

Three Rivers Water Filtration Plant

Fort Wayne's Three Rivers Filtration Plant treats, softens and filters drinking water to serve over 250,000 people in Fort Wayne and surrounding areas. Treated water is pumped out of the Plant and into Fort Wayne's water distribution system.

Plant Capacity: 72 MGD

Original Plant Completed: 1933

Capacity addition 1954

Capacity addition 1979

Lab addition 1993

Electrical generator addition 2006

High Service Pump Station 2007

UV disinfection 2012 - 2014



History

Fort Wayne's first water works was constructed in 1880 and the water supply came from deep wells. The original cost of the works was just over \$250,000. During the period between 1880 and 1930 the pipes carrying clean water were extended as the community grew. The late 1920's saw acute water shortages during the summer sprinkling season and there was general community discussion about the need for new water supply. By the early 1930's the capacity limitations of an underground water supply (wells) became more and more apparent. A 1930 engineering study indicated that the existing water wells had reached capacity and that drilling additional wells would not produce enough water to justify the cost.

The 1930 study also looked for other sources of a sustainable water supply. It determined that there were no small lakes in the area with enough of a watershed area to be able to consistently meet the needs of a growing industrial community. The study looked at using the Maumee River at or below Fort Wayne as a possible water supply. The Maumee River would have furnished a sufficient and consistent supply, but the quality of the water was questionable because the Maumee received much of the drainage – including sanitary sewage – from the City itself.

The St. Joseph and St. Marys Rivers were also considered as a raw water source. The St. Joseph was determined to be preferable as a water supply because it had a more steady flow and better water quality than the St. Marys.

In 1933, the original Three Rivers Water Filtration Plant was completed at the point where the St. Marys River and the St. Joseph River come together to form the Maumee River. The original Plant provided filtration and water softening facilities to treat 24 million gallons of water per day. The original Plant included a 20 million gallon finished water reservoir and a pump station that would send water out to homes and businesses. The construction was financed with a \$2.5 million bond issue.

The Plant was constructed on a 25 acre tract of land east of Spy Run Avenue. The site is historically significant and saw the passing of the prehistoric mound builders, native Americans including Iroquois, Shawnee and Miami, French trappers, British conquerors and finally the

American pioneer. Flags of France, Great Britain and the early United States flew from forts located within a gunshot's distance of today's Plant.

The site at the confluence of the rivers was chosen as the location for the Filtration Plant in 1931 for several reasons. The land was already owned by the City. Its central location made it easy to send water to all parts of the city from the Plant. Also because of its natural setting the site could be landscaped and made attractive.

The desire to make the Plant building a landmark carried through the planning and design phases. The building was designed in a gothic architectural style by the firm of Hoad, Decker, Shoecraft & Drury of Ann Arbor, Michigan and originally consisted of a central tower with wings extending from four sides. The exterior of the building was covered with Indiana limestone. Many of the corners feature carvings of events in the history of water, water related scenes or Indiana wildlife.

Other significant water utility facilities were completed concurrent with the Plant in 1933. The St. Joseph River Dam and Pumping Station was built across the St. Joseph River from what is now Johnny Appleseed Park – previously City Utilities Park. The dam creates an upstream reservoir where water is stored to supply City Utilities.

In 1954, an expansion of the original Plant doubled its capacity by adding facilities to provide complete treatment for another 24 million gallons of water per day (MGD). In 1979, ground was broken for yet another expansion. The 1979 expansion of the filtration and softening facilities added another 24 MGD of capacity to the Plant bringing its total ability to produce finished water to 72 MGD. The Cedarville Dam on the St. Joseph River at Cedarville was also completed as part of the 1979 project to create more on-stream water storage. The projects in 1979 were financed through an \$18 million bond issue.

Both the 1954 and 1979 expansions added complete separate treatment plants to the water treatment complex. The three individual plants can be run independently so that various portions of the total Plant may be taken off-line for routine maintenance or repair as needed. The various additions to the complex over the years were carefully designed to be in keeping with the Plant's original architecture and character.

In 1993 an addition to the Plant was built to house new water testing and analytical laboratories. The new laboratory addition provided more space and modern equipment for testing required by ever-increasing Federal regulations. Lab technicians test "raw" and "finished" water for more than 120 substances. Some tests are done continually; others are done daily, weekly, monthly or annually. Testing is done at hourly intervals within the Plant so that the treatment process can be adjusted as needed to meet changing raw water conditions. In addition, the Plant collects and



St. Joseph River Dam

tests water samples from various parts of the City everyday to make sure that it meets health and safety standards.



New electrical generator built in 2006

In 2005 and 2006, City Utilities invested \$4 million in a major electrical upgrade at the Plant including the construction of backup electrical generators capable of powering the entire Plant in the event of an electrical outage. Electrical upgrades throughout the Plant cleared the way for the next phase of improvements.

In 2007, the new high service pressure North Pump Station was constructed to send water from the Plant out to all parts of the City. It has four pumps, each capable of pumping 16 million gallons of water per day. The project replaces the original high pressure pump room

built in 1933 and increases the effective capacity of finished water storage. The design of the building and pumps allows space for two more pumps to be installed, one of which will be installed in year 2013 as part of the ultraviolet (UV) disinfection project. The original east pump building is being recycled and will soon house the new ultraviolet light disinfection system that is currently under construction and will be operational in 2014.

Treating the Water

Water flowing into the Three Rivers Filtration Plant is treated using a combination of physical and chemical processes. The first step in the treatment process involves the addition of ferric sulfate, lime, and carbon to the raw water. The chemicals are physically mixed into the water with large paddles. In this flocculation stage, the ferric sulfate causes the formation of sticky clumps in the water called “floc.” Soil particles and other materials in the water stick to the floc. During flocculation, the lime begins to soften the water and the carbon soaks up agricultural chemicals and helps to remove taste and odor. The water moves into settling tanks where the floc particles continue to grow and pick up the carbon. The clumps of floc eventually become so heavy that they settle to the bottom of the tanks. The water is then drained off from the top. Water goes through the flocculation and settling processes again, then receives a chemical treatment of chlorine and fluoride. The chlorine kills bacteria and germs. The added fluoride will remain in the water to aid in the prevention of tooth decay.

Finally the water flows into filters where it moves by gravity through several layers of filtering material. Because of a difference in electrical charges between the water particles and the filter material, the filter media attract and trap micro-organisms that are resistant to chlorine disinfection. The filters also trap and hold many of the remaining microscopic particles that cause the water to be cloudy. The



Settling basins on the south side of the Plant

cloudiness, or turbidity, of the water is a general indicator of water quality. It is measured in Nephelometric Turbidity Units, or NTU. The goal of the Plant is always to produce water with less than 0.1 NTU of turbidity. Federal regulations require that water be treated so that turbidity does not exceed 0.3 NTU.

An ultraviolet light (UV) disinfection process to be implemented in 2014 will increase protection against an intestinal parasite called *Cryptosporidium*. Although *Crypto* has never been found in Fort Wayne's drinking water, new federal regulations require that all water systems that receive their water from a river, lake or stream implement added precautions. Traditional chlorine disinfection does not kill *Crypto*, but filtration physically removes it from the water. Treating water using ultraviolet light deactivates *Cryptosporidium*, and will allow City Utilities to meet the high standards set by the US Environmental Protection Agency and Indiana Department of Environmental Management.

Following the treatment process, water is stored in an underground reservoir at the Plant until it is pumped into the pipes that carry it to customers in Fort Wayne and vicinity.