

# Acclaimed city water works system fueled growth

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Unidentified workers and engineers pose at the Ohio River intake tunnel project circa 1898

Cincinnati's water system has been at the forefront of U.S. water treatment and a critical part of the region's infrastructure for nearly two centuries.

The system's history stretches from the time early settlers used hollowed-out logs to carry untreated water from the Ohio River near today's Sawyer Point to the state-of-the-art \$30 million ultraviolet light treatment plant under construction at the Greater Cincinnati Water Works plant off Kellogg Avenue in California.

Every day, the Water Works treats about 133 million gallons for delivery through its 3,100 miles of water mains to 1.1 million people in parts of Hamilton, Butler, Warren and Clermont counties, and Boone County in Northern Kentucky.

When the Cincinnati town council granted the first license to the privately owned Cincinnati Manufacturing Co. to develop a water system in 1817, it was one of the first city water systems in the country, said Dave Rager, who was director of the Greater Cincinnati Water Works from 1993 to 2011.

He said it predates the Boston water system, which started in the 1820s.

When the city began a major reconstruction of the water system in the 1890s, Cincinnati was the nation's fifth-largest "city and became one of the first to take water treatment seriously.

A century later, in 1992, the water works became the first water utility to use granular activated carbon to recycle carbon to reduce the need for chlorine in the delivery system, reducing odor and improving the water's taste.

The technology gained the city international recognition.

"Water systems officials from London, Paris and Asia, came here to see how we did it," said Rager, who is now executive director of the Northern Kentucky Sanitation District No. 1.

Development of Cincinnati's water system over the last two centuries reflects both the growth of the region, and increased awareness for the need for better water quality.



"New Works" pumping station for the Cincinnati Water Works under construction in California.

"What really strikes you about the early years of the water works was the recognition of the city's leader then 'that they had to undertake big, bold construction efforts to plan for the city's future," Rager said.

Before 1799, early settlers drew water from natural springs by hand. Residents paid 25 cents a week for access. By about 1805, Cincinnati had about 1,700 residents and water was being hauled by wooden wagons from the river to homes and businesses.

But as Cincinnati grew, community leaders realized the town needed a better water system. In 1817, the town council gave Cincinnati Manufacturing Co. exclusive rights to develop a public

water supply. The system supplied the first water in 1821 from a wooden pumping station powered by horse and oxen on Front Street, where Sawyer Point is today.

In 1824, a steam engine from the riverboat Vesta replaced the horse and oxen, giving the system the capacity to pump about 1.2 million gallons a day. Two years later, the Cincinnati Water Co., backed by prominent citizens, acquired the water works from Samuel W. Davis, who later served as Cincinnati mayor. In 1828, the first iron pipe was installed in the system.

As the city grew, the system expanded and water rates rose. In 1839, the Ohio General Assembly passed legislation enabling the city's purchase of the system for \$300,000. In May 1839, city voters approved the purchase, 728-533, after four earlier votes had failed.

Until the 1890s, when mechanical meters were installed, the water works relied on census takers who went door-to-door annually counting the number of wash basins and livestock in each household to assess water rates, Rager said.

In 1896, the city completed plans for a new pumping station, settling reservoir and the first water treatment using sand filtration near California, east of downtown. The plan called for water taken from the river to be fed to the Eden Park reservoir by a pipeline and the Ohio General Assembly allowed the city to sell bonds. The cost of the project, including a new main and Western Hills pumping station: \$11 million.

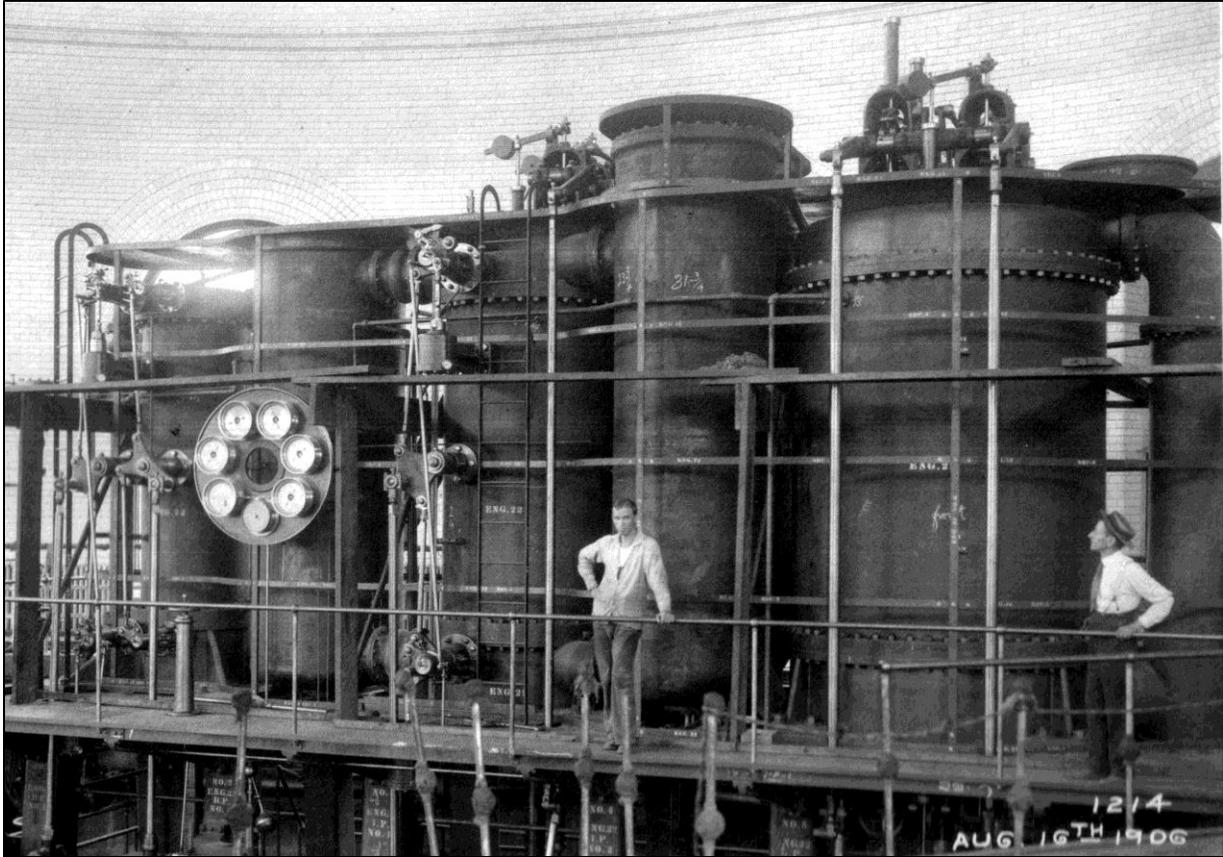
Richard Miller, 85, who retired as water works director in 1993 after 44 years, said one key feature of the state's enabling legislation required all revenues from the water works be reinvested in the system preventing the money from being siphoned off for other municipal uses.

The plans for a new pumping station touched off a decade long construction project to build a new Water system in California.

It began with a three-year effort to dig 1400-foot-long tunnel about 60 feet below the bottom of the river bed from the Kentucky side, where the channel was deepest to the site of the pumping station in California.

Remarkably, said Larry Moster, assistant treatment superintendent, the 7-foot diameter tunnel was dug has basically by hand using mules to remove the excavated rock and dirt. A key feature of the so-called "new works" were four, 103-foot high steam engines to pump water from the river. The steam engines, which were used until the system switched to electric power in the early 1960s, still sit idle in the California pump house and are believed to be the tallest ever built.

To assemble the engines, the water works installed a rail line from the city to California and installed a 30-ton rotating crane inside the pump house.



Construction in 1906 of the tallest steam engines ever built at Cincinnati Water Works California pumping station.

In 1909, the service area of the water system was approximately 50 square miles. With its newly constructed water treatment plant in full operation, the production capacity exceeded city demand and the city began selling its surplus water to customers outside the corporate city limits.

By the end of 1941, the system had expanded to serve a population in excess of 550,000 through 1,000 miles of water mains with an average daily production close to 70 million gallons a day.

After World War II, expansion continued as Cincinnati's suburbs grew. In 1955, the city and Hamilton County entered into a 30-year contract for water service to the unincorporated areas. In the early

1970s continued growth of the water service area led to creation of the Charles M. Bolton plant in Fairfield to pump and treat water from the Great Miami aquifer. Despite that, the Ohio River still represents almost 90 percent of the water system's capacity.

To trace the history of the Greater Cincinnati Water Works, the city has created a small museum at the Miller plant in California. For information on guided tours call the water works at 513-591-7700.

## **WATER WORKS TIMELINE**

**1839:** The City of Cincinnati purchases the privately owned Cincinnati Water Company for \$300,000, making it the first municipally owned water works in the State of Ohio.

**1896:** Cincinnati Water Works, (CWW) begins constructing a state-of-the art water treatment plant on the Ohio River, the site of today's Richard Miller Treatment Plant in Cincinnati. The design called for an intake near the Kentucky shoreline and a tunnel under the river.

**1907:** New treatment plant is operational and becomes the second rapid-sand filtration plant in the United States, boasting the four tallest steam pumps ever built.

**1928:** CWW pioneers powered activated carbon filtration.

**1940:** CWW provides water beyond city boundaries and into Hamilton County.

**1970s:** CWW constructs Charles M. Bolton Plant to produce water from the Great Miami Aquifer.

**1992:** CWW becomes the first utility in the world with a granular activated carbon system to capture organic impurities with an on-site furnaces to recycle the carbon for water treatment.

**2002:** To recognize the water works' regional growth, the name is changed to the Greater Cincinnati Water Works.

**2003:** System begins supplying water to the City of Florence and Boone County through a 3,000 foot long pipeline 30 feet under the river

**2010:** Water works breaks ground on its \$30 million ultraviolet-light treatment plant at the Miller plant scheduled to begin operating next year.

## **WATER WORKS MILESTONES.**

>> The first municipal water system established in Ohio in 1839 by an act of the state legislature.

>> In 1907 it became the second municipal water system to deploy a then-new technology called rapid sand filtration to more efficiently remove solids from the water as result of research conducted by George Warren Fuller, considered the father of modern water-sanitation, at the water system's Eden Park reservoir between 1898 and 1899. The impact of the new system was immediate. The number of cases of water-borne typhoid fever in the city dropped from nearly 2,.000 in 1906 to a couple hundred in 1908.

>> In 1928 the system pioneered the use of powder activated-carbon filtration to improve taste and eliminate odor from chlorine treatment and 20 years ago became the first water utility in the country to use granular activated carbon filtration with on-site furnaces to dean the carbon of pollutant rather than the more expensive process of replacing the carbon.

>> When the new ultraviolet-light treatment plant comes on line next year, the Greater Cincinnati Water Works will be the largest water utility in North American to use a three-step system of sand filtration, granular activated carbon and UV light to remove pollutants from its water supply.

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