



WAUSAU WATERWORKS

FOR YOU!

Volume 13, No. 3

Special Anniversary Edition

1885 **Celebrating 125 Years
of Excellence!** 2010



Wausau Water Works' first water distribution system was powered by a steam plant built in 1885 which housed the Holly steam engine.

-- Photo courtesy of Marathon County Historical Society

125 Years - We've Come a Long Way!

We've come a long way since building the steam plant back in 1885. Our processes have changed tremendously since those early days, but one thing hasn't, our commitment to providing quality drinking water and wastewater treatment to the residents of the City of Wausau. September 22nd and 23rd are the dates to commemorate the 125th Anniversary of Wausau Water Works. We invite you to join us for the special anniversary celebration festivities that will kick off on Wednesday, September 22, 2010 at 12:30 p.m. at the Water Treatment Plant, 1801 N. River Drive. Along with a number of guest speakers, refreshments will be served and Wausau Water Works customers will have an opportunity to register for a drawing for a \$125.00 credit on their utility bill, as well as other prizes. Tours of the water plant will be conducted between 1 p.m. and 6 p.m.

Tours of the Wastewater Treatment Plant will be held on **Thursday, September 23rd** also from 1 p.m.-6 p.m. The Wastewater Treatment Plant is located at 435 Adrian Street. Maps showing directions to the open house events are shown on page 8. We hope you will join us in celebrating 125 Years of Excellence!

125th Anniversary Celebration

Schedule of Events

Wednesday, September 22
12:30 p.m.

Wausau Water Treatment Plant
1801 North River Drive

Welcome: Mayor Tipple

Guest Speaker: Nancy Quirk
Chair, Wisconsin Water Association

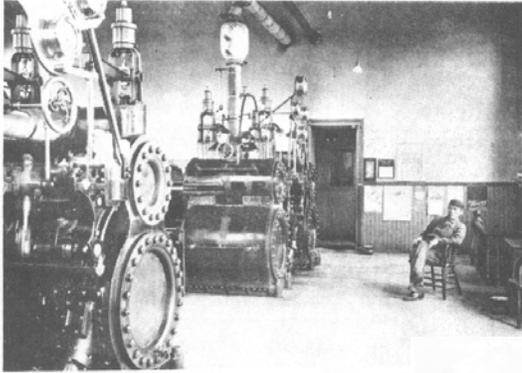
Guest Speaker: Donna Seidel
*Representative 85th Assembly
District*

Guest Speaker: Ken Blomberg
*Executive Director, Wisconsin Rural
Water Association*

**Introduction of Wausau Water
Works Commission, employees
and retirees:** Director Brad
Marquardt

Refreshments and tours to follow

In the Beginning...



One hundred and twenty-five years ago, the City of Wausau found it necessary to establish a public water works. Thus, in 1885, Wausau Water Works was founded. Land was secured just north of Bridge Street along the Wisconsin River and was the original site of the first well and pumping station. The supply well was forty feet in diameter and was thirty-two feet deep. The pumping station consisted of boilers and two steam-driven pumps. The Holly pumps, as they were called, had a rated capacity of 2,100 gpm each. The boilers were fired with "hog feed" which at that time was terminology for wood chips and sawdust. The total cost of 10 miles of water mains, 100 hydrants, two pumps, one boiler, one supply well, and a storage building amounted to \$115,175.

In 1905 efforts were made to secure an additional water supply. A supply line was constructed to the Wisconsin River.

To protect the intake and filter the river water, a wooden crib was built. Shortly after the system was put into operation, it was learned that the river water was not fit for human consumption. The system was taken

out of operation and was used only for emergencies. The filtering crib still can be seen in the river bed during low flow periods.

Between 1910 and 1912, major improvements were made to the water supply system and pumping equipment. In an effort to solve water quality and supply problems, numerous deep wells were dug. The new



wells supplied water to the original well which acted as a reservoir. Snow steam pumps were also installed at this time to increase the pumping capacity to 6 million gallons per day (mgd).

Due to the hilly terrain, distribution of water around the City of Wausau always posed a problem. Thus, in the early 1900s, a tower and booster station were constructed to solve pressure problems on the east hill. In 1954, the original stone tower was replaced with a 75,000 gallon steel tower. The tower was located at McClellan and 14th Streets.

In the mid 20s, it became apparent that the present water quality and supply was not adequate to meet the demands of the City. Over the years, relatively high concentrations of iron and manganese had

caused water main capacity problems due to deposition. Studies were conducted to evaluate the feasibility of a treatment facility to improve water quality. If by treatment the water quality could be improved, the

present supply system could continue to be adequate to meet quantity needs. Thus, in 1927, a 5.5 mgd rapid sand filter plant was constructed at a cost of approximately \$80,000. It was the third of its type built in the state. The plant was designed and built under the direction of W.G. Kirschoffer, consultant and hydraulic engineer, Madison, Wisconsin.

In 1933-34, chlorination of water was started for disinfectant purposes.

In 1951, three wells were drilled on the west side of the river to resolve water supply problems. The water from the wells was of good quality and thus was pumped directly into the distribution system. To further reduce water supply problems, in 1959, a 2.5 million gallon ground reservoir was constructed. The reservoir was located on the west hill near the intersection of Elm Street and 12th Avenue.

Between 1961 and 1964, the Water Utility completed major improvements. This included a new water treatment plant, additional supply wells, a raw water line across the river and numerous distribution improvements. The entire project cost approximately \$1,750,000.

In 1995, automation of the water plant was completed which eliminated the need to have 24 hour staffing/7 days per week. Staffing needs were reduced to 8 hours per day, with minimal attendance on weekends for lab work.

In 2001, a major upgrade to the water plant was completed which added the south plant as a mirror image of the north plant, eliminating the need for annual shut down for cleaning purposes. New chemical storage facilities also eliminated safety

(continued on page 3)



In the Beginning...

(Continued from page 2)

concerns, and the treatment process was changed from chlorine gas to chloramines, which also enhanced the quality of the water. The project costs were approximately \$5 million.

This brings us to our present day facilities which are still located on the original site of the first well and pumping station, just north of Bridge Street along the Wisconsin River.

Wausau's first

sewers were combination sanitary and storm lines. Since sewage and storm drainage were both disposed of by direct discharge into the Wisconsin River, it was convenient and acceptable to use the sewer system as a combined system. However, at times of heavy rainfall, the combined sewer system became surcharged, thus causing severe basement flooding in the plateau areas.

Additionally, in the 1930s, it became apparent that the water quality of the Wisconsin River had become polluted to the point that it posed a serious public health threat. The river could no longer assimilate the enormous load of raw sewage that it was receiving. This prompted Wausau to start a program of separation of sewers and to direct the sanitary sewers to a common point at which a sewage disposal plant would treat sanitary waste.

Thus, a major public works project started in 1939 under the direction of Jerry Donohue Engineering Co, Sheboygan, WI. The project included seven miles of sanitary sewers, four

miles of storm sewers and a sewage disposal plant. The cost of this project was approximately 1.5 million dollars.

The sewage disposal plant was completed and put into service July 29, 1940. The plant was designed to treat 4.5 mgd. The intent of the plant was to remove objectionable material which would either float or settle out of the water. The treated water was then discharged into the Wisconsin



River. The sludge or residue that remained behind was anaerobically digested and rendered stable.

In the mid-forties, Schofield was also faced with the problem

of sewage treatment. After a thorough cost study of the alternatives, Schofield elected to enter into a contract with the City of Wausau for treatment of their municipal waste.

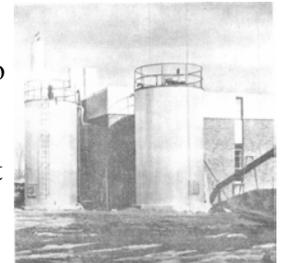
After World War II, the Town of Stettin, which adjoins the City of Wausau, experienced rapid growth. It soon became apparent to the Town of Stettin that the private septic systems were failing and were creating a public health menace. After the State Board of Health reviewed the problem, orders were issued for specific residential areas of Stettin to construct sewers to discharge the sewage to Wausau for treatment. Thus, in the late 1950s, Wausau was receiving waste from



the Town of Stettin for treatment. During the 1960s, there had been a growing awareness of the problems created by water pollution and an

increasing demand for cleaner waters. This resulted in a concerted effort by various government agencies to reduce the pollution loads to the state waters. As part of that effort, the Wisconsin State Board of Health and the Committee on Water Pollution conducted studies of the Wisconsin River and issued various orders to curb pollution. One such order, #3-65J-9 issued July 28, 1965, was received by the City of Wausau. In 1966, the City of Wausau contracted with Becher-Hoppe Engineers, Inc., of Schofield, WI to make appropriate recommendations to meet the order. As a result of those recommendations, Wausau began a major public works project to improve the storm and sanitary collection system, and expand the present primary treatment facilities into a modern, up-to-date secondary treatment facility.

In the late 1960s, the secondary treatment plant was completed, along with the necessary improvements to the collection system. The total project cost was approximately \$2.9 million.



Another major renovation was completed in 1991 which automated the treatment plant, eliminating the need for 24 hour, 7 day a week monitoring. A state of the art ultra-violet disinfection system was also installed. Total project costs exceeded \$13 million.

Photos on the top of page 2 show the 1885 Holly pump used to pump water into the distribution system, and construction of the boiler plant in 1909. Bottom photo shows laying of water mains during the early 1900s. Page 3, top photo, is of the installation of the first sewer mains. Photo at bottom of column one is the construction of the 1939 wastewater plant. Photo in column three is the 1970 Zimpro plant.

Who We Are, and What We Do

We'd like to introduce ourselves, and give you a little background on what we do on a day to day basis. 25 years ago, when we celebrated our 100th Anniversary, we had a staff of 49 employees. Since that time, through automation of our plant processes and meter reading, we have reduced our staff to 27. Several of these employees also serve in multiple capacities for the utility and the City.

Administrative Staff and Utility Commission



Administrative duties for the Water Works are performed by Brad Marquardt (left), Director of Public Works and Utilities, and Dave Erickson, Utilities Coordinator/ Environmental Engineer. Both Brad and Dave oversee the daily operations of Wausau Water Works as well as performing other duties for the City of Wausau.

The Utility is managed by the Wausau Water Works Commission which is composed of Mayor Jim Tipple, Commission President; Councilman Edward Gale, Secretary; and three lay persons from the community, L.S. (Sam) Rebman, Roger Otto and George Million, who serve five year terms. Deb Geier serves as Recording Secretary. The Commission typically meets the first Tuesday of each month at 1:30 p.m.



Water Treatment Plant



Operations of the Water Treatment Plant are handled by a crew of four individuals. Shown in the photo above is (L-R) Kevin Behnke, Maintenance Mechanic; Dick Boers, Water Superintendent; Ryan Nesbitt, Certified Water Plant Operator; Tim Mesalk, Maintenance Mechanic/ Relief Plant Operator. The water plant treats an average of 5 million gallons of drinking water daily, with peak flows of approximately 8 million gallons. They ensure a safe, continuous supply of quality drinking water taking over 10,000 water samples annually, performing maintenance at 7 booster stations, 6 well houses, 3 water reservoirs and 2 elevated water tanks, in addition to the operation of the water treatment plant. The mechanics are also responsible for the utility fleet repairs.

Meter Reading

Tom Stieber, meter reader, reads over 5,000 water meters monthly. By automating the meter reading process, what used to take 2-3 employees approximately 10-14 days per month is now done in approximately 4 hours through the use of a drive-by radio read system. When not reading, Tom exchanges meters and performs final readings.



Water Distribution/Metering



When a water main breaks on the coldest, most blustery day of the year, these are the guys who are on duty to make sure water is back on as quickly as possible. The Distribution/Metering division, shown above, consists of (back row, L-R) Eric Smith, John Motl, Crew Chief; John Dupius, Chad Marten, Harold Ferge, Rick Dorn, Bob Thompson, Assistant Water Superintendent; (front L-R) Shannon Lane and Scott Boers. Along with maintaining over 230 miles of water mains, they also ensure that over 1,600 water hydrants are in top operating condition. As a construction crew, they also install and maintain 16,000 water service laterals, maintain and exercise 6,000 valves, as well as exchanging water meters, performing leak detection services, final readings and customer service calls for approximately 16,000 customers.



Wastewater Treatment Plant



Operations of the Wastewater Treatment Plant are performed by a five man crew of mechanics and one supervisor, consisting of (back L-R) Brad Wendtland, Mark Hilgendorf, Tom Blaschka, (front L-R) John Rick, Wastewater Supervisor; Pat VanOuse and Roy Kressman. The wastewater plant treats an average of 4.5 mgd of sewage from the City of Wausau, City of Schofield and a portion of the Town of Stettin. Along with the daily operations of the wastewater plant the crews are also responsible for the spreading of *Black Gold*, a nutrient rich biosolid that is produced as a by-product of the treatment process. The *Black Gold* is recycled onto DNR approved farm acreage. The mechanics are also responsible for the maintenance of 25 sewage lift stations.

Sewer Collection



Before the sewage from homes and business can reach the wastewater plant, it goes through a system of sewer mains which are maintained by the Sewer Collection Crew. Members of the crew, shown above, include (L-R) : John Rick, Waste-

water Supervisor; Ken Rye, Crew Chief; Mark Sowinski, Kevin Hertel, Ric Frahm and Matt Baker. The Sewer Collection Crew maintains approximately 250 miles of mains by televising, jetting and flushing the mains. They also respond to sewer backup calls by assisting with clean up and disposal.

Customer Service



When a customer has a question about their water or sewer bill or needs to schedule an appointment for a final reading or other service, it's the City of Wausau Customer Service team that helps you with this service. Members of the team shown above are (back L-R) Deb Geier, Terry Larsen, Mary Goede, (front L-R) Shanna Hansen, Irene Peters and Mary Foss. Under the direction of the Finance Department, Terry Larsen, Utilities Billing Coordinator, is primarily responsible for reviewing meter readings and generating bills for over 5,000 customers each month. Although bills are generated on a quarterly basis, one-third of the City is billed each month. Deb Geier, Administrative Assistant, oversees the utility billing functions as well as maintaining responsibility for the day-to-day financial operations of the utility including budget preparation and annual reporting to the Public Service Commission, along with the utility commission and preparation of this newsletter.

And the Winners ...

Wausau Water Works has a long history of receiving awards both for the Utility and by the employees. Among those receiving awards were Joe Gehin who received the Leon Smith Award in 1989, the George Warren Fuller Award in 1995, and was also recognized as the Public Employee of the Year by the Wausau Area Chamber of Commerce in 2001. Dick Boers was recognized in 1987 with the Wisconsin Water Association's Operator Meritorious Award. Jim Riege and Gus Strehlo were each recognized by the Wisconsin Wastewater Operator's Association as Operator of the Year. Wausau Water Works also received a Utility Achievement Award in 2000 from the Wisconsin Water Association for their involvement with the Area Water Utilities, and has also been recognized three times as having the Best Newsletter, in the large utility category, by the Wisconsin Rural Water Association. And, in 2010 they were honored with an Utility Achievement Award from the Wisconsin Water Association for their showcase video that was created in part in recognition of their 125th Anniversary. This video can be viewed on the City's website at: www.ci.wausau.wi.us.

Heroes Among Us

Martin Fenske and Gordon Zinkowich were each recognized with Heroism Awards by the American Water Works Association. Fenske was recognized in 1967 and Zinkowich in 1991. Both gentlemen risked their lives by diving into the Wisconsin River to save the life of another individual. In Fenske's case, it was a 6-year old girl who had fallen into the river during spring breakup, and in Zinkowich's case, he and another City employee, Bob Ashe, rescued a woman who had jumped from the Bridge St. bridge.



The Treatment Story

As you've already read, Wausau Water Works was founded in 1885. The original public water supply was from a dug well, 35 feet in diameter and 31 feet deep, located on the east bank of the Wisconsin River. The original public water system consisted of two steam pumps, one boiler, ten miles of watermain and 100 hydrants. Between 1906 and 1924, 15 additional wells were driven in areas to the west and south of the original well and pumping station. The combined capacity of all 16 wells was approximately five million gallons per day. In 1927, a rapid sand filtration plant was constructed, primarily for iron and manganese removal. In 1933, chlorination of the water was initiated for disinfectant purposes. Fluoride was added in 1952. In 1964, the Water Works completed the construction of a new water filtration treatment plant (north plant) at the site of the first dug well and a pumping station. In 2001, the first stage of a mirror image (south plant) of the existing facilities was completed with the addition of gravity aerators, chemical feed facilities and clarification.

The primary purpose of treatment of the wells is for iron and manganese removal. In addition, two wells are treated to reduce volatile organic compound concentrations. The treatment goal is an iron concentration less than 0.3 mg/l and manganese concentrate less than 0.05 mg/l. The treatment facility has been treating iron to a concentration of less than 0.02 mg/l and manganese to non-detect limits.

The present water supply system consists of a 9 mgd water treatment plant, six gravel-packed wells, 4.5 million gallon distribution system storage and over 230 miles of watermain. Wausau Water Works pumps 1.8 billion gallons of water

per year and serves close to 16,000 general customers as well as the Village of Brokaw.

Water Treatment Process Aerators



Aerators consist of aluminum tray units, aerated by gravity splashing and rated at 4 mgd each. These units may assist in the oxidation of iron and manganese, but their

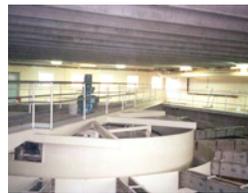
primary function is the removal of carbon dioxide.

Lime Feeder

When the pH of the water is raised to 10.0, the dissolved iron and manganese become solid particles and can settle by gravity out of the water. Lime is added at a dosing rate of 55 mg/l to raise the pH.

Upflow Solids Contact Clarifier

The upflow solids contact clarifier is a square unit seventy feet wide with a surface area of 4,900 square feet. The unit has a maximum water depth of 15.5 feet and a volume of 568,106 gallons. This provides a detention time of 91 minutes and a rise rate of 1.42 gallons per minute per square foot at 9 mgd flow rate.



Recarbonation Basin

The recarbonation basin has a maximum water depth of 10 feet and a volume of 36,500 gallons, providing a detention time at 9 mgd of 5.35 minutes. The basin is equipped with a submerged carbon dioxide diffuser to lower the pH to 8.5.

Filters

The existing four filters are 36.5 feet long by 21.5 feet wide. Filters are provided with fiberglass wash

troughs and rotary type surface wash equipment. Filter media consist of 12 inches of



gravel and 27 inches of crushed quartz. Operating at 9 mgd, the plant has a filter loading of 2.0 gallons per minute per square foot.

Backwash Equipment

The filters are equipped with duplicate backwash pumps drawing from the clear well, each rated at 12,000 gallons per minute. This provides a maximum backwash rate of 15.3 gallons per minute per square foot.

Clear Well

A one million gallon capacity clear well is located beneath the filters, pipe gallery, and pump room. The clear well is baffled to prevent the accumulation of an area of stagnant water due to short circuiting.

High Service Pumps

The high service pumping equipment consists of vertical turbine pumps, including one 1,200 gpm, two 2,400 gpm, and one 4,200



gpm pump is equipped with a diesel fueled auxiliary engine. The high service pumps draw

water from the clear well and pump to the water distribution system.

Chemical Feeders

Chemical feeders are provided to feed lime, liquid alum, activated silica, sodium silico-fluoride, chlorine and ammonia. Alum, lime and activated silica are applied in the clarifier. The chlorine and ammonia form a potent disinfection compound called chloramines. The chloramines are added to the clear well.

Wastewater Plant

The first system of sewers was installed in the early 1900s. Since there was no treatment, sewage flowed directly to the Wisconsin River. In 1940, a primary treatment plant was built which was the first step to remove pollutants. Recognizing the need to further enhance treatment in 1970, a secondary treatment system was constructed which removed 85-90% of the pollutants. In the mid 1980s, the DNR established Waste Load Allocation Limits for the major pulp and paper industries and the Wausau wastewater treatment facilities. The more stringent effluent limits required plant upgrading that was completed in 1991. The 1991 upgrade is still in operation today.

Wastewater Treatment Process Bar Screens

Raw wastewater flows in a 48 inch diameter sewer passing through two mechanically cleaned bar screens to the wet well. The screened debris is conveyed to a dumpster for disposal at the landfill.

Raw Wastewater Pumps

Four pumps remove the wastewater from the wet well and discharge it through a 36 inch diameter pipe to the grit removal system. Each pump has a 9,500 gpm capacity and is driven by a 100 hp motor. The combined capacity is 35.8 mgd.

Grit Removal System

Grit removal is provided by a forced vortex in conjunction with gravity in an 18 foot diameter tank to force the grit (coarse to fine sand and debris) to fall into a hopper at the bottom of the tank. Air is used to scour the grit and lift it from the hopper to a dewatering screw which discharges to a dumpster for disposal at the landfill. The grit removal area includes a 3 foot partial flume for flow measurement.

Primary Clarifiers

Four clarifiers allow gravity settling and removal of 50% of the organic solids and 30% of the BOD. Each tank is 80 foot diameter and has a 10 foot water depth. The settled solids (primary sludge) are pumped to the anaerobic digestion process. Floating material called scum is pumped to a rotating drum screen which discharges to a dumpster.



Aeration Basins

Treated wastewater from the primary clarifier flows to six basins which begin the secondary treatment process, called activated sludge. Micro-organisms consume the organics in the wastewater. Fine bubble diffusers disperse air for the aerobic bacteria and also provide mixing. Each basin is 136 feet long by 30 feet wide with 15 foot water depth. The wastewater is retained in the basins for about 8 hours during normal conditions.



Air Supply

The air to the aeration basis is supplied by three air blowers, each rated for 5,500 cfm. One blower is driven by a 300 hp electric motor; two blowers are driven by gas-fueled engines. The engine fuel will normally be methane digester gas with natural gas as a backup supply.



Final Clarifiers

The wastewater from the aeration tanks enter three clarifiers. Two

tanks, constructed in 1970, are 90 foot diameter with 10 foot water depth. The third tank is 110 foot diameter with a 13 foot water depth. The biological mass in the wastewater settles and is withdrawn through suction-type collectors by three return activated sludge pumps. Each pump is rated for 2,400 gpm with variable-control paced proportional to raw wastewater flow. Excess biological growth mass is pumped to the waste sludge thickening process by two waste activated sludge pumps.

Filtration

Filtration is necessary to remove suspended solids and BOD to meet tertiary effluent standards during low river flows in hot, dry weather.



Two 3,000 gpm effluent pumps lift the wastewater to the filters. The design flow is 8.2 mgd. Each filter basin is 10 foot wide by 25 foot long and operates at a filtration rate of 4.56 gpm per square foot. The backwash wastewater is returned to the aeration tanks.

Disinfection

Disinfection is accomplished by ultraviolet radiation. Fecal coliform concentrations are to be less than 400 colonies per 100 milliliters. Disinfection is required from May through September. The effluent from the disinfection facilities flows to the Wisconsin River by a submerged pipe.



Anaerobic Digestion Tanks

The primary clarifier and secondary clarifier sludges are stabilized in an

(Continued on Page 8)

Anaerobic Digestion Tanks --
(Continued from Page 7)

anaerobic digester by biological organisms. The process reduces volatile solids by 40% and the process generates methane gas. Two primary anaerobic digestion tanks and two secondary anaerobic digestion tanks are interconnected to a building which houses pumps, piping, gas safety devices, gas compressors and monitoring/control instruments for the digestion process. Two tanks, each 60 foot diameter by 20 foot water depth, provide a 25 day retention of the primary sludge and thickened waste activated sludge. The primary anaerobic digestion tanks are heated to 90° F with an internal heating system. Contents are mixed by methane gas compressors.



Tour Directions

The maps below show directions to the Water Treatment Plant, 1801 N. River Drive and the Wastewater Treatment Plant at 435 Adrian Street. Signs will be posted on the day of the respective tour.



Special Thanks are extended to Becher Hoppe Associates, Marathon County Historical Society and the Wisconsin Wastewater Operators Association for their contributions of articles and photos for this special anniversary edition newsletter.

125th Anniversary Celebration
 Water Plant Tours - Wednesday, September 22
 Wastewater Plant Tours - Thursday, September 23

