

TEXAS' OLDEST LIVING REUSE SYSTEM TELLS ALL

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ABSTRACT

Odessa initiated reuse of its wastewater effluent in 1949. Over the last 57 years, the program has grown to incorporate industrial, irrigation, and residential customers. Through reuse of the effluent, billions of gallons of water have been conserved for the potable water system.

KEYWORDS

Reuse, effluent

INTRODUCTION

Odessa is a city of approximately 100,000 people located in West Texas. The climate is arid where approximately 13" of rainfall is received in good years. Often the annual rainfall is less.

Odessa does not have any local water resources sufficient to meet its water needs. All water is purchased from the Colorado River Municipal Water District. The City's major water source is Lake Ivie which is 160 miles from Odessa. With water resources so limited, the need to conserve water resources has been apparent and has resulted in Odessa taking the necessary steps to use as much of its treated effluent for more nonpotable purposes. The history of Odessa's reuse program is the subject of this paper.

DISCUSSION

In the late 1940s, Odessa began its reuse program when it built its first wastewater treatment plant, South Dixie Water Reclamation Plant. A condition of the sale of the property for the wastewater plant was provision of 3 MGD of the primary treated wastewater to the landowner for irrigation of alfalfa.

In the 1950s, the petrochemical plant next door to the wastewater plant signed a contract for use of 4 MGD of the primary treated wastewater. This customer required higher quality water for use in its cooling towers and agreed to construct a secondary treatment plant at the South Dixie Plant.

In the 1980s, several factors resulted in Odessa investigating expansion of its reuse program. Two of these factors were due to the discharge of the treated wastewater into an effluent dominated stream, Monahans Draw. Downstream landowners had contested issuing Odessa's wastewater discharge permit. After weeks of hearings, the state issued the permit but the permit

included recommendations for Odessa to expand uses of its effluent. This recommendation resulted in a study conducted in 1985, which identified several reuse alternatives including:

1. Agricultural where irrigation with reuse water could be substituted for irrigation with groundwater.
2. Nonpotable urban uses including irrigation of golf courses, parks, cemeteries, makeup water for recreational ponds, and dual water distribution systems.
3. Industrial uses including use of the water for cooling tower makeup water, boiler feed water and process water.
4. Indirect potable water use in which highly treated effluent could be used to recharge the aquifer.
5. Direct potable use where the effluent would receive additional treatment and then be blended with the City's lake water prior to treatment at the water treatment plant.

Before a decision was made concerning the direction the City would take with its reuse program, a very unusual situation occurred. In 1986, Odessa received approximately 34" of rainfall over a relatively short time period. The runoff from these rains overwhelmed Monahans Draw and flooded farms, structures and equipment that had been established in the normally dry playa lakes along the Draw. As a result of the flooding, three lawsuits were filed by downstream landowners. The City was unable to convince the juries which heard these cases that the flooding was caused by the unusually high rainfall and not due to its discharges to Monahans Draw. The potential for additional lawsuits expedited the City's decision to move forward with expansion of its reuse program.

The third reason for the progress of Odessa's reuse program in the 1980s was directly related to the Director of Utilities, Bob Derrington. He understood the need of water conservation in West Texas and was a strong advocate for reuse long before reuse was popular. His vision for beneficial use of treated effluent not only impacted Odessa's reuse program, but reuse throughout Texas as he served on committees which led to the expansion of reuse in Texas

As a result of the 1985 study, Odessa determined that the most feasible reuse alternative was nonpotable urban uses. A study was conducted in 1987 which identified three golf course, Texas Department of Transportation right of ways, university grounds and a cemetery as potential customers. Due to the low cost of the reuse water and extensive educational efforts which overcame the stigma of using wastewater effluent, contracts were signed in 1992 with all of these entities except the cemetery.

Finding uses for the effluent was only one of Odessa's challenges. Since Odessa had selected a reuse which would result in irrigation of grounds where public access was not restricted, upgrades at the wastewater treatment plants would be needed to meet the quality requirements for Type I reuse water established in Texas. In addition, a means of transporting the treated water to the customers had to be addressed.

As the City made plans to upgrade the smaller of its two wastewater treatment plants (Bob Derrington Water Reclamation Plant) for provision of the Type I effluent, it was determined that

it could not complete permit required upgrades to the South Dixie Plant, and plans were initiated to expand the Derrington Plant to treat all of Odessa's wastewater. Since the industrial and agricultural reuse water was provided from the South Dixie Plant, decisions had to be made as to whether these reuses would be continued. Ultimately, the industrial reuse was maintained but the farming operation was abandoned.

In 1995, the City dedicated the expanded and upgraded Derrington Plant. In addition to the capital expenditures to ensure the water quality of the reuse water met Texas standards, 1.5 million dollars was spent to construct a pump station and force main to its industrial reuse customer and 4.0 million dollars was spent to provide storage, pump station, 15 miles of transmission lines, and batching stations for all the irrigation reuse customers.

Even though the 1992 reuse contracts obligated all the treated effluent to the original customers, water was still discharged daily to Monahans Draw especially during the winter when little irrigation is conducted. The City began receiving requests for reuse water for a City-owned park, a City-owned recreational pond and an exclusive residential area. The City's desire to limit its discharge of effluent to Monahans Draw and reuse as much effluent as possible, lead to negotiation with these customers that allowed provision of reuse water only if available. Since the availability of reuse water was not guaranteed, each customer was required to provide their own storage facility and alternate water supply in the event reuse water was not available. These negotiations resulted in reduced irrigation costs for the Parks Department and one of the first residential reuse sites in Texas.

In 2000, an electric power generating plant decided to locate in Odessa and requested reuse water for their cooling towers and blowdown water. Since the majority of the reuse water is used for irrigation, approximately 4.5 MGD was still discharged in the winter. The power plant was to be constructed between the Derrington Plant and the existing industrial customer so transmission facilities were available. Therefore, a take or pay contract was negotiated for all available reuse water from the Derrington Plant. The power plant also took responsibility for provision of any additional water they would need to meet their needs.

In 2005, the Colorado River Municipal Water District (CRMWD) who supplies water to many West Texas communities began looking for new water resources. A guaranteed water resource is wastewater treatment plant effluents. Therefore, they approached several of their customer cities, including Odessa, to determine their willingness to dedicate any of their unobligated reuse water to CRMWD. CRMWD would provide all required additional treatment of the effluent and then supplement the water supply through aquifer storage, aquifer recharge, by mixing the treated effluent with surface water or through other means. Since the power plant has opted not to use the reuse water on a continual basis, Odessa potentially has reuse water available especially in the winter months. A contract has, therefore, been negotiated with CRMWD which gives them first rights to any available reuse water after the needs of Odessa's contract customers have been met. At this time, CRMWD has not decided to move forward with use of Odessa's water, but it is possible that the next phase of Odessa's reuse program will include indirect or direct potable reuse.

SUMMARY

Over the last 57 years, the reuse program has grown as Odessa has sought to conserve its water supply by using reuse water for nonpotable purposes. Innovative approaches to negotiating reuse water contracts has allowed Odessa to serve additional customers and increased the feasibility of using as much reuse water as possible.