



PIX 16448

The Fort Carson golf course receives irrigation water from the wastewater treatment plant.

The U.S. Department of Energy's (DOE) Federal Energy Management Program (FEMP) facilitates the Federal Government's implementation of sound, cost-effective energy management and investment practices to enhance the nation's energy security and environmental stewardship.

## **WATER RECLAMATION AND REUSE AT FORT CARSON**

### **Best Management Practice Case Study #14 — Alternate Water Sources**

The U.S. Army's Fort Carson has built a successful and award-winning water conservation program through a series of initiatives that avoid using potable water. The program involves an innovative approach to utilizing alternative sources of water, water reclamation, and recycling.

Fort Carson is located near Colorado Springs, Colorado, and together with the Piñon Canyon Maneuver Site, occupies 373,000 acres. The army base has more than 9 million square feet of facility space—buildings that serve the army base—and an additional 4 million square feet of private family housing.

Fort Carson serves as a training facility for the U.S. Army Special Forces, an infantry division, and Army Reserves. The base hosts more than 45,000 military personnel annually. Approximately 20,000 civilians and military personnel work and live there.

Every year, Fort Carson consumes about 700 million gallons of potable water, including domestic water for family housing. The base purchases potable water from the local municipal water utility, and treats its wastewater onsite. The average annual water bill surpasses \$2.1 million.

Because of the high demand for water from a growing population in Colorado Springs and the dry climate of central Colorado that includes regular droughts, the military base and surrounding communities have faced intermittent water restrictions in recent years. As a result, Fort Carson has developed a comprehensive approach to water management, including facility and operational efficiency improvements and water reuse and reclamation.

### **Project Summary**

Fort Carson has successfully reclaimed effluent from its wastewater treatment plant for turf irrigation for more than three decades. And for the past 20 years, the base has operated a large vehicle wash facility that recycles water using a closed-loop system. Through these two projects, Fort Carson conserves approximately 300 million gallons of potable water annually.

### ***Wastewater Reclamation***

Fort Carson treats wastewater onsite in a large treatment plant. The plant consists of head-works separation, oxidation ditches, clarifiers, aerobic digesters with a belt-filter press, continuous backwash sand filters, and ultraviolet disinfection. The rated capacity of the plant is 3 million gallons of water per day.



PIX 16447

Fort Carson has improved how it processes and recycles water at its wastewater treatment plant, shown here in an aerial view.

As part of its water reclamation program, the base reclaims the effluent from the wastewater treatment plant to irrigate turf at the Fort Carson golf course. The effluent is transported through six miles of pipeline to a clay-lined holding pond, from which it is then distributed to the 180 acres of irrigated areas on the golf course. This process saves approximately 100 million gallons of water every year.

The treatment plant also reuses approximately 3 million gallons of effluent for process water needed in the wastewater operations. For example, the nonpotable water line returns effluent to the plant for the sludge belt filter press and other operations.

### **Water Reuse at the Central Vehicle Wash Facility**

The Fort Carson Central Vehicle Wash Facility reuses water from washing and removing debris from tactical and support vehicles. The facility operates year-round and performs more than 10,000 vehicle washes in an average year; it has the capacity to wash up to 500 vehicles per day (when the ambient temperature is above 40°F). By reusing the water through a closed-loop recycle system, the facility reduces annual consumption of potable water by approximately 200 million gallons and eliminates the need to treat 1.1 million gallons of wastewater per day.

The wash facility consists of two storage basins with a capacity of 9 million gallons and two other basins—referred to as birdbaths—for tracked and wheeled vehicles with high-pressure water cannons.

The treatment system consists of a grit- and oil-separation basin, intermittent sand filters, and extended aeration. Makeup water to replenish system losses and evaporation—approximately 3 million gallons per year—accounts for less than 2% of total water use at the wash facility.

### **Cost and Savings Summary**

Fort Carson saves approximately 300 million gallons annually through water reclamation and recycling efforts. The base has established rates with the local water utility for summer potable water, winter potable water, and wastewater effluent for the golf course. At 2008 rates, Fort Carson is saving approximately \$682,000 per year. The savings is based on the amount of purchased potable water deferred from the water reuse and reclamation activities (see table).



PIX 16449



PIX 16446

Soldiers hose down trucks with high-pressure water to clean off debris in the Fort Carson Central Vehicle Wash Facility. The basin, known as a “birdbath,” collects the water for reuse.

### **Annual Water and Cost Savings Summary**

<b>Water Conservation Initiative</b>	<b>Million gallons</b>	<b>Cost savings</b>
Water reclamation for turf irrigation	100	\$215,000
Water reuse in wastewater processes	3	\$7,000
Water reuse in vehicle wash facility	200	\$460,000
<b>Total</b>	<b>303</b>	<b>\$682,000</b>

### **For More Information**

FEMP Water Efficiency: <http://www.eere.energy.gov/femp/program/waterefficiency.html>

Water Efficiency Best Management Practices: [http://www.eere.energy.gov/femp/program/waterefficiency\\_bmp.html](http://www.eere.energy.gov/femp/program/waterefficiency_bmp.html)