

# CITY OF WOOSTER UTILITIES DIVISION

## ANNUAL REPORT FOR YEAR 2014

*Prepared by*

**Kevin P. Givins**  
Utilities Manager

*Contributions from*  
**Robert King**  
Water Treatment Supervisor

**Steve Carathers**  
Wastewater Treatment Supervisor

**Milan Steiner**  
Distribution/Collection/Meters Supervisor

**Michael Schultz**  
Laboratory Technician

**Adam Wilford**  
Pretreatment Coordinator

March 1<sup>st</sup>, 2015

## EXECUTIVE SUMMARY

The most significant events for the Utilities Division during 2014 were the initiation of the Quasar Energy project and the introduction of a new method of finding water main leaks in the City's distribution system. The addition of Quasar's 1.1 megawatt generator to the Water Resources Recovery and Bioenergy Facility produced over **5,900,000 kilowatts** of power using waste from city sewage and third party substrates that would have been disposed in a sanitary landfill. *That's enough electric to power over 550 homes for a year!* The plant's AEP electric cost for the year was reduced by **\$246,257** from the previous year. The City's Distribution Crew in conjunction with Underground Utilities Inc. used specialized flow and level sensors along with system isolation to find water loss in the Low Pressure Zone. This investigation resulted in locating a 100,000+ gallon per day leak in a section of line under the Dix Expressway. Standard sonic testing would not have been able to find this leak.

In total, the WPCP treated 1.685 billion gallons of wastewater in 2014 with the average daily flow being 4.618 million gallons per day and receiving a peak daily flow of 17.67 million gallons on April 30, 2014. This is an increase of 7 million gallons over 2013. In addition, the plant treated 2.99 million pounds of biological oxygen demanding (BOD) substances and 3.64 million pounds of suspended solids from the wastewater.

The Water Plant produced a total of 1.197 billion gallons of potable water in 2014. This total is a decrease of 115 million gallons from 2013. The average daily production was 3.28 million gallons with a peak of 4.06 million gallons on February 14th. The average per capita usage was 123 gallons per day based on the current population estimate of 26,619. Production costs for chemicals alone totaled \$231.55/Million Gallons (MG) of water produced; however, total plant expenses (minus capital improvements) put the cost at \$1,693/MG produced.

Unaccounted water losses showed moderate improvement during the year. In 2014, 36% of the water treated and pumped from the plant was not billed to an account (down from 42% in 2013). These losses are attributed to distribution line losses (main leaks), service leaks, unmetered accounts, unauthorized use and meter inefficiency. In 2014, the entire system was leak surveyed twice and 36 main leaks were identified and repaired. Two of these main leaks were on large transmission lines in remote areas of the system. The impact of these repairs has shown an immediate return as the plant production has been lower than in previous months.

### Water Resources Recovery Facility

#### SUMMARY

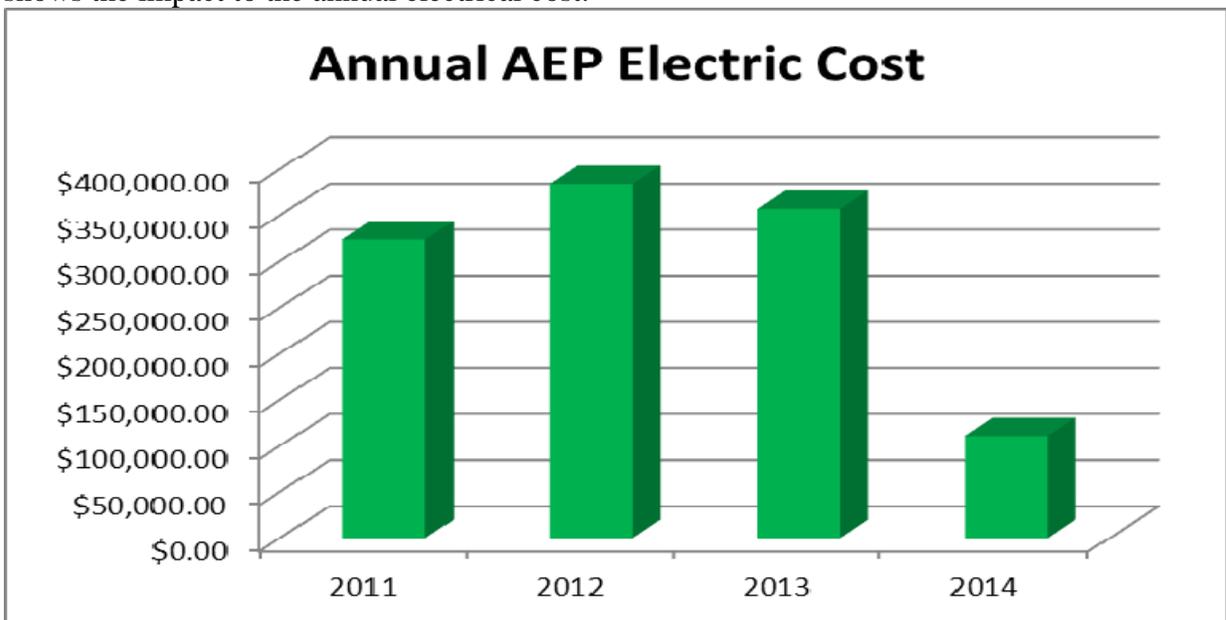
#### TREATMENT OPERATIONS

2014 marked the first full year of operation of the Quasar Energy Project in the newly (and aptly) renamed "Water Resource Recovery and Bioenergy Facility". The industry trend is to remove the words "sewage" and "pollution" from the title of these plants and highlight the function they perform. The plant experienced a few effluent violations mostly due to learning the balance of the return flow from Quasar's equipment. Quasar has shown a high level of commitment to address our concerns and constantly strives to work together with the City to eliminate operational problems. As Quasar continues to innovate their systems, the minor effluent problems should gradually be reduced.

## City of Wooster Water Resources Recovery and Bioenergy Facility



The 1.1 megawatt cogeneration system installed as part of the 2013 agreement with Quasar performed well throughout the year. The facility's annual cost to the electric supplier, AEP, was reduced by \$246,257 from 2013. August's \$315 invoice proved to be the most substantial monthly reduction, down from August 2013's \$30,961 bill. The following chart shows the impact to the annual electrical cost.

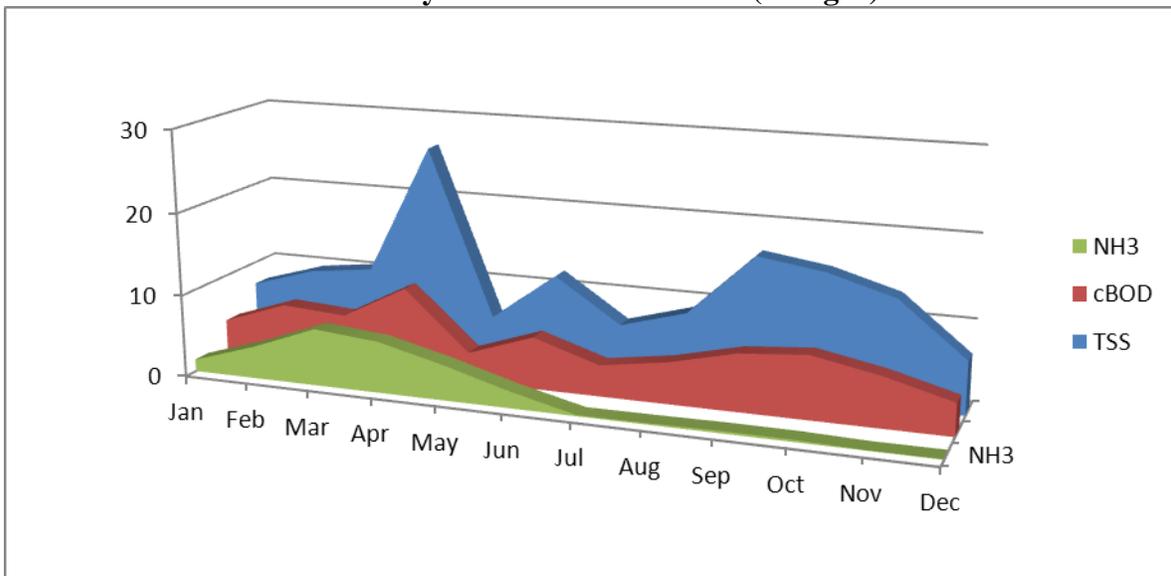


The “wet stream improvements” recommended in the 2012 URS Plant Evaluation Report, have been bid and a contract awarded to Kirk Brothers Construction. Groundbreaking should begin in the Spring of 2015 as weather permits. The improvements to the aeration system, SCADA control, septage receiving and a winter bypass should be completed by the end of 2016.

In total, the WPCP treated a total of 1.685 billion gallons of wastewater with the average daily flow being 4.616 million gallons per day receiving a peak daily flow of 17.67 million gallons on April 30, 2014. This represents a total increase of 142 million gallons over 2012. In addition, the plant removed 2.99 million pounds (design is 5.02 million pounds) of biological oxygen demanding (BOD) substances and 3.64 million pounds (design is 3.65 million pounds) of suspended solids from the wastewater. The flow design of the facility is for 7.5 million gallons per day with a hydraulic maximum of 27 million gallons.

In contrast to the wastewater treated at this facility, the Water Treatment Plant produced on average 3.28 million gallons per day. The reasons for this obvious disparity of 1.33 million gallons per day between water produced and wastewater treated in 2014 is attributed to a combination of precipitation entering the WPCP through the combined sewer system, collection system infiltration and un-metered sources. The infiltration component of this disparity continues to be actively addressed. The Utility and Engineering Divisions jointly continue to pursue the implementation of a sewer separation program. Un-metered sources are being identified and metered as part of the continuing meter upgrade program; however, some areas of the system (i.e. Killbuck South sewer district and some areas in Madisonburg) will not be metered as they are sewer only accounts and receive a flat rate billing.

**Monthly Final Effluent Results (in mg/L)**

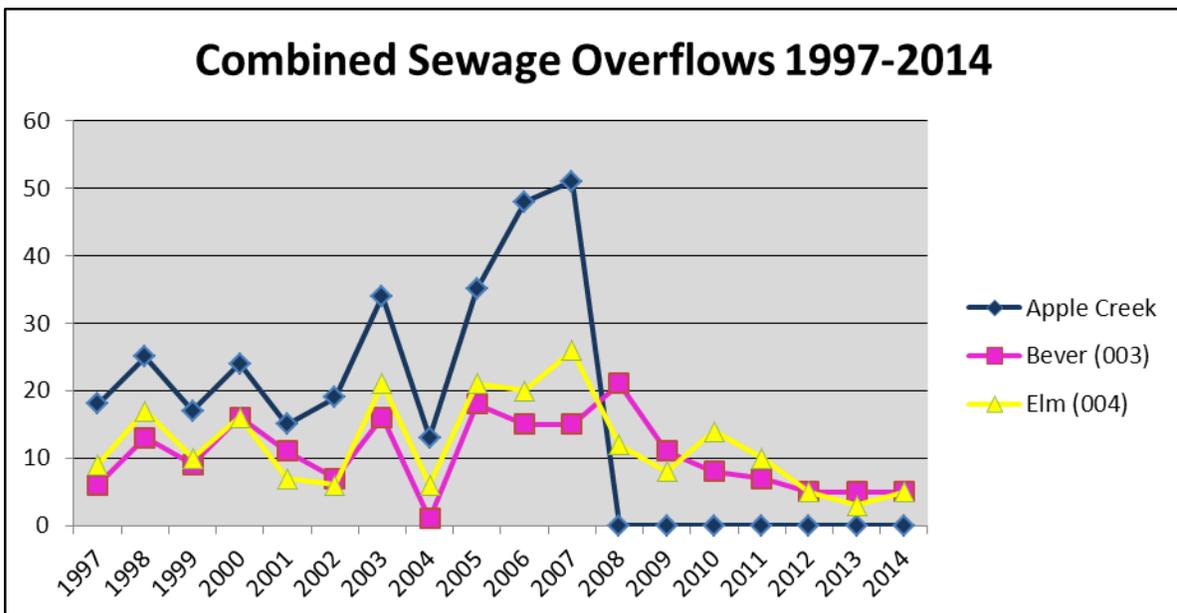


The typical strength of wastewater is calculated in relationship to three basic attributes, Carbonaceous Biochemical Oxygen Demand (CBOD), Suspended Solids (SS) and Ammonia (NH3). An additional indication of wastewater strength, Chemical Oxygen Demand (COD) is used primarily at our industrial users due to the repeatability and speed in which information can be derived by testing. The average daily strength of the wastewater treated at this facility in calendar year 2014 was 7,445 pounds of CBOD, 9,150 pounds of TSS and 504 pounds of NH3. When comparing to the design of the facility, the plant is operating at 50% CBOD loading, 91% TSS loading and 58% Ammonia loading.

WPCP cost per million gallons of treated wastewater in 2014 was \$727 for O&M and the total cost of WPCP operations and personnel was \$1,221/MG.

Given that based on design criteria, a person contributes 0.167 lbs of BOD and 0.2 pounds of SS per day. Looking at 7,445 lbs per day influent BOD and 9,150 pounds per day of TSS load to the plant, the plant is treating the equivalent waste stream of 44,580 people for BOD and 45,750 people for TSS.

The ongoing sanitary/storm water separation projects continue to show improvement on controlling surface water from entering the City collection system and overloading the hydraulic capacity of the treatment plant. The combined sewer overflow structures that allow raw wastewater to enter the Apple Creek were activated 10 times during 6 separate storm events in 2014. That total represents a steady decline since the plant redesign in 2007. As part of the City's long term control plan, the goal is to only activate the overflows when a 5-year storm event occurs.



## INDUSTRIAL PRETREATMENT / BIOSOLIDS PROGRAM

The City of Wooster's Sewer Use Ordinance and Enforcement Response Guide provide the legal authority to enforce the OEPA approved pretreatment program of the city as well as USA EPA regulations

A conscious effort is made through training and the Internet to keep current with rule changes pertaining to pretreatment, and modification requests will be submitted for EPA approval, when deemed necessary.

Pretreatment operating procedures in place are adequate and followed to meet program goals. All sampling and reporting requirements were met in this pretreatment year. New pretreatment permits have been issued in accordance with the Pretreatment Section of the NPDES permit issued in 2013.

All industrial users that meet the criteria, as established by the EPA, of a Categorical Industrial User (CIU) or Significant Industrial User (SIU) are monitored for compliance with categorical and/or local limits for conservative and conventional pollutants. In addition, additional sampling is done to insure non-domestic wastewater dischargers are in compliance with local limits. Currently the city has two permitted CIU's and two SIU's and monitors other non-significant dischargers for compliance.

In addition to quarterly compliance sampling, several industrial users discharging higher than normal conventional pollutants are sampled weekly for Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS). The analytical results of those samplings are averaged for each month and a sewer surcharge for high strength waste is billed accordingly.

This year The City of Wooster published two Significant Industrial User (EnviroClean & ArtiFlex) and one Non-Significant Industrial User (Buckeye Container)for discharge violations.

The City of Wooster Pretreatment Program is financed through the city sewer fund. No financing problems were experienced in this pretreatment year or are anticipated for the next pretreatment year.

The City of Wooster experienced no spills, interferences or pass through of toxins directly attributable to industrial discharges.

All U. S. and Ohio EPA sampling and reporting requirements for the City of Wooster's biosolids program were met in 2014.

### Special WPCP Projects Completed in 2014

- ❖ Refurbished the membrane roofs on the Administration and Blower Buildings.
- ❖ Generated an additional \$57,604 dollars in revenue from septage receiving in 2014.
- ❖ Held multiple training sessions for water and wastewater CEUs for Wooster Staff and other outside groups.
- ❖ Wet stream improvement project was bid and awarded to Kirk Brothers Construction.
- ❖ Rebuilt internal recycle and RAS pumps
- ❖ Replaced pump control system at Deer Creek Lift Station.
- ❖ Finalized proposal to run electric line from WRRF to WTP and take advantage of the excess power produced from Quasar project.
- ❖ Held a public open house to introduce the Quasar/Wooster public private partnership. 250 people attended including local dignitaries and a representative from the Federal USDA.
- ❖ Filled vacant Assistant Operator and Lab Technician positions.

**WATER POLLUTION CONTROL PLANT  
EMPLOYEE ROSTER as of 1/1/15  
(Certification level)**

**MANAGEMENT:**

Utilities Manager

Kevin Givins (WW III)

Plant Supervisor

Steve Carathers (WW IV)

**LABORATORY TECHNICIANS:**

Michael Shultz (WW III)

DJ Reichert (WWIII)

**PRETREATMENT/BIOSOLIDS COORD.:**

Adam Wilford (WW III)

**OPERATORS:**

Benjamin Martin (WW I)

Rick Shilling (WW I)

Adam Wilford (WW III)

Cody Bower (WWI)

Rory Reed

**ASSISTANT OPERATOR**

Vacant

**PLANT MECHANICS (shared with WTP):**

Ray Windsor (WWII)

Chad Frank (WW II)

**ACCOUNT CLERK (shared with PPMD):**

Janell Cooper

## **Water Pollution Control Plant Goals and Objectives for 2015**

- **Maintain Compliance with NPDES Permit**
  - Add additional SCADA monitoring, control and reliability as part of upcoming construction project
  - Increase treatment capacity, aeration and scum removal with URS wet stream improvements
  - Modify process flows to improve ammonia/nitrogen treatment
  - Consolidate electrical systems of WWRF & WTP
  - Clean Bever St. and Elm St. Swirl concentrators
  - Reduce permit exceedances to zero
  - Improve warning/alarm system within control network
  
- **Continue Staff Training and Professional Development**
  - Host OTCO Basic & Advanced Wastewater Training Courses
  - Update Lock Out/Tag Out, Blood Borne Pathogen, and Personnel Protective Equipment Training
  - Send Staff to exam preparatory class for OEPA Wastewater Certification Exam
  - Fill vacant Operator and Assistant Operator positions
  
- **Replacement of Obsolete and Worn Equipment**
  - Remove unused SAF unit, chemical storage tanks
  - Rebuild Moyno sludge pumps (as needed)
  - Restore Aquionics UV unit
  - Refinish/replace pumps at older lift stations
  - Refurbish Final Clarifiers 1 thru 4 in URS wet stream improvement plan
  - Remove old aeration system from #3 and #4 VLR's and replace with fine air diffusers
  - Finish training room remodel (add electric and network connections)

## **WATER TREATMENT PLANT**

### ***TREATMENT OPERATIONS***

The City of Wooster's Water Treatment Plant (WTP), now in its 17<sup>th</sup> year of operation, continues to perform well. The overall reliability of the plant systems has been excellent with the aid of our well trained and attentive operations and maintenance staff.

Finished water pumped to the city in 2014 decreased by 115 million gallons from the previous year for a total of 1.197 billion gallons. The high duty pumps sent an average of 3.27 million gallons per day of finished water into the distribution system. The peak-pumping day occurred on June 15th when 4.20 million gallons of finished water was pumped into the city. The average per capita usage of water in 2014 was 135 gallons per day (based on population data of 26,619).

The chemical cost per million gallons of treated water in 2014 was \$231.55 while the total cost of WTP operations and personnel was \$1,506/MG.



## Average Chemical Cost/Million Gallons Finished Water

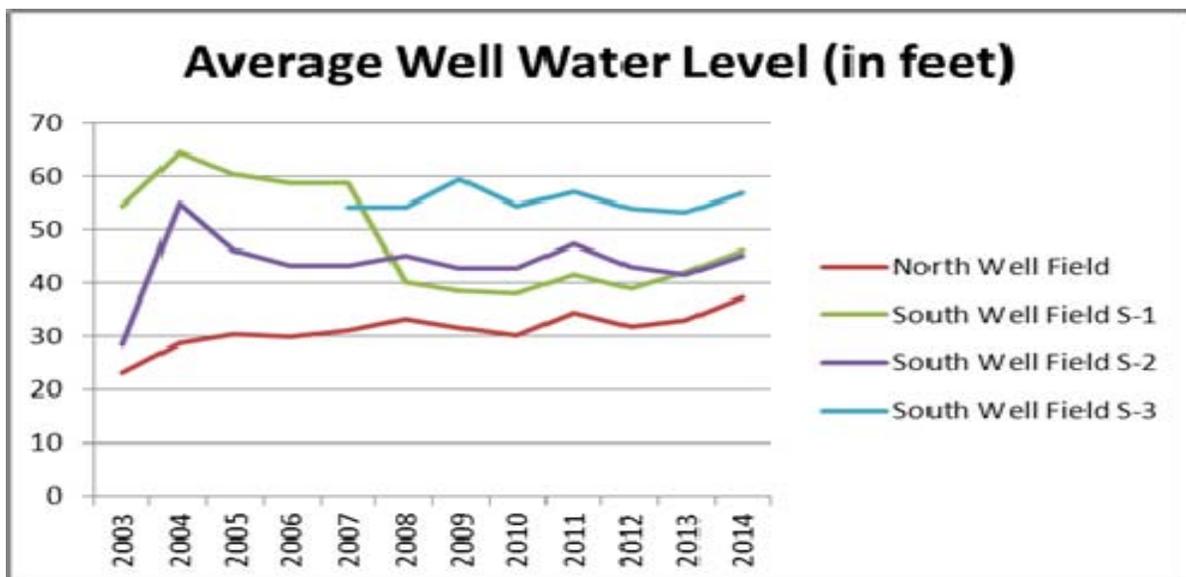
YEAR	LIME	SODA ASH	CHLORINE	CO2	Total
2003	\$59.48	\$15.77	\$17.36	\$7.25	\$99.86
2004	\$72.31	\$17.95	\$21.46	\$9.91	\$121.63
2005	\$114.06	\$23.59	\$31.73	\$10.56	\$179.94
2006	\$121.44	\$25.82	\$31.05	\$8.52	\$186.83
2007	\$114.16	\$31.80	\$22.58	\$9.95	\$178.49
2008	\$122.28	\$35.32	\$22.38	\$13.47	\$193.45
2009	\$127.19	\$38.54	\$30.87	\$14.83	\$211.43
2010	\$125.71	\$37.69	\$29.41	\$12.65	\$205.46
2011	\$140.69	\$41.73	\$23.44	\$12.59	\$218.45
2012	\$148.08	\$42.93	\$34.42	\$15.01	\$240.44
2013	\$144.28	\$43.67	\$25.86	\$16.92	\$230.73
2014	\$147.67	\$43.87	\$24.85	\$15.16	\$231.55

Annual Chemical Usage (in pounds)				
Year	LIME	SODA ASH	CHLORINE (in Gallons)	CO2
2003	2,250,126	340,446	41,896	178,309
2004	2,436,907	306,616	46,896	219,410
2005	2,607,260	320,853	52,155	210,899
2006	2,417,440	311,940	45,883	170,141
2007	2,322,350	317,163	49,313	198,571
2008	2,482,800	330,000	44,856	261,200
2009	2,501,644	308,622	42,026	280,971
2010	2,604,814	309,347	50,066	279,712
2011	2,433,240	304,865	44,468	284,815
2012	2,411,607	306,815	43,374	285,115
2013	2,647,538	335,271	42,947	346,816
2014	2,424,685	315,308	40,206	352,278

## Annual Water Plant Production 2013-2014

YEAR	TOTAL MILLION GALLONS RAW WATER	TOTAL MILLION GALLONS FINISHED WATER	AVERAGE CHEMICAL COST PER MILLION GALLONS	AVERAGE HARDNESS RAW WATER mg/L	AVERAGE HARDNESS FINISHED WATER mg/L
2003	1391	1378	\$99.86	371	111
2004	1278	1267	\$121.10	389	117
2005	1303	1290	\$179.94	389	119
2006	1260	1249	\$186.83	379	114
2007	1252	1240	\$186.83	365	110
2008	1260	1248	\$193.45	371	110
2009	1197	1185	\$211.43	374	112
2010	1281	1269	\$205.46	369	108
2011	1188	1176	\$218.47	369	108
2012	1209	1197	\$240.43	367	107
2013	1325	1312	\$230.73	365	108
2014	1209	1197	\$231.55	365	107

Sludge, a byproduct of the lime and soda ash softening process, is pumped to the sludge lagoon at the Water Pollution Control Plant. There were 13.08 million gallons of lime and soda ash sludge pumped to the WPCP in 2014. The sludge is held in a storage lagoon until it can be transported to farm fields for agricultural use.



The City well fields are rotated monthly (with the exception of S-1 as it is used as an interceptor to prevent underground contamination to migrate into the other production wells) to allow for recharge periods and scheduled maintenance. The North Well Field average water level was 37.3 feet. Its lowest level was in October at 32.3 feet, and the high was at 43.3 feet in May. The S-1 Well in the South Well Field averaged 46.1 feet of water peaking at 52.2 feet in May and a low of 40.5 feet in September. The S-2 Well in the South well field averaged 45.1 feet, peaking at 52.8 feet in April, and a low of 32.7 feet in September. The S-3 Well averaged 56.7 feet, peaking at 60.9 feet in May to a low of 52.9 in March.

The OARDC reports of 2014 show 31.2 inches of precipitation in the Wooster area compared to 36.4 inches in 2013. The average rainfall is 38.9 inches for the Wooster community. For the year 2014, the area was 7.7 inches below the normal precipitation. The below average precipitation (in conjunction with lower production) had little effect on well levels which actually posted higher water levels.

**Wooster Annual Precipitation (OARDC Weather Station)**

<b>YEAR</b>	<b>TOTAL ANNUAL PRECIPITATION</b>	<b>CHANGE FROM NORMAL (38.9") PRECIPITATION</b>
<b>2003</b>	<b>43.2</b>	<b>11.10%</b>
<b>2004</b>	<b>46.8</b>	<b>20.30%</b>
<b>2005</b>	<b>34</b>	<b>-12.60%</b>
<b>2006</b>	<b>37</b>	<b>-4.90%</b>
<b>2007</b>	<b>35.4</b>	<b>-9.00%</b>
<b>2008</b>	<b>35.6</b>	<b>-8.50%</b>
<b>2009</b>	<b>34.5</b>	<b>-11.30%</b>
<b>2010</b>	<b>34.1</b>	<b>-12.30%</b>
<b>2011</b>	<b>44.9</b>	<b>15.40%</b>
<b>2012</b>	<b>29.5</b>	<b>-24.20%</b>
<b>2013</b>	<b>36.4</b>	<b>-6.40%</b>
<b>2014</b>	<b>31.2</b>	<b>-19.80%</b>

Production of safe and satisfactory drinking water throughout 2014 was indicated by negative E-Coli bacteria results in samples of finished water collected from representative points of the distribution system. There were a total of 1305 bacteria tests completed including Wooster Distribution, new water lines, water line breaks, depressurization events, boil advisories, outside water systems, and private wells.

## SOUTH WELLFIELD CONTAMINATION

Since 1985, the city has operated interceptor wells and packed media stripping towers to remove volatile organic contamination from the South Wellfield. The interceptor wells protect the City's production wells from the contamination plume migrating further into the South production wells. In addition, the operations staff conducts a semiannual testing event of monitoring wells in and around the South Wellfield to record movement and levels of contaminants found in the ground water. Forty test wells are measured for water depth, tested for turbidity, pH, conductivity and sampled for volatile organics.

In 2014, the packed media stripping towers treated 326 million gallons of contaminated water then discharged into the Little Apple Creek.

## SPECIAL PROJECTS COMPLETED IN 2014

- ❖ Overhauled #1 Production well in South Well field
- ❖ Performed roof repairs in Administration Area of plant.
- ❖ Rebuilt chiller/HVAC system in plant laboratory.
- ❖ Replaced/repared valves in lime sludge holding pit.
- ❖ Painted piping in Mechanicsburg Road Pump Station.
- ❖ Replaced all fluorescent lighting in High Duty Pump Room and West Basement with more efficient LED strip lighting. The longer lasting LED lights will require less replacement in the hard to reach fixtures.
- ❖ Rehabilitation of the one million gallon Madison Tank was completed.



### Madison Tank Rehabilitation

Before (left)

After (right)

**WATER TREATMENT PLANT  
EMPLOYEE ROSTER** (as of 1/1/2015)  
(Certification level)

**MANAGEMENT:**

Utilities Manager

Kevin Givins (WS III)

Plant Supervisor

Robert King (WS III)

**LABORATORY TECHNICIAN:**

Michael Shultz (WS III)

**OPERATORS:**

Michael Stebelton (WS III)

James Phillips (WS I)

Dave Mosher (WS III)

Tim Breneman (WS I)

Emma Thoricht (OIT I)

**ASSISTANT OPERATOR**

Vacant

**ACCOUNT CLERK (shared with PPMD):**

Janell Cooper

## **Water Treatment Plant Goals and Objectives for 2015**

- Improve unaccounted water by 20% (15% improvement in 2014)
  - Leak detection survey of entire system twice
  - Add AMR to booster pumping stations
  - Continue loss prevention utilizing system from Underground Utilities Inc.
  - Finish replacement of failing AMR system (90% complete)
  
- Increase distribution turnover and improve water quality
  - Complete contract for new pumping station on Melrose Drive
  - Modify System Pumping procedure to prevent water stagnation in system
  - Construct new tank in North High Pressure Zone (complete mid 2015)
  - Initiate Backflow Tracking Program with Aqua Backflow and modify legislation to enhance program
  
- Maintain Wellfield Reliability
  - Overhaul and rebuild check valves at the North Wellfield
  - Capacity test and acidize interceptor wells
  
- Increase Building Maintenance of 17 year old water plant
  - Refinish floor in Chlorine Storage Room
  - Minor roof restoration project (under contract)
  - Paint Electrical Room and back hallway

## Distribution/Collection/Meters

The Distribution/Collection/Meters (D/C/M) Subdivision is responsible for the maintenance and operation of all the City's underground utilities and the water metering system. As part of the ongoing water loss reduction program, D/C/M completed 2 full sonic leak detection survey rounds of the distribution system. In addition, this year a new system was developed using instantaneous tank flow measurements and level sensors. These data points are monitored while isolating sections of the pressure zone to correlate possible water loss. An established leak under the Dix Expressway was located using this new method. The leak was estimated to lose 100,000+ gallons per day.



Distribution/Collection repaired  
36 water main breaks in 2014

Other highlights of the D/C/M Group for 2014;

- 364 Water Main valves cycled
- 21 Hydrants repaired
- 201 Curb boxes repaired or replaced

- 36 Main Breaks repaired
- 1422 Hydrants flushed
- 2.48 miles of sewer mains jetted
- 2.1 miles of sewer mains televised
- 2.09 miles of sewers root treated
- 704 Delinquent water shut offs
- 2469 MTUs replaced
- Meters processed 3714 work orders

### Distribution/Collection/Meters Goals for 2015

- Final completion of MTU Project (over 90% complete)
- Jet 10,000 feet of sewer main
- Televis 2 miles of sewer main
- Flush every hydrant in distribution system
- Cycle 20% of main water valves
- Complete 2 leak detection surveys
- Reduce water loss by 20%
- Investigate Division relocation to old ODOT facility next to Biotower

### Distribution/Collection/Meters EMPLOYEE ROSTER (as of 1/1/2015) (Certification level)

#### MANAGEMENT:

Utilities Manager

Kevin Givins (WS III & WW III)

D/C/M Supervisor

Milan Steiner (WD II & WC II)

#### UTILITY OPERATORS

Ed Flinner (WC I & WDI)

John Bender (WD I)

#### UTILITY OPERATOR TRAINEES

VACANT

#### TRADESPERSONS

Barb Hardin (WD OIT I)

John Rutter (WD OIT I)

#### ACCOUNT CLERK (shared with PPMD):

Janell Cooper