BUSINESS ATTRIBUTES OF SUCCESSFUL RESPONSIBLE MANAGEMENT ENTITIES

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ABSTRACT AND BENEFITS

Abstract:

Reported septic system failure rates range from less than 1 percent to as high as 70 percent, yet anecdotal reports typically set this range at 30 to 50 percent. However, ongoing and effective management programs have proven successful at greatly reducing failure rates (EPRI, 2000). Responsible Management Entities can provide the administrative framework essential to ensuring that decentralized wastewater treatment systems protect both public health and the environment for the long term. Unfortunately, they have been slow in developing. The study described in this research was conducted to identify successfully operating Responsible Management Entities and find those business characteristics common among them and in the process accelerate their formation.

The project team first defined "Responsible Management Entity" and "success". The team used the definition proposed by Yeager and English (2001) when they coined the term "Responsible Management Entity", rather than the more restrictive definition used by the EPA in their voluntary management guidelines. Defining success proved more challenging, as the definition was developed *after* reviewing the business practices of a number of RMEs. Ultimately, the project team settled on defining "success" as attaining the necessary technical, financial, and managerial capacity needed to operate the business. By this definition of success, the project team found few successful Responsible Management Entities. Significantly, the project team also found that governance is an important issue for the future success of a Responsible Management Entity. Often overlooked, the manner by which the entity is governed must be carefully considered when forming the entity.

The assessment also led to a number of suggested strategies for forming management programs for specific situations. Suggested strategies are presented for three specific situations, including 1) management plans in regions with existing decentralized treatment systems (such as septic systems), 2) management plans for regions with existing development and new treatment systems, and 3) management plans for regions with new development and new treatment systems.

Benefits:

- Identify the technical, managerial and financial practices essential to successfully operating Responsible Management Entities;
- Establish the importance of proper governance of the Responsible Management Entities;
- Provide most appropriate management strategies for various situations commonly encountered in regions with decentralized wastewater infrastructure;
- Facilitate the formation of more Responsible Management Entities to provide long-term management of decentralized wastewater treatment systems.

Keywords: Responsible Management Entity, decentralized wastewater treatment, TMF capacity, governance

CHAPTER 1.0 - INTRODUCTION

1.1 Goals & Objectives

Responsible Management Entities (RME) can provide a vital role in protecting public health and the environment by providing management services for decentralized wastewater systems. Functioning much like centralized sewer districts, a decentralized RME has access to the technical expertise to choose appropriate treatment technologies, oversee installation, and ensure ongoing operation and maintenance. With explosive growth in advanced treatment technologies, and a growing recognition of the environmental damage wrought by existing, unmaintained septic systems (which have been ignored for many years), the need for RMEs is great.

This report summarizes efforts to examine the operations of existing RMEs to determine those attributes that make them successful. In the course of identifying existing RMEs, the project team found that there are few successful ones in operation today. Thus, as much as possible this study is a comprehensive assessment of those organizations.

1.2 Defining a Responsible Management Entity (RME)

The decentralized wastewater industry is composed of numerous small businesses, with innumerable stakeholders presenting significant roadblocks to greater professionalism. Historically, the wastewater community has viewed decentralized treatment systems as a stop-gap measure until a conventional, centralized system can be built. Only recently, as on-site treatment technologies have gained greater acceptance, has the U.S. Environmental Protection Agency (USEPA), the national agency charged with protecting the nation's water, agreed that decentralized treatment can be a long-term solution.

More widespread implementation of decentralized systems, however, will require a greater level of professionalism from the industry than has been demonstrated in the past. For instance, a significant roadblock is the regulatory nature of the decentralized industry, where control of system installation is the responsibility of local county officials. Thus, the approval, adoption and incorporation of new ideas and treatment technologies is left to individual county health officials, some of whom embrace these new ideas and some of whom completely shun them. The result has been sporadic and inconsistent implementation of the USEPA's inclusion of decentralized systems into long-term solutions of meeting the future wastewater treatment needs of the United States.

In order to facilitate this change, RMEs are needed to coordinate the many different needs of homeowners, installers, regulatory officials and other stakeholders. An RME would serve as the administrators of decentralized wastewater treatment districts, and can institute the sort of professionalism needed by the industry.

There is no commonly accepted definition of a RME. Yeager and English (2001) defined the term as follows: "A legal entity that has the technical, managerial, and

financial capacity to ensure the viable, long-term, cost-effective, centralized management, operation, and maintenance of decentralized wastewater systems in accordance with appropriate regulations and generally accepted accounting principles." The authors of the term intended to incorporate two key concepts into this definition, including:

- *The technical, financial, and managerial (TMF) capacity of a decentralized RME must be evaluated just as the Safe Drinking Water Act (SDWA) requires evaluation of the TMF capacity of a public water system; and,*
- *Management entails more than operation and maintenance and needs to be evaluated separately.*

This definition is somewhat different from the way the term is used by the EPA in their voluntary management guidelines (USEPA, 2003). In that document, the EPA restricts the use of the term to entities operating under either management models 4 or 5, as described below. However, it can be argued that the term is used in a broader fashion throughout the onsite industry to include local governmental units operating model 3 (i.e. permit) management systems. The project team adopted this broader use of the term.

During the early stages of the project when the project team was trying to find the most effective ways to identify appropriate business attributes, members of the project team from the National Rural Electric Cooperative Association (NRECA) stated that their experience has shown that an entity's "governance capacity" is just as significant as the entity's TMF capacity in ensuring business success. Governance capacity includes how the RME's governing body is selected, how effectively the governing body undertakes their responsibilities, and how accountable the governing body is to the RME's customers and appropriate regulatory agencies.

Based on these observations and the project team's prior expertise, the study was undertaken to evaluate successful RMEs in terms of their technical, managerial, financial and governance (TMFG) capacity and to facilitate the development of more RMEs throughout the United States.

1.3 EPA Management Levels

The project team first sought to identify successful RMEs. The goal was to identify those agencies and organizations that are operating a decentralized sewer district in the mode of the EPA's management models 4 and 5 (USEPA, 2003). In other words, the goal was to identify RMEs which were providing management along with operation and maintenance of decentralized systems, with ownership by either the homeowner or the RME.

The 2003 EPA Management Handbook describes their five models of management of on-site systems. The handbook is quite detailed in their discussion of each of the five models, but the five models can be more simply described as follows:

- Model 1 – Homeowner awareness
- Model 2 – Maintenance contracts
- Model 3 – Operating permits
- Model 4 – Responsible management entity operation and maintenance
- Model 5 – Responsible management entity ownership

The complexity of each model increases as a management program grows from Model 1 to Model 5. Model 1 is limited to providing homeowner education on proper maintenance of septic systems. Model 5 represents the conditions encountered in urban areas in the United States served by a wastewater district, where the district owns everything downstream of individual home laterals. In many locations where decentralized wastewater treatment predominates, it is quite likely that a mixture of the various models will be necessary.

As the project team learned more about the status of RMEs currently operating around the country, it became apparent that limiting the review to RMEs operating under management models 4 and 5 presented problems for two reasons. First, there are very few operating models, which would limit the amount of information that could be collected for analyzing successful business models. Second, it is apparent that a number of model 3 programs are currently operating quite successfully in different parts of the country. Thus, the project team made the decision to include a handful of successful model 3 programs in the assessment, which include some of the largest and longest-running onsite programs in operation today. Their inclusion is essential both for comparing and contrasting to successfully operating models 4 and 5 and as a viable option for those locales without any formal program.

This report is intended to provide guidance to organizations interested in fulfilling the role of a Responsible Management Entity. Thus, based on the results of the research described in this document, recommendations on a "suggested strategy" are given for different circumstances commonly encountered in the United States today.

CHAPTER 2 - METHODS

2.1 Summary of Efforts

Identifying the best practices of existing Responsible Management Entities can best be accomplished through a broad assessment of current practices. Thus, the research process consisted of information-gathering using a variety of sources, analysis of the data, and the development of recommendations based on the analysis. The project team first sought to identify agencies and organizations presently operating as Responsible Management Entities in the decentralized wastewater area. Once identified, a variety of methods were used to determine their success. Those agencies that passed this initial review were then assessed in more detail, including, in select cases, site visits from the project team. The fifteen agencies detailed in the next chapter were identified as successes, and were chosen for additional assessment based on their diversity in size, business organization, geographical location, and socioeconomic regions they serve. Specific steps used in this assessment are described in more detail below.

2.2 Identify Source

When the project was first conceived, the team intended to develop a comprehensive list of all potential RMEs in operation within the United States, but given the industry's fragmented nature, this goal proved very difficult to achieve. It was further complicated by restrictions placed on the project team relative to the number of individuals associated with these RMEs that could be contacted.

Thus, the project team developed a list of potential RMEs through more indirect means. First, the team identified potential RMEs through a systematic approach of consulting a variety of sources and contacting various industry experts. National experts within the onsite industry, along with the literature, provided the names of a number of potential RMEs currently in operation. Thus, much of this task involved pursuing more information about the companies and agencies on these lists to assess their veracity.

2.2.1 Intensive Literature Search.

One of the more significant approaches to identifying potential RMEs was to assess a wide variety of sources within the literature. The National Decentralized Water Resources Capacity Development Project (NDWRCDP), which was a $ 10 million research project by Washington University in St. Louis, funded a study by the Rocky Mountain Institute (RMI) of Aspen, Colorado. In the course of their research, RMI conducted a search for potential RMEs and from their search developed a number of case studies of RMEs. Their search yielded a number of unique contacts, and thus the RMI database was used as the basis for this project's comprehensive list. A second, major source of potential RMEs came from a National Rural Electric Cooperative Association (NRECA) database of member cooperatives involved in wastewater operations.

Using these sources, along with additional potential contacts solicited from national experts from the onsite industry, the project team proceeded to assess their activities and business structure by pursuing information on them that could be obtained in various ways without directly contacting the individual agencies. Websites on the

internet, past conference proceedings and papers were reviewed, and personal contacts were interviewed to determine if the agency met the criteria sought for further study.

2.2.2 Contact through Industry Experts

The concept of a Responsible Management Entity is relatively new and the industry is disaggregated into innumerable small businesses, so any attempt to identify RMEs requires pursuing a large amount of hearsay. Thus, initial data collection efforts focused on contacting a variety of industry experts to identify potential candidates. The task was completed efficiently using the prior knowledge of two team members who were on the Project Advisory Committee for the NDWRCDP. These individuals were able to use the resources of the NDWRCDP in the course of their advisory committee activities to provide the names of numerous candidates without directly contacting any of them. Further, identification of a potential RME often led to the identification of other potential RMEs.

More often, however, this approach yielded a list which included many names of candidates which had already been identified. It became apparent that much of the discussions of RMEs' business practices focus on the same small handful of entities. Further, what is meant by a RME differs, depending on the user's interpretation. These distinctions are considered in more detail in the next chapter. It should be noted at this point that these differences led, in part, to the inclusion of a few Model 3 programs in this assessment. Their inclusion was deemed essential if the final analysis was to provide the sort of guidance the project team hoped it would provide.

2.3 Develop Master List

The intensive search to identify potential RMEs led to the development of a long list of various agencies, organizations, municipal governments, and private companies that could be Responsible Management Entities. The list of organizations included over 30 water and sewer districts, 24 rural electric cooperatives, 29 county and municipal governments, and two private companies. A number of organizations were mentioned by experts or otherwise identified as potential RMEs, but a cursory review of data sources showed them to not be; these are not included in the master list. The names and locations of these organizations are included in Table 2-1. The names of the agencies in Table 2.1 are grouped according to the type of agency, as noted above. While the intent was to make this list as comprehensive as possible, there are no claims that it is so.

Table 2-1. List of Potential Responsible Management Entities

Rural Electric Cooperatives	
Name	Location
Barrow Utilities & Electric Coop	Barrow, AK
Inside Passage Cooperative	Auke Bay, AK
Covington Electric Coop	Andalusia, AL
Pioneer Electric Coop	Greenville, AL
Tohono O'odham U.A.	Sells, AZ
Talquin Electric Coop, Inc.	Quincy, FL
Monroe Co. Electric Coop	Waterloo, IL
City of Stockton, KS	Stockton, KS
Inter-County Energy Coop Corp	Danville, KY
People's Coop Services	Rochester, MN
Intercounty Electric Coop Assn.	Licking, MO
Platte-Clay Electric Coop, Inc.	Kearney, MO
United Electric Coop	Maryville, MO
White River Valley Electric Coop	Branson, MO
City of Stromsburg	Stromsburg, NE
Central Electric Coop, Inc.	Parker, PA
Northwestern RECA, Inc.	Cambridge Springs, PA
Somerset REC, Inc.	Somersete, PA
Joe Wheeler REC	Alabama
Tideland REC	Pantego, NC
Sterns County	St. Cloud, MN
Connexus WaterWays	Ramsey, MN
Clark Energy Coop	Preston, KY

County & Municipality Governments	
Name	Location
Hamilton County HD	Ohio
Charlotte County HD	Florida
Austin, Texas	Austin, TX
Brookfield Township	Michigan
Springfield Township	Michigan
McKemie Park	Virginia
Conewago Twnship	Hanover, PA
Toms Creek Basin	Blacksburg, VA
Union Township	New Jersey
Boone County, MO	Columbia, MO
Lester County	Kentucky
Savannah, NY	New York
Broad Top Twnship	Defiance, PA
City of Sharon	Massachusetts
Lake Panorama, IA	Guthrie Co HD
Cerro Gordo County	Iowa
Town of Gardiner	Ulster Co, NY
Town of Crawford	Orange Co, NY
Town of Montgomery	New York
Town of Cuyler	Courtland Co, NY
Livingston Co. HD	Mt. Morris, NY
Cayuga Co HD	Auburn, NY
City of Nags Head	North Carolina
Wabedo Township	Minnesota
Larimer Co. HD	Wellington, CO
Jefferson Co. HD	Golden, CO
Town of Gloucester	Gloucester, MA
Schyler Co. HD	Montour Falls, NY

Water , Sewer & Other Special Purpose Districts			
Name	Location	Name	Location
Stevens County PUD	Washington	Stinson Beach WD	California
Phelps Co Water District	Rolla, MO	Mobile Area W&S	Mobile, AL
Skagit Co. Clean Water District	Starbuck, WA	Sea Ranch Onsite Disposal WW Zone	Sea Ranch, CA
Pena Blanca WSD	Pena Blanca, NM	Paradise, CA	Grass Valley, CA
Otter Tail Management Dist	Duluth, MN	Clay Iowa Reg Water	Iowa
Duluth/North Shores San Dist	St. Louis Co, MN	SIRWA	Creston, IA
Crystal Lakes W&S Assoc	Crystal Lakes, CO	Rathbun Reg WD	Rathbun, IA
Washington Island UD	Wisconsin	Rural Utility Service	Iowa
Georgetown Divide PUD	Georgetown, CA	Will County HD	Joliet, IL
North 10 Mile Lake SD	Cass County, MN	Otter Tail WMD	Otter Tail Co, MN
Shingobee Island SD	Cass County, MN	Kabetogama SD	St Louis Co, MN
N. Long Lake SD	Crow Wing Co, MN	Jt Power Board 30 Lakes Watershed	Crow Wing, MN
Grand Lake Assn.	St. Louis Co., MN		

Private Companies			
Name	Location	Name	Location
On-site Systems, Inc.	Nashville, TN	EcoCheck, Inc.	Forest Lake, MN
Applied Water Management, Inc.	New Jersey		

Note: HD = health department

2.4 Selection of RMEs for Follow-Up Evaluation

The project team next judged each of the potential RMEs listed in Table 2-1 to determine whether it was a success. In order to make this judgment, the meaning of "successful RME" had to be first established. As noted above, the term "RME" has been used in a number of ways by different stakeholders within the decentralized wastewater industry. The intent of this study was to focus on those management entities that would fall under the EPA management models 4 and 5, so at the outset the project team focused only on models 4 and 5. However, as more information was developed about the different entities in Table 2-1, it became apparent that some of the better examples of EPA management model 3 (i.e., a permit system) should be included in the assessment. As will be explained in the following chapter, management model 3 has been successfully adopted in many places and, based on observations made during this project, can be an effective strategy for addressing failed septic systems.

Establishing what constitutes a success proved to be a challenge. (In fact, the criteria used for success were not identified until *after* the data was analyzed.) Ultimately, however, the project team recognized that successful RMEs had the technical, managerial, financial and governance capacity needed to ensure its long-term survival. Admittedly, this is a circular argument as the criteria for judging success can only be detailed once the business operations of candidate RMEs were evaluated. Nonetheless, specific attributes of a successful RME include:

- it retains technical expertise in appropriate collection and treatment technologies either through subcontractors or on staff;
- it retains expertise necessary to provide professional management of all aspects of RME's business operations on staff;
- it has either the customer base or financial backing of a private or governmental entity to cover the cost of the professional management staff and the RME's business operations;
- it is governed in a manner where a governing body sets policy and the professional staff makes the daily decisions necessary to ensure long-term survival.

These attributes are discussed in greater detail in Section 3.3, Commonalities.

2.5 Development of the Discussion Guide

Prior to contacting any RMEs, the project team next developed a method of assessing the business operations of the organizations, by developing a detailed guide for use in assessing the business operations. The discussion guide includes a number of questions to assess each organization's technical, managerial, financial and governance capabilities. Project team members from the NRECA provided assistance in developing questions to assess the organization's governance.

Rural electric cooperatives, like many nonprofit organizations that pursue "public good" goals, are governed by a board of directors which are elected by the members of the cooperative. NRECA research has shown that the composition of and expertise among the board members is crucial for the business success of the cooperative (Hall,

2004). Therefore, the project team added questions to assess the organization's governance to better gauge the relatively importance of this component to its business success. Given the importance of considering governance as part of the overall assessment of the individual RMEs, the project team devised a discussion guide meant to assess the technical, managerial, financial and governance (TMFG) capabilities of the RME.

A copy of the discussion guide used in the study can be found in the Appendix. The guide was not simply an interview form; instead, it served as the basis for discussions which often wandered far from the questions included on the guide. Thus, the project team's discussions with the targeted RMEs were not interviews but rather the basis for detailed and ongoing evaluations of the organization's business practices. This approach required establishing a working relationship with contacts within the RME to better establish appropriate business practices.

2.6 Discussions with Selected RMEs

Using the discussion guide, project team members proceeded to contact selected RMEs and ask questions to ascertain the selected company's business practices. Some of the selected RMEs were visited in person while others were contacted via telephone or email. The results of these discussions were summarized on the discussion forms. The results from these discussions comprise the summaries of the individual RMEs presented in section 3.2.

CHAPTER 3.0 DATA ANALYSIS

3.1 Introduction

Given the fractured nature of the onsite industry and the lack of national regulations governing it, it would be very challenging to develop a comprehensive list of RMEs currently active in the country. However, the list of potential RMEs given on Table 2-1 contains a broad array of local governmental entities, special purpose districts, rural electric cooperatives and private companies currently functioning across the nation.

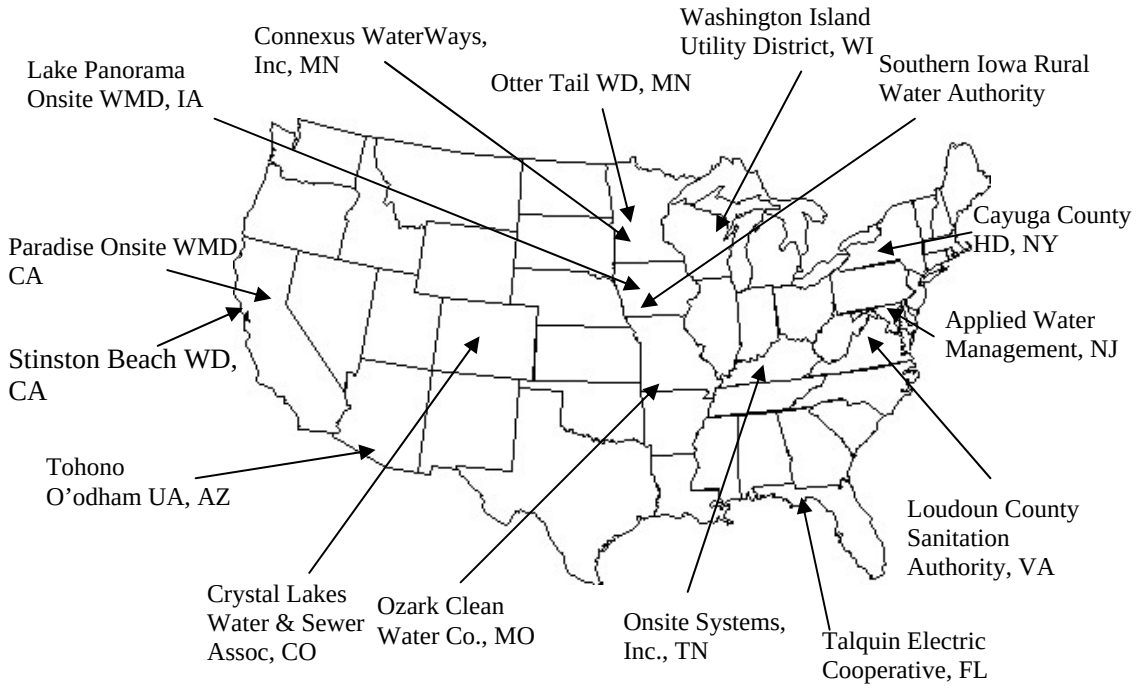
Once review the preliminary information commenced, it became quickly apparent that a great number of the entities listed on Table 2-1 were not model 4 or model 5 RMEs, or were not working well. Further evaluation of these entities was deemed fruitless because the overall intent of the project was to provide information to further the growth of additional RMEs throughout the country. In fact, once this preliminary review was complete, it was apparent that the current universe of model 4 or model 5 RMEs in operation was quite small. However, the preliminary review also identified a number of agencies (usually county health departments) operating very successful permitting programs (i.e. USEPA model 3 programs). Thus, the project team chose to include a handful of these programs in this review in recognition of the obvious value these programs can bring to ensure the long-term management of decentralized wastewater systems.

Of the more than 80 agencies listed in Table 2-1, fifteen were chosen for further study. These 15 were chosen based on their proven effectiveness or promise of future success, and their great diversity. This diversity includes the socioeconomic regions they serve, ranging from a rural county in Iowa to exurban portions of California's central valley, as well as the geography of the region. The 15 agencies represent a wide array of ways by which a region can ensure long-term management of decentralized wastewater, and include governmental agencies with taxing authority, nongovernmental organizations where participation with the RME is voluntary, and regulated private companies. By developing a diverse list, the project team hoped to ensure that any attributes common to all would be essential to a RME's success.

3.2 Summary of the Responsible Management Entities Studied

A total of fifteen organizations were carefully reviewed to ascertain the potential for common business practices. Nine of these were directly contacted; information on the remaining six was collected from various information sources, including websites, published papers, and through prior project work conducted by team members. This summary should not be considered a comprehensive list of RMEs currently operating in the United States. Instead, this discussion includes a wide range of RMEs that were evaluated to determine business commonalities. A graphical representation of the fifteen entities is given in Figure 3.1.

Figure 3.1 Locations of RMEs in Detailed Evaluation



3.2.1 Lake Panorama, Iowa

3.2.1.1 Description

Lake Panorama is 5,100 acre rural development in Guthrie County, Iowa. The development is a private community which is governed through the Lake Panorama Association (the Association), which issues dues and assessments and ensures that all homeowners within the community sign and abide by the homeowner covenant. The Association acts as a municipal government in that it provides potable water service, maintains roads, registers boats used on the lake, operates and maintains a golf course, and (through an allied organization) periodically dredges the lake.

In 1980 the Association assisted the County Board of Health in developing the Lake Panorama On-site Wastewater Management District, which operates under the Guthrie County Health Department. Today, there are approximately 1,100 systems managed under by the district, with the vast majority being septic systems serving individual family homes. However, the community continues to grow, adding between 15 and 25 homes per year.

The lake and community serve as a resort for many Des Moines residents, so the development has a mix of part-time and full-time residents. It was the lake's resort status, combined with concerns over pollution of the lake from failed septic systems that led to the formation of the district. Given the district's long operation and his intimate familiarity with the District, the Guthrie County sanitarian was interviewed for this study.

3.2.1.2 Technical, Managerial and Financial Capacity

The onsite district is operated on a day-to-day basis by the Guthrie County sanitarian and his staff as an EPA Model 3 program, or permit system. The sanitarian conducts inspections of all septic systems within the district on a routine basis. Every septic tank is inspected at least every three years. Operating permits are issued to each

system. According to the county sanitarian in charge of the district, the frequency for inspections has been established over the life of the program through trial and error.

The costs of the annual septic system permit fee, time-of-sale inspection fee, and percolation test fee are $ 200 each. In all cases, these fees are higher than the fees for similar tests in other parts of Guthrie County. (For instance, the cost for a percolation test is $150 for elsewhere in Guthrie County). There are separate fees for clusters, secondary treatment systems, and septic tank inspections (i.e. if the tank cover is removed). The district uses these fees, which are paid to the Guthrie County Board of Health, to manage the program. The on-site district expenses are rolled into the Health Department's (and thus the County's) overall budget and reimbursed by the County assessor, so the budget for the program is not separate. According to the sanitarian, which has been with the program since its inception, overruns can be covered by property tax receipts. However, given that only some of the fees and assessments associated with the onsite management district are itemized (others are lumped into other categories), it is impossible to determine if the program incurs any overruns. Given that the district requires homeowners to cover any costs associated with fixing problems and that it relies on county employees to conduct inspections, overruns are not significant. The fees generated by permits and construction fees pay for the ongoing inspections, which are conducted yearly on permanent residences and every other year on part-time ones.

Property owners who must pump their septic tank select a pumper from a list of approved contractors and pay for the pumping directly. The pumper contacts the district upon completion of job. The county ordinance requires that all homeowners within the development join the district. The lake association has the authority to shut off the water supply for any property owner who does not pay the permit fees.

After twenty years of operation, the district averages only about one system failure per year. The county sanitarian reviews all new installations, fences off the disposal site and meets with installers prior to construction, and allows only four installers to complete about 90 percent of all installations.

3.2.1.3 Governance Capacity

The Lake Panorama Onsite Wastewater Management District operates under the supervision of the Guthrie County Board of Health, but direct oversight of the activities of the County sanitarian is the responsibility of a five-member administrative committee. The administrative committee members are local residents appointed by the County Board of Health, three of whom are selected from recommendations provided by the Association. The administrative committee, which meets monthly from April through November, reviews the sanitarian's inspection reports, has the authority to issue variances, and can order the Association to shut off potable water to anyone within the District who does not fix an identified problem.

The average tenure of administrative committee members is about ten years, and all of the current members have been on the committee for at least that long. Membership on the administrative committee is voluntary; no reimbursement is given for meetings, training, or time. The monthly meetings are held at the Association's offices within the development; the committee members are also residents, so there is no need to reimburse travel expenses. Further, committee members are often very familiar with individual homeowners and a rich source of information on specific issues associated with specific homes.

3.2.1.4 Summary

The district operates under EPA management model 3. The systems are owned by the property owners, and the district issues permits for construction and operation of the systems. Given that most of the onsite systems under the program are conventional septic systems, the program's principal focus has been to ensure and verify that septic tanks are regularly pumped. The district operates administratively within the county's Health Department, but is specifically focused on septic system management. Given its public status, it has the enforcement authority to ensure that its demands are enacted by residents.

3.2.2 Southern Iowa Regional Water Authority

3.2.2.1 Description

Southern Iowa Regional Water Authority (SIRWA) provides water to about 10,000 customers in all or part of nine different counties in southern Iowa, including Union, Ringgold, Adair, Madison, Cass, Adams, Decatur, Clarke, and Taylor. SIRWA is one of several regional water authorities serving the rural portions of Iowa, and has been in existence for about 30 years. Regional water authorities were formed in Iowa to provide safe and clean drinking water to a region with poor groundwater quality and few surface water sources.

SIRWA is not new to wastewater treatment, as the organization currently operates wastewater systems for nine communities. The systems are quite small, and consist of gravity collection with treatment by facultative lagoons. Individual statistics of the nine communities are presented on Table 3-1.

Table 3-1. Statistics on nine community wastewater systems operated by SIRWA

Location	No. Lift Stations	No. Connections	No. Grinder Pumps
Arispe	1	54	3
Blockton	2	113	2
Cromwell	2	55	0
Decatur City	0	110	4
Gravity	2	99	4
Orient	3	211	6
Sharpsburg	1	46	1
Tingley	1	123	4
Woodburn	1	105	5
Totals	13	916	29

In 2004, SIRWA commenced operating a decentralized system in Shannon City, IA under EPA management model 5. The town has a total of 48 connections with about two-thirds of the connections served by peat filters installed on the homeowner's property and one third served by conventional septic systems. SIRWA's efforts in Shannon City are the current limit of the organization's emphasis on onsite wastewater treatment management, as the other systems they manage are conventional gravity ones. However, given the Authority's commitment to providing both water and wastewater to rural communities in southern Iowa and their intent to continue using the decentralized approach in the future, this RME was chosen for further study.

3.2.2.2 Technical, Managerial and Financial Capacity

SIRWA worked with the local county health department sanitarian and local staff from U.S. Department of Agriculture's Rural Development (RD) in the design of the

systems for Shannon City. The Union County sanitarian, along with assistance from RD, designed individual onsite treatment systems for all homes within Shannon City. Depending on the soil analysis and size of the building lot, each home is served by either individual septic tanks tied to community leach fields or a septic tank followed by a peat filter and leach field. Staff from RD, SIRWA and the county sanitarian jointly chose to install peat filters wherever there was insufficient space for a leach field or unacceptable soil conditions. The choice of peat systems was based both on the passive nature of the treatment system and the existence of the manufacturer's warranty. Equipment purchase and system installation was determined through a bid process using prequalified contractors, and was covered using a combination of grants and loans from Rural Development.

Initially, a conventional gravity sewer system with a facultative lagoon was proposed for Shannon City and construction costs were estimated at approximately $12,000 per person. With an average income within the city of only $ 13,000, this was deemed unacceptable. The County sanitarian and staff from RD then assessed the potential for using on-site treatment systems. Based on a preliminary review of the town the decentralized approach was estimated at approximately $ 7,000 per person and so was pursued. Unfortunately, once property lines were better determined the project team found that more peat systems were needed and fewer community leach fields were possible. The final construction costs averaged approximately $ 10,000 per person, which was lower than the centralized approach but much higher than initially anticipated.

Wastewater customers from Shannon City, as with all of SIRWA's wastewater customers, are given one bill for both sewer and water. In the event that the homeowner does not pay his or her sewer bill, SIRWA has the authority to shut off water service. In order to minimize labor costs associated with operating and maintaining the on-site treatment systems, the Authority personnel assigned to serve the portion of SIRWA's service territory where Shannon City is located was cross-trained in the operation of the on-site systems. Maintenance is minimal, so staff is only required to check the septic tanks and rake the peat filter annually. SIRWA's administrator does not feel that the attention that must be paid to the onsite treatment systems has proven excessive.

SIRWA has found that most Shannon City residents have accepted the new sewer service without much complaint. SIRWA owns the treatment systems and bases monthly fees on the residents' metered potable water use. The monthly fee is $ 16.00 plus $0.50/100 gallons of water consumed over 2000 gallons, which is identical to the rate SIRWA charges other rural communities for wastewater services (regardless of system type). Typically, these communities include gravity sewers and treatment with facultative lagoons. The rate translates into monthly bill of $ 42 per month for a "typical" family of four (based on average consumption of 60 gallons per capita per day. SIRWA has found that water use within the City is typically much lower than national averages; given the flow-based nature of the rate, revenues have been lower than projected. It has been speculated that the low water use is mostly the result of the historically miserly use of water when the residents used individual wells with poor water quality.

SIRWA has a different rate for sewer service within the towns it serves from the rate charged to rural areas, like Shannon City. In towns with typical centralized sewers,

the sewer bill is based on water use, so the classic "family of four" pays under $ 20 per month (reflecting the fact that the centralized systems have better economies of scale).

The SIRWA administrator admits that the current rate structure does not completely cover costs for the decentralized customers of Shannon City; thus, the centralized wastewater customers and water customers of SIRWA cover some of the decentralized system costs (chiefly administrative costs). However, SIRWA provides this service because they view it as essential to their mission. The monthly fees at Shannon City cover only operation and maintenance costs; there is no reserve fund for equipment replacement in the future. The governing board of SIRWA intends to revisit this issue as more decentralized systems are installed and currently plans to establish a reserve fund in the future.

3.2.2.3 Governance Capacity

SIRWA is incorporated as a 357(a) corporation. It is run much like an electric cooperative with an elected Board of Directors. SIRWA daily operations are performed by six full-time managers and 29 staff members. The Authority's activities are reviewed by a seven member Board elected by those served by the Authority. The Board members come from different regions within the service territory. The Board members are paid a $15 per hour for their time plus travel, and meet monthly for about four hours each meeting. There are no term limits, and the administrator feels this is a crucial rule as they have difficulty recruiting quality Board members. In the administrator's opinion, it takes about three years for a Board member to know the system, so term limits would force the paid staff to be constantly training new Board members. The SIRWA Board is fairly progressive and nearly unanimous in their support of the Authority getting into the business of maintaining on-site wastewater treatment systems.

3.2.2.4 Summary

The Shannon City operation is in its infancy, but given SIRWA's prior experience with wastewater systems and its stated commitment to the rural parts of southern Iowa, its future should be considered bright. The Authority intends to continue with long-term expansion into decentralized wastewater treatment systems, and in fact has several new systems under design.

The Authority has encountered some problems at Shannon City, including installation costs higher than projected, and revenues lower than projected, but the consensus among the Board of Directors is that these issues are temporary. However, the Authority is emphasizing small clusters rather than the individual, decentralized approach employed in Shannon City. Thus, SIRWA's long-term growth plan includes constant discussions with small towns within their service territory to provide sewer systems with construction on decentralized sewer systems (STEP collection systems with treatment in lagoons) scheduled for two more towns in 2006.

Population loss is a major concern throughout the state of Iowa. The Authority's administrator points out that the population of Iowa communities with sewer service typically stabilizes or grows, while those without sewer service continue to decline. The authority has established good working relationships with local health departments and the Iowa Department of Natural Resources. These relationships with the Iowa regulatory community give SIRWA the legitimacy necessary to serve as a long-term RME.

3.2.3 Connexus WaterWays

3.2.3.1 Description

Connexus WaterWays and EcoCheck, Inc. collaborate to provide decentralized wastewater services to portions of suburban regions around the Minneapolis-St. Paul metropolitan area. Connexus Energy is a rural electric cooperative and EcoCheck is the operations and maintenance division of North American Wetlands Engineering, a design firm that specializes in decentralized wastewater treatment solutions. The two companies have teamed to provide decentralized wastewater treatment to a portion of Connexus customers. Connexus represents about 25 percent of EcoCheck's business as a decentralized wastewater system operations and management company. EcoCheck also contracts with a variety of homeowners associations, special purpose districts, and individual businesses. The Connexus/Ecocheck team approach has proven successful given their steady growth in customers served. This section focuses on wastewater customers served by Connexus Energy through their subsidiary, Connexus WaterWays, which operates under EPA Model 5. The information presented in this section is based primarily on a site visit completed in the fall of 2005.

3.2.3.2 Technical, Managerial and Financial Capacity

Under the business arrangement the two companies have established, Connexus owns the systems and provides administrative oversight, including billing and other back office services, and Ecocheck is the operation and maintenance services company. Ecocheck operates a variety of decentralized treatment systems for its many customers, including wetlands, recirculating sand filters, fixed media filters, peat filters, drip irrigation systems, and several types of subsurface discharge systems, along with surface water discharges. Given EcoCheck's wide expertise in operation and maintenance, Connexus does not limit the types of treatment process it uses in the systems it owns. However, to date the two companies have teamed on nothing but cluster systems for new developments.

Connexus WaterWays employs a variety of treatment methods for the onsite systems it owns and operates, including peat filters, constructed wetlands, recirculating sand filters, and Advantex® textile filters. System capacities range from 6,300 gpd up to 86,300 gpd. All systems are discharged via subsurface disposal. Connexus hires an independent evaluation of any new system prior to entering an agreement to own or operate the system. This enables the company to ensure that the treatment system design is adequate and can be properly maintained.

Approximately 25 percent of EcoCheck's customers are subordinate sanitary sewer districts (SSSDs), which are special purpose districts unique to the state of Minnesota that enable a group of homeowners to form a district to provide a specific public service. The service can be almost anything, so the focus of these districts can range from animal control to water to road maintenance. The law makes them easy to form but harder to dissolve: formation of the district requires only a majority of the affected homeowners to agree, but requires a supermajority (75 percent) to dissolve.

The law also stipulates that the district must be administered by the township or county where the SSSD resides. By mandating the involvement of the local government, the SSSD planners must complete a level of prior planning not normally found with more "ad hoc" arrangements, such as homeowners' associations. Table 3-2 provides a measure of the detail often required from SSSDs by local government. It compares the

project monthly costs necessary for a reserve fund based on various assumed interest and inflation rates. As can be seen by the detail provided in the table, the specific projections are highly contingent on the specific site and are particularly impacted by the number of connections.

Table 3-2. Comparison of Asset Replacement Costs for a 107 home cluster in Minnesota under various interest rate and inflation rate scenarios.

Cost	Scenario A	Scenario B	Scenario C
(1) Annual Monitoring, Operating and Maintenance Costs	$ 24,807	$ 24,807	$ 24,807
Capital Replacement Costs			
Anticipated Rate of Return	2 %	0 %	2 %
Anticipated Inflation Rate	0 %	0 %	2 %
Asset Life (years)	30	30	30
Asset Current Cost	$ 578,095	$ 648,571	$ 648,571
Future Asset Replacement Costs	$ 578,095	$ 648,571	$ 1,174,796
NPV of Future Asset Replacement	$ 319,149	$ 648,571	$ 648,571
(2) Cash Recovery/Payments	$ 14,250	$ 21,619	$ 28,959
Future Value of Payments	$ 578,095	$ 648,571	$ 1,174,796
Annual Replacement Fee per Home	$ 130.73	$ 198.34	$ 265.68
(3) Total Annual Costs (1) + (2)	$ 39,056	$ 46,426	$ 53,765
Monthly Cost per connection (3/(12*107))	$ 29.86	$ 35.49	$ 41.11

Connexus charges monthly fees that vary depending on the complexity of the system operated and the management arrangement, and range from $ 29.50 to $ 48.00. A breakdown of a "typical" monthly rate is given on Table 3-3. Of this rate, operation and maintenance accounts for between $ 10.00 and $ 20.00 per month. Thus, the balance of the fee from Connexus includes costs for replacement of large items, emergency funds, septic tank pumping, and various testing and reporting fees.

Table 3-3. Representative breakdown of monthly fee for Connexus-owned treatment system

Operations, sampling & testing	$ 16.50
Utilities and permit fees	$ 4.75
Maintenance	$ 5.20
Capital Replacement	$ 18.50
Costs are for a 10,000 gpd system with pretreatment. All values are approximate.	

Based on EcoCheck's experience with Connexus and with working with other SSSDs, the EcoCheck staff now offer a service to interested parties, including groups interested in planning a SSSDs and homeowners associations, of determining appropriate monthly sewer rates. Based on their efforts, a monthly rate of $ 25 to $ 40 is necessary in order to properly account for all costs and to put some funds aside in emergency pools for replacement of "big ticket" items within the collection or treatment system.

The Connexus/EcoCheck partnership operates under management model 5 for approximately 400 connections. Wastewater customers receive a monthly bill for the service on their Connexus electric bill, and contact Connexus on questions concerning service. Connexus serves as the point of contact for homeowners and developers interested in third-party ownership and maintenance of on-site treatment systems, and

they present some information on their website (www.connexusenergy.com). However, technical issues including system design, and all maintenance responsibilities and emergency service calls are handled by EcoCheck. Further, EcoCheck staff determines when septic tanks should be pumped and delegates major repairs to subcontractors.

3.2.3.3 Governance Capacity

Connexus manages its wastewater service through a separate division known as Connexus WaterWays, which operates under the company's Retail Services that includes Connexus Security and Automation. The entire group experienced an 8.1 percent increase in revenue in 2003 with total sales of $ 1.4 million, suggesting a profitable future. The activities of the Retail Services group are managed through the company's Board of Directors, which includes (as with any rural electric cooperative) nine members, a chair and vice-chair, a secretary/treasurer, and an administrative assistant.

Connexus WaterWays is not a regulated public utility; instead, it operates as a division under the electric cooperative and is governed by the rules under which the cooperative operates. Once a customer enters into an agreement with Connexus, the system is the property of Connexus in perpetuity. In the five years that Connexus WaterWays has been in business, there have been no problems with customers unhappy with the performance of their systems.

3.2.3.4 Summary

Connexus currently owns 12 cluster systems. Connexus Energy's overall financial strength allows Connexus WaterWays to sustain complete design, installation and maintenance services throughout the entire build out process of the development. Thus, Connexus works with a developer to select a treatment system and provides construction oversight while the developer installs the systems; at the conclusion of the project, the developer deeds the system to Connexus. This enables the electric cooperative to exercise control of the system installation yet not be burdened with installation costs, which is a strategy used by other RMEs assessed, including Ozark Clean Water Company (section 3.2.6) and On-Site Systems (section 3.2.8). Importantly, Connexus has declined some offers from some developers where they deemed construction control was not sufficient.

3.2.4 Otter Tail Management District

3.2.4.1 Description

The Otter Tail Water Management District, located in west central Minnesota, recently celebrated its 20th anniversary as a method of protecting local water quality through the management of onsite wastewater systems. The district covers a portion of Otter Tail County that includes 6 lakes in four different townships, along with a portion of the City of Otter Tail. The district's history, formation, governance and structure are described in detail by Christopherson and Anderson (2004). Briefly, the District was formed after an educational program developed by a group of citizens concerned with declining water quality in Otter Tail Lake led to 85 percent of property owners agreeing to form a sanitary district. The district was formed under Minnesota statues governing the formation of subordinate sanitary sewer districts (see section 3.2.2.2).

The district has proven to be a resounding success, and Christopherson and Anderson (2004) provide documented evidence of the improvements to the water quality in the local lakes. The information included in this section was collected principally from

the above reference paper along with discussions with staff of the University of Minnesota extension service.

3.2.4.2 Technical, Managerial and Financial Capacity

Residents formed the district in 1984 to address concerns about deteriorating water quality, which is the basis for a very strong tourism-based economy. The program consists of two tracts, or programs, from which homeowners can choose. Homeowners in both programs receive regular inspections and information from the District. In addition, the District maintains records on all systems. However, in the "passive" program the owner pays for the maintenance, repair and replacement of the system. In the "active" program, the District provides all maintenance and repair. The two-tiered approach was adopted because about 75 percent of the residents are seasonal. It is unknown how many residents are in the passive program, but based on overall budget and the District's rate structure, it is safe to assume that the majority of seasonal residents are in the passive program, while the permanent residents and resorts and business are in the active program.

All cluster systems are required to be in the active program. Individual homeowners choose which program to participate in at the time of construction. Those electing to be in the passive program can go to the active program at any time, but once on the active program the property cannot go to the passive one. Since the District was formed, 850 individual onsite systems and 16 cluster systems were installed. The construction and engineering costs were covered by more than $ 5.5 million in federal grants administered through the state's pollution control agency. Most of the new installations were completed in the first five years of the District; since that time, the District has focused on monitoring. Prior to construction, new systems are reviewed by the District staff for compliance with appropriate codes. Services, such as design, installation, maintenance or repair on existing systems must be performed by contractors licensed by the state.

User fees vary depending on the size of the system. Those on the passive program pay an annual administrative fee from $ 36 to $ 261, depending on if the property is a home or a business. Annual user fees within the active program are presented in Table 3-4.

Table 3-4. User fees with the Otter Tail Onsite Management District's active program

Type of Facility	Annual Fee
Permanent residence with septic tank, pump and drainfield	$ 168
Permanent residence with septic tank and drainfield	$ 120
Seasonal residence (based on 3 months average occupancy)	30 % of permanent rates
Permanent residence on cluster system	$ 196
Seasonal residence on cluster system	$ 152
Resorts and businesses	$ 164 - $ 2,178

The district employs one full-time manager and two part-time employees, and has an annual operating budget of approximately $ 140,000. According to Wallace et.al. (2005), up to 10 percent of property owners default on making payments and so the District collects the payments plus penalties and interest through property tax assessments. Without this capacity of collecting via property taxes, the District could not remain financially viable.

3.2.4.3 Governance Capacity

The District functions as a publicly-owned sanitary district. The District is governed by a seven-member Board which has the capability to hire a manager, set budgets and fees, collect defaulted fees through property taxes, and issue compliance orders. The Board members are appointed by the county commissioners. The District maintains a list of accepted installers and pumpers which homeowners can hire.

3.2.4.4 Summary

The district has elements of both EPA models 3 and 4 in that homeowners own their systems but can choose either a "passive" maintenance program or an "active" maintenance program. Besides being a success story for the possibilities of a well-conceived permit system, the District is an excellent example of the improvement possible when federal funding is applied in a careful and sensible manner.

The most encouraging aspect of this RME is the improvement in water quality at the lake. According to the analysis by Christopherson and Anderson (2004), since the formation of the District phosphorus levels in Otter Tail Lake have dropped by 50 percent while lake clarity has improved by about 40 percent. Much of the credit for its creation and continuous operation should be given to the hard work and perseverance of the current manager, who has occupied that position since the District's inception.

3.2.5 Stinson Beach, California

3.2.5.1 Description

Stinson Beach is an isolated beach community located on the Pacific Coast approximately one hour's drive north of San Francisco in Marin County. It is located near San Francisco but the local terrain isolates it from much of the rest of the Bay area. The community is surrounded by national forest land and consists of numerous beach homes and a modest business area. Stinson Beach is a surfing community, and given its location in northern California one can described its inhabitants as environmentally conscious. The residents turned back a proposal for a sewer system in the 1960's due to fears of excessive growth, and instead embraced the concept of an on-site wastewater management district. The information presented in this section was based on an interview of the district's chief inspector, and information collected from the study by Pinkham, et. al. (2004).

3.2.5.2 Technical, Managerial, and Financial Capacity

As a division under the community's water department, the district issues permits and conducts inspections of all systems to ensure compliance. Residents pay a bimonthly fee which covers various personnel costs, including those of an inspector, a part-time engineer, and a portion of the water district's administrator salary.

The district includes 715 systems, about half of which are conventional septic systems. There is no more undeveloped land within the town, so any new installations are associated with either failed septic systems or tear downs. Virtually all new installations are advanced ones (i.e. treatment of septic tank effluent prior to disposal). Systems are inspected on an ongoing basis based on a prescribed schedule, rather than inspection at the time of property transfer. Any problems the inspector finds must be fixed by the homeowner within a prescribed time period. The costs of fixing these problems are the responsibility of the homeowner.

New systems are reviewed by the district's part-time engineer for adherence to the district's guidelines. Marin County Department of Health defers responsibility of all on-

site systems within the town's boundaries to the on-site wastewater district. California is unique in having regional water quality boards that have jurisdiction on all water quality matters within several counties. The regional water quality board governing Marin County reviews the district's guidelines to ensure they meet the state's water quality objectives.

The district keeps track of septic tank pumpage from all on-site systems within the district, along with a record of inspection history, enforcement history, and any repairs done as a result of the district's inspection process. Pumpers, who are registered by the district, submit monthly reports to the district on the location of pumped septic tanks and amount of septage pumped.

The district's inspector, who has served with the district since the program was launched in the 1970's, noted that it took about ten years for the program to gain widespread public acceptance. Given the district's close association with the city's water department, the onsite management district has a powerful tool for ensuring compliance. The department rules give the onsite district the right to shut off a homeowner's water supply if they do not cooperate. The inspector noted that they have had to shut off only one customer's water since the program began.

The bimonthly wastewater fee is currently $ 61.28, which generates approximately $ 270,000 per year. Design review fees range from $ 1,200 for a standard system, $ 1,700 for a sand filter, and $ 2,400 for an advanced system. These review fees cover the cost of engineering review of the system, which is performed for the district through a subcontractor (i.e., the part-time engineer).

3.2.5.3 Governance Capacity

The district operates as a division of the Water Department, and uses the administrative, back-office capabilities of that group, including their offices. The management district, which has complete control over on-site wastewater management within the Stinson Beach city limits, functions under EPA management model 3. Daily operations of the Water Department are the responsibility of a full-time administrator, who must report to a five member Water Board. These members are volunteers appointed by the City Manager. Given the town's very small size, the meetings and functionality of the Board is fairly simple. Members of the Board are not paid for either meetings or any expenses.

3.2.5.4 Summary

Stinson Beach operates one of the longest-running on-site management programs currently in the United States. The Model 3 program developed for the town is, in the opinion of the management district staff, operating well. However, widespread acceptance was slow in coming, and the district's inspector estimated that the process took about ten years. The program town is completely built-out, so no new homes are constructed. There are a handful of tear downs each year, and under new regulations conventional septic systems are no longer allowed. The town's program proves that, in the right circumstances, an operating permit maintenance program can be used to ensure ongoing maintenance of existing septic systems, particularly in sensitive environmental areas.

3.2.6 Ozark Clean Water Company

3.2.6.1 Description

Table Rock Lake is an impoundment in southeast Missouri formed when the Army Corps of Engineers dammed the White River near Branson, Missouri in the 1950's. Much like Otter Tail County, Minnesota, the lake serves as a centerpiece for a tourism-based economy in a rural area. In more recent years, the region has had explosive population growth from people, including many retirees, seeking to enjoy the area's beauty year-round.

The lake is located in a region characterized by steep hills and poor and thin soils, underlain by karst formations. Thus, groundwater contamination can move quickly once underground. The region's historically rural (and poor) nature, coupled with the hilly terrain, has minimized the widespread use of wastewater collection systems. Instead, most areas outside of a handful of municipalities rely on septic systems. Recent data suggests that there are widespread failures of septic systems throughout the region, and that a number of these failed systems are discharging untreated (or barely treated) sewage into the lake (MEC, 2001).

In the late 1990's a widespread algae bloom occurred on the most developed portion of the lake. This occurrence led a number of area business people to form Table Rock Lake Water Quality, Inc., a non-profit agency committed to improving the water quality in the lake. The agency sought and secured a grant to conduct a study of different management models for managing advanced on-site treatment systems throughout the region. The study was developed to compare management model 3 (i.e., a permit system) with management model 5 (i.e. a RME owner and operator). As with many rural areas, there are virtually no institutions with the unique capabilities necessary to operate a RME and virtually no tradition of septic system maintenance. In fact, only one local agency, White River Electric Cooperative through its wholly owned subsidiary White River Environmental Services (WRES), responded to the project's request for agencies willing to serve as the model 5 RME.

WRES is a wholly-owned, subsidiary of White River Electric Cooperative incorporated as a limited liability corporation. WRES was formed to provide consulting and operations and maintenance services to water and wastewater treatment systems throughout the electric cooperative's service territory. The company includes an administrator, operations manager, administrative assistant, and four operators. The business activities of WRES are carefully scrutinized by the parent company, which has underwritten the venture providing this service in southwest Missouri.

After extensive review of applicable rules and regulations, WRES (along with White River Electric Cooperative management) decided that the company would not own individual treatment systems. Thus, WRES business managers formed an independent, nonprofit sewer cooperative modeled after electric cooperatives, named Ozark Clean Water Company (OCWC). Information about the company included in this section is given based on the assistance project team members have given to TRLWQ, Inc. during the demonstration project.

3.2.6.2 Technical, Managerial and Financial Capacity

By early 2006, the company had been in business about eighteen months, using its participation in the EPA demonstration project to provide its first customers. Customers become members of the cooperative and, as with a rural electric cooperative, direct the company's actions through an elected Board of Directors. The Board hires the technical

and managerial expertise necessary to run daily operations, and oversees management of the Company's financial activities.

The Company subcontracts for the technical expertise within WRES to inspect and supervise the installation of all new systems, and for all operation and maintenance activities. The Company focuses on new systems, in both existing homes and new homes, yet has taken over existing systems if inspections prove that the treatment system meets their standards. However, they have yet to take over any existing conventional system (i.e. a septic system) without some sort of modification to improve performance. These modifications typically involve the installation of various mechanical treatment devices followed by drip dispersal

The Company has also successfully employed a strategy of working with specific developers and homeowners' associations to identify cluster systems it can own and operate. Ozark Clean Water Company Board members believe that cluster systems are more economical, and they enable the company to more quickly build the number of connections. In general, the company limits the treatment systems installed to three or four principal technologies, including textile filters, recirculating sand filters, and FAST systems (BioMicrobics of Lenexa, Kansas). They subcontract system design and installation to local engineering firms and contractors. A major problem during their first two years in business has been finding qualified subcontractors to complete this work. At the time of this writing, the Company has settled on two contractors for installations and one engineering firm.

OCWC fee schedule is based on the type of treatment system and whether or not the unit is a cluster system. Residential rates are approximately around $ 28 per month, although some existing cluster systems are less than $ 10 per month. The company commissioned a rate study that estimated the actual cost to provide routine service and cover all conceivable replacement costs ran as high as $ 70 to $ 90 per month (Aiken, 2004). The OCWC Board members felt that this was too high, so they reduced the monthly fee and excluded certain "big ticket" items from those they are willing to replace. A comparison of monthly rates calculated to cover certain replacement costs for two types of treatment systems is summarized in Table 3-5.

Table 3-5. Comparison of Calculated Monthly Rates by Ozark Clean Water Company for Two Service Possibilities and Two Treatment Systems

Treatment system	Complete(1)	Less Major Components(2)
FAST + effluent pump	$ 49.92	$ 27.77
Advantex AX 20	$ 45.92	$ 22.36

(1) Rate includes repair and replacement of floats, electrical contactors, panel breaker, drip field pump, filter dosing pump, filter media and VeriComm control panel.
(2) Rate includes repair and replacement of drip field pump, filter dosing pump, and VeriComm control panel only.

The Company currently hires WRES to provide operating and maintenance services for all members. With its short history, OCWC has not yet been posed with members unwilling or unable to pay their bills. Under the current fee structure, individual members must cover the cost of major equipment failure, including treatment systems, septic tanks, control panels and large tanks. The Company will repair and replace only the controls and pumps, and all other equipment is excluded. By terms of

current agreements, the individual member will be responsible for replacing any tanks, treatment equipment, piping and tubing, or other equipment at the end of its service life. This approach was used in the hope that in future years, as the customer base grows, the Company will be able to establish a reserve fund for use in replacing equipment.

The company enters into an agreement with individual members. The agreement is tied to the property so that, in the event of a property transfer, the new owner must become a member of the cooperative and OCWC continues to own, operate and maintain the treatment system. Further, OCWC has easement access to the treatment system, including the dispersal field, in perpetuity. However, the Company includes a provision in their service contract that collects a security deposit equivalent to three months of bills, along with a provision giving the Company the right to shut off service for nonpayment.

3.2.6.3 Governance Capacity

OCWC is managed by five board of directors elected from the membership. As with electric cooperatives, membership is voluntary, and the member gives ownership of their treatment system to the sewer cooperative (from the sewer lateral). The OCWC Board of Directors has the authority to hire the professional staff which manages day-to-day activities, which at the time of this publication is WRES, and provides fiscal oversight on behalf of the members. As with an electric cooperative, OCWC's articles of incorporation require the Board to hold a members' meeting at least annually where they provide a full accounting of the organization's activities.

Current members of the Board were hand picked from the community to get the organization launched. However, two of these members are retiring so the Board plans to conduct the first election of new Board members during calendar year 2006. Each member signs an agreement to allow OCWC service providers to access the system as needed. The first election for Board members is planned for calendar year 2006.

3.2.6.4 Summary

Ozark Clean Water Company was successfully launched to provide wastewater treatment services to a largely rural region around a beautiful lake. The company currently has a handful of paying customers but expects that they will have over 350 connections by the end of 2006, principally due to the incorporation of several large housing developments. The company was able to leverage its participation in the national demonstration project to launch the enterprise. The importance of this outside funding cannot be stressed enough. Thus, OCWC is well on its way to success given its growth and backing by White River Electric Cooperative. Currently, the OCWC Board is working with a variety of county health departments and developers to promote the use of the sewer cooperative throughout the region. Their plan calls for reaching a goal of 1,000 customers by the end of calendar year 2007.

3.2.7 Paradise, California Onsite Wastewater Management Zone

3.2.7.1 Description

Paradise, California is located in northern California about 15 miles southeast of Chico. During the 1970's and 1980's, population growth transformed the town into a bedroom community for Chico. Wastewater treatment for much of the growth that occurred in this time was accommodated by conventional septic systems. However, high bacteria levels began to be observed in some private drinking water wells near the central part of town.

The city funded a study in 1988 to review options, and the engineering firm recommended the construction of a sewer system to serve the central portions of town. However, there was widespread outrage over the proposed fee structure which fell heavily on business owners. The outrage eventually led to local voters recalling four of five Town Council members, and the plan for a centralized system died. Thus, in 1992 the town council established the Paradise Onsite Wastewater Management Zone by adopting Ordinance No. 219 in order to manage wastewater on a town-wide basis. The information provided in this section was compiled from Pinkham et.al. (2004) and Banathy (2004).

3.2.7.2 Technical, Managerial and Financial Capacity

The zone managers first established regulatory provisions for installation, operation and maintenance of onsite treatment systems. In 1994, the town formerly adopted a code which detailed regulatory and enforcement aspects of the zone and detailed requirements for design, construction, inspection and operation of all onsite systems. The zone was first managed by town employees but has since been privatized.

Since its formation, the zone had developed a certification and training program for evaluators, revised regulations for large systems, and revised maximum hydraulic loading rates and nitrogen loading rates. The Paradise Onsite Management Zone includes three full-time and one part-time staff members, all of whom work out of city hall but are employed by a private contractor. The zone functions mostly under management model 3; however, with the construction of new cluster systems it is moving towards operating those under model 5. System construction is being funded through a special enterprise fund from the town's general fund.

Zone staff review and approve all applications for wastewater systems, perform inspections of onsite systems, respond to complaints from the public concerning onsite systems within their jurisdiction, review required reports of certain systems, and will operate and maintain any town-owned wastewater treatment systems. The zone includes over 11,000 onsite treatment systems, making it one of the largest onsite wastewater management programs in the country.

Conventional septic systems are inspected regularly, depending on site conditions and previous inspection results, but at a minimum at least every seven years. The inspections are conducted by a private evaluator and paid for by the owner for a price determined by the zone. More advanced systems require more detailed and frequent inspections. The zone managers review testing from larger onsite systems serving commercial property and monitoring several groundwater wells scattered throughout the region.

The annual operating permit fee is $ 14.40 for residential customers, but it is higher for commercial customers. The annual fee has remained at that level since the zone's formation; however, the town revised the fee structure by raising fees for a variety of other permits and activities. The revised fee structure now enables the program to cover its costs. The total budget for the zone for the most recent fiscal year (2004/2005) was approximately $ 349,000, of which approximately $ 266,000 was for personnel costs and $ 83,000 was for supplies.

More recently, the zone has developed a strategy to put the central business district on clusters (Town of Paradise, 2004). The conceptual plan involves constructing three separate clustered sewer systems serving a total of 93 residential lots and 187 commercial lots. The design flows for each cluster range from 30,000 gpd to 40,000 gpd.

The individual clusters will be conventional gravity sewers; however, those properties located below the hydraulic grade of the trunk sewer would use their existing septic tank as a pump tank to lift the sewage to the trunk line. Interestingly, as currently conceived the town will not require residents located along the new trunk line to connect to it; connections will be entirely voluntary. The town intends to phase in the clusters over time. According to the conceptual plan, construction of each cluster will cost between $ 1.2 million and $ 1.5 million; anticipated rates are not known.

3.2.7.3 Governance Capacity

Paradise functions principally as a model 3 permit system, but it is moving towards functioning as a model 5 RME for specific portions of the zone. The Paradise Onsite Wastewater Management Zone operates within the Town of Paradise Public Works Department. The zone's administrator reports to the town's Director of Public Works. Proposed rule changes must be approved by the Central Valley Regional Water Quality Board, which provides government oversight to the zone.

The Paradise Onsite Zone demonstrates one way to structure a Responsible Management Entity, where a private company provides a governmental service on a contract basis. Pinkham et.al. (2004) observed that moving to its present management program was neither simple nor painless.

3.2.7.4 Summary

The two cluster systems under design will have capacities totaling approximately 40,000 gallons per day. The cluster systems will serve much of the business district, which is the most heavily developed portion of the town. Construction of some of the clusters will be funded in part by a redevelopment agency authorized by the town's voters in 2002. Another existing cluster was paid for by a local business that had a failed septic leach field. These existing and planned clusters are owned and will be operated by the management district, adding a model 5 element to the overall program.

Given the design of the proposed clusters, Paradise is best described as a permitting agency evolving into a more comprehensive onsite RME. The onsite management zone gained public acceptance through its ten years of service. Town officials have used that reputation to propose a centralized sewer solution which, ten years ago had been quickly rejected. The zone has been able to grow into the job of planning and implement services expected of a conventional sewerage agency.

3.2.8 Onsite Systems, Inc.

3.2.8.1 Description

Perhaps the best known Responsible Management Entity is Onsite Systems, Inc., a private company headquartered in Nashville, Tennessee. The company was founded as an installer of on-site systems in and around Nashville in 1989. Company officials recognized the need for ongoing maintenance in the early 1990's after several failures of the systems which they installed, so they began offering ongoing operation and maintenance services.

Once the operation and maintenance services were added to the business, the owners recognized the importance of integrating all planning and operations aspects in providing sewer service. Thus, company officials sought to provide more comprehensive wastewater treatment to the developers with whom it worked. This led company officials to a strategy of offering wastewater treatment as a regulated utility within the state of Tennessee. As a regulated utility, the company first petitioned the Tennessee Regulatory

Authority (TRA) to provide sewer services to a housing development in Maury County, Tennessee. Their business has grown to owning and operating cluster systems throughout Tennessee, with more recent additions in Alabama, Georgia, Kentucky and Florida.

Currently, the company has about 1,500 billing customers representing 20,000 connections. They add between 300 and 400 new connections each year. Approximately 80 percent of their business is in Tennessee, 10 percent is in Alabama, and the remaining customers evenly distributed in Georgia, Mississippi , Kentucky and Florida. The information about the company presented in this section was developed based on a review of public documents and an interview with the company's president, Charles Pickney.

3.2.8.2 Technical, Managerial, Financial Capacity

The experience of the company in establishing a rate is instructive for other aspiring RMEs. The company first established a rate of $ 8.49 per month for sewer service for the Maury County development. As a company committed to operating and maintaining these decentralized systems, the rate calculation was based solely on the cost to operate and maintain the collection system. As the company expanded its service territory to five or six more locations in other counties throughout Tennessee, they used an identical service fee of $ 8.49 per month. However, company officials admit that they had not considered a myriad of other costs associated with the long-term operation of the treatment systems, including charges for such things as treatment, billing and collection, bonding, sampling and testing fees, various state and local taxes, and profit. It rapidly became apparent that the existing sewer rate was not sustainable and could not ensure the long-term health of either the company or the sewer systems it owned.

In 1999, the company petitioned to the TRA to have the monthly charge raised from $ 8.49 to a range of $ 30.87 to $ 36.93, depending on the treatment system, special county assessments and other site specific considerations (TRA, 1999). The TRA granted the rate increases and the company has used the modified rate structure since to develop rates for each development for which it takes ownership. The breakdown for the rate charged at one location in Tennessee served by the company is presented on Table 3-6.

Table 3-6. On-site Systems billing structure for development in Cannon County, Tennessee[2]

Unit Cost	Amount Charged	Amount Escrowed[1]
Collection system operation & maintenance	$ 8.95	$ 6.35
Treatment system cost (Sand/Gravel Filter system)	$ 6.23	$ 2.90
Utility costs (Filter and pump station)	$ 1.30	None
Disposal system costs (drip irrigation)	$ 1.53	$ 0.88
Billing and collection costs	$ 1.50	None
Miscellaneous costs	$ 0.40	None
Tennessee DEQ Annual Fee	$ 0.52	None
Bonding cost (County requirement)	$ 0.00	None
Franchise Excise Taxes	$ 0.82	None
Property Taxes	$ 0.67	None
Federal Taxes	$ 1.11	None
Local management fee	$ 2.00	None
Corporate management fee	$ 2.80	None
Total	$ 34.83	$ 10.13
(1) Escrowed funds are set aside to cover costs associated with capital equipment replacement		

(2) Source: TRA (1999)

Company officials insist on owning all of the systems that it operates and maintains. The owners have decided to limit themselves to new developments only where they can specify the type of collection and treatment system. They ensure installation quality by working with developers before the system is installed to provide specifications for the collection and treatment system. As the business has grown throughout Tennessee and beyond, the company began subcontracting with local firms to provide system operation and maintenance; Onsite Systems, Inc. continues to provide the "front office" or administrative support, such as billing and petitioning to regulatory agencies and construction oversight. They also train the local firms to ensure that a standardized approach is used in the operation, maintenance, and response to emergency calls.

Besides establishing a fair monthly rate, the owners have developed templates for use with developers, installers and other subcontractors, local operating and maintenance firms, and homeowners. This standardization carries many benefits and ensures the treatment system is designed to handle the appropriate flow. The developer pays for the construction of the new collection and treatment system, and upon completion gives the company an exclusive, 99-year license to own and operate it. Further, the developer must include a covenant for every home sold within the subdivision that mandates the homeowner to hook up to the collection system.

3.2.8.3 Governance Capacity

After struggling with a number of different approaches, the company settled on operating their systems as publicly regulated utilities. In 1994 they were granted a license by the Tennessee Regulatory Authority (TRA) to operate their first system for Oakwood Subdivision in Maury County, Tennessee. In Tennessee, the company deals solely with the TRA to establish terms of service and sewer rates. Further, company management has decided to follow an identical business model in the other states in which it operates. Thus, the company functions as a publicly regulated utility in all states where it operates, including Alabama, Georgia, Mississippi and Kentucky.

3.2.8.4 Summary

As a privately-owned Responsible Management Entity, Onsite Systems, Inc. is using the basic principles of aggregation found in other industries to achieve economies of scale to become a profitable enterprise. The treatment systems have become sufficient reliable that the company can now provide front office support for a number of smaller, more local firms that perform the day-to-day operations. This business mode is proven successful and could be replicated in many regions of the country.

3.2.9 Tohono O'odham Utility Authority

3.2.9.1 Description

The Tohono O'odham Utility Authority (TOUA) provides water, sewer, electric, cellular phone and regular phone service to a large section of Pima County, Arizona, located west of Tucson. TOUA provides these services to the Tohono O'odham Nation, located on the Papago Indian Reservation. The information included in this section is based on prior work with the authority by project team members and discussions with the Authority's general manager in charge of water and wastewater operations.

3.2.9.2 Technical, Managerial and Financial Capacity

The Authority provides water services to approximately 3,000 customers and wastewater services to approximately 1,600 connections, which includes a variety of clusters and individual homes. System expansion is at an annual rate of approximately 2 to 3 percent. Wastewater treatment systems include wetlands and community leach fields, but primarily rely on lagoons. As a low income area, most of the reservation was served by cesspools or other rudimentary wastewater treatment systems. Over time, the Bureau of Indian Affairs (BIA) Health Services has funded the construction of modern wastewater treatment systems for communities within the reservation. Thus, the Authority is called upon to operate new systems as they are built.

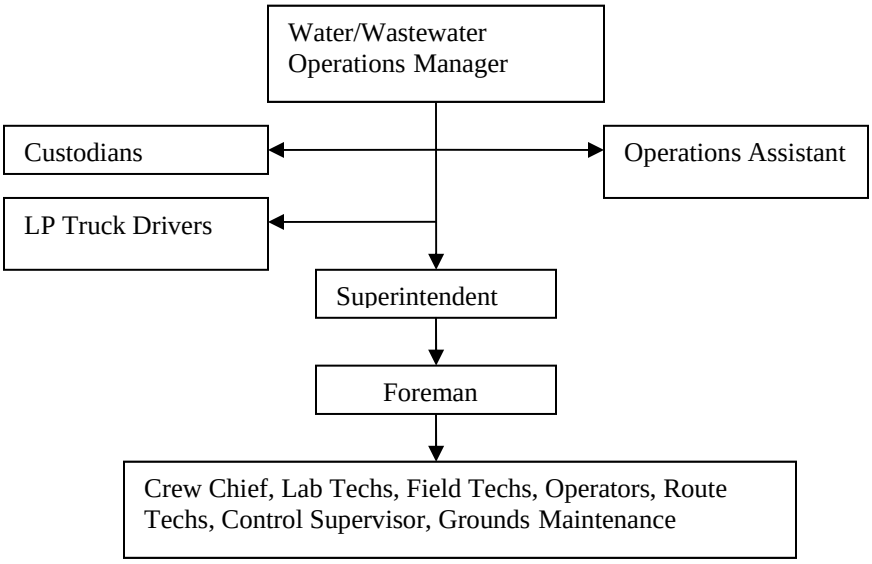
Typically, the BIA provides funding while the Authority provides contract management and oversees construction to ensure facilities are built according to their specifications. Once the system is completed, the Authority takes over ownership and operation. The Authority has taken over old systems, but only after reviewing them and identifying funding sources which could be used to finance repairs needed to bring them up to code.

The wastewater department of the Authority chooses the locations of new treatment systems based on a five-year sanitation needs list continually updated by TOUA and the Indian Health Service. Thus, growth is more attributable to federal appropriations rather than aggressive marketing by the Authority.

The Authority has a total annual operating budget of $ 1.9 million. While construction is financed from grants and federal appropriations, the ongoing operation and maintenance is financed from user fees. TOUA uses a two-tiered rate structure, charging $ 4.15 per month flat fee and an additional usage charge of $ 0.95/1,000 gallons for the first 20,000 gallons and $ 1.00/1,000 gallons for any additional water used. Water use is the average of the homeowner's water use during the months of December, January and February. Based on the number of wastewater connections and an assumed average water usage, this rate generates approximately $ 250,000 per year for wastewater services, or around 10-15 percent of the Authority's total annual operating budget.

The current water and wastewater director has been with the Authority for over 17 years, and supervises a total of 23 employees. The department's structure is presented on

Figure 3-2. TOUA water/wastewater department organization.



TOUA functions principally as a municipality, and thus should be considered a publicly-owned RME operating under EPA's management model 5. By operating on an Indian reservation, the Authority must meet federal environmental regulations but is not under the direct supervision of either the state or the local county. This makes the TOUA somewhat unique compared to other RMEs.

3.2.9.3 Governance Capacity

The Authority is a quasi-municipal type of operation, technically known as a tribal instrumentality. As a tribal instrumentality, it operates under a plan of operation instead of under specific bylaws. As with an electric cooperative or other non-profit, the Authority's day-to-day operations are overseen by a professional management staff, whose actions are directed by appointed members of the Board of Directors.

The structure of the Board makes TOUA unique. The seven-member Board reports to the tribe's legislative council and has oversight responsibilities. Thus, the Board hires the general manager and, as with other boards, keeps track of utility operations by way of monthly meetings. The Board consists of three members of the Nation and four other members who must have managerial or executive-level experience with a public utility, such as water, wastewater or electric.

3.1.9.4 Summary

Tohono O'odham has operated successfully as a full-service utility in a low-income region in the Arizona desert. Their existence reinforces the notion that it is possible to develop and successfully operate a RME under nearly any socioeconomic condition. However, the manner by which TOUA is formed and operates (i.e. within an Indian reservation) includes certain special circumstances that may not transfer to other locations.

The Authority is a full-service utility, providing numerous services to their customers, including electric, water and telecommunications. Thus, the Authority spreads their fixed, administrative costs over a large number of customers and different services, giving them an economy of scale not available to organizations restricted solely

to wastewater management. In addition, the Authority's unique operation as a tribal instrumentality gives it monopoly power over residents within the reservation and favorable financing for capital construction through the federal government. While study of its operation is helpful, it cannot be viewed as a readily-reconstructed management program.

3.2.10 Crystal Lakes, Colorado Water and Sewer Association

3.2.10.1 Description

The Crystal Lakes Water and Sewer Association provides water and sewer services to over 110 full-time homes and over 500 part-time dwellings in a private community located in the Rocky Mountains. The association was originally formed due to a state mandate to develop a water augmentation plan, and has evolved into providing various wastewater disposal services, including soil absorption systems designed to meet County health department requirements. Information presented in this section on the RME is based on McKenzie (2001), Dix (2001) and information from the community's website (www.crystal-lakes.org). The Association functions principally as a Model 3 permit system; however, there are aspects of both Model 4 (certain maintenance services) and Model 5 (with three clusters, as described below).

3.2.10.2 Technical, Managerial and Financial Capacity

The Association was formed to manage the water rights within the subdivision; subsurface discharge of wastewater recharges the subdivision reservoirs, and is thus encouraged. The Association maintains four reservoirs within the community's boundaries, records water meter readings on private wells, provides pumping of septic tanks and vaults at a modest charge, hauls potable water to cisterns, and reviews all new systems. Individual property owners are responsible for the design, construction and operation of their on-site systems. The Association makes standard details for septic tanks, cisterns, soil filters, holding tanks and wells available to community members at no charge. The standard designs meet the County's minimum requirements; systems deviating from these standard designs must be approved by the Association and the county health department.

The Association owns and operates three cluster soil absorption systems for some of the lots within the community. One cluster serves 25 homes, while another serves the lodge, a restaurant, and the Association's offices. Residents with dwellings on those lots are required to hook up to the collection system. If the central sewer is unavailable, residents can choose between sealed vaults, standard on-site septic systems, and evaporative transpiration systems. While sealed vaults are available to any property, septic systems and evaporative transpiration systems are only allowed if the strict requirements of the local health department are met. The Association will pump and haul septage from vaults and septic tanks, and treat the septage at one of the Association's wastewater treatment facilities. The Association owns two pump trucks for this purpose and charges for the service separately.

The Association is a RME functioning primarily as a model 3 permit system, but provides its members with some forms of assistance. The Association is managed by paid employees, who are governed by an elected board of directors. The activities of the Association are funded through a number of annual dues and user fees, which vary depending on the type of on-site system used. Currently, the Association charges $ 270 for every improved lot (i.e. with sewer service) and $ 170 for every unimproved lot.

Charges are based solely on whether the lot has service and not on resident status (i.e. full-time resident vs. part-time). There are additional fees for specific services, including $ 150 to pump a sealed vault, $ 200 to pump a septic tank, and additional maintenance fees of $ 60 to $ 240 for those residents on community systems. The Association has the authority to place liens on property in the event that annual dues become delinquent; however, the liens can only be collected at the time of property transfer.

Crystal Lakes also has a Roads and Recreation Association that has separate dues to provide for services such as snow plowing, trash removal and road maintenance. This association operates under a separate board with a separate budget, but the two associations share paid staff. This sharing makes determining staff costs difficult to discern. Given the number of developed lots and the current rate schedule, and assuming that about one fourth of the developments tanks are pumped each year, the Association has an overall budget slightly higher than $ 200,000, which averages approximately $ 270 per lot for both sewer and water. While this value seems fairly low compared to other RMEs, Dix (2001) notes that the Water and Sewer Board has chosen to cover current costs and does not use any money collected to fund a reserve for future replacement of equipment.

3.2.10.3 Governance Capacity

Crystal Lakes Water and Sewer Association is a nonprofit corporation formed under the rules of Colorado. The Association is governed by a five member Board of Directors whose members are elected by community residents and are not compensated. Board members, however, do not need to be community members. By covenant, all members of the community are required to join the Association and so receive one vote per lot when electing Board members. Both part-time and full-time residents are eligible to vote. The Association, which is a separate entity from the community's homeowners association, has a detailed set of bylaws governing its actions.

3.2.10.4 Summary

Crystal Lakes Water and Sewer Association was formed to address water supply issues but has since evolved into a management entity for wastewater issues. The Association manages septic systems through ongoing inspections, but also provides technical assistance to property owners. The community has space for over 1300 homes, so the Association is crucial to ensure that individual septic systems are maintained for the long-term. Given its professional management and the close governance by the Board, this management program has proven successful.

3.2.11 Loudon County, Virginia

3.2.11.1 Description

The Loudon County Sanitation Authority (LCSA) is a political subdivision established in 1959 by the County's Board of Supervisors. Today, the LCSA provides water and wastewater services to nearly 50,000 connections within Loudon County, which is the county immediately west of Fairfax County and the Washington D.C. metropolitan area. Since 2001, LCSA has operated a handful of decentralized wastewater treatment systems which currently include approximately 1,000 connections. In these cases, LCSA functions under both a model 4 and model 5 RME. This information was gathered from a site visit, and a review of information provided by LCSA staff and in the literature.

The eastern third of the county, closest to metropolitan Washington D.C., is on a central sewer system operated by LCSA. With a rapidly growing population, the County Board of Supervisors revises the county's growth plan about every ten years. The most recent revision was completed in 2001, and this plan dictates which parts of the county are to be serviced with conventional wastewater sewers and which are to be served with decentralized systems. Their service territory is depicted graphically in Figure 3-3. LCSA has a policy to operate and maintain any wastewater system built within the County with 15 or more connections (Danielson, 2005a). County ordinances require LCSA involvement for any system with two or more connections. Those systems with between two and 15 connections currently fall into a regulatory limbo; older, existing systems are owned and operated by the property owner and new systems are not allowed by the county health department.

3.2.11.2 Technical, Managerial and Financial Capacity

The Authority supervises the design and construction of new systems and provides builders and developers with design standards. They review all system designs often using a dedicated subcontractor; however, all permitting and soils reviews are completed by the Loudon County Health Department. LCSA is currently working with the state Health Department on an agreement to allow LCSA to waive all local health department reviews of wastewater treatment systems under LCSA purview that are discharging to the subsurface. (In Virginia the local health department is charged with permitting all subsurface-discharging wastewater systems regardless of flow rate.)

Onsite water and wastewater systems are operated and maintained by LCSA's community systems group, which includes a program director, administrative assistant, laboratory manager, operations manager, and eight operators (total staff of twelve). This represents approximately 10 percent of LCSA's total staff treating approximately 1 percent of their total flow. This difference illustrates one of the challenges of making decentralized systems a cost-competitive alternative to centralized systems. The Authority owns and operates community systems (i.e. those serving housing subdivisions) and operates onsite systems serving commercial enterprises, but does not own them. The commercial enterprises maintain ownership in order to take advantage of system depreciation (for tax purposes) and to shop for a more competitive price for system operation, in the event other operators are allowed into Loudoun County.

LCSA currently operates ten decentralized wastewater systems scattered throughout the county. LCSA is committed to using decentralized systems wherever they make sense, as dictated by the County's growth plan. Included in their long-term plans is the intent to make the community systems a break-even venture, which will entail adding additional customers. The Authority also intends to become a one-stop shop for wastewater services within the County by taking over both plan reviews and permit tasks currently performed by either the health department of state environmental department.

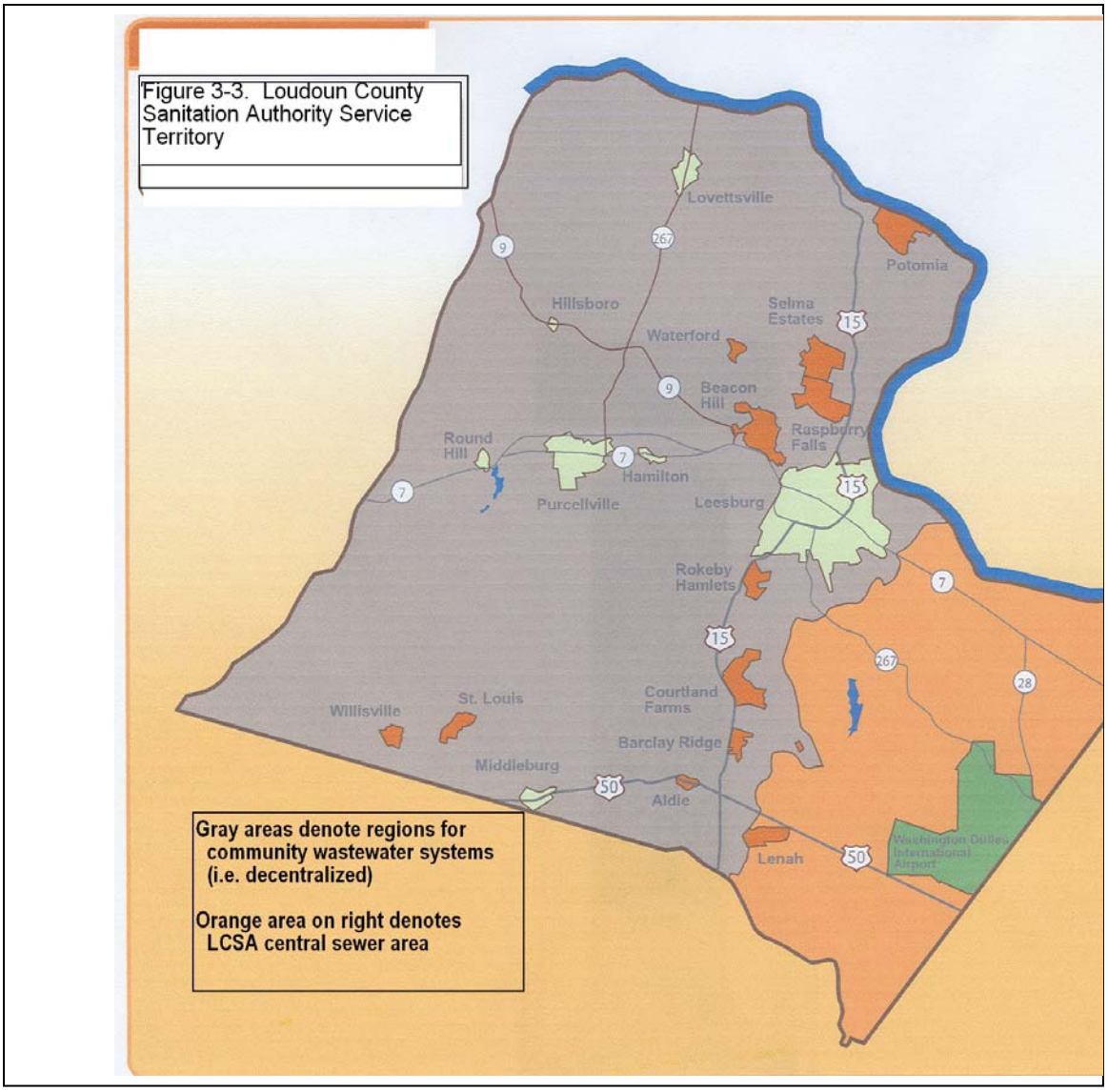


Figure 3.3 LCSA Service Territory

Currently, rates are computed on a system-by-system basis, but LCSA plans to propose a single rate for all decentralized systems beginning sometime in calendar year 2006. Given that County ordinance requires new developers to use LCSA as the operator of any new wastewater treatment system, LCSA is able to demand certain concessions from developers. For instance, the developer must build a system to meet LCSA design standards, and they must subsidize the plant operation until the development is over 90 percent sold. In addition, LCSA requires developers to complete a rate study using provided labor and utility rates. The results are used as the basis for establishing rates which must be vetted at a public hearing by the LCSA's governing board.

The current rate structure is complicated because the rates are computed specifically for each system. The rates, effective as of January 2006, are presented in Table 3-7.

Table 3-7. Quarterly wastewater service rates effective January 2006 for LCSA.

System Type & Capacity[1]	Serving	Flat Fee	Rate per 1,000 gals[2]	LCSA owned?
5,000 gpd upflow clarifier, subsurface discharge	School	Time and materials		No
10,000 gpd extended aeration	Industrial Park	$ 183.50	None	No
15,000 gpd extended aeration	Homes	$120.00	None	Yes
58,000 gpd lagoons	Homes	$ 148.00	None	Yes
60,000 gpd SBR & sand filter	Homes	$ 29.16	$ 5.30	Yes
86,000 gpd aerated lagoon	Homes	$ 82.18	None	Yes
91,000 gpd extended aeration, subsurface discharge	Homes	$ 35.69	$ 3.98	Yes
250,000 gpd Schrieber system	Commercial	Time and materials		No

(1) All systems are surface discharging unless otherwise noted.
(2) Rate based on volume is in addition to the flat fee.

By comparison, user fees for the LCSA central sewer system are $ 16.62 per quarter plus $ 2.59 per 1000 gallons. There are plans for four more systems currently in progress. In addition, LCSA staff is currently in the process of assessing the possibility of establishing a single, decentralized wastewater rate (Danielson, 2005b).

3.2.11.3 Governance Capacity

Loudon County Sanitation Authority is governed by a nine-member Board of Directors, members whom are appointed by the County Board of Supervisors. Prospective members apply to the County government for the position and the Board of Supervisors vote on the applicants. Directors serve four year terms and are paid $ 400 per month. According to LCSA staff, the Board has a very good relationship with the Authority's professional staff and do not micromanage the Authority's activities.

3.2.11.4 Summary

Loudon County Sanitation Authority is an example of a sewer district in a rapidly growing region beginning to operate cluster systems. The sewer district avoids the cost of constructing new systems by requiring the developer to finance it. In this way, costs for new development are borne by those directly responsible for need for the new infrastructure. The majority of the ten systems it currently operates are gravity systems flowing to package treatment plants or lagoons. However, the Authority has within the past five years decided to focus on on-site wastewater treatment with subsurface discharge of the wastewater. Further, the Authority has evolved their management structure so that there is a differentiation between the on-site and cluster systems with the Authority's centralized sewer system. Specific staff and resources are committed to the endeavor.

By the end of 2005 the community systems approach was not yet self sustaining. Authority staff members admit that the user fees collected from the on-site systems do not fully cover the costs to operate the systems, so there is a subsidization of the on-site systems by the centralized portion. However, Authority staff members believe that this disparity will shrink as more community systems are installed and LCSA takes over their operation. LCSA has the technical, financial, managerial and governance structure necessary to ensure their successful operation.

3.2.12 Washington Island, Wisconsin

3.2.12.1 Description

Situated at the tip of Door County, Wisconsin in Lake Michigan, the incorporated town of Washington Island is a vacation destination for many Midwesterners. With a year round population of only a few hundred, the island can swell to several thousand for certain periods in the summer. Its isolation and thin, rocky soils combined with limestone bedrock near the soil surface make installing a conventional, gravity sewer system and treatment plant a major challenge. However, its tourism-based economy forced island residents to address their wastewater issues, which were recognized to be causing water quality problems as early as the mid 1960's. In fact, an outbreak of infectious hepatitis was traced to septic tank effluent contamination in 1968. In the mid-1980's the island funded a feasibility study that led to a full scale management plan for all systems on the island. The current management practices, which grew from changes made to that initial plan, are described in detail by Pinkham et.al. (2004). This section contains a summary of that information, and describes a utility district that operates principally a model 3 permit system, but has elements of a model 5 RME, too.

3.2.12.2 Technical, Managerial and Financial Capacity

The town formed the Washington Island Utility District in 1995 to enact the town's facility and wastewater management plan. The 700 residents' wastewater needs are entirely met through on-site systems, which include a combination of conventional septic systems, recirculating sand filters, pressure mounds, and holding tanks. Septage from holding tanks and septic tanks is hauled to a central facility, where it is treated using a high-strength fixed activated-sludge treatment unit and the effluent is field applied on city-owned land in the summer. The district requires inspections of all systems a minimum of every three years, and more often for more complex systems, such as recirculating sand filters. The district also requires water meters on all holding tanks. Pumping of septic systems is required every three years or when the tank is one-third full of solids, whichever comes first.

The district employs a single, part-time manager to review the reporting of pumpage and inspections, operate the central facility, and coordinate activities with the county sanitarian. Property owners are responsible for hiring and paying for all inspection and pumping services. Pumping costs average $ 60 per tank and onsite system owners pay the town $ 0.015 per gallon for field spreading. District income ranged between $ 20,000 and $ 56,000 from 1997 to 2002, reflecting the district's low expenses. However, the District owns the activated sludge system used to treat septage and holding tank wastewater, so an element of model 5 is present. The district puts any funds collected in excess of expenses into a reserve fund to pay for future system improvements.

With a single employee, the district relies on licensed plumbers and pumpers to ensure that onsite systems are maintained. Further, the district purchased a data collection system and requires pumpers and inspectors who work on systems within the district to enter information into the system. The data collection system is web-based, eliminating the need for service providers to transmit results to the District office and eliminating errors due to reentry of data. The district employee spends a portion of his time reviewing this information in order to verify that individual systems are functioning properly. Pumpers are required to enter the amount pumped and the water meter data recorded whenever they pump a tank on the island, and inspectors enter results from their

inspections. This information is available to the district and to government regulators and is used to ensure that the tanks are not leaking.

3.2.12.3 Governance Capacity

The utility district is municipally-owned public utility that is not regulated by the public service commission. Instead, the district's activities are reviewed by a five-member board whose members are elected to two to three year terms from the town's elected Board of Supervisors. In reality, the utility's governing board is a working committee within the town's elected governing board. The utility board meets every other month to review the budget and set policy and goals.

3.1.12.4 Summary

Washington Island shows how much can be accomplished on modest budgets and reflects a very well-run permit system. Responsibility for operation and maintenance of the on-site systems rests with the residents. A key to Washington Island's program is the web-based data collection system, which makes reporting easy and minimizes data entry errors.

3.2.13 Cayuga County, New York

3.2.13.1 Description

With two environmental gems in Little Sodus Bay on Lake Ontario, and Owasco Lake (the drinking water source for the county seat), the citizens in Cayuga County, New York have had a long-term interest in water quality. Pollution concerns led the citizens to the development of a sanitary code in 1994 that is considered by many to be the strictest county onsite wastewater program in the state. The information provided in this section was based on a study of onsite programs throughout New York State by Allee et.al. (2001).

3.2.13.2 Technical, Managerial and Financial Capacity

Cayuga County's management program is a model 3 permit system; the County's principal emphases are technical assistance and inspection of systems. The County has instituted a tiered-inspection program in that those systems located adjacent to water bodies, and thus pose the most significant threat, must be inspected more frequently than those located further away. Inspections can be conducted by inspectors from the Soil and Water Conservation District or by independent contractors. Independent inspectors must complete County-mandated training, including annual refresher courses. At the time of the publication, the County had about 50 certified inspectors. Inspections and septic tank pumping are also required when a particular property is sold.

The County also requires that all new systems installed in "sensitive" areas, including near Sodus Bay and Oswaco Lake, be designed by a professional engineer. Contractors can design new systems in regions of the County outside of these sensitive areas, but all designs must be reviewed by the Department of Health. In a unique arrangement, the County negotiated an agreement with the Soil and Water Conservation District to provide design services as an alternative to hiring a private firm. District staff develop a design which is then reviewed by engineers hired by the District. This alternative is used by those residents unable or unwilling to hire their own engineer.

The County sends out letters to residents warning of impending inspections on a town-by-town basis. The County has noticed that a rash of septic improvements (based on issuance of permits) follows the inspection letters and precedes the actual inspection. Thus, the incident of system failures has declined over the life of the program. Once a

failed system is identified, the property owner is notified and given a predetermined time period to fix the problem. Failure to do so leads to penalties, which can include substantial fines.

3.2.13.3 Governance Capacity

The program is based on the County's sanitary code and is administered by the County's Department of Health. The Department of Health is run by paid professional staff and governed by an eight-member board, all of whom are appointed. Two of the eight spots, however, are filled by local legislators. The board member terms run for six years, but they can be reappointed.

3.1.13.4 Summary

Cayuga County's operates a successful on-site permit program. The County's success is the result of strict enforcement of a well-written sanitary code governing onsite wastewater treatment system installation and operation. The vast majority of the onsite systems are conventional septic systems serving single-family homes, and the County's system of inspection has enabled them to systematically identify and fix problems with unsatisfactory performance.

3.2.14 Applied Water Management

3.2.14.1 Description

Applied Water Management is a unit of American Water, one of the largest private contract operators of water and wastewater com facilities in the United States. The company was formed in 1984 to provide consulting engineering design services for decentralized wastewater systems, and begin to include operations and construction services in 1990. It was acquired by E'Town Corporation in 1998 at the end of a three-year joint venture to design and construct new systems. RWE/Thames Water acquired E'Town in 1998 and merged Applied Water Management along with several water companies into American Water. American Water acquired Azurix NA, one of the world's largest contract operators, in 2001. Thus, Applied Water Management now exists within a company capable of providing full services in water and wastewater treatment, design, construction and operations.

3.2.14.2 Technical, Managerial and Financial Capacity

Depending on the circumstances, the company operates either as a Model 4 or Model 5 RME with the decentralized systems it operates. Based on information gathered from the company's *Overview of Qualifications*, the company currently owns 12 decentralized wastewater treatment plants in New Jersey, ranging in capacity from 16,000 to 250,000 gallons per day. The plants included in this list include lagoons, an extended aeration package plant, two sequencing batch reactors, and several membrane bioreactors (MBR). MBRs are quite sophisticated and require a fairly high level of expertise on the part of operators, but can produce a very high quality effluent.

The way the company is operated within New Jersey is instructive. The company formed a subsidiary firm, Applied Waste Water Management, which is a regulated utility company under the direction of the New Jersey Board of Public Utilities (NJBPU). The company operates both water and wastewater systems, and the BPU establishes the rates. Rates for community systems are set by the BPU at $ 940 per year, which is equivalent to $ 75.33 per month (NJBPU, 2004). According to a document from the Division of the Ratepayer Advocate of the NJBPU, the company currently provides services to about 3,250 connections in five New Jersey counties. The company employs over 70 operators

and, rare among RMEs assessed in this study, owns a fleet of trucks for the hauling and disposal of sludge, septage and grease. As with Onsite Systems, Inc., the company also offers design, design/build, and construction services. In fact, the majority of systems it operates are systems it has designed.

In at least one case, the company purchased the collection and treatment system from a developer, but at a greatly reduced price. In this case, the developer's construction cost was estimated to be $ 2.8 million, while the purchase price was $ 150,000. Under the existing tariff, the developer must subsidize the cost of operating the system until 97 of the 127 residences are occupied.

3.2.14.3 Governance Capacity

Applied Water Management is a privately-held utility operating under the rules and regulations of the public utility commission in the states where it operates. The company operates in an identical manner to Onsite Systems operations in Tennessee. It could not be determined from the documents reviewed for this study whether the company operates in a similar manner in other states, but it is likely that it does so.

As a subsidiary of a worldwide corporation involved in water and wastewater treatment, Applied Water Management is uniquely positioned as a RME of decentralized wastewater services. As a private corporation, its actions are dictated by a management team beholden to a Board of Directors and company shareholders.

3.2.14.4 Summary

Applied Water Management is a unique example of a model 4 and model 5 RME. Given its long history providing decentralized wastewater solutions, combined with the administrative and managerial resources available to it as a subsidiary of a major, private operations and maintenance corporation, the company is in an excellent position to provide decentralized wastewater treatment. It shares many similarities with both Onsite Systems in Tennessee and Connexus WaterWays in Minnesota, particularly with its focus on new development. However, its negotiated sewer rates are significantly higher than others reviewed for this study. This may be a function of operating in New Jersey, where the cost of living is relatively high, or it may be the result of the company's use of membrane bioreactors, which are more expensive to operate than conventional systems used in most small communities, such as lagoons.

3.2.15 Talquin Electric Cooperative

Talquin Electric Cooperative provides water and wastewater services to over 4,000 customers in northwest Florida around the Tallahassee metropolitan area. As with all rural electric cooperatives, Talquin's principal business is providing electricity to its customers; however, the company has provided water and sewer to some of its electric customers since the mid-1960's, when they took over a donated wastewater system which a developer no longer wanted to maintain.

Talquin employs a staff of approximately 20 people to operate and maintain their water and wastewater systems, which are spread across four different counties. They also

subcontract the operation of some of the company's drinking water systems that are fed by wells. The company has approximately 20,000 water customers (compared to over 100,000 electric customers). The largest wastewater system, which serves a residential development and small industrial park, accounts for approximately one-half of the company's customers.

All of the wastewater systems are conventional, gravity collection systems, treatment using a packaged activated sludge treatment plant, followed by surface discharge. Thus, Talquin's wastewater operations do not truly fit as a decentralized Responsible Management Entity. However, given their mention at least anecdotally as a potential model for other decentralized RMEs, they are included in this discussion. Talquin Electric Cooperative is an example of an agency with "back office", administrative capabilities that has become involved in wastewater treatment in order to meet their customers' needs.

The water and wastewater portion of Talquin Electric operates as a division within the electric utility, and thus must follow the directions dictated by the cooperative's Board of Directors. As with other nongovernmental agencies that have become involved in providing wastewater treatment, Talquin has a strong and stable Board of Directors that is compensated for their time, given training opportunities to enhance their management skills, and gives their professional staff the support to meet the needs of the customers.

The water and wastewater division operates independently from Talquin's electric operations and develops and follows a separate budget. The water and wastewater operations are further divided because of the significant difference in the number of customers. The wastewater operations are supported completely by the monthly user fees, which are based on water use and average approximately $ 35.00. All wastewater customers are charged the same rate, regardless of the type of treatment plant or the size of the collection system used.

Core business operations, including billing, meter reading, accounting and finance are managed cooperative-wide, but a portion of the water and wastewater budget is charged for these services. Water and wastewater customers receive their water and wastewater bills as a line item on their electric bill. According to Talquin staff, the wastewater portion of the business covers its costs, with the exception that depreciation costs are not completely covered.

Talquin's venture into providing wastewater treatment serves as a possible model for other agencies interested in becoming a decentralized RME. The cooperative was able to leverage its competency in operating and maintaining an electric system into another type of public utility service. However, it kept the two types of services separate and independent both from an operations standpoint and an accounting standpoint to provide a better evaluation of its success (or lack of success). Providing professional wastewater service is an expensive enterprise, particularly when compared to the prevalent practice in many rural areas where ongoing management is ignored once the septic system is installed. Potential RMEs that already have the back office business capabilities needed to provide this professional management can reduce initial costs and keep monthly rates at competitive levels.

3.3 Business Structures of Selected RMEs

The operating characteristics of the RMEs studied and summarized in the preceding section are presented on Table 3-8. The entities are arranged according to the EPA model under which it operates.

Table 3-8. Case study summary

RME Name	State	EPA Model No.	Year Established Decentralized Program	No. of Decentralizd Wastewater Accounts	Other Services Provided	Legal Structure	Fee Basis	Approx. Monthly Cost [5]
Lake Panorama	IA	3	1980	1,100	None	Special purpose district	Annual permit	$ 16.67
Stinson Beach	CA	3	1970	750	Water	Special purpose district	Bimonthly bill	$ 30.64
Cayuga County	NY	3	1994	25,000	None	County government	Permit fees as req'd	$ 3.33[6]
Paradise Wastewater Management District	CA	3 [1]	1993	11,000	None	Special purpose district	Annual permit	$ 1.20
Otter Tail Wastewater Management District	MN	3/4	1984	1,545	None	Special purpose district	Annual	$ 14.00
Crystal Lakes Water and Sewer Association	CO	3/4/5	1995	650	Roads, trash through separate (but related) group	Private homeowners association	Annual assessment	$ 28.50
Washington Island	WI	3/5	1996	700	None	Special purpose district	Disposal charges as needed	$ 5.00 [7]
Loudon County Sanitation Authority	VA	4/5	1958	1,000 [2]	Water	Special purpose district	Quarterly bill	$ 49.30
Connexus Waterways	MN	5	2000	1,750	Water, electric, propane, telecommunications	Nonprofit electric cooperative	Monthly bill	$ 35.00
Ozark Clean Water Company	MO, AR	5	2003	420	None (considering water)	Nonprofit sewer cooperative	Monthly bill	$ 28.00
Onsite Systems, Inc.	TN, AL, GA, FL, KY	5	1994	20,000	Design and construction	For profit private corporation	Monthly bill	$ 33.90
Southern Iowa Regional Water	IA	5	1975[3]	44[4]	Water	Regional water authority	Monthly bill	$ 19.60

RME Name	State	EPA Model No.	Year Established Decentralized Program	No. of Decentralizd Wastewater Accounts	Other Services Provided	Legal Structure	Fee Basis	Approx. Monthly Cost (5)
Authority								
Tohono O'odham Utility Authority	AZ	5	1975	1,600	Water, electric, telecommunications	Tribal authority	Monthly	$ 10.99
Applied Water Management	NJ, MA,NY CT,PA	5	1984	4,800 (8)	Design, engineering, construction, sludge and septage hauling, expert witness	Private corporation	Quarterly	$ 75.33

Notes to Table 3-7

(1) Paradise currently functions strictly as a Model 3, but has plans on operating as a Model 5 in the near future.
(2) LCSA also operates a centralized system serving 45,000 connections.
(3) SIRWA began centralized wastewater service in the mid 1970's but launched a decentralized program in 2004.
(4)The decentralized system operated by SIRWA has 44 connections; however, the Authority operates 9 other systems with a total of 916 connections.
(5) Rates and the basis for rates vary widely; this column presents entity's charges on a monthly basis for a hypothetical family of four using 7,200 gallons in a month (60 gpcd).
(6) Cayuga County charges directly only for plan review ($ 200). Required inspections, which cost $ 150 to $ 200 each, are paid directly to the certified inspector every 2 to 7 years.
(7) Washington Island charges for the amount pumped from the septic tank and treated at the Island's central facility. This figure is based on assuming a tank is pumped every two years.
(8) Estimate based on treatment capacity of 1.16 mgd (combined in all systems) and assumed wastewater of 100 gpcd and 2.3 persons per household.

The selected RMEs represent a broad range of regions of the country, climate and topography, and even the predominate socioeconomic class. The array of RMEs included in Table 3-8 range from an upper middle class resort-area in central Iowa to a low-income region in the Arizona desert. This suggests that successful RMEs can operate in any number of ways, including public or private companies, and under any of EPA's top three management models (or some combination). Otter Tail Wastewater District is one example of successful RME operating under more than one management level.

When viewed as a whole, there proved to be several common business practices among this group of RMEs. While the list of agencies identified in this report is far from comprehensive, it is sufficiently broad to expect that identifying any business practices common amongst the group should be carefully considered by those interested in implementing a formal decentralized wastewater management program.

3.4 Commonalities

The agencies and organizations presented on Table 3-8 share a number of common business attributes. The commonalities span a broad range of technical, managerial, financial, and governance issues. These issues must be considered when bringing long-term management of decentralized treatment systems to a particular region. A solid foundation in these four components of business operation is essential to the success of any Responsible Management Entity.

3.4.1 Technical Commonalities

It is obvious that in the successful operation of wastewater treatment systems, technical expertise is essential. Those operating wastewater treatment systems must have expertise in the biological and chemical principles upon which modern wastewater treatment is founded. Such knowledge and experience is essential to ensure satisfactory operation of the systems for the long term, and becomes particularly important for more advanced systems that rely on mechanical devices to optimize treatment.

However, technical commonalities were the least significant issue for a successful RME. There is no single treatment system that works well for all utilities, yet there was a tendency to pick the same one whenever possible. Thus, the successful ones very often operate under a "Southwest Airlines mode", where the RME uses just a handful of technologies (three or fewer). Like Southwest Airlines, which uses only a single type of plane, successful RMEs tend to limit the types of treatment systems they operate to a handful in order to simplify construction, operation and maintenance by minimizing inventories on spare parts and training requirements.

There are many good treatment systems available on the market today. Successful RMEs pick one or two with which they have become comfortable and use them repeatedly. In fact, those interviewed for this study offered several stories where attempts to incorporate alternates to the "tried and true" oftentimes ended in disaster. So, while there is no single treatment system or even a single treatment approach (e.g. fixed film aerobic, facultative lagoon, or wetlands), performance reliability is key.

3.4.2 Managerial Commonalities

Successful RMEs share certain characteristics in the manner by which they are managed. These include:

- A paid manager;
- Effective "hammer" to collect from customers who don't pay
- A dedicated individual (or small group) who sees the process through.

Paid manager. All of the RMEs assessed in this study possessed excellent organization management, reflected in the existence of a paid manager. Consistent among all RMEs assessed in this study, key business aspects were addressed and either delegated to someone within the organization or assigned to a subcontractor. Examples of the business aspects include financial ones like budgeting, accounting, and billing, along with more obvious tasks like routine operations and monitoring, and emergency service calls. However, successful RMEs invariably emphasized the importance of even minor details, such as the aesthetics of the treatment plant, uniforms for service personnel, and an emphasis on friendly customer service.

Management entails coordinating the various and differing tasks over a wide variety of activities, and at the same time exercising careful control of the individual components because without that there is tremendous danger to misspend. Thus, budgeting and cost control procedures were firmly in place and follow a prescribed protocol at each of these agencies.

One of the more common problems for small business owners, which predominate in this industry, is that expertise in one area (e.g. system installation) does not automatically confer expertise in another area (e.g. finance). The type of business owner most likely to become a RME would be one already involved in the on-site wastewater industry, such as an installer or engineer. However, such companies often lack sufficient knowledge on how best to budget unexpected costs to determine appropriate monthly charges, especially over the long time periods expected of public utilities.

Successful RMEs use the expertise from a variety of disciplines when developing the business plan. Some of those interviewed for this study confessed to learning about such things the "hard way" (i.e. through trial and error). However, the majority had the expertise in place, or identified the responsibility, before beginning the business. Given the unique structure of the on-site industry, and the regulatory requirements that govern its behavior, perhaps the best recommendation for those interested in forming a RME is to confer with an existing one. All of the RMEs contacted for this study were very willing to share information.

Nonpayment of bills. Another commonality between successful RMEs is that they have an effective method for dealing with nonpayment of bills. Managers for a new RME should anticipate that nonpayment will range between 5 and 10 percent of the customer base (Christopher & Anderson, 2004; McKenzie, 2001). During the initial start-up period, the rate may be much higher. This problem has sunk many business ventures, so it should be addressed in the RME's business plan. For successful operation of the business, there must be provisions for collecting payments in arrears. There are several possible strategies, but the best choice will depend on the laws under which the RME is formed. One of the more common ones available to many agencies is shutting

off water service. On-site Systems, Inc. installs a shut-off valve in all service lines the company installs, specifically for this purpose. Another common approach is to collect delinquent fees through property tax assessments. Privately-owned RMEs are more limited in their options, and must usually rely on user agreements or similar legal documents.

If the percentage of sewer charges in arrears grows too high, there can be severe consequences for the RME's cash flow. A prudent course demands that the RME accept a certain amount of customers will be late, and plan accordingly. One way to ameliorate the financial impact from those who pay late is to include a small fee within each monthly bill to fund reserves that can be used when late payment causes cash flow problems. For publicly regulated utilities, this can be a challenge (even though it is accepted business practice) to get utility commission acceptance. In order to justify this fee there should be stiff penalties for those who do pay late, along with the means to collect on those penalties.

Dedicated core. The final managerial commonality observed among successful RMEs is the presence of one (or a very small number) of dedicated individuals who are directly behind the RME's formation and early growth. While a partnership and blend of expertise is necessary, the successful RMEs nearly always has (or had) a dedicated leader who gives the time necessary to get the venture started. The need for an entity to manage on-site wastewater systems typically requires a significant amount of negotiations with regulatory officials and the general public. Many times this "schmoozing" must be done on one's own time: at a minimum, much of the public relations work must be completed during non-business hours (e.g. in the evenings or on weekends) when much of the general public is more available.

It was also common to find a single individual with a strong vision that the RME was absolutely necessary. In fact, it would be more descriptive (and accurate) to say that the individual was often quite passionate about the use of decentralized systems as a way of addressing groundwater pollution from failed septic systems. There are numerous obstacles to more widespread use of the devices, including regulatory barriers and a general reluctance within the design community, and only a very dedicated individual can maintain the drive to overcome the many problems.

3.4.3 Financial Commonalities

Successful RMEs share certain commonalities in the manner by which financial issues are addressed. These include:

- Existence of a long-term financial plan;
- Attained the critical mass necessary to be self-sufficient;
- Established a sustainable monthly charge, ($ 25 to $ 35 per month);
- Provision for independent financial oversight.

Specific commonalities are described in more detail in the sections below.

Long-term Financial Plan. A well-crafted business plan includes a financial plan. However, the successful RMEs also have developed a strategy for long-term growth. Those that do not grow are usually EPA model 3 permit systems located in regions without the capability to expand (e.g. Washington Island, Stinson Beach). Most

do not start out with sufficient customers to make the entity financially viable so they must grow their way to financial viability. The managers of the RMEs interviewed for this study identify ways by which they had (or intended) to bring more connections within their operations over time. It is important to note that for those RMEs that are part of a municipal government, "long-term growth" has a different meaning, yet is still essential.

Publicly-owned RMEs are often restricted to some geographical boundary and so will presumably reach some maximum level at some point. However, these types of RMEs must still operate under many of the same financial restrictions that private RMEs (and other small businesses) face. Further, the public relations effort is just as challenging for publicly-owned RMEs as it is for privately-owned ones. Thus, the municipally-owned RMEs assessed in this study had plans for incorporating additional connections within their jurisdiction into the program over time. Usually this consists of setting a goal for the number of new connections added to the program on a regular. For instance, TOUA accomplishes this growth by following a five-year plan. Stinson Beach eventually brought all septic systems within the town into their program by conducting a specific number of inspections each year.

Attained a Critical Mass. An organization's administration requires professional expertise which carries a minimum cost, regardless of the organization's size. The company engaged in providing long-term management of on-site wastewater treatment systems is no different. Successful RMEs must have a functional administration providing the necessary leadership for the organization. In general, the minimum cost associated with providing this administration varies depending on the location, but based on the case studies assessed during this study is around $ 270,000 (based on minimum annual salaries for professional staff and support totaling $ 85,000 plus overhead costs).

Covering the administrative fee is a challenge when the organization has a limited number of customers. The administrative costs are fixed, so they must be covered regardless of the number of customers. However, based on discussions with industry practitioners, the general public resists paying more than about the equivalent of $ 40 per month for sewer service. Successful RMEs must obtain a large enough customer base to cover the cost of administering the organization while at the same time keeping the monthly charge under $ 40, and ideally around $ 30. This translates into a minimum number of customers, or "critical mass", of 750 to 1000 connections (750 customers paying $ 30 per month provides about $ 270,000 annually to cover fixed administrative and operating costs).

Of course, an important question for young RMEs without a critical mass of customers is how the administrative cost is covered until there is a sufficient customer base. There is no easy method, but the RMEs studied during this project often relied on other parts of their business to carry the operation and maintenance group until the critical mass is attained. The monthly charge, number of customers, and fixed overhead costs are interrelated: if the monthly charge is too low, fixed overhead costs may never be covered no matter how many customers join.

Establish a sustainable monthly fee. The critical mass of customers is related to a sustainable monthly fee. The RME must establish a monthly fee that covers all expected costs, yet is sufficiently low to be accepted by the public. This usually requires the RME specifically exclude certain items, particularly if operating under a management model

other than Model 5. One common mistake is to equate the monthly fee only with the cost of providing treatment system operation and maintenance. Long-term management necessitates that a variety of other costs are covered, including (but not necessarily limited to) sampling and testing, replacement of failed mechanical equipment, taxes and bonds, franchise fees, and profit. Failure to account for any of these other costs can be disastrous, because oftentimes many costs (e.g. quarterly tax payments or equipment replacement costs) will be large, lump sums.

The practice of Connexus and Onsite Systems, Inc. are instructive. The company's records include an exhaustive breakdown which exemplifies how a sewer charge is calculated. As part of Onsite System's filings with the Tennessee utility commission, the company submits extensive reference material concerning the justification and assumptions used to generate the individual components of the fee. This breakdown enables the company to better track, and thus control, the costs incurred in the long-term operation and maintenance of an onsite wastewater system. Those costs were presented on Table 3-6. A similar breakdown for Connexus is given on Table 3-3. Based on these two companies, approximately 30 to 40 percent of the monthly fee covers costs associated with replacement of capital equipment, including pumps and motors, land for disposal, and other "big-ticket" items.

3.4.4 Governance Commonalities

The NRECA has shown that the governance of rural electric cooperatives is a key indicator of the cooperative's business success. In general, those cooperatives with governing boards whose members have a wide range of expertise are often the most successful cooperatives. Successful boards are also generally characterized by minimal turnover, clear, written policies that are followed, and a practice of continuous training for the Board of Directors on a variety of topics.

Given its importance, the project team assessed the governance of the successful RMEs identified during the preliminary phase. Three commonalities associated with organizational governance were identified, including:

- Political will exists;
- Organization operates outside of the classic health department paradigm;
- Board focuses on big picture and does not micromanage.

Political will exists. "Political will" is a broad concept with several associated components. First, all of the successful RMEs studied for this project operate in a climate where the general public accepts their need and thus are willing to pay the monthly charge. Given the sentiment against paying for sewage treatment in many parts of the country the fact that the general public (or at least that part of the public paying the bills) accepts the need for long term management of the sewage treatment system is absolutely crucial to the successful operation of the RME. Many of the older RMEs achieved this political will slowly, over a time period measured in years.

In general, attaining this good will requires one of two strategies. Either the RME operates in an environment where the monthly charge is mandated, or a representative of the RME spends a significant amount of time working on an individual basis with members of the general public to sell the concept (see the *Dedicated core* commonality).

Onsite Systems, Inc. has chosen the first route by ensuring that home buyers purchasing homes within a subdivision where the company owns the wastewater treatment system are required by the developer to connect to the system. In this case, the homeowner signs on by choosing to purchase the home within the subdivision.

On the other hand, the Otter Tail Management District in Minnesota is an example where RME staff sold the concept to individual members of the public. In fact, the District's general manager spent many hours meeting with individual home owners to explain both the need for onsite management and the proposed structure. In the case of Otter Tail, the district was implemented in a region with numerous lakes which form the basis of a strong tourism economy; so many homeowners were more inclined to embrace a solution to a problem that threatened the health of the lakes. Working with the general public requires patience, dedicated massagers, and a compelling message, because, in many cases, the general public is being asked to pay for something for which it historically has not had to pay. This method of achieving widespread public acceptance may be best in isolated circumstances, such as where a pristine body of water is threatened by failed septic systems. The Paradise, California example is unique in that the success of an on-site system management program via permits led to a new cluster sewer system. This occurred in a town that voted down sewers a decade earlier.

A second component of attaining sufficient political will is the presence *and enforcement* of onsite regulations. It is not sufficient for a county to draft onsite regulations to address failed septic systems. The more difficult task is to enforce those regulations so that residents with failed systems address the problem. Oftentimes, the local county health department is staffed by dedicated individuals who must enforce rules on their friends and neighbors, which is a distasteful job. Nevertheless, even enforcement of the regulations is critical to the success of a RME. Enforcement means installers and homeowners operate under the same set of rules, which results in the punishment of those who choose to ignore septic problems or who try to profit from shoddy or incomplete installation. As noted elsewhere in this report, successful RMEs require sufficient financial resources; those financial resources can only come if those who contribute to a problem provide for the money to fix it.

A final component of generating sufficient political will is that the laws for incorporation of the RME are in existence. Typically, it is not necessary for the RME to get new legislation passed in order to incorporate and provide this service. Usually, the laws necessary to incorporate as a public utility, private utility, or cooperative are already in existence and can be used. However, in some cases a prospective RME may find that state laws do not exist that enable the RME to be formed and operate in a profitable manner and yet be protected from potential litigation. More typical, laws already exist that enable that incorporation.

Existence outside of the "normal" health department paradigm. The design, installation and ongoing operation of most septic systems in the U.S. are regulated by the county government where the building is located. In fact, in the great majority of cases, enforcement of the rules is the responsibility of the local health department. Given the historical mission of most county health department, this approach has made sense.

As septic systems failures have become more common, building density decreases, and the soil science assessments, treatment systems, and rules and regulations governing on-site wastewater treatment have grown in complexity, the inadequacy of this

arrangement becomes more obvious. Pre-engineered treatment systems coupled with drip irrigation dispersal enable a developer to provide wastewater treatment to many sites that before could not be developed. However, the sophistication and knowledge necessary to judge whether a particular design is sufficient has also grown.

In the search for RMEs as part of this study, it was obvious that most local health department officials are hard-working and knowledgeable regulators. However, too many of them must fill many different roles in the course of any given business day, from assessing hotel room cleanliness to ensuring food safety at local restaurants to ensuring that septic tanks are installed properly. Thus, in many places the job of a local county health inspector has become too big. Successful RMEs have gotten around this issue with a variety of strategies.

The successful RME is able to avoid working under the "typical" local health department paradigm. For instance, Onsite Systems, Inc. in Tennessee operates as a regulated public utility under the Tennessee Regulatory Authority. Ecocheck and Connexus Energy, on the other hand, have focused their efforts on specific counties bordering the Twin Cities metropolitan area in Minnesota. These counties have encountered explosive growth and so have health department employees focused exclusively on dealing with onsite treatment systems. By developing close relationships with the individual regulators, these companies have earned a level of trust that smoothes the permit process immeasurably.

Many successful RMEs operate as a special district or municipal zone developed to take responsibility for onsite systems. This is the case throughout California, where on-site management districts govern the installation and management of decentralized wastewater systems specifically for the county. It has also been employed successful in Lake Panorama, Iowa, throughout the state of New York, and in the Otter Tail Management District in Minnesota.

Governing board focuses on big picture and does not micromanage. Perhaps the most important commonality among successfully operating RMEs is the careful division of responsibility within the organization. This is most important for those public agencies that are governed by an independent board of directors. There are several examples of successfully operating RMEs which are governed by a board. In every case, the board formulates both goals and policies, but leaves the execution of those policies to paid staff. Further, in each case where the project team spoke with members of the RME, the professional staff reported both a good working relationship with the board and a sense of freedom in how best to accomplish their job. This sense of freedom was true for both publicly-held and privately owned RMEs. The NRECA has shown that the governing Boards must focus on the "big picture", and enable the paid staff to conduct day-to-day business. Board members must refrain from micromanaging and instead act as a reality check on the actions of the staff.

In fact, the state of California has long recognized the importance of functioning Boards. The California Special Districts Association (www.csda.net) is a nonprofit formed to ensure the continued existence of local, specialized districts. They represent districts formed for irrigation, fire protection, water, cemeteries, libraries and a host of other public benefits. In recognition of the important role that ordinary citizens have in the functioning of these districts, the Association offers a Governance Academy that teaches governance foundations, community leadership, finance and fiscal accountability,

and the Board's role in human resources. Although much of the information on their website is restricted to their members, the background information provides an excellent primer on the best structure and practices for governing boards. A national organization, such as WERF or NOWRA, could provide similar tools for RME boards involved in the management of decentralized systems.

CHAPTER 4.0 CONCLUSIONS & RECOMMENDATIONS

4.1 Conclusions

Several common attributes to successfully operating Responsible Management Entities (RMEs) have been categorized under the headings of the technical, managerial and financial capabilities of the RME. Further, in the course of identifying these common attributes, the project team discovered additional characteristics about the formation of RMEs that should be noted. This section summarizes these findings and provides recommendations on RME formation dependent on the state of the on-site infrastructure.

First, in the project team's attempt to develop a comprehensive list of operating RMEs in the United States, it became apparent that the definition a "Responsible Management Entity" varies significantly. Even with a generous interpretation of success, there are a fairly small number of successfully operating RMEs. This is particularly true for those operating under either EPA management model 4 or model 5, where the RME operates and maintains a number of decentralized wastewater treatment systems. It is fair to claim that the numbers were artificially limited by the project team's definition of "success" and that the project team's search was far from comprehensive. Yet, while decentralized treatment systems are gaining more widespread attention from the wastewater treatment industry, sewer districts dedicated to providing decentralized wastewater services remain uncommon.

The project team's efforts in identifying successful RMEs also revealed that, in many cases, a well-conceived permit system can be very effective in ensuring maintenance of on-site systems, particularly when conventional septic systems predominate. Many experts will commonly refer to these types of programs as "RMEs". Given both the broad use of the term, the many model 3 permit systems in place, and the evident success of the program, the project team included these in the assessment. In fact, these types of programs are often the best way to manage existing treatment systems, which often consist principally of septic systems.

The assessment yielded a number of commonalities among successfully operated RMEs, covering technical issues, finances, and managerial considerations, along with the way the RME is governed. The commonalities were discussed in detail in the preceding chapter, but it is worth noting that their success depends mostly on the management, acceptance of the venture by the public, and sound financial planning. There is a significant emphasis within the decentralized wastewater industry on differences between competing technologies. Yet, the selection of specific technologies turns out to be an insignificant factor in determining the business success of the RME. Clearly, the decentralized industry would benefit from more focus on financial and managerial issues, rather than debates on performance of competing technologies.

Planners, regulators, developers, the general public, and other stakeholders can benefit from the identification of the common business attributes in successful RMEs. Its success depends on widespread acceptance of the program by the general public, which can be achieved by either legislative fiat or through continuing public relations. Either of

these often requires taxpayer funding, and are the result of developing a coherent and clear message about the public health and environmental impacts from failing septic systems. Thus, the results of this study can be used to assist these stakeholders in crafting such a plan.

4.2 Recommendations for RMEs

Long-term management of advanced treatment systems is essential to protect human health and the environment, but there is a lack of guidance on how best to form an onsite wastewater management program. The most basic question to answer when forming a management program is the management model (or models) under which the program should be operated. This is not easily answered and requires consideration of numerous local factors that will be peculiar to the region where the program is to be implemented. However, the commonalities identified in this study can assist in pointing towards strategies best suited for specific situations.

In general, existing systems are best addressed through a permit process, which can be implemented at relatively low costs and puts the burden of paying for systems which have not been maintained on to the homeowner. On the other hand, cluster systems necessarily lead to model 5 programs, both because this helps ensure their maintenance and because in many cases the number of systems on any one cluster brings the system under the purview of the state regulatory agency rather than a county health department.

This section summarizes recommendations, based on the assessment of the successfully operating RMEs from this study, on the most appropriate management model given specific situations. Virtually any region looking to establish an onsite management district can be covered by one of three descriptions: 1) existing developments with existing treatment systems (often where conventional septic systems predominate); 2) existing developments where new treatment systems have been installed; and 3) new development with new treatment systems, such as the growth occurring in exurban areas. Each of these situations is discussed in more detail in the sections below.

4.2.1 Existing Development; Existing Treatment Systems

Widespread failure of existing treatment systems in existing development is (unfortunately) common. Typically, the failures manifest themselves either as a public health crisis or (more often) environmental problem, such as nitrate-contaminated groundwater or fecal coliform in a lake. Based on the observations made during this study, the most effective approach to addressing the long term management of existing treatment systems is to implement a Model 3 (i.e. permit) system under the control of local government. Based on the results of this study, there are a number of reasons why a permit system is the only feasible way to address this problem.

The primary problem facing regions with widespread septic system failures is in finding the money necessary to fix the problem. The technical solutions are simple enough to devise, but per household costs of $ 15,000 to $ 20,000 *and higher* are not uncommon. Repairs of this magnitude will preclude most homeowners from participating in any voluntary program. Further, even if a money source is identified, there are typically not sufficient funds to address all needs. A permit system can be implemented over several years, as property is transferred or problems are identified,

which invokes a “defacto” prioritization method. In order to maintain public trust, it is essential that activities involving tax funds be completed with sufficient transparency that public trust is maintained; this is only possible when the agency in charge is a public one.

Another stumbling block to establishing a Model 4 or 5 RME in a region with existing on-site systems is that virtually no agency, public or private, wants to encumber the potential liability from large numbers of septic systems whose condition is unknown. Throughout this study the researchers found representatives from various RMEs and potential RMEs extremely reluctant to take responsibility for existing problems, and so there was a natural tendency to only manage systems where performance could be verified.

Thus, in those places trying to address failed septic systems in existing development, planners should develop a permit program. There are several programs that have proven effective, including several described in this study--Stinson Beach, California, the passive program in Otter Tail, Minnesota and a number of counties throughout New York. In general, permit systems have been implemented in regions with valuable water resources.

4.2.2 Existing Development; New Treatment

The construction of new treatment systems for existing development offers the opportunity to launch a Responsible Management Entity focused on maintaining the new systems. Costs for new systems are typically between $ 10,000 and $ 20,000 for individual homes, so in those places where new systems have been installed it is usually accomplished with either separate financing or public funds. The homeowner often does not bear the entire cost of the new system, and thus is amenable to agreements requiring long-term maintenance that involve a monthly, or regular, payment.

In these circumstances either a Model 3 permit system or Model 4 RME operation and maintenance program is recommended. In fact, a public/private partnership between the local governmental entity and a private firm such as used in Paradise, California is an excellent option. The governmental body provides the needed regulatory mandate while the private company provides personnel needed to implement a new system. A partnership can bring significant benefits to a region because existing companies dealing with decentralized systems often have an excellent understanding of the management practices needed to keep these types of systems running. However, their long-term survival is based on their customers’ willingness to hire their services. The regulatory mandate ensures that their customers continue to pay for the service.

In these circumstances, a model 5 RME could also be implemented. Under model 5, the RME owns the treatment system. However, model 4 (where the system is owned by the homeowner) is usually a more politically feasible option as many homeowners are unwilling to give up ownership of anything located on their property. In fact, the two-tiered approach used in Otter Tail, Minnesota is an excellent example of one way to deal with existing development. In particular, Otter Tail’s strategy of allowing the homeowner to move from the passive program (homeowner owned and managed) to the active program (district managed) but not vice versa is an excellent one. This enables the district to be launched and in operation for some time to establish a track record. In this way, the homeowner is able to see the benefits of a RME owning and operating the treatment system before committing to the switch.

4.2.3 New Development; New Treatment

New treatment systems installed in new development offer the best opportunity to ensure that decentralized wastewater treatment systems satisfy public health and environmental standards for the long-term. In these cases, the most effective way to meet these long-term goals is by establishing a Model 5 Responsible Management Entity that provides all aspects of a modern sewer district. The system components are owned by the RME, which exercises control over the treatment system, installation, and operation of the systems. In this way, cluster systems lend themselves best managed under a model 5 program.

New development enables the RME to work with a single point of contact for a cluster of homes by working with the project developer during the building of the homes. In this way, the RME avoids working with individual homeowners, which can greatly slow the implementation of a cluster system. In addition, the RME gives the regulators charged with protecting human health and the environment a single point of contact when regulating wastewater discharges from cluster systems. Those business models used by Onsite Systems, Inc. in the southeast, Connexus WaterWays in Minnesota, and Ozark Clean Water Company in Missouri, are particularly good examples of this approach.

4.3 Future of Responsible Management Entities within the Industry

The onsite wastewater industry is arguably in need of increased professionalism. In order to achieve this worthy goal, it is incumbent on those involved in the profession to police themselves. This can be done in the same manner that other professions, in medicine, law and engineering, police themselves through licensing. Certain portions of the industry, including soil scientists and engineers, have licensing requirements. However, licensing requirements for installers, maintenance personnel, and others are not universal. Many counties and states are in the process of establishing minimum requirements for licensing.

However, the move towards greater professionalism does not end with more rigorous licensing. It must be followed by strict enforcement of acceptable codes of conduct, so that the general public can have confidence that a license actually means something. Installers and maintainers that do not meet minimal standards should be advertised as such by a “Better Business Bureau” for the decentralized industry.

As the ethic of professionalism grows within the industry, there will be an acceleration in the formation of new RMEs. These agencies can bring tremendous benefits to rural and semi-urban areas in the United States by providing modern wastewater service that protects public health at an acceptable price. Advancements in technology make it possible to provide high levels of wastewater service at virtually any location, regardless of local soil conditions, development density, and similar factors. Thus, the attributes identified in this study can be replicated by any group committed to the formation of a long-term management of onsite wastewater treatment systems.

4.4 Next Steps

This report describes a broad assessment of current practices which led to several conclusions about the current status of RMEs and can be used to further the development and establishment of successful ones. Those seeking to establish an RME must consider what management model is appropriate for their situation and apply the basic principles, described in this report, that have proven successful. Based on the conclusions described

in this report, there are a number of "next steps" that should be implemented to continue the establishment of RMEs destined for success, including the following.

- Bring Management, Operation & Maintenance (MOM) into national conferences;
  Conferences, workshops and training programs on the technical aspects of decentralized wastewater treatment are offered through a number of venues. While most of these do an excellent job providing information on soil science, equipment selection, system design, and other technical criteria, operation and maintenance issues are more limited in scope. Often, the focus is on specific treatment units rather than as an overall management strategy for the area being served. More significantly, financial and governance information is seldom discussed. USEPA should encourage the broad adoption of MOM topics in these venues by appointing or sponsoring a conference liaison with specific industry organizations, such as NOWRA and WEF.
- Conduct a "*Management Summit*" of system operators and potential operators;
  A Management Summit should be convened to gather real-world operating experience from owners and operators of successful RMEs to share with potential RMEs. The structure of this sort of meeting could vary, but RME managers could describe the history of their system and current organization, with an emphasis on the development of technical, managerial, financial, and governance capacity. The managers could also look at the unique challenges that they have encountered, and how they have addressed them. The summit will include a focused problem-solving process to gather individual and group approaches and generate creative ideas for establishing and maintaining successful RMEs.
- Develop generic operating rules and guidelines
  Using the information gathered at the *Management Summit*, generic guidelines can be developed to assist in the establishment of RMEs. This sort of endeavor would be similar to the generic operating rules and regulations developed by USEPA for the sewer use ordinance in the 1970s.

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APPENDIX A

Defining Business Attributes for a Successful RME

Discussion Guide
Questions for Phone Interviews

Section I - Community Need

1. Determine the size of the business, including number of customers (both residential and commercial), number of connections, and types of decentralized wastewater treatment and dispersal systems currently in use.
2. How many customers does the entity add annually?
3. Does the management entity own any of the systems identified in question 2?
4. Describe the current state of wastewater treatment infrastructure within your service territory. Is the region experiencing positive population growth? If so, how much growth (i.e., number of building permits issued last year) and what kinds of wastewater systems are currently being installed for new homes?
5. Describe community support for providing advanced systems.
    a. Is the general public familiar with these systems?
    b. Is there a general environmental ethic within the community?
    c. Does the community willingly embrace governmental participation in solving a problem, or expect fellow citizens to figure things out on their own?
6. Identify locations where this service is provided.
7. Describe the management entity's reputation within the community and with your customers.

Section II – Technical, Managerial & Financial Capacity

1. Describe how the management entity secures qualified technical capacity in conducting their business.
    a. Does the management entity have professional registered engineers and soil scientists on staff to provide design services for new on-site systems?
    b. If technical expertise is subcontracted, are the same professionals hired or are the jobs bid separately?
    c. Does the management entity obtain any permits as part of their business?
    d. Are the operation and maintenance (O&M) services subcontracted or performed by staff?

e. If O&M services are subcontracted, what tools are used to manage the subcontractors to ensure that they are acting properly (i.e. meeting environmental regulations, analyzing samples as required, etc.)?
f. Who completes system design, and who checks the design to ensure these designs meet the standards set by the entity? Who inspects the construction to insure that the installed facilities meet the design requirements?
g. In whose name are operating permits for new systems issued?
h. How do you ensure systems which you did not design, yet took over, meet acceptable design standards?

2. Describe how the management entity secures qualified managerial capacity in conducting their business.
    a. Who is responsible for day-to-day administration of the management entity, and for whom does this person work? Is there an expert in wastewater on the utility's core executive staff team?
    b. Are the core functional areas and associated staff of the electric utility integrated with the core functional areas of the wastewater RME, including: engineering, operations, finance/accounting, marketing and customer service, and human resources?
    c. Describe the size and qualifications of the staff.
    d. Is the entity computerized, and what specific software systems are in use? Specifically, describe the back office customer information technology "infrastructure". If an electric coop, is the coop's IT infrastructure used in the management of the RME (e.g., billing included with electric bill)?
    e. Are the entity's policies and procedures written down?
    f. Does the management entity do any benchmarking of its own performance? If so, what criteria are used?
    g. What is the procedure for changing staff salaries and how frequently is this done?
3. Describe how the management entity secures qualified financial capacity in conducting their business.
    a. What is the entity's annual budget?
    b. How is the entity financed (e.g., specified tax, user fees, permit fees, etc.)?
    c. Can we obtain a copy of your rate structure for services provided?
    d. Who has responsibility for monitoring the budget and how often is it reviewed and approved?
    e. Is there a comprehensive system for budgeting that includes corrective action and variance reporting?
    f. Is there a long-term plan for acquiring assets and business growth?
    g. Are there audits of the entity's budget? If so, how often?
    h. If a budget is used, may we obtain a copy of the most recent year (either calendar or fiscal)?

Section III – Governance Capacity

1. Describe the corporate/legal form of the entity.

a. Is the entity set up as a wholly-owned subsidiary, a joint venture, an LLC, or other legal form to the parent company (or coop)?
b. Is it a non-profit or for profit venture? If for profit, how is this reconciled with the organization's tax exempt status? If a cooperative, are the customers 'members' of the electric cooperative?
c. Is it a public utility regulated by the local state's public utility commission?
d. Is the entity a sewer district? Is so, are all people within your service territory required to join the district?
e. How has protection from liability for failing or failed systems been addressed?
f. Has the entity been liable for any damages associated with on-site wastewater systems installation and operation?

2. Is the management entity governed by a board of directors? How many Directors sit on the Board?
3. How does the Board ensure that it is following all federal, state, contractual, bylaw, and policy requirements and abiding by all applicable codes, service rules, regulations, contracts and policies?
4. Describe the Board's policy on Nomination and Election of Directors. Are they elected from the membership or appointed by the electric cooperative board? Is this codified as a formal policy?
5. What is the average tenure of Directors? What is the average turnover?
6. Does the Board have an attendance policy for meetings?
7. How frequently does the Board meet and how long do the meetings typically last?
8. Who makes the agenda for the Board meetings?
9. Are Board meetings open to the public or just to members, and is this required by state law?
10. Describe the Board's policy on Director Fees and Expenses? Is this codified as a formal policy? Are the Board members paid? If so, what is the basis for paying (i.e. hourly rates or lump sum, etc.)?
11. If the management entity is governed in some other way than by a Board of Directors, who has authority for final decisions and what is the basis for that authority (e.g. special legislation, written into bylaws, etc.)?
12. Describe the Board's policy on Director Education and Development?
13. Does the entity or Board have a mission statement? If so, may we have a copy?

Section IV – Local Regulatory Issues

1. What local governmental agency or agencies have jurisdiction over the systems the entity owns or operates (e.g. health department, state environment department, etc.)?
2. Where are the jurisdictional differences between the entities, based on:
   a. Flow?
   b. Number of connections?
   c. Residential vs. commercial properties?

d. Other?

3. Is there a formal planning and zoning commission within the entity's service territory?
4. If so, does planning and zoning have any role in the approval process for providing on-site, decentralized wastewater services? Describe that role, if appropriate.
5. Given current growth within the entity's service territory, describe the potential for changes in local regulations or annexation trends that could impact potential business for the entity.
   a. How frequently are local regulations governing on-site systems amended?
   b. If applicable, has the planning and zoning commission done any long-range forecasting within the entity's service territory? If so, what was the result of that forecasting?
   c. How do these issues fit into the entity's plans for future growth?