

CASE STUDY

An Affordable Wastewater Collection and Treatment Solution for Municipalities and Communities

STARBUCK, WASHINGTON

Problem

Failing septic systems in Starbuck, Washington, threatened to pollute groundwater and the nearby Tucannon River. Residents discovered they would not be allowed to rehab or replace their current systems because their lots did not meet the state's current minimum size for wastewater systems. But a community wastewater system seemed out of reach.

Solution

By supplementing grant money with citizen "sweat equity," the town's residents were able to install an affordable Orenco® Effluent Sewer and AdvanTex® Treatment System. The town of Starbuck now has an efficient, effective, nutrient-reducing wastewater system built and operated at a reasonable cost.

Community Builds Own Effluent Sewer System, Cuts Cost in Half

When the failing septic systems in Starbuck, Washington (pop. 165) threatened to pollute the groundwater and nearby Tucannon River, residents discovered they wouldn't be allowed to rehabilitate or replace them. Their lots didn't meet the state's current minimum size for onsite wastewater systems. But residents believed they couldn't afford a community wastewater system, especially when initial cost estimates came in at \$1.8 million for construction and a monthly fee of \$55-\$65 per household.



The small eastern Washington town of Starbuck (pop. 165) installed a low-cost, reliable effluent sewer system to serve the community, followed by an AdvanTex® Treatment System.

one of its chief proponents, an engineering firm experienced in self-help projects for small communities. Loomis Austin, Inc., had specified Orenco Systems® equipment in Texas and knew that effluent sewers were relatively easy to install. Armed with plans for an affordable system from Loomis Austin and grant funding from the state of Washington and the US Forest Service, the townspeople took on the challenge of doing the installation themselves.

Enter the Washington Department of Ecology's "self-help" program. If Starbuck could eliminate debt from the equation by supplementing grant money with citizen contributions of labor, the town could cut the monthly fee to less than \$20. Residents embraced the concept, as did

Municipal and Community Market

Project Overview

STARBUCK, WASHINGTON



Installation Date

- 1999 (completed in 9 months)

Effluent Quality*

- 1.5 mg/L BOD₅
- 1.4 mg/L TSS
- 12.1 mg/L TN

Start-Up Date

- January 2000

Project Cost Excluding Donated Labor

- \$863,000

Donated Labor

- 7,500 hours

Fees

- \$16 per month base charge plus \$1 per 1,000-gal (3,785-L) winter average water use

Primary Treatment (Onsite Facilities)

- 90 STEG (Septic Tank Effluent Gravity) connections
- 1,500-gal (5,678-L) single compartment concrete tank
- Orenco Biotube® Effluent Filter

Collection System

- 2.5 miles (4 km) of PVC pipe, mostly 2" (5.1 cm) and 3" (7.6 cm)
- 8,000-gal (30.3-m³) STEP pumping station with two ¾-hp pumps and VeriComm® telemetry controls

Secondary Treatment

- 16 AdvanTex® RX40 Textile Filters
- 2 denitrifying upflow filters: 1 day HRT (peak flow)
- 2 flow-splitter basins set for 50/50 filtrate split

Continued on next page

STARBUCK, WASHINGTON

Loomis Austin recommended an Orenco Effluent Sewer and AdvanTex® Treatment System. On each property, a 1,500-gallon (5,678-L) watertight tank with Biotube® effluent filter was installed, where solids are retained and treated. The filtered effluent from the tanks flows by gravity through small-diameter collection lines, mostly 2" and 3" (5.1 cm and 7.6 cm), to an 8,000-gallon (30.3-m³) STEP pumping station, equipped with telemetry controls. The pumping station pumps to a 20,000 gpd (75.7 m³/day) AdvanTex Treatment System (sixteen RX40 textile filters). After treatment, the effluent is so clean it's used to irrigate grazing lands via a drip irrigation system.



Aerial view of Starbuck, Washington, and its AdvanTex® Treatment System.

Carol Wildman, Starbuck's former clerk/treasurer, oversaw the self-help project. "People here can be stubborn," she said, "so we made hook-ups voluntary." Each household wanting a connection to the effluent sewer was expected to donate 80 hours of labor.

Some people laid pipe; others fed work crews or babysat for crew members. Still others ran errands or did paperwork. Retirees found a new reason to get up in the morning. In the end, virtually everyone in town opted to hook up. After nine months, installation was completed and Starbuck had accomplished what amounted to a modern-day barn-raising on an amazing scale.

The collection system — 2.5 miles (4 km) of pipe and 90 hook-ups, including a school and a restaurant — cost \$325,000. Treatment facilities added \$414,000 and professional fees another \$124,000. Grant funds covered that \$863,000 total. But grant administration, housing and meals for engineers, meals for volunteers, and approximately 7,500 hours of volunteer labor were contributed by the community! Residents pay a base monthly fee of \$16, plus one dollar per thousand gallons of water used (averaged from winter monthly consumption).

The system has been performing beautifully since the January 2000 start-up: lab sampling shows average BOD and TSS under 5 mg/L and total nitrogen of 12.1 mg/L. The system operator — Wildman's husband, Floyd — spends about ten hours a month on O&M, excluding the drip irrigation equipment.

"When you design a self-help project, the goal is constructability," says engineer Andy Hollon of Loomis Austin. So forget the big pipes, deep trenches, mammoth construction equipment, and special expertise! For the town of Starbuck, Orenco Effluent Sewer and an AdvanTex Treatment System fit the bill.

Data used by Orenco to derive the representations and conclusions contained within this Case Study were current as of March, 2014.

Municipal and Community Market

Project Overview

Secondary Treatment (continued)

- Design flow: 20,000 gpd (75.7 m³/day)
- Average actual flow: 7,330 gpd (27.7 m³/day)
- Recirculation rate:
 - 5:1 start-up
 - 4:1 after 1 year
- Tanks
 - 20,000-gal. (75.7-m³) blend tank
 - (2) 10,000-gal. (37.9-m³) recirculation tanks
- Pumps
 - Four ¾-hp pumps in each recirc tank

Dispersal

- 20,000-gal. (75.7-m³) surge/dose tank
- 50,000 linear feet (15,240 m) of drip irrigation line
- 4 acres (1.62 ha)

Operation/Maintenance

- Approx. 10 hrs/mo for maintenance of tanks, collection system, AdvanTex® Treatment System, and upflow filters

* Samples collected between 4/4/00 and 3/25/14 and analyzed by a third party.

"A self-help project is no picnic. It requires hard work and sacrifice. But look at what we accomplished. Our wastewater system is completely debt-free. It was definitely worth it!"

~ Carol Wildman, City of Starbuck

For more information about effluent sewers, Orenco Sewers™ and AdvanTex® Treatment Systems, contact Orenco Systems®, Inc.



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