated that bacteria generation plants on the two identified locations were in progress and would be installed to cater the need of Southern and Eastern regions of Railways.

[22] March 2014, April 2014, July 2014, July 2015, December 2015, February 2016 and October 2016

3.3 Availability of infrastructure in Carriage Workshops/MLR Workshops

Coaches received in Carriage Workshops for POH/MLR are required to be fitted with bio-toilets. Once fitted, these coaches come back to designated Carriage Workshops for POH after completion of prescribed time period and their POH becomes due. Adequate storage space for bio-tanks and bacteria inoculum and other infrastructure facilities such as hydraulic/fork lifts, ramps for loading/unloading of bio-tanks etc. were required for ensuring that work of retrofitment of bio-toilets. Low lift hydraulic/fork lift jacks are required for lifting and moving bio-tanks in Workshops. These were to be made available as per Compendium issued by CAMTECH (April 2013). Railway Board directed (05 November 2014) Zonal Railways to procure evacuation machine for removal of non-biodegradable waste from the bio-tanks. Further, JWG in their 16th quarterly meeting (03 July 2015), decided that evacuation machines as per CAMTECH specifications were required to be procured for removal of non-biodegradable waste at Coaching Depot.

It was observed that

- In the 32 Coaching Depots test checked, evacuation system had not been procured by any of the Zonal Railways for removal of non-biodegradable waste from bio-tanks. In WR, bio-toilets were bypassed and continued to run in this condition for several trips, because non- bio-degradable waste could not be removed in the absence of evacuation machines.
- In MLR Workshop, Bhopal and Jhansi though low lift hydraulic jacks & evacuation systems were not available, the work was carried out with the available 'fork lift'. However, proper storage space for storing inoculums was not available in the workshops. There was no separate ramp for loading and unloading of bio-tanks and apron for retrofitment. Separate shed for storing bio-tanks was also a constraint in retrofitment of bio-toilets in the workshop. There were no problems and constraints in direct mounting of bio-toilets during MLR.
- Low lift hydraulic jacks were not available in Alambagh Workshop of NR, Izzatnagar and Gorakhpur Workshops of NER, Ajmer Workshop of NWR, Golden Rock & CW & LW/Perambur Workshops of SR, Hubbali Workshop of SWR, Bhavnagar Workshop of WR, Nishatpura Workshop of WCR. Dibrugarh Workshop of NFR had two Low Lift Hydraulic Jacks, but both were under repair.
- In WR, it was noticed that a contract for dismantling, cleaning, repairing and re-fitment of 236 bio-digester tanks during POH of coaches at Lower Parel Workshop at a cost of ₹ 6,13,600 was awarded vide Letter of Acceptance (LOA) dated 16 April 2016 to M/s Metro Engineering, Mumbai

with a completion period of 12 months. Though the contractor requested (13 July 2016) Railway Administration to make available coaches for carrying out the above work, the same were not made available due to absence of infrastructure such as cleaning area, drainage area with requisite facilities, tank storage etc. which was to be arranged by the Engineering Department. Lack of co-ordination between two Engineering and Mechanical Departments of the Railways thus led to non-commencement of work. Further, scheduled maintenance of bio-toilets was not carried out during POH for want of specific consent along with necessary guidelines and sanctions from Maharashtra Pollution Control Board.

- Storage facility for inoculums (anaerobic bacteria) was not available in workshops at Kanchrapara/ER, Harnaut/ECR, Alambagh/NR, Izzatnagar/NER, New Bongaigaon /NFR, Tirupathi/ SCR, Bhavnagar/WR, Nishatpura/WCR. Dedicated space for dismantling and storage of used/unused bio-toilets had not been provided in Workshops at Kanchrapara/ER and Nishatpura/WCR, while separate infrastructure for carrying out retrofitment of bio-toilets was not available in Jodhpur Workshop of NWR. Though covered place for storing of bio-toilets was available, a large number of bio-toilets were kept in the open in Kharagpur workshop of SER.
- In SR, adequate covered storage facilities for storing inoculums were available in all the three Workshops. However, the Workshops have no separate covered space for storing bio-toilets.
- There were no separate ramps for loading and unloading of bio-tanks for retrofitment in two selected workshops of CR and NFR, all the three Workshops of SR and Tirupati Workshop of SCR.
- Bio-toilet apron required to be provided as per minutes of JWG meeting (03 July 2015) had also not been provided in any of the selected carriage workshops.

The above deficiencies in infrastructure affected proper fitment of bio-toilets in Workshops and needed to be addressed urgently.

Ministry during Exit Conference stated (July 2017) that specification of Evacuation systems has been finalized recently. Budget provision had been made in the current year and Zonal Railways were in the process for procurement of Evacuation systems.

Chapter 4: Upkeep and maintenance of bio-toilets

Audit Objective 3: Whether Coaching Depots and Workshops were able to ensure proper maintenance and upkeep of bio-toilets in passenger coaches?

4.1 Maintenance of bio-toilets in passenger coaches in Coaching Depots

Railway Board issued (December 2012) detailed instructions to Zonal Railways for proper, efficient/effective monitoring, operation and maintenance of bio-toilets installed in passenger coaches. A Compendium of instructions on bio-toilets was brought out by CAMTECH in April 2013. A Handbook on maintenance of bio-toilets by Coaching Depots was also brought out by CAMTECH in October 2014. RDSO also brought out Guidelines on bio-tanks for IR in May 2014.

As per the handbook, there are four variants of bio-tanks in operation in IR. Each Coaching Depot is required to maintain details of coaches fitted with different variants of bio-toilets in the proforma prescribed in the guidelines for Annual Maintenance and Operating Contract (AMOC) for bio-toilets. The performance of bio-toilets in these trains was to be monitored and monthly reports sent to Railway Board and RDSO.

For fail-safe operation of mounting brackets and safety wire ropes, Railway Board instructed (December 2012) all Zonal Railways to ensure regular/ periodical inspection of welding of mounting brackets, regular/ periodical inspection of safety wire ropes and ensure that fasteners for bio-tanks/safety wire ropes are intact. Railway Board also instructed Zonal Railways to maintain performance records and obtain regular passenger/staff feedback; conduct monitoring as per Trial/Test Schemes issued by RDSO; and enter into AMOC with suppliers as per RDSO instructions/guidelines.

Compliance of instructions in this regard was examined and the following was observed:

4.1.1 Upkeep of bio-toilets in Coaching Depots

As per Handbook issued by CAMTECH, bio-toilets should invariably be checked at the time of arrival of rakes in Coaching Depot for scheduled maintenance and at the time of withdrawal of rakes from Coaching Depot. It was however observed that these instructions were not followed by Vishakhapatnam Coaching Depot in ECoR.

Problem of insufficient space between two bio-tanks has not yet been addressed and consequently Coaching Depots of SR experienced difficulties in checking of vital items like inner head stock, drawbar assembly etc. during

maintenance. Carriage & Wagon supervisors and staff working in pit line have been facing inconvenience during under-gear maintenance.

The data regarding complaints received from public and deficiencies noticed by the selected Coaching Depots on arrival of the train fitted with bio toilets during the year 2016-17 was collected by Audit. It was seen that

Out of 613 trains being handled in these coaching depots, 160 trains did not have any bio-toilets fitted. In remaining 453 trains having 25080 bio-toilets (either full complement or partial), the following 199689 instances of deficiencies /complaints were noticed during 2016-17 **(Annexure 4)**:

Table 11 – Data of defects/problems noticed in bio-toilets on arrival in Coaching Depots during 2016-17 (except SCR)

Type of defect/problem	***Number of instances***
Choking	102792
Foul smell	16375
Non- Functional	11462
Non-availability of dustbins	21181
Non-availability of mugs	22899
Others like ball valve failure, wire ropes etc.	24980
Total	***199689***

It was seen that

- The number of defects/problems was highest (41111) in the Bengaluru Coaching Depot (SWR) followed by 24495 and 22521 deficiencies in Gorakhpur (NER) and Wadi Bunder (CR) Coaching Depots respectively.
- Number of complaints per bio-toilet was highest in Bengaluru Coaching Deport-SWR (98), followed by Wadi Bunder Coaching Depot (32), Rameswaram Coaching Depot-SR (28) and Gwalior Coaching Depot-NCR (17).
- Out of total 102792 instances of choking, 10098 (10 *per cent*) cases related to the month of March 2017, thus showing that defects/problems still remained around the average level.
- Out of 102792 cases of choking, the highest cases (34 *per cent*) of choking were noticed in Bengaluru Coaching Depot of SWR.
- 102792 cases of choking were noticed in 25080 bio-toilets, implying that one bio-toilet got choked four times in a year during 2016-17. During 2015-16, against 24675 numbers of bio-toilets handled by Coaching Depot, 61088 cases of choking were seen. This shows that instances of choking of bio-toilets increased during 2016-17 and needs to be addressed.

- 34841 cases (33.89 *per cent*) out of 102792 cases of choking were noticed in Bengaluru Coaching Depot (SWR) alone handling 418 (1.6 *per cent*) out of 25080 bio-toilets maintained by selected Coaching Depots, implying that one bio-toilet got choked 83 times in a year.
- Out of 24980 cases of ball valve and wire rope failure etc., 8945 (36 *per cent*) were noticed in Wadi Bunder (CR) Coaching Depot followed by 5036 cases (20 *per cent*) in SBC (SWR) Coaching Depot.

The large number of defects/problems was an area of concern, which is required to be addressed by the railways on priority basis.

On the issue of large number of bio-toilets being choked up and trains running with bio-toilets in bypassed condition for several trips, Ministry during Exit Conference stated (July 2017) that this was being dealt promptly by the concerned Coaching depots. The choking problem was due to misuse of bio-toilets by the passengers. Stainless steel dustbins in bio-toilets were prone to theft. All out efforts were being made to fit anti pilferage devices to minimize the cases of theft. Regular passenger awareness drives were being conducted to sensitize the passengers and cases of choking were now reduced and at present focus was on providing 'S' trap bio-toilets.

4.1.2 Non-award of AMOC/non-commencement of work despite award of AMOC for maintenance of bio-toilets

Railway Board advised[23] (December 2012) all CMEs to enter into AMOC with suppliers for proper and efficient monitoring, operation and maintenance of IR-DRDO bio-toilets. Review of records of 32 selected Coaching Depots of 16 Zonal Railways revealed that:

- AMOC was yet to be awarded in 12 Coaching Depots (Sorting Yard, Liluah (ER), Dhanbad (ECR), Vishakhapatnam (ECoR), New Delhi and Lucknow (NR), Allahabad (NCR), Bikaner (NWR), Santragachi and Tatanagar (SER), Indore and Porbandar (WR) and Jabalpur (WCR) and maintenance of bio-toilets was being done departmentally at these Depots.
- In three Coaching Depots Rajendranagar (ECR), Srikhetra-Puri (ECoR) and Guwahati Kamakhya (NFR), Nodal Officers to liaise with AMOC contractors had not been nominated despite AMOC contracts having been awarded and work commenced by the contractors at these depots.

Regarding the issue of non-award of Annual Maintenance and Operation Contract Ministry during Exit Conference agreed (July 2017) to look into the matter and initiate action.

[23] Letter No. 2009/Dev. Cell/ICCI/1 Vol.-IV dated 24/12/2012

4.1.3 Non-compliance of Guidelines regarding testing of effluents from bio-toilets in Coaching Depots

The compendium on IR-DRDO bio-toilets prescribed the testing schedules for effluents from bio-toilets. Accordingly, Coaching Depots have to ensure the under mentioned tests once in 90 days:

Table 12 - Details of Tests of Effluents from bio-toilets to be done in Coaching Depots

S. no	Nature of Test	Place of testing
1.	pH value Test	Coaching Depot
2.	Total Solids (TS) Test	Coaching Depot
3.	Total Dissolved Solids Test (TDS)	Coaching Depot
4.	Total Volatile Solids (TVS)	Coaching Depot
5.	Chemical Oxygen Demand (COD) Test	Government approved Lab/DRDE
6.	Fecal Coli Forms Count	Government approved Lab/DRDE

As per Handbook on bio-toilets, records for monitoring and testing should be kept in Coaching Depots in the format prescribed[24]. DRDE, Gwalior clarified (22 April 2015) that if parameters of any bio-toilet tank were not matching with the defined levels, testing of the diseased tank should be made two more times at an interval of 15 days. If test parameters were beyond the permissible limits, even after three consecutive testing of the effluents then recharging of 60 liters of inoculum should be ensured.

However, it was observed these instructions had not been followed in two Coaching Depots viz. Dhanbad Coaching Depot (ECR) and New Delhi (NR), as tests for effluent and bacteria culture were not carried out at all. Further, records in respect of samples sent for testing and results thereof were not maintained as required in five Coaching Depots at Dhanbad (ECR), Vishakhapatnam (ECoR), New Delhi (NR), Secunderabad (SCR) and Jabalpur (WCR). Testing equipment like pH meters, magnetic stirrers and stirrer bars, electronic weighing balances, Pippettes, Silica crucibles, hot air oven etc. had been provided only in 10 Coaching Depots of five Zonal Railways (ER, NCR, NWR, SR and SER).

4.1.4 Improper handling of bacteria in Coaching Depots

The Compendium on IR-DRDO bio-toilets for IR, elaborates the procedure for handling of bacteria inoculum, it prescribes that inoculum be stored in sealed containers and the stock of container be used within a period of two days after opening. If it is used after a week time it should be used after counting Most Probable Number (MPN). It was observed that

- In seven[25]Coaching Depots, bacteria inoculum had not been stored in

[24] Para of the Handbook
[25]Rajendranagar and Dhanbad (ECR),Lucknow (NR),Allahabad (NCR), Gorakhpur (NER), Jaipur and Bikaner (NWR)

containers with lids.

- In 13[26]Coaching Depots inoculum had not been utilized within its shelf life of two to three months.
- In six[27]Coaching Depots, inoculum was utilized a week after opening of the containers without counting MPN, raising doubts about efficacy of the bacteria being used.
- In 11[28] Coaching Depots, the quality of inoculum being used could not be ensured, as proper storage facilities were not available for the containers. In Carriage Workshop, Lower Parel, 3,600 litres (18 drums) of anaerobic bacteria procured at a cost of ₹68,400 in May 2016 had not been consumed and the same was still lying in the workshop. Since the shelf life of bacteria is three to four months, the same should have been utilized by August-September 2016.

Fig 5: Stock of anaerobic Bacteria lying at Lower Parel Workshop unused, even after its shelf life expired

4.1.5 Utilization of Cleaning Agents

Railway Board directed (December 2012) Zonal Railways to ensure use of proper and prescribed cleaning agents to avoid any adverse effect on bacteria in bio-tanks and have spares/consumables as per the holding of coaches with bio-toilets.

As per monthly schedule of work, examination of the chlorinator of bio-toilets and charging with chlorine tablets was to be done. In addition to charging chlorine, various locations of bio-toilets were required to be cleaned regularly. Different cleaning agents are used for cleaning different areas/parts such as PVC flooring, ceramic toilet fittings, commode pans/wall protectors, glass cleaning, laminated plastic sheets, berth Rexene, painted surfaces, stainless steel, etc. TASKI products of Johnson Diversey are one of the recommended cleaning agents. Other recommended agents are Harpic/ Retoil/ Domex products of Eco Lab/Collin/Lizol. Further, the Compendium on IR-DRDO bio-toilets for IR, recommends use of KM_nO_4 tablets in place of Chlorine tablets considering cost effectiveness as well as durability.

[26]Pune (CR), Sealdah (ER), Vishakhapatnam and Srikhetra (ECoR), Lucknow Jn (NER), Jaipur and Bikaner (NWR), Basin Bridge (SR), Santraganchi (SER), Bilaspur (SECR), Indore and Porbandar (WR) and Jabalpur (WCR)
[27]Pune (CR), Lucknow Jn. (NER), Guwahati -Kamakhya (NFR), Jaipur and Bikaner (NWR) and Jabalpur (WCR)
[28] Lucknow (NR), Gwalior and Allahabad (NCR), Jaipur and Bikaner (NWR), Hyderabad (SCR), Bilaspur and Durg (SECR), Indore and Porbandar (WR) and Jabalpur (WCR)

It was observed that KM_nO_4 tablets were not being used in any of the 32 Coaching Depots, instead Chlorine tablets continued to be used at these Coaching Depots.

Ministry during Exit Conference stated (July 2017) that KMNO4 tablets which were more effective and less expensive as compared to chlorine tablets, were under development by DRDE.

4.1.6 Checks to be carried out during POH

Guidelines issued by CAMTECH in the Compendium on IR-DRDO bio-toilets maintenance (issued in April 2013) prescribe checks to be carried out during POH viz. flapper/slider/ball valve, leakage in piping, flush system, pneumatics, valves, pressurizer, PLC, pneumatic valves, ball valves etc., charging of bio-culture if required (based on test reports), testing of complete toilet system, drawing and delivering of samples as per requirement to Government Accredited Laboratories and dismantling of retention tank for inspection and thorough cleaning. This was required to be done in one tank of each variant to check general condition, thereafter, based on its condition all tanks were to be removed and thoroughly cleaned. In WR, it was observed that checks as detailed above were not being carried out in the two selected carriage workshops.

Thus, there is an urgent need to operationalize Annual Maintenance and Operations Contracts and effectively monitor working and maintenance of bio-toilets fitted in passenger coaches by the Coaching Depots. Evacuation systems should be made available in order to maintain the bio-toilets received in the Coaching Depots. The problems of choking and foul smell needed to be addressed through proper maintenance of bio-toilets in Coaching Depots, especially in Coaching Depots at Bengaluru with higher number of instances. Checks prescribed to be carried out on bio-toilets during POH should also be exercised for their smooth operation in trains.

4.2 Joint Inspection of trains, fitted with bio-toilets and passenger feedback

Joint Inspection was conducted with Railway Officials on-board 33 Trains of 16 Zonal Railways, to assess the functioning of bio-toilets fitted in coaches. Overall, 1,788 bio-toilets installed in 688 coaches were inspected during October 2016 to January 2017. It was observed that,

- Out of the 1,788 bio-toilets, 94 bio-toilets were non-functional at the time of joint inspection. The number of such non-functional bio-toilets on various Zonal Railways ranged between one (Train No. 22443, Kanpur

Central-Bandra Terminus Superfast Express (NCR)) and 28 (Train No. 12863, Howrah-Yeshwantpur Express (SER)).

- As per instructions[29], stainless steel dust bins of standard design were to be provided in lavatories of coaches fitted with bio-toilets to dissuade people from dumping non-biodegradable waste in bio-toilets. During joint inspection, it was observed that dustbins were not available in 377 out of 1,788 bio-toilets jointly inspected. The number of such toilets in which dustbins were not available ranged between 1 (Train No. 12180, Agra Cantt-Lucknow Superfast Intercity Express (NCR) and 73 (Train No. 15636, Guwahati-Okha Express (NFR).39 bio-toilets which did not have dust-bins were found in a choked condition due to dumping of non- biodegradable waste into the toilets. On the issue of non-availability of dustbins raised during Exit Conference in WR, it was clarified that Stainless Steel dustbins are prone to theft, and these are often found missing during inspection.

Fig 6: Water Bottles were used by Passengers and kept on window in Train No. 82652 (SWR)

Fig 7: Choked Bio-toilet in Train No. 19270 (WR)

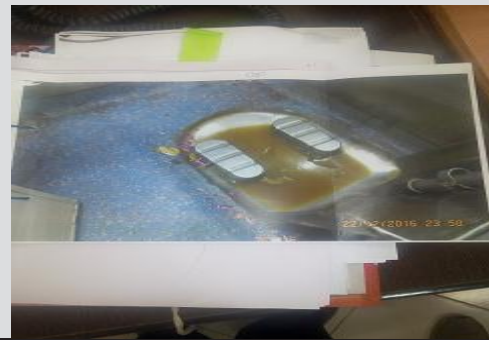

Fig 8: Choked bio-toilet in Train No 22443/44 (NCR)

Fig 9: Choked and unclean bio- toilet in Train No. 19270 (WR)

- In SWR, due to non-availability of water mugs in non-AC coach fitted with bio-toilets, passengers were forced to carry water bottles as an alternative. This possibly could have resulted in dumping of water bottles in bio-toilets and the resultant choking.

[29]RDSO-Lucknow letter No. MC/CB/LF dated 12/09/2013

- Foul smell was found emanating from 223 bio-toilets inspected, indicating problem with the flushing system/inadequate water supply in the toilets and deficiency in maintenance of toilets. In ECoR, maximum number of cases (24) of foul smell were noticed in Train No. 18495, Rameswaram - Bhubaneshwar Weekly Express.
- Spill over of faecal matter outside the bio-tanks due to leakage from the connector hose was noticed in 21 cases.
- Lack of awareness about bio-toilets provided in the train was observed amongst some passengers in general coaches.

Feedback on bio-toilets was obtained from 825 passengers of 33 selected trains of 16 Zonal Railway which were jointly inspected with Railway officials. It was found that

- Overall 80 *per cent* of the passengers were aware about bio-toilets provided in the coaches. On NFR, 64 *per cent* passengers were not aware about the provision of bio-toilets in coaches.
- Overall 83 *per cent* passengers felt positive change regarding bio-toilets as compared to conventional toilets.
- Overall 82 *per cent* passengers were satisfied about adequacy of water supply in the bio-toilets. However, on ECoR, 51 *per cent* passengers opined that water supply in bio-toilets was inadequate.
- Overall 23 *per cent* passengers had encountered choked bio-toilets during their journey while 44 *per cent* passengers complained about foul smell emanating from the bio-toilets. Only in case of NCR this percentage was higher i.e. 56 *per cent*.
- 76 *per cent* passengers had observed availability of dustbins inside bio-toilets, while 74 *per cent* had seen and read instructions displayed on the walls/doors regarding use of bio-toilets.
- Overall 89 *per cent* passengers felt that bio-toilets in passenger coaches would enhance cleanliness level at Stations and on Tracks.

During a special drive conducted by Zonal Railways in May 2015, 54,648 bio-toilets in 18,033 coaches were checked (some coaches were checked more than once). Of these, more than 10,000 bio-toilets (18 *per cent*) were either found defective or foul smell emanating was reported. Choking of toilet pan / 'P' trap, leakage from joints, foul smell emanating, non-functioning of ball-valve and ball valve in open position were the major problems, reported to Railway Board consequent upon Special Drive conducted by most of the Zonal Railways.

4.3 Training on maintenance and operation of bio-toilets

Keeping in view the large-scale proliferation of bio-toilets, Railway Board directed (May 2013) Zonal Railways that extensive/ exhaustive training on bio-toilets should be imparted to all trainee Staff/Officers at National Academy of Indian Railway(NAIR), Vadodara and Indian Railway Institute of Mechanical and Electrical Engineering(IRIMEE), Jamalpur, as the training was crucial for efficient operation and maintenance of bio-toilets. It was also advised that extensive and exhaustive training in Supervisory Training Centre (STC) /Basic Training Centre (BTC) be imparted to all Field Staff, including Railway Supervisors, OBHS Staff, Cleaning Staff and Train Attendants. Further, Railway Board directed (October 2013) Zonal Railways that an Expert Officer be designated and trained in each Zone. He would travel across the zone and share knowledge with those who were responsible for maintenance and upkeep of bio-toilets. The details of staff trained in maintenance of bio-toilets during the period of review were as follows:

Table 13 - Details of training imparted to staff in Coaching Depots handling bio-toilets

Zonal Railway	Total staff in Coaching Depots		Staff trained in maintenance of bio-toilets		Percentage of trained Supervisory Staff	Percentage of trained non-Supervisory Staff	Whether Expert officer nominated?
	Supervisory	Non-supervisory	Supervisory	Non-supervisory			
A	B	C	D	E	F	G	H
CR	449	2306	110	758	24.49	32.87	Y
ECoR	98	1352	24	25	24.49	1.85	Y
ECR	148	1462	63	9	42.57	0.62	Y
ER	362	3925	179	1085	49.45	27.64	N
NCR	226	2192	77	508	34.07	23.17	Y
NFR	116	1367	11	5	9.48	0.37	N
NER	133	1710	80	769	60.15	44.97	Y
NR	658	6750	361	2277	54.86	33.73	Y
NWR	157	934	20	84	12.74	8.99	N
SR	434	5058	86	2299	19.82	45.45	Y
SCR	293	2901	96	384	32.76	13.23	Y
SER	212	2362	51	81	24.06	3.43	N
SECR	81	715	37	25	45.67	3.49	N
SWR	201	1445	40	99	19.90	6.85	Y
WR	607	2692	278	233	45.79	8.65	Y
WCR	112	1005	57	220	50.89	21.89	**N**
Total	**4287**	**38176**	**1570**	**8861**	**36.62**	**23.21**	

As can be seen from the above,

- Only 36.62 *per cent* Supervisory and 23.21 *per cent* non-Supervisory staff were trained in maintenance of bio-toilets, since the issue of orders for imparting training.

- Non-Supervisory staff was responsible for maintenance of bio-toilets in the Coaching Depots. In ECR and NFR, less than one *per cent* of the non-Supervisory Staff had been given training. In ECoR, NWR, SER, SECR SWR and WR, less than 10 *per cent* of non-Supervisory staff was trained.
- ER, NFR, NWR, SER, SECR and WCR were yet to nominate an Expert Officer as per the directions of Railway Board.
- Where Expert Officers were nominated, they had not been sent for training to the nominated training institutes.

There is an urgent need to trains more number of non-Supervisory staff, who can effectively handle maintenance and upkeep of bio-toilets fitted in passenger coaches.

Ministry during Exit Conference assured (July 2017) to look into the matter regarding training of staff.

4.4 Public Awareness Initiatives

Railway Board directed (March 2016) Zonal Railways to take up vigorous Public Awareness Drive through frequent announcements, running captions and playing short clippings regarding bio-toilets on display boards/LED screen at Railway Stations, distribution of stickers /pamphlets among passengers, providing stickers inside/outside coaches fitted with bio-toilets and advertisements in local/National Newspapers etc.JWG in their meetings also have been emphasizing the need to take steps for creating public awareness through various means.

It was observed (September 2016), that while stickers were found pasted inside/outside the coaches fitted with bio-toilets, none of the Zonal Railway except SR conducted any specific Passenger Awareness Drive to educate the public by distributing pamphlets, making announcements or arranging display on display boards/LED screens. SR arranged for two awareness drives each in Basin Bridge Coaching Depot and Rameswaram Coaching Depot during 2015-16 and 2016-17.

Thus, effective steps needed to be taken to make passengers aware about the working and usage of bio-toilets, which would go a long way in ensuring proper upkeep and maintenance of bio-toilets. If railways highlighted the issue of elimination of manual scavenging through use of bio-toilets while conducting Public Awareness drives, the same would be more effective.

Chapter 5: Conclusion and Recommendations

5.1 Conclusion

Railway Board has been monitoring the work of induction of bio-toilets in new and existing coaches through the Joint Working Group, which has members from various stakeholders and they have been taking feedback from field offices and deliberating on relevant issues. Different variants of bio-toilets were installed in seven trains on a trial basis during January 2011 to April 2012. However, before the test results in respect of these rakes could be analysed, JWG in their 4th meeting (November 2011) recommended large scale proliferation of 10,000 bio-toilets to be planned in the near future. IR issued instructions for large scale proliferation of bio-toilets in passenger coaches in November 2011. Though the JWG recommended standardization of the design of bio-toilets in November 2011, a variety of designs with respect to pan size, ball valve, opening/closing mechanism of valve, design of connector between pan and P trap etc. continue to be deliberated in various monitoring meetings and yet to be standardized. Provision of dustbin inside the toilet was recommended by JWG in April 2011, however the design of dustbin could be finalized only by November 2013.

Railway Board set the target of turning out 100 *per cent* passenger coaches (both conventional and LHB coaches) with bio-toilets in 2015-16. However, three PUs in IR turned out 5.7 *per cent* coaches without bio-toilets in 2016-17. 6.7 *per cent* LHB coaches were also turned out with bio-toilets in 2016-17. As regards retrofitment of bio-toilets in existing coaches during mid-life rehabilitation, POH in Carriage Workshops and regular maintenance in Coaching Depots, Zonal Railways could not achieve the targets in 2014-15 and 2015-16. In 2016-17, the target of 20,000 for retrofitment was achieved.

None of the Workshops of Indian Railway carried out scheduled maintenance of bio-toilets. Due to delays in procurement of bio-tanks, bio-toilets could not be fitted in coaches as targeted. Non-standardization of design by the Railway Administration also led to non- provision of bio-toilets in coaches as targeted. Funds allotted to Zonal Railways for retrofitment of bio-toilets could not be utilised fully in all the three years.

Stations and corridors nominated as Green Train Station and Green Corridor did not adhere to the necessary conditions laid down for the same.

Supply of adequate numbers of bio-toilets for retrofitment in Workshops and Zonal Railways was a constraint. Only 43 *per cent* of ordered quantity of 80,000 bio-toilets was supplied till March 2017. Out of nine firms on which the orders were placed, three firms have been delisted and contract with one firm

has been proposed for cancellation. Railways have a target of induction of 40,000 (2017-18), 60,000 (2018-19) and 30,000 (2019) bio-toilets during the next three years, for achievement of which timely supply of bio-toilets would be essential.

There were deficiencies in the available infrastructure in Workshops and Coaching Depots such as storage facilitates for bio-tanks and bacteria inoculum. Annual Maintenance and Operations Contracts were not awarded in 12 Coaching Depots of nine Zonal Railways. Evacuation systems were not made available to maintain the bio-toilets fitted in coaches received in the Coaching Depots. Prescribed chlorination tablets (KM_nO_4 Tablets) were not being used in any of the 32 selected Coaching Depots, instead Chlorine tablets continued to be used.

Analysis of data on instances of defects/problems such as choking/foul smell, non-availability of dust-bins, and mugs etc. in 15 Zonal Railways in selected 30 Coaching Depots showed that out of 613 trains being handled in these Coaching Depots, 160 trains did not have any bio-toilets fitted. In remaining 453 trains having 25080 bio-toilets (either full complement or partial), 199689 instances of deficiencies /complaints were noticed during 2016-17. There was an increase in cases of choking per bio-toilet in the year 2016-17 as compared to 2015-16. During joint inspections of 1,788 bio-toilets installed in 688 coaches during October 2016 to January 2017 by Audit similar problems were noticed. Large numbers of instances of choking and foul smell needed to be addressed through proper maintenance of bio-toilets in Coaching Depots.

Training to non-Supervisory staff responsible for effective maintenance and upkeep of bio-toilets fitted in passenger coaches needs to be given priority. Adequate Passenger Awareness drives were not undertaken to make passengers aware about working and usage of bio-toilets resulting in bio-toilets frequently being found choked.

5.2 Recommendations

1. ***The issues relating to standardisation of design may be effectively addressed. This will also help in effective handling of maintenance issue of bio-toilets.***
2. ***Issues of quality and quantity in supply of bio-toilets by private firms may be addressed urgently and the process streamlined so as to ensure achievement of ambitious targets of fitment of bio-toilets in the next few years.***
3. ***The checks prescribed by Research, Design and Standards Organisation for visual inspection and testing of effluent discharge from the bio-toilets***

fitted may be exercised regularly, so as to monitor the performance of bio-toilets effectively. Checks prescribed for bio-toilets during periodical overhaul should be exercised and scheduled maintenance of bio-toilets may be carried out for their smooth operation in trains.

4. *Augmentation of capacity for in-house production and procurement of bio-tanks from private firms for supply of adequate number of bio-tanks needs to be ensured to facilitate achievement of the target set for fitment of bio-toilets in all coaches.*
5. *Adequate facilities for bacteria generation needs to be installed urgently.*
6. *Zonal Railways may consider adequate provision of infrastructure such as fork lifts, storage facilities and evacuation machines etc. in Workshops and Coaching Depots on priority to ensure timely retrofitment and proper maintenance of bio-toilets.*
7. *Training to adequate number of non-Supervisory staff in the Workshops and Coaching Depots entrusted with the responsibility of upkeep and maintenance of bio-toilets and their retrofitment may be ensured.*
8. *Annual Maintenance and Operations Contracts may be finalised for all Coaching Depots.*
9. *Passenger Awareness Drives may be organised at regular intervals to create awareness about proper usage and working of the bio-toilets, by utilising electronic and print media and short films displays at major stations. Railways may consider highlighting elimination of manual scavenging through use of bio-toilets to make these drives more effective.*

New Delhi **(Nand Kishore)**
Dated: 31 July 2017 **Deputy Comptroller and Auditor General**

Countersigned

New Delhi **(Shashi Kant Sharma)**
Dated: 31 July 2017 **Comptroller and Auditor General of India**

Annexure 1 (Refer Para 1.7)						
Details of criteria and Sample selected						
Type of unit	**Production Units**	**Zonal Railways**	**Carriage Workshops**	**Coaching Depots**	**Green stations**	**Trains having bio-toilets**
Sample size	*100%*	*Sample size*	*100%*	*2 major depots in each zone*	*100%*	*Pasenger Survey and Joint Inspection with Railway Officials*
1	***2***	***3***	***4***	***5***	***6***	***7***
	Rail Coach Factory, Kapurthala	CR	Matunga	Wadi Bunder	NIL	Vidarbha Express (12105)
	Inetgral Coach Factory, Perambur		Parel (MLR)	Pune		Punjab Mail (12137)
	Modern Coach Factory, Rae Bareilly	ER	Liluah	Sorting Yard	NIL	Saraighat Express (12345)
			Kanchrapara	Sealdah		Howrah Delhi Kalka Mail (12311)
		ECR	Harnaut	Rajendra Nagar	NIL	Capital Express (13246)
				Dhanbad		Swarnarekha Express (13301)
		ECoR	Bhubaneshwar	Vishakpattanam	NIL	Rameswaram Bhubaneswar Express (18495)
				Puri		Puri-Okha Express (18401)
		NR	Jagadhari	New Delhi	Shri Mata Vaishno Devi Katra-Firozpur	Mahamana Express (22418)
			Alambagh	Lucknow		Varuna Express (14228)
		NCR	Jhansi (MLR)	Allahabad	NIL	Kanpur -Bandra Express (22443/44)
				Gwalior		Kanpur-Udhampur Express (14155/56)
		NER	Gorakhpur	Lucknow	NIL	Pushpak Express (12533/34)
			Izzatnagar	Gorakhpur		Maduadeeh -Rameshwaram Express (15119/20)
		NFR	Dibrugarh Town	Guwahati- Kamakhya	NIL	Guwahati-Okha Express (15636)
			New Bongaigaon	Dibrugarh-Tinsukia		Guwahati -Lokmanya Tilak Express (15648)
		NWR	Ajmer	Bikaner	NIL	Aravali Express (19708)
			Jodhpur	Jaipur		Jaipur-Bhopal express (19711)
		SR	Perambur	Basin Bridge	Rameswaram	Chennai Egmore - Rameswaram Express (16101)
			Loco Works/Perambur	Rameswaram		Rameswaram -Tirupati Express (16780)
			Golden Rock			
		SCR	Lalaguda	Hyderabad	Machilipatnam	Visakha Express (17016)
			Tirupati	Securendarabad		Kagaznagar Express ((12757)
		SER	Kharagpur	Santragachi	NIL	Howrah-Yeshwantpur Express (12863/64)
				Tatanagar		Howrah-Mumbai Mail (12810/09)
		SECR	Motibagh, Nagpur	Bilaspur	NIL	Chhattisgarh Sampark Kranti Express (12823)
				Durg		Nagpur Bilaspur intercity express (12856)
		SWR	Hubli	Yashwantpur	Mysuru*	Mysuru-Varanasi Express (16229)
			Mysuru	Bengaluru		Srimata Vaishnodevi Katra -Yashwantpu Suvidha Express (82652)
		WR	Lower Parel	Indore	Okha	Saurashtra Express (19215/16)
			Bhavnagar	Porbandar	Porbandar	Porbander-Muzzafarpur Express (19269/70)
						Saurashtra Mail (22945/46)
		WCR	Nishatpura, Bhopal (MLR)	Kota	NIL	Kota-Udhampur Express (19805)
				Jabalpur		Jabalpur-Nizamuddin Express (12121)

*Note:- Mysuru station was identified for as Green Train station but yet to be notified.

Annexure 2 (Refer Para 2.4)
Details of budget allotment vis-a-vis utilisation of funds for retro fitment of bio-toilets in Zonal Railways

Zonal Railway	Year	Funds allotted for fitment of Bio-toilets (in lakhs)	Funds utilised for fitment of bio toilets (in lakhs)	Variation between column 3 and column 4	Reasons for variations
1	*2*	*3*	*4*	*5*	*6*
CR	2014-15	200.00	0.00	NA	The cost of fitment of bio-toilets is included in the cost of MLR. No separate fund is provided for fitment of bio-toilets
	2015-16	430.00	0.69	NA	
	2016-17	430.00	123.67	306.33	The work is still in progress and the expenditure incurred till date is only on procurement of materials. Hence the variation.
ECoR	2014-15	132.00	132.00	0.00	Shortfall in achievement
	2015-16	600.00	430.00	170.00	
	2016-17	1300.00	1244.00	56.00	-
ECR	2014-15	0.00	0.00	0.00	
	2015-16	400.00	69.42	330.58	Non-achievement of target
	2016-17	300.00	0.00	300.00	One P.O was issued during 2016-17 for procurement of 72 Bio-tanks dated 31/03/2017.
ER	2014-15	250.00	250.00	0.00	Not applicable
	2015-16	100.00	130.39	-30.39	Assistance taken from other Railway. Bio-toilets received from Bhopal Workshop
	2016-17	300.00	335.00	-35.00	Debit will be raised on Rly. Board for the variation amount
NCR	2014-15	100.00	26.53	73.47	Shortfall in supply under Divisional Contract in 20141-5 and 2015-16. The procurement process was not finalised by the Stores Department in 2016-17.
	2015-16	200.00	170.07	29.93	
	2016-17	300.00	0.00	300.00	
NFR	2014-15	150.00	61.27	88.73	less procurment and unadjustable amount against pending bills
	2015-16	600.00	311.05	288.95	
	2016-17	794.00	793.00	1.00	Procurment under process
NWR	2014-15	350.00	24.04	325.96	The Rate Contract for bio-toilets in NWR was executed by Railway Board and the debits for the work executed by the contractor has not been received from Railway Board till date.
	2015-16	600.00	310.85	289.15	
	2016-17	6000.00	0.00	6000.00	
		900.00	828.47	71.53	
NER	2014-15	600.00	0.00	600.00	Supply payment in next year
	2015-16	1700.00	1051.00	649.00	
	2016-17	1100.00	842.00	258.00	Work is now being done by private agencies allotted by Railway Board.
NR	2014-15	620.00	0.00	620.00	Non-availability of coaches/ material
	2015-16	2120.00	2120.00	0.00	Not Applicable
	2016-17	3668.00	2262.00	1406.00	
SR	2014-15	0.00	0.00	0.00	Retrofitment of Bio-toilets are carried out through RSP. No separate details regarding year wise allotment/expenditure are available.
	2015-16	0.00	0.00	0.00	
	2016-17	2768.00	913.00	1855.00	
SCR	2014-15	350.00	348.00	2.00	
	2015-16	800.00	467.00	333.00	Material not received
	2016-17	600.00	597.00	3.00	Material under procurement P.O released
SER	2014-15	990.00	31.57	958.44	PO issued for 198 sets of Bio toilet. Out of which only 50 sets received and fitted in coaches
	2015-16	600.00	37.48	562.53	
	2016-17	501.00	329.00	172.00	
SECR	2014-15	0.00	0.00	0.00	

Annexure 2 (Refer Para 2.4)
Details of budget allotment vis-a-vis utilisation of funds for retro fitment of bio-toilets in Zonal Railways

Zonal Railway	Year	Funds allotted for fitment of Bio-toilets (in lakhs)	Funds utilised for fitment of bio toilets (in lakhs)	Variation between column 3 and column 4	Reasons for variations
1	*2*	*3*	*4*	*5*	*6*
	2015-16	180.00	180.00	0.00	
	2016-17	0.00	0.00	0.00	
SWR	2014-15	200.00	30.59	169.41	Balance Fund has been carried over to Next Financial Year.
	2015-16	300.00	97.63	202.37	
	2016-17	350.00	903.86	-553.86	Previous Year Fund has been Spent in the Current Year.
WCR	2014-15	1015.63	719.40	296.23	Shortage of Bio tanks.
	2015-16	0.00	1204.00	-1204.00	
	2016-17	2000.00	943.00	1057.00	Due to non-availability of Bio-tanks
WR	2014-15	100.00	81.12	18.88	Short supply of Bio tanks and other materials related to BIO-Toilets.
	2015-16	800.00	85.19	714.81	
	2016-17	800.00	751.43	48.57	
TOTAL	**2014-15**	**5057.63**	**1704.52**	**3353.12**	
	2015-16	**9430.00**	**6664.77**	**2765.24**	
	2016-17	**22111.00**	**10865.43**	**11245.57**	

Annexure 3 (Refer Para 2.4.2)

Details of retrofitment of bio-toilets during POH in Carriage Workshops (except NCR and SECR where there are no Carriage Workhsops)

Name of the ZR	Name of the Carriage Workshops	Year	Number of coaches POHed during the year	Target for		Achievement of		Number of coaches fitted with full complement of bio-toilets in POH during the year	Number of passenger coaches where bolted design bio-toilets were directly mounted during POH	Number of coaches in which dual mounting arrangement was fitted at the time of replacement of headstock during POH, but not fitted with bio-toilets as on 31st March	Number of coaches having dual mounting arrangement fitted with bio-toilets during POH in the year
				Coaches	Bio Toilets	Coaches	Bio Toilets				
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
CR	Matunga	2014-15	2183	0	0	44	86	0	4	6	0
		2015-16	2173	0	0	39	110	13	8	14	1
		2016-17	2197	0	0	246	908	229	197	3	27
ER	Liluah	2014-15	2581	0	0	58	210	48	0	18	31
		2015-16	2724	62	248	45	180	24	0	0	0
		2016-17	1642	0	0	191	729	185	13	10	11
	Kanchrapara	2014-15	506	0	0	0	0	0	0	0	0
		2015-16	544	0	0	7	13	0	7	0	0
		2016-17	541	0	0	41	164	29	29	0	0
ECR	Harnaut	2014-15	242	0	0	0	0	0	0	0	0
		2015-16	309	8	32	0	0	0	0	0	0
		2016-17	466	110	440	65	260	65	65	0	0
ECoR	Bhubaneshwar	2014-15	1364	0	0	26	56	0	0	0	0
		2015-16	1460	0	0	27	83	0	0	0	0
		2016-17	1356	236	945	242	968	242	167	0	0
NR	Alambagh & Jagadhari	2014-15	3040	125	500	0	0	0	0	0	0
		2015-16	3286	120	348	86	196	11	54	3	19
		2016-17	2969	271	284	258	859	227	109	12	128
NER	Izzatnagar	2014-15	324	1	1	0	0	0	0	0	0
		2015-16	414	25	71	25	71	16	14	0	3
		2016-17	429	105	420	26	104	26	0	0	44
	Gorakhpur	2014-15	1821	102	204	43	87	0	30	0	0
		2015-16	1958	160	640	58	175	0	0	0	0
		2016-17	1882	225	900	197	760	185	0	74	0
NFR	Dibrugarh Town & New Bongaigaon	2014-15	1355	0	0	0	0	0	0	0	0
		2015-16	1379	0	0	14	25	2	0	0	0
		2016-17	1459	750	3000	189	669	155	23	0	0
NWR	Ajmer & Jodhpur	2014-15	2384	87	0	44	89	3	18	0	28
		2015-16	2515	155	0	54	135	23	38	0	41
		2016-17	2520	0	4200	219	668	0	0	0	0
SR	Perambur, Chennai	2014-15	2141	0	0	18	72	18	0	0	0
		2015-16	2146	344	0	59	236	59	1	0	44
		2016-17	2056	462	1848	261	1023	588	261	0	82
	Golden Rock	2014-15	940	0	104	36	71	0	0	1	0
		2015-16	939	30	120	47	110	7	0	1	48
		2016-17	1023	205	820	169	672	177	160	3	8
	Perambur, loco workshop	2014-15	523	0	0	0	0	0	0	0	0
		2015-16	545	0	200	26	61	26	0	0	26
		2016-17	610	87	348	87	348	18	87	56	27

Annexure 3 (Refer Para 2.4.2)

Details of retrofitment of bio-toilets during POH in Carriage Workshops (except NCR and SECR where there are no Carriage Workhsops)

Name of the ZR	Name of the Carriage Workshops	Year	Number of coaches POHed during the year	Target for		Achievement of		Number of coaches fitted with full complement of bio-toilets in POH during the year	Number of passenger coaches where bolted design bio-toilets were directly mounted during POH	Number of coaches in which dual mounting arrangement was fitted at the time of replacement of headstock during POH, but not fitted with bio-toilets as on 31st March	Number of coaches having dual mounting arrangement fitted with bio-toilets during POH in the year
				Coaches	Bio Toilets	Coaches	Bio Toilets				
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
SCR	Tirupati & Lalaguda	2014-15	2239	0	400	29	74	7	4	21	25
		2015-16	2258	0	776	130	304	30	15	6	106
		2016-17	2812	0	6400	0	2122	584	355	0	137
SER	Kharagpur	2014-15	1656	99	396	0	0	0	0	0	17
		2015-16	1692	142	568	6	24	0	0	8	6
		2016-17	1642	219	878	98	383	94	87	0	11
SWR	Hubli & Ashokpuram, Mysuru	2014-15	1983	0	0	86	172	0	0	0	87
		2015-16	2015	58	232	122	242	0	2	0	122
		2016-17	1971	540	2160	568	2128	500	500	67	0
WR	Lower Parel & Bhavnagar	2014-15	2756	0	0	69	194	3	14	0	14
		2015-16	3147	195	780	29	72	1	17	0	17
		2016-17	2196	725	2900	142	321	142	0	0	0
WCR	Nishatpura, Bhopal	2014-15	18	0	0	0	0	0	0	0	0
		2015-16	10	0	0	0	0	0	0	0	0
		2016-17	14	0	0	0	0	0	0	0	0
	TOTAL	**2014-15**	**28056**	**414**	**1605**	**453**	**1111**	**79**	**70**	**46**	**202**
		2015-16	**29514**	**1299**	**4015**	**774**	**2037**	**212**	**156**	**32**	**433**
		2016-17	**27785**	**3935**	**25543**	**2999**	**13086**	**3446**	**2053**	**225**	**475**
		Grand Total	**85355**	**5648**	**31163**	**4226**	**16234**	**3737**	**2279**	**303**	**1110**

Annexure 4 (Refer 4.1.1)

Statement showing details of defects/problems noticed in bio-toilets on arrival at Coaching Depots during 2016-17

Zonal Railways	Name of coaching depot	No. of trains being handled by Coaching depot	No. of trains fitted with bio-toilet	No. of total bio-toilets	No. of complaints/ deficiiency received /noticed from public /coaching depot	Type of complaints/deficiency/prblems/faced by public or noticed by coaching depot							
						Choking	Foul smell	Non-functional	Non-availability of dustbin	Non-availability of mugs	Others like ball valve failure, wire rope etc	Number of complaints/ instances per bio toilet	Number of choking instances per bio toilet
CR	Wadibunder	15	5	705	22521	2027	8421	1568	1560	0	8945	*31.94*	*2.88*
	Pune	14	13	852	2018	1216	599	172	0	0	31	*2.37*	*1.43*
ER	Sealdah	31	26	1304	8363	1070	82	313	3536	2795	567	*6.41*	*0.82*
	Sorting yard	14	14	1204	1756	601	95	887	NA	NA	173	*1.46*	*0.50*
ECoR	Vishakhapatnam	28	9	1129	166	71	14	0	0	0	81	*0.15*	*0.06*
	Puri	32	29	1299	444	300	40	0	26	0	78	*0.34*	*0.23*
ECR	Rajendranagar	12	12	402	1348	420	12	0	340	0	576	*3.35*	*1.04*
	Dhanbad	11	11	275	223	46	0	94	0	NA	83	*0.81*	*0.17*
NFR	Dibrugarh	10	9	318	429	302	0	97	0	0	30	*1.35*	*0.95*
	Guwahati	38	38	1920	2958	2870	11	0	0	0	77	*1.54*	*1.49*
NWR	Jaipur	19	17	717	5145	3334	0	0	1208	0	603	*7.18*	*4.65*
	Bikaner	9	9	478	0	0	0	0	0	0	0	*0.00*	*0.00*
NER	Lucknow	11	9	714	5793	948	NA	2161	1277	1407	NA	*8.11*	*1.33*
	Gorakhpur	37	37	2200	24495	4616	82	628	2732	15931	506	*11.13*	*2.10*
NR	New Delhi and Lucknow	35	23	1268	5815	3264	27	20	0	0	2504	*4.59*	*2.57*
SR	Basin Bridge	30	19	1302	10142	9744	0	0	85	0	313	*7.79*	*7.48*
	Rameswaram	4	4	590	16695	16695	0	0	0	0	0	*28.30*	*28.30*
SECR	Bilaspur	14	14	817	7952	1469	389	69	3601	2029	395	*9.73*	*1.80*
	Durg	12	12	268	1640	622	170	6	366	332	144	*6.12*	*2.32*
SER	Santragachi	86	14	1611	2741	704	0	225	0	0	1812	*1.70*	*0.44*
	Tata	13	13	453	1993	295	0	497	725	94	382	*4.40*	*0.65*
NCR	Allahabad	10	7	399	2275	1022	219	61	952	NA	21	*5.70*	*2.56*
	Gwalior	9	7	420	7041	1907	1907	89	974	NA	2164	*16.76*	*4.54*
WCR	Kota	10	10	898	1564	323	301	37	477	311	115	*1.74*	*0.36*
	Jabalpur	20	20	1078	5553	3894	287	1357	NA	NA	15	*5.15*	*3.61*
WR	Porbandar	14	14	846	6972	3000	18	862	2933	0	159	*8.24*	*3.55*
	Indore	18	18	553	8256	3701	3701	422	389	0	43	*14.93*	*6.69*
SWR	Yeshwantpur	23	18	642	4280	3490	0	663	0	0	127	*6.67*	*5.44*
	Bengaluru	34	22	418	41111	34841	0	1234	NA	NA	5036	*98.35*	*83.35*
Total		**613**	**453**	**25080**	**199689**	**102792**	**16375**	**11462**	**21181**	**22899**	**24980**	***7.96***	***4.10***