

Maintaining Septic Systems

Submitted to:

Southwest Florida Water Management District

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Table of Contents

Background.....	3
Barriers and Benefits.....	4
Summaries of Programs	5
Clearwater Information Exchange, Victoria State, AUS.....	5
National Small Flows Clearinghouse (NSFC), USA.....	6
Georgetown Public Divide Utility District, CA, USA	6
Stinson Beach County Water District, CA, USA	6
Lake McConaughy Education to Action Project.....	7
Innovative Partnerships for Public Outreach on Private Well and Septic System Management, Maryland, USA	7
Septic Maintenance Pilot.....	8
Pilot Evaluation	10
Endnotes.....	11

Background

Septic system failure caused by improper maintenance of a septic system harms water quality in many of the same ways as do fertilizers and dog waste. As with dog waste, fecal coliform contamination is possible. Fecal coliform contamination is potentially the most prominent issue relating to septic system failure.¹ Fecal coliform is a disease-causing bacteria, potentially responsible for diarrhea, hepatitis A, dysentery and typhoid fever.² Contamination of ground water from sewage overflows can also cause cholera and salmonella.³

Like fertilizers, sewage overflows can also contribute to excess nutrients in the water, such as nitrates and phosphorus.⁴ While septic systems are generally effective at removing phosphorus, as a system ages its phosphate-absorption capacity can be depleted, causing phosphate plumes and increased levels of phosphorus in surface water.⁵ Accumulation of phosphorus produces blooms of algae and other aquatic plants that decompose, depleting the oxygen in the water that plant and animal life require.⁶ This process is called “eutrophication” and is responsible for fish kills, threatened biodiversity of potential commercial and recreational species, aquatic plant beds and coral reefs.⁷ Eutrophication is responsible for 50% of impaired lake area and 60% of impaired river area in the United States.⁸

In addition to fecal coliform contamination, nutrient enrichment also harms drinking water.⁹ A very high concentration of nitrates in drinking water can lead to methemoglobinemia, or “blue baby disease.”¹⁰ Methemoglobinemia is a condition in which infants who consume nitrate-heavy drinking water turn blue due to blood oxygen starvation, which can potentially result in death if not properly treated.¹¹ An additional issue stemming from improper maintenance of septic systems is metal contamination, which can be particularly harmful to aquatic life and can impair drinking water.¹² Improper maintenance of one’s septic system may also lead to undesirable and offensive smells, a mosquito breeding ground, expensive repairs and/or replacement costs, costly cleanup of damage caused by sewage backup, and condemnation of the house, potentially resulting in eviction.¹³

About 25%–32% of households in the United States live beyond the reach of a public sewer system and, therefore, must rely on a septic system for the disposal and treatment of sanitary waste, which includes kitchen, bathroom and laundry wastewater.^{14 15} Even a properly maintained septic system can release over 10 pounds of nitrogen into the ground water per person using the system.¹⁶ And it is estimated that one to five percent of septic systems malfunction yearly.¹⁷ However, some estimates are significantly higher. In the state of Maryland, for example, the estimation of the number of failing septic systems is 60%.¹⁸

Barriers and Benefits

There is a lack of rigorous research on the barriers and benefits to the proper maintenance of septic systems. However, most programs attempting to increase a household's proper maintenance of septic systems are educational. Programs to encourage this behavior seem to be built on the presumption that a lack of knowledge is the major barrier. A lack of knowledge can entail not knowing the condition of one's septic system when purchasing a new home.¹⁹ Without a community outreach program, the only time that a homeowner will be informed of his or her septic system is at the point of purchase, and while realtors are responsible for informing homeowners of its existence, many realtors do not know the condition or how to maintain the septic system of the house they are selling.²⁰ Therefore, a lack of knowledge about the home's septic system on the part of a realtor is a barrier to householders properly maintaining their systems. A lack of knowledge can also mean that homeowners are often unaware that they are responsible for the quality of their own water.²¹ Another barrier includes the lack of community protocols for inspection and maintenance of rural septic systems.²² Without a uniform tracking system or database, it is difficult for a governing agency to administer information or regulations.²³ It is difficult to ensure maintenance of septic systems if there is no mechanism in place to ensure that they are maintained.²⁴ Specific barriers relating to a homeowner's knowledge of their septic system include homeowners not knowing where their septic systems are even located, let alone how to properly maintain them, as county health departments do not necessarily have septic systems marked to the surface.²⁵ A lack of regular septic system inspections is another barrier to their proper maintenance.²⁶ Often, the only time an inspection is required is during a real estate transaction when the mortgage company hires an "inspector." These inspectors, however, do not have to be certified to call themselves "inspectors," which leads to yet another knowledge-related barrier to the proper maintenance of septic systems.

While not as widely addressed, another barrier to the proper maintenance of one's septic system is convenience. Not only may homeowners not know how to properly maintain their system, they may not find the time that is needed to do so in their busy lives. Making it easier for homeowners with reminders for maintenance and by offering licensed inspectors to service regular maintenance checks is one way to make maintenance of septic systems more convenient.

Cost can be another barrier to proper septic system maintenance. The costs to repair a failed septic system are around the same as installing a new system, ranging between \$3,000 and \$7,000 per unit.²⁷ While these costs are much higher than the cost to properly maintain a septic system, which is between \$100–\$300 USD each year depending on the type of system,²⁸ this cost difference is perhaps not made salient enough to householders. Providing short-term loans to householders who are in need of financial support for the maintenance of their system is a potential method of overcoming cost as a barrier.²⁹

The “ick” factor is another potential barrier to proper maintenance. Rural homeowners who are not knowledgeable in septic system maintenance may not be overly enthusiastic to develop this knowledge due to the associated stigma around sewage systems. Again, offering a program with licensed inspectors to help homeowners maintain their systems properly is one way of overcoming this barrier.

Finally, another barrier to the proper maintenance of septic systems is the sheer number of behaviors that are related to this activity. For proper maintenance, certain products (e.g., Kitty litter, HHW) and organic materials (e.g., hair combings) should not be flushed down the toilet. In addition, a household should only be using an amount of water that is appropriate for the system, the septic system should be properly designed and situated and regular maintenance checks, including a pumping every one to three years, must be performed.³⁰ While it is impossible to reduce the number of behaviors associated with properly maintaining a septic system, reminders to carry out those behaviors, programs to increase the knowledge of septic system owners and programs that help licensed inspectors to perform regular maintenance checks of septic systems can all help to overcome these barriers.

The benefits to properly maintaining one’s septic system are related to the costs involved with maintaining versus repairing a septic system. As mentioned above, maintaining one’s septic system is significantly less expensive than fixing a malfunctioning one. Also, a properly maintained septic system will eliminate many of the problems associated with a failing system, such as undesirable and offensive smells, a mosquito breeding ground, costly cleanup of damage caused by sewage backup and condemnation of the house, potentially resulting in eviction.³¹

Summaries of Programs

Municipalities are beginning to deliver programs to encourage homeowners to properly maintain their septic systems. The following section includes reviews of two online educational septic system databases, Clearwater Info Exchange and National Small Flows Clearinghouse, as well as a few smaller scale projects designed to make septic system management more readily accessible and easier for homeowners.

Clearwater Information Exchange, Victoria State, AUS³²

Clearwater Info Exchange includes a wealth of information about septic system maintenance aimed at helping Environmental Health Officers (EHOs) and other agencies involved in domestic wastewater management sustainably manage septic systems. The web site includes a report that summarizes articles from the Domestic Wastewater Database, listing informational needs of EHOs as well as best management practices. On the web site, there are 129 resources in all and they are divided into six categories: technical information, innovation in planning, regulatory opportunities, technological developments, innovation in management and, finally, homeowners and community. Each of these six resource categories contains case studies of successful council initiatives, technical guidelines, training manuals, information sheets, links to

other applicable web sites and research papers. The *homeowners* and *community* category contains a handy Smart Septics Community Education Kit designed to assist councils in developing community on-site wastewater management education programs. Section 1 of the kit contains background information about the Keeping Your Backyard Healthy: Smart Septics Solutions community education program, why wastewater management is important, the legislative responsibilities of councils, different education options and web links. Section 2 of the kit contains how-to instructions on effectively planning and delivering the Keeping Your Backyard Healthy: Smart Septics Solutions program. Section 3 contains educational resources, including information sheets for publication on council web sites and distribution to residents, print and radio community awareness media advertisements, powerpoint presentations, briefing sheets for councils and community members, and other tools such as post cards and stickers. There is a glossary of relevant terms in Section 4 of the kit. Finally, Section 5 contains a CD with electronic versions of education resources that can be adjusted for local use and plastic-wrapped hard copy versions of the resources. Most of the kit is available online, except for the CD and hard copy resources, which must be purchased from the Municipal Association of Victoria.³³

National Small Flows Clearinghouse (NSFC), USA³⁴

Like Australia's Clearwater Info Exchange, NSFC is an online resource for septic system maintenance. The NSFC is a subcategory of the U.S. National Environmental Services Center, dedicated to supplying information about septic system maintenance. It explains what a septic system is; how to maintain a septic system, including what not to flush down the toilet; an online brochure explaining maintenance procedures; the EPA homeowners guide to septic systems; and, for a small fee, they offer a record-keeping folder and information package on septic systems that can be ordered by phone or email. In addition, there is a quarterly newsletter, *Pipeline*, which focuses on a single wastewater issue each publication. Two publications are dedicated to the discussion of septic systems, *Pipeline* Volume 6 (3) and 6 (4).³⁵

Georgetown Public Divide Utility District, CA, USA³⁶

On top of managing water reservoirs, two water treatment plants, an irrigation canal system and two hydroelectric plants, the Georgetown Divide Public Utility District allocates approximately 10% of its resources to managing on-site wastewater systems in a large subdivision. The utility works extensively with homeowners, providing a comprehensive site evaluation program, designing the septic system for each property, laying out the system for the contractor and conducting inspections during construction. After construction there is continued communication between the households and the utility, including scheduled inspections. Homeowners pay \$12.50 per month for management of single-family systems, while owners of undeveloped lots pay \$6.25 per month for the service.³⁷

Stinson Beach County Water District, CA, USA³⁸

In 2000, SBCWD revised their 1994-01 Ordinance to come up with Ordinance No. WW2000-01, which eliminates a relaxed repair code, formalizes design standards for

sand filters and requires the installation of a system that meets the current code if new construction is proposed for a property.³⁹ Since the Onsite Wastewater Management Program was inception, SBCWD has been responsible for introducing special systems to the Bay Area that help to solve depth to ground water and poor percolation rate problems.⁴⁰ These systems are now being used across the county, and Stinson Beach is considered to be a model for on site system management for other communities throughout the United States.⁴¹ In addition to monitoring the operation of septic systems, this Californian Water District monitors ground water, streams and sensitive aquatic systems surrounding the coastal community to uncover contamination from on-site disposal systems.⁴²

Stinson Beach residents pay \$61.38 USD every two months for a basic wastewater fee and \$40.00 bimonthly, plus a \$60 fee for each inspection for a quarterly holding tank inspection, or \$120 bimonthly as well as the \$60 inspection fee for a monthly holding tank inspection.⁴³ There are a number of other fees that customers are required to pay for maintaining or redesigning their septic systems.⁴⁴

For FY2005–2006, the wastewater fund expended \$336,456 USD on officers and employees, contractual services, outside services and supplies.⁴⁵ They made \$336,644 USD from wastewater system users' fees that same year, covering the program's expenses.⁴⁶

Lake McConaughy Education to Action Project⁴⁷

Lake McConaughy, Nebraska, was having problems related to on-site wastewater treatment systems. A multiyear project beginning in January 2002 and concluding in December 2006, the Education to Action project was established to address those issues. There are two main objectives of the project. The first is to provide information and learning opportunities for residents as well as business owners about septic systems and how they are a potential nonpoint source of pollution to surface and ground water. The second is to support and encourage residents to take voluntary steps to address septic systems as well as other local environmental and natural resources concerns. Through this program, an education kit created to inform septic system owners about the proper care and maintenance of their system was designed. The kit includes background information, management plans, case studies, action ideas and additional resources. In addition to the kit, there have been some topic-related seminars in Nebraska, such as the July 2005 "Septic System Viewing Open to Public" seminar. In addition to the educational seminars and kits, informational brochures with a door hanger tab, entitled "Handle It: Maintain Your Septic, Protect Your Health," have been distributed.⁴⁸

Innovative Partnerships for Public Outreach on Private Well and Septic System Management, Maryland, USA⁴⁹

The state of Maryland has taken a different approach to helping homeowners manage their septic systems — by intervening at the point of the real estate agent. More than 30,000 of the 427,000 septic systems in Maryland were known to be failing and another

60% were expected to be failing when this program was implemented. Thousands more are installed yearly. The barrier that this program addressed is that urban dwellers are moving to rural areas without being familiar with septic system maintenance, and realtors and builders of homes do not supply sufficient or accurate information to prospective homeowners. The goal of Maryland's program is to educate homeowners about their septic systems and wells, but this program's method for reaching this goal is through educating realtors. The only time an inspection of a property's well and septic system may be required is during a real estate transaction. Often the only time a homeowner is made aware of their underground systems is during the buying or selling of a home. This program was designed around the idea that realtors lead that process; therefore they should be very knowledgeable about the private systems for the homes that they sell. To overcome the realtor's lack of knowledge, workshops are held for realtors. Realtors need to obtain continuing educational credits in order to maintain their licenses and are increasingly held liable in transactions. Therefore, partnering with a real estate association is a natural fit. Part of the workshop presentation includes viewing a PowerPoint presentation that helps workshop attendees to visualize all components of a septic system.

Other educational outreach methods include the deliverance of file folders, in which each of the four sides are covered with vital information about septic systems and wells. The folders are handy for holding records pertaining to one's septic system. The folders are handed out at the workshops but are also distributed by county health organizations, septic haulers, some water testing laboratories and are available online. As of 2003 when this report was written, over 50,000 folders had been distributed. One problem that was encountered with this program was convincing the Maryland Real Estate Commission of the importance of training realtors to be knowledgeable about septic systems and wells.

About 20 homeowner group workshops are held annually with more than 1,500 homeowners in attendance. There are from six to ten realtor group workshops held annually, with approximately 60 realtors in attendance at each workshop.

While formal evaluations have apparently not been conducted, this program is believed by its developers to be having an impact. They suggest that people are more aware of nitrogen overloading problems and are thus more likely to accept proposed regulatory changes in order to reduce nitrogen. In addition, participating homeowners have potentially avoided costly repair bills as a result of gaining more knowledge about how to maintain their septic systems.

Septic Maintenance Pilot

An effective nonregulatory program to increase maintenance of septic systems should be comprised of the following elements:

- Public education on the health and financial risks posed by inadequate maintenance

- Easy access to information on companies who can perform septic maintenance
- Reminders to maintain a septic system
- Enhanced motivation to maintain a septic system
- The development of social norms that maintaining a septic system is socially approved of

Each of these facets of a successful strategy is discussed below.

Public Education: It is unlikely that many homeowners understand fully the public health implications of not servicing their system or the potential costs of having to replace a system that no longer functions as a consequence of neglect. Messages regarding the public health risks posed by inadequately maintained septic systems are best conveyed by a credible source, such as a public health care worker. It is suggested that in one variation of the pilot (see below) a public health care worker go door-to-door in those areas that have septic systems in order to speak to the homeowners about the importance of proper maintenance. In contrast, in another version of the pilot, the public health care worker would call homeowners and have the same conversation with them over the phone.

Company Information: In order to make it convenient for homeowners to know whom to call in order to have their septic system maintained, they should be provided with an information card that provides this information.

Reminders: Forgetting to maintain a septic system can likely be easily overcome by providing homeowners with reminders of when servicing is required. These reminders are likely best delivered through the mail.

Enhancing Motivation: Homeowners are more likely to maintain their septic systems if they have made a commitment to do so. It is suggested that residents be asked to make a commitment to regularly maintain their septic system and that when reminders are provided to the household that this reminder also provide notification of the commitment they made.

Social Norms: Like many behaviors, motivation to maintain a septic system can be enhanced by increasing perceived social pressure to engage in this action. While there are several methods that can be employed to increase perceived social pressure, it is suggested that homeowners be provided with small stickers that can be placed on a window of their home that indicates that they are protecting local water quality by regularly maintaining their septic system.

It is suggested that several strategies be tested against one another to find which most cost-effectively increases the maintenance of septic systems.

Strategy 1: In this strategy a public health care worker goes door-to-door and speaks to homeowners regarding the importance of maintaining their septic system. The public health care worker also provides information on local companies that provide septic

maintenance and seeks permission to provide the homeowner with reminders of when maintenance is likely next needed, based on the size of the household and septic system installed. In addition, the homeowner is asked to make a commitment to maintain their septic system, with the commitments being appended to the reminder notice that is sent out following the first visit. Finally, the household is asked if they will place a small static cling sticker in the window of their home showing that they regularly maintain their septic system.

Strategy 2: In the second strategy, the door-to-door visits are replaced by phone calls in which a public health care worker emphasizes the importance of septic system maintenance. The public health care worker also informs the resident that information on local companies that provide septic maintenance can be sent to them and seeks permission to provide the homeowner with reminders of when maintenance is next needed. In addition, the homeowner is asked to make a public commitment to maintain their septic system, with the public commitments being appended to the reminder notice that is sent out following the phone call. Finally, the household is asked if they will place a small static cling sticker in the window of their home showing that they regularly maintain their septic system. This sticker is included along with the other mailings.

Strategy 3: In the third strategy, direct contact is replaced with a mailing to the household. In this mailing a public health care worker emphasizes the importance of septic system maintenance. The mailing also provides information on local companies that provide septic maintenance and provides a postage-prepaid form that provides permission for the homeowner to be provided with reminders of when maintenance is next needed. In addition, the homeowner is asked to make a commitment to maintain their septic system, with the commitment being appended to the reminder notices that are sent out. Finally, the cover letter included with the mailing asks the household to place a small static cling sticker in the window of their home showing that they regularly maintain their septic system. This sticker is included along with the other information in the mailing.

Pilot Evaluation

Four hundred households will be randomly assigned into one of four groups (the above three groups, plus a control group that does not receive any strategy). Records from the participating septic system companies will be used to assess the short- and long-term impacts of this pilot. More specifically, each participating company will be asked to provide the addresses and dates on which they provided septic system maintenance in the pilot areas. Further, the cost per household to deliver the above three strategies will be calculated to work out a return on investment (ROI) for each strategy.

Endnotes

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