

PROJECT PROFILE

An Affordable Greywater Treatment and Reuse Solution for Commercial Properties

SUMMIT BECHTEL RESERVE, WEST VIRGINIA

Problem The Boy Scouts of America (BSA) wanted an environmentally friendly method for disposing of the greywater generated by the 336 shower buildings at their showcase camping and training facility, the Summit Bechtel Family National Scout Reserve (SBR) in West Virginia. The chosen technology would need to be energy-efficient and take up as little space as possible.

Solution An array of AdvanTex® AX20-RTs – 224 all together – was installed to process the greywater and treat it for reuse in toilets. Two AdvanTex AX-Max™ units provide additional treatment. This greywater system saves the camp up to 200,000 gallons (757 m³) per day during large events like the National Scout Jamboree, a monumental gathering every four years of tens of thousands of Boy Scouts, leaders, and support staff.

Planning for Sustainability

In 2009, the Boy Scouts of America (BSA) purchased 10,600 acres (4,290 ha) of property in West Virginia next to the New River Gorge National River. This property would become home to the National Scout Jamboree and the Christen National High Adventure Base, attracting scouts from around the country. The facility was named the Summit Bechtel Family National Scout Reserve (SBR) and would be completed in time for the 2013 jamboree.

Boy Scouting places great emphasis on environmental stewardship. In fact, one of the requirements for becoming an Eagle Scout is earning either the “Environmental Science” or “Sustainability” merit badge. In



At the Boy Scouts of America's National Jamboree site, AdvanTex® Treatment Systems from Orenco® treat up to 200,000 gpd of greywater for reuse.

Commercial — Reuse Market

Project Overview

SUMMIT BECHTEL RESERVE, WEST VIRGINIA



Design Parameters

- 336 shower buildings
- 232,000 gpd (878 m³/day) capacity
- Up to 75,000 scouts, leaders, and staff at the National Scout Jamboree

Treatment Requirements

- 10 mg/L average cBOD₅ (25 mg/L maximum)
- 10 mg/L average TSS (30 mg/L maximum)
- 10 NTU average turbidity (20 NTU maximum)
- <14 MPN/100mL E. coli (<240 MPN/100mL maximum)
- 6.5 - 8.5 average pH

Installation Date

- June 2011

Greywater Treatment

- 224 AX20-RT units installed in pairs, with each pair treating 2,000 gpd (7.6 m³/day)
- Two 14-ft (4.3-m) AX-Max units, each capable of treating 4,000 gpd (15 m³/day)

Disinfection

- UV disinfection

Reuse Application

- Toilet flushing

Engineering

- Pete Muñoz, P.E., Senior Engineer, Biohabitats, Inc.
- Ryan Case, Project Manager/Senior Engineering Technician, Biohabitats, Inc.

Continued on back page

SUMMIT BECHTEL RESERVE, WEST VIRGINIA

keeping with those principles, the BSA contacted Natural Systems International, an engineering firm specializing in environmental planning, restoration, and design-build services. (Natural Systems was acquired in 2011 by Biohabitats, a company that also emphasizes ecological stewardship.)

Sustainability was a major goal in the design and development of SBR. While planning for onsite treatment of the facility's wastewater, engineers realized it was essential to minimize overall water use at the camp. A significant means of accomplishing this would be to capture greywater from the camp's showers and sinks for use in toilet flushing.

The Biohabitats' engineering team evaluated over twenty different greywater treatment options with the following criteria in mind:

- small footprint
- quick start-up capability (from non-use to full treatment in 24 hours or less)
- dependable operation and ease of maintenance
- low energy use
- effective treatment, even with highly variable flows
- established performance record, especially for greywater systems

In the end, Orenco's AdvanTex® Treatment Systems proved to be the best solution, meeting all of these requirements. Biohabitats recommended a total of 224 AdvanTex AX20-RT units and two 14-ft AdvanTex AX-Max™ units be installed in small clusters next to each shower/bathroom facility. This provides a capacity of 232,000 gpd (878 m³/day) – enough to handle heavy flows during the National Scout Jamboree, which draws approximately 40,000 campers every four years.

Saving Money with AdvanTex

Both the AX20-RT and AX-Max greywater systems are pre-plumbed, “plug & play” units that are easy to install. The entire system – including treatment, recirculation, and discharge – is built inside a fiberglass tank. This simple design reduces costs not only for the initial excavation and installation, but also for ongoing operation and maintenance.



Engineers recommended these AdvanTex AX20-RT units due to the many advantages they offered, including a small footprint and a proven performance record for greywater treatment.



Treated greywater flows from the green AX20-RT units into the black dose tank and then to a UV disinfection unit. (The red tank in the background treats blackwater.)

In addition, AdvanTex units are known for their energy savings. They use highly efficient ½-hp (0.37- kW), 115-volt pumps that consume fewer than 2 kWh per 1,000 treated gallons¹ (3.8 m³). For the AX-RT, that typically equals just \$2-3/month, depending on local electricity rates.

And, most important of all, with the AdvanTex greywater treatment systems in place, SBR saves up to 200,000 gallons (757 m³) of water per day during its largest event, the National Scout Jamboree. That's because every gallon of water from the shower houses is available to be used not once, but twice, before it's pumped away to the wastewater treatment plant.

SUMMIT BECHTEL RESERVE, WEST VIRGINIA

How It Works

The AX20-RTs are installed in pairs at each of SBR's shower/bathroom facilities. Greywater from the showers and sinks enters the first AdvanTex tank through an inlet tee. Any solids that may have accidentally gone down the drain are collected in a catch basin, leaving only liquid and air inside the tank.

The liquid passes through an Orenco Biotube® effluent filter and is then pumped intermittently in very small amounts over the textile treatment media, which hangs in sheets at the top of the AdvanTex unit. The microorganisms attached to these sheets extract and digest the organic waste in the water, cleaning it as it trickles through the media. This textile media has exceptional water-holding capacity, providing more time for the bacteria to feed.

Another advantage of the AdvanTex textile is its large amount of void space, which allows for greater movement of air as well as more room for the ac-



Shower facilities like these provide the greywater that is treated for reuse in toilet flushing.

cumulation of inorganic solids. In addition, the attached-growth surface area of the textile is 4-8 times larger than typical recirculating filter media, providing more area for microbial growth and a greater opportunity for both air and effluent to come in contact with the microbes.²



The AdvanTex Greywater Treatment Systems in place at the Summit Bechtel Reserve are an important part of the facility's overall sustainability. AdvanTex technology is known for its low energy use and for effective treatment, even with the highly variable flows common to camping areas.

SUMMIT BECHTEL RESERVE, WEST VIRGINIA

After the effluent passes through the textile media, it flows by gravity from the second AX20-RT to a dose tank before undergoing UV disinfection. Following disinfection, the effluent is kept in a pressure tank, which provides water for the camp's toilets. If there's more effluent than is needed for toilet flushing, the excess is routed to the blackwater collection system, which leads to SBR's wastewater treatment plant.

Happy Campers

Five years after installation, the AdvanTex greywater treatment systems at SBR continue to meet high expectations. Pete Muñoz, P.E., a Senior Engineer with Biohabitats, Inc., commented, "[Orenco's] proven dedication to quality and their continued investment in research and development gives us the confidence that Orenco's system will perform as designed. When we were designing the innovative greywater recycling system to be installed at each of 112 shower complexes at the BSA Summit, AdvanTex technology met all criteria and helped ensure a successful project outcome."

The Summit Bechtel Reserve is an amazing state-of-the-art facility offering youth a wide variety of outdoor adventures, from whitewater rafting to rappelling to BMX biking – all with minimal environmental impact. Orenco is proud to have had a part in its development and to play a continuing role in its sustainability.

¹ Internal tests.

² Terry R. Bounds, P.E., "Performance of Textile-Based Packed Bed Filters," (Sutherlin, Oregon: Orenco Systems, 2002).

**Commercial —
Reuse Market****Engineering (continued)**

- Biohabitats also designed the central onsite wastewater treatment and dispersal system installed at the Summit Bechtel Reserve.

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~ Pete Muñoz, P.E., Biohabitats, Inc.

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


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Data used by Orenco to derive the representations and conclusions contained within this Project Profile were current as of September, 2016.