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Operation and Maintenance of Onsite Wastewater Treatment Systems

Dillip Kumar Behera

Jajpur Road College, Jajpur, Odisha, India

Abstract: Wherever practical, public sewer systems (such as municipal wastewater treatment plants and collection systems) are recommended for the collection and treatment of household wastewater. Residential OWTSs shall only be used where it has been demonstrated that public sewer facilities are not feasible or available and where site conditions are suitable to support OWTSs. Public sewer systems to collect and treat wastewater are preferred; however, the trend away from building new or expanding existing wastewater treatment plants, combined with development further from existing wastewater treatment plants will increase the reliance on OWTSs as a long-term method of wastewater treatment for many Indian State residents. India residents and visitors also frequent summer camps, restaurants, motels, mobile home parks, recreation and tourist facilities that rely on OWTSs.

Key words: Operation · Municipal maintenance · Public Sewer system

INTRODUCTION

OWTSs will not function properly if left unattended. A household OWTS will functionsatisfactorily if it is properly located, designed, constructed and maintained [1]. To assure that OWTSsfunction satisfactorily, owners should observe the following practices for operating and maintaining their systems. Information is also available for guidance to homeowners in the NYSDOH document,"Septic Systems-Operation and Maintenance". Design professionals, developers, contractors, pumpers, inspectors should provide this document to homeowners to reinforce the need to properly care for andmaintain their OWTS and its components [2].

Inspection and Maintenance of OWTS Components
Septic Tanks: The contents of the septic tank should be pumped out every two (2) to three (3) years, orwhenever any of the following conditions apply:

- The total depth of sludge and scum exceeds 1/3 of the liquid depth of the tank,
- The bottom of the scum layer is within three (3) inches of the bottom of the outlet baffle, or
- The top of the sludge layer is within ten (10) inches of the bottom of the outlet baffle.

A NYSDEC licensed septage waste transporter (septic tank pumper) can measure tank layers with a "sludge judge" or similar device and pump out the tank if necessary. Pump out clearances notedabove also apply to any chamber in multi-compartment tanks and to any tanks in series.If the septic tank is not emptied periodically, excess solids can pass into the absorption facility,rapid clogging occurs, premature failure follows and finally, the absorption facility must be repaired orreplaced. Periodically pumping a septic tank is far less expensive than replacing an absorption facility. Septic tanks should be inspected annually to determine structural integrity and ensure that the inlet andoutlet baffles or tees are in place. All baffles, inlet and outlet piping should be inspected using a stronglight. Repairs should be made if necessary [3].

Some concrete baffles or sanitary tees may deteriorate over time from caustic gases produced inthe tank. Baffles and tees, which have deteriorated and no longer perform as designed, must bereplaced. The effluent filter and/or gas deflection baffle should be inspected and cleaned following thepump-out of the tank.

Interior surfaces of the tank should be inspected for leaks and cracks using a strong lightfollowing pump out of the tank. If a crack or leak below the liquid level cannot be repaired or sealed,the tank must be replaced.

Corresponding Author: Dillip Kumar Behera, Jajpur Road College, Jajpur, Odisha, india.

If differential (uneven) settlement is evident in the area of the septic tank, thetank must be properly replaced upon a stable foundation of re-graded sand, pea gravel or crushed stone [4].

Enhanced Treatment Units (ETU): ETUs often depend upon mechanical equipment (pumps, blowers, bubblers, control panels) tofunction properly and continually produce clarified effluent. The periodic inspection and maintenance ofthe equipment is important to ensure the mechanical and structural components of the units are operatingand in good condition. A contract with a manufacturer approved service provider needs to be in place toensure the unit(s) are inspected and maintained in accordance with the manufacturer'srecommendations.

ETUs listed by NSF as Class I, Standard 40 units come with an initial two (2) year maintenancecontract, warranty and operating manuals. After two (2) years, the owner needs to continue contractswith qualified service providers to ensure the unit is inspected and maintained in accordance with themanufacturer's recommendations for the life of the unit. Without proper maintenance, these units willfail to perform as designed and reasons for installing the unit(s) will be compromised [5-8].

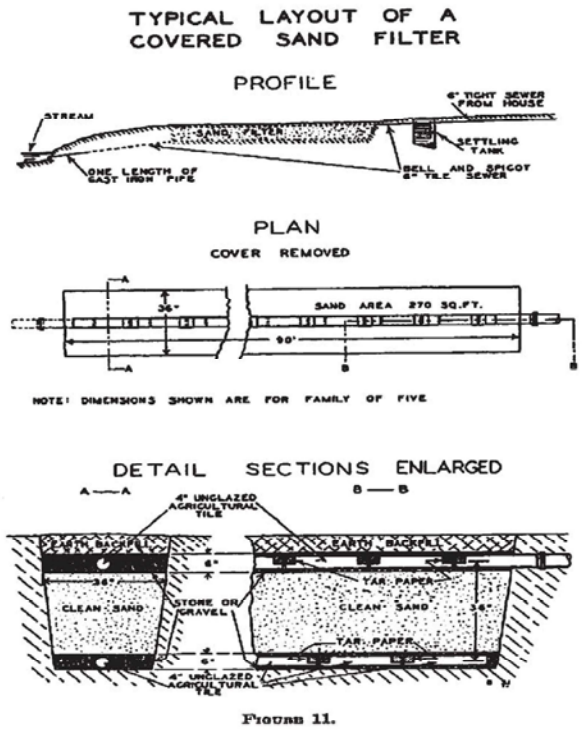

Fig. 1: This diagram is for historical interest only. Do not use for plan or design preparation.

Distribution Devices: Distribution boxes should be inspected periodically to ensure equal flow to all absorption linesand to check for solids leaving the septic tank. The inlet and outlet pipes should be inspected to assurethat all outlet inverts are at the same elevation and adjust or install flow equalization devices ifnecessary. Flow equalization devices (such as speed leveling devices) make it possible to correctunequal flow distribution with minimal effort. Distribution box baffles should be inspected to make surethey are properly positioned. Finding solids in a distribution box is indicative of hydraulic overload,improper septic tank outlet baffles, an undersized septic tank and/or an overfull septic tank.Distribution boxes and flow equalization devices permit use of the entire absorption facilityand/or periodic resting of portions of overdesigned absorption facilities (one or more extra trenches). Periodic six (6) months resting of each lateral is very advantageous to absorption facility longevity andis recommended. Periodic resting is easily accomplished by use of adjustable flow equalization devicesand outlet plugs in distribution boxes [7-10].

A stake should be used to locate distribution box covers below grade. A sketch or planindicating measured distances from permanent points (corners of house foundation, property stakes, utility poles, etc.) to the covers should be retained and used by the owner. The cover of the distributionbox should be kept locked at all times when it is located at or above grade.

Pump and Siphon Systems: Some systems (dosing or pressure distribution systems) incorporate pumps or a siphon, ifadequate slope exists. In these cases the pump or siphon chamber must be routinely inspected to ensureproper operation and structural integrity [11]. Access covers to pump or siphon chambers must be lockable to prevent entry by unauthorizedpersons, especially children. Pump or siphon chambers frequently contain toxic gases and must not beentered by individuals untrained in proper safe entry protocols. Only properly trained persons shouldever attempt to enter or repair such facilities. Pump or siphon chambers must include downward facingand screened air vents, which should be checked periodically for blockage.

When inspecting pump systems, the effluent pump and alarm should be checked for properoperation. If duplex pumps are used, both pumps and alarms should be checked. The pump chamberand plumbing connections should be checked for leaks and groundwater infiltration.

Leaks should berepaired promptly. Float switches controlling pumps should be tested and adjusted for correct dischargelevel.Siphon dosing systems should be inspected semi-annually to assure the wastewater level in thedosing chamber is within the normal operating range (bottom of bell to below the overflow) [12]. The alarmshould be checked for proper operation. The alarm should be set to activate prior to wastewaterdischarging from the overflow pipe. Hydraulic bell siphons and snifter tubes can be tested for leaks bycovering the siphon with water and inspecting for air bubbles. The dosing chamber and plumbingconnections should be checked for leaks or groundwater infiltration. Leaks should be repaired promptly.Dosing and pressure distribution system designers and installers should provide homeownerswith instructions that describe proper operation and maintenance of the system. If the system is alreadyinstalled at a time of property transfer, a briefing with the previous owner of their experience with thesystem may be helpful [13-15].

Absorption Facilities: Proper operation and maintenance of OWTSs increases system lifespan, optimizes wastewatertreatment and helps to prevent system failures. System failures can pollute the environment and createpublic health nuisances. Keep trees away from the immediate area of the absorption field as their rootsmay enter and clog the system. Keep swimming pools (above or in ground) away from the absorptionfacility. Do not pave or build structures over an absorption facility. The size of an existing system should be evaluated. Owners should consider increasing the sizeof an existing septic tank and absorption facilities when additions are made to homes (expansionbedrooms, installation of additional wastewater generating appliances and fixtures, etc.)Runoff to the absorption area should be eliminated by re-grading, ditching or bermingsurrounding areas. Groundwater diversion may also be necessary to alleviate high groundwater, whichinterferes with the proper operation of the facility [15-18].

The absorption facility should be observed periodically for surface discharge or ponding ofeffluent. Such occurrences could indicate system is in need of repair or replacement. Observation portscan be installed at the distal end of the absorption trenches, as depicted in Addressing System FailureOWTSs can fail (examples include due to wastewater backup to plumbing fixtures, untreatedwastewater on the ground surface, impacts to water courses orcontamination of ground water sourcessuch as wells or springs). Failure can be caused by many factors.

CONCLUSION

OWTSs located in sensitive areas or on difficult sites that need repair or replacement, the LHD should be contacted to obtain additional information, technical assistance, references, literature and research available regarding wastewater treatment technologies and methods. Specialized or critical situations may occur when soil is unsuitable, high ground water, rock or clay is too close to the ground surface, or concern exists over possible water supply (well or spring) contamination, stream impacts or lake eutrophication. In such cases, experienced professional consultation and special designs may be necessary. In some cases site and soil conditions preclude the use of OWTSs and centralized sewers will be required for site development.

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