

A Review on Faecal Sludge Treatment Plant

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***Abstract:** The Faecal Sludge Treatment Plant [FSTP] is a Very Important in these Days in Countries Like India. Because of its Various Objective and its Process can make the development in the Sector. By Faecal Sludge most of the Sludge and sewage is Disposed and have Numerous other Reuse Options [i.e., Composting, Solid Fuel, Bio – gas]. Faecal Sludge Treatment Plant is Bio – Safe for use. And the System of FSM Services is Automated, Simple design, and have the Continuous Operation. Faecal Sludge Treatment Plant have the Capability to take the Additional Load of Liquid waste and Solid Waste. Tiger Bio – Filter Technology plays an important role In Faecal Sludge Treatment Plant.*

Keywords: Faecal Sludge, Tiger Bio – Filter Technology, Sludge Disposal, Anaerobic Digester, Bio – Safe Process.

I. INTRODUCTION

When the Government of India Launched Swachh Bharat Mission [SBM]. The Main Aim of this Mission was to Sustain and Creation of the liquid Waste and Solid waste Management Services in Rural Areas. From that Faecal Sludge Management [FSM] was the one of the Main Component to implement the Mission. The FSM provides the New Technology To dispose the Sludge, and also FSM is known for Delivering the safe Sanitation to Rural areas. FSM is the Solution for Sustaining the Waste for the Growing Need of India. The Importance of Faecal Sludge Treatment Plant [FSTP], from the Market Perspective can be Achieved through the Synergies of Various Organizations to FSM [1].

1.1 Faecal Sludge

Faecal sludge (Septage) is the mixture of both solid and liquid waste that get collected in onsite sanitation systems (OSS) e.g., septic tanks. It is raw or partially digested mixture that results from the collection, storage or treatment of combinations of excreta and blackwater. It is Very Important to Dispose the Sludge to Protect the Public Health and Environment from the Disturbance and effects of Faecal material.

1.2 Need of Faecal Sludge Treatment Plant

As per India – Today Magazine the current Urban Population of India 410 million People will Increase to 814 million by 2050 and as There are Numerous Rural Areas in India where now also most of the Rural areas has no proper Sanitation and No proper Treatment Process for Waste water, Sludge and other Effluent that Generates in Rural Areas. In Early Days, In Numerous Places there was major use of Conventional Type of Sewage Treatment [Septic]. But as the Conventional Process had Less Efficiency Percentage, Low Reuse Options. Due to that there should be some another Upgradation to its Process. i.e., Faecal Sludge Treatment Plant [FSTP] Therefore there is Major need of FSTP [2].

1.3 Tiger Bio – Filter Technology:

Tiger Bio Filter uses a unique Combination of Filters and worms to dispose the Sludge and sewage and recycle about 95% of waste water. All of FSTP is depend on this Technology. The Tiger Bio – Filter [TBF] is design in that way it can be customized according to the Individual components for the Best Results. Furtherly this Treatment Technology is Self – regulating and treat maximum range of waste water.

The Tiger Bio – Filter had been Installed in Variety of Places in Kerala and across Pune. Including housing and Commercial establishment and a large-scale sewage Treatment Plant in Sahakar Nagar, Pune. The Efficiency of the Tiger Bio – Filter is suitable for both Rural and Urban Local Bodies.

1.4 Treatment Process:

In Faecal Sludge Treatment Plant [FSTP] There are Four Main Process That Leads for the Treatment. From the First All of the Sludge is Collected from Numerous Septic Tank, Lateral, etc. It is Collected from Special Collection Vehicle and have special type of Equipment. After the Sludge is Proceed towards the Treatment Process [3]. Different Types of stages In Treatment of FSTP.

1.4.1 Screening: Screening is a waste water Pre – treatment, which aims to prevent coarse

1.4.2 Solid, such as plastic, rags and other trash from entering the treatment Plant:

Solids get Trapped by inclined screens or bar racks. The spacing between the Bars usually is 15 to 44mm, depending upon the Cleaning Patterns. It is very Important to prevent damage and clogging of downstream. Faecal Sludge Treatment Plant [FSTP] uses both Coarse screen and Fine screen.

1.4.3 Anaerobic Digester:

The purpose of Anaerobic Digester is to Encourage the Growth of Anaerobic Bacteria, Particularly the Methane producing bacteria that decrease organic solids by Reducing them to soluble Substance. Anaerobic Digestion is the Biological Degradation of organic matter In the Absence of Oxygen. During this Process Organic Matter is Converted to Bio – Gas. The Major Advantage of Anaerobic Digester is to improve soil Health by Converting the Nutrients to more Accessible from for plant to use. This Process is also use to kill the Pathogens present in it.

1.4.4 Verm Filtration:

Verm filtration is an Innovative waste water Treatment Process that Implies the use of composting worms to treat water loaded with Organic Containment. It is considered to be an innovative technology that provides a sustainable solution for the Treatment of waste water with Synchronous Sludge reduction and Treatment. The Overview of Verm Filtration system have Anti – Clogging nature and the Treatment efficiency, Improvement to the Process. The Main keyword to Verm Filtration is Onsite and Decentralized to the Process [4].

1.4.5 Polishing - Tertiary Process:

Polishing is the Tertiary and final wastewater treatment stage before the waste water can be Discharged into River. Polishing process Involves removal of remaining suspended solid particle and Biological Oxygen Demand of Water [BOD]. Before Release This helps in making the Water more hygienic and environmentally safe. (it should be in the same line)

The Polishing Process starts with Filtration. This is done by passing Final wastewater over filters [Which can be bed of sand or Charcoal]. This causes the Particle matter from water to attach the Filter.

The next Step in Polishing treatment process is called ‘Lagooning’. During this Polishing treatment the water is kept in natural conditions. Usually this is known as open water bodies which are called Polishing ponds. These ponds are usually from 5 to 10 Feet deep and the water is stored in these Ponds for Duration Range from 1 day to 3 days. During this Time Sedimentation of non – degradable and degradable suspended particles at the bottom of the pond is Facilitated in a natural way. Further aquatic plants, weed eating fish are put them in the Polishing Pond to absorb and consume any other remaining particle matter.

1.5 Need for FSSM Policy [Faecal Sludge & Sewage Management]:

According to the data released in the report “Incentivization of Sewage treatment plants, 2015” by the Central Pollution Control Board, out of the 816 municipal sewage treatment plants (STPs) listed across India, 522 are operational (only 64% are functioning), 79 STPs are Non-Operational, 145 STPs are under construction and 70 STPs are proposed. The treatment capacity that is available is only for 37% of the total 62,000 MLD (million liters per day) of human waste that is generated in urban India.

Currently on-site pit latrines and septic tanks account for a substantial proportion of toilets in urban India – over 47% of urban Indian households depend on onsite facilities (Census 2011) and this proportion is increasing. Further, as urban

households without toilets obtain facilities over the next few years under SBM, it is likely that many will acquire on-site arrangements like pit latrines and septic tanks in cities at locations where sewerage systems are not available [5]. The key objective of the urban FSSM Policy is to set the context, priorities, and direction for, and to facilitate, nationwide implementation of FSSM services in all ULBs such that safe and sustainable sanitation becomes a reality for all in each and every household, street, town and city.

1.6 Status of Sanitation in Urban India: According to the Census 2011 [5].

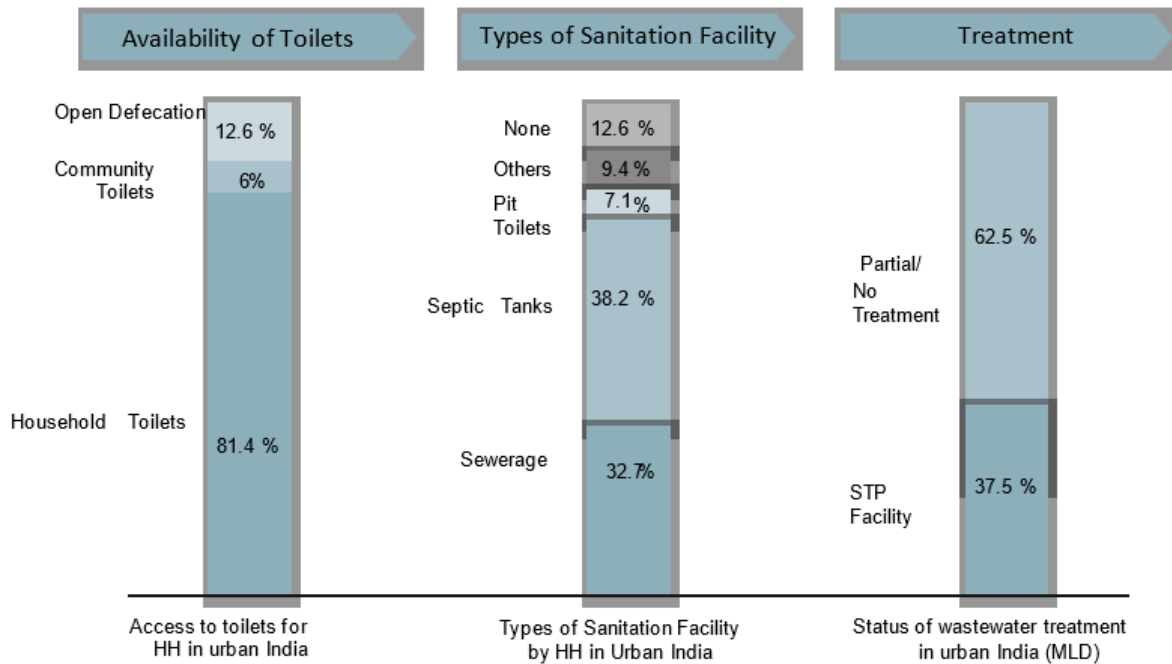


Figure – 1 Bar Chart Showing Sanitation in Urban Area India

1.7 Characteristics:

The Mixture of solid waste and liquid waste collected from the Septic Tank, normally have the Strong odor to it and have large quantities of solid waste, due to this collection of Sludge and a layer of dirt on the surface of liquid. Faecal Sludge have many Characteristics which includes separation of liquid waste and solid waste and dispose them in the Proper manner, it has the good Desludging frequency, it has more capability to process both wastes. Compare to Conventional type of Sewage Treatment Plant [6].

1.8 Reuse Options:

As there are Synergies of Faecal Sludge Treatment Plant it has many Reuses option which can help in forming the Renewable type of Energy and can be used for Better Future.

II. COMPOSTING

As we know composting is the process where organic matter is proceeded in the Presence of Oxygen and we can Co – relate this from Faecal Sludge that the Organic matter remains in Anaerobic Digestion process is used as composting and Faecal Sludge have more nitrogen in it, therefore when Faecal Sludge is mixed with the Crop waste. The composting process is increased, and it can also be increased by proper mixture.

- **Solid Fuel:**

The Resource Recovery which is separated from waste and can be recycled into the new product or used as alternative form of energy that is known as Solid Fuel.

- **Bio – Gas:**

It is a Renewable type of energy and eco – friendly it is produced in the Anaerobic Digestion process, when organic matter is separated by Micro-organisms in the absence of oxygen.

- **Landscape Irrigation:**

The liquid waste which is separated from the solid, is Further treated and can be used for Agriculture and Landscape Irrigation [6].

Following is the Comparison Between Conventional and Faecal Sludge Management.

Conventional sewage treatment	Comparison of Faecal Sludge Treatment Plant and Conventional Technology
The non sewer system provides low cost option	Faecal sludge produces more options from on site technology such as septic tank
Conventional type has no highest efficiency	efficiency Faecal sludge treatment plant has highest collection
%60Efficiency is around	%80Efficiency in Faecal Sludge Treatment Plant is about
It does not have anaerobic digestion process	It involves the anaerobic digestion process

Table: Comparison of Conventional Sewage Treatment Plant and Faecal Sludge Management

III. CONCLUSION

Faecal Sludge Management [FSM] is the rising need of an hour in today’s world in the Urban – Rural Localities of the world to promote safe and sustainable. It creates a healthy environment and safe living standards for the living communities. Apart from the Faecal sludge has end product has a huge market as the Resources recovered from the Treatment stages of the Faecal sludge has various end use in the Various Forms. It creates an opportunity for the use of the Bio – fuel for various purposes and hence increasing the Usage of Renewable energy, A key element towards achieving sustainability.

REFERENCES

- [1] “Manual: Faecal Sludge Management,” 2021. Accessed: Dec. 29, 2022. [Online]. Available: https://swachhbharatmission.gov.in/sbmcms/writereaddata/Portal/Images/pdf/Faecal_sludge_management_manual_English.pdf
- [2] H. Ganapathi, Faecal Sludge Management: A Study with Reference to New Delhi, India Peya Jal Suraksha Development of Six Pilot Riverbank Filtration Demonstration Schemes in Different Hydrogeological Settings for Sustainable Drinking Water Supply (Part View project Harsh Ganapathi Wetlands International South Asia Faecal Sludge Management: A Study with Reference to New Delhi, India. 2017. [Online]. Available: <https://www.researchgate.net/publication/337947134>
- [3] K. Samal et al., “Design of faecal sludge treatment plant (FSTP) and availability of its treatment technologies,” Energy Nexus, vol. 7, p. 100091, Sep. 2022, Doi: 10.1016/j.nexus.2022.100091.
- [4] K. Krishnasamy, J. Nair, and R. J. Hughes, “Verm-filtration systems for liquid waste management: A review,” International Journal of Environment and Waste Management, vol. 12, no. 4. Inderscience Publishers, pp. 382–396, 2013. Doi: 10.1504/IJEWM.2013.056908.
- [5] “Government of India Ministry of Urban Development National Policy on Faecal Sludge and Septage Management (FSSM),” 2017. Accessed: Dec. 29, 2022. [Online]. Available: http://amrut.gov.in/upload/newsrelease/5a5dc55188eb0FSSM_Policy_Report_23Feb.pdf
- [6] M. Ruhela, P. Rani, S. Bhardwaj, and F. Ahamad, “Efficiency assessment of faecal sludge treatment plant (FSTP): An analytical study,” Archives of Agriculture and Environmental Science, vol. 6, no. 3, pp. 347–353, Sep. 2021, Doi: 10.26832/24566632.2021.0603013.