TWENTY YEARS OF SUCCESSFUL ONSITE WASTEWATER MANAGEMENT – THE OTTER TAIL, MINNESOTA WATER MANAGEMENT DISTRICT

Sara Christopherson and Jim Anderson*

Abstract

The Otter Tail Water Management District was formed in 1984 as a mechanism to assure the proper onsite treatment of wastewater in a 55 square mile area experiencing decreasing lake water quality and population growth. It is in West Central Minnesota, two and a half hours from Minneapolis - St. Paul. Initially the District served 1200 homes, cabins and businesses and has expanded to cover 1545 connections. Within the District are 6 lakes, 4 townships and portions of the City of Otter Tail, all using an individual system or are connected to one of sixteen cluster systems. The District has the ability to levy taxes and write and enforce ordinances. The District has an inspection and monitoring program to track performance. To maintain these systems, residents can choose to be either on an active or passive maintenance program. For those on the active program, the District provides maintenance, repairs and replacement of the systems. Those on the passive plan are under the jurisdiction of the District, but maintenance, repair and replacement costs are the owner's responsibility. User fees are assigned based on the type of system and level of maintenance program chosen. The District has the ability to issue compliance orders and has the capability to levy costs to the property tax statements. When the District was formed, the Board of Managers was required to install ground water monitoring wells around the cluster systems and to monitor domestic wells. These wells have been sampled since 1984. The District has monitored the health of the lakes through secchi disk readings and phosphorus measurements. The data shows very little impact on groundwater and improved water quality in the lakes. System failure rates have been less then 2% over 20 years which equates to replacement of an average of 1.6 systems per year.

Introduction

Over the years, many of the residents and leaders in the area surrounding Otter Tail Lake saw the deteriorating lake water quality at the same time as anticipated population growth. A group of concerned citizens formed a task force which first identified that proper sewage treatment was critical to the future of their community. There were up front educational programs which lead to 85% of the owners agreeing with the formation of the District. The District was then formed to assure proper treatment at an affordable long-term cost which would maintain the rural character of their community The District was formed under a Minnesota statute allowing the formation of sanitary districts (M.S. 116A, 1971). Most of the similarly formed districts are in lakeshore areas where there were documented wastewater and water quality problems. The formation of this type of district begins with a petition to the Minnesota Pollution Control Agency (MPCA) which determines if there is a need.

---

* Sara Christopherson, Extension Specialist, Onsite Sewage Treatment Program., Water Resource Center, Phone Number: (612) 625-7243, E-mail: heger001@umn.edu,
Jim Anderson, Professor and Center Director, Water Resource Center. Phone Number: (612) 625-0279, E-mail: ander045@umn.edu

A Board of Managers representing the District was created to operate the District. The District has the ability to levy taxes and write and enforce ordinances (Olson et.al. 2002). In the USEPA 2002 Draft Guidelines for Management of Onsite/Decentralized Wastewater Systems this type of District would fit in Model Program Areas 3 or 4. The exception which keeps this approach from being clearly within Program Area 4 is the lack of limited term operating permits per se for the systems, or a licensing program. However, there is an inspection and monitoring program to track performance and a licensing program is administered statewide by the MPCA.

The project started with an environmental impact study in 1978 and the formation of the District in 1981. This District operates under oversight by 7 board members appointed by the Otter Tail County Board. Board members are selected from within the District boundaries. The Board is an independent entity that has the responsibility to oversee operations, hire a manager, set yearly operating budgets and user fees. It operates in a non-profit manner. There are no funds allocated other than the fees established. In 1982, the final environmental impact study was completed which was followed by the final project and public hearing through 1984. Construction of 850 new individual onsite and cluster systems began in 1984 and was completed in 1985 in Otter Tail County shown in Figure 1.

Fig 1. Otter Tail County, Minnesota.

The District is comprised of three types of users:

- 1160 seasonal residents (75%)
- 390 permanent residents (25%)
- 48 resorts or businesses (3% of total, 75% seasonal)

Seasonal and permanent residents are further broken down by the type of system which treats their wastewater which is the main factor in determining the user fees. To maintain these systems, residents can choose to be either on an active or passive management program. All owners regardless of program enrollment receive these minimum services from the District:

- Regular inspections of systems (interval based on system type and use)
- Maintain records/history of system
- Information/education on user “best management practices” from the University of Minnesota’s Septic Systems Owner’s Guide (Olson et al, 2004)

The District maintains the system for those on the active program and pays for all repairs. Cluster systems must be on the active program. In the passive program, the owner pays for the maintenance, repairs, and replacement but is still under the Districts jurisdiction. User fees are assigned based on the type of system and the type of maintenance program. The choice is made at the time of construction. Once on the active program the property cannot go to the passive program, but one on the passive program can go to the active.

The District plans for the entire area and has installed cluster systems where they were needed. Sixteen clusters have been installed in areas with small lake lots or poor soil conditions which can not support individual onsite systems. The cost of new construction is the responsibility of the owners, but the district inspects all systems during construction for compliance with Minnesota Rules 7080 (MPCA, 2002) and has to approve them before construction is completed.

The District has the ability to issue compliance orders and has the capability to assign costs (including penalties and interest) to the property tax statements. Up to 10% of the owners default on making their payment and the property tax collection mechanism of the District is used and necessary for financial viability. Individual permits are issued for new construction, upgrades and replacement. The property owner holds the construction permit and determines at the time of construction to be on the active or passive management program. The District allows alternative and innovative system designs. Regardless of the maintenance program the district inspects the systems and has access to them to evaluate whether the maintenance has been properly done.

Program enrollment includes both new and existing development. Existing properties can go on the active program based on a sliding scale. The system is inspected and the tank cleaned at the start of the program. The sliding scale is over a 10 year period where the district picks up 10 percent more of the repair costs each year. At the end of the period the system is covered 100 percent unless there is an owner abuse issue that causes a problem.

Oversight is provided by the district board of managers. There is one full time and two part time employees of the district. Other services such as, tank pumping, planning, design, construction and repair are contracted for with other individuals or businesses. Anyone working on these systems has to be licensed by the state. They must have a demonstrated working knowledge of how each of the system components operates. Over the 20 years, 17 of the over 1500 onsite systems have been replaced. This corresponds to a 1.1% failure rate. In addition, 120 older pre-project systems have been upgraded or replaced.

Financing

Initial Capital Investment

The original planning and design was done with federal grant funds administered through the Minnesota Pollution Control Agency. The total grant expenditures for the installation of the initial systems were $5,621,700. Total construction costs were $4,347,400 with $1,106,000 in engineering costs, $130,423 in administrative costs and $37,800 in land costs. The total non reimbursable expenses paid by county and landowners amounted to $244,660 included bonding and finance charges. The cost figures for the initial project installation are significantly lower then they would be today. In the last twenty years, there has been a decrease in grant availability and an increase in system installation costs. Both of these changes typically result in a higher cost per lot paid by property owners.

On-going Operational Costs

The annual operating budget is approximately $140,000. Table 1 indicates the general rate structure effective 2002 for facilities on the active plan. These rates include the administrative fee ($36-$38 for dwellings or $36-$261 for businesses) and all repairs and replacement of systems. Facilities on the passive system only pay the administrative fee. User fees for resorts and businesses are calculated on an individual basis due to the difference in size and components of each system.

Table 1. Facility and annual cost for facilities on active plan.

Type of Active Facility	Annual Cost
Permanent residence with tank, pump and drainfield	$168
Permanent residence with tank and drainfield	$120
Seasonal residence (based on 3 months average)	30% of permanent residence rates
Permanent cluster system	$196
Seasonal cluster system	$152
Resorts and businesses	$164 - $2178

Impacts on Water Quality

Groundwater

There were originally 110 groundwater monitoring wells installed during the initial construction. They were installed up and down gradient of each cluster drainfield at the top of the water table. Initial testing showed several wells had elevated levels of nitrate (higher then 5 mg/l) prior to drainfield construction due to agricultural activities and improper sewage treatment (Johnson, 1986). Since start up only one domestic well has shown levels of nitrate above 10 mg/l and several domestic wells have been replaced over the years due to shallow depth (less then 50 feet) and close proximity to a cluster drainfield (within 100 feet). Groundwater mounding has been observed at one cluster drainfield as a result of wastewater loading in an area of a weak horizontal flow gradient. The monitoring has been scaled back to fifty-five wells as a result of the monitoring showing no appreciable degradation in groundwater quality. Figure 1 shows long term monitoring results for a set of wells up and down stream of a cluster drainfield. These data show that the impact on groundwater quality is minimal and helped the District convince the MPCA to scale back the amount of groundwater monitoring to less then 30 wells.

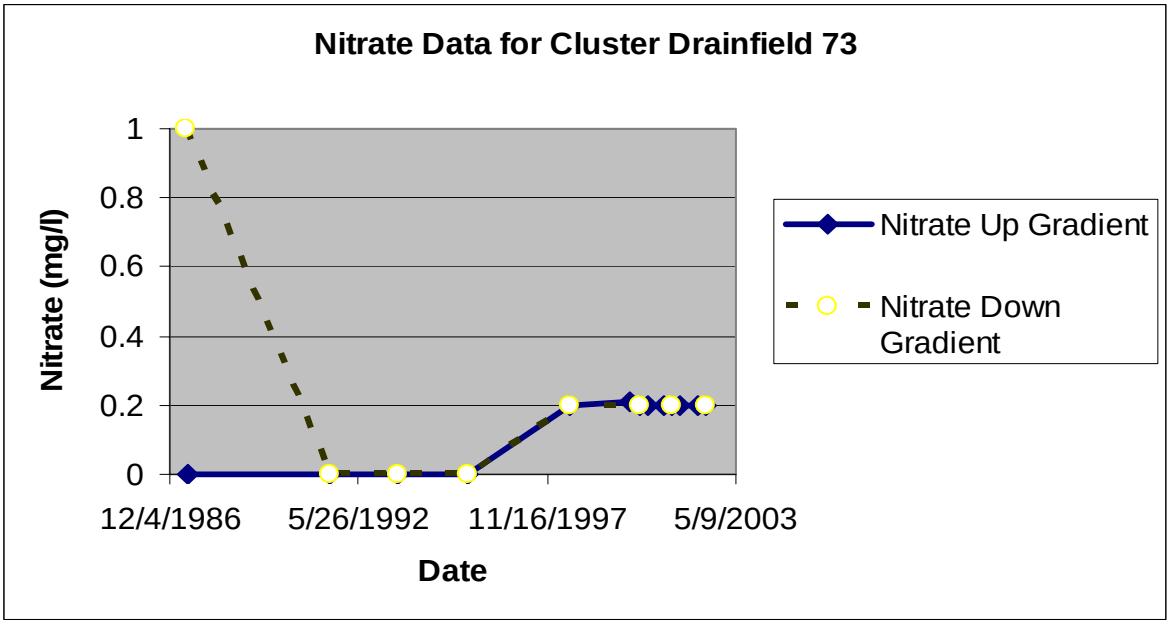

Fig 2. Nitrate Data from One Cluster Drainfield.

Surface Water

Water quality of the lakes within the District has improved in all measured parameters including a decrease in level of phosphorus and chlorophyll-A and in increase in secchi disk readings. Figures 1 and 2 show the improvements of Otter Tail Lake, which is the largest and most developed lake in the District (Mann, 2002 and MPCA 2004). Similar data exists for the other 5 lakes in the District.

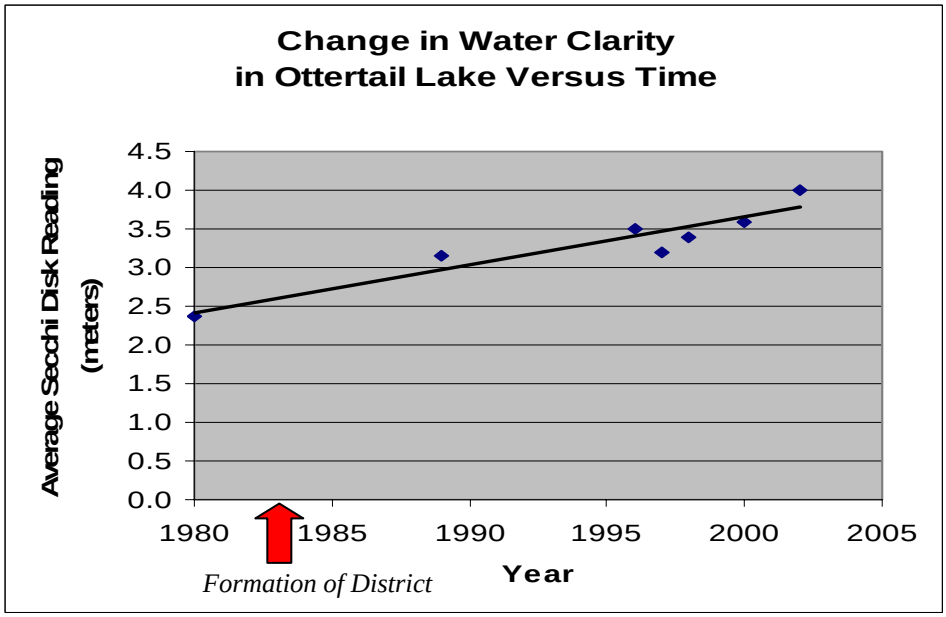

Fig 3. Secchi Disk Readings for Otter Tail Lake.

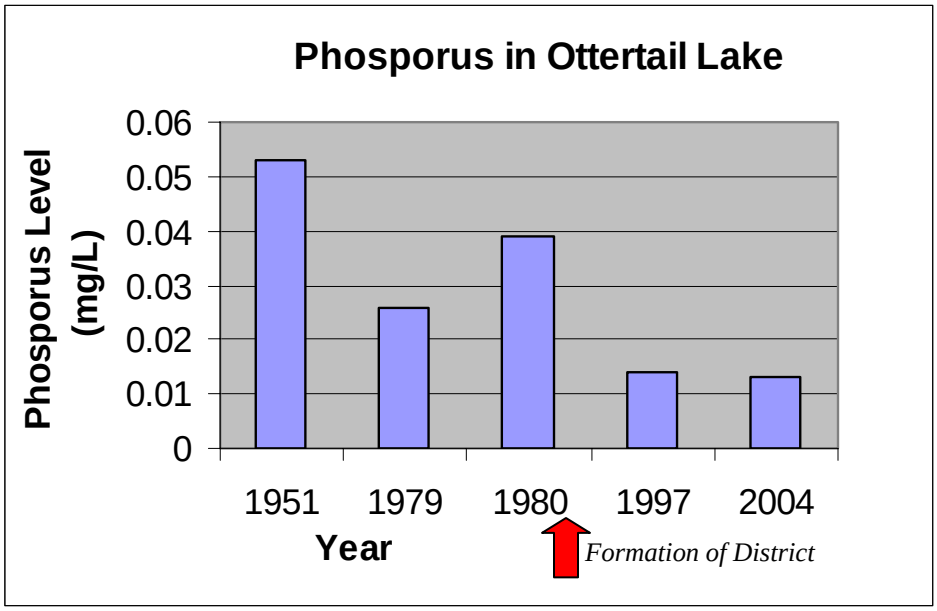

Fig 4. Phosphorus Levels in Otter Tail Lake

Conclusions

The Otter Tail Water Management District is a success story for proper management of onsite systems with an effective yet modest level of inspection and maintenance. The District has documented a less then 2% failure rate over 20 years. System improvements and management occur at affordable costs resulting in improved lake water quality, improved property values while maintaining the rural character of the community despite moderate growth.

References

Environmental Protection Agency. 2000. Guidelines for management of onsite and clustered wastewater treatment systems. www.epa.gov/OW-OWM.html/septic/pubs/septic_guidelines.pdf.

Johnson, Larry. 1986. Eugene A. Hickok and Associates. Post-construction hydrogelogical study – Otter Tail Lakes Sewer District.

Mann, Rollie. 2002. Manager of Otter Tail Water Management District. Annual reports to the MPCA.

Minnesota Pollution Control Agency. 2004. Citizen Lake Monitoring Program. www.pca.state.mn.us/water/clmp.html

Minnesota Pollution Control Agency. 2002. Minnesota Rules Chapter 7080. www.revisor.leg.state.mn.us/arule/7080/

Minnesota Statute 116A. 1971. www.revisor.leg.state.mn.us.

Olson, Ken, S. Christopherson, D. Gustafson, and B. Liukkonen. 2004. Septic Systems Owner's Guide – PC-6583-S. University of Minnesota, St. Paul, MN.

Olson, Ken, Bridget Chard, Doug Malchow and Don Hickman. 2002. Small community wastewater solutions – BU-07734-S. University of Minnesota, St. Paul, MN.