Chapter 3 Management program models

3.1 Introduction to the management models

USEPA has developed five models to characterize what programs might look like at various intervals along the management continuum. The management models, which are part of the *Voluntary Guidelines for Management of Onsite and Cluster (Decentralized) Wastewater Treatment Systems* (USEPA, 2003), are presented as a series of progressive steps in the management continuum. The management models are crafted so that the management requirements for wastewater systems become more rigorous as system technologies become more complex and/or the sensitivity of the environment increases. This concept is a key to management program development.

This chapter discusses management program objectives, presents brief descriptions of the types of systems targeted under each model, and outlines the major benefits and limitations of each of the five models. The reader should note that these five conceptual models are presented for illustration purposes only. The array of management program activities for any community must be based on its goals, regulatory requirements, and resources and the overall environmental setting in which the regulatory authority and management entities (or service providers) operate. Thus, the management program developed by a local community might not exactly reflect one of these five models but might borrow elements from two or more to better respond to unique community concerns (e.g., lake eutrophication, ground water contamination) or address other issues that local citizens describe as important.

> "The sewage management program is as necessary as any other component of the onsite system. A good sewage management program will extend the life of the onsite system and eliminate or delay the need for public sewer systems."
>
> *David V. Linahan, Sewage Management Programs for Decentralized Wastewater Treatment Systems, 2000*

The models share the common goal of ensuring that human health and the environment are protected. Effective implementation of any management program requires ongoing coordination among appropriate regulatory authorities, the community, and other partners in the management program. This coordination is necessary to help ensure that state and local OWTS programs are managed to protect public health and the environment and to meet state, tribal, or local water quality standards, such as applicable pathogen and nutrient criteria.

Each management model includes a set of management objectives and related program elements and activities targeted toward the satisfactory achievement of the objectives. The management models are benchmarks for a state, tribal, or local unit of government to (1) identify management needs, (2) evaluate whether the current management program is adequate, and (3) develop an appropriate management program or necessary program enhancements to achieve public health and environmental goals. USEPA recognizes that states, tribes, and local governments need a flexible framework to best tailor their programs to the specific needs of their communities. These management models are not intended to supersede existing federal, state, tribal, or local laws and regulations, but rather to facilitate compliance with them.

The management models summarized in Table 3-2 and described in the following sections span the

management continuum, from simple inventory and maintenance awareness programs for system owners to programs with comprehensive management entities that own and operate a number of systems. As noted previously, local programs will vary depending on the unique regulatory, ecological, and economic conditions of each community.

3.2 Description of the management models

The Management Guidelines consist of a series of five management models. As the models progress from The Homeowner Awareness Model to The Responsible Management Entity (RME) Ownership Model, they reflect the need for improved management practices and increased oversight as determined by the complexity of treatment systems employed and the potential risks to public health and water resources. For example, The Homeowner Awareness Model recommends management practices for areas where the risks to public health and water resources are low and the suitable treatment technologies are passive and robust. The RME Ownership Model, on the other hand, defines an appropriate level of practice and oversight for communities where there are significant risks to public health or water resources. Table 3-1 presents a brief description of each management model; detailed information on how each program element discussed in Chapter 3 might be addressed under each model can be found in Appendix D. Table 3-1 presents the management program objectives, provides a brief description of the types of systems applicable, and lists major benefits and limitations for each of the five management models.

The Guidelines contain certain key concepts that are the foundation of changes needed to improve the performance of decentralized wastewater treatment systems. These concepts are imbedded in the activities of each management model and have the potential for making the difference in the field. These concepts include:

- an increase in the level of management as the level of risk and technical complexity increase,
- inventorying existing systems and their level of performance as a minimum,
- operating permits for large systems and clusters of onsite systems,
- discharge permits for systems which discharge to surface waters,
- increased requirements for certification and licensing of practitioners, and
- elimination of illicit discharges to storm drains or sewers.

The management models provide benchmarks for a state, tribal, or local unit of government to 1) select appropriate management objectives to meets its wastewater treatment needs; 2) evaluate the strengths and weaknesses of its current program in achieving the desired objectives; 3) design a management program and activities needed to meet unique local objectives; and 4) develop a plan for implementing the management program.

In deciding whether or not to use on-site systems, it is important to consider the risks they may pose to the environment and public health. There may be cases where on-site systems are not appropriate due to the environmental sensitivity or public health concerns of an area. In the cases where on-site systems are appropriate, it is critical that they are managed to prevent environmental and public health impacts. All of the management models share the common goal of ensuring that public health and water resources are protected. Effective implementation of management programs requires coordination among state, tribal, and local water quality, public health and planning and zoning agencies, and community officials. USEPA continues to encourage this coordination on a watershed basis. Zoning ordinances and land use planning are also mechanisms used by state, tribal and local governments to address water resources issues. Coordination is necessary also to help ensure that state, tribal, and local decentralized wastewater programs are managed on a watershed basis to achieve protection consistent with applicable state and

tribal water quality standards, including pathogen and nutrient criteria. These goals are best achieved where performance-based management of onsite and cluster systems has been implemented to protect the quality of the receiving watershed and/or aquifer.

The legal authority for regulating onsite and cluster systems generally rests with state, tribal and local governments. USEPA recognizes that these units of government need a flexible framework and guidance to best tailor their management programs to the specific needs of the community and the needs of the watershed. While each management model stands alone, the models are intended only to be guides in developing an appropriate management program. Activities shown in program elements from one management model may be incorporated into another model to enhance the effectiveness of local programs in achieving the desired objectives under the prevailing circumstances. However, substituting activities from higher levels into lower level management programs should be carefully considered because of the interdependence of many activities on overall program capabilities. It is also possible to implement more than one management model, as appropriate, within a jurisdiction for the circumstances encountered (housing density, site and soil characteristics, and treatment technology complexity). Further, it is important to note that these management models are not intended to supersede existing federal, state, tribal and local laws and regulations, but rather to complement their role in protecting public health and water quality.

Governmental roles and authority in implementation of management programs based on the Guidelines will vary from jurisdiction to jurisdiction. **Application of the NPDES program under the Clean Water Act is required if there is a discharge of pollutants from a point source to a water of the U.S**. This requirement also covers systems that discharge to ditches, pipes, or other conveyances that ultimately discharge to waters of the U.S. Similarly, application of the Underground Injection Control (UIC) program under the Safe Drinking Water Act is required if a large capacity system is subject to UIC controls. The provisions of the program elements in each model may inform the State, Tribe, or USEPA in establishing NPDES permit requirements, if the NPDES program is applicable.

In many cases, states will establish the authority for creation of management entities, provide funding, and provide technical assistance and training to local governments. The local governments would then have primary responsibility for implementation of the management program. If a decentralized system is required to have an NPDES permit and an authorized state or tribe is administering a decentralized management program under this strategy, the requirements of the program should be incorporated into the applicable NPDES permit which is the primary regulatory instrument. If a state or tribe administering the program is not an authorized NPDES authority, the requirements of the program should be submitted to the NPDES permit issuing authority as a 401 water quality certification requirement. If the program is being administered by a local authority, or a tribe without 401 certification ability, the requirements of the program should be recommended to the NPDES permitting issuing authority for inclusion in the facilities permit. However, there are some cases where the states themselves have the primary role and authority to implement the regulatory program at the local level. In most cases where a tribe chooses to implement the program, there is no Federal restriction to prevent local tribal authorities from implementing the program, if the tribal code allows.

State, tribal, and local governments must recognize that there likely will be increased costs experienced by both the regulatory authority and the property owner in improving management practices and programs. The cost impacts may increase as the level of management increases, however, there are tradeoffs that exist. Costs incurred by the regulatory authority and/or management entity may be offset by increased permit fees and more efficient data management tools while the costs to the property owner may be offset by reduced repair and replacement costs, cost avoidance of environmental restoration, and increased property values and quality of life.

3.3 Homeowner awareness model

As a minimum level of management, the **Homeowner Awareness Model** is recommended for all jurisdictions. This is a program specifying appropriate management practices where treatment systems are owned and operated by individual property owners in areas of low environmental sensitivity, i.e., no restricting site or soil conditions such as shallow water tables or drinking water wells within locally determined horizontal setback distances. This model is applicable where treatment technologies are limited to conventional systems, which are passive and robust treatment systems that can provide acceptable treatment under suitable site conditions despite a lack of attention by the owner.

Management Model 1: Fairfax County, Virginia

Fairfax County, Virginia is 400 mi^2 and is home to over 1 million residents. The Fairfax County Health Department sends out reminders to residents with septic system to pump them out every 5 years. The Department also requires an onsite system inspection during a property transfer. The Department maintains a database of system locations, date and amount of sewage pumped out, and the disposal site.

Failures that may occur and continue undetected will pose a relatively low level of risk to public health and water resources. The objectives of this management model are to ensure that all systems are sited, designed, and constructed in compliance with sound, prevailing rules, all systems are documented and inventoried by the regulatory authority, and system owners are informed of maintenance needs of their systems through timely reminders. The model is intended to provide an accurate record of the type and location of installed systems, to raise homeowners' awareness of basic system maintenance requirements, and to better ensure that the homeowners attend to those deficiencies that overtly threaten public health. This model, like all management programs described in this guidance, suggests the use of only trained and licensed/certified service providers. This model is a starting point for enhancing management programs because it provides communities with a good database of systems and their application for determining whether increased management practices is necessary.

3.4 Maintenance contract model

The **Maintenance Contract Model** is recommended where more complex system designs are employed to enhance the capacity of conventional systems to accept and treat wastewater or where small clusters are employed. For example, pretreating wastewater to remove non-biodegradable materials and particulate matter that typically pass through a septic tank may enhance subsurface infiltration system performance on marginally suitable sites (sites with limited area, slowly permeable soils, or shallow water tables). However, such pretreatment units can have mechanical components and sensitive treatment processes, which require routine observation and maintenance if they are to perform satisfactorily. Maintenance of these more complex systems is critical to sustaining acceptable protection in these areas of greater environmental sensitivity. Therefore, these systems should be allowed only where trained operators are under contract to perform timely operation and maintenance. The objectives of this model build on The Homeowner Awareness Model by ensuring that property owners maintain maintenance contracts with trained operators.

Management Model 2: Maintenance contracts

Owners of onsite/cluster systems with electro-mechanical components must secure permanent maintenance contracts in Wisconsin and Florida. Maintenance contracts specify minimum inspection and monitoring requirements, tank pumpout schedules, and other tasks required under state rules. Maintenance task requirements are specific to the type of system, design capacity, receiving environment, and other factors.

3.5 Operating permit model

The **Operating Permit Model** is recommended where sustained performance of onsite wastewater treatment systems is critical to protect public health and water quality. Examples of locations where this program might be appropriate include areas adjacent to estuaries or lakes where excessive nutrient concentrations may be a concern or situations where a source water assessment has identified onsite systems as potential threats to drinking water supplies. USEPA strongly recommends that this be the minimum model used where large capacity systems or systems treating high strength wastewaters exist. EPA has determined not to regulate large capacity onsite systems at this time based on the belief that implementation of these Management Guidelines can assure adequate protection of public health and the environment.

A principal objective of this management program is to ensure that the onsite wastewater treatment systems continuously meet their performance requirements. Limited term operating permits are issued to the property owner and are renewable for another term if the owner demonstrates that the system is in compliance with the terms and conditions of the permit. In subareas where it is appropriate to use conventional onsite system designs, the operating permit may only contain a requirement that routine maintenance be performed in a timely manner and the condition of the system be inspected periodically. With complex systems, the treatment process will require more frequent inspections and adjustments, so process monitoring may be required.

Management Model 3: Cranberry Lake, New Jersey

Residents adjacent to Cranberry Lake in New Jersey must obtain a permit to install an onsite system. They must provide a plot plan with the well, septic tank, and drainfield delineated. Residents must renew their operating permit every three years by submitting proof that the tank was pumped by a licensed service provider or submit a waiver from the Board of Health. The fee for the 3-year operating permit is $15.

An advantage to implementing the program elements and activities of this management program is that the design of treatment systems is based on performance requirements that are less dependent on site characteristics and conditions. Therefore, systems can be used safely in more sensitive environments if their performance meets those requirements reliably and consistently. The operating permit provides a mechanism for continuous oversight of system performance and negotiating timely corrective actions or levying penalties if compliance with the permit is not maintained. To comply with these performance standards, the property owner should be encouraged to hire a licensed maintenance provider or operator.

3.6 RME operation and maintenance model

The **Responsible Management Entity (RME) Operation and Maintenance Model** is recommended where large numbers of onsite and cluster systems must meet specific water quality requirements because the sensitivity of the environment is high, e.g., wellhead protection areas or shellfish waters. Frequent and highly reliable operation and maintenance is required to ensure water resource protection. Issuing the operating permit to a responsible management entity (RME) instead of the property owner provides greater assurance of control over performance compliance. This allows the use of performance-based systems in more sensitive environments than The Operating Permit Model.

Management Model 4: Wabedo Township, Minnesota

The Wabedo Township signed a contract with Crow Wing Power and Light (CWPL) to maintain the homeowner's onsite systems. CWPL conducts monthly inspections, maintains a database, pumps all tanks every two years, repairs systems at scheduled intervals, and provides insurance for all systems. The homeowner is responsible for reimbursing CWPL for any repairs outside the scheduled operation and maintenance program, which costs $15 a month.

For a service fee, a RME takes responsibility for the operation and maintenance. This can reduce the number of permits and the necessary administration by the regulatory authority. System failures are also reduced as a result of routine and preventive maintenance. The operating permit system is identical to The Operating Permit Model except that the permitee is a public or private RME. States may need to establish (and some already have) a regulatory structure to oversee the rate structures that RME's establish, and any other measures that a public services commission would normally undertake to manage private entities in non-competitive situations.

3.7 RME Ownership model

The **Responsible Management Entity (RME) Ownership Model** is a variation of the RME operation and maintenance concept in The RME Operation and Maintenance Model, except ownership of the system is no longer with the property owner. The designated management entity both owns, operates, and manages the decentralized wastewater treatment systems in a manner analogous to central sewerage. Under this approach, the RME maintains control of planning and management, as well as operation and maintenance.

This management program is appropriate for similar environmental or public health conditions as The RME Operation and Maintenance Model, but provides a higher level of control of system performance. It also reduces the likelihood of disputes that can occur between the system operator and the property owner in The RME Operation and Maintenance Model when the property owner fails to fully cooperate with the RME.

The RME can also more readily replace existing systems with higher performance units or cluster systems when necessary. EPA recommends implementation of the management practices detailed in The RME Ownership Model in cases such as where new, high density development is proposed in the vicinity of sensitive receiving waters. States may need to establish a regulatory structure to oversee the rate structures that RME's establish, and any other measures that a public services commission would normally undertake to manage entities in non-competitive situations.

Management Model 5: Sanitation district management of onsite systems in New Mexico

Residents and public agency officials in Peña Blanca, New Mexico sought to improve the management of systems in the community after a 1985 study found that 86% of existing systems required upgrades, repair, or replacement. The Peña Blanca Water and Sanitation District was designated as the lead agency for managing OWTSs because it already provided domestic water service to the community and had an established administrative structure. The Water and Sanitation District is organized under state statutes requiring a petition signed by 25 percent of the registered voters and a public referendum prior to district formation. Once formed, water and sanitation districts in New Mexico are considered subdivisions of the state and have the power to levy and collect ad valorem taxes and the right to issue general obligation and revenue bonds. The sanitation district relies on the New Mexico Environment Department to issue permits and monitor installation, while the district provides biannual pumping services through an outside contractor for a monthly fee of $10.64 for a 1,000-gallon tank. The district also supervises the community's onsite system ordinance, which prohibits untreated and unauthorized discharges, lists substances that may not be discharged into onsite systems (e.g., pesticides, heavy metals), and provides for sampling and testing. Penalties for noncompliance are set at $300 per violation and not more than 90 days imprisonment. Liens may be placed on property for nonpayment of monthly pumping fees. The program has been in operation since 1991 and serves nearly 200 homes and businesses. Sampling of private wells in the area in 1999 found nitrate nitrogen levels below 1 mg/L. Septic tank effluent pooling on ground surfaces, a problem identified in the 1985 study, has been eliminated.

Source: Rose, 1999

3.8 Applying the management models

Tables 1 through 5 in Appendix D provide descriptions of specific activities to be undertaken for the various program elements of a management model. The party that has primary responsibility for the activities is also identified. The program elements and activities listed for each management model are considered to be the minimum elements and activities necessary to achieve the stated management objectives for each model.

As previously indicated, the management model selected by a particular community or service area should be based on environmental sensitivity, public health risks, the complexities of the wastewater treatment technologies that might or should be implemented, and size and/or density of development. Selection of the management model is made after the decision to use decentralized wastewater treatment is made. The tables generally describe recommended activities for each of the management elements associated with the management models. How each of these elements and activities will be implemented will depend on decisions by the local community and regulatory authority, based on generally accepted onsite wastewater science and practice, locally appropriate statutes, ordinances, institutional structures, technical capabilities, public preferences and other factors. Thus, the general framework for a local management program should be derived from the tables but it must be tailored to suit local circumstances and preferences.

USEPA recognizes the varied nature of management needed across the country and within states and localities, the need for flexibility in adopting recommendations of the Guidelines and the lack of resources for implementation. While states, tribes and local communities are encouraged to implement management models; an individual program may properly include elements of several management models. These

hybrid or combination programs may be appropriate where site conditions vary within the community and/or institutional capacity is not uniform within the jurisdiction. It is also recommended that appropriate levels of management for decentralized systems be established in jurisdictions which have both centralized and decentralized wastewater treatment. In some cases, it may be feasible for the entity which manages the centralized wastewater treatment facility to also manage the decentralized systems.

Targeting of specific types of systems for improved management may also be appropriate when resources are limited and a phased approach that focuses on priority systems is preferred. A widely used approach has been to initially target higher density or environmentally sensitive areas when there are limited resources for monitoring efforts. Examples of environmentally sensitive areas include those used for drinking water sources, areas adjacent to heavily used lakes and beaches, and areas that impact coral reefs or shellfish beds. Any approach taken should include input from all the stakeholders in a local jurisdiction or watershed.

The implementation of higher levels of management will often occur in progressive stages, as more performance data and experience with systems develops, public awareness and support increase, and the capacity of state, tribal, and local institutions to deal with management challenges builds over time. Implementation of the elements and activities recommended by The Homeowner Awareness Model as the threshold level of management will not only raise the quality of management practices for most existing programs, but also initiate activities (such as an inventory of systems) that allow the community to identify and address circumstances that may require upgrading to higher levels of management.

While the Homeowner Awareness Model may adequately address conventional systems within low-risk segments of a service area, there may be other areas of higher risk, which require higher levels of management. For these areas, a higher level management model, more appropriate for areas with higher sensitivities, may be incorporated into the overall management program to customize system management to the needs of the community or service area. It is important that the management program be structured to adequately manage an appropriate set of onsite and cluster systems for the full range of environmental conditions. For example, The Operating Permit Model might be selected for the more sensitive areas such as those along lake fronts or estuaries shown to have poor water quality, while a lower level management model may still be appropriate where the receiving environment is not as sensitive and conventional systems are acceptable.

It must be stressed that each management entity—whether assembled from partner agencies and service providers or created especially to handle the full range of program elements—will have unique requirements that will likely require some hybridization of one or more of the management models discussed previously. Ciotoli and Wiswall (1982) found that voluntary levels of management, such as a homeowners' association, were inadequate for cluster systems because they could not legally enforce rules to maintain or restore compliance with their discharge permit. Herring (2001) concluded that homeowners were unlikely to conduct routine maintenance tasks unless gross failure occurred, and then it was too late. Providing higher levels of management attention (inspections, monitoring, maintenance) to even simple treatment systems can extend the life of the systems, improve performance, contribute to maintenance, and increase in property values.

The best way of looking at the array of management program models is to consider first the local problems and needs. If improved public health protection is the primary concern because of a high rate of existing system backups to the ground surface or into buildings and the vulnerability of the watershed is moderate to minimal, a basic program (e.g., Management Model 1) might suffice where onsite systems can be upgraded. In more ecologically vulnerable areas where problems have been demonstrated from existing unmanaged onsite systems and their upgrading is technically feasible, Management Model 3 entity might help to mitigate degradation and satisfy the oversight agencies. Where system density is high

and/or inadequate lot sizes are common and have resulted in environmental and public health problems, Management Models 3-5 may be able to address these problems.

The implementation of management programs over time will often occur in progressive stages as more monitoring information becomes available, public awareness and support increase, and the ability of state, local, and tribal institutions to deal with management challenges improves. Implementation of Management Program 1, which is considered a minimal level of management, provides a basis for raising awareness of maintenance needs, identifying and characterizing existing onsite systems and potential problem areas, and building support for higher levels of management if they are needed.

3.9 Environmental sensitivity and public health risk

The locally developed management program should be based upon the potential risk of onsite wastewater treatment system discharges impacting the public health or the quality of local water resources. The level of oversight incorporated into the management program should increase as the potential for negative impacts to public health or for environmental degradation increases. Examples of parameters to consider in assessing public health and environmental sensitivity include soil permeability, depth to a restrictive horizon and groundwater, aquifer type, receiving water use, proximity to surface waters, topography, geology, location of critical habitat under the Endangered Species Act, and density of development. Another useful parameter to consider is the "susceptibility determinations" that states and tribes will make as part of their source water assessments. These assessments determine which potential sources of pollution, including decentralized wastewater systems, pose the greatest threats to drinking water.

Other issues to consider that may have a direct impact on public health include the need to protect shellfish harvesting and direct contact recreational waters. An area with moderately permeable soils and a groundwater table that is sufficiently isolated from the effects of onsite discharges may be designated as an area of low public health risk and environmental sensitivity, while an area with excessively permeable soils with a shallow water table used for a drinking water source would be designated as an area of high concern. For those watersheds where a determination has been made that the onsite wastewater treatment system is contributing to a violation of water quality standards, the elements and activities of the Operating Permit Model, the RME Operation and Maintenance Model, or the RME Ownership Model should be selected to address restoration of the watershed. More detailed information on these factors are provided the Management Handbook.

3.10 Complexity of treatment systems

The complexity of the treatment system also influences the management program selected. As the complexity of a treatment system increases to meet management objectives or system performance standards, the need for a higher level of operation and maintenance and monitoring increases to ensure that the system does not malfunction to create an unacceptable risk to public health or water resources. A less complex treatment system, such as a conventional onsite septic system, depends upon passive, natural processes for the movement, treatment, and dispersal of wastewater. The prescriptive elements of The Homeowner Awareness Model, where properly applied, may be sufficient for conventional onsite technologies to consistently function as effective wastewater treatment systems. A more complex treatment system, such as a surface discharging aerobic treatment system with filtration and disinfection, will require routine monitoring and attention from a professional technician to maintain its performance, and therefore requires a higher level of oversight. EPA's updated Onsite Wastewater Treatment Systems Design Manual[11], provides guidance on performance and management requirements for a broad range of onsite treatment and dispersal technologies. System size also influences the management model selected.

Large capacity and cluster systems require a higher degree of management than individual onsite systems.

Communities that have made the decision to use onsite and cluster systems should use these Guidelines as a tool for identifying approaches for proper management of the systems. Implementation of the management practices defined in the Guidelines will help communities meet water quality and public health goals, provide a greater range of options for cost-effectively meeting wastewater needs, and protect consumers' investment in home and business ownership. Tables 1 through 5 in Appendix A provide a useful summary of the program elements for each management model and the associated responsible party and activity. The draft Management Handbook provides further detail on how to implement the management programs and is designed to assist state, tribal and local officials, service providers, and other interested parties with improving system operation, maintenance, and performance.

Visit EPA's web site on decentralized wastewater treatment at *www.epa.gov/owm/mtb/decent*. The site includes fact sheets on technologies, useful links to other sites, a calendar of events, frequently-asked questions, sources of funding information on demonstration projects, and numerous reference documents such as EPA's new *Onsite Wastewater Treatment Systems Manual*.

Table 3-1: SUMMARY OF THE VOLUNTARY GUIDELINES FOR MANAGEMENT OF ONSITE AND CLUSTERED (DECENTRALIZED) WASTEWATER TREATMENT SYSTEMS

TYPICAL APPLICATIONS	PROGRAM DESCRIPTION	BENEFITS	LIMITATIONS
HOMEOWNER AWARENESS MODEL			
• Areas of low environmental sensitivity where sites are suitable for conventional onsite systems.	Systems properly sited and constructed based on prescribed criteria. Owners made aware of maintenance needs through reminders. Inventory of all systems.	Code compliant system. Ease of implementation; based on existing, prescriptive system design and site criteria. Provides an inventory of systems that is useful in system tracking and area_wide planning.	No compliance/problem identification mechanism. Sites must meet siting requirements. Cost to maintain database and owner education program.
MAINTENANCE CONTRACT MODEL			
• Areas of low to moderate environmental sensitivity where sites are marginally suitable for conventional onsite systems due to small lots, shallow soils, or low permeability soils. • Small cluster systems.	Systems properly sited and constructed. More complex treatment options, including mechanical components or small clusters of homes. Requires service contracts to be maintained. Inventory of all systems. Service contract tracking system.	Reduces the risk of treatment system malfunctions. Protects homeowners' investment.	Difficulty in tracking and enforcing compliance because it must rely on the owner or contractor to report a lapse in a valid contract for services. No mechanism provided to assess the effectiveness of the maintenance program.
OPERATING PERMIT MODEL			
• Areas of moderate environmental sensitivity such as wellhead or source water protection zones, shellfish growing waters, or bathing/water contact recreation. • Systems treating high strength wastes or large capacity systems.	Establishes system performance and monitoring requirements. Allows engineered designs but may provide prescriptive designs for specific receiving environments. Regulatory oversight by issuing renewable operating permits that may be revoked for non_compliance. Inventory of all systems. Tracking system for operating permit and compliance monitoring. Minimum for large capacity systems.	Allows systems in more environmentally sensitive areas. Operating permit requires regular compliance monitoring reports. Identifies non_compliant systems and initiates corrective actions. Decreases need for regulation of large systems. Protects homeowner investment.	Higher level of expertise and resources for regulatory authority to implement. Requires permit tracking system. Regulatory authority needs enforcement powers.
RESPONSIBLE MANAGEMENT ENTITY (RME) OPERATION AND MAINTENANCE (O&M) MODEL			
• Areas of moderate to high environmental sensitivity where reliable and sustainable system operation and maintenance is required, e.g., sole source aquifers, wellhead or source water protection zones, critical aquatic habitats, or outstanding value resource waters. • Cluster systems.	Establishes system performance and monitoring requirements. Professional O&M services through RME (either public or private). Provides regulatory oversight by issuing operating or NPDES permits directly to the RME (system ownership remains with the property owner). Inventory of all systems. Tracking system for operating permit and compliance monitoring.	O&M responsibility transferred from the system owner to a professional RME that is the holder of the operating permit. Identifies problems needing attention before failures occur. Allows use of onsite treatment in more environmentally sensitive areas or for treatment of high strength wastes. Can issue one permit for a group of systems. Protects homeowner investment.	Enabling legislation may be necessary to allow RME to hold the operating permit for an individual system owner. RME must have owner approval for repairs; may be conflict if performance problems are identified and not corrected. Need for easement/right of entry. Need for oversight of RME by the regulatory authority.
RESPONSIBLE MANAGEMENT ENTITY (RME) OWNERSHIP MODEL			
• Areas of greatest environmental sensitivity where reliable management is required. Includes sole source aquifers, wellhead or source water protection zones, critical aquatic habitats, or outstanding value resource waters. • Preferred management program for cluster systems serving multiple properties under different ownership (e.g., subdivisions).	Establishes system performance and monitoring requirements. Professional management of all aspects of decentralized systems through public/private RMEs that own/manage individual systems. Qualified, trained and licensed professional owner/operators. Provides regulatory oversight by issuing operating or NPDES permit. Inventory of all systems. Tracking system for operating permit and compliance monitoring.	High level of oversight if system performance problems occur. Simulates model of central sewerage, reducing the risk of non_compliance. Allows use of onsite treatment in more environmentally sensitive areas. Allows effective area_wide planning/watershed management. Removes potential conflicts between the user and RME. Greatest protection of environmental resources and owner investment.	Enabling legislation and/or formation of special district may be required. May require greater financial investment by RME for installation and/or purchase of existing systems or components. Need for oversight of RME by the regulatory authority. Private RMEs may limit competition. Homeowner associations may not have adequate authority.

Note:

Permit coverage under the NPDES program under the Clean Water Act is required if there is a discharge of pollutants from a point source to a water of the U.S. This requirement also covers systems that discharge to ditches, pipes, or other conveyances that ultimately discharge to waters of the U.S.

Similarly, application of the Underground Injection Control (UIC) program under the Safe Drinking Water Act is required if a large capacity system is subject to UIC controls. The provisions of the program elements in each model may inform the State, Tribe, or USEPA in establishing NPDES permit requirements, if the NPDES program is applicable.