

TABLE ROCK LAKE

Missouri

NATIONAL ONSITE DEMONSTRATION PROJECT

EXECUTIVE SUMMARY

Increasing population and development in the Table Rock Lake watershed threatens water resources by increasing sources of nutrient pollution, not the least of which is failing septic systems. The largely rural population uses onsite wastewater treatment systems (OWTS) to treat wastewater, although these systems are often not suitable to the thin existing soils in the region to effectively treat wastewater. The Table Rock Lake National Demonstration Project tested different types of advanced technology for OWTS. The Demonstration Project also utilized the Environmental Protection Agency's (EPA) management models for proper maintenance of OWTS. This project planned to find solutions to the many failing and inadequate OWTS in the Table Rock Lake area. Three main goals were:

1) Install and test different types of advanced wastewater treatment technologies to evaluate effectiveness in the unique geological setting around Table Rock Lake.

A number of excellent decentralized treatment technologies including advanced OWTS (systems with pre-treatment components before dispersal into soil) had been field-tested elsewhere and were commercially available. The focus of the Demonstration Project was to compare technology and test performance in treating wastewater and phosphorus removal using FAST, RetroFAST, ZABEL or ZABEL SCAT treatment systems in the Table Rock Lake area.

2) Develop a management program following the EPA's recommended management models for OWTS.

With advanced OWTS regular maintenance is needed to ensure proper functioning. Advanced OWTS had received a bad reputation nationwide due to failures from lack of maintenance by system owners. A responsible maintenance entity (RME) was needed to remove maintenance responsibilities from real estate developers or homeowners.

3) Identify legal impediments to widespread adoption of advanced OWTS by changing the regulatory and wastewater industry's perceptions of these systems and gaining their acceptance in Missouri.

In the past advanced OWTS technologies have not been widely accepted as feasible or practical and most contractors in the area were unfamiliar with such systems. The few installers that had experience with advanced OWTS, such as drip dispersal, did not generally recommend these systems or install them due to maintenance concerns. With adoption of renewable operating permits requiring maintenance, an answer to this concern would be presented.

Twenty five sites were installed or remediated through this Demonstration Project. Criteria for acceptance into the project included environmental need, installation feasibility, cost share potential and the owner's willingness to cooperate with project goals. Different types of advanced OWTS installed included constructed wetlands, aeration/fixed film, media filters using foam cubes and peat moss and recirculating sand filters. All of these systems effectively pre-treat wastewater before dispersal into surface stream or soil.

Monitoring systems were installed on four sites to measure treatment success. Samples were taken from septic tank effluent (raw sewage), treatment effluent (pre-treated, filtered liquids) and sub-surface liquids (after passing by drip irrigation through the soil). Analysis of samples produced evidence of successful treatment with effluent BOD₅ (biochemical oxygen demand) and TSS (total suspended solids) values from three of the monitored systems consistently below 20 mg/L. The fourth monitored system was a much higher restaurant-strength waste, which had median treatment BOD₅ and TSS of 59 and 32 mg/L respectively. Median sub-surface phosphorus concentrations ranged from 0.5 to 1.2 mg/L demonstrating the soil's capacity for phosphorus removal.

Average Septic Effluent, Treated Effluent and Subsurface Concentrations

Parameter	Septic Tank	Treated	Sub-surface
BOD ₅ (mg/L)	162	26.8	3
TSS(mg/L)	46	17.7	NA
Ammonia(mg/L)	5.6	4	0.41
Phosphorus(mg/L)	3	2.7	0.93
Fecal Coliform (colonies/100 mls)	271,000	19,488	140

The major results from the Demonstration Project are:

- 1) **Acceptance by State/County regulatory agencies and installers of advanced OWTS as a solution to failing conventional systems and the use of drip irrigation in imported soil for pre-treated effluent dispersal.**
- 2) **Installation and remediation of over 25 OWTS in the Table Rock Lake region and influencing numerous installers and homeowners to seek advanced OWTS options.**
- 3) **Formation of Ozarks Clean Water Company (OCWC) as a RME to remove maintenance responsibilities from developers and homeowners in cluster systems (subdivisions & apartment complexes that use a central OWTS).**
- 4) **Changes in the wastewater ordinance by local regulatory agency, the Stone County Health Department, to require renewable operating permits for advanced OWTS (EPA management level 3).**
- 5) **Demonstration that phosphorus removal can be effectively achieved through advanced OWTS and drip irrigation in imported soil around Table Rock Lake.**

Data from this project will provide regulatory agencies with scientific evidence necessary to accept advanced OWTS as standard systems removing them from experimental status. Project partners and participants gained applied knowledge of advanced OWTS and alternative treatment technology to help protect water quality resources. Education and outreach through numerous local, statewide and national meetings helped to focus attention on the potential water quality implications of failing wastewater systems and successful remediation systems in the Table Rock Lake watershed. An outstanding benefit of the Demonstration Project includes a change in the way OWTS are installed in southwest Missouri, along with a change in the public's perception of advanced OWTS. Another applied achievement of the project was the formation of OCWC which will continue to grow and provide service to benefit residents of Missouri particularly residents of the Table Rock Lake watershed. This project may serve as a national action model for other lake communities facing similar problems and needing effective solutions.

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