TABLE OF CONTENTS

EXECUTIVE SUMMARY

The performance of onsite and cluster (decentralized) wastewater treatment systems is a national issue of great concern to EPA. Decentralized systems are used with 25 percent of the homes in the U.S., 33 percent of new development and are considered permanent components of our nation's wastewater infrastructure. 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 due to improper management. Therefore, EPA is issuing *Voluntary Guidelines for Management of Onsite and Cluster (Decentralized) Wastewater Treatment Systems* to enhance the performance and reliability of decentralized wastewater treatment systems, to institutionalize the concept of management, to raise the quality of state, tribal and local management programs, and establish minimum levels of activity. Adequately managed decentralized systems can provide an alternative to centralized wastewater treatment systems. EPA continues to support the most cost-effective approach to implementing protective water pollution control solutions whether it be centralized or decentralized. The Guidelines are applicable when a decision to implement a decentralized approach is or has been made.

EPA intends that the Guidelines be used by state, tribal, and local authorities to help communities in meeting water quality and public health goals. Proper management of onsite systems has several benefits including protection of water quality and public health, protection of consumers' investment in home and business ownership, increased onsite system service life and replacement cost savings, avoidance of transfers of water away from the source by conserving groundwater, and elimination of the need to use a community's tax base to finance sewers. Although their implementation is voluntary, EPA strongly encourages consideration of the Guidelines as a guide in strengthening existing management programs and implementing new ones.

Unfortunately, many state, tribal and local rules that regulate onsite systems are not adequate to ensure their proper use. While "failure" of onsite systems is a term subject to much debate, 1995 U.S. Census date reports that over 10 percent of all systems backup into homes or surface on the ground and more than half the systems in the U.S. were installed more than 30 years ago when onsite rules were nonexistent or poorly enforced. Few receive proper maintenance because homeowners are either unaware of the need for maintenance or find it a distasteful task, and most regulatory programs do not require homeowner accountability for system performance after installation. Ultimately it is the absence of a comprehensive management program which addresses each of these issues that prevents onsite and cluster (decentralized) systems from being considered as an effective and reliable wastewater treatment strategy.

If implemented by state, tribal and local governments, the Guidelines will provide for a viable, long-term option for meeting public health and water quality goals, particularly for small, suburban, and rural areas. In addition, they will support the activities and approaches being used in other EPA programs and contribute toward achievement of mutual water quality and public health goals. These programs include Watershed Management, Water Quality Management (including Total Maximum Daily Loads), Biosolids and Residuals Management, Water Quality Standards, Source Water Assessment and Protection, Underground Injection Control, National Pollutant Discharge Elimination System, Coastal Zone Management, Nonpoint Source Control Program, and Storm Water Management.

Five management program models are provided as conceptual approaches with progressively increasing management controls as sensitivity of the environment and/or treatment system complexity increase. Each model consists of 13 critical elements that describe activities to be performed to achieve the management goal. The purpose of the models is to provide a guide to match the needed management

controls to identified public health and water quality risks presented by decentralized systems in a particular area. The models are flexible so that programs may be customized by substituting elements of one program into another to accommodate local needs, practices, and conditions. The models are built around ensuring accountability and competency of the regulators and service providers through certification and continuing education, owners through education and/or inspection requirements, and third party managers through contract and permit stipulations to achieve their goals. The five models are:

- **"Homeowner Awareness"** is a suitable program where treatment systems are owned and operated by individual property owners in areas of low environmental sensitivity. This program limits treatment technologies to conventional systems which require little owner attention. To help ensure timely maintenance is performed, the regulatory authority mails maintenance reminders at appropriate intervals to owners.

- **"Maintenance Contracts"** is recommended where more complex designs are employed to enhance the capacity of conventional systems to accept and treat wastewater. Because of treatment complexity, contracts with qualified technicians are needed to ensure proper and timely maintenance.

- **"Operating Permits"** is an appropriate program where sustained performance of treatment systems is critical to protect public health and water quality. Limited term operating permits are issued to the 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.

- **"Responsible Management Entity (RME) Operation and Maintenance"** is suitable where frequent and highly reliable operation and maintenance of decentralized systems is required to ensure water resource protection in sensitive environments. Under this model, the operating permit is issued to an RME instead of the property owner to provide the needed assurance that the appropriate maintenance is performed.

- **"RME Ownership"** is a program where the treatment systems are owned, operated and maintained by the RME removing the property owner from responsibility for the system. This program is analogous to central sewerage and provides the greatest assurance of system performance in the most sensitive of environments.

The legal authority for regulating onsite and cluster (decentralized) wastewater treatment systems generally rests with state, tribal, and local governments. EPA recognizes that these units of government need a flexible framework and guidance to tailor their programs to the specific needs of the communities and watersheds. While each management program model stands alone, the models are intended to be only guides in developing an appropriate management program. Activities in program elements of higher level models may be incorporated into lower level programs to enhance the local program in achieving its desired objectives. Also, it is possible to implement more than one management program model within a jurisdiction as appropriate for the circumstances encountered such as housing density, receiving environment characteristics, new development, high volume or high strength wastewaters, etc. Management models may also be implemented in conjunction with centralized wastewater treatment and collection. It is important to note that the management program models are not intended to supersede existing federal, state, tribal, or local laws and regulations, but rather to complement them in protecting public health and water quality.

To assist state, tribal, and local units of government in evaluating and upgrading their onsite and cluster (decentralized) wastewater management program, a draft Management Handbook complements the

Guidelines. The draft Management Handbook includes case studies and examples of materials used by communities that have implemented management programs effectively.

What is the Purpose of the Voluntary Guidelines? EPA has developed the *"Voluntary Guidelines for Management of Onsite and Cluster (Decentralized) Wastewater Treatment Systems"* to raise the level of performance of onsite and cluster wastewater treatment systems through improved management programs. Decentralized wastewater treatment systems are defined here as managed individual onsite or cluster wastewater systems (commonly referred to as septic systems, private sewage systems, individual sewage treatment systems, onsite sewage disposal systems or "package" plants) used to collect, treat and disperse or reclaim wastewater from individual dwellings, businesses or small communities or service areas. Such systems can provide an alternative to conventional centralized wastewater systems regulated under the state water pollution control programs and the Clean Water Act's (CWA) National Pollutant Discharge Elimination System (NPDES) program. Onsite and cluster systems can provide a high level of public health and water quality protection if they are properly planned, sited, designed, constructed, installed, operated and maintained. EPA is issuing this guidance 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. However, the decision on use of centralized or decentralized wastewater treatment is one to be made at the state, tribal and local levels after consideration of a number of factors.

These Guidelines are not intended to supercede any otherwise applicable federal, state, tribal or local requirements. Please note that the statutes and regulations described in this document contain legally binding requirements. The guidance provided in this document do not substitute for those statutes or regulations. These guidelines are strictly voluntary and, by themselves, do not impose legally-binding requirements on EPA, State, local or tribal governments, or members of the public and, based upon the circumstances, may not apply to a particular situation. Although EPA strongly recommends the approach outlined in this document, State and local decision makers are free to adopt approaches that differ from these guidelines.

> ***"EPA continues to support the most cost-effective and environmentally sound approach to implementing protective water pollution control solutions whether it be centralized or decentralized. The Guidelines apply when the decision is to implement a decentralized approach."***

Who Can Benefit from the Guidelines? The Guidelines contain a set of management models, 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. EPA recognizes the importance of each party in improving management programs and encourages identification of distinct and separate roles and responsibilities when implementing management programs. The primary audiences for these Guidelines are state, tribal and local regulators and community officials who are responsible for regulating onsite and cluster systems. The secondary audiences are those that manage onsite and cluster systems, including management entities, planners, designers, installers, operators, pumpers, haulers and inspectors. In particular, local communities with a need to improve system performance should consider these Guidelines as a first step in evaluating their existing programs. EPA also encourages state and tribal agencies which regulate onsite and cluster systems to evaluate their existing programs and adopt some form of these management models. Although very important to implementation of a management program, owner responsibilities are not discussed here in detail.

To What Type of Systems Do the Guidelines Apply? The Guidelines apply to both existing communities and to areas of new development that use onsite and cluster systems of any size for

residential and commercial wastewater treatment and dispersal. Centralized collection and treatment facilities are not addressed here. Industrial wastewater treatment systems are also not addressed, since many industrial wastes are prohibited by federal and state regulation from using onsite treatment and dispersal, because of the potential to interfere with wastewater treatment, and/or pollute ground water resources.

These Guidelines are not intended to be used to determine appropriate or inappropriate uses of land. The information in the Guidelines is intended to be used to help select appropriate management strategies and technologies that minimize risks to human health and water resources in areas where connections to centralized wastewater collection and treatment systems are not considered appropriate. The determination of appropriate siting requirements, system density restrictions or required technologies is a state, tribal or local decision.

How are the Models Structured? These management models 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 intensity increases progressively from one management model to another, reflecting the increased level of management activities needed to achieve water quality and public health goals. Although adoption of the Guidelines is voluntary, EPA strongly encourages communities to consider the Guidelines as a basis for their onsite and cluster wastewater management program, due to public health and water quality concerns associated with these systems.

Why is Management Needed? *The performance of onsite and cluster wastewater treatment systems is a national issue of great concern to EPA.* Onsite and cluster wastewater treatment systems serve approximately 25 percent of U.S. households and approximately 33 percent of new development.[(1)] Onsite and cluster systems can provide a high level of public health and natural resource protection if they are properly planned, sited, designed, constructed, 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/or surface and ground water quality. Many were initially sited and installed as temporary solutions with no ongoing management as a result of the perception that centralized treatment and collection would soon replace them. More than half the existing onsite systems are over 30 years old, and surveys indicate at least 10 percent of these systems backup onto the ground surface or into the home each year.[(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 many of the systems within the service area.

In the National Water Quality Inventory, 1996 Report to Congress, state agencies designated the top ten potential contaminant sources which threaten their ground water resources. The second most frequently cited contamination source is septic systems. The report states that "improperly constructed and poorly maintained septic systems are believed to cause substantial and widespread nutrient and microbial contamination to ground water." Other contaminant sources identified by states included underground storage tanks, landfills, large industrial facilities and numerous other activities. [(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)] Other leading sources included urban runoff/storm sewers, municipal sewer discharges, and industrial point sources. In U.S. classified shellfish growing areas, closures and harvest restrictions have occurred primarily because of "the concentration of fecal coliform bacteria associated with human sewage and with organic wastes from livestock and wildlife." The 1995 National Shellfish Register indicated that the most common pollution source cited for shellfish restrictions was urban runoff (principal or contributing factor in 40% of all harvest-limited growing areas), followed by unidentified upstream

sources (39%), wildlife (38%) and septic tanks (32%).[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 advanced wastewater treatment plant.[6]

Onsite and cluster wastewater systems also contribute to contamination of drinking water sources. EPA estimates that 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] The contaminants of primary concern in EPA's study of ground water-based drinking water systems are waterborne pathogens from fecal contamination. Malfunctioning septic systems are identified as a potential source of this contamination; other sources could include leaking or overflowing sanitary sewer lines, as well as stormwater runoff. A recent example of contamination involved nearly 800 visitors to a fair in Washington County, New York, who became ill after consuming water from a well source which was likely contaminated by a septic system at an adjacent dormitory. 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 from a privately-owned water supply in Racine, Missouri, and 49 cases of hepatitis A in Lancaster, Pennsylvania in 1980.[8] EPA is also concerned with the presence of nitrates in groundwater, particularly in rural areas where residents must rely on individual wells and onsite systems to serve relatively small lots.

While it is difficult to measure and document specific cause-and-effect relationships between onsite wastewater treatment systems and the quality of our water resources, it is widely accepted that improperly managed systems (resulting from inadequate siting, design, construction, installation, operation and/or maintenance) 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 and cluster systems through better management will be essential if the nation's water quality and public health goals are to be attained.

What are the Benefits of a Management Program? Benefits of a management program are accrued by both the communities developing effective management programs and the individual property owners and include:

- Protection of public health and local water resources: Although unquantified, septic system failures in the form of yard backups has been recognized as a public health hazard for many years. Improved management will minimize the occurrence of failures by ensuring pollutants are adequately treated and dispersed into the environment, thereby reducing risks to both public health and local water resources.

- Protection of property values: There are many documented instances over the last few decades of the increased value of property in areas formerly served by failing onsite systems after the area has been sewered. Management programs offer an opportunity to obtain the same level of service and aesthetics as sewered communities at a fraction of the cost, thus providing property appreciation and cost savings.

- Ground water conservation: Many areas of the United States which have undergone rapid development and sewering are experiencing rapidly declining water tables and/or water shortages because ground water is no longer being recharged by onsite systems.

- Preservation of tax base: As a result of financing the high cost of centralized sewers, many small communities have exhausted their tax base at the expense of other public safety and education programs to pay for those sewers. Many communities then entice growth in an effort to pay for these

systems, thus destroying the community structure which originally attracted residents.

- Life-cycle cost savings: There is a clear indication that, in many cases, management may pay for itself in terms of lower failure rates and alleviating the need for premature system replacement; however, this will depend on the types of systems that are employed and the management program chosen. Documentation of that savings is only now being initiated.

How were the EPA Management Guidelines Developed? 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, typically have 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 and cluster 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 regulatory approaches. Many existing management programs are inadequate or too narrow in focus, allowing premature system failures to occur. Although the varying reasons for system failure may include shortcomings in siting, design, construction, operation or maintenance, it is ultimately the absence of a comprehensive management program, which addresses each of these issues, that prevents onsite and cluster systems from reaching their potential as an effective and reliable wastewater treatment strategy.

These Guidelines recommend that communities provide an adequate level of management of onsite and cluster wastewater treatment systems. A management program is made up of a series of program elements and activities that address public education and participation, planning, performance requirements, site evaluation, design, construction, operation and maintenance, residuals management, training and certification/licensing, inspections/monitoring, corrective actions and enforcement, recordkeeping/inventory/reporting, and financial assistance and funding of onsite and cluster wastewater treatment and dispersal. Therefore, a management program involves, in varying degrees, regulatory and elected officials, developers and builders, soil and site evaluators, engineers and designers, contractors and installers, manufacturers, pumpers and haulers, inspectors, management entities, and property owners. Establishing distinct roles and responsibilities of the partners involved is very important to ensuring proper system management.

RELATIONSHIP TO OTHER EPA PROGRAMS

These 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. The Guidelines complement any applicable regulatory authority under the Clean Water Act (CWA), Safe Drinking Water Act (SDWA), or the Coastal Zone Management Act (CZMA), or any other Federal law. For example, there are certain situations where use of these Guidelines includes authorization under an NPDES permit, which is required for all discharges of pollutants from a point source to waters of the U.S.

Related programs include wastewater permitting, storm water management, biosolids and residuals management, watershed management, water quality management, water quality standards, nonpoint source control, underground injection control, source water assessment and protection, coastal zone

management and technology transfer. The relationship of the Guidelines to these companion programs is summarized in Appendix B.

DESCRIPTION OF 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 increased management 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 was developed 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, was developed for communities where there are significant risks to public health or water resources. Table 1, "Summary of EPA Guidelines for Management of Decentralized Wastewater Systems," presents a brief description of each management model. The table 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.

Tables 1 through 5 in Appendix A describe the management models which include the objective or goal to be reached and an accompanying set of program elements and activities necessary to achieve the stated objectives. They 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. The draft Management Handbook, which is being issued concurrently with the Guidelines, provides detailed guidance on how to select, evaluate, develop, and implement the Guidelines.

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. EPA 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. EPA believes that 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. EPA recognizes that these units of government need a flexible framework and guidance to best tailor their 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 National Pollutant Discharge Elimination System (NPDES) program under the CWA is required as part of management if there is a discharge of pollutants from a point source to a water of the U.S.) 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. However, there are some cases where the states themselves have the primary role and authority to implement the regulatory program at the local level. EPA has observed effective implementation of environmental programs, including the pretreatment and storm water management portions of the NPDES program, at all levels. 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.

Table 1: SUMMARY OF VOLUNTARY GUIDELINES FOR MANAGEMENT OF ONSITE AND CLUSTER (DECENTRALIZED) WASTEWATER TREATMENT SYSTEMS

TYPICAL APPLICATIONS	PROGRAM DESCRIPTION	BENEFITS	LIMITATIONS
HOMEOWNER AWARENESS MODEL			
• reas of low environmental sensitivity where sites are suitable for conventional onsite systems.	• ystems properly sited and constructed based on prescribed criteria. • wners made aware of maintenance needs through reminders. • nventory of all systems. •	• ode compliant system. • ase of implementation; based on existing, prescriptive system design and site criteria. • rovides an inventory of systems that is useful in system tracking and area-wide planning.	• o compliance/problem identification mechanism. • ites must meet siting requirements. • ost to maintain database and owner education program.
MAINTENANCE CONTRACT MODEL			
• reas 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. • mall cluster systems.	• ystems properly sited and constructed. • ore complex treatment options, including mechanical components or small clusters of homes. • equires service contracts to be maintained. • nventory of all systems. • ervice contract tracking system.	• educes the risk of treatment system malfunctions. • rotects homeowners' investment.	• ifficulty in tracking and enforcing compliance because it must rely on the owner or contractor to report a lapse in a valid contract for services. • o mechanism provided to assess the effectiveness of the maintenance program.
OPERATING PERMIT MODEL			
• reas of moderate environmental sensitivity such as wellhead or source water protection zones, shellfish growing waters, or bathing/water contact recreation. • ystems treating high strength wastes or large capacity systems.	• stablishes system performance and monitoring requirements. • llows engineered designs but may provide prescriptive designs for specific receiving environments. • egulatory oversight by issuing renewable operating permits that may be revoked for non-compliance. • nventory of all systems. • racking system for operating permit and compliance monitoring. • inimum for large capacity systems.	• llows systems in more environmentally sensitive areas. • perating permit requires regular compliance monitoring reports. • dentifies non-compliant systems and initiates corrective actions. • ecreases need for regulation of large systems. • rotects homeowners' investment.	• igher level of expertise and resources for regulatory authority to implement. • equires permit tracking system. • egulatory authority needs enforcement powers.
RESPONSIBLE MANAGEMENT ENTITY (RME) OPERATION AND MAINTENANCE (O&M) MODEL			

• reas 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. • luster systems.	• stablishes system performance and monitoring requirements. • rofessional O&M services through RME (either public or private). • rovides regulatory oversight by issuing operating or NPDES permits directly to the RME (system ownership remains with the property owner). • nventory of all systems. • racking system for operating permit and compliance monitoring.	• &M responsibility transferred from the system owner to a professional RME that is the holder of the operating permit. • dentifies problems needing attention before failures occur. • llows use of onsite treatment in more environmentally sensitive areas or for treatment of high strength wastes. • an issue one permit for a group of systems. • rotects homeowners' investment.	• nabling legislation may be necessary to allow RME to hold the operating permit for an individual system owner. • ME must have owner approval for repairs; may be conflict if performance problems are identified and not corrected. • eed for easement/right of entry. • eed for oversight of RME by the regulatory authority.
RESPONSIBLE MANAGEMENT ENTITY (RME) OWNERSHIP MODEL			
• reas 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. • referred management program for cluster systems serving multiple properties under different ownership (e.g., subdivisions).	• stablishes system performance and monitoring requirements. • rofessional management of all aspects of decentralized systems through public/private RMEs that own/manage individual systems. • ualified, trained and licensed professional owner/operators. • rovides regulatory oversight by issuing operating or NPDES permit. • nventory of all systems. • racking system for operating permit and compliance monitoring. •	• igh level of oversight if system performance problems occur. • imulates model of central sewerage, reducing the risk of non-compliance. • llows use of onsite treatment in more environmentally sensitive areas. • llows effective area-wide planning/watershed management. • emoves potential conflicts between the user and RME. • reatest protection of environmental resources and owner investment.	• nabling legislation and/or formation of special district may be required. • ay require greater financial investment by RME for installation and/or purchase of existing systems or components. • eed for oversight of RME by the regulatory authority. • ole source contracting may limit competition. • omeowner associations may not have adequate authority.

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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 implementing these management programs. The cost impacts may increase as the level of management increases, however, there are tradeoffs that exist. Costs incurred by the 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.

As a minimum level of management, EPA recommends **The Homeowner Awareness Model.** This is a suitable program 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 typically limits treatment technologies 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. 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 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 a higher level of management is necessary.

EPA recommends **The Maintenance Contract Model** 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.

EPA recommends **The Operating Permit Model** 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. EPA 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.[10] A principal objective of this management program is to ensure that the onsite

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. An advantage to implementing 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.

EPA recommends **The Responsible Management Entity (RME) Operation and Maintenance Model** 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. 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.

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 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.

General. Tables 1 through 5 in the Appendix provide brief 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 the minimum elements and activities necessary to achieve the stated management objectives for each model. The draft EPA Management Handbook provides a detailed discussion of how to apply the management programs.

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 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 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.

EPA recognizes the varied nature of management needed across the country and within states and localities, the need for flexibility in adopting 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 contain 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 Homeowner Awareness Model as the threshold level of management will not only raise the quality of management 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

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.

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, 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 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.

Complexity of Treatment System. 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 management. 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.

Management Handbook. The Management Guidelines are complemented by a Management Handbook that will help states, tribes and local communities wishing to evaluate and upgrade their existing programs to develop and implement improved management programs. The draft Management Handbook includes case studies and examples of materials used by communities that have adequately implemented management programs.

CONCLUSION

as a tool for identifying approaches for proper management of the systems. 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. Tables 1 through 5 in the Appendix provide a useful summary of the program elements for each management program 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.

FOR FURTHER INFORMATION

Visit EPA's web site on decentralized wastewater treatment at *www.epa.gov/owm/mtb/decent*. The site includes a copy of the draft management handbook, 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".

(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: 1996 Report to Congress***, 1998 (EPA 841-R-97-008).

(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 (FL) National Estuary Program (www.sarasotabay.org), ***Sarasota Bay: Reclaiming Paradise – A Vision for Sarasota Bay (State of the Bay, 1992)***.

(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) 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, ***40 CFR Part 144, Underground Injection Control Program – Notice of Final Determination for Class V Wells; Final Rule,*** Federal Register, June 7, 2002, Vol. 67, No. 110, pages 39584 - 39593.

(11) U.S. Environmental Protection Agency, ***Onsite Wastewater Treatment Systems Manual,*** EPA 625/R-00/008, February, 2002.

(12) 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

(13) U.S. Environmental Protection Agency, ***Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule***, EPA 832-B-92-005, 1993.

(14) U.S. Environmental Protection Agency, ***Guide to Septage Treatment and Disposal***, EPA/625/R-94/002, 1994.

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

[17] U.S. Environmental Protection Agency, ***Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters***.

[18] U.S. Environmental Protection Agency, ***Onsite Wastewater Treatment Systems Manual,*** EPA 625/R-00/008, February, 2002.

[19] U.S. Environmental Protection Agency, ***Design Manual – Onsite Wastewater Treatment and Disposal Systems***, October, 1980. (EPA/625/1-80/012)

Aerobic Treatment Unit (ATU): A mechanical wastewater treatment unit that provides secondary wastewater treatment for single home, cluster of homes, or commercial establishments by mixing air (oxygen) and aerobic and facultative microbes with the wastewater. ATU's typically use either a suspended growth process (such as activated sludge - extended aeration and batch reactors), fixed film process (similar to a trickling filter), or a combination of the two treatment processes.

Alternative Onsite Treatment System: A wastewater treatment system that includes different components than typically used in a conventional septic tank and subsurface wastewater infiltration system (SWIS). An alternative system is used to achieve acceptable treatment and dispersal of wastewater where conventional systems either may not be capable of protecting public health and water quality, or are inappropriate for properties with shallow soils over groundwater or bedrock or soils with low permeability. Examples of components that may be used in alternative systems include sand filters, aerobic treatment units, disinfection devices, and alternative subsurface infiltration designs such as mounds, gravelless trenches, and pressure and drip distribution.

Centralized Wastewater System: A managed system consisting of collection sewers and a single treatment plant used to collect and treat wastewater from an entire service area. Traditionally, such a system has been called a Publicly Owned Treatment Works (POTW) as defined in 40 CFR 122.2.

Cesspool: A drywell that receives untreated sanitary waste containing human excreta, which sometimes has an open bottom and/or perforated sides (40 CFR 144.3). Cesspools with the capacity to serve 20 or more persons per day were banned in federal regulations promulgated on December 7, 1999. The construction of new cesspools was immediately banned and existing large-capacity cesspools must be replaced with sewer connections or onsite wastewater treatment systems by 2005.

Cluster System: A wastewater collection and treatment system under some form of common ownership which collects wastewater from two or more dwellings or buildings and conveys it to a treatment and dispersal system located on a suitable site near the dwellings or buildings.

Construction Permit: A permit issued by the designated local regulatory authority that allows the installation of a wastewater treatment system in accordance with approved plans and applicable codes.

Conventional Onsite Treatment System: A wastewater treatment system consisting of a septic tank and a typical trench or bed subsurface wastewater infiltration system.

Decentralized System: Managed onsite and/or cluster system(s) used to collect, treat, and disperse or reclaim wastewater from a small community or service area.

Dispersal System: A system which receives pretreated wastewater and releases it into the air, surface or ground water, or onto or under the land surface. A subsurface wastewater infiltration system is an example of a dispersal system.

Engineered Design: An onsite or cluster wastewater system that is designed and certified by a licensed/certified designer to meet specific performance requirements for a particular wastewater on a particular site.

Environmental Sensitivity: The relative susceptibility to adverse impacts of a water resource or other

disruptions).

Large Capacity Septic System: An onsite method of partially treating and disposing of sanitary wastewater having the capacity to serve 20 or more persons-per-day subject to EPA's Underground Injection Control regulations.

Management Model: A program consisting of thirteen elements that is designed to protect and sustain public health and water quality through the use of appropriate policies and administrative procedures that define and integrate the roles and responsibilities of the regulatory authority, system owner, service providers and management entity, when present, to ensure that onsite and cluster wastewater treatment systems are appropriately managed throughout their life cycle. The program elements include public education and participation, planning, performance requirements, training and certification/licensing, site evaluation, design, construction, operation and maintenance, residuals management, compliance inspections/monitoring, corrective actions and enforcement, record keeping, inventory, and reporting, and financial assistance and funding. Management services should be provided by properly trained and certified personnel and tracked via a comprehensive management information system.

National Pollutant Discharge Elimination System (NPDES) Permit: A national program under Section 402 of the Clean Water Act for regulation of discharges of pollutants from point sources to waters of the United States.

Onsite Service Provider: A person who provides onsite system services. They include but are not limited to designers, engineers, soil scientists, site evaluators, installers, contractors, operators, managers, maintenance-service providers, pumpers, and others who provide services to system owners or other service providers.

Onsite Wastewater Treatment System (OWTS): A system relying on natural processes and/or mechanical components to collect, treat, and disperse or reclaim wastewater from a single dwelling or building.

Operating Permit: A renewable and revocable permit to operate and maintain an onsite or cluster treatment system in compliance with specific operational or performance requirements stipulated by the regulatory authority.

Performance-Based Management Program: A program designed to preserve and protect public health and water quality by seeking to ensure sustained achievement of specific, measurable performance requirements based on site and risk assessments.

Performance Requirement: Any requirement established by the regulatory authority to assure future compliance with the public health and water quality goals of the community, the state or tribe, and the federal government. Performance requirements can be expressed as numeric limits (e.g., pollutant concentrations, mass loads, wet weather flow, structural strength) or narrative descriptions of desired conditions or requirements (e.g., no visible scum, sludge, sheen, odors, cracks, or leaks).

Permitting Authority: The state, tribal, or local unit of government with the statutory or delegated authority to issue permits to build and operate onsite wastewater systems.

Prescription-Based Management Program: A program designed to preserve and protect public health

quality standards.

Prescriptive Requirements: Specifications for design, installation and other procedures and practices for onsite or cluster wastewater systems on sites that meet stipulated criteria. Proposed deviations from the stipulated criteria, specifications, procedures, and/or practices require formal approval from the regulatory authority.

Regulatory Authority (RA): The unit of government that establishes and enforces codes related to the permitting, design, placement, installation, operation, maintenance, monitoring, and performance of onsite and cluster wastewater systems.

Residuals: The solids generated and/or retained during the treatment of wastewater. They include trash, rags, grit, sediment, sludge, biosolids, septage, scum, grease, as well as those portions of treatment systems that have served their useful life and require disposal such as the sand or peat from a filter. Because of their different characteristics, management requirements can differ as stipulated by the appropriate Federal Regulations.

Responsible Management Entity (RME): A legal entity responsible for providing various management services with the requisite managerial, financial, and technical capacity to ensure the long-term, cost-effective management of decentralized onsite and/or cluster wastewater treatment facilities in accordance with applicable regulations and performance requirements.

Septage: The liquid and solid materials pumped from a septic tank during cleaning operations.

Septic Tank: A buried, watertight tank designed and constructed to receive and partially treat raw wastewater. The tank separates and retains settleable and floatable solids suspended in the wastewater and discharges the settled wastewater for further treatment and dispersal to the environment.

Source Water Assessment: A study and report required by the Source Water Assessment Program (SWAP) of the Safe Drinking Water Act addressing the capability of a given public water system to protect water quality that includes delineation of the source water area, identification of potential sources of contamination in the delineated area, determination of susceptibility to those sources, and public notice of the completed assessment.

Underground Injection Well: A constructed system designed to place waste fluids above, into, or below aquifers classified as underground sources of drinking water. As regulated under the Underground Injection Control (UIC) Program of the Safe Drinking Water Act (40 CFR Parts 144 & 146), injection wells are grouped into five classes. Class 5 includes shallow systems such as cesspools and subsurface wastewater infiltration systems. Subsurface wastewater infiltration systems with the capacity to serve 20 or more people per day, or similar systems receiving non-sanitary wastes, are subject to federal regulation. Class V motor vehicle waste injection wells and large-capacity cesspools are specifically prohibited under the UIC regulations.

APPENDIX A: MANAGEMENT PROGRAM TABLES

APPENDIX B: RELATIONSHIP TO OTHER EPA WATER PROGRAMS

These 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. Related programs include wastewater permitting, storm water management, biosolids and residuals management, watershed management, water quality management, water quality standards, nonpoint source control, underground injection control, source water assessment and protection, coastal zone management and technology transfer. The relationship of the Guidelines to these companion programs is summarized in the following discussion.

Wastewater Permitting. In 1972, Congress established the NPDES program under the Clean Water Act (CWA). Under the CWA, discharge of a pollutant from a point source to waters of the United States is prohibited unless that discharge is authorized by a NPDES (CWA Section 402) or wetlands (CWA Section 404) permit. NPDES permits are issued by a State or Tribe authorized to implement the NPDES program, or by EPA if there is no authorized State or Tribe. The NPDES permit establishes necessary technology-based and water quality-based terms, limitations and conditions on the discharge to protect public health and the environment. EPA's NPDES regulations (40 CFR 122.28) provide for issuance of a "general permit" to authorize discharges from similarly situated facilities such as onsite and cluster systems. Several States issue general permits for discharges from onsite and/or cluster systems, including Arkansas, Kentucky and North Carolina. An example of the key aspects of a general permit is provided in the Management Handbook.

Storm Water Management. Polluted storm water runoff is often transported by municipal separate storm sewer systems (MS4s) or discharged from industrial or construction activities and ultimately discharged into local rivers and streams without treatment. Common pollutants include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and carelessly discarded trash, such as cigarette butts, paper wrappers, and plastic bottles. When deposited into nearby waterways through MS4 discharges, these pollutants can impair the waterways, thereby discouraging recreational use of the resource, contaminating drinking water supplies, and interfering with the habitat for fish, other aquatic organisms, and wildlife.

In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) storm water program. The Phase I program requires communities with MS4s serving populations of 100,000 or greater or sites with industrial or construction activity to implement a storm water management program as a means to control polluted discharges. The Storm Water Phase II Rule, promulgated on December 8, 1999, extends coverage of the NPDES storm water program to certain "small" MS4s and small construction sites. Operators of regulated small MS4s are required to design their programs to reduce the discharge of pollutants to the "maximum extent practicable"; protect water quality; and satisfy the appropriate water quality requirements of the Clean Water Act.

The Phase II program for MS4s is designed to accommodate a general permit approach using a Notice of Intent (NOI) as the permit application. The operator of a regulated small MS4 must include in the permit application, or NOI, its chosen best management practices (BMPs) and measurable goals for each of six

One measure in a Phase II storm water program is the detection and elimination of illicit discharges. EPA has determined that many onsite and cluster systems (typically those that discharge to surface waters) illicitly discharge effluent to storm ditches which drain to storm sewers. In these cases, there must be a permit approach to protect the MS4 from pollutants associated with the onsite and cluster system. The Guidelines can be used to assist NPDES permit applicants in determining appropriate BMPs.

Biosolids and Residuals Management. The 1987 Amendments to the CWA required the development of comprehensive requirements for the use and disposal of sewage sludge (biosolids). As defined in the resulting "Use and Disposal of Sewage Sludge" rule at 40 CFR Part 503, sewage sludge includes the residuals produced by the treatment of domestic sewage (other than grit and screenings) and includes septage from onsite and cluster wastewater treatment systems. The Part 503 rule (along with non-hazardous solid waste disposal requirements under 40 CFR Part 257 and 258 which apply when domestic septage is mixed with other waste sources by pumpers) establish minimum Federal requirements for the proper management of septage from onsite and cluster wastewater treatment systems. EPA has developed supplemental guidance on the management of septage in *Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule*[13] and *Guide to Septage Treatment and Disposal*[14].

Watershed Management. The Guidelines can be integrated into a comprehensive watershed approach at the state, tribal, or local government level. There are clear benefits to managing onsite/centralized systems at basin, watershed or subwatershed levels. Ideally, the use of a watershed approach will facilitate the identification of both existing and anticipated sources of pollutants of concern, e.g., nutrient and pathogens, and allow the appropriate jurisdictions to take coordinated actions to protect or restore an identified resource. In such an approach, short and long-term wastewater management plans and actions for both centralized and decentralized systems can be integrated into a comprehensive plan that may include analyses and actions that address the impacts of other contributing sources of pollutants such as animal waste, wildlife or agriculture. The use of a watershed approach also encourages the coordination of management entities and actions across jurisdictions. Inter-jurisdictional planning and coordination can result in more efficient resource utilization, including data sharing, and also help to avoid inconsistent management policies or requirements that can cause unanticipated consequences such as accelerated growth in adjacent communities due to less burdensome requirements or lower costs.

Water Quality Management (including Total Maximum Daily Loads). Nationally, States have reported in their Clean Water Act Section 303(d) reports that designated uses are not being met for approximately 5,400 water bodies due to pathogens and that approximately 4,700 water bodies are impaired by nutrients[12]. Onsite wastewater treatment systems are often significant contributors of pathogens and nutrients. Under EPA's current requirements a total maximum daily load (TMDL) determination is required when the total loading of pollutants to a water body results in a violation of water quality standards. The Agency promotes the control and management of both point and non-point source discharges on a watershed basis. If onsite and cluster systems are determined to be a significant source of the pollutants, increased management is needed.

The most common approach to resolving problems with onsite wastewater treatment systems has been to replace onsite wastewater treatment systems with a centralized wastewater treatment and collection system. However, a decentralized approach, with a high level of management, is capable of meeting water quality objectives while offering communities a wider range of options. In these situations, these Guidelines can be a valuable tool to use as the basis of TMDL/watershed implementation plans which promote improved management to address identified problems. An appropriate level of management, as

program. In such cases, permit requirements should be consistent with any applicable TMDL and water quality standards.

Water Quality Standards. State and tribal water quality standards do not consistently address pathogen and nutrient loadings. This lack of consistency has been due to a scarcity of information on how to measure, monitor and evaluate the impacts of pathogens and nutrients on water quality. New methods and information are being developed to assist tribes, states and local governments in assessing and developing appropriate management strategies to control these pollutants. EPA is currently developing recommendations for improved methods to measure and document human health risks due to exposure to the most common pathogens and differing concentrations of these pathogens. A thorough discussion is available in the draft *Implementation Guidance for Ambient Water Quality Criteria for Bacteria-1986.*[(15)] EPA is also developing a series of *Nutrient Criteria Technical Guidance Manuals* [what is reference?] for various water body types, e.g., rivers and streams. The intent of these documents is to provide States/tribes with methods to assess waterbody nutrient impairment, select criteria, design monitoring programs, and implement management practices. These factors should be considered during the siting, design, and operation of onsite and decentralized wastewater treatment systems.

Nonpoint Source Program. Congress established the national nonpoint source (NPS) program in 1987 when it amended the Clean Water Act with Section 319. States were required to conduct nonpoint source assessments and develop EPA approved "Nonpoint Source Management Programs." All States and Territories and, as of September 2001, over 70 Tribes (representing over 70% of Indian lands) now have EPA-approved nonpoint source assessments and management programs. Typical categories of nonpoint sources identified and addressed in the state, territorial and tribal assessments and management plans include: agriculture, urban, onsite disposal systems, forestry and hydromodification. In some states, the primary responsibility for managing onsite and cluster systems falls within the purview of the NPS program.

Congress provides funding to assist the states, territories and tribes in developing and implementing their NPS management programs. These funds can be used by states, territories and tribes to address sources identified within in their management programs submissions. States, territories and tribes can use these funds to promote, demonstrate and fund activities relating to onsite and cluster management programs including monitoring, program assessments and development, demonstration projects, research, public education and outreach and system replacement/rehabilitation. The voluntary Guidelines are intended to support the achievement of the goals of the state, territorial and tribal programs as they relate to onsite and cluster program management.

Underground Injection Control (UIC) Program. Certain onsite systems are regulated under the Underground Injection Control (UIC) Program. The UIC program was established by the Safe Drinking Water Act (SDWA) to protect current and future underground sources of drinking water (USDWs) from contamination caused by subsurface disposal of wastes. EPA groups underground injection into five classes (Classes I-V), from deep to shallow. Class V wells include typically shallow, percolating systems, such as dry wells, leach fields, and similar types of drainage wells that overlie USDWs.

Under the existing federal regulations, Class V injection wells are authorized by rule provided they meet certain reporting requirements (e.g. submit inventory information) and do not endanger underground sources of drinking water. EPA recognizes that State, Tribal and local governments commonly regulate onsite systems of varying sizes. Regardless, the UIC program is responsible for ensuring that these entities meet UIC program requirements when regulating large-capacity septic systems (those that accept

accept industrial, chemical, or other non-sanitary wastes, also called "industrial drainage wells" or "agricultural drainage wells."

In 1999, the UIC program undertook two efforts relevant to large-capacity septic systems. First, the program promulgated regulations prohibiting the construction of new large capacity cesspools, and ordered all existing large capacity cesspools to be closed by April 5, 2005. Second, the program completed a comprehensive study of shallow injection wells, including septic systems, that are regulated under the Underground Injection Control Program.[16] EPA found that, 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, and that they are being addressed locally.

Source Water Assessment and 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. The SWAP requires States to conduct source water assessments for all their public water systems. Assessments consist of delineating protection areas for the source waters of public drinking water supplies, identifying potential sources of contaminants within these areas, determining the susceptibility of the water supplies to contamination from these potential sources, and making the results of the assessments available to the public. Assessments for many water systems, such as those in rural areas, are likely to inventory onsite and cluster systems located in delineated source water protection areas and identify some of these as priority pollution threats. Communities are encouraged to consider this emerging information from the assessments as a factor in deciding what level of management of onsite and cluster systems is necessary. 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 also recommends the onsite and cluster management Guidelines as a tool in the protection of drinking water sources.

On June 7, 2002 (67 FR 39583), EPA announced a final determination for all sub-classes of Class V wells (such as large capacity septic systems), not included in the December 7, 1999 final UIC rule. The agency determined that additional federal requirements are not needed, at this time, and existing federal underground injection control regulations are adequate to prevent Class V wells from endangering USDWs. This is based on the actions EPA is taking to improve the performance of onsite and cluster systems through the development of these Management Guidelines.

Coastal Zone Management Act. EPA and National Oceanographic and Atmospheric Administration (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 management measures for both new and operating onsite sewage dispersal systems (OSDS). The measures are described in EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*[17]. 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

Technology Transfer. EPA has recently published the *Onsite Wastewater Treatment Systems Manual* (Onsite Manual) to provide new information on alternative treatment technologies and to promote a performance-based approach to onsite and cluster wastewater system management. This document is an update of EPA's 1980 *Design Manual - Onsite Wastewater Treatment and Disposal Systems*[19]. The Onsite Manual serves as the technical complement to the Management Guidelines and as a reference to identify the environmental, technological, administrative and public health factors to consider when developing an improved management program. The Onsite Manual contains information that can be used by program managers in assessing the environmental impacts of specific onsite and cluster wastewater treatment technologies on both the watershed and individual site levels and in the selection of appropriate technologies.