



# Boy Scout Jamboree Site Adopts Water Reuse

ORENCO

Cleaning up after yourself and taking care of your surroundings are principles of scouting. Conservation efforts and a new “Sustainability” merit badge reflect the Boy Scout philosophy and the times.

By Carol Brzozowski

**S**ustainability is a core principal for the Boy Scouts of America (BSA). So much so that the organization promotes it in every aspect of the program, all the way through the highest rank—Eagle Scout—in which candidates are required to earn a merit badge in either Environmental Science or Sustainability.

The century-old organization’s 15,000-acre property—the Summit Bechtel Reserve in southern West Virginia—is the new permanent home of the National Scout Jamboree, which attracted more than 30,000 Scouts and

their leaders during its grand opening 2013 Jamboree. When it’s not used for Jamboree events—which occur every four years—it serves as a high-adventure camp to be used every few months or more often, mostly in the summer and occasionally in the winter.

How to deal with wastewater at The Summit, which has been designed as a flagship sustainability project for the BSA, presented a challenge. The solution: graywater would be processed on site in a manner that would not only have the lowest impact, but offer the highest yield in beneficial use by treating

water from each building’s showers and sinks for use in toilet flushing.

Orenco Systems was selected to provide AdvanTex AX-RT advanced wastewater treatment. Clear, odorless, reusable effluent is produced through a pre-packaged “plug and play” AX20 wastewater treatment system. UV disinfection also is available for the system.

The system produces biochemical oxygen demand (BOD) and total suspended solids (TSS) of 10 mg/L or less, enabling it to be reused for secondary purposes such as toilet flushing or subsurface irrigation.



The system has five main functional parts: a primary settling tank, a Biotube effluent filter, textile sheets for attached growth, a recirculating section of the tank with a Biotube pump vault, and a discharge section of the tank with a discharge pump in a flow inducer.

The procedure is as such: graywater from showering enters the primary tank through its inlet tee. Once there, any solids in the graywater separate out, leaving a clear layer from which liquid can be drawn. Effluent from the clear layer passes through a Biotube effluent filter and is discharged by gravity to the unit's recirculation treatment tank, which contains a Biotube pump package. The recirculation pump is controlled by a timer to ensure that small, intermittent (micro-doses) of effluent are applied to the textile sheets throughout the day. This ensures an aerobic, unsaturated environment for optimal treatment.

Effluent is sprayed over the textile sheets, which provide for surface area for microorganisms that treat the grey water to populate. The effluent then percolates down through the textile sheets and is distributed between the recirculation and discharge chambers by means of the baffle. A pump in the discharge chamber periodically doses effluent to a UV disinfection unit and into a pressure tank that provides the water for the toilets.

Orenco Systems was initially approached by Natural Systems International—acquired in 2011 by Biohabitats—which provides services in environmental planning, restoration, and design/build.

“Natural Systems needed something that can start up quick and they needed our help,” says Grant Denn, senior manager for engineered projects for Orenco. “There are cabins at The Summit, which

were going to have intermittent usage, and they wanted to find a way to treat the waste from the cabins quickly to the point where they could reuse it at the cabins for toilet flushing. They needed technology that was going to be up-and-running very quickly.”

Usually there is a “work-in” period of a week or two when a system goes online before sampling is done, but Orenco's systems are able to offer a quick start-up to provide treatment, he says. “We started sampling right away—we knew we were going to get treatment right away,” he adds. “Natural Systems was looking at something that would get quick treatment because there was not going to be anybody there and then suddenly there were going to be Scouts there and they were going to want to start using the water right away for toilet use. They asked if our technology is capable of meeting that challenge, and our answer was yes.”

Most technologies have suspended growth, which is a time period needed until there are enough “bugs” (microorganisms) colonized to treat the waste, Denn points out.

“Ours is an attached growth—the bugs are attached to this textile material, and, since they already have a place to live, they attach immediately and start treating, whereas, with suspended growth, they have to get to a point where there's a big enough growth that the waste is going to come into contact with,” he adds.

One of the differences between a standard AdvanTex and the AdvanTex AX-RT is that the latter has the recirculation tank inside of the system and is combined in the fiberglass module, says Denn. Each has 1,000 gallons of capacity.

The Orenco systems met the BSA specifications for fiberglass. Orenco designed the systems with Natural Systems and trained installers. The 110 systems that were installed cost \$1.2 million. The design is for 200,000 gallons of reuse a day capacity, as to accommodate large events such as the National Jamboree.

“Beyond that, it's going to be up to 2,000 gallons per day per cabin unit,” says Denn.

The initial Orenco wastewater

treatment systems were installed in June 2011, with everything online and working for the property's inaugural Jamboree.

In the Orenco systems at The Summit, what can't be reused for lack of demand goes into the blackwater collection system that is then transported to a wastewater treatment system for overall treatment, Denn says.

Because of the light use in the winter, Orenco made some winterization modifications to the system to alleviate concerns over freezing pipe—and expansion cracking the pipes—by installing a small valve to allow water to drain out.

BSA initially wanted to include Scouts in a walk-through of the system or to do maintenance, Denn says. “We recommended against that. We'd prefer to see professionals who know how to do it do that. You're still dealing with human waste, even in the graywater portion of it.”

The system has light maintenance, he adds. “What we recommend for the Summit system is that annually, when they get ready to take it offline, they open it up to make sure everything looks OK, and then they can quickly test the pumps. Graywater is such an easy application for AdvanTex since its primary use is for all the wastewater from a facility, so it's not likely they'd have to do any maintenance on the actual textile media.”

The maintenance should ensure that the floats, alarms, and pumps are working, Denn says. The laterals should be flushed each year only if needed.

“There are the normal mechanical issues that you want to look through,” he adds. “You glance at the textile to make sure it has a normal appearance, which is a light or medium brown in color. There should be no odor from it. If everything looks good and tests fine, they can button them up for the winter.”

The BSA views sustainability as consisting of three responsibilities: social, environmental, and economic.

Regarding the social aspect, Denn says: “Could they have just put in a regular system and piped it all the way to a big plant? Sure. But that's not what they wanted to do. They wanted to do something to demonstrate to the Scouts that we're being conscious of our surroundings

and taking care of our surroundings as you should. They are instructing them that when they go home, they should do some of those things.”

On the environmental factor, the BSA “wanted to treat the waste at each individual cabin and reuse it in the cabin to teach the Scouts you have a responsibility and you need to take care of your own waste the best you can and you can treat it to a high level in a small space,” adds Denn.

As for the economic factor, end users of the system also save on costs through the system being pre-assembled and shallowly buried, which cuts down on excavation costs.

The beneficial reuse of water is key in the project, Denn points out. “It’s being reused for toilet flushing instead of them just sending it off somewhere and disposing of it into the ground or back into the stream. You’re also not bringing in fresh water to flush toilets,” he says.

Energy savings are another value, Denn explains. “The pumps we use are very highly energy efficient; they’re half horsepower, 115-volt,” he says. “They’re very similar to a well-type pump—they’re not the traditional wastewater effluent application. The controls are essentially as such that they will determine what the actual usage is and then set the timer settings to the actual usage. We’re basically not running it all of the time at higher rates.”

The system has settings that offer flexibility prior to a large event such as the National Jamboree. “The best thing for efficiency is that you’re reusing the water and not bringing in fresh water and it’s a very energy-efficient process,” says Denn.

The wastewater treatment system is one of several sustainability initiatives hosted at The Summit Bechtel Family



Installation of the onsite wastewater treatment and reuse system by Orenco Systems at the Summit Bechtel Reserve—Boy Scouts of America Jamboree site

National Scout Reserve. Those related to water efficiency include composting toilets requiring no water and low-flow fixtures that combine pressure and aeration to utilize half of the standard water consumption.

Other efforts include a hydration station that minimizes the use of plastic by encouraging refills through canteens, hydration packs, and reusable water bottles; stream restoration and the use of wetlands to treat runoffs from roads and campsites; a conservation buffer to protect the New River Gorge National River headwaters; a transit center to keep buses out of the camping areas; pedestrian and bike trails; locally harvested wood used for building construction; and a sustainability managed forest.

Denn notes that since Orenco was founded in 1981, the idea of sustainability has been building over time and more of its onsite wastewater treatment systems are being used for reuse. “In New Zealand, they use a lot of reuse water for toilet flushing,” he notes. “In the US, the beneficial reuse is for irrigation—sometimes drip irrigation and sometimes spot irrigation.”

Orenco also provides a UV system

to treat, disinfect, and reuse water on the lot in which it is installed.

Additionally, Orenco is involved in hundreds of effluent sewer collection systems where primary treatment occurs on the lot. “Instead of taking all of the solids into the collection system, they go into a septic tank on the lot where you get the breakdown of the solids and you’re only moving liquid away,” says Denn.

The anaerobic digestion through the septic tank is significantly more energy-efficient than what occurs in a traditional wastewater treatment plant, Denn says. “There’s essentially no energy use,” he says. “Instead of going to a plant and having to treat and remove the solids—which is the most expensive portion of treatment at a traditional treatment plant—we’re doing that onsite. And since we’re only moving liquid, that allows us to keep the sizes of the lines down and allows us to provide a watertight system so you don’t have infiltration and inflow.”

In applications that involve a nitrogen or phosphorous standard, chemicals may be necessary to pull those constituents out of the system, he says.

“Our AdvanTex treatment systems are very simple and natural. The bugs are coming from us—they’re enteric, from our bodies—and we provide a place for the bugs to grow, which is the textile that breaks down the waste stream. We prefer to treat it right at the home or facility—as close to the point of generation as possible.

“Whenever possible we reuse it onsite,” he adds. “But in cases where the treated wastewater cannot be used onsite year round, such as during a saturated period of time during the winter, what can’t be used can be discharged out into a common collection system.”

The Boy Scout site represents what can be done going forward to address water reuse issues, says Steve Braband, company president of BioSolutions. BioSolutions provides products and services for the wastewater industry, specializing in providing complete site-specific packages for decentralized wastewater.

The company serves as an authorized distributor or dealer of more than 15 manufacturers of wastewater treatment products—of which Orenco is one—including septic tanks for residential and commercial use; small-scale wastewater treatment systems that transform residential wastewater into clear, odorless water ready for subsurface irrigation, and large-scale treatment systems for shopping centers, school districts, municipalities, recreational facilities, wineries, and industry. The company also provides disinfection systems, subsurface systems, and subsurface drip as well as other dispersal technologies.

BioSolutions assists with property owners’ site-specific needs, works with contractors to ensure the system is installed in accordance with manufacturer’s specifications, provides startup services, coordinates a full-service compliance program, and performs onsite maintenance service.

Braband says BioSolutions began in 2002 shortly before the EPA report to Congress discussing long-term use of decentralized wastewater.

“We have expanded our business into both rainwater and graywater systems as the need has been recognized, and have been pushing the regulations to allow systems like this to be able to work within our regulatory area,” says Braband.

Braband began working with the Los Angeles Department of Water and Power (LADWP) to show how existing decentralized wastewater systems could be used for graywater reuse projects.

“There has been a recognition over the last few years that we use 20% of all of our energy in California to pump water from northern California to southern California,” notes Braband. “There also is a recognition that we needed to get smarter in our use.

“Some of the challenges of centralized reuse have been with the collection lines within many of the cities and the ability to take that recycled water and bring it back into the upper portions of the city. This has become cost-prohibitive in many cases.” The use of decentralized graywater systems is a common practice in Australia, which has served as a role model for other parts of the world facing similar water use challenges.

BioSolutions has been involved in decentralized wastewater projects throughout southern California, including Malibu, as well as working with Los Angeles Public Works on providing treatment systems at the county beaches with the goal of protecting the coast environment.

“One, we’re trying to clean up the beach, and two, it’s looking at ways of taking that water and reusing it. One of the challenges faced in our region is that while the technologies exist, the regulatory agencies were lagging behind to allow those technologies to be used,” points out Braband.

“We started working with LADWP before the regulations came into place. New non-potable water regulations were adopted January 1.”

Since January 1, Braband’s company has begun developing projects in California following the template of successful projects in other parts of the country, such as the Boy Scout Jamboree site, he says.

Five years ago, Braband—who is himself a Scouter and whose son is in Scouts—had done some preliminary studies on wastewater reuse at the BSA’s Camp Emerald Bay on Catalina Island.

Addressing the perception that innovative ideas start in California and migrate to the East, Braband points out

that is not the case regarding wastewater reuse. “We found we were the 49th state to come up with new state regulations for onsite wastewater. So in some ways, the East Coast, and other places like Australia, have been the leaders in coming up with some of these solutions for reuse.”

But the water crisis that has plagued the state is underscoring the need to move more quickly, Braband adds.

“We’re already looking at a mandate of reducing our water use by 20%, looking at ways for reusing,” he says. “California has already been using decentralized stormwater regulations that have been put into place.”

Braband points out that one of the challenges being faced in California with respect to reuse is proper infrastructure for rainwater cisterns. “When it rains, we can collect a lot of water, but unlike the East Coast that uses water cisterns a great deal, in our arid region we have to build larger cisterns to be able to collect rainwater because we go for longer periods of not having that rainwater available.”

“In some instances, we’ve been looking at a graywater/rainwater hybrid system where we can use daily graywater instead of using potable water, augment that with rainwater and then as a last resort, use potable water for landscaping, reflush, and other non-potable reuse applications.” Society needs to find ways to adapt, especially in emergency applications such as the water challenges recently being experienced in California, Braband says.

“It’s not restricted to water,” he says. “I’ve heard a lot of environmental technologies are moving forward and that the standards are always lagging behind. We have to find a way to streamline that review process of the technologies to make them readily available so we can actually utilize them.” WE

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*Carol Brzozowski specializes in topics related to stormwater and technology.*



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