

Sewage Treatment System (STS) Management Plan

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1.0 Introduction

Proper siting, design, installation, monitoring, operation, and maintenance are the critical elements to the success of onsite sewage treatment systems. This type of wastewater infrastructure is only viable when all six elements are properly executed by the parties involved. Failure to follow through with any one of these elements often leads to system failures, polluted waterways, nuisance conditions, expensive repairs/replacements or costly sanitary sewer extensions.

This plan highlights the programs, policies and procedures used by the Hamilton County Public Health (HCPH) to ensure all of the critical elements, when dealing with onsite sewage treatment systems, are properly addressed. It identifies the tools used by HCPH to monitor existing sewage treatment systems. It also discusses the steps taken to correct individual system failures, as well as, the planning and prioritizing taken to address areas where a large number of malfunctioning onsite sewage systems exists.

1.1 Background

Currently, 18,637 privately owned onsite sewage treatment systems exist within HCPH's jurisdiction. Household sewage treatment systems (HSTS) account for 18,112 of this total with the balance of 525 being commercial semi-public facilities. It is believed that around 2,500 additional onsite sewage treatment systems exist in other health districts/departments jurisdictions within Hamilton County including the Cities of Cincinnati, Indian Hill, Springdale and Sharonville.

Around 61 percent of the existing onsite sewage treatment systems rely on mechanical components to treat the wastewater generated in the unsewered areas of the Health District's jurisdiction. The remaining 39 percent are the more conventional type of non-mechanical sewage systems such as leach lines, drywells, and sand filters.

Sewage treatment systems that were designed to discharge make up over 71 percent of the total, or 13,264 systems. It is estimated that 1.75 billion gallons of partially treated sewage enters Hamilton County waterways each year as a result of these discharges. Aerobic treatment units account for the largest majority of the discharging systems at 9,615. Subsurface sand filters used throughout the Health District's jurisdiction total 2,948. Newer advanced treatment systems and commercially owned extended aeration package plants round out the remainder of the discharging systems at 729 and 62, respectively. Only 268 residential discharging systems are authorized by OEPA to release effluent to the waters of the state, under a National Pollution Discharge Elimination System (NPDES) permit.

Currently, 24 percent of all discharging systems, or 3,119, are known to rely upon collector lines that accept and transport effluent from as few as two systems to as many as fifty systems and convey that effluent to a common discharge point. Many collector lines are privately owned, with most having no legally described easements. Those that might

be publicly owned are storm sewers, which traverse through local neighborhoods. There are 560 known collector lines within the Health District's jurisdiction.

From the 1950's to the early 1990's, policy makers in Hamilton County failed to realize the importance of onsite sewage treatment system infrastructure. The belief that these systems were short term stopgaps until sanitary sewers were extended has resulted in a legacy of problems. Similar thinking exists today in the minds of some system owners and has resulted in the lack of proper operation and maintenance of thousands of sewage systems. This presents a tremendous burden on the residents of Hamilton County and their government.

The current administration at HCPH has laid the framework for a sustainable reliance on onsite sewage treatment systems by addressing proper siting, design, installation, monitoring, operation, and maintenance for new and replacement systems in regulation. The existing legacy systems will continue to be routinely monitored by Health District staff. It is expected that those systems will eventually be phased out through upgrades, replacements, or sanitary sewer extensions due to non-compliance with operational criteria, effluent quality standards or Phase II Stormwater Regulations of the Federal Clean Water Act.

1.2 Scope

This plan discusses the regulations and policies that directly affect the siting, design, installation, monitoring, operation, and maintenance of household sewage treatment systems in the jurisdiction of HCPH. It also addresses the monitoring, operation and maintenance of semi-public systems that are inspected by HCPH via contract with the Ohio Environmental Protection Agency (OEPA). It does not address the regulation or policies of other city health districts/departments within Hamilton County.

1.3 Purpose

Provide explanation and overview of the programs, policies, and regulations governing onsite sewage treatment systems under the jurisdiction of HCPH.

2.0 Sewage Treatment System Regulations

In 1977, the Ohio Public Health Council (OPHC), under the authority of Chapter 3701.34 of the Ohio Revised Code (ORC), adopted minimum household sewage disposal system (HSDS) rules in Chapter 3701.29 of the Ohio Administrative Code (OAC). In 2007, the OPHC updated the statewide rules governing sewage treatment systems. Shortly after these new rules were implemented, the State Legislator passed a bill which repealed the statewide sewage rules sighting that the economic impact caused by these rules was too great. By them doing so, they again gave local boards of health the authority to use the provisions found in ORC 3709.21, allowing local boards of health the power to adopt their own regulations. As such, Hamilton County's Sanitary Regulation 529 was re-adopted, thereby building upon its successful implementation dating back to 1993.

The re-adoption of Regulation 529, effective July 16, 2007, contained several revisions which closely mimicked the recently repealed standards that were found within the Statewide Sewage Rules. Those revisions include:

1. Requirements to obtain an NPDES permit from OEPA for HSTS that intends to discharge to the waters of the state.
2. Establishment of a vertical separation distance in the soil between the application point of sewage to any condition in the soil that would limit sewage treatment.
3. The newly expanded authority to regulate Small Flow Onsite Sewage Treatment System (SFOSTS) (Soil absorption STS for structures other than a one, two or three family dwelling that treats less than 1000 gallons per day).

3.0 OEPA and Onsite Sewage Treatment Regulations

Since the formation of Ohio EPA in 1972, regulation of semi-public sewage treatment systems has been performed by this agency under ORC 6111. Similarly, NPDES permitting of discharges to the waters of the state are administered by OEPA via rules in OAC 3745. Prior to 2007, OEPA had not required NPDES permits for individual HSTS. Consequently, there are currently 12,792 unpermitted discharges in HCPH's jurisdiction.

In 1984, amendments to ORC 3709.085 introduced language that allows permissive contracts between the OEPA and local health districts (LHD's) for inspecting semi-public sewage treatment facilities. Under these contracts, enforcement, permitting and installation inspections remain a function of OEPA. However, changes brought about by the passage of House Bill 231 in 2005, allowed LHD's to fully regulate non-discharging small flow onsite sewage treatment systems (SFOSTS) that generate less than 1,000 gpd. Hamilton County Public Health began regulating these systems since the law became effective in 2007.

In 2007, the OEPA issued its first Statewide General NPDES permit for new or replacement Household Sewage Treatment Systems. That permit prohibits new parcels from being created that necessitate the use of a discharging sewage treatment system. Coverage for new construction on pre-existing lots and replacement systems under this permit can only be granted when a LHD documents that a soil absorption system is not possible. Coverage for new HSTS on pre-existing lots are drastically restricted by limiting acceptable discharge areas. Under the first five years of this NPDES permit, the OEPA has issued coverage to 347 properties in HCPH's jurisdiction.

4.0 STS Operating Standards

On September 17, 2010, changes to Chapter 3718 of the Revised Code became effective. Those changes implemented new standards for determining the function status of STS throughout Ohio. The statewide minimum standards for STS failure are as follows:

1. A sewage treatment system is not operating properly due to a missing component, incorrect settings, or a mechanical or electrical failure.
2. There is a blockage in a known sewage treatment system component or pipe that causes a backup of sewage or effluent affecting the treatment process or inhibiting proper plumbing drainage.
3. An inspection conducted by, or under the supervision of, the environmental protection agency or a sanitarian registered under Chapter 4736. of the Revised Code documents that there is ponding of liquid or bleeding of liquid onto the surface of the ground or into surface water and the liquid has a distinct sewage odor, a black or gray coloration, or the presence of organic matter and any of the following:
 - a. The presence of sewage effluent identified through a dye test;
 - b. The presence of fecal coliform at a level that is equal to or greater than five thousand colonies per one hundred milliliters of liquid as determined in two or more samples of the liquid when five or fewer samples are collected or in more than twenty per cent of the samples when more than five samples of the liquid are collected;
 - c. Water samples that exceed one thousand thirty e. coli counts per one hundred milliliters in two or more samples when five or fewer samples are collected or in more than twenty percent of the samples when more than five samples are collected.
4. With respect to a discharging system for which an NPDES permit has been issued under Chapter 6111 of the Revised Code and rules adopted under it, the system routinely exceeds the effluent discharge limitations specified in the permit.

5.0 Siting, Design and Installation

Hamilton Count Public Health uses a seven step process prior to final approval of any STS installed within its jurisdiction. This process is used to ensure that all STS are properly sited, designed and installed before being placed into service.

5.1 STS Installation Applications

Prior to the installation of any STS, the property owner must make application to the Health District. Two different processes are used based on whether the application is for a SFOSTS/new construction of a HSTS or for an existing site in need of a replacement HSTS system.

For all SFOSTS or for new construction of a HSTS, the applicant must supply a detailed site plan along with the proposed structure plans. A complete set of STS drawings, based

off of an accurate soil report, must also be supplied by a qualified STS designer and soil specialist. Health District staff will visit the proposed development site to verify the accuracy of the soil report and review the design for compliance with Regulation 529 and HCPH's Installation and Specifications Manual. Plans and soil reports meeting the standards are then reviewed by a separate Health District staff member before application approval is given.

Applications for replacement HSTS are handled differently in order to reduce the financial burden on existing Hamilton County residents. In these cases, Health District personnel conduct the initial site visit to perform the site and soil investigation. Based off of the information gathered, an HSTS design is developed internally which meets the requirements of Regulation 529 and the HCPH's Installation and Specifications Manual. Before final application approval is given, a separate Health District staff member reviews the completed plan.

5.2 STS Selection Hierarchy

As a starting point for all STS applications, properties are thoroughly evaluated to determine the most suitable sewage handling method after sanitary sewers have been determined to be unavailable. The following criteria are used:

1. Small flow onsite sewage treatment systems are required to treat less than 1,000 gallons per day and must utilize a soil absorption system as the final dispersal component. If this is not possible, the SFOSTS applicant would be referred to the OEPA for all permitting needs.
2. Household sewage treatment system options are evaluated based on the following hierarchy:
 - a. Install an on-lot soil absorption system where the site and soil conditions allow. If not, then;
 - b. Install an on-lot NPDES approved discharging system with partial soil absorption system where the site conditions allow. If not, then;
 - c. Install an on-lot NPDES discharging system where the site conditions allow. If not, then;
 - d. Install an off-lot NPDES discharging system with partial soil absorption system where the site conditions allow. If not, then;
 - e. Install an off-lot NPDES discharging system.

For an HSTS, if a soil absorption system can not be installed on a parcel, drainage permission must be obtained from all downstream property owners within 100 feet of a proposed discharge point. When an off-lot discharge is necessary, a recorded easement must be obtained prior to approval. Variances from the requirements in Regulation 529 may be sought by the owners of pre-existing properties that can not meet all HSTS siting requirements. Variances can not be granted from the NPDES permit requirements.

5.3 Permit-to-Install

After the STS Application is approved a Registered Installation Contractor must obtain a Permit-to-Install. In HCPH's jurisdiction, installation contractors are required to receive training from HSTS manufacturers/distributors prior to the installation proprietary STS components. They are also required to carry liability insurance and a \$25,000 surety bond to ensure proper STS installation and protect property owners.

5.3.1 Preconstruction Conferences

Once a Permit-to-Install is obtained, it is the installation contractors responsibility to properly layout the system at the site prior to installation. A preconstruction conference must then be scheduled with the HCPH staff to verify STS component placement, discuss any proposed changes, and obtain permission to start the installation.

When changes are proposed to the STS design, the system designer and property owner are consulted for written approval prior to proceeding. Where major design changes are necessary, a new set of installation plans must be submitted, reviewed and approved before the installation can commence.

5.3.2 Partial Installation Inspections

A minimum of two "open ditch" or partial inspections are performed by HCPH staff on every STS installation. These inspections are scheduled by the installation contractor at set intervals based on the type of STS. During these inspections, the STS contractor is required to provide the inspector with an as-built record of the installation to date. HCPH inspectors may use the as-built to spot check the installation or they may inspect the entire job and create their own as-built. Any noted deficiencies are supplied to the installation contractor and a re-inspection is required to verify corrections.

5.3.3 System Startup Inspection

Prior to a final installation inspection and STS approval, a manufacturer/distributor inspection is required. During this inspection, a qualified private sector inspector visits the installation site to verify that STS components are installed to the manufacturer's specifications, to determine if the system is operating as designed, and to establish baseline data for record keeping.

5.3.4 Final Installation Inspection

Final installation inspections are withheld until after all partial inspections are complete, the manufacturer/distributor startup inspection reports are received, an installer as-built record is submitted and any electrical inspections have been approved. Once these requirements are satisfied, the installation contractor must schedule a final inspection. HCPH staff then visits the site to verify that all of the supplied information is correct, that finished grade of the STS meets specifications, and that proper erosion control measures

have been taken. If approved, a final approval sticker is left with the installation contractor.

6.0 Operation, Maintenance and Monitoring (OM&M)

Post installation activities directly affect the expected longevity of all STS. All else being equal, systems that are operated properly, maintained consistently, and monitored routinely, will last longer than systems that are not. Additionally, systems that are used in accordance with established guidelines offer greater protection of public health and the environment. It is the sewage treatment system owner's responsibility to perform these necessary tasks to protect their investment.

6.1 OM&M Education

To promote proper education, Health District personnel are thoroughly trained in the operation, maintenance and monitoring requirements for every type of sewage treatment systems used in the county. These staff members offer one-on-one training sessions to septic system owners in order to provide meaningful OM&M education. Trainings are also given to public officials to increase the awareness of the problems with older STS.

Facts sheets describing the general workings of the different types STS are provided to STS owners via direct mailings and through the Health District's website. These informational brochures briefly describe the OM&M requirements and list registered service providers that can be contacted for STS maintenance and/or repairs.

6.2 Operation Permit Inspection Programs

In 1974, the first statewide household sewage disposal code was adopted by the public health council. In these rules, operation permits were to be issued by the local boards of health for all septic systems within their jurisdiction. Although many health districts ignored this requirement, Hamilton County began issuing permits while inspecting only a small percentage of the systems. As time progressed and many more permits were issued, the short-sightedness of that style of operation permit program was realized by many.

In 1993, under the direction of a new Health District Administration, a complete overhaul of the operation permit program was undertaken. To start, Regulation 529 was adopted by the Board of Health, the Division of Water Quality and Waste Management was created, and new staff members were hired. The staff's objectives were to inventory and evaluate the existing HSTS, provide community education, inspect faulty HSTS until compliance was achieved, and show targeted improvements.

As system inspections are performed, scheduling, tracking, permitting and billing occurs through an Access database where an unlimited number of custom reports or queries can be generated. Health District inspectors are assigned geographic areas of the county and are responsible for both routine and follow-up inspections in these areas. STS that are

being properly operated and maintained are issued a provisional operation permit. STS that are malfunctioning or disapproved during routine inspections are automatically assigned a follow-up date for the reinspection to occur.

Malfunctioning STS owners are given 45 days to make repairs or take corrective action before the follow-up reinspection. Provided the corrections have been made, there is no charge for the first reinspection. If a failure persists, a second reinspection is scheduled and a charge is incurred for the first, second and any subsequent reinspection. For cases where compliance can not be achieved through the operation permit program, the Hamilton County Prosecutor's Office is notified for enforcement action through the legal system.

Through the operation permit inspection programs, all sewage treatments systems, discharge lines, and collector lines are mapped and updated in the Cincinnati Area Geographic Information System (CAGIS). Real time linking of CAGIS data to the STS Access databases allows Health District Staff the tools needed for advanced planning, reporting, mapping, and tracking.

6.2.1 Mechanical STS Operation Permits

Since 1993, the Health District has annually inspected all HSTS with electrical components such as aerobic treatment units, mounds, and dosed sand filters. Within the first years of this program, all mechanical systems had been inventoried. Currently, there are 11,047 mechanical HSTS used in Hamilton County with a majority residing west of Cincinnati.

Mechanical systems are inspected to verify that they are operating as designed and to confirm that they are being properly maintained by their owner. During these inspections observational criteria are used to determine satisfactory STS performance, as opposed to, routine effluent quality sampling. After a completed inspection, a system report is filled out by Health District Staff and mailed with an invoice to the system owner. Minimally, mechanical systems installed before December 10, 2004, are disapproved if any of the following conditions exist:

1. Motor missing
2. Motor inoperable (cold)
3. Motor not drawing air, or insufficiently drawing air
4. Broken lid(s), i.e., piece missing or broken to the extent that it allows entrance of surface water, or lid cannot be lifted without collapse; decayed metal grating.
5. Flooded filter
6. Visual evidence of septic sewage, i.e., black, odorous
7. Visual evidence of electric service problem
8. Components are not functioning in accordance with design standards.
9. Discharge creates a public health nuisance
10. An access riser has not been brought to grade over each compartment requiring maintenance

11. An effluent sampling well is not present when an effluent sample is needed to determine the operating status of the system

Mechanical systems installed on or after December 10, 2004, are required to maintain a contract with a certified service provider. These systems are also required to be equipped with telemetry that alerts the Health District and the service provider when a component failure or malfunction is present. These newer style STS may be disapproved for any of the following reasons:

1. The system contains any broken or missing components
2. The system is improperly maintained
3. A registered maintenance provider contract has not been obtained
4. The system is not operating as designed
5. The system has been altered without approval
6. If the effluent quality is not maintained
7. The system is consistently operated above its design flow rate
8. Any other condition which may adversely affect the treatment, absorption, or longevity of the STS.

Since the inception of mechanical STS inspection program, mechanical systems failure rates have steadily declined from a high of 51% in 1994, to the somewhat predictable rate of 20%. This decrease can be attributed to owner education, strict enforcement, the use of better tracking technologies.

6.2.2 Non-Mechanical STS Operation Permits

In 1998, the Health District began inspecting all HSTS without electrical components such as leach lines, subsurface sand filters, and drywells. These types of systems are inspected on a five-year rotation once approved. Within the first five years of this program, all non-mechanical systems had been inventoried and placed into the operation permit program. There are 7,065 non-mechanical HSTS used in Hamilton County with a majority using subsurface sand filters (2,772), followed by leach lines (2,249) then drywells (1,410).

Non-mechanical systems are inspected to verify that they are operating as designed and to confirm that they are being properly maintained by their owner. During these inspections observational criteria are used to determine satisfactory STS performance. Where problems are suspected, dye testing and effluent sampling may be performed by Health District staff to help document failures. Failed systems often require a complete system replacement since repairing a non-mechanical system is rarely successful.

Minimally, non-mechanical systems are disapproved if any of the following conditions exist:

1. Gray, malodorous sewage is seeping to the ground surface on the property being inspected, creating a nuisance;

2. Gray, malodorous sewage is discharging from the sewage system to an adjacent property or roadside drainageway;
3. Any similar condition is occurring which is creating a public health nuisance
4. An effluent sampling well is not present when an effluent sample is needed to determine the operating status of the system.

Since the inception of non-mechanical STS inspection program, failure rates have dropped from a high of over 23% to around 4%. It is believed that this rate will remain steady as the surplus of older failing non-mechanical systems have been replaced.

6.2.3 Semi-Public STS Inspections

In 2000, after a contract was signed with the OEPA, semi-public sewage treatment systems began to be inspected by HCPH. These commercial facilities are inspected on a yearly basis and contain both mechanical and non-mechanical sewage treatment systems. In this program, all 525 facilities are classified by their discharge volume into groupings of non-discharging systems (321), systems that discharge less than 5,000 gpd (193) and systems that discharge between 5,000 to 25,000 gpd (11).

Semi-publics are inspected using the same criteria as established in Regulation 529 for household systems. Occasional effluent quality sampling is performed on the discharging systems as a spot check to the observational inspection criteria used. Repairable failures are addressed by Health District staff through the re-inspection process. When enforcement action or a replacement system is needed, the cases are referred to the OEPA.

Since the inception of the program, failure rates have dropped from a high of 42% in 2000, to the somewhat predictable rate of 20%. This decrease can be attributed to owner education, strict enforcement, and the use of better tracking technologies. It is believed that semi-public failure rates will remain consistent due their reliance on older mechanical components and the fact that many were sited, designed and installed improperly.

7.0 Nuisance Complaint Investigations

In accordance with the Ohio Revised Code 3707.01, the Health District responds to all public health nuisance complaints filed by the public. Per HCPH policy, nuisance complaints are field investigated within five business days and, if necessary, notices of violation are issued within the following three days. When an HSTS failure is observed, a maximum of one month is given to abate the nuisance condition. For cases where compliance can not be achieved through a written notification process, the Hamilton County Prosecutor's Office is informed so that enforcement action may be taken.

8.0 Sanitary Sewer Extensions and STS or STS Upgrades, Repairs Replacements

The staff at HCPH continually monitors the status of individual sewage treatment systems and collector lines through an operation permit inspection program. With the use of CAGIS and Access databases, areas contaminated by failing or improperly operated or maintained sewage treatment systems are easily identified. Waterways in these areas are sampled to document pollution problems so that sanitary sewer extension, STS upgrades or replacements will be scheduled. Since 1993, a total of 1,800 STS have been abandoned in favor of sanitary sewer, over 33,000 STS repairs have occurred, and nearly 2,400 replacement systems have been installed.

HCPH works with property owners and the Metropolitan Sewer District (MSD) to bring sanitary sewer service to neighborhoods via the petition process. Through this process, after a resident requests sewer service, MSD determines the scope of the project and requires the resident to collect signatures supporting a sanitary sewer extension. Upon collection of 50% +1 signatures from the residents that would benefit from the sanitary sewer, MSD sends an official voting ballot to all benefitted parties. If 50% +1 support the project, the sewer will be installed. There are currently over 1,400 properties pursuing sanitary sewers either through Health District or resident initiated projects. Once installed, all properties accessible to an available sanitary sewer must connect under the following timelines:

- i 90 days if the STS is malfunctioning
- i 2 years if the property has a properly operating discharging STS
- i 5 years if the property has a properly operating soil absorption STS

There are currently 243 properties under orders to connect to an accessible sanitary sewer and properly abandon their STS with HCPH's jurisdiction.

HCPH continues to work with representatives from MSD to develop a sanitary sewer extension plan for a large number of priority areas throughout the county. Once this plan is finalized, those areas where sanitary sewers will not be installed will be required to upgrade or replace all inadequate sewage systems. There are currently 120 areas throughout HCPH's jurisdiction that have been identified for sewer extension planning or STS upgrades/replacements.

9.0 Summary

In 1993, the Hamilton County Public Health took the necessary steps to address thousands of existing inadequate sewage treatment systems by developing an operation permit inspection program. Once all HSTS had been inventoried and evaluated, the district used what it had learned to revise Regulation 529 in order to address the proper siting, design, installation, monitoring, operation, and maintenance of new STS. These new regulations demonstrate a serious commitment to the future of onsite sewage treatment system infrastructure in Hamilton County. Since it is known that older

discharging STS will fail to meet future NPDES permit requirements and they are considered illicit discharges under Phase II Stormwater Regulations of the Federal Clean Water Act, the district has been working with MSD to develop a sanitary sewer extension plan to address these systems. Upon completion of this plan, non-compliant STS will be required to connect to the sanitary sewer, upgrade or be replaced as appropriate.