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Chical Area On-Site Wastewater Treatment System Management Pueble of Isleta, New Mexico

Blane M. Sanchez

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Pueblo of Isleta, New Mexico

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Committee

Dr. Bruce Thomson, Chair
Dr. Ted Jojola
Russel D. Pederson, PE

A Professional Project Report Submitted in Partial Fulfillment of the Requirements for the Degree of
Master of Water Resources
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COMMITTEE APPROVAL

The Master of Water Resources Professional Project Report of **Blane M. Sanchez** is approved by the committee:

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SUMMARY OF CONTENTS

TITLE PAGE
APPROVAL PAGE
SUMMARY OF CONTENTS i
LIST OF TABLES, FIGURES, APPENDICES iii
ACKNOWLEDGEMENTS v
ABSTRACT vi

Introduction 1

Wastewater Management Background 3
- Water Pollution Control History 3
- Indian Health Service History 5
- Decentralized versus Centralized Wastewater Treatment Systems 6

Decentralized On-site Wastewater Treatment System Technology 8
- Basic Design and Treatment 8
- Environmental Considerations 13
  - Human Health 14
  - Groundwater 14

Chical Area 18
- Environment Description and Land Uses 18
- Tribal Government 21
- Tribal Services, Permits, and Fees 22
- Community Challenges 22
- Current Septic System Management 23
- Side Bar - Land Use Planning - Oneida Nation 25

Overview of EPA Management Guidelines 26
- Purpose 26
- EPA Management Models 27
  - Homeowner Awareness 27
  - Maintenance Contracts 28
  - Operating Permit 29
  - Responsible Management Entity (RME) Operation and Management 30
  - Responsible Management Entity (RME) Ownership 31
- *Side Bar – Examples of Management Strategies* 32
  - *Warren, VT* 32
  - *Pena Blanca, NM* 33
  - *Bernalillo County, NM* 34

Chical Area On-Site Wastewater Treatment Management Plan 35
- Project Approach 35
- Objectives 35
- Considerations 36
- Recommended On-site Wastewater Treatment (OWTS) Management Plan 37
- Implementation 39
  - OWTS Program 39

Inventory and Evaluation 41
Performance Criteria 42
Operation and Maintenance Service 45

Chical Area OWTS Management Program Elements 48
Program Administration Elements 50
Public Education and Participation 50
Planning 50
Performance Criteria 50
Record Keeping, Inventory, and Reporting 51
Financial Assistance and Funding 51

System Installation & Operation Oversight 52
Site Evaluation 52
System Design 52
Construction 53
Operation & Maintenance 53
Residuals management 54

Compliance Assistance/Assurance 54
Training & certification/ licensing 54
Inspections & monitoring 55
Corrective actions & enforcement 55

Funding Support 56

Recommendations 57
Inventory OWTS, Evaluate Performance, and Data Base Creation 57
OWTS are properly Sited, Design, and Constructed 57
Systems are periodically inspected and repaired when necessary 57
Professionally trained personnel perform system O&M 58
The design of the OWTS is determined by *Performance Criteria* 58
Tribal OWTS Management Program and O&M service assessment 58

Conclusions 59

GLOSSARY 62
REFERENCES 64

APPENDICES

APPENDIX A Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems

APPENDIX B Bernalillo County Wastewater Ordinance 2000-7

APPENDIX C New Mexico Liquid Waste Treatment and Disposal Regulations

APPENDIX D Funding Sources

LIST OF FIGURES

Figure 1: Conventional OWTS 8

Figure 2: Septic Tank Cross-section 9

Figure 3: Drainfield and distribution pipes 10

Figure 4: Typical Cross-section Drainfield Trench Construction 10

Figure 5: Gravelless Leaching Chamber 11

Figure 6: Biodegradation in Soil 12

Figure 7: Soil Particle Biodegradation 12

Figure 8: Example of OWTS System Layout 13

Figure 9: NMED - Documented Groundwater Contamination by Septic Tanks 15

Figure 10: NMED Areas of Concern – Valencia County, NM 17

Figure 11: Chical Area, Pueblo of Isleta 20

Figure 12: Matrix for EPA Model 4 Management Type – Chical Area OWTS 37

Figure 13: Conceptual Organization Chart 40

TABLES

TABLE 1: MANAGEMENT FEATURES OF A CHICAL AREA OWTS MANAGEMENT PLAN 38

TABLE 2: BERNALILLO COUNTY PERFORMANCE STANDARDS 43

TABLE 3: NEW MEXICO MINIMUM REQUIRED TREATMENT LEVELS FOR SITE CONDITIONS 44

TABLE 4: MANAGEMENT CATEGORIES AND PROGRAM ELEMENTS 49

APPENDICIES

APPENDIX A: Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems

APPENDIX B: Bernalillo County Wastewater Ordinance 2000-7

APPENDIX C: New Mexico Liquid Waste Treatment and Disposal Regulations

APPENDIX D: Funding Sources

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ABSTRACT

On-site wastewater treatment systems (OWTS) have been utilized to provide treatment and disposal for the Chical Area of the Pueblo of Isleta for over 30 years. The OWTS technology used here primarily consists of septic tanks and absorption fields. The groundwater below the Chical Area is a highly valued resource by the Isleta Pueblo, but the hydrogeology makes it vulnerable to contamination from OWTS.

Most of these systems have been installed with the assistance from the Indian Health Service. However, Isleta has not developed a plan or management program to ensure that these OWTS are properly sited, constructed, operated or maintained. Over this time, the number of septic systems has increased and the trend continues due to unregulated housing development on the irrigated lands in the Chical Area.

The Environmental Protection Agency (EPA) reports nationally that septic systems are utilized by 25% of existing homes and 33% of new homes. The more alarming statistics are that up to 30% fail annually and over 50% are over 30 years old (EPA, 2003). All homes in the Chical Area utilize septic systems and many existing systems are over 30 years old.

In 2003, the EPA published its Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems (Management Guidelines). The intent of these guidelines is, "*to improve the performance of decentralized wastewater systems through better management.*" This guidance is applicable to tribal government and their communities to improve OWTS management programs. Implementation of these guidelines will help insure that individual wastewater treatment systems function properly to protect public health, the environment, and water resources.

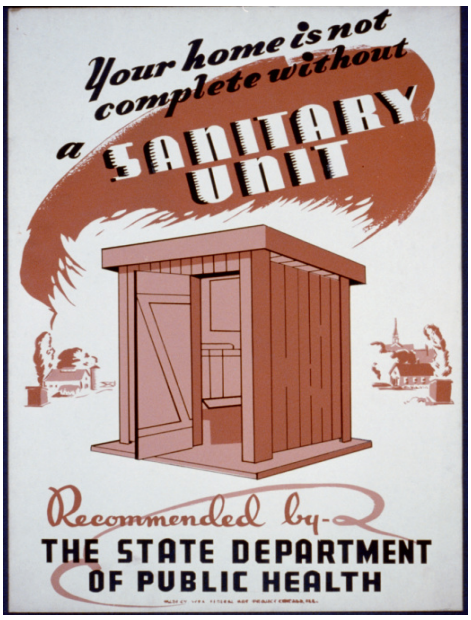
The objective of this professional project report was to identify and recommend an OWTS management plan for the Chical Area and the Pueblo of Isleta. Five Conceptual Models from the EPA Management Guidelines were reviewed and those management components found applicable were integrated to form the Chical Area OWTS Management Plan. Recommended management components

include: 1) inventorying and evaluating OWTS performance and creating a data base; 2) OWTS are properly sited, designed, and constructed; 3) OWTS are periodically inspected and repaired when necessary; 4) professionally trained personnel perform system operation and maintenance service; and 5) the design of the OWTS is determined by *performance criteria*. The management components are to be implemented through a Tribal OWTS Management Program that assesses a fee for the O&M service to be provided.

CHICAL AREA ON-SITE WASTEWATER TREATMENT SYSTEM MANAGEMENT
PUEBLO OF ISLETA, NEW MEXICO

Introduction

On-site wastewater treatment systems have been around since the mid-1800s (Eddy, 2000). During this time, water supply was the controlling factor making sanitation a major concern in rural areas. There was little recognition of the potential for regional groundwater contamination (Thomson, 2005). Water was either pumped or carried. Water had not yet been integrated with the privy. The flushable toilet (commode) appeared in the 1850's as various patents were filed (Taylor, 2005). As for the person who actually invented the indoor toilet, there is not consensus among historians on this subject.



For much of rural America, the outhouse was a common feature of that setting. The outhouse consisted of a shed located over a hole in the ground and was relocated when the hole was full. The outhouse was common for the Pueblo of Isleta reservation, even up to the early 1970's when I recall my grandmother's home receiving indoor plumbing for a bathroom.

On-site wastewater treatment systems (OWTS), better know as septic systems, were installed with support from the Indian Health Service (IHS) in the early 1970's for isolated residences on the Pueblo of Isleta. This technology has been utilized for the Chical Area of Isleta for over 30 years. Over this time period, the number of septic systems has increased and the trend continues due to unregulated housing development. IHS continues to provide assistance in the design and construction of on-site wastewater treatment and disposal systems through its Sanitation Facilities Construction Program. Currently, Isleta does not have a

plan or management program to oversee these OWTS to insure they are properly maintained and function as designed once they are constructed. Furthermore, there are no design or installation standards for systems that are not installed by IHS.

Statistics by the U.S. Environmental Protection Agency (EPA) show that septic systems are utilized by 25% of existing homes and 33% of new homes being constructed nationwide (EPA, 2003). EPA states further that up to 30% of systems fail annually and over 50% of the systems are over 30 years old. In the Chical Area, all homes utilize septic systems and many existing systems are over 30 years old. System failures are apparent for both existing and new systems, however, exact numbers are not known (Jojola, 2005).

The EPA published its Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems (***Management Guidelines***) in March 2003. This document is a result of the EPA's response to Congress on the use of decentralized wastewater treatment systems (EPA, 1997). The *Management Guidelines* were developed "*to improve the performance of decentralized wastewater systems through better management*." These Management Guidelines are applicable to tribal government and their communities to improve or develop OWTS management programs. The basic goals of these voluntary guidelines are to help insure that individual wastewater treatment systems function properly to protect public health, the environment, and water resources. The *Management Guidelines* are found in **Appendix A**.

The objective of this professional project report is to identify and recommend an OWTS management plan for the Chical Area and the Pueblo of Isleta using these *Management Guidelines*.

Wastewater Management Background

Water Pollution Control History

The Federal Water Pollution Control (WPCA) Act of 1948 is often considered the first environmental legislation approved by Congress (Arenovski, 1996). Congress amended the WPCA in 1972 and prohibited surface discharges of wastewater without a permit (Ibid, ____). In 1977, the WPCA was amended by the Clean Water Act with six new goals and objectives:

- By 1983, achieve a level of water quality to protect fish and recreation.
- By 1985, eliminate discharges of pollutants to surface waters.
- Toxic pollutants could no longer be discharged.
- Construct publicly owned wastewater treatment facilities.
- Develop area wide waste treatment management planning.
- Elimination of the discharge of pollutant through technology development.

EPA developed regulations to achieve these goals and objectives and approved funding of grants to support planning, construction of primary wastewater treatment plants, and research.

However, without financial aid, many municipalities found it difficult to construct expensive publicly owned wastewater treatment facilities. Federal subsidies were made available in 1981 to help cover the costs of these central treatment plants (Arenovski, 1996). Also at this time, ***primary treatment*** was recognized as ineffective to protect the water resources. Congress took notice of this ineffectiveness and in 1981 enacted amendments to the Clean Water Act that required upgrading sewage treatment plants to meet higher standards based on secondary biological treatment technology. Also, Congress implemented the Federal Construction Grants Program to support facility upgrades and new construction (Ibid, ____).

In 1987, Congress then passed the Water Quality Control Act which added a new goal to the Clean Water Act to control non-point source pollution. At this time, the Federal Construction Grants Program was eliminated and Congress enacted by the state revolving fund system in its place. The state revolving fund is a low interest loan system available to municipalities to assist meeting their wastewater treatment needs. Under this new system, the financial burden was reversed and municipalities paid 75% of construction costs while the federal government made up the remaining 25%. This shift in financial responsibility resulted in many smaller communities having difficulty in securing state revolving fund loans and gaining public support to construct these large expensive facilities (Arenovski, 1996).

Social, demographic, and environmental problems, along with financial limitations associated with this approach to wastewater management, required looking for alternatives to offset this situation. Such alternatives include individual on-site disposal systems like conventional septic systems, innovative advanced technologies, and shared systems that could be utilized to provide equally acceptable or better treatment in some circumstances (Ibid, ____). These decentralized on-site systems allowed for aquifer recharge, and land use (e.g. open space) and cost benefits. Up until now, these decentralized wastewater management systems were limited due to the perception of unreliability and were primarily viewed as short term solutions. These on-site technologies if properly managed can provide the treatment necessary to protect public health and the environment including groundwater and surface waters, just as well as centralized systems (EPA, 1997).

The 1987 Clean Water Act also provided the ability for Federally recognized Indian Tribes to be considered as "States" for the purposes of developing and implementing water quality standards (Section 518, 33 USC 1251). The Pueblo of Isleta was the first tribal government in the country to have its standards approved by the EPA in 1993. Isleta's standards were set to be integrated into the City of Albuquerque's discharge permit requiring improved quality for treated effluent entering the Rio Grande. During times of low or zero river flow, the discharged effluent affected what Isleta received and depended on for its established uses. As a result, the City brought suit against the EPA for their approval of Isleta's water quality standards. In 1997, the U.S. Supreme Court declined to hear their appeal and the lower court rulings held to affirm the EPA approval of Isleta's standards (City of Albuquerque v. Browner, 1997).

Indian Health Service History

Responsibility for Native American health has undergone many organization transfers. The U.S. War Department had the responsibility for Native American health until it was transferred to the Bureau of Indian Affairs (BIA) in 1849 (Kuschell-Haworth, 2005). In 1912, the Public Health Service (PHS) became involved with Indian health with a report to Congress that identified the need for a specific program to improve sanitation conditions on reservations (IHS, 1999). The BIA Health Division was created in 1921, and was the forerunner to the Indian Health Service (HHS, 2005). In the late 1920's, the PHS assisted the BIA in surveying their schools and hospitals water and waste disposal systems (IHS, 1999). Indian homes and communities were left out of this survey. It was not until 1950, that the need for reservation sanitation improvement was recognized.

In 1950, life expectancy was 60 years for American Indians and Alaskan Natives as compared to 69.1 years for the U.S. White population. The age adjusted gastrointestinal disease death rate was 15.4 per 100,000 in 1955 for the American Indians and Alaskan Natives on tribal lands. This rate was 4.3 times higher than for the rest of the U.S. (IHS, 1999).

On July 1, 1955, health care for Indians was transferred from the BIA to the PHS (NLM, 1998). As part of this transfer, the Indian Health Service (IHS) was created by Indian Health Transfer Act (P.L 83-568). After a series of meetings between the PHS, Department of Health, Education and Welfare (HEW), the Department of Interior, and the Bureau of Budget, legislation for the authority to construct sanitation facilities reservation homes and communities was sought from Congress (IHS, 2005). In 1957, several bills were introduced, but only P.L. 85-137 was enacted authorizing the Surgeon General to construct sanitation facilities on the Elko Indian Colony in Nevada. Funding for the $34,000 project was provided later in the Supplemental Appropriation Act of 1958.

The authorizing Act for the Elko Colony did not address the need for other facilities on the remaining Indian reservations and communities. Such authorization was introduced in the 85th Congress, but died in the House when the second session closed (IHS, 2005). In the 86th Congress, the HEW Secretary asked Congress for authorization to construct sanitation facilities for Indian homes and

communities. From eight bills introduced, P.L. 86-12, the Indian Sanitation Facilities Act (42 USC §2004a) was passed and amended the Indian Health Transfer Act by authorizing the construction of water and sewer service for the reservations. This enabling legislation for the Indian Sanitation Facilities Construction (SFC) Program was signed into law on July 31, 1959.

The goal of the SFC Program is to raise the health status of American Indian and Alaska Natives by working with them to: 1) provide water supplies and adequate waste disposal; 2) provide technical assistance to tribal governments who operate and maintain completed facilities; and 3) provide engineering consultation regarding environmentally related health problems (IHS, 1999).

From 1959 to 1998, over 9,100 sanitation projects servicing about 230,000 Indian homes provided water supply and waste disposal facilities. Upon completion of a sanitation project, these facilities are owned or transferred to the tribe, individual, or appropriate authority for operation and maintenance (O&M). Ongoing technical assistance is provided, but not financial assistance for the O&M of these facilities (IHS, 1999).

Decentralized versus Centralized Wastewater Treatment Systems

Wastewater management has consisted of either centralized sewer treatment facilities for highly populated areas, or decentralized on-site septic systems for small towns, suburban, and rural areas. Supported by the national goal to restore our surface bodies of water and federal funding providing for publicly owned treatment works during the 1970's and 1980's, the focus was on large centralized wastewater collection and treatment facilities rather than decentralized systems. Federal subsidies of 50% or more in matching funding supported construction of these centralized systems. The Construct Grants Program that provided these subsides ended in 1990, but resulted in 75% of the population being served by centralized sewage treatment. The State Revolving Fund Program that took the place of the Construction Grants program did not benefit those smaller communities that had problems meeting the financing requirements of the revolving fund program (Arenovski, 1996).

A ***Centralized Wastewater System*** is a managed system consisting of collection sewers and a single treatment plant to collect and treat wastewater from an entire service area. Traditionally, such a

system has been called a Publicly Owned Treatment Works (POTW) as defined in 40 CFR 122.2 (EPA, February 2003). Constructing, operating, maintaining, and upgrading these centralized systems requires a large population and tax base. In some settings, the need or the plan to increase development to expand the tax base and pay for centralized sewer resulted in uncontrolled growth and environmental damage. Centralized treatment costs two to four times more per customer for small communities and many small communities have exhausted their tax base at the expense of other public safety and education programs to pay for those sewers (EPA, February 2003). Clearly the conventional, centralized system has its place, but there is ample reason to question if that place is everywhere that an "organized" wastewater system is desired (Venhuizen, 2005).

A ***Decentralized Wastewater System*** is an on-site or cluster system(s) used to collect, treat, and disperse or reclaim wastewater from a single dwelling or building, a small community, or service area (EPA, February 2003). Decentralized systems are more commonly known as septic systems. A common misconception is that on-site systems are inferior and not as safe as centralized systems. The development of modern on-site treatment technologies and management programs has reversed this misconception. Implementing these technologies and management programs now rests with local communities. A well managed on-site wastewater treatment system will prevent small communities from having to finance the high cost of constructing and operating and maintaining centralized sewers. The decentralized concept also provides greater flexibility to address a variety of situations within a service area in the most cost efficient, environmentally sound and societally responsible manner (Venhuizen, 2005).

Decentralized On-Site Wastewater Treatment System Technology

Basic Design and Treatment

Conventional on-site wastewater treatment systems (OWTS) are designed to provide primary treatment of wastewater. Primary treatment is a liquid waste treatment process that takes place in a treatment unit (septic tank) and allows those substances in wastewater that readily settle or float to be separated from the water being treated (NMAC, 20.7.3). The conventional on-site septic system has three components, the ***septic tank***, drainfield, and soil beneath the drainfield for effluent adsorption and purification (Figure 1). The drainfield and soil beneath are collectively referred to as the ***absorption field***.

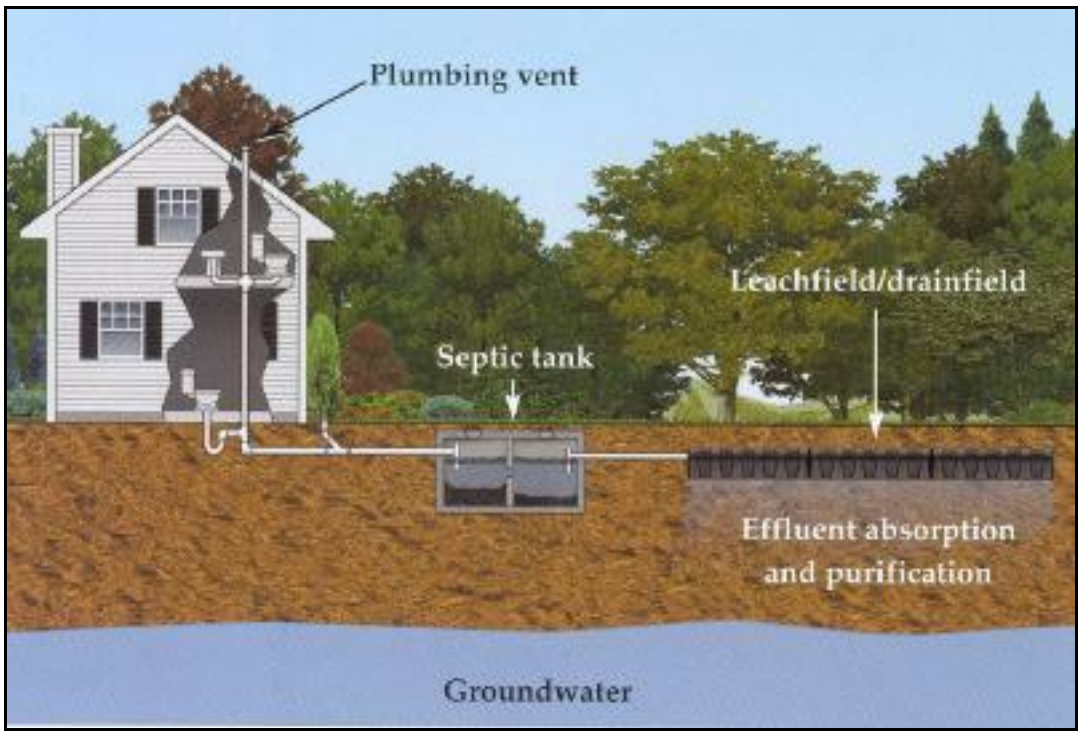


Figure 1: Conventional OWTS (Natural Home Building Source)

The septic tank must be watertight and constructed of material (like concrete, fiber, reinforced plastic, fiberglass, or polyethylene) resistant to decay or corrosion. The size of the tank is based on the

household being served and the volume of wastewater being generated. The tank should retain wastewater for at least 24 hours and hold at least one week of waste flow (EPA, 2000).

Wastewater generated in the household is collected and transported to the buried septic tank. The septic tank should be designed with an inlet baffle forcing wastewater downward to prevent short-circuiting across the top. The septic tank provides primary treatment by allowing solids to settle to the bottom and floatable solids (oil, grease, hair) rise to the top as scum. See Figure 2 below.

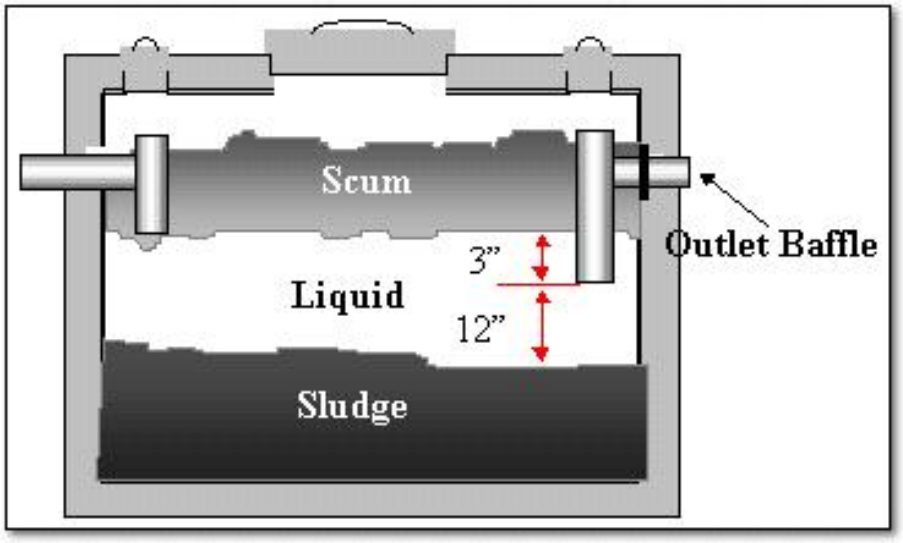


Figure 2: Septic Tank Cross-section

Up to 50 percent of the solids retained in the septic tank decompose, while the remainder accumulates as sludge on the bottom (EPA, 2000).

In between the sludge and scum is the clarified effluent. An outlet baffle helps keep the scum layer from flowing out with the clarified effluent into the drainfield. Grease should not be disposed of down the drain and garbage disposals should not be utilized. The clarified effluent flows from the septic tank into the drainfield through distribution pipes buried beneath the ground (Figure 3). Drainfields are typically constructed with four inch diameter distribution pipes laid in trenches and surrounded with gravel of a certain size (Figure 4). Gravelless systems consisting of ***leaching chambers*** (Figure 5) utilize

modular plastic arch segments two to four feet wide that connect together. Both gravel and gravelless systems should distribute the effluent evenly before percolating into the soil below the drainfield.

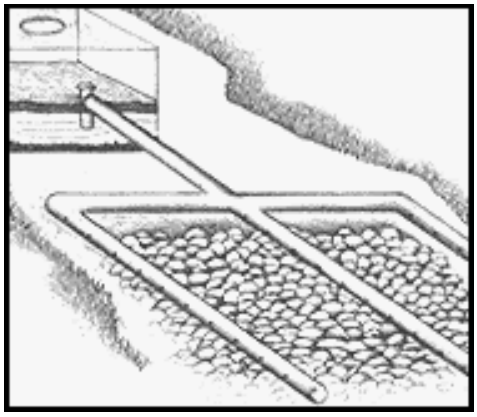


Figure 3: Drainfield and distribution pipes (Soap and Detergent Association)

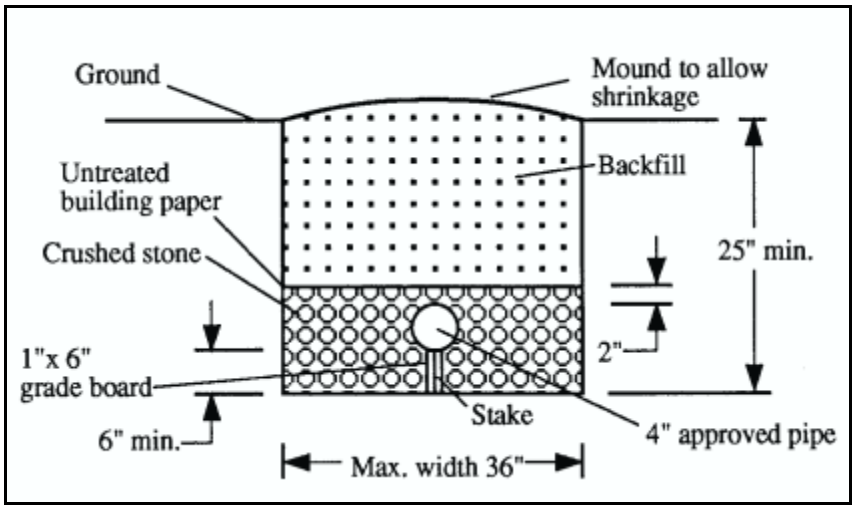


Figure 4: Typical Cross-section Drainfield Trench Construction (University of Georgia Cooperative Extension Service)

Source: Infiltrator Systems Inc., 2000.

Figure 5: Gravelless Leaching Chamber

The soil beneath the drainfield induces further treatment of the effluent through physical, chemical, and biological processes. To effectively utilize these natural processes, the soil between the drainfield and the water table must be large enough and remain unsaturated. Water flows more slowly through unsaturated soil, and the slower the flow rate, the more effective the effluent is cleaned. Good aeration is important to achieve decomposition of organic particles and compounds, ***biodegradation*** of detergent, and die-off of bacteria and viruses (Brown, 2005).

Biodegradation is a natural process that breakdowns organic (carbon-containing) ingredients into carbon dioxide, water and minerals by the action of microorganisms, such as bacteria. Figure 6 and Figure 7 show a simplified illustration of the effluent movement through the soil, soil adsorption of nutrients and other chemical compounds, and *biodegradation*.

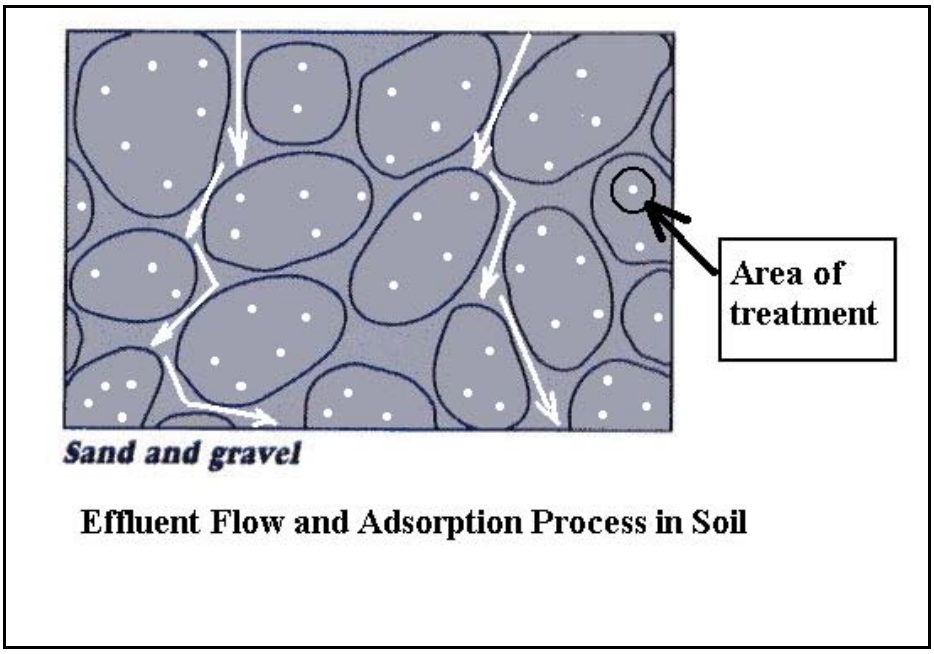


Figure 6: Biodegradation in Soil

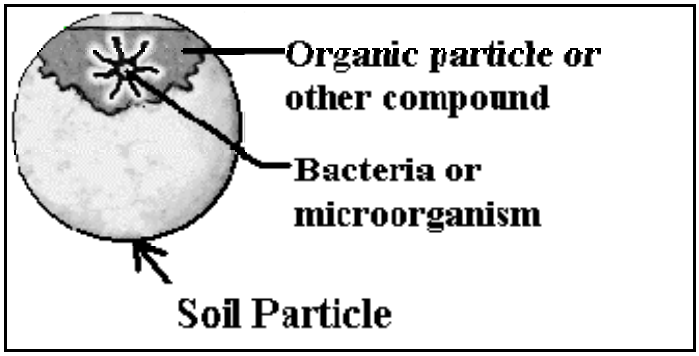


Figure 7: Soil Particle Biodegradation (Soap and Detergent Association)

The ability to treat effluent in the soil depends on the size and characteristic of the *absorption* field and quality of the effluent entering it. Maintaining a balance between the amount and quality of effluent placed in the soil and what it can treat effectively is crucial to preventing groundwater contamination. The siting, design, construction, and operation and maintenance of OWTS influence the efficiency of wastewater treatment by natural processes.

Environmental Considerations

OWTS can be sources of nitrogen, phosphorus, organic matter, and bacterial and viral pathogens that can impact the environment and human health if not properly sited, designed, constructed and maintained. Figure 8 is an example of siting conditions and OWTS layout (ANJEC, 2002).

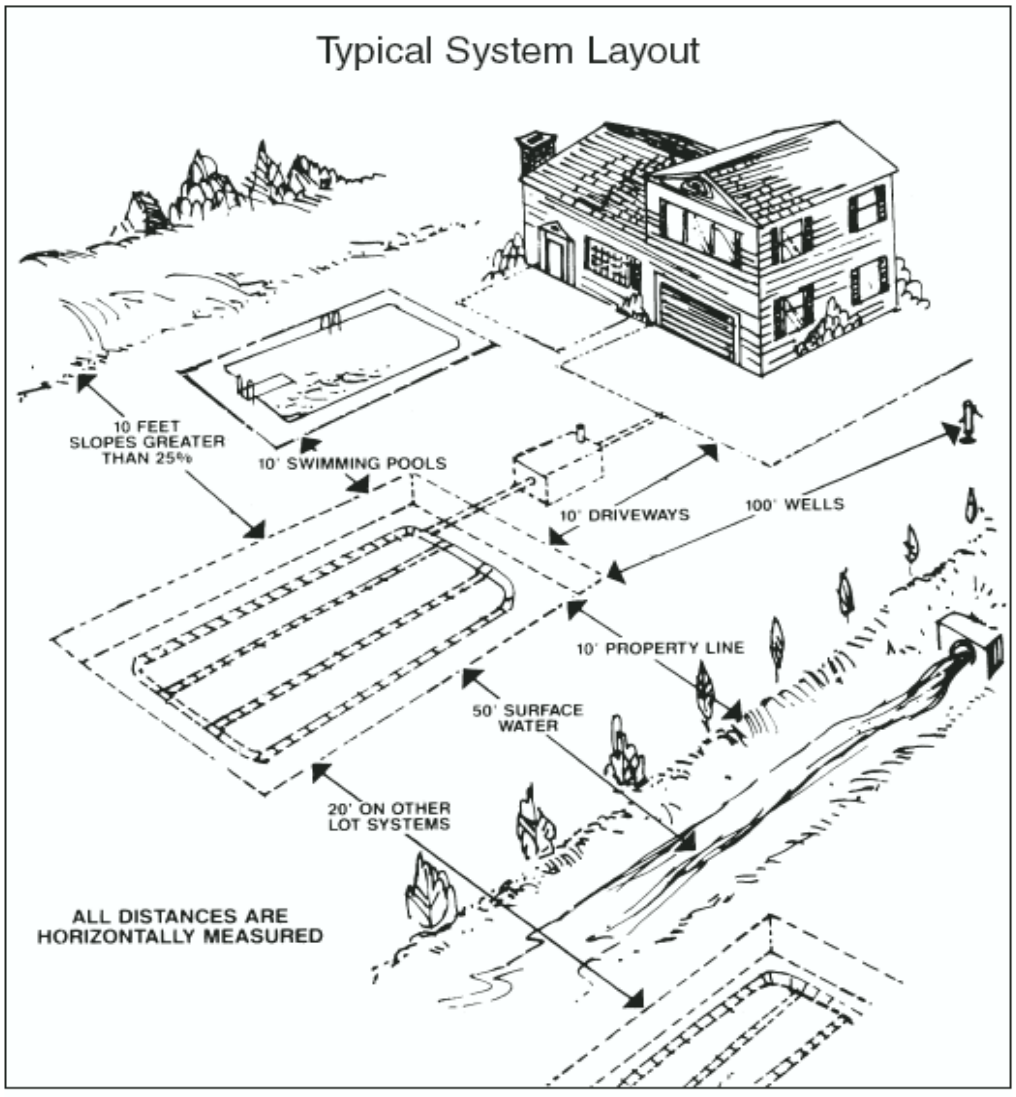


Figure 8: Example of OWTS System Layout (ANJEC)

Human Health

A failing system will allow large amounts of viruses and bacteria to contaminate the surface of the ground and any nearby surface waters. People and animals contacting the contaminated area are susceptible to infection from the viruses and bacteria. Children, the elderly, and people with depressed immune systems are more vulnerable to problems than healthy adults (Santa Cruz Co., 2005).

Wastewater may contain many pollutants that are harmful to human health. Raw sewage contains microorganisms such as bacteria, viruses and protozoa that are potential pathogens. These can cause sickness and disease including diarrhea, dysentery, cholera, hepatitis and typhoid. Raw sewage may also contain household cleaners and solvents, many of which contain carcinogenic solvents. Prescription drugs and their bodily byproducts are known to disrupt human hormones. Others are direct DNA toxins and some create antibody-resistant bacteria. In addition, both solid and liquid human waste is generally rich in nitrogen. Under certain conditions, nitrogen can be converted to nitrate that poses health risks to infants and toddlers. This condition has been named, "blue baby syndrome." For these reasons, it is very important that untreated sewage not contaminate drinking water (WRP, 2001).

Groundwater

Groundwater is the primary source of drinking water in New Mexico and for Isleta and the Chical Area. OWTS can contaminate groundwater with dissolved solids, nitrate, anoxic constituents (manganese, iron and hydrogen sulfide), organic compounds, and microorganisms (McQuillan, 2004). The New Mexico Environment Department (NMED) has identified groundwater contamination caused by septic systems across the State as shown in Figure 8 below.

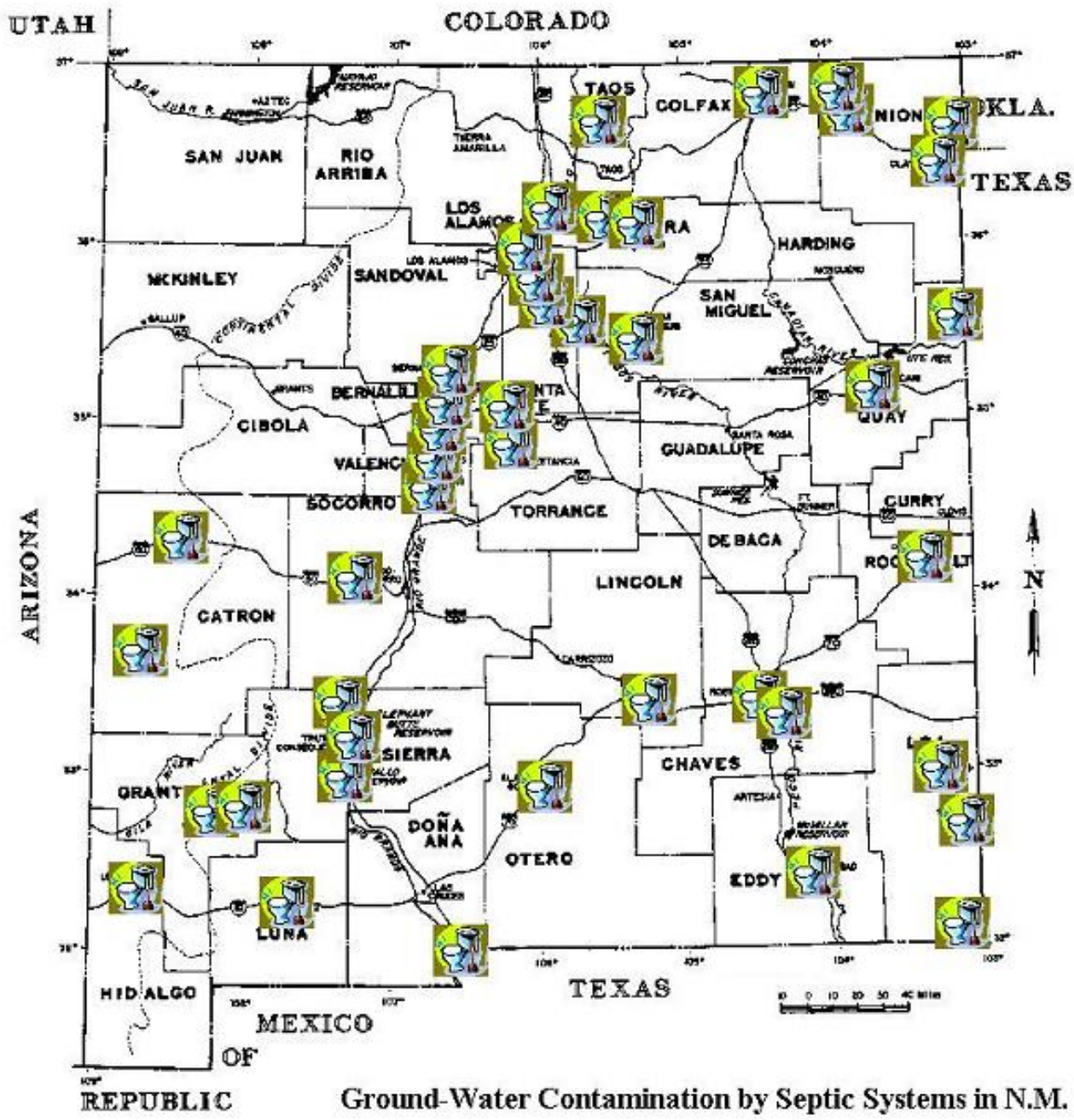


Figure 9: Documented Groundwater Contamination by Septic Tanks (NMED)

Widespread groundwater contamination exists in the middle Rio Grande valley. To the north in Bernalillo County, many public and private wells have been affected. Where the groundwater table is close to the surface and most vulnerable, groundwater contamination already

exists. It has also been detected in areas where the depth to groundwater is several hundred feet below the surface of the land (BCEHD, 2000).

To the south, NMED identifies Areas of Concern (AOC) in Valencia County (Figure 10). AOC's (in red) are highly sensitive aquifers vulnerable to contamination from septic tank discharges with groundwater less then 100 feet from the surface (NMED, 2005).

The "Wastewater Service Improvement Project Draft Environmental Assessment" written by the Army Corps of Engineers for the Village of Bosque Farms noted that, "[t]he *proposed project would alleviate some of the current groundwater contamination and associated health concerns that are occurring due to on-site disposal systems* (ACE, 2004)." The Bosque Farms area (white box) is shown in Figure 10.

The Chical Area lies also within the NMED designated AOC for Valencia County. The Chical Area is the black hash polygon shown in Figure 10. Bosque Farms is appurtenant to the southwest boundary of the Chical Area.

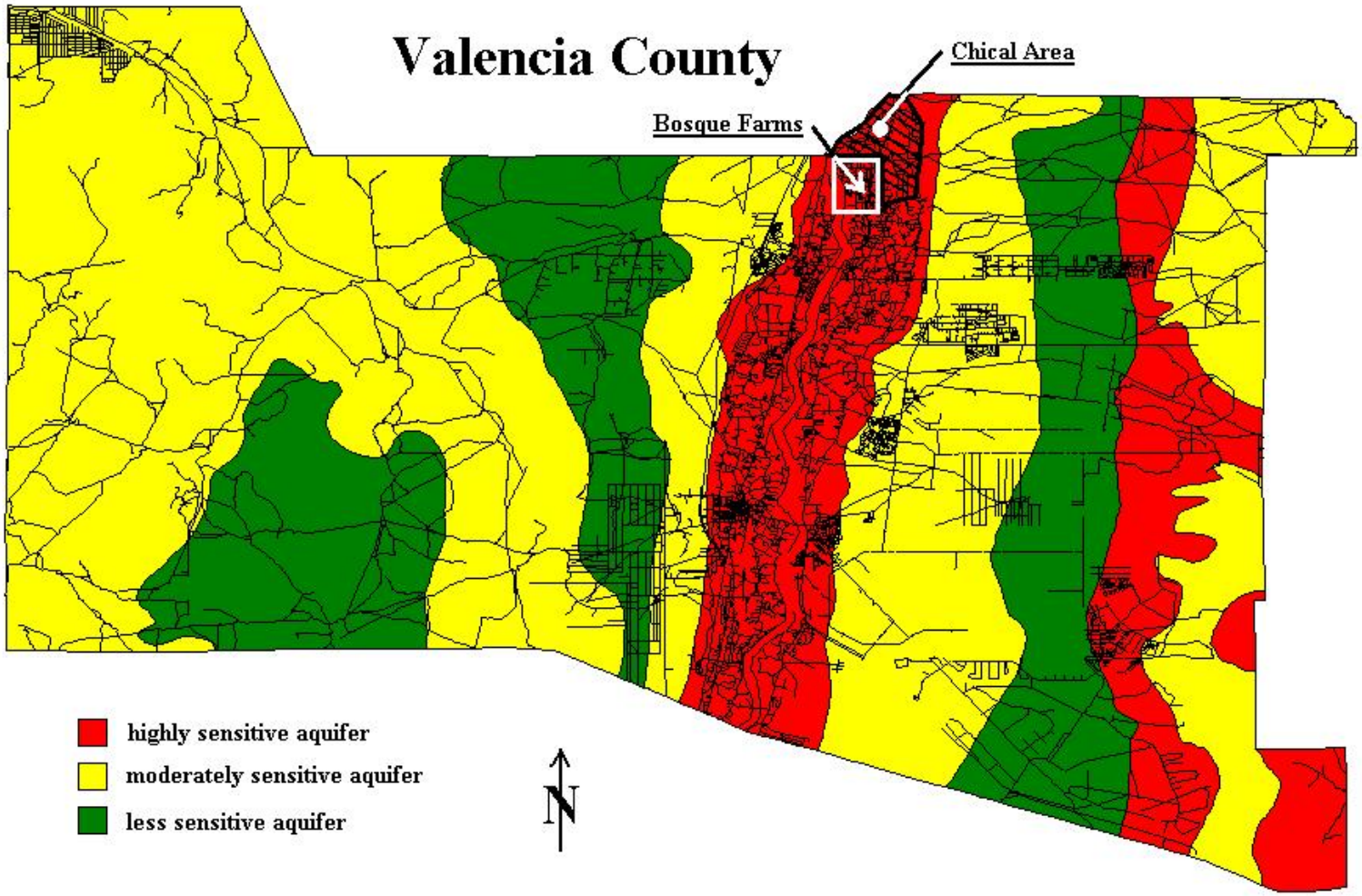


Figure 10: Areas of Concern – Valencia County, NM (NMED)

Chical Area

Environment Description and Land Uses

The Chical Area of the Pueblo of Isleta is located on the east side of the Rio Grande and includes the communal areas of Chical, Lo Bumtee, and Ranchitos (Figure 10). The Chical Area is situated on the alluvial valley flood plain consisting of level well drained loamy soils (SCS, 1975). The Chical Area is approximately 4,395 acres with 433 housing units identified in a 2000 draft wastewater management report (Chavez-Grieves, 2000). Land use has been traditionally agricultural with a minimally developed irrigation and drainage system interspersed throughout. Information is not available regarding the value of irrigated land on the Isleta. However, in comparison to non-Indian land, its value is greater due to its prior and paramount water rights, agricultural productivity, open space that provides wildlife habitat, and traditional use areas that are priceless. Residential home sites and some limited tribal businesses development located on NM State Highway 47 that bisects the Chical Area. NM State Highway 47 which is a major four lane thoroughfare connecting Bosque Farms, and other communities to the south with U.S. Interstate 25 to the north.

A community water system has been developed for the Chical Area through efforts from the IHS. Well sites are adjacent and just outside the Chical Area boundaries where groundwater is pumped from Rio Grande alluvium fill. Due to Isleta's sensitivity about disclosing certain water resources information, the actual depth from which potable water is pumped is unknown. However, community wells are believed to have been developed from at least a depth of 300 feet. A number of private wells exist, but their numbers, locations, and status of use are unknown. Fortunately, health risks related to drinking water contamination are low due to wells being located off the irrigated land and the depth from which water is believed to be pumped from.

In the Chical Area, all homes utilize OWTS and many of the systems are over 30 years old. System failures are apparent for both existing and new systems however, exact numbers are not known (Jojola, 2005). The majority of OWTS are situated on irrigated lands with the exception of a few houses

in Chical and Lo Bumtee which are located just above the valley floodplain. The bulk of residential septic systems were installed with the assistance of the IHS. There are some OWTS that have been installed or repaired privately by the owner or through a contractor and absent any technical assistance from the IHS or approved entity. It is likely that some of these septic systems were poorly designed or constructed.

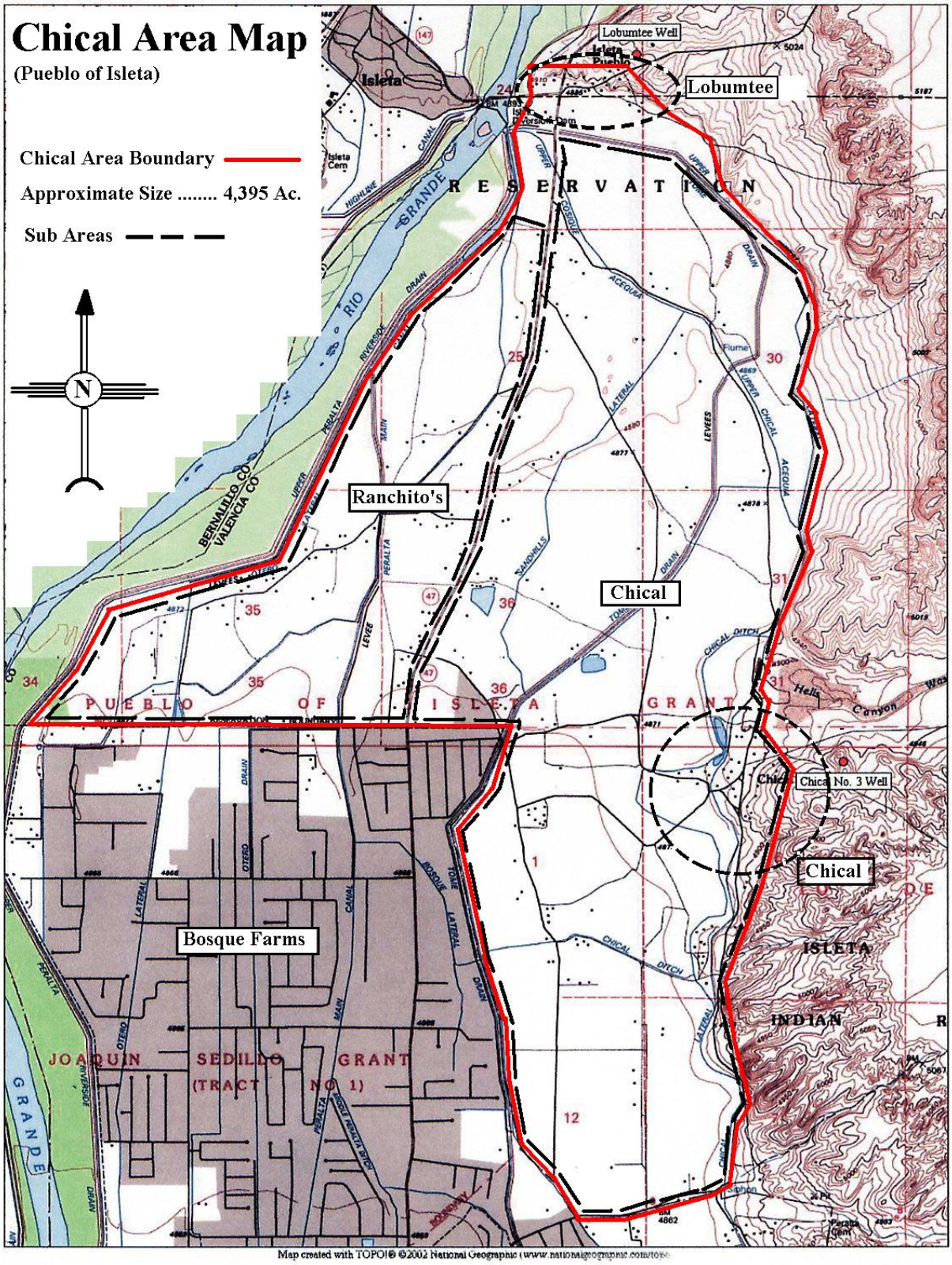


Figure 11: Chical Area, Pueblo of Isleta

The Chical Area is considered by NMED to be a highly sensitive area vulnerable to contamination from leaking septic tank discharges. These areas are associated with the valley floodplain where depth to groundwater is less than 100 feet. In fact, seasonal groundwater can be found as close to four feet from the surface in the Gila-Vinton-Agua ***soil association*** mapped for the Chical area (SCS, 1975). The 1975 Soil Conservation Service Soil Survey states that "[*c*]*ontamination of the water supply is a hazard if the soils are used for septic tank filter fields."* The threat of groundwater contamination from septic for the Chical Area is confirmed by the published survey.

Tribal Government

Most tribal governments like Isleta Pueblo are still catching up in terms of providing the necessary services and programs that are taken for granted by non-Indian communities. Tribal governments have slowly expanded their capabilities often depending on the priority the federal government has placed on meeting tribal needs with associated funding. Federal funds have never been sufficient to meet full tribal needs and tribal governments make due with what federal funds are available. Revenue that has been recently generated by Indian Gaming has been used to support existing programs and services that have not been fully funded by the federal government. Often, remaining funds are reinvested into economic development in order to continue supplementing tribal programs and, contrary to popular belief, little funding remains to develop new programs and services still needed. With this new found revenue, there is a misconception by the public and some federal law makers that gaming tribes are now self supporting. Due to this sentiment, Tribal governments remain wary of federal initiatives and shifting policy that is aimed at reducing or ending federal funding and its responsibilities.

The tribal government structure of Isleta adopted a democratic from of government in 1947 and subsequently revised it in 1991(POI Constitution, 1991). Elections are held every two years. The Executive Branch consists of the Governor and 1st and 2nd Lieutenant Governors. The Governor is responsible for tribal government administration. The Legislative Branch is a twelve (12) member Tribal Council. The Tribal Council enacts laws for the Pueblo and is responsible for management and control of

the lands and resources of the Pueblo. The Judicial Branch consists of the tribal and appellate courts. The tribal court has jurisdiction over civil and criminal jurisdiction cases included in the Pueblo of Isleta Code of Law (Code). The Pueblo's Code is not extensive, has not been updated to meet existing needs, and has limited regulatory authority. The Tribal Council also serves as the appellate court.

Tribal Services, Permits and Fees

The Pueblo of Isleta tribal government provides potable water, septic tank pumping, and solid waste disposal at no cost for tribal members. Off reservation, these services are normally provided through a ***public utility*** or private entity and costs associated with these services are passed on to the consumer. Isleta's policy thus far has not required any level of community financial support to help offset costs for services. This policy stance must be factored into an on-site wastewater management recommendation.

*A **Public utility** is an organization supplying water, electricity, transportation, etc. to the public, operated, usually as a monopoly, by a private corporation under government regulation or by the government directly (Webster's, 1995).*

It should be noted that the Pueblo does assess a combination of fees and permits for the privilege to utilize other tribal resources by its members. Examples include irrigation, grazing, hunting, and wood harvesting.

Community Challenges

This aspect is probably the most crucial in implementing positive change. Unlike most non-Indian communities that are taxed and/or assessed to pay for public services provided, this structure does not extend to Isleta. Not requiring or having a structure to generate revenue to pay for tribal water, sewer, and solid waste service creates a challenge to implement the public utility concept. However, as

operation and maintenance costs increase for the Pueblo, a revenue generating structure to support these services will have to be explored.

Despite the dilemma of a missing revenue structure to support these services, Isleta embraced a community change by accepting and implementing a solid waste management program. Before this program was established, households burned trash in barrels. This burning released dioxins and other carcinogenic compounds into the air and surrounding environment (EPA, 2005). The pollution generated was a human health hazard especially for those tribal members concentrated and living in main village of Isleta. However, with tribal government support, intense public outreach and community education, and federal funding and technical assistance, the former scenario changed. The long term practice of trash burning in barrels is now outlawed, and has been replaced with weekly garbage service. This positive change took place only within the last 10 years.

Current Septic System Management

As discussed previously, decentralized on-site wastewater treatment and disposal via septic systems was instituted through the IHS in the early 1970's for isolated residences on the Pueblo of Isleta and has been used for the Chical Area of Isleta for over 30 years. IHS continues to provide assistance in the design and construction of on-site wastewater treatment and disposal systems through its Sanitation Facilities Construction Program. As a condition of this assistance, the facilities become the property of the home owner, along with all operation, maintenance, and repair expense responsibilities upon completion of an OWTS project through IHS (IHS, 1999).

Over this time, the use and number of OWTS has increased and the trend continues due to unplanned housing development. While the IHS provides assistance in the design and construction of on-site wastewater treatment and disposal systems, the Pueblo does not have a formal plan or stand alone management program to oversee the complete life cycle of these on-site septic systems. Specifically missing is a mechanism to insure the septic systems are properly maintained and operated as designed

once they are constructed. Furthermore, OWTS that are installed privately are not subject to a formal process that guarantees proper siting, design, construction, and installation.

The Pueblo does provide a septic tank pumping service at no cost when requested by tribal OWTS owners. These requests are called into the Governor's office and clerical staff process work orders which are then submitted to the individual assigned to this job. Septic tank wastewater is disposed of at the facultative lagoon system that services the main village of Isleta (Jojola, 2005).

On occasion when the service vehicle is down for repair, OWTS owners have opted to utilize septic tank pumping services from a non-tribal private source (Abeita, 2005). In these instances, the system owner pays for this private service. Reimbursement is not provided by Isleta to OWTS owners when private service is obtained on their own.

At the time when septic tanks are being pumped, a formal evaluation of the system by the Pueblo is not conducted as part of this service. Information concerning the O&M of these systems is not taken to track the condition, functionality, and any problems found with the system. Though maintenance and proper operation of the on-site system rests with the homeowner, this responsibility and periodic service is usually not performed. The fact that OWTS do not receive, and are not tracked for, operation and maintenance (O&M) service can be linked to failing systems and the frequency of pumping service required.

Some of these failing systems can be attributed to the age of the system. Requests for replacement are submitted through the Pueblo to IHS. The IHS must then divide its available resources between replacement of failing systems and meeting the demand for on-site systems associated with new home site development. There does not appear to be a system to prioritize between new construction and replacement of OWTS.

Currently, the Pueblo has not developed a comprehensive land use plan to delineate where residential development can or cannot occur, especially on prime irrigable land. Irrigable lands are priceless for Isleta in terms of the connectivity between water rights, economic potential, and agriculture as it relates to traditional and cultural values. Based on discussion with Isleta Tribal Program staff, not all

appropriate departments are involved when it comes to evaluating the siting of potential home sites (Romero, 2005). Only the Realty and Housing Departments are directly involved with the IHS in the development of new home sites and associated OWTS. The Departments of Environment, Hydrology, and Planning are not involved to provide concerns related to the environment, water resources, and land use conflicts.

***Side Bar* - Land Use Planning - Oneida Nation**

The Oneida Nation in Wisconsin developed a land use plan in 1989. The land use plan is currently being updated, but the intent is to help guide future land uses over a period of 20 years (Oneida Nation, 2004). As part of its Comprehensive Plan, the Nation developed a Land Use Technical Guide for internal use between departments related to acquisition and use of tribal land. Responding to increased growth within the Nation, the Technical Guide helped document and educate those not familiar with the process and lessened the issues related to land purchases and development. While the Oneida Nation Technical Guide has a specific focus and objective regarding (non-Indian) land purchases within the reservation boundaries, their overall approach to land development is being highlighted here.

The Oneida Nation approaches the preservation and development of tribal land to include both tribal government and members. As part of this process, a land inventory is required. The Technical Guide is used as a tool to assess the condition of the land and help define limitations and potential uses. The Land Use Plan defines the location of land use (Oneida Nation, 2005).

The process adopted outlines procedures for the evaluation and use of tribal property. Integral to this process is the expertise contained and utilized within the tribal structure that includes Land Management, Environmental Health and Safety, Geographical Information Systems, and Planning Departments. A flow chart was developed to outline and help visualize the process. As an adopted policy of the Nation, Tribal and non-tribal projects that do not follow this process will not be approved by the Land Commission and face a higher level of scrutiny by their Business Committee. The purpose of this process is to ensure that tribal lands (which are a limited resource) are best managed for the long-term needs of the Nation (Oneida Nation, 2004).

Overview of EPA Management Guidelines

Purpose

In 2003, the U.S. Environmental Protection Agency (EPA) published its **Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems** (***Management Guidelines***) "*to improve the performance of decentralized wastewater systems through better management*." The basic goals of these voluntary guidelines are to help insure that individual on-site wastewater treatment systems function properly to protect public health, the environment, and water resources. The purpose of these *Management Guidelines* is to raise the level of performance of decentralized on-site wastewater treatment systems through improved management programs (EPA, 2003). Decentralized wastewater treatment systems, better known as septic systems, provide an alternative to centralized wastewater treatment systems and can be protective of human health and the environment if they are properly planned, sited, designed, constructed, installed, operated and maintained.

There are five conceptual models identified with levels of management that increase in relation to the sensitivity of the surrounding environment and/or the complexity of the treatment system. Each model has thirteen (13) associated elements that describe the activities to be performed to achieve the management objectives. The purpose of the models is to provide a guide to help determine management controls necessary to offset potential public health and water quality risks from OWTS for a given area.

Flexibility is built into the models so that programs can be tailored through substituting elements from among the models to accommodate the local practices, needs and conditions. The "best" model program is the one that provides the appropriate management controls for the potential risks. The legal authority for regulating on-site septic systems lies with Isleta Tribal government. To assist in identifying a decentralized wastewater management program, the EPA developed the draft **Handbook for Management of On-site and Clustered (Decentralized) Wastewater Treatment Systems** (***Management Handbook***) to complement the *Management Guidelines*. The *Management Handbook* will

be utilized to evaluate and identify which management model and associated elements is best suited for the Chical Area.

The following summary of the EPA Management Models is provided with recommendations regarding their applicability to the Chical Area Setting.

EPA Management Models

Homeowner Awareness

The **Homeowner Awareness Model** (Model 1) is the base level of management recommended by the EPA (EPA, 2003). Model 1 is applicable where treatment technologies are confined to conventional systems that are passive and in sound condition, and provide acceptable treatment under suitable site conditions despite a lack of attention by the owner. A program under this Model specifies appropriate management practices where on-site treatment systems are owned and operated by individual property owners and are situated in areas of low environmental sensitivity (i.e., no restricting site or soil conditions such as shallow water tables or drinking water wells within locally determined horizontal setback distances). Failures that occur and continue undetected will pose a relatively low level of risk to public health and water resources.

This model establishes a database by documenting and inventorying on-site systems present. Information gathered helps evaluate whether increased management practices are necessary. The objectives include:

1) That conventional on-site systems are properly sited, designed, and constructed in accordance with sound, prevailing rules;

2) That systems are periodically inspected; and,

3) Repaired when necessary by the Owner.

The Regulatory Authority maintains an accurate record of the types and location of all on-site systems. Also provided are periodically notices to the Owner/User regarding operation and preventive maintenance recommendations. Education outreach is important in raising

homeowners' awareness of basic system maintenance requirements, and to better ensure that the homeowners attend to those deficiencies that openly threaten public health.

All management programs described in the EPA Management Guidelines suggests the use of only trained and licensed or certified service providers.

Recommendation

An inventory of OWTS, development of an OWTS data base, and the associated objectives are applicable and recommended. However, a higher level of management is recommended due to the following conditions: 1) the Chical Area groundwater is highly vulnerability to contamination from OWTS; and 2) not all systems are passive, or in sound condition.

Maintenance Contracts

The **Maintenance Contract Model** (Model 2) is applicable where more complex system designs are necessary to improve and enhance conventional systems including small ***cluster systems*** (EPA, 2003). The objective of this model builds upon the Homeowner Awareness Model by ensuring that property owners retain maintenance contracts with trained operators to allow use of more complex or mechanical treatment options. Maintenance contracts provide for appropriate and timely system maintenance by qualified technicians over the service life of the system. Maintenance of these more complex systems is critical to sustaining acceptable protection in these areas of greater environmental sensitivity. These systems should be allowed only where trained operators are under contract to perform timely operation and maintenance. For example, the operation and maintenance of electric pumps used for pressurized on-site systems is critical for their performance. Newer systems are designed with effluent filters that require periodic cleaning and may or may not coincide with scheduled septic tank cleanout. Also, the homeowner may not elect perform this undesirable maintenance themselves.

Recommendation

Having a trained entity to provide system operation and maintenance is applicable and recommended. However, the contract arrangement concept is not fully supported due to the following concerns: 1) which operator contractors are eligible and would they perform O&M service on Isleta; 2) which court of law (Isleta, other) will resolve contract disputes when service provider is based off-reservation; 3) tribal government support for contract service and potential issues; and 4) OWTS owners acceptance of a contract arrangement with private service provider.

Operating Permit

The **Operating Permit Model** (Model 3) is recommended where sustained performance of on-site wastewater treatment systems is critical to protect public health and water quality (EPA, 2003). The objective of this model builds upon the first two Models by issuing renewable and revocable operating permits to on-site system Owners. Such permits stipulate specific and measurable ***performance criteria*** for the treatment system and periodic submittals of compliance monitoring reports. *Performance Criteria* is any condition established by Isleta to ensure future compliance with the public health and water quality goals of the community, the Tribe, and the federal government. Performance criteria can be expressed as numeric limits (e.g., pollutant concentrations, mass loads, wet weather flow, and structural strength) or narrative descriptions of desired conditions or requirements (e.g., no visible scum, sludge, sheen, odors, cracks, or leaks).

Limited-term operating permits are issued to the property owner and are renewable for another term if the owner demonstrates that the system is in compliance with the terms and conditions of the permit. In sub-areas where it is appropriate to use conventional on-site system designs, the operating permit may contain only a requirement that routine maintenance to be performed in a timely manner and the condition of the system be inspected periodically. Complex systems and treatment processes will require more frequent inspections and adjustments, so operational monitoring may be required.

Under this ***performance based management program***, the design of the on-site wastewater treatment system is based on meeting *performance criteria* rather than site characteristics and conditions. Operating permits allow for clustered or on-site systems in areas having wide range of site characteristics. Therefore, on-site systems can be used in more sensitive environments if their performance meets those requirements in a sustained manner. The operating permit also provides a mechanism for continuous oversight of system performance, appropriate corrective actions, or levying penalties if permit compliance is not maintained.

Recommendation

The concept of issuing operator permits to OWTS owners and premised on maintenance contracts previously discussed is a regulatory approach Isleta would probably reject. However, the design of OWTS based on *performance criteria* is applicable and recommended. The advent of Isleta's surface water quality standards seems to support the concept of *performance criteria*. Similar protection is provided for groundwater resources that have been recognized as being vulnerable to contamination from septic tank discharges.

Responsible Management Entity (RME) Operation and Maintenance

The ***Responsible Management Entity*** **(RME) Operation and Maintenance Model** (Model 4) is applicable where large numbers of onsite and clustered systems must exhibit continual and highly reliable operation and maintenance is required to meet specific water quality requirements because the sensitivity of the environment is high (EPA, 2003). The ***Responsible Management Entity*** (RME) is a legal entity responsible for providing various management services with the requisite managerial, financial, and technical capacity to ensure the long-term, cost-effective management of decentralized onsite or clustered wastewater treatment facilities in accordance with applicable regulations and performance criteria.

Continuing to build upon all previous Models, the objective expands to ensure that on-site systems consistently meet their stipulated performance criteria through a RME that is

responsible for O&M of systems within their service area. Ownership of the on-site system remains with the property owner.

Issuing the operating permit to an RME instead of the property owner provides greater assurance of control over performance compliance. For a service fee, the RME takes responsibility for the O&M. System failures are also reduced as a result of routine and preventive maintenance. This allows for the use of performance based on-site systems in more sensitive environments than the Operating Permit Model.

This approach can reduce the number of permits and the administration functions performed by the regulatory authority. The operating permit system is identical to that of the Operating Permit Model except that the permittee is a public or private RME. Also, it may be necessary (as some States have done) to establish a regulatory structure to oversee the rate structures that an RME establishes and any other measures that a public services commission would normally undertake to manage private entities in non-competitive situations.

Recommendation

Isleta tribal government already provides management services in various forms related to water, wastewater, and solid waste. Therefore, their established managerial, financial, and technical capacity can be extended to provide long term, cost-effective management of OWTS. It is recommended that operation and maintenance for OWTS be provided by a tribal RME. A service fee to provide O&M is also being recommended. As in Model 3, Operator Permits are not applicable for the reason provided. Also, the necessity to establish a public service commission and regulatory rate structure is not applicable due to Tribal government being both regulator and service provider.

Responsible Management Entity (RME) Ownership Model

The **Responsible Management Entity (RME) Ownership Model** (Model 5) differs from Model 4, in that the on-site system is owned by the RME rather than the property owner (EPA, 2003). The objective is to provide the highest level of professional management in the

planning, siting, design, construction, and O&M of individual OWTS via the RME. Under this approach, the RME owns the OWTS and maintains complete management control in a manner similar to central sewerage and utility service. This reduces the likelihood of disputes that can occur between the RME and the property owner in the Model when the property owner fails to fully cooperate with the RME. This management model is appropriate for environmental or public health conditions similar to those for the RME Operation and Maintenance Model, but Model 5 provides the highest level of control over system performance.

The RME can also more readily replace existing systems with higher-performance units or clustered systems when necessary. The use of higher performance on-site units allows for environmental limitations to be addressed and performance measures to be adhered to. EPA recommends implementation of the management practices detailed in the RME Ownership Model in cases such as where new, high-density development is proposed in the vicinity of sensitive receiving waters.

Recommendation

It is highly unlikely the Pueblo would accept ownership of individual OWTS. Therefore, this model is not applicable.

Side Bar - Examples of OWTS Management Strategies

Warren, VT

In the early 1980's, the small New England community of Warren in northern Vermont, began experiencing the occurrence of failing septic systems. Along with these failures, water quality monitoring showed elevated levels of E. Coli in the Mad River (Clark et. al., 2001). The community looked at developing a centralized wastewater treatment system, but stalled due to high costs, resistance to mandatory connection requirements, and the dispersal field being too small for the entire community. In 1998, Warren received an EPA demonstration grant to evaluate, develop, and implant an alternative community wastewater solution.

As part of its wastewater solution, an extensive public education program with homeowner

workshops was developed and a wastewater needs survey was performed. A committee of local residents was formed to guide the process of lot by lot assessment to evaluate site conditions and wastewater treatment needs. Individual on-site systems were rated using State and local regulations to determine site suitability and whether systems were appropriate or required modification. A Geographical Information System was used to compile field assessments into an electronic data format.

The wastewater needs assessment identified existing and suitable on-site systems to remain, failing systems and solutions to remedy, and established a community wastewater management program. Solutions ranged from improved maintenance or upgrades for suitable systems, replacing marginal or failing systems with appropriate treatment, and potential cluster systems were identified. The approached taken allowed for customized solutions for each site based on fact based assessment of needs and alternative (Clark, et. al., 2001). Implementing a management program was the next step to maintain all wastewater treatment systems functioning well into the future.

Pena Blanca, NM

The community of Pena Blanca begun to experience potential public health issues in 1985, due to a large number of septic systems and cesspool failures (NESC, 2005). These failures resulted in sewage being exposed on the surface. The community applied for financial assistance under an EPA Grant program and a private contractor was hired to facilitate the planning process.

The planning process studies found 86 percent of homes needing wastewater system improvement. Problems identified included, overburdened systems serving multiple homes, shallow groundwater, and inadequate leachfields. The initial study recommended construction of a small diameter pressure collection system and facultative ponds with intermittent sand filters. The estimated cost was $3.1 million.

Funding was not available to support the recommend project requiring an alternative plan to be devised. In 1986, the second study examined use of on-site systems incorporating new septic leachfields, cluster systems, and sand mound disposal systems to be installed for estimate cost of $1.2 million. In 1990, 133 on-site systems where installed at a total cost of $939,700.

The lead agency for the project was the Peña Blanca Water and Sanitation District (WSD). Due to their presence in already providing domestic water service for the project area, they took on the responsibility of maintaining on-site systems to ensure proper operation. The WSD utilizes NMED to permit on-site systems and oversee installation. The WSD provides biannual pumping of septic tanks for a monthly fee of $10.64 for 1,000 gallon tank. In the first eight years of operation, samples taken from private wells in area found nitrate level below 1.0 mg/l. The NM drinking water standard for nitrate allows up to a maximum of 10 mg/l.

Bernalillo County, NM

Groundwater contamination has been acknowledged in both shallow levels and several hundred feet below the surface. Affected have been both private and public wells. Septic tank effluent was identified as contributing to this contamination (Bernalillo Co., 2000). Due to this setting and in 2000, Bernalillo County established an ordinance affecting wastewater systems for its residents. A copy of the ordinance is provided in ***Appendix B****.*

The ordinance requires residents to connect to Albuquerque's centralized sewer if service is available within 200 feet. However, where this is not practical, on-site wastewater systems will be required to meet certain performance standards. These performance standards are based on each site's soil and hydrogeological conditions and the degree of treatment necessary. A permissible quality must be met before the effluent enters the leachfield. The greater the site's restrictive conditions, the greater the treatment that will be required. On-site systems require a minimum 3/4 acre lot size.

For those on-site systems functioning properly, compliance with the ordinance must be achieved by 2015. Failing systems have 30 days to come into compliance (WRP, 2000). The ordinance now requires that all on-site system owners to enter into maintenance contracts with a certified provider (to provide proper maintenance and inspections) and to obtain an operator's permit. The operator permit will be issued after entering into a maintenance contract and the system meets the provisions of the ordinance. Changes in system ownership will require a new operator permit to be issued.

Chical Area On-Site Wastewater Treatment Management Plan

Project Approach

The normative approach to developing a decentralized management strategy usually incorporates a process that involves the affected community. Public involvement cannot be discounted when devising a management strategy for a particular community if expected to be successful. For example, the development of the solid waste program at Isleta greatly utilized public involvement. Public outreach included meetings, information dissemination, and surveys to get feedback from the community. Public participation was a key factor in developing the management program and making that endeavor a success.

This project report is not meant to ignore or sidestep this process. However, the analysis provided and recommendations put forth identify a *potential* management plan for the Chical Area and Isleta. This potential plan is based on the research conducted, personal knowledge and experience with the federal government in managing the Pueblo's natural resources, working for Isleta, and being a tribal member living on the reservation. This insight should be helpful in identifying a decentralized on-site wastewater treatment system management plan that is applicable to the Chical Area environment. It is acknowledged that the content of this report and recommended management plan can be accepted, modified, or rejected at anytime by the Pueblo of Isleta.

Objectives

Most communities would benefit from some type of organized management program (Pipeline, 1996). Organizing a management program for on-site wastewater treatment systems should include the following universal objectives:

- Identify all existing OWTS and insure individual systems work properly.
- Insure that all systems are correctly sighted, designed, and constructed.
- Extend the life of the system through proper operation and maintenance.

- Provide education outreach and education.
- Monitor systems and provide record keeping.

These objectives are incorporated in each conceptual EPA Management Model previously summarized. The level of management necessary to meet these objectives increases as the resource value, environmental sensitivity, and complexity of the OWTS also increases.

Considerations

To implement those objectives identified above, an OWTS management plan must integrate well into the tribal government setting; its existing and future policies; current and future capabilities; and tribal leadership's expectations as to how such a plan will fit into the long range goals of the Pueblo. The success or failure of a management plan eventually rests with the community and is directly tied to how they are included as part of this process. Also to be considered is the role of federal government agencies in providing technical and financial support for both the short and long term. Other key factors that influence the Chical Area management plan include:

- *Primary treatment* has been recognized as ineffective to protect the water resources.
- Isleta has established surface water quality standards in regard to the high value it has for that resource.
- Upon completion of an OWTS project through IHS or private means, the facilities become the property of the home or property owner, including all costs related to the operation, maintenance, and repair those systems.
- The Chical Area has been identified as being situated on a highly sensitive groundwater area.

To conclude, the matrix in Figure 12 illustrates key environmental conditions listed above that influence the level and type of management to be proposed.

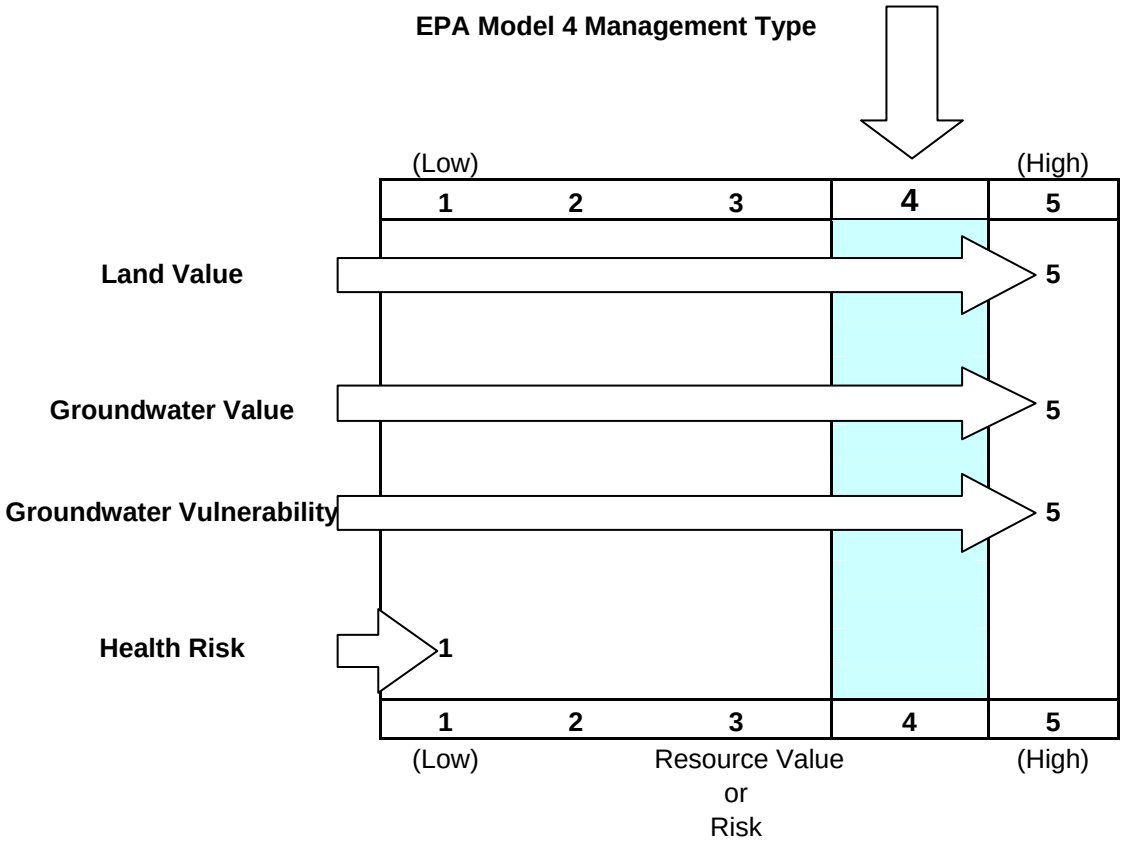


Figure 12: Matrix for EPA Model 4 Management Type - Chical Area OWTS

Recommended On-Site Wastewater Treatment (OWTS) Management Plan

Combining the above considerations and key factors along with the recommendations noted from the review of the EPA Management Models, the conceptual Chical Area OWTS Management Plan components are summarized in Table 1.

TABLE 1: CHICAL AREA OWTS MANAGEMENT PLAN

Plan Components
From Model 1 • Inventory OWTS, evaluate their performance, and create a database. • OWTS are properly sited, designed, and constructed. • Systems are periodically inspected and repaired when necessary. From Model 2 • Professionally trained personnel perform system O&M. From Model 3 • The design of the OWTS is determined by *performance criteria*. From Model 4 • Program management (inventorying, evaluation, record keeping, public education, professional O&M services; regulatory oversight; and compliance monitoring functions) will be provided by a Tribal Responsible Management Entity (RME). A fee will be assessed for O&M service provided.
Benefits
• The inventory created database is useful in system tracking; area wide planning; identifying non-compliant OWTS; and determining necessary repairs or upgrades. • OWTS that are properly sited, designed, and constructed ensure for the safe and reliable treatment of wastewater. • Systems periodically inspected and repaired when necessary extend the longevity of the design system and ensure for the safe and reliable treatment of wastewater. • The use of professionally trained personnel provides for safe and reliable operation of OWTS; reduces the risk of malfunctions by identifying problems needing attention; and initiating corrective actions before failures occur. • Isleta health and water quality goals can be effectively met through *performance criteria* that determine the design of OWTS rather then site characteristics and conditions alone. • By transferring O&M responsibility from the OWTS owner to the Tribal RME, any required service is performed systematically, and reduces or eliminates the need for regulatory enforcement action by assuring performance compliance. • Compliance and monitoring reporting provided by the RME.
Challenges
• A Tribal RME and program must be established to implement the management plan. • A higher level of management and technical expertise will be required. • Securing community acceptance and support of OWTS management, a Tribal RME to provide O&M service, and a service fee assessed for O&M. • Development of a comprehensive land use plan to support the OWTS Management program.

Implementation

The Chical Area OWTS Management Plan identifies that program management will be provided by a Tribal Responsible Management Entity (RME). The Tribal RME or OWTS Program is conceived as the best approach to effectively and efficiently implement management of OWTS. The OWTS Program would serve both as regulator and as a quasi-public utility similar to Isleta's Solid Waste Program.

It is anticipated that primary funding will be sought from the IHS and/or EPA to establish the program. However, other funding sources, including tribal funding, will be considered to support overall program development. Once established, assessment fees collected for O&M service would be used to support the OWTS Program. At this time, it is unknown what percentage of program costs would be generated by service fees. However, it should be anticipated and included in planning and budgets that tribal financial support may be required in the interim or to make up for program shortfalls.

The following conceptual approach describes the OWTS Program's establishment; initial program development; and implementation of the management components:

OWTS Program

The Isleta tribal government has the authority to govern and the responsibility to enact programs to manage the reservation's resource in the best interest of the Pueblo and its present and future members. Provided this conceptual plan is supported, Tribal Council action would be required to establish the OWTS Program as the Tribal RME to oversee OWTS management. This would be precedent setting because no other tribal program exists anywhere to provide this service (Pederson, 2005). However, Isleta has already broken ground when they established a quasi-tribal utility in the form of its Solid Waste Management Program.

At the program's inception, Isleta's Environment Department would be tasked to work with the IHS, EPA, and others in seeking technical and funding assistance to establish an OWTS Program. Funding received would be administered through this department until the program was established and operational with program manager on board. From this point, the program

manager would become responsible to develop and administer the OWTS Program. It is proposed that the OWTS Program remain under the Environment Department. Accordingly, Isleta personnel performing septic tank pumping service would become part of the OWTS Program.

The OWTS Program would be responsible to carry out all management components including education outreach; inventories and evaluations; creating a database; developing performance criteria; and providing professional O&M services including compliance monitoring. Some of these responsibilities and associated activities may require coordination with other Tribal departments. It is proposed that the OWTS Program develop an ***operating plan*** to accomplish this. The *operating plan* would be developed cooperatively with other departments and programs (Geographical Information System, Treasurer, etc.) to utilize their expertise and capabilities to help carry out the OWTS Program. Isleta Tribal Administration approval of the *operating plan* is necessary. Figure 13 depicts the conceptual organization chart where the OWTS Programs resides.

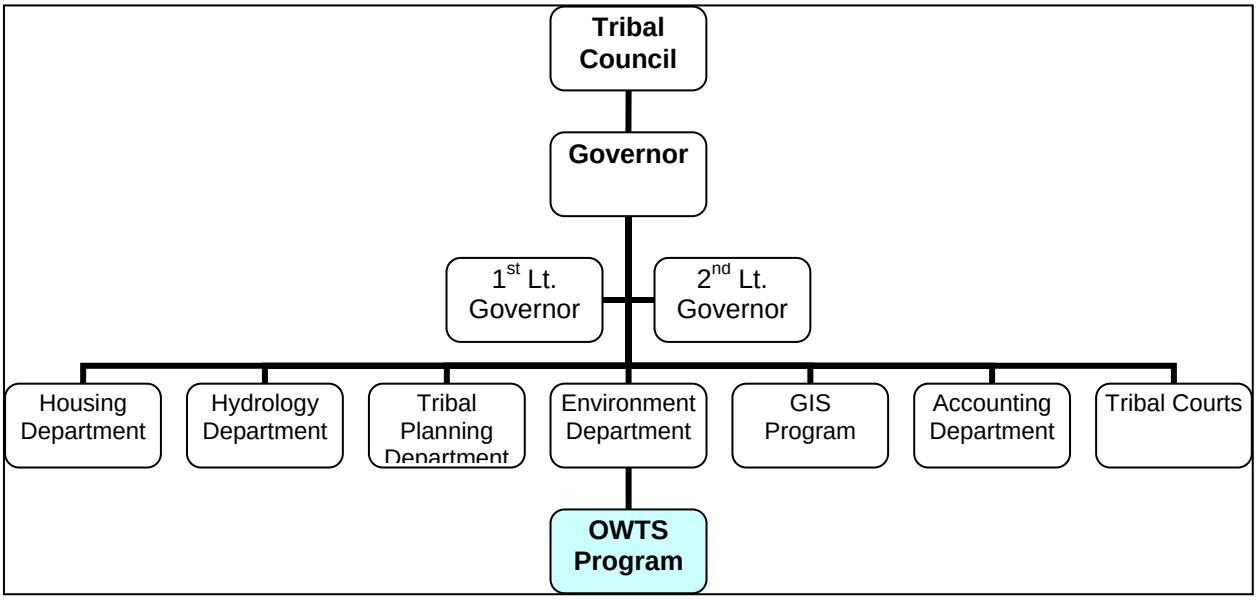


Figure 12: Conceptual Organization Chart

Inventory and Evaluation

Inventorying and evaluating OWTS provides valuable information regarding the designed system, its functionality, and potential to meet *performance criteria* (to be discussed in the following section. Some information regarding system design and siting is available from the IHS for their more recent projects, however, the rest is scattered or lost (Lucero, 2005). A physical assessment will have to be performed to obtain not only missing information related to siting, design, and construction, but the condition and functionality of the OWTS. The following is a list of information that is needed (WRP, 2001):

- Type of treatment unit
- Number of bedrooms and/or number persons being served
- Design flow
- Size of septic tank
- Absorption size and design
- Soil type
- Lot size
- Depth to limiting layer (e.g. water table)
- Slope of disposal area
- Total flow (gal/day)
- Number and locations of wells on property
- A copy of as built design or one generate from on-site assessment.

Additional information needed would include drainfield distances to surface water bodies like irrigation drains or canals, irrigated fields, potable water lines, and other OWTS. This information should be available from as built designs, or will have to be generated on-site.

The Evaluation component would assess the OWTS septic tank and drainfield conditions; the presence of odors, leaks or ponding water; and excessive vegetation growth. Obvious conditions that threaten human health or the environment would generate a corrective action plan to address the immediate problem. The second part of the evaluation component (conducted at a later date) would assess OWTS in meeting the *performance criteria*. Non-compliant systems identified would generate corrective action plans to determine whether the system would have to be upgraded or completely re-designed.

Inventory information compiled for each OWTS would be entered into a database utilizing Isleta's Geographical Information System (GIS). This information will be used for system tracking, comprehensive planning. Upon completion of the inventory and evaluation, reports would be submitted to the Governor and Tribal Council.

Performance Criteria

Performance Criteria is any standard or requirement established by Isleta to ensure future compliance with public health and water quality goals of the Tribe. *Performance criteria* can be expressed as numeric limits (e.g., pollutant concentrations, siting requirements, or other measurable standards) or narrative descriptions of desired conditions or requirements (e.g., no visible scum, sludge, sheen, odors, cracks, or leaks). *Performance criteria* should include *cluster systems* and their potential use.

This management component would first need to determine the public health and water quality goals of Isleta. Based on those goals, performance criteria can be developed that determines design requirements for OWTS. Development of *performance criteria* would occur simultaneously while the Inventory component is being conducted. *Performance criteria* should be completed no later than the end of the Inventory work, if possible. This would allow the second part of the evaluation to proceed without delay in determining a course of action to bring OWTS into compliance. A separate report would be generated for the Tribal Council regarding the results.

Performance criteria have been adopted in Bernalillo County's Wastewater Ordinance (Appendix B). Bernalillo County's performance standards for minimal treatment are based on lot size, soil texture and structure, depth of soil, and soil slope. These components make up three class categories that determine effluent quality to be met for settleable solids, biological oxygen demand, total suspended solids and fecal coliform. Total Nitrogen performance is determined by flow, lot size and whether existing before or after the effective date of the ordinance (December

2000). Total Nitrogen cannot exceed a specific loading rate based on the performance standards described previously. Table 2 below summarizes Bernalillo County's performance standards.

TABLE 2; BERNALILLO COUNTY PERFORMANCE STANDARDS

Performance Standard	Description	Site Characteristics	Effluent Standards	Total Nitrogen
Class 1	Minimal Treatment. Conventional septic systems meet this standard.	Existing lots $\geq$ ¾ acre and new lots $\geq$ 5 acres; with well drained soils > 4 feet deep; slope < 15 degrees.	Setteable solids $\leq$ 0.5 ml/l BOD $\leq$ 150 mg/l TSS $\leq$ 60 mg/l Fecal $\leq 10^6$ MPN/100ml	91.3 lbs/acre/year for existing Class 1 lots $\geq$ 2 acres 82.2 lbs/acre/year for existing Classes 2 and 3 lots < 2 acres; and for all Classes and new lots > 3/4 acres.
Class 2	Higher degree of treatment than Class 1; more contaminates removed.	Lots 1/3 to ¾ acre with well drained soils > 4 feet deep or lots > ¾ acre with well drained soils > 2 feet deep; slope < 15 degrees	Setteable solids $\leq$ 0.5 ml/l BOD $\leq$ 30 mg/l TSS $\leq$ 30 mg/l Fecal $\leq 10^4$ MPN/100ml	
Class 3	Higher degree of treatment than Class 2: more contaminates removed.	Lots < 1/3 regardless of soil thickness and all lots with > 1 foot thickness, well drained soils, slope < 15 degrees	Setteable solids $\leq$ 0.5 ml/l BOD $\leq$ 30 mg/l TSS $\leq$ 30 mg/l Fecal $\leq 10^3$ MPN/100ml	
Disinfection	Additional treatment for some Class 2 and 3; injection of chemical that kills bacteria & viruses.	Required for Class 2 and 3 with well drained soils, 1 > and less than 4 feet thick, slope < 15 degrees.	Fecal $\leq$ 200 MPN/100ml	

New Mexico's Liquid Waste and Disposal Regulations establish minimum required treatment levels for site conditions (NMAC, 20.7.3.605). The level of treatment is based on the most restrictive combination of siting conditions. Siting conditions are soil texture, depth of soil, hydraulic loading rates and lots size. (Appendix C). Non-discharging systems are allowed in place of advanced treatment. Mound systems may be used to meet depth of soil requirements or overcome soil limitation. If existing level of nitrate in groundwater exceed 5 mg/l, the equation below is used for determining the required Total Nitrogen (TN) concentration allowed for a specific lot size.

Total Nitrogen concentration (in mg/l) = [lot size (in acres) / design flow (in gpd)] x 30,000

The concentration limit is based on a six sample rolling average with no single sample exceeding twice the concentration limit.

TABLE 3: NEW MEXICO MINIMUM REQUIRED TREATMENT LEVELS FOR SITE CONDITIONS

The Required Level Of Treatment Shall Be Based On The Most Restrictive Combination Of Siting Conditions	
Soil Types	
Type Ia (Coarse Sand)	*Secondary treatment and disinfection
Type Ib (Medium Sand, Loamy Sand)	Primary treatment
Type II (Sandy Loam, Fine Sand, Loam)	Primary treatment
Type III (Silt, Silt Loam, Clay Loam, Silty Clay Loam, Sandy Clay Loam)	Primary treatment
Type IV (Sandy Clay, Silty Clay, Clay)	Secondary treatment with a low pressure dosed disposal system

Depth of Suitable Soil	
$\geq$ 4 feet	Primary treatment
2 to 4 feet	*Secondary treatment and disinfection
$\leq$ 2 feet	*Tertiary treatment and disinfection

Hydraulic Loading Rates and Lot Size	
$\leq$ 500 gallons/day/acre with lot size $\geq$ 0.75 acre	Primary treatment
> 500 gallons/day/acre or less than 0.75 acre	*Tertiary treatment
Lot size < 3/4 acre overlaying naturally occurring anoxic groundwater	Secondary treatment required and tertiary treatment may be required

Secondary treatment is commonly a biological treatment process followed by settling and clarification resulting in a reduction of: 1) the 5-day biochemical oxygen demand (BOD5); 2) total suspended solids (TSS); and both concentration not to exceed a 6-sample rolling average of 30 mg/l with no single sample to exceed 60 mg/l.

Tertiary treatment - means additional treatment beyond secondary treatment standards, specifically, the reduction in the total nitrogen concentration.

*To be exempt from tertiary treatment requirements, the permit applicant shall show by clear and convincing evidence that the discharge of liquid waste shall not degrade a body of water.

In developing Isleta's *performance criteria*, other examples such as those from Bernalillo County and the State of New Mexico could be used as guidelines. Technical assistance would also be sought from IHS, EPA, the Pueblo's Environment Department, and others. *Performance*

criteria would require Tribal Council approval. If *performance criteria* cannot be met in the design, an OWTS cannot be installed at that site. Such an occurrence might be rare and a non-discharging system could be considered as an alternate means of wastewater treatment. However, this type of system may be too cost prohibitive.

An expected outcome of *performance criteria based management* might require that OWTS to incorporate ***advanced treatment*** designs. *Advanced Treatment* is any process utilized to reduces or remove organic matter, solids, nutrients, disease-causing organisms and other pollutants from wastewater beyond the ability of conventional septic system. *Advanced treatment* is a complex and expensive treatment process that requires more frequent inspections and adjustments, and operational monitoring. If not properly managed, advanced systems pose a far greater risk of failure than do conventional septic systems (Hoover, 2005).

Operation and Maintenance Service

All OWTS require some form of Operation and Maintenance (O&M) service. This service is directly tied to the functionality and longevity of these systems. To ensure the required O&M is performed (including compliance monitoring), this service will be provided by the OWTS Program.

Information not readily available for individual system O&M would be obtained from the Inventory performed. Conventional systems require less maintenance than advanced systems that have mechanical and electrical parts (control panels and timers, floats and submersible pump, etc.) The system design determines the type and frequency of O&M. However, all systems require periodic septic tank cleanout based on time, or actual measurement of accumulated sludge. Also, newer designed systems incorporate effluent filters that need to be cleaned in between septic tank cleanouts.

Inspections should occur at least biannually, but the frequency increases with advanced systems. Inspections include monitoring of leachfields for standing water on the soil surface,

erosion, and areas of massive plant growth. Massive plant growth indicates leaks and/or subsurface mounding of effluent from an undersized or clogged drainfield (EPA, 2004). Compliance monitoring would include effluent and groundwater sampling to measure if wastewater treatment is meeting *performance criteria*. The frequency of effluent sampling would depend on site characteristics, depth to groundwater, the type of system design, and the need to obtain this information.

To support the OWTS Program and O&M service to be provided, it has been proposed that an assessment fee be implemented. This recommendation for fees is supported on the following fronts:

- Upon completion of an OWTS project through the IHS or, through private means, the facilities become the property of the home owner, along with all operation, maintenance, and repair expense responsibilities.
- O&M and repair costs are the responsibility of the homeowner and not tribal government.
- Home owners cannot perform most system maintenance themselves.
- Tribal government costs to provide essential public services increases as the community continues to grow.
- O&M service costs outweigh repair or replacement costs for the entire system which remains the responsibility of the system owner.
- Having OWTS owners pay for this utility service enhances Isleta's economy and frees up funding for other tribal needs.

An assessment fee cannot be identified at this time and would require a separate detailed analysis which is not a part of this report. In the previous Pena Blanca example, a monthly fee of $10.64 was charged based only on a biannual pumping service of septic tanks. An informal survey of local private off-reservations businesses providing pumping service on Isleta charged

an average of $115.00. In comparison, pumping service costs near Santa Fe averaged $160.00 (Eldorado Sanitation District, 2005). These costs are within the range identified by the EPA (EPA, 1999).

EPA information also found biannual inspections costs ranging between $50 and $250 (EPA, 1999). As an example and applying mid-range costs of $137.50 for annual septic pumping and $150.00 for biannual inspections costs, a monthly O&M assessment fee would be $23.95. Extrapolating from this monthly assessment provides $124,444 in potential revenue generated toward a program budget for a program to oversee 433 homes and OWTS in the Chical Area. Actual monthly O&M assessments would be adjusted up or down based on the actual number of OWTS serviced and/or the individual system's O&M requirements including the frequency of septic tank cleanout.

Included as part of O&M is the aspect compliance monitoring. Compliance monitoring is necessary to evaluate the effectiveness of the system's design to treat wastewater. It is recommended that the quality of both treated effluent and the groundwater beneath be tested to measure the effectiveness of the system. The type and frequency of testing will be determined by *performance criteria*.

It is emphasized that an OWTS management program founded on *performance criteria* will influence the types of systems required to meet the public health and water quality goals of Isleta. This in turn will affect O&M assessment costs, but not to the point of being prohibitive. It should be also recognized that household's with a proven financial disadvantage can have fees adjusted accordingly. Pending what the actual O&M costs are actually determined to be, fees assessed would be approached on a non-profit basis and to provide for a level of professional quality service.

Chical Area Owts Management Plan Program Elements

To implement the Chical Area OWTS Management Plan, a more comprehensive set of key program elements must be applied. The EPA Handbook for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems (***Management Handbook***) provides a more detailed discussion of these program elements. This section discusses briefly the general purpose and how they would be applied in the Chical Area OWTS Management Plan.

There are thirteen (13) Program elements associated with every Model previously identified. These elements apply universally to some degree regardless of the environmental conditions, economic setting, or available resources of the community. Depending on the type of management adopted, how a program is developed and supported by a community, implementing these elements and their activities can vary. This point is particularly stressed given the uniqueness of the Tribal government setting under which the OWTS Program will operate.

The Chical Area Plan will address apparent and emerging problems with actual, on-the-ground resources and programmatic capabilities. Program element activities are based on both proactive and reactive measures stemming the conceptual OWTS Program vision that includes *performance criteria* that supports the human health and water resource goals of Isleta. Those program elements are based on the needs and capabilities of Isleta.

The *Management Handbook* divides the program elements into three major functional categories of Program Administration; System Installation and Operation Oversight; and Compliance Assistance/Assurance (See Table 4).

TABLE 4: MANAGEMENT CATEGORIES AND PROGRAM ELEMENTS (EPA, 2003)

CATEGORY	MANAGEMENT PROGRAM ELEMENTS
Program Administration	• Public education and participation • Planning • Establishment of performance requirements • Record keeping, inventories, and reporting • Financial assistance and funding
System Installation and Operation Oversight	• Site evaluation • System design • Construction or installation • Operation and maintenance • Residuals management
Compliance Assistance/Assurance	• Training and certification/licensing of service providers • Inspections and monitoring • Corrective actions and enforcement

Program elements and associated activities to be implemented are normally separated and assigned to various entities in a non-tribal setting. Under the tribal setting however, the OWTS Program serves as regulator, manager, and O&M service provider overseeing OWTS. Therefore, management program elements and responsibilities are confined almost entirely to the Tribal OWTS Program and the Owner/User unless otherwise indicated. Tribal Government, Tribal Programs, IHS and/or other federal agencies may play a role in providing assistance in carrying out these activities. The elements are divided by management category, elements, and responsibilities and are shown in the following outline form.

Program Administration Elements

Public Education and Participation

Purpose
Maximize public involvement in the need for and implementation of the management program.

OWTS Program Responsibilities
- Educate/inform Owner/User of care and use of system.
- Educate/inform Owner/User of OWTS Program requirements and prohibited uses of system.
- Hold public meetings to inform the public of any proposed program and/or rule changes with support from the Environment Department.

System Owner/User Responsibilities
- Be informed of purpose, use, and care of treatment system.
- Be informed of existing rules and review and comment on any proposed program and/or rule changes.
- Participate in public meetings, and other community education/participation involvement opportunities.

Planning

Purpose
Consider site and area wide conditions and impacts, long-term watershed, & public health protection.

OWTS Program Responsibilities
- Develop criteria (e.g., site evaluation, design, construction) to be required of systems and inform Owners.
- Continuously evaluate existing wastewater treatment needs and forecast future needs.
- Coordinate program criteria, program changes, and implementation with appropriate tribal departments/programs.
- Evaluate potential risks of wastewater discharges to limit environmental impacts on receiving environments during the criteria development/rule making process.
- Limit potential risks of environmental impacts from residual management program and evaluate available handling/treatment capacities.
- Monitor & model pollutant loads of current and future development scenarios.
- Assess and identify critical areas and sites requiring higher levels of treatment based on soils and hydrogeological information or special use areas requiring restricted development.

Performance Criteria

Purpose
Link treatment criteria to health & resource goals.

OWTS Utility Responsibilities

- Establish numeric and/or narrative performance criteria for OWTS necessary to protect public health and water resources for each receiving environment.
- Establish system failure criteria to protect public health, e.g., wastewater backups in building, wastewater ponding on ground surface, insufficient separation from ground water or wells.
- Establish inspection, O&M, and monitoring requirements for approved systems.
- Specify accepted treatment technologies.
- Evaluate cumulative impacts/allotments for all sources and/or key pollutants.

System Owner/User Responsibilities

- Comply with OWTS Program requirements regarding the care and use of the system.

Record Keeping, Inventory, and Reporting

Purpose

Provide inventory development and maintenance for administrative, O&M, planning and reporting to Tribal Government.

OWTS Utility Responsibilities

- Administer a database inventory (locations, site evaluations, record drawings, permits, performed maintenance, and inspection reports) for systems with assistance from Geographic Information System staff.
- Maintain a residuals treatment and disposal tracking system.
- Administer a tracking database for compliance reports.
- Administer periodic financial, management, and technical audits of the program through the Environment Department or Tribal Administration.
- Provide report of inventory, maintenance, observed system deficiencies, etc. to Tribal Government.
- Provide certified report of all observed system deficiencies to Owner.
- Perform system monitoring as required.
- Prepare and submit records of residuals handling as required.
- Maintain system monitoring and service records.

System Owner/User Responsibilities

- Maintain approved copy of recorded drawings and O&M manual of system.
- Maintain copy of maintenance records of system.
- Provide drawings, specifications, O&M manual, and maintenance records to new property owner at time of property transfer.

Financial Assistance and Funding

Purpose

Provide financial support for management program.

OWTS Utility Responsibilities

- Initiate monthly/quarterly service fees to provide financial support to sustain the management program through Treasurer's Office.
- Provide a listing of financial assistance programs available to Owner/User and the qualifying criteria for each program.

- Consider implementing a financing program to assist Owners in upgrading/replacing their systems.
- Conduct regular reviews of management program with Owner/User and Tribal Government to optimize operations.

System Installation & Operation Oversight

Site Evaluation

Purpose
Assess site and relationship to other features.

OWTS Utility Responsibilities
- Codify prescriptive requirements for site evaluation procedures.
- Codify criteria for treatment site characteristics suitable for designs that will prevent unacceptable impacts on ground and surface water resources.
- Establish the defining characteristics of each receiving environment.
- Approve site evaluation procedures used to ensure that system designs are appropriate for the sites and their stipulated performance criteria.
- Hire staff with certified/licensed capacity to perform site evaluation or train existing staff to perform duty. Coordinate training/certification with IHS, EPA, other appropriate entity.

Site Evaluator - IHS
- Evaluation performed by IHS staff or together with OWTS Program staff
- Describe site and soil characteristics and determine suitability of site with respect to performance criteria and determine site's hydraulic and treatment capacity.
- Comply with tribal requirements in the evaluation of sites for wastewater treatment and dispersal.
- Provide supplemental certification/licensing training for site evaluators to meet needs.

System Owner/User Responsibilities
- Comply with sitting requirement established by OWTS Program for proposed system if other that IHS related project.

System Design

Purpose
Ensure system design is appropriate for site and effluent quality to be achieved.

OWTS Utility Responsibilities
- Codify prescriptive, pre-engineered designs that are suitable for treatment sites that meet the appropriate prescriptive site criteria with assistance from IHS.
- Administer the plan review program for engineered designs to meet stipulated performance criteria.
- Require routine operation and emergency contingency plans that will sustain system performance and avoid the submission of un-permitted discharges.
- Require certified/licensed designers for non-IHS designed systems.

Designer (IHS/Private) Responsibilities

- Design treatment system that is compatible with the site and soil characteristics described by the site evaluation.
- Comply with adopted tribal *performance criteria* in the design of wastewater treatment and dispersal systems.
- Provide review/certification that non-IHS system design meets *performance criteria*.

Construction

Purpose

Ensure installation as designed; record as built drawings.

OWTS Program Responsibilities

- Administer a program review for system construction including proposed system siting and design plans with IHS.
- Require designer of record to certify that completed system construction is in compliance with approved plans and specifications based on *performance criteria*.
- Require that record drawings of constructed system be submitted to the OWTS Program.
- Require a copy of system O&M manual to the OWTS Program.

Contractor/Installer Responsibilities

- Provide certification/license to practice.
- Construct the designed system in accordance with the approved plans and specifications based on *performance criteria*.
- Prepare record drawings of completed system and submit to Owner.
- Provide Owner with an O&M manual describing component manufacturer's maintenance and troubleshooting requirements/recommendations.
- Comply with applicable tribal requirements in the design and construction of OWTS.

Designer (IHS/Private) Responsibilities

- Approve proposed field changes and submit to OWTS Program and Owner.
- Certify that construction of the system is in conformance with the approved plans and specifications.

Owner Responsibilities

- Comply with any additional construction requirements established by the RME for system acceptance in the O&M program.
- Hire a certified/licensed contractor/installer to construct system if a private project.
- Submit final record drawings of constructed system to OWTS if a private project.
- Submit a copy of system O&M manual to OWTS Program to record required maintenance if a private project.

Operation & Maintenance

Purpose

Ensure systems perform as designed.

OWTS Program Responsibilities

- Provide Owner/User with educational materials regarding system use and care.
- Track and review compliance monitoring reports to ensure that systems are operating in accordance with operating permits.
- Inspect and service the system as necessary in accordance with the O&M manual.
- Certify to that required maintenance and monitoring was performed in a timely manner and noting any system deficiencies.
- Comply with Program requirements in the operation and maintenance of the treatment and dispersal system.
- Hire a certified/licensed staff as pumper/hauler or operator to maintain system, or obtain training/certification for staff to these duties.
- Submit compliance monitoring reports to Tribal Government

Owner/User Responsibilities

- Follow recommendations provided by OWTS Program to ensure that undesirable or prohibited materials are not discharged to system.
- Comply with any OWTS Program requirements regarding care and use of system.

Residuals management

Purpose
Minimize health or environmental risks from residuals handling or dispersal.

OWTS Program Responsibilities

- Administer a tracking system for residuals hauling, treatment, and disposal and review to evaluate compliance with 40 CFR Part 503 Use and Disposal of Sewage Sludge, 40 CFR Part 257, and applicable tribal requirements.
- Inventory available residuals handling/treatment capacities and develop contingency plans to ensure that sufficient capacities are always available.
- Comply with applicable tribal requirements in the pumping, hauling, treatment, and disposal of wastewater treatment system residuals.
- Hire staff with pumper/hauler certified/licensed to remove, treat, and dispose of residuals.

Compliance Assistance/Assurance

Training & certification/ licensing

Purpose
Promote excellence in site evaluation, design, installation, & other service provider areas.

OWTS Program Responsibilities

- Obtain training from the manufacturer or vendor regarding appropriate use, installation requirements, and operation and maintenance procedures of any proprietary equipment to be installed.
- Ensure that OWTS Program staff who operate and/or maintain systems obtain appropriate certification(s)/license(s) to practice.

- Arrange for supplemental training as needed for staff to manage, operate, and/or maintain systems.

Inspections & monitoring

Purpose
Document O&M service performance; functioning of systems; and compliance with performance criteria.

OWTS Program Responsibilities
- Perform inspection programs at point-of-sale, change-in-use of properties, "targeted areas," and/or systems reported to be in violation.
- Conduct compliance inspections of residuals hauling, treatment, and disposal by OWTS Program and staff.
- Perform system inspections randomly.
- Obtain certification/license for staff to practice.
- Perform system compliance inspections in accordance with OWTS Program requirements.
- Submit compliance monitoring reports to the Tribal Government.
- Conduct regular reviews of management program with Owner/User, Environment Department, Tribal Government, and IHS to optimize system operation program.

Corrective actions & enforcement

Purpose
Ensure timely return to compliance with applicable performance requirements.

OWTS Program Responsibilities

- Develop compliance plans with Owner/User for correcting documented non-compliant systems.
- Comply with terms and conditions of the negotiated compliance schedule for system performance.
- Administer enforcement program including fines and/or penalties for failure to pay assessment fee for O&M service, or repair costs.
- Obtain necessary authority to enter property to correct imminent threats to public health.

Designer – Private Entity Responsibilities
- Provide Owner/OWTS Program with documents (drawings, specifications, modifications, etc.) that may be required by the Regulatory Authority prior to corrective actions.

Contractor/Installer Responsibilities
- Perform required repairs, modifications, and upgrades as necessary.

Owner Responsibilities
- Comply with terms and conditions of the compliance plan for component replacement or repairs.

FUNDING SUPPORT

There is limited funding in the form of grants or loans for wastewater related projects. The majority of the funding is specific, and mostly for new construction or replacement of existing systems. Funding to support developing an OWTS management program is limited. However, the sources listed provide potential funding for both establishing the program and to replace existing systems. Depending on the uniqueness of any project and how the project is promoted, whether for construction, rehabilitation, demonstration, education, training, or to develop tribal capacity, a project to develop an OWTS management program can be potentially be funded.

Federal funding sources for the OWTS program are expected to come mainly from the IHS and EPA. The IHS Sanitation Facilities Construction (SFC) Program and the EPA Clean Water Act Indian Set-Aside Grant Program work cooperatively together. Other EPA sources included the General Assistance Program (GAP), Clean Water State Revolving Fund (NMED Construction Programs Bureau), National Onsite Demonstration Project, U.S. Department of Health and Human Services (Administration for Native Americans), United States Department of Agriculture (Rural Utilities Service). IHS often participates in projects funded (at least in part) by some of the other agencies noted here. Information on these funding sources was obtained via the EPA website (EPA, 2005). These funding programs are summarized in **Appendix D**.

Recommendations

The objective of this professional project report is to identify and recommend an OWTS management plan for the Chical Area and the Pueblo of Isleta. That objective was accomplished and the resulting Chical Area OWTS Management Plan was presented. Those management components recommended and listed in TABLE 1 are summarized below.

Inventory OWTS, Evaluate Performance, and Data Base Creation

An inventory of OWTS is essential to knowing the number of systems present and their treatment design. Evaluating their performance reveals which systems are operational or failing. This inventory and evaluation information creates a data base that is useful to track these systems; provides for area wide planning; identifies non-compliant systems and determines necessary management steps to repair or replace them. These components provide the basis from which OWTS management evolves.

OWTS are properly Sited, Design, and Constructed

OWTS that are properly sited, designed, and constructed provide for the safe and reliable operation and treatment of household wastewater. If anyone of these aspects if compromised, the system could fail prematurely, or threaten human health and the environment. Most systems installed through the IHS meet those aspects. However, those systems privately constructed without standards are suspect. In either case, establishing an OWTS Program assures these management components are adhered to.

Systems are periodically inspected and repaired when necessary

Having OWTS inspected and repaired when necessary extends their longevity and provides for their safe and reliable treatment of wastewater. Proper operation and maintenance of these systems must be conducted according to their design. Failure to provide the required O&M can result in premature failure, threaten the surrounding environment, and burden the owner with repair or replacement costs.

Professionally trained personnel perform system O&M

The operation and maintenance of OWTS is a specialized service very few home owners are able or willing to perform themselves. Providing this specialized service requires personnel performing O&M tasks to be trained and certified professionals. The success and requirement of an OWTS Program depends on staff that are trained and certified to perform O&M. Having this requirement result in a professional level of service provided.

The design of the OWTS is determined by *Performance Criteria*

The public health and water quality goals of Isleta will determine the nature and extent of *performance criteria*. *Performance criteria* will determine the design of OWTS in meeting these goals. While these criteria may appear restrictive and difficult to implement, this recommended management component parallels the intent behind Isleta's water quality standards. The intent of those standards and criteria is to maintain the highest level of protection for the environment we live in and for future benefit of community.

Tribal OWTS Management Program and O&M service assessment

To implement these management components, it has been recommended that a Tribal OWTS Management Program be formed. The establishment of this program also follows a path already taken by Isleta and its Solid Waste Program. Rather than utilizing an off reservation contractor, Isleta chose to develop its capabilities to assume responsibility to manage its solid waste. The same philosophy holds true with the approach to have Isleta manage its OWTS. However, the OWTS Program is poised to enter new territory by assessing a fee for O&M service to be provided by the OWTS Program. The reasoning and benefits have been provided for this recommendation. By adopting this approach, Isleta affirms its ability self govern and to generate from within the ability to provide certain services with support from the community.

Conclusion

In conducting the research and reviewing the literature, I did not find any information or specific examples of a tribal government or tribal communities that have addressed the topic OWTS management. Without a tribal example to consider or compare to, the resulting management plan and recommendations generated out of this report have touched a new area. While the report is specific to the Chical Area and the Pueblo of Isleta, each tribal setting is unique. What has been proposed here may work in other areas or even be improved upon. The underlying intent of this report is to affect the potential for positive change.

This report covered a range of topics and issues related to understanding the reasons, purpose, and benefits supporting the recommendation of an OWTS management plan and program for the Chical Area. Reviewed and discussed were the major topic areas of: wastewater management history; decentralized on-site system technology, treatment, and environmental considerations; a description of the Chical Area and Tribal government setting; the intent behind the EPA Voluntary Guidelines; and the conceptual management models from which the Chical Area OWTS management plan was derived. While much detail was left out regarding these topic areas, enough pertinent information was reviewed and presented to provide an appreciation and understanding of the OWTS management issue.

With that appreciation and understanding, it should now be recognized that if OWTS are properly sited, designed, constructed, and operated and maintained, the foregoing processes allows these systems to provide an adequate form of wastewater treatment. Adequate is “ok”, but because the groundwater resource beneath the Chical Area is both valuable and vulnerable to contamination from inadequately sited, designed, constructed, operated or maintained OWTS, a higher standard should be expected. A potential remains for any one of these processes to be the weak link. Realizing the vulnerability of groundwater degradation attributed to these potential system process shortfalls, *performance criteria* becomes a necessity to guide these processes.

Performance criteria can only be effectively applied through a comprehensive OWTS management program and overseen by a responsible management entity. That responsible management entity for the Chical Area has been recommended to be a tribal program serving as both regulator and quasi-utility. As envisioned, the tribal program would oversee every aspect of OWTS development and management by ensuring the processes of siting, designing, construction, operation, and maintenance components meets the public health and water quality goals of Isleta.

A crucial component of the recommended Tribal Utility management program concept has to do with implementing an assessment fee for O&M service provided to Chical Area OWTS owners. This recommendation is supported and based on the understanding that whether the OWTS is installed by his or by private means, the system becomes the property of the home owner. Ownership of the OWTS also entails all operation, maintenance, and repair costs. The responsibility for O&M service to be paid by the owner/user remains - it is just a matter of time when it occurs.

For this conceptual management plan to work, everyone has to accept this understanding. Tribal leadership and the community must have a better appreciation and understanding of OWTS and the management that is required for these systems. Tribal leadership must first gain this appreciation and understand if it is to be shared by the community, particularly if the OWTS owners are going to be paying for the O&M of their systems. If the Pueblo government and community can be convinced of the positive changes that were brought about with the inception of the solid waste management, then there is promise for an OWTS management program as well.

The proposed Chical Area OWTS Management Program would be the first of its kind for a tribal setting. As with any fledgling program, there is a learning curve. However, the potential lingers and there are supporting entities available to help make this concept work. Whether the Pueblo of Isleta accepts, modifies, or declines the recommendations of this report, they are now aware of the potential of groundwater degradation that can occur from unmanaged OWTS. The potential for groundwater contamination will increase as homes continue to be developed on vulnerable irrigated land. Isleta can be proactive now or be reactive in the future when groundwater degradation has been discovered or human

health is threatened. Isleta and the Chical Area community need only to look across the fence at Bosque Farms. The potential for groundwater contamination is closer than realized.

Glossary

Absorption field **-** A field in which effluent from the septic tank is gravity-fed from a pipe. This is where bacteria and other microbes break down the effluent using nutrients in the soil before it reaches the water table. Know also as a drain field, or leach field.

Advanced Treatment – Is any process utilized to reduces or remove organic matter, solids, nutrients, disease-causing organisms and other pollutants from wastewater beyond the ability of conventional septic system. Chemicals are sometimes added during the treatment process to help settle out or strip out phosphorus or nitrogen. Some examples of nutrient removal systems include coagulant addition for phosphorus removal and air stripping for ammonia removal.

Centralized Wastewater **System** **-** a managed system consisting of collection sewers and a single treatment plant used to collect and treat wastewater from an entire service area. Traditionally, such a system has been called a Publicly Owned Treatment Works (POTW) as defined in 40 CFR 122.2 (EPA, February 2003).

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

Decentralized Wastewater System **-** an onsite or cluster system(s) used to collect, treat, and disperse or reclaim wastewater from a single dwelling or building, a small community, or service area (EPA, February 2003).

Leaching chamber **-** is a wastewater treatment system consisting of trenches or beds, together with one or more distribution pipes or open-bottomed plastic chambers, installed in appropriate soils. These chambers receive wastewater flow from a septic tank or other treatment device and transmit it into soil for final treatment and disposal.

Management Guidelines **-** The U.S. Environmental Protection Agency's *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems.*

Management Handbook **-** The U.S. Environmental Protection Agency's *Handbook for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems*.

Mayor domo *– The ditch boss or superintendent elected [or appointed in the Pueblos case] by the acequia irrigators to manage day to day affairs of the ditch system, from overseeing the spring cleaning to allocating waters throughout the irrigation season according to the established set of rules, customs, and acequia laws (Rivera, 1998).*

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

Operating Plan **-** is a schedule of events and responsibilities that details the actions to be taken in order to accomplish the goals and objectives of the OWTS management plan.

Primary treatment **-** A liquid waste treatment process that takes place in a treatment unit and allows those substances in wastewater that readily settle or float to be separated from the water being treated.

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

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

Public utility - *Is an organization supplying water, electricity, transportation, etc. to the public, operated, usually as a monopoly, by a private corporation under government regulation or by the government directly*

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

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

Soil association – A mapping unit used on general soils maps in which two or more defined taxonomic units occur together in a characteristic pattern.

Source Water Assessment - Is a study and report required by the Source Water Assessment Program (SWAP) of the Safe Drinking Water Act addressing the capability of a given public water system to protect water quality.

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