

Carvins Cove Water Treatment Facility and Natural Reserve



Carvins Cove Reservoir is situated within Carvins Cove Natural Reserve, a 12,672-acre watershed near Hollins University in Botetourt County. The land in the reserve above the 1,200-foot contour is owned and managed by the City of Roanoke. The land below this elevation, and the reservoir, are owned and operated by the Western Virginia Water Authority.

In addition to receiving water from the watershed, the reservoir is fed from two underground tunnels that carry overflow from Tinker and Catawba Creeks. This surface water source covers 630 acres and stores 6.5-billion gallons of water at full pond.

The Water Treatment Process

Pretreatment ● ● ● ●

Oxygen is added to the water in the Carvins Cove Reservoir and then chlorine dioxide is added as the water flows through pipes to the treatment plant. This helps to oxidize dissolved organic matter, iron and manganese.

Aeration ● ● ● ●

Sodium Permanganate is added as the water from the reservoir flows by gravity or through the low lift pumping stations to the aeration basins. This helps remove iron and manganese. Aeration removes unwanted dissolved gases and oxidizes dissolved metals to improve taste and odor.



Flash Mixing ● ● ● ●

After aeration, rapid uniform dispersion of chemicals takes place in the flash mixers.

Flocculation Basins ● ● ● ●

Ferric Sulfate (iron) is added in the flocculation basins and mixed at low velocities to allow for coagulation of suspended particles into heavier and easier to settle floc particles. The water spends about an hour in these basins. The basins are about 11-feet deep and hold 100,000-150,000 gallons of water.



Sedimentation ● ● ● ●

After flocculation, the partially treated water enters the settling basins to allow the suspended solids (floc) to settle out. Weirs at the end of basins assist in keeping the smaller or lighter flow from continuing on through the filtration process. Each of the eight sedimentation basins hold about 650,000 gallons of water. Water spends about 3-hours in these basins.



Filtration ● ● ● ●

As the water leaves the sedimentation basins, it flows to the filter building for further processing. When the water enters the building it is distributed to six dual medium filters. Each filter consists of anthracite (carbon media) over filter sand. The filters are backwashed approximately every 70-hours. This backwashing is done with water that flows by gravity from two holding tanks with a total capacity of 240,000 gallons.



Chemical Treatment ● ● ● ●

The filtered water is disinfected with sodium hypochlorite - a strong bleach solution. Fluoride is added to promote strong teeth and orthophosphate is added to control corrosion in pipes.

Finished Water Storage ● ● ● ●

Once the water is filtered and post-treated with chlorine, fluoride and orthophosphate, it is stored underground in two finished water reservoirs on the plant site. These two reservoirs offer a combined six-million gallons of storage.

The finished water reservoirs are interconnected and provide operational flexibility between the plant and the distribution system.



Water Treatment Operators ● ● ● ●

Water Treatment Operators have the responsibility of making sure that the water we send to our customers meets all the standards established by the Virginia Department of Health and the Environmental Protection Agency (EPA). Computerized SCADA equipment is used by the operators to monitor all processes as the water flows through the plant.

Water Treatment Operators can start their career directly out of high school or a community college as Operators in Training. As they pass licensure tests and gain work experience, they can progress to Class I Water Operators.

See www.westernvawater.org/careers for more information.

Carvins Cove Natural Reserve

● ● ● ●

Carvins Cove Natural Reserve, the second largest municipal park in the United States, offers outdoor recreation opportunities, including boating, fishing, hiking and nature viewing. You can bring your own boat or paddleboard or rent kayaks, paddle boats and jon boats at the reservoir. See the Water Authority's website for more details.



Visitors to the Natural Reserve are charged \$7 per car for daily use or annual passes are available for \$50. Payment drop boxes are located at the Bennett Springs and Timberview parking lots, or passes can be purchased from the Security Office on Reservoir Road. For more information, call the Natural Reserve at 540-563-9170.



WESTERN VIRGINIA
WATER AUTHORITY

601 S. Jefferson Street
Suite 200
Roanoke, VA 24011

540.853.5700 • www.westernvawater.org