Ohio Department of Health

Report to the Household Sewage and Small Flow On-Site Sewage Treatment System Study Commission

Executive Summary

Safe communities require safe sewage treatment systems. Sewage systems should provide for the treatment of sewage and not merely disposal. These systems constitute the wastewater treatment infrastructure for homes, small businesses, churches or community buildings in areas that are not served by public sewers, and their proper design and management is a significant public health and safety issue. Approximately 25% of Ohio's households are served by some type of sewage system located on the property, with an estimated one million systems in use today.

Ohio's legacy of household sewage management began with state minimum rules adopted in 1977 by the Public Health Council that authorized the use of three basic system types. The most common sewage system of a septic tank to leach lines, was designed to use the soils as the primary treatment media. Ohio's soils, however, are clay-rich, and seasonally saturated. Systems installed in these soils provided for disposal through dilution, versus treatment of sewage. In some areas, discharging systems were installed due to the challenging soils. These discharging systems, numbering over 250,000, produce waste streams that do not meet water quality standards of the Clean Water Act, causing water quality impacts in many areas. Poor system designs have also led to ground water contamination and disease outbreaks. As a result, the state, communities and homeowners have spent hundreds of millions of dollars to extend sewer lines and build wastewater treatment plants, or replace failing systems.

With the statewide rules remaining unchanged since 1977, many local health districts adopted more stringent rules that provided for the use of newer technology systems and the evaluation of site and soil conditions. The passage of Sub. H.B. 231 by the 125th General Assembly and enacted on May 5, 2006 as Chapter 3718 of the Revised Code provided comprehensive legislation that authorized statewide rules that established standards for the proper siting, design, installation, monitoring, operation and maintenance, and abandonment of sewage treatment systems. The Public Health Council adopted rules that became effective on January 1, 2007 and greatly expanded the use of different system technologies in Ohio. The law also created the Sewage Treatment System Technical Advisory Committee and a process to quickly approve the use of new technologies in the state. Continuing concerns over the costs of systems that ensured treatment led to the suspension of the authorizing statute and rescission of the 2007 rules. Through Am. Sub. H.B. 119 adopted by the 127th General Assembly, the Ohio Department of Health (ODH) was directed by the legislature to prepare a comprehensive analysis and report on the types of alternative systems, and their costs and economic factors.

ODH researched and evaluated the performance of the sewage treatment systems being used in Ohio and the surrounding Midwestern states. Most sewage treatment systems in Ohio use septic tanks to shallow or moderate depth leach lines installed into the soil. Unsaturated, aerobic soil is used as the primary media for treatment of the wastewater. Where the soils are seasonally saturated at shallow depths, the sewage can be treated with various components to reduce the amount of treatment the soil must accomplish. Systems can also be elevated above saturated soils using sand and gravel. Other methods of soil dispersal such as low-pressure pipe and drip irrigation can be used to evenly distribute the sewage effluent across the soil and improve treatment. Spray irrigation systems are an above ground method of distributing highly treated wastewater.

Seasonal saturation in the soils, and the presence of bedrock represent conditions that do not allow for the treatment of wastewater necessary to keep communities safe. Receptors of wastewater that can be contaminated include the shallow water table in soils, drinking water and ground water aquifers and surface water bodies. ODH obtained data from other state agencies to evaluate soils, bedrock, surface and ground water data to help guide recommendations for system standards using an approach that considered risks to public health, drinking wate, and recreational resources in the state. ODH evaluated regional percentages of land areas affected by setting the vertical separation distance needed (i.e., the thickness of useable soil needed) for use of soil absorption trenches or leach lines for wastewater treatment. National research suggests that a minimum of 2 feet of useable soil is needed to remove odor, organics, solids, bacteria and viruses in sewage. ODH recommends that at least 18 inches of useable soil or vertical separation distance is needed for treatment. Setting the vertical separation distance at 18 inches to the seasonal perched water table will impact under 38% of the state, and setting 36 inches of useable soil above bedrock and sand and gravel aquifers will impact less than 5% of the state and still provide treatment of sewage.

ODH worked with local health districts to collect information from January 1 to November 30, 2007, on nearly 6,000 sewage treatment systems installed and their costs. Between January 1 and June 30, 2007, 87% of systems installed were septic tank to soil absorption systems; 10% were elevated mound systems; 3% used a pretreatment component to help reduce the vertical separation distance needed, less than 1% used drip distribution systems; 1% were authorized discharging replacement systems, and 4% were reported as unknown. Between July 1 and November 30, 2007, 60% of the systems were septic tank to soil absorption; 12% used pretreatment prior to soil absorption; 10% used elevated sand mounds; 3% used drip distribution; 6% were authorized discharging replacement systems; and 10% were reported as other. No low-pressure pipe or spray irrigation systems were installed. For the entire reporting period, over 95% of the systems installed were for households; the remainder was for small flow systems such as businesses, churches, and community buildings. New installations totaled 85% of all systems installed, 12-13% were replacement systems, and the remainder not reported.

Average state costs for new system installations ranged from $6,500 to 7,500 for septic tanks to leach lines (soil absorption trenches); $8,000 to 8,700 for pretreatment to leach

lines; $14,000 to 19,000 for sand mounds; $19,000 for drip distribution systems; and $11,600 for discharging systems in compliance with water quality standards set under the General National Pollutant Discharge Elimination System (NPDES) permit. Based on reported data, the average state cost for new system installation was $8,100.

Using the reported and averaged statewide system costs, the total estimated annual dollars spent on system installations and replacements in Ohio was calculated. Total dollars spent on system replacements was estimated at $14.6 million, representing nearly 30% of the total estimated $49 million spent on system installations. This compares to the nearly 1 billion spent on sewer line installations to areas of failing systems since 1989, at an average annual cost of 55 million per year.

Costs and numbers of disease outbreaks from sewage are difficult to detect and determine unless larger numbers of persons are affected such as the outbreak on South Bass Island in 2004. U.S. EPA does provide information on projected illness costs associated with viral outbreaks that range from over $100 up to $23,000 per person. Exposure to sewage diseases has the most significant impact on sensitive populations such as small children, the elderly, and immune-compromised persons.

True annual system costs (system installation plus operation and maintenance) amortized over 30 years were calculated and ranged from $336 (conventional system) to $1,172 (drip distribution) which is very similar to the state average sewer rate costs of $442 annually, and 30 year annual costs of $504 to 1,272 with the addition of connection fees and costs.

U.S. EPA establishes a benchmark of affordability for public sewer rates for communities as 2% of the median annual household income. Socioeconomic data was calculated for each county and region of the state. For all regions, 2% of the annual median household income ranged from $660 to $996. True annual sewage treatment system costs reported ranged from $336 to 1,056 annually, within the range of the 2% benchmark set for wastewater treatment with public utilities. Using the 2000 census data, and the average annual rate of system replacements, ODH has calculated that approximately 500 households below 200% of federal poverty levels will need financial assistance at an estimated cost of $2.1 to 4.2 million annually.

According to U.S. EPA (2002) many states have chosen to take a practical hybrid approach to sewage management that combines performance based objectives with some prescriptive technologies that have proven effective under known range of site conditions. Hybrid approaches can integrate risk assessment into the setting of performance standards and prescriptive requirements, with the consideration of economic factors as required by the legislature in Ohio. ODH used this approach to consider low to high-risk receptors (seasonal perched water to drinking water sources) and then recommend appropriate treatment levels for those resources based on national standards. System costs and affordability were also considered. ODH also researched other types of information in providing sewage treatment system recommendations, including an evaluation of the standards set by surrounding states, and the more stringent rules that local health districts have adopted and been using for the last five months.

Using this approach, ODH is recommending new design standards for sewage treatment systems that vary from the standards set in the 2007 rules. ODH is recommending that the vertical separation distance to seasonal perched water table be reduced from 2 feet to 18 inches. Different methodologies can be used to reduce the thickness of suitable soil needed in those areas of the state (38%) where shallow seasonal water is within 18 inches or bedrock or ground water aquifers are within 36 inches (5%). Pretreatment units can be used to reduce the amount of treatment the soils need to do resulting in less thickness of soil needed. In conjunction with a risk-based approach, artificial drainage may also be used in some soils to help modify sites with shallow seasonal saturation. ODH is working with the Ohio State University to determine which soils in the state can use artificial drainage to help effectively lower the seasonal perched water table to help improve sewage system treatment while reducing system costs by allowing more conventional systems to be used. Different methods of soil dispersal ranging from low pressure pipe, pressure distribution to sand mounds, drip distribution and spray irrigation can also be used to help ensure effective treatment in the soil and address challenging soil or site conditions. The thickness of suitable soil can be reduced from 12 inches to 6 inches with appropriate levels of treatment. By providing different tools and options for systems and sites, most lots can be developed, and more conventional systems can be installed, resulting in lower system costs.

Other recommendations refer to practices and activities that are critical to ensure proper system design, installation, permitting, operation and management, some of which were in place prior to 2007, during early 2007, and have been continued by local health districts through local, more stringent rules. Site and soil evaluations are a key prerequisite to system design followed by the use of best standards of practice for system installation. ODH recommends that system contractor registration and competency requirements continue with recognition of national certification programs. Local operation and management programs must have flexibility and be tailored to local community needs and system types. Continued proper management of septage to ensure compliance with federal regulations is also recommended. ODH has evaluated existing financial resources available for individuals to supplement or finance system replacements and installations, and has researched and presented information on other financial management solutions. Finally, ODH believes that the key elements of a successful sewage treatment systems program, as identified nationally, can be implemented by retaining the provisions of Chapter 3718 of the Revised Code that are now tolled. ODH recommends that this Chapter be reinstated effective July 1, 2009.

ODH is pleased to provide this report and stands ready to work with the Household Sewage and Small Flow On-Site Sewage Treatment System Study Commission, our local health partners, and the regulated community to achieve a cost-effective, long term solution for sewage treatment systems that protects the health and safety of Ohioans.