– DRAFT–
EPA GUIDELINES FOR MANAGEMENT OF ONSITE/DECENTRALIZED WASTEWATER SYSTEMS

PURPOSE

The purpose of the *EPA Guidelines for Management of Onsite/Decentralized Wastewater Systems* is to raise the level of performance of onsite/decentralized wastewater systems through improved management programs. Onsite/decentralized wastewater treatment systems include individual onsite or cluster wastewater systems (commonly referred to as septic systems, private sewage systems, individual sewage systems, etc.) used to treat and dispose of relatively small volumes of wastewater, generally from individual dwellings, or groups of dwellings and businesses which are located relatively close together (please refer to Appendix A for a list of terms and definitions). EPA is proposing the voluntary national guidelines in order to raise the quality of management programs, establish minimum levels of activity, and institutionalize the concept of management. Implementation of 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.

The guidelines contain a set of model programs, based on a comprehensive approach that relies on coordinating the responsibilities and actions among the State, tribal or local regulatory agency, the management entity or service provider and the system owner(s). These model programs are structured to reflect an increasing need for more comprehensive management as the sensitivity of the environment and/or the degree of technological complexity increases. A program's designation increases progressively from Model Program 1 through Model Program 5, reflecting the increased level of management activities needed to achieve water quality and public health goals. Although adoption of the guidelines is voluntary, EPA encourages communities, due to public health and water quality concerns, to consider the guidelines as a basis for their onsite/decentralized wastewater management program.

The guidelines apply to both existing communities and to areas of new development that use onsite/decentralized systems of any size for residential and commercial wastewater treatment and disposal.

THE NEED FOR MANAGEMENT

The performance of onsite/decentralized wastewater systems is a national issue of great concern to EPA. Onsite/decentralized wastewater treatment systems serve approximately 25 percent of U.S. households and almost 40 of percent new development.[(1)] This results in approximately four billion gallons of wastewater released daily by these systems. Onsite/decentralized systems can provide a high level of public health and natural resource protection if they are properly selected, sited, designed, operated and maintained. Unfortunately, many of the systems currently in use do not provide the level of treatment necessary to adequately protect public health and surface and ground water quality. More than half of the

existing systems are over 30 years old, and homeowners indicate that at least 10 percent of all systems are not working at all at any given time.(1) Other data has shown that at least 25 percent of systems are malfunctioning to some degree.(2) In a majority of cases, the homeowner is not aware of a system failure until it backs up in the home or breaks out on the ground surface. In many areas of the country, the local authority lacks records of all the systems within the service area.

State agencies report that septic systems constitute the third most common source of ground water contamination and that these systems have failed because of inappropriate siting or design or inadequate long-term maintenance.(3) States have also identified over 500 communities in the 1996 Clean Water Needs Survey(4) as having failed septic systems that have caused public health problems. In 1996, septic systems were reported by States as a leading source of pollution for more than one-third (36 percent) of the impaired miles of ocean shoreline surveyed.(3) The discharge of partially treated sewage from malfunctioning on-site septic systems was identified as a principal source of degradation, or a contributing factor, in 32 percent of all harvest-limited shellfish growing areas, resulting in considerable economic impact on the shellfish industry.(5) Onsite wastewater systems also may be contributing to an overabundance of nutrients in ponds, lakes and coastal estuaries, leading to overgrowth of algae and other nuisance aquatic plants. For example, the 45,000 septic systems in Sarasota County, Florida, contribute four times more nitrogen to the Bay than the City of Sarasota's wastewater treatment plant.(6)

Septic systems also contribute to contamination of drinking water sources. EPA estimates that an estimated 168,000 viral and 34,000 bacterial illnesses each year occur as a result of consumption of drinking water from systems which rely on improperly treated ground water.(7) Malfunctioning septic systems are identified as one potential source of this contamination. A recent example of contamination involved a substantial number of visitors to the New York State Fair in 1999, who became ill after consuming water from a well source, which was likely contaminated by septic systems at an adjacent university. Other examples in which septic systems were attributed to be the pollution source include 82 cases of shigellosis resulting from a contaminated well in Island Park, Idaho in 1995, 46 cases of hepatitis A at a non-community water supply in Racine, Missouri, and 49 cases of hepatitis A in Lancaster, Pennsylvania in 1980.(8)

While it is difficult to measure and document specific cause-and-effect relationships between onsite systems and the quality of our water resources, it is widely accepted that improperly operating systems are contributors to major water quality problems. As documentation becomes available concerning the source of impairments, EPA will be better able to determine the extent of the relationship. It is already evident that improved operation and performance of onsite/decentralized systems through better management will be essential if the nation's water quality and public health goals are to be attained.

EPA'S DEVELOPMENT OF MANAGEMENT GUIDELINES

In April 1997, EPA published its *Response to Congress on Use of Decentralized Wastewater Treatment Systems* which concluded that, overall, "adequately managed decentralized wastewater treatment systems can be a cost effective and long-term option for meeting public health and water quality goals, particularly for small, suburban, and rural areas."(9) EPA stated that both centralized and decentralized system alternatives should be considered when upgrading failing onsite ("septic") systems. The report found that decentralized systems protect public health and

the environment, lower capital and maintenance costs for low-density communities, are appropriate for varying site conditions, and are suitable for ecologically sensitive areas. More important, EPA identified several major barriers to the increased use of these systems, including the lack of adequate management programs. Most onsite/decentralized systems are regulated at the State, tribal or local level, not at the Federal level, and there is a great deal of inconsistency in the management approaches. Many existing management programs are inadequate or too narrow in focus, and premature system failures may result. Although the varying reasons for system failure may include shortcomings in maintenance, siting, design, installation, construction, or operations, ultimately it is the absence of a comprehensive management program, which addresses each of these issues, that prevents onsite/decentralized systems from reaching their potential as an effective and reliable wastewater treatment strategy.

Specific direction for the development of management guidelines, as a follow-up to the report to Congress, was included in the development of the *Clean Water Action Plan* (CWAP).[10] On the 25th anniversary of the Clean Water Act (CWA), EPA was directed to work with other Federal agencies and the public to develop a plan that charts a course toward fulfilling the CWA's goal of "fishable and swimable" waters for all Americans. The CWAP was released in February 1998, and included several key actions to promote the proper application and management of onsite/decentralized wastewater systems due to their potential to degrade water quality. One key action is development of voluntary national standards for communities to consult in their initiation or enhancement of management for onsite/decentralized wastewater systems. These management guidelines are our response.

EPA's guidelines recommend that communities provide an adequate level of management of their onsite/decentralized wastewater systems. A management program is a series of activities that address the planning, siting, design, installation, operation, maintenance, monitoring and enforcement (if necessary) of onsite/decentralized wastewater treatment and disposal. Therefore, a management program involves, in varying degrees, regulatory and political personnel, developers and builders, soil and site evaluators, engineers and designers, contractors and installers, manufacturers, service providers, management entities, and property owners.

RELATIONSHIP TO OTHER WATER PROGRAMS

These proposed guidelines will help support the activities and approaches being applied in several other EPA programs and contribute toward achieving mutual water quality objectives and public health protection goals. A few of these companion programs are summarized in the following discussion.

Impaired Waters. Nationally, States have reported in their 1998 Clean Water Act Section 303(d) reports that designated uses are not being met for 5,281 water bodies due to pathogens and that 4,773 water bodies are impaired by nutrients.[11] Onsite systems are often significant contributors of pathogens and nutrients. Under EPA's current requirements a total maximum daily load determination is required when the total loading of pollutants to a water body results in a violation of water quality standards. If septic/onsite systems are determined to be a significant source of the pollutants, then a more rigorous level of wastewater management could be established to satisfactorily address the problem. The most common approach to resolving problems with onsite systems has been to replace onsite systems with a centralized wastewater treatment and collection system (or transmission line to an existing facility). However, a decentralized approach, with a high level of management, can meet water quality objectives

while offering communities a wider range of options, often at considerably lower cost than conventional (collection/central treatment) approaches. In these situations, EPA recognizes these guidelines for improved management as a valuable tool in addressing the problem. A high level of management, as described in this document, would provide EPA with reasonable assurance of long-term, consistent reduction of pollutant loads to meet the currently applicable total maximum daily load requirements in watersheds.

Water Quality Standards. In the development of water quality standards by States/tribes and approval of those standards by EPA, there is a variation in the criteria for pathogens and nutrients, and their application. EPA and the States/tribes are gaining more knowledge in this area. EPA is currently developing recommendations for a better means to measure and document human health risks than total or fecal coliforms because they provide better estimates of human illnesses, specifically acute gastrointestinal disease. A thorough discussion is available in the draft *Implementation Guidance for Ambient Water Quality Criteria for Bacteria-1986.*[14] Also, EPA is developing a series of *Nutrient Criteria Technical Guidance Manuals* for various water body types, e.g., rivers and streams. The intent of these documents is to provide States/tribes with methods to, among other things, assess water body nutrient impairment, select criteria, design monitoring programs, and implement management practices. These should be considered during the siting, design, and operation of onsite and decentralized wastewater systems.

Source Water Protection. The 1996 Amendments to the Safe Drinking Water Act require States and tribes to implement Source Water Assessment and Protection (SWAP) programs which assess areas serving as sources of drinking water, identify potential threats, and implement protection efforts. Several programs specifically address the protection of ground water, since it serves as the source of drinking water for 95 percent of the nation's population in rural areas, and for half of the total U.S. population. EPA recommends the onsite/decentralized management guidelines as a tool in the protection of drinking water sources.

Underground Injection Control (UIC) Program. Certain septic systems are regulated under the Underground Injection Control (UIC) Program. The UIC program was established by the Safe Drinking Water Act to protect underground sources of drinking water from contamination caused by the underground injection of wastes. Septic systems are regulated under the UIC program if they accept sanitary wastes and are used by a multiple dwelling, community or regional system, or accept sanitary wastes and are used by a non-residential establishment and have the capacity to serve 20 or more people per day, or accept anything other than sanitary waste regardless of size. Discharges from these septic systems are authorized as long as they do not endanger underground sources of drinking water.

In September 1999, EPA completed a comprehensive study of shallow injection wells, including septic systems, that are regulated under the Underground Injection Control Program.[12] Although there are about 43,000 documented large capacity septic systems, EPA estimates that over 350,000 exist nationwide. While the prevalence of contamination cases appears low relative to the prevalence of these systems, there are documented examples which implicate these large systems as sources of ground water contamination. EPA is under a consent order to make a decision concerning the need to further regulate these large septic systems as well as other types of shallow injection wells. The effectiveness of EPA's onsite/decentralized management guidelines will be considered as part of that decision.

Coastal Zone Management Act. EPA and NOAA jointly administer Section 6217 of the Coastal Zone Management Act Reauthorization Amendments of 1992. This provision requires

the 29 States with approved Coastal Zone Management Programs to establish and implement Coastal Nonpoint Pollution control Programs. These programs must include practices to meet management measures for both new and operating onsite disposal systems (OSDS). The measures are described in EPA's "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters." The measure for new OSDS specifies that they be designed, installed, and operated properly and be situated at safe distances from sensitive resources including wetlands and flood plains. Protective separation between the bottom of the infiltration system and ground water tables is to be established, and OSDS are to be designed to reduce nitrogen loadings in areas where surface waters may be adversely affected. The measure for operating OSDS requires operation and maintenance to prevent surface water discharge and reduce loadings to groundwater, as well as inspection at regular time intervals and repair/replacement of faulty systems. The OSDS measures described above are consistent with the concepts described in these guidelines.

Design Manual. EPA is currently revising the *Onsite Wastewater Treatment and Disposal Systems Design Manual*[13] to provide new information on alternative treatment technologies and to promote a performance-based approach to onsite/decentralized wastewater system management. The Design Manual will serve as the technical complement to the Management Guidelines and will be useful as a reference to identify the environmental, technological, administrative and public health factors to consider when developing an improved management program. The Design Manual will also contain information intended to be used by program managers in assessing the environmental impacts of specific onsite/decentralized wastewater system technologies on both the watershed and individual site levels and in the selection of appropriate technologies and management strategies.

DESCRIPTION OF MODEL MANAGEMENT PROGRAMS

Five separate model programs are presented as a progressive series in which the management requirements of wastewater systems become more rigorous as the system technologies become more complex and/or as the sensitivity of the environment increases. Table 1, "Summary of Model Programs for Management of Onsite/Decentralized Wastewater Systems," presents a brief description of each model program. The table compares the management program objectives, provides a brief description of the types of systems applicable to the program, and lists the major benefits and limitations for each of the five model programs. The model programs are discussed in more detail in the individual tables below which describe each model program.

The model programs share the common goal of ensuring that human health and the environment are protected. Effective implementation of these model programs requires ongoing coordination among appropriate State, Tribal and local water quality, public health and planning and zoning agencies. This coordination is necessary to help ensure that State and local onsite/decentralized programs are managed on a watershed basis to protect public health and the environment, and meet State and Tribal water quality standards, e.g., applicable pathogen and nutrient criteria. EPA believes that these goals are best achieved through the use of performance standards for individual systems that have been developed to protect the water quality of the receiving watershed and/or aquifer.

Each model program includes a set of management objectives, and an accompanying set of associated elements and activities targeted towards the satisfactory achievement of the objectives. The model programs are benchmarks for a State, tribal or local unit of government to: 1) identify its management objective, 2) evaluate whether its current program is adequate, and

3) determine both an appropriate management program, and the necessary program enhancements to achieve its management objectives and public health and environmental goals. EPA recognizes that States, tribes and local governments need a flexible framework and guidance to best tailor their programs to the specific needs of the community, and to the institutional capacity of the regulatory authority. These model programs are not intended to supersede existing federal, State, tribal and local laws and regulations, but rather be a complement to them.

EPA recommends **Model Program 1, *System Inventory and Awareness of Maintenance Needs*,** as a minimum level of management. Model Program 1 is a suitable management program where conventional onsite 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 drinking water wells in close proximity. Conventional systems are passive and durable treatment systems that can provide acceptable treatment under suitable site conditions despite a lack of attention by the owner. Failures that may occur and continue undetected will pose a relatively low level of risk to public health and the environment. The objectives of this management program are to ensure that all systems are sited, designed and constructed in compliance with the prevailing rules, that all systems are recorded and inventoried, and property owners are informed of maintenance needs of the systems. Model Program 1 is intended to raise the local regulatory agency's awareness of the location of systems, raise homeowners' awareness of basic system needs and ensure that homeowners attend to those needs. This Program is also a starting point, providing communities with basic data for determining whether higher management levels are necessary.

EPA recommends **Model Program 2, *Management Through Maintenance Contracts,*** as the minimum necessary where more complex system designs are employed to enhance the capacity of conventional systems to accept and treat wastewater because of small lots, slowly permeable soils, or shallow seasonal water tables. This program may also be appropriate for areas that supply water to public water systems (e.g., source water or wellhead protection areas). The objectives of this program build on Model Program 1 by ensuring that maintenance contracts with trained operators are maintained by the property owner. Marginally suitable sites typically require improved effluent dispersal to the soil or advanced treatment such as media filters or aerobic treatment units. Maintenance of these more complex systems is critical to sustaining acceptable performance in these areas of greater environmental sensitivity. Therefore, these systems should be allowed only where trained operators are under contract to perform timely maintenance.

EPA recommends **Model Program 3, *Management Through Operating Permits,*** where the onsite system must provide treatment to achieve specific water quality criteria. Examples include shellfish growing areas, or situations where a source water assessment has identified onsite/decentralized systems as threats to drinking water supplies. The objective of this management program, in addition to the previous levels is to ensure that the onsite systems continuously meet their performance requirements. Treatment systems that are designed to meet specific effluent limits are less dependent on site characteristics and conditions. Therefore, they can be used safely in more sensitive environments but only if their performance can be ensured continuously. Limited term operating permits are issued to the property owner that are renewable for another term if the owner demonstrates that the system is in compliance with the terms and conditions of the permit. The permit provides the management program a mechanism for continuous oversight of system performance and negotiating corrective actions or levying

penalties if compliance with the permit is not maintained. To comply with these performance standards, the property owner should contract with a maintenance provider, as in Program 2.

EPA recommends **Model Program 4, *Utility Operation and Maintenance,*** for performance-based systems where the sensitivity of the environment is high and there is a need for continuous monitoring and reliable operation and maintenance. For example, this approach may be applicable where monitoring of a drinking water supply has detected pathogens or elevated levels of nutrients and a source water assessment has identified onsite/decentralized systems as sources of concern. The objective of this program is to achieve greater control over compliance by issuing the operating permit to a utility instead of the property owner. This allows use of performance systems in more sensitive environments that Model Program 3. The utility takes responsibility for the operation and maintenance of systems owned by subscribers for a service fee. This reduces the number of permits and the necessary administration by the management program. System failures are also reduced as a result of routine maintenance. Ownership of the system remains with the property owner. The operating permit system is identical to Model Program 3 except that the permitee is a public or private utility.

Model Program 5, *Utility Ownership and Management,* is a variation of the utility operation/maintenance concept in Model Program 4, except ownership of the facilities is no longer with the property owner. The designated management entity both owns and operates the onsite systems in a manner analogous to a conventional wastewater utility. Under this approach, the utility maintains total control of all aspects of management, not just operation and maintenance. This model is appropriate in similar environmental or public health conditions as Model Program 4, but provides a somewhat higher level of control and reduces the likelihood of disputes between the system operator and the property owner. The utility can also more readily replace existing systems with higher performance units where necessary. EPA recommends implementation of Model Program 5 in cases such as when new, high density development is proposed in the vicinity of sensitive receiving waters.

TABLE 1. SUMMARY OF EPA GUIDELINES FOR MANAGEMENT OF ONSITE/DECENTRALIZED WASTEWATER SYSTEMS

Model Program	Typical Application	Management Objectives	Benefits	Limitations
1	Areas of low environmental sensitivity, where conventional onsite systems are adequate to protect water quality and public health.	**SYSTEM INVENTORY AND AWARENESS OF MAINTENANCE NEEDS** To ensure conventional onsite/decentralized systems are sited and installed properly in accordance with appropriate State/tribal/local regulations and codes and are periodically inspected, maintained, and repaired as necessary. Regulatory agency is aware of the location of systems and periodically provides owners with operation and maintenance information.	Relatively easy and inexpensive to implement and maintain. (Programs are based upon conventional, prescriptive system designs that rely upon conservative site criteria and system design requirements promulgated in codes.)	No mechanism to ensure operating compliance of systems. No mechanism to identify problems before failures occur. Limits building sites to those meeting prescriptive requirements.
2	Areas such as wellhead or source protection areas, where sites are marginally suited for conventional systems, requiring alternative, enhanced treatment systems to be implemented.	**MANAGEMENT THROUGH MAINTENANCE CONTRACTS** To allow the use of more complex mechanical treatment options in areas of higher density or some environmental sensitivity. Requires maintenance contracts to be maintained between the owner and equipment manufacturer/ supplier or service provider over the life of all systems.	Reduces the risk of failure through the requirement for routine maintenance of mechanical components by skilled personnel.	State/tribal/local agency may have difficulty tracking and enforcing compliance with the maintenance requirements and/or contract.
3	Environmentally sensitive areas, such as where conventional systems are a potential threat to drinking or shellfish growing waters. Engineered designs are needed, to meet specific performance requirements based on site characteristics.	**MANAGEMENT THROUGH OPERATING PERMITS** To allow the use of onsite/decentralized treatment on sites with a greater range of characteristics than allowed by prescriptive codes. Establishes specific and measurable performance requirements, renewable operating permits, and regular compliance monitoring reports, in addition to requiring maintenance contracts.	Increases the range of sites suitable for onsite/ decentralized treatment. Avoids problem of owner not managing system adequately and continues to operate a non-compliant system. Reduces the risk of failures by requiring that performance requirements be met to renew limited term operating permit.	Needs a higher level of technical/engineering expertise to implement.

TABLE 1. SUMMARY OF EPA GUIDELINES FOR MANAGEMENT OF ONSITE/DECENTRALIZED WASTEWATER SYSTEMS (CONT.)

Model Program	Typical Application	Management Objectives	Benefits	Limitations
4	Areas where there is suspected impairment of receiving waters such as sole source aquifers, critical aquatic habitats, outstanding natural resource waters, or other areas where the environmental and technology concerns require reliable, long-term system operation and maintenance.	**UTILITY OPERATION AND MAINTENANCE** To ensure that onsite/decentralized treatment systems consistently meet their performance requirements through the creation of public or private utilities that are responsible for the performance of systems within the service area. The utilities are issued operating permits for the systems and maintain them, but system ownership remains with individual property owners.	Responsibility for operation and maintenance is transferred from the owner to a professional utility that has an economic incentive to comply with the operating permit. Routine inspections may identify obvious problems before system failure occurs. Reduced number of permits requiring oversight by regulatory agency.	Additional regulatory oversight needed to evaluate and ensure that the utility is technically and financially viable. Potential conflicts between owner and operator. Requires authorizing legislation.
5	Same environmental and public health conditions as under Model Program 4. EPA recommends applying Model Program 5 in areas of new, dense development.	**UTILITY OWNERSHIP AND MANAGEMENT** To provide professional management of the siting, design, construction, operation, maintenance, etc. of onsite/decentralized systems through the creation of public or private utilities that own and manage systems within the service area.	Simulates the municipal model of central sewerage by transferring all responsibility from the property owner to a professional entity, reducing risk of non-compliance to lowest level. Allows effective area-wide wastewater planning through integration of onsite/decentralized systems with conventional sewerage. Avoids conflicts between owner and operator.	Property owner may oppose utility's easement to property for the system. Additional regulatory oversight needed to evaluate and ensure that the utility is technically and financially viable. Greater financial investment by utility due to purchase of systems and components. Requires authorizing legislation.

HOW TO APPLY THE MODEL PROGRAMS

General. The tables on the following pages provide detailed descriptions of the program elements and specific activities associated with each of the five Model Programs. The program elements and activities make up each model program based on its stated management objective.

As previously indicated, the management model selected for a particular community or service area should be based on environmental sensitivity, public health risks, and the complexity of wastewater treatment technologies being implemented. The summary tables generally describe each of the management elements associated with the various model programs. How each of these elements will be implemented, however, will depend on decisions by the local community or implementing authority, based on locally-appropriate statutes, ordinances, institutional structures, technical capabilities, public preferences and other factors. Thus, the general framework for each model program presented in the tables will need to be tailored to suit local circumstances and preferences.

The implementation of higher levels of management will often occur in progressive stages, as more information becomes available, public awareness and support increase, and the capacity of local and State/tribal institutions to deal with management challenges builds over time. Implementation of Model Program 1 as the threshold level of management will not only raise the quality of management for most existing programs, but also will establish program elements (such as data collection) which will allow the community to identify and address circumstances requiring higher levels of management.

It should also be noted that for a given service area, more than one level of management may be appropriate. While Model Program 1 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 model, more appropriate for areas with higher sensitivities, can 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/decentralized systems for the full range of environmental conditions. For example, Model Program 3 might be selected for the more sensitive areas such as those along a lakefront or estuary, that have shown to have poor water quality, but a lower level model would still be appropriate for conventional systems in areas that are not as sensitive.

Environmental Sensitivity and Public Health Risk. The particular Model Program selected for an area should be based upon the potential for onsite system discharges to impact the public health or the quality of surface and ground waters. 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 groundwater, aquifer type, receiving water use, proximity to surface waters, topography, geology, and density of development. Another useful parameter to consider is the “susceptibility determinations” that States and tribes will make as part of the source water assessments. These assessments determine which potential sources of pollution, including septic systems, pose the greatest threats to drinking water systems. Other issues to consider that may have a more 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 deep groundwater table 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 may be designated as an area of higher concern. For those watersheds where a determination has been made that the onsite system is contributing to a violation of the water quality standards, Model Program 3, 4, or 5 should be selected to allow for restoration of the watershed. More detailed information on these factors will be provided in EPA's revised Onsite Design Manual.

Complexity of Treatment Technologies. The complexity of the treatment system should also influence the Model Program selected. As a treatment system's complexity increases to meet management objectives or system performance standards, the need for a high level of operation and maintenance increases to ensure that malfunctions do not occur. A less complex treatment system, such as a conventional onsite septic system, tends to depend upon simple natural processes for the movement, treatment, and disposal of wastewater. The prescriptive elements of Model Program 1, 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 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 management. EPA's updated Onsite Design Manual, currently being prepared, will provide guidance on performance and management requirements for onsite technologies.

Guidance Manual. The Management Guidelines include a Guidance Manual that will help States, tribes and communities evaluate existing programs, and apply the management programs. An outline of the proposed Guidance Manual is included as Appendix B. The Guidance Manual will eventually include case studies and examples of materials used by communities that have adequately implemented model programs. The Management Guidelines will be complemented by an updated version of EPA's Onsite System Design Manual, currently being drafted, which will provide technical guidance on specific onsite/decentralized wastewater system technologies.

MODEL PROGRAM 1
SYSTEM INVENTORY AND AWARENESS OF MAINTENANCE NEEDS

Objective: To ensure conventional onsite/decentralized systems are sited and installed properly in accordance with appropriate State/tribal/local regulations and codes, and are periodically inspected and repaired as necessary. Regulatory agency is aware of the location of systems and periodically provides owners with operation and maintenance information.

PROGRAM ELEMENT	ACTIVITY
Planning	Coordinate with State, tribal and local planning and zoning, water quality, and other water use-related agencies.
Performance Requirements	Prevent direct and indirect human contact with raw and treated wastewater.
Site Evaluation	Codify prescriptive requirements for evaluation procedures and acceptable site criteria to minimize impacts to groundwater and aquatic resources.
Design	Codify designs suitable for sites meeting specific criteria**.**
Construction	Administer program for construction permits including agency review and acceptance of proposed system plans with a final construction inspection for compliance assurance.
Operation & Maintenance	(Responsibility of owner) Require controls to alert owner of need for maintenance. Establish program for owner reminders to perform scheduled preventive maintenance.
Residuals Management	Assure residuals are used/disposed of in accordance with 40 CFR Part 503 (Use and Disposal of Sewage Sludge) and applicable State/tribal/local requirements. Administer tracking system for residuals hauling and disposal**.**
Certification/Licensing	Administer certification/licensing programs based on requirements in CWA.
Education/Training	Educate owners on purpose, use, and care of system. Publish technical guidelines for service providers. Provide technical training for service providers.
Inspections/Monitoring	Administer program for point-of-sale and change-in-use inspections.
Corrective Actions	Negotiate compliance schedules for correcting documented failures. Administer enforcement program with fines and/or penalties for failure to comply with requirements in timely manner.
Record keeping & Reporting	Maintain construction permit file including site evaluation report and record drawings of system. Administer maintenance reminder system.
Financial Assistance	Provide inventory of available financial assistance programs to owners.

* Detailed components of each element will be presented in the Guidance Manual.

MODEL PROGRAM 2
MANAGEMENT THROUGH MAINTENANCE CONTRACTS

Objective: To allow the use of more complex mechanical treatment options through the requirement that maintenance contracts be maintained between the owner and equipment manufacturer/supplier or service provider over the life of the system.

PROGRAM ELEMENT	ACTIVITY
Planning	Coordinate with State, tribal and local planning and zoning, water quality, and other water use-related agencies.
Performance Requirements	Prevent direct and indirect human contact with raw and treated wastewater. **Establish measurable requirements for system maintenance**.
Site Evaluation	Codify prescriptive requirements for evaluation procedures and acceptable site criteria to minimize impacts to groundwater and aquatic resources.
Design	**Establish alternative site acceptance criteria for systems with enhanced pretreatment.**
Construction	Administer program for construction permits including agency review and acceptance of proposed system plans with a final construction inspection for compliance assurance.
Operation & Maintenance	(Responsibility of owner) Require engineering controls/alarms to alert owner of need for maintenance . **Enact requirement for private maintenance contract between owner and trained service provider**.
Residuals Management	Assure residuals are used/disposed of in accordance with 40 CFR Part 503 (Use and Disposal of Sewage Sludge) and applicable State/tribal/local requirements. Administer tracking system for residuals hauling and disposal**.**
Certification/Licensing	Administer certification/licensing programs for site evaluators, installers, septage haulers, and inspectors.
Education/Training	Educate owners on purpose, use and care of system, **selection of service providers, and procedures to follow when alarms are triggered.** Publish technical guidelines for service providers. Provide technical training for service providers.
Inspections/Monitoring	Administer program for point-of-sale and change-in-use inspections. **Administer program for scheduled reporting of completed maintenance of mechanical treatment components.**
Corrective Actions	Negotiate compliance schedules for correcting documented failures. Administer enforcement program with fines and/or penalties for failure to comply with requirements in timely manner.
Record keeping & Reporting	Maintain construction permit file including site evaluation report and record drawings of system. **Administer tracking system for private maintenance contract compliance.**
Financial Assistance	Provide inventory of available financial assistance programs to owners**.**

* Detailed components of each element will be presented in the Guidance Manual. Activities listed in bold represent the incremental change from the previous model program.

MODEL PROGRAM 3
MANAGEMENT THROUGH OPERATING PERMITS

Objective: To allow the use of onsite/decentralized treatment on sites with a greater range of characteristics than allowed by prescriptive codes through the establishment of specific and measurable performance requirements, renewable operating permits, and regular compliance monitoring reports.

PROGRAM ELEMENT	ACTIVITY
Planning	Coordinate with State, tribal and local planning and zoning, water quality, and other water use-related agencies.
Performance Requirements	**Establish performance and maintenance requirements specific to individual systems**.
Site Evaluation	Codify prescriptive requirements for evaluation procedures.
Design	**Establish procedures to approve engineered designs capable of meeting specific and measurable performance requirements**.
Construction	Administer program for construction permits including agency review and approval of proposed system plans with a final construction inspection for compliance assurance **(professional engineering certification)**.
Operation & Maintenance	(Owner responsibility) **Administer program for limited term operating permits that are renewable upon documented compliance with permit conditions.** **Require approved contingency plans to prevent catastrophic failures.**
Residuals Management	Assure residuals are used/disposed of in accordance with 40 CFR Part 503 (Use and Disposal of Sewage Sludge) and applicable State/tribal/local requirements. Administer tracking system for residuals hauling and disposal**.**
Certification/Licensing	Administer certification/licensing program for site evaluators, **designers,** installers, septage haulers, and inspectors.
Education/Training	Educate owners on purpose, use and care of system, and selection of service providers. Publish technical guidelines for service providers. Provide technical training for service providers.
Inspections/Monitoring	Administer program for time-of-sale and change-in-use inspections. **Administer program for periodic compliance monitoring/reporting.** **Require system inspections at time of operating permit renewal**.
Corrective Actions	Negotiate compliance schedules for correcting documented failures. Administer enforcement program with fines and/or penalties for failure to comply with requirements in timely manner.
Record keeping & Reporting	Maintain construction permit file including site evaluation report and record drawings of system. **Administer tracking system for operating permits**.
Financial Assistance	Provide inventory of available financial assistance programs to owners.

* Detailed components of each element will be presented in the Guidance Manual. Activities listed in bold represent the incremental change from the previous model program.

MODEL PROGRAM 4
UTILITY OPERATION AND MAINTENANCE

Objective: To ensure that onsite/decentralized treatment systems consistently meet their performance requirements through the creation of public/private utilities that would be responsible for the performance of systems within the service area.

PROGRAM ELEMENT	ACTIVITY
Planning	Coordinate with State, tribal and local planning and zoning, water quality, and other water use-related agencies.
Performance Requirements	Establish measurable performance and maintenance requirements specific to individual system applications.
Site Evaluation	Codify prescriptive requirements for evaluation procedures.
Design	Establish procedures to approve engineered designs capable of meeting specific and measurable performance requirements**.**
Construction	Administer program for construction permits including agency review and acceptance of proposed system plans with a final construction inspection for compliance assurance (engineer certification rather than agency inspection for final construction approval for engineered designs).
Operation & Maintenance	**(Management entity responsibility)** Administer program for limited term operating permits that are renewable upon documented compliance with permit conditions. Require approved contingency plans to prevent catastrophic failures.
Residuals Management	Assure residuals are used/disposed of in accordance with 40 CFR Part 503 (Use and Disposal of Sewage Sludge) and applicable State/tribal/local requirements. Administer tracking system for residuals hauling and disposal**.**
Certification/Licensing	Administer certification/licensing programs for site evaluators, designers, installers, **operators**, septage haulers, and inspectors**.**
Education/Training	Educate owners on purpose and use of system.
Inspections/Monitoring	Administer program for time-of-sale and change-in-use inspections. Administer program for periodic compliance monitoring/reporting. Require system inspections at time of operating permit renewal.
Corrective Actions	Negotiate compliance schedules for correcting documented failures. Administer enforcement program with fines and/or penalties for failure to comply with requirements in timely manner.
Record keeping & Reporting	Maintain construction permit file including site evaluation report and record drawings of system. Administer tracking system for operating permits. **Administer financial, management, and technical audits of management entity.**
Financial Assistance	Provide inventory of available financial assistance programs to owners.

* Detailed components of each element will be presented in the Guidance Manual. Activities listed in bold represent the incremental change from the previous model program.

MODEL PROGRAM 5
UTILITY OWNERSHIP AND MANAGEMENT

Objective: To provide professional management of the siting, design, construction, operation and maintenance of onsite/decentralized systems through the creation of public/private utilities that own and manage individual systems within the service area.

PROGRAM ELEMENT	ACTIVITY
Planning	Coordinate with State, tribal and local planning and zoning, water quality, and other water use-related agencies. **Provide area-wide comprehensive wastewater planning.** **Provide service area planning**.
Performance Requirements	Establish measurable performance and maintenance requirements specific to individual system applications.
Site Evaluation	Codify prescriptive requirements for evaluation procedures.
Design	Establish procedures to approve engineered designs capable of meeting specific and measurable performance requirements.
Construction	**Administer general permit program for management entities to design and construct individual, cluster, and conventional sewerage systems that meet established performance requirements**.
Operation & Maintenance	(Management entity responsibility) Establish program for limited term operating permits that are renewable upon documented compliance with permit conditions . Require approved contingency plans to prevent catastrophic failures.
Residuals Management	Assure residuals are used/disposed of in accordance with 40 CFR Part 503 (Use and Disposal of Sewage Sludge) and applicable State/tribal/local requirements. Administer tracking system for residuals hauling and disposal**.**
Certification/Licensing	Administer certification/licensing programs for site evaluators, designers, installers, operators, septage haulers, and inspectors**.**
Education/Training	Educate owners on purpose and use of system.
Inspections/Monitoring	Administer program for periodic compliance monitoring/reporting. Require system inspections at time of operating permit renewal.
Corrective Actions	Negotiate compliance schedules for correcting documented failures. Administer enforcement program with fines and/or penalties for failure to comply with requirements in timely manner.
Record keeping & Reporting	Administer tracking system for area-wide operating permits. Administer financial viability audit of management entities**.**
Financial Assistance	Provide inventory of available financial assistance programs to permittees.

* Detailed components of each element will be presented in the Guidance Manual. Activities listed in bold represent the incremental change from the previous model program.

REFERENCES

(1) U.S. Department of Commerce, U.S. Census Bureau, ***American Housing Survey for the United States - 1995***, issued September, 1997.

(2) Nelson, V.I.., S.P. Dix and F. Shephard, ***Advanced On-Site Wastewater Treatment and Management Scoping Study: Assessment of Short-Term Opportunities and Long-Run Potential (DRAFT)***, May, 1999. Data based on reporting from onsite system inspections in Massachusetts.

(3) U.S. Environmental Protection Agency, ***National Water Quality Inventory Report to Congress (305(b) Report)***, 1996.

(4) U.S. Environmental Protection Agency, ***1996 Clean Water Needs Survey Report to Congress,*** September, 1997. (EPA 832/R-97-003)

(5) U.S. Department of Commerce, National Oceanic and Atmospheric Administration, ***National Shellfish Register***, 1995.

(6) Sarasota Bay National Estuary Program, ***Sarasota Bay: Reclaiming Paradise***.

(7) U.S. Environmental Protection Agency, ***40 CFR Parts 141 and 142: National Primary Drinking Water Regulations: Ground Water Rule; Proposed Rules***, Federal Register, May 10, 2000.

(8) Source: U.S. Centers for Disease Control, ***Database of Waterborne and Foodborne Disease Outbreaks in the United States, 1971-1994***. Data summary and analysis provided by EPA as part of the development of the Ground Water Rule, and found at www.epa.gov/ogwdw000/standard/phs.html.

(9) U.S. Environmental Protection Agency, ***Response to Congress on Use of Decentralized Wastewater Treatment Systems***, April, 1997. (EPA 832-R-97-001b)

(10) U.S. Environmental Protection Agency and U.S. Department of Agriculture, ***Clean Water Action Plan: Restoring and Protecting America's Waters***, February 14, 1998. (EPA 840-R-98-001)

(11) U.S. Environmental Protection Agency, ***1998 Section 303(d) List Fact Sheet: National Picture of Impaired Waters Highlights of the 1998 303(d) Lists (based on Tracking System data available 04/06/00)***. Found at: http://www.epa.gov/owow/tmdl/states/national.html

(12) U.S. Environmental Protection Agency, ***Class V Underground Injection Control Study***, September, 1999. (EPA/816-R-99-014)

(13) U.S. Environmental Protection Agency, ***Design Manual – Onsite Wastewater Treatment and Disposal Systems***, October, 1990. (EPA 625/1-80-012)

(14) U.S. Environmental Protection Agency, ***Draft Implementation Guidance for Ambient Water Quality Criteria for Bacteria-1986,*** January 2000. (EPA-823-D-00-001)

APPENDIX A

LIST OF TERMS AND DEFINITIONS

Aerobic Treatment Units (ATU): An onsite treatment system which provides wastewater treatment and storage functions similar to a normal septic tank. ATU's inject air into the tank allowing aerobic bacteria to treat the wastewater.

Alternative Onsite System: An onsite treatment system other than a conventional septic tank and leach field design. Alternative systems are used to accommodate a variety of site conditions (e.g., high ground water, low-permeability soil) and/or to provide additional treatment. Examples of alternative systems include alternative collection sewers, sand mounds, sand filters, anaerobic filters, disinfection systems, and cluster systems, among others.

***Centralized System*:** A collection and treatment system containing collection sewers and a centralized treatment facility. Centralized systems are used to collect and treat large volumes of wastewater. The collection system typically requires large-diameter deep pipes, major excavation, and frequent manhole access. At the treatment facility, the wastewater is treated to standards required for discharge to a surface water body. The large amounts of biosolids (sludge) generated in treatment are treated and either land applied, placed on a surface disposal site, or incinerated.

***Class V Well*:** A shallow waste disposal well, storm water and agriculture drainage system, or other device, including a large domestic onsite wastewater system, that is used to release fluids above or into underground sources of drinking water. EPA permits these wells to inject wastes provided they meet certain requirements and do not endanger underground sources of drinking water.

Cluster System: A decentralized wastewater collection and treatment system where two or more dwellings, but less than an entire community, is served. The wastewater from several homes often is pretreated onsite by individual septic tanks before being transported through alternative sewers to an off-site nearby treatment unit that is relatively simple to operate and maintain than centralized systems.

Construction Permit: A permit issued by a local authority which authorizes the installation of a wastewater treatment system.

Conventional Onsite System: A conventional onsite system includes a septic tank and a leach field.

***Decentralized System*:** An onsite or cluster wastewater system that is used to treat and dispose of relatively small volumes of wastewater, generally from dwellings and businesses that are located relatively close together. Onsite and cluster systems are also commonly used in combination.

***Effluent*:** Partially or fully treated wastewater flowing from a treatment unit or facility.

***Management of Decentralized Systems*:** The centralized management and monitoring of onsite or cluster wastewater systems, including, but not limited to, planning, construction, operation, maintenance, and financing programs.

***Onsite System*:** A natural system or mechanical device used to collect, treat, and discharge or reclaim wastewater from an individual dwelling without the use of community-wide sewers or a centralized treatment facility. A conventional onsite system includes a septic tank and a leach field. Other alternative types of onsite systems include at-grade systems, mound systems, sand filters and small aerobic units.

Operating Permit: A renewable and revocable permit where the onsite/decentralized system contains components that must be operated in compliance with specific operational or performance requirements.

Permeability: Is the ease at which gases, liquids, or plant roots penetrate or pass through soil.

Prescriptive Standards: Standards that specify design, siting and other procedures for system applications on sites that meet specific criteria. Proposed deviations from the specified procedures require formal approval from the regulating agency. Prescriptive standards provide limited flexibility in design options and restrict the range of their application.

***Residuals*:** The by-products of wastewater treatment processes, including sludge and septage.

***Septage*:** The solid and semi-solid material resulting from onsite wastewater pretreatment in a septic tank, which must be pumped, hauled, treated, and disposed of properly.

Septic Tank: A buried tank designed and constructed to receive and pretreat wastewater from individual homes by separating settleable and floatable solids from the wastewater. Grease and other light materials, collectively called scum, float to the top. Gases are normally vented through the building's sewer pipe. An outlet blocked off from the scum layer feeds effluent to a subsurface soil absorption area or an intermediate treatment unit.

APPENDIX B

EPA GUIDELINES FOR MANAGEMENT OF DECENTRALIZED WASTEWATER TREATMENT SYSTEMS DRAFT GUIDANCE MANUAL OUTLINE