

**CITY OF ST. JOSEPH WATER FILTRATION PLANT**  
**OPERATIONAL REPORT**  
**DECEMBER 2015**  
**ANNUAL REPORT 2015**



**Mission Statement**

WSJOB- The City and Authority working together to provide safe drinking water of the highest quality to all of our customers at the lowest possible price.

## WATER PLANT REPORT-DECEMBER 2015

Water demand in December was down by 543,454 gallons or 0.65% from last year. This reverses an upward trend that began in August and continued through most of November. This year 82,827,795 gallons were delivered which compares to 83,371,249 gallons delivered December of 2014. The November 2015 pumpage ranked 30<sup>th</sup> in the thirty year tabulation dating back to 1986. In spite of the Fall uptick in water demand the annual usage dropped from 1.466 billion gallons in 2014 to 1.410 billion gallons in 2015 representing a 0.4% decline.

### **GENERAL ACTIVITIES**

#### Phase I SCIP

Staff is working on an RFP for the filter study which was identified in the Strategic Capital Improvement Plan (SCIP). The filter study will address hydraulic limitations in the filter piping and assess the feasibility of rerating filters 5-12. In addition a new DWRP project plan will have to be done for the SCIP. The last project plan was completed in 2007 and included the intake, E&P improvements and clarifier upgrades. Staff will attend an infrastructure financing seminar in Lansing on February 2<sup>nd</sup> to learn of recent changes in the DWRP program.

#### General Plan & Reliability Study

Plant staff is assisting the engineering department and FTC&H as they update the City of St. Joseph General Plan and Reliability Study. A concurrent effort is under way in the Authority water system. Both plans are due and were submitted in draft form to the MDEQ in December for comment. Wightman & Associates updated the Authority plan. General plans and reliability studies fall under Rule 1606 of the Safe Drinking Water Act (Public Act 399 as Amended).

#### Applied Water Continuous On Line Chlorine Monitoring Capability

Staff is working with ABCS and West Michigan Instrumentation to install chlorine monitors in the clarifiers to measure applied water chlorine residual. This will enable operators to respond more effectively to changing raw water conditions which are manifested in the clarifiers. This is vital since the shift in chlorine feed from almost all of the dose in the wet well a 50/50 mix wet well/clarifier effluent (applied water). As has been reported earlier the shift in chlorine feed is being done to reduce the formation of disinfection byproducts and hence improve finished water quality.

#### TOC Data Logging

Concurrent with the installation of continuous on line chlorine monitoring capability staff is working on interfacing the on-line TOC analyzer with the process computer. This will enable the logging and trending of data which is currently being recorded by hand and transferred to paper reports.

#### Water Plant Operator Position

As reported last month, Ryan Patzer returned to Public Works after successfully completing his training shift. The position was immediately posted internally and Kevin Kelly from Public Works bid and was accepted after an interview with plant staff and consultation with his past supervisors in the city. He is excited to be working at the plant and is doing well in training.

A provisional water plant operator's license has been applied for. After completing training wherein he will operate side by side with staff operators he will be permitted to operator on the provisional license for a period of one year. In the interim he will have two opportunities (May and November) to take the MDEQ certification examination. Upon passing the examination he will be a fully certified water plant operator at the F-4 level.

#### Annual Report Woodbine Lodge

Submitted to the Berrien County Health Department.

#### NPDES COC Annual Report

The water plant maintains NPDES permitted surface water discharges. Examples are the reclaim basin overflow and reservoir overflow. There were no discharges in 2015.

#### Fairplain Interconnects

The Fairplain interconnect project has been postponed until Spring 2016.

### **2015 ANNUAL REPORT**

The annual report consists largely of tables and graphs that illustrate system operation over the course of 2015. Of note historical data is included dating back to 1986 on some of the tables. The remainder of this work you will recognize as the regular monthly report.

- Annual Pumpage-Water Delivered 1986-2015
- St. Joseph Water Plant Pumpage-Water Distributed/Rainfall 1997-2015
- Water Distributed Peaking Factor 1986-2015
- Treated Water, Distributed Water and Filtration 2015
- TOC Compliance
- TOC and UV254
- Stage 2 Disinfection By-Products Rule-City of St. Joseph
- Stage 2 Disinfection By-Products Rule-Authority
- Water Quality 2015
- St. Joseph River Water Quality 2015
- Treatment Chemical Summary 2015

#### Annual Pumpage-Water Delivered 1986-2015

This graph illustrates pumpage for the period 1986 to 2015. The year 1988 set records that still stand for the highest max day of 15.34 million gallons and the highest annual pumpage of 2.126 billion gallons. The strong economy and growth in the Authority service area during the 1990's leading up to the recession in 2008 can be seen on this graph as well.

#### St. Joseph Water Plant Pumpage-Water Distributed/Rainfall 1997-2015

This graph shows how water demand responds to rainfall. As one can see the low rainfall does not always correlate well to high water demand. We were not able to find rainfall data prior to 1997.

### Peaking Factor

The peaking factor is defined as the ratio of the maximum day water demand to the average day water demand. It provides a useful system capacity planning tool for utilities. In the annual report we looked at this relationship over the past thirty years and found that in spite of declining water demand the peaking factor has remained relatively constant. This is probably due to the effects of conservation, water saving household devices, industry moving out of the area and in recent years the economy. In 1986 the Peaking Factor was 2.03. It nearly peaked at 2.63 in 1988, stayed in the 2.0 to 2.5 range for most of the period before settling down to 2.05 in 2015. The very dry year of 2012 garnered a 2.58 ratio only because the average was down to 4.3 MGD which compares to an average day of 5.8 MGD in 1988 when the plant hit an all time max day of 15.33 MGD. In the most recent high demand year 2005 the peaking factor hit a record 2.64 on an average day demand of 5.5 MGD.

### Treated Water, Distributed Water and Filtration 2015

This table includes information on treated and distributed water as well as filtration efficiency and process water used in the plant.

### TOC Compliance

TOC Compliance illustrates sample results on raw and finished water TOC, removal efficiency, removal ratio, alternate compliance and alkalinity. These samples are taken monthly and sent to the MDEQ laboratory in Lansing for analysis. This report updated and submitted monthly to the MDEQ District office in Plainwell.

### TOC and UV254

TOC and UV254 are chemical parameters that provide critical tools in assessing coagulation efficiency and disinfection by-product formation and removal. The St. Joseph water plant laboratory is equipped with a continuous on-line TOC monitor that samples and measures TOC (Total Organic Carbon) on raw water and filtered water. UV254 is sampled three times a day and measured utilizing a spectrophotometer in the plant lab.

### The Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR)

The Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR) reduces drinking water exposure to disinfection byproducts. The Rule applies to community water systems and non-transient non-community systems, including those serving fewer than 10,000 people that add a disinfectant to the drinking water during any part of the treatment process. The Stage 2 DBPR strengthens public health protection by tightening compliance monitoring requirements for Trihalomethanes (TTHM) and Haloacetic acids (HAA5). The rule targets public water systems (PWSs) with the greatest risk. Taken together, the Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rules (DBPRs) improve drinking water quality. The rules do this by providing protection from disinfection byproducts. Byproducts, if consumed in excess of EPA's standard over many years, may increase health risks. Pathogens, such as *Giardia*, *Cryptosporidium*, and viruses, are often found in source water and can cause gastrointestinal illness. Illnesses include diarrhea, vomiting, cramps and other health risks. In many cases, water needs to be disinfected to inactivate (or kill) these microbial pathogens. However, disinfectants can react with naturally-occurring materials in the water to form byproducts including Trihalomethanes (TTHM), and Haloacetic acids (HAA). The City of St. Joseph and Authority remain in full compliance with the D/DPR. The results are tabulated in the attached reports which were submitted to MDEQ and are reported quarterly.

### Water Quality 2015

This page includes a partial tabulation of raw water quality and finished water quality which is intended to provide a means to compare the two. Overall finished water quality remained high throughout the year. The upcoming 2015 Consumer Confidence Report (CCR) will contain more water quality information.

St. Joseph River Water Quality 2015

Given the proximity of the St. Joseph River to the water plant intake in Lake Michigan river water chemistry can have a marked effect on the raw water quality. Over the course of the past two years water plant staff has been collecting river water samples at the LaFarge facility in St. Joseph. The results of the laboratory analysis of those samples are presented in this graph.

Treatment Chemical Summary 2015

The treatment chemical summary tabulates the dosage, pounds fed and cost for the chemicals added at the water plant for the year 2015.

# Monthly Maintenance Notes

December 2015

Normal PM Maint. done Monthly	Check all High Service and Low Service Pumps, BPS pumps, Service BPS Chlorinators, Change out air filters on VFD Drives and Air Handlers. Mow and Grounds work at Plant, Booster Stations and Water Towers
12/2 & 12/3/15	Cleaned Clarifier # 2
12/3 & 12/7/15	DA Dodd - Inspection and testing of all plant backflow devices (Removed 1 device over alum tanks that was feed a system that was out of service, installed spool piece)
12/04/15	Reset limit positions for East Security Gate
12/07/15	Hach - Service and calibration of all filter turbidimeters
12/07/15	UCC - Installed temporary cap on emergency riser for South Low Service Intake
12/08/15	Airtherm - Installed new control board on air make up unit in South Low Service building. Also installed new thermal couple and fan motor on unit heater.
12/10/15	Installed new raw water sample pump
12/11/15	Installed new sample pump for filters 9 - 12
12/14 & 12/15/15	Installed New Top Rollers on Clarifier # 2
12/17/15	DA Dodd - Tested Backflow devices at Hilltop and Cleveland BPS
12/21/15	Installed new GFI outlet for vacuum pump
12/22/15	Rebuilt Clarifier # 2 Wing arms, installed new thrust bearings on arms and new thrust bearings on wing pivot blocks
12/23/15	Installed new GFI outlet for chlorinator @ Hilltop BPS

**ST. JOSEPH WATER FILTRATION PLANT  
1701 LIONS PARK DRIVE  
SAINT JOSEPH, MI. 49085**

**By: Greg Alimenti  
St. Joseph Water Plant  
700 Broad St.  
Saint Joseph, MI. 49085-1276  
(269) 983-1240**

**DECEMBER 2015**

DISTRIBUTION:	
Total Gallons	82,827,795
Average Day	2,671,864
Maximum Day	3,011,349
Minimum Day	2,300,241

TREATMENT:	
Total Low Service	85,563,715
Wash Water Gals.	1,028,083
Wash Water %	1.21%
Plant Use Gals.	1,752,725
Plant Use %	2.05%

FILTRATION:		
Ave. Filter Run	64.2	hours
Ave. Filter Rate	1.86	g/sqft/min
Filter Eff. Index	291.0	
Ave. Loss of Head	1.3	feet
Plant Sewer Usage		
	914	\$ 2,019.94

LABORATORY REPORT		
Average of	Raw	Tap
Chlorides mg/L	17.6	18.9
Fluoride mg/L	0.14	0.70
Alkalinity mg/L	119	106
Hardness mg/L	144	143
pH	8.1	7.4
Calcium mg/L	40	40
Magnesium mg/L	11	11
Turbidity NTU	1.32	0.03
Temperature °F	48	
Total Coliform		0.0
Chlorine Residual		
		mg/L Free
Mixing Basin		0.90
Applied		1.76
Tap		1.60
Distribution		1.00

TREATMENT CHEMICAL SUMMARY:					
	Applied mg/L	Total Lbs.	Cost	Inventory lbs.	Days Supply
		CHEMICAL			
Alum (Al <sup>+3</sup> )	1.62	1,152	\$3,795.26	128,156	154
Chlorine (Cl <sub>2</sub> )	2.91	2,075	\$557.55	11,348	170
Fluoride (F <sub>2</sub> )	0.72	517	\$905.16	37,161	

		REMARKS:			
Total Cost all Chemicals	\$5,257.97				
Chemical Cost per Mil. Gallon Treated	\$61.45				
Chemical Cost per Mil. Gallon Delivered	\$63.48				
<b>PLANT UTILITIES SUMMARY</b>					
Electric:					
Total KWH	223,800	***includes measure of melted snow			
Total Power Cost	\$ 15,666.00	visit the City of Saint Joseph's Home page at <a href="http://www.sjcity.com">www.sjcity.com</a>			
Power Cost per Million Gallon Treated	\$ 183.09	e-mail comments to either: <a href="mailto:operator@sjcity.com">operator@sjcity.com</a> or <a href="mailto:galimenti@sjcity.com">galimenti@sjcity.com</a>			
Power Cost per Million Gallon Delivered	\$ 211.60	<b>WEATHER CONDITIONS AT THE PLANT</b> Air Temp. °F			
Gallons Pumped per KWH	370	SJWW Weather Computer		Avg.	42.2
		Rain Guage, Inches	3.27	Max.	63.5
		days it rained***	13	Min.	26.9
Natural Gas:		Wind Speed, Avg	11.5	Lake Temp. °F	
Metered Cubic Feet	3131	Wind Speed, Max	60	Avg.	48.0
Natural Gas Cost	\$1,484.18	Prevailing Wind Dir.	SSE	Max	51.0
Emergency Power Diesel Fuel Inv., Gals.	North 300	Lake Level (USACE)	579.36	Min	45.8
	South 1500				

**DISTRIBUTION REPORT**

*For the Month of December 2015*

Activity		Number/Description	
Water Main Breaks		2	
MISS DIGS		190	
Delinquent Shut Off		21	SJCT
Delinquent Shut Off (Broken Payment Plans)			
Hydrants (Repaired/Replaced)		0	
Valves		1	10" on State St. and Sutherland (City) Repacked to stop leak
Taps (1")		3	2700 Lincoln Ave (SJCT) New const. 430 Jakway (SJCTE) New const. 1890 W. John Beers (LCT) Bad well
Cross Connection Control (Hydro Designs)			
Service Work (System Valves)			
Repair of Curb box/Shut-Off Valves		0	
Service Repair		1	1117 State St. (City), Repair of leak on service line.
Service Replacement		0	
Water Quality Complaint(s)		0	
Hydrant Flushing to maintain water quality		0	
Hydrant Flushing (Stage 2 Rule)			
Service line complaints (customer side)		2	Ridge Rd (LCT) Deteriorated private service line refer to cust. Oak Terrace (LCT) Service line leak referred to customer 720 Broad St (City) Service line leak referred to customer
Staff Education/Training		1	Traffic Control Class-Clark
Overtime-Total		62	(Including Sanitary and Storm)
Turn Off		23	(Note: For delinquent Shut off see above)
Turn On		8	
Finals		119	
<b>Meter Repair/Replacement</b>			
			Audit Meter
			Verify Read
			1
Meter Repair			Move Mxu Box
Per detail			New Installation
			1
Meter leaking		4	New Installation-Benton Harbor
Stopped Meter		5	Replaced/various reasons (1 downsize, 1 defective)
Faulty Register			Rockwell Replacement
Frozen Meter			Mxu Replaced
			5
Move Meter Inside			Sprinkler meter removed/line capped
Hard to read		6	Removals/demo
			2
Replace/Adding Sprinkler Meter			Curb box location
			2
Damage to Trt		1	Broken Remote
New Plumbing		3	Noisy Meter
New siding			Upgrade 5/8" to 3/4" (upgrade to 1")
Meter sent out for testing			Meter Change/Benton Harbor

**CITY OF ST. JOSEPH WATER MAIN BREAK REPORT**

For the Month/Year of: December 2015

#	Date	Location	Main Size	Gallons Lost	Break Type	Valves Turned	City Twp	Labor	Remarks
1	12/3/2015	South State at Colonial	10	4,000	Crack, circ	5	City	25.0	Soil cover 5.0 ft. Clay. 12"x10" band, no cath, cast iron
2	12/3/2015	1217 Adams	6	6,000	Crack, circ	3	LCT	23.0	Soil cover 5.0 ft. Sand. 12" x 6" band, no cath. Ductile?
TOTALS				10,000		13		48.0	

SOUTHWEST MICHIGAN REGIONAL SANITARY SEWER & WATER AUTHORITY  
CLEVELAND BOOSTER STATION

HILLTOP BOOSTER STATION

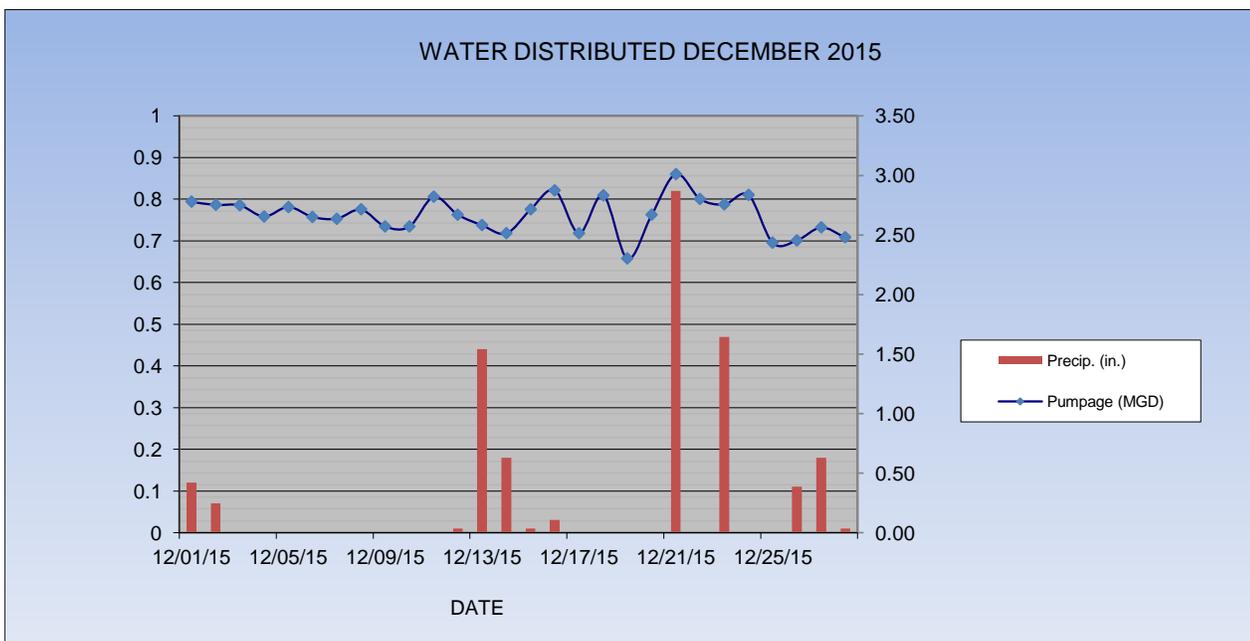
DATE	FLOW MGD	FEED GAL	CHL LBS/DAY	CHLORINE APPLIED mg/l	Cl <sub>2</sub> PRE mg/l	Cl <sub>2</sub> POST mg/l	Cl <sub>2</sub> MON mg/l	FLOW MGD	FEED GAL	CHL LBS/DAY	CHLORINE APPLIED mg/l	Cl <sub>2</sub> PRE mg/l	Cl <sub>2</sub> POST mg/l	Cl <sub>2</sub> MON mg/l	BOOSTER MGD			
1-Dec	1.525	68	9.64	0.76	2.20	1.94	2.09	0.000	0	0.00	0.00	2.11	1.73	1.83	1.525			
2-Dec	1.559	81	11.48	0.88	2.20	1.97	2.20	0.000	0	0.00	0.00	1.81	1.55	1.66	1.559			
3-Dec	0.000	0	0.00	0.00	1.73	1.75	1.97	1.753	27	3.83	0.26	2.20	1.63	1.84	1.753			
4-Dec	1.672	85	12.05	0.86	2.09	1.90	2.00	0.000	0	0.00	0.00	2.19	1.50	1.60	1.672			
5-Dec	1.040	55	7.80	0.90				0.606	9	1.28	0.25				1.646			
6-Dec	1.040	55	7.80	0.90				0.606	9	1.28	0.25				1.646			
7-Dec	1.040	55	7.80	0.90	1.26	1.33	1.37	0.606	9	1.28	0.25	1.66	1.27	1.29	1.646			
8-Dec	0.000	0	0.00	0.00	1.16	1.09	1.21	1.778	82	11.63	0.78	1.23	1.38	1.43	1.778			
9-Dec	1.681	77	10.92	0.78	2.17	1.79	2.28	0.237	15	2.13	1.07	1.17	1.11	1.23	1.919			
10-Dec	0.000	1	0.14	0.00	1.71	1.78	1.83	0.432	17	2.41	0.67	1.43	1.95	2.13	0.432			
11-Dec	1.366	59	8.37	0.73	3.35	2.46	2.53	0.862	41	5.81	0.81	2.19	1.87	2.01	2.228			
12-Dec	0.508	14	1.98	0.47				1.114	25	3.54	0.38				1.622			
13-Dec	0.508	14	1.98	0.47				1.114	25	3.54	0.38				1.622			
14-Dec	0.508	14	1.98	0.47	1.64	1.67	1.71	1.114	25	3.54	0.38	1.66	1.51	1.63	1.622			
15-Dec	1.693	0	0.00	0.00	1.43	1.41	1.51	0.000	0	0.00	0.00	1.39	1.38	1.44	1.693			
16-Dec	0.000	1	0.14	0.00	1.29	1.37	1.40	1.540	18	2.55	0.20	2.20	1.59	1.72	1.540			
17-Dec	1.659	80	11.34	0.82	2.87	2.30	2.47	0.000	1	0.14	0.00	1.28	1.44	1.50	1.659			
18-Dec	0.000	0	0.00	0.00	2.16	2.17	2.27	1.610	22	3.12	0.23	1.98	1.76	1.87	1.610			
19-Dec	1.140	23	3.26	0.34				0.553	8	1.13	0.25				1.693			
20-Dec	1.140	23	3.26	0.34				0.553	8	1.13	0.25				1.693			
21-Dec	1.140	23	3.26	0.34			1.88	0.553	8	1.13	0.25	2.19	1.97	2.11	1.693			
22-Dec	0.000	0	0.00	0.00			1.70	1.639	24	3.40	0.25	2.20	1.74	2.19	1.639			
23-Dec	0.000	0	0.00	0.00			1.61	1.667	21	2.98	0.21	1.98	1.66	1.89	1.667			
24-Dec	0.000	0	0.00	0.00				1.703	29	4.11	0.29				1.703			
25-Dec	0.000	0	0.00	0.00				1.703	29	4.11	0.29				1.703			
26-Dec	0.000	0	0.00	0.00				1.703	29	4.11	0.29				1.703			
27-Dec	0.000	0	0.00	0.00				1.703	29	4.11	0.29				1.703			
28-Dec	0.000	0	0.00	0.00			1.45	1.703	29	4.11	0.29	2.01	1.56	1.73	1.703			
29-Dec	0.000	0	0.00	0.00			1.40	1.602	64	9.07	0.68	2.55	1.99	2.61	1.602			
30-Dec	0.000	0	0.00	0.00			1.33	1.690	52	7.37	0.52	2.61	2.00	2.35	1.690			
31-Dec	0.000	0	0.00	0.00				1.721	25	3.54	0.25				1.721			
<b>TOTAL</b>	<b>19.217</b>	<b>728</b>	<b>103.2</b>					<b>31.864</b>	<b>680</b>	<b>96.41</b>					<b>51.081</b>			
<b>AVE DAY</b>	<b>0.620</b>		<b>3.3</b>	<b>0.32</b>	<b>1.9</b>	<b>1.8</b>	<b>1.8</b>	<b>1.0279</b>		<b>3.1</b>	<b>0.32</b>	<b>1.90</b>	<b>1.63</b>	<b>1.80</b>	<b>1.648</b>			
<b>MAX</b>	<b>1.693</b>		<b>12.1</b>	<b>0.90</b>	<b>3.4</b>	<b>2.5</b>	<b>2.5</b>	<b>1.7778</b>		<b>11.6</b>	<b>1.07</b>	<b>2.61</b>	<b>2</b>	<b>2.61</b>	<b>2.228</b>			
<b>MIN</b>	<b>0.000</b>		<b>0.0</b>	<b>0.00</b>	<b>1.2</b>	<b>1.1</b>	<b>1.2</b>	<b>0.0000</b>		<b>0.0</b>	<b>0.00</b>	<b>1.17</b>	<b>1.11</b>	<b>1.23</b>	<b>0.432</b>			
<b>MONTHLY TOTALS:</b>	Cleveland Total MG			19.217	SJCT EAST			Hilltop Total MG					Cleveland Pump Station:			17.524		
	Treated			17.524	Average Day			0.186	Treated					31.864	Hilltop Pump Station:		31.864	
<b>Total Authority Flow:</b>	56.219	Untreated			1.693	Month Total			5.773	Untreated					0.000	TOTAL AUTHORITY (Trted.)		49.388

**ST JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED/RAINFALL  
DECEMBER 2015**

Day to Day Comparison 2015/2014

DATE	PUMPAGE (gallons)	PUMPAGE (MGD)	Rainfall (in)		
12/01/15	2,777,494	2.78	0.12	2,777,494	2,961,242
12/02/15	2,752,070	2.75	0.07	2,752,070	2,873,099
12/03/15	2,748,391	2.75	0	2,748,391	2,663,551
12/04/15	2,653,722	2.65	0	2,653,722	2,897,054
12/05/15	2,734,976	2.73	0	2,734,976	2,714,932
12/06/15	2,651,028	2.65	0	2,651,028	2,599,374
12/07/15	2,636,592	2.64	0	2,636,592	2,493,255
12/08/15	2,712,917	2.71	0	2,712,917	2,776,475
12/09/15	2,569,948	2.57	0	2,569,948	2,569,010
12/10/15	2,570,309	2.57	0	2,570,309	2,868,152
12/11/15	2,819,309	2.82	0	2,819,309	2,766,942
12/12/15	2,669,151	2.67	0.01	2,669,151	2,576,713
12/13/15	2,581,073	2.58	0.44	2,581,073	2,672,155
12/14/15	2,512,127	2.51	0.18	2,512,127	2,731,229
12/15/15	2,713,034	2.71	0.01	2,713,034	2,636,886
12/16/15	2,874,847	2.87	0.03	2,874,847	2,595,791
12/17/15	2,513,750	2.51	0	2,513,750	2,692,379
12/18/15	2,832,261	2.83	0	2,832,261	3,011,321
12/19/15	2,300,241	2.30	0	2,300,241	2,819,148
12/20/15	2,667,378	2.67	0	2,667,378	2,772,318
12/21/15	3,011,349	3.01	0.82	3,011,349	2,601,819
12/22/15	2,801,546	2.80	0	2,801,546	2,713,023
12/23/15	2,756,405	2.76	0.47	2,756,405	2,623,544
12/24/15	2,834,970	2.83	0	2,834,970	2,584,704
12/25/15	2,432,832	2.43	0	2,432,832	2,585,813
12/26/15	2,453,726	2.45	0.11	2,453,726	2,586,864
12/27/15	2,562,706	2.56	0.18	2,562,706	2,325,798
12/28/15	2,478,257	2.48	0.01	2,478,257	2,575,646
12/29/15	2,610,809	2.61	0.82	2,610,809	2,703,664
12/30/15	2,866,445	2.87	0	2,866,445	2,714,955
12/31/15	2,728,132	2.73	0	2,728,132	2,664,391
<b>TOTAL</b>	<b>82,827,795</b>	<b>82.83</b>	<b>3.27</b>	<b>82,827,795</b>	<b>83,371,249</b>

<b>Average Day</b>	<b>2,671,864</b>
<b>Maximum Day</b>	<b>3,011,349</b>
<b>Minimum Day</b>	<b>2,300,241</b>

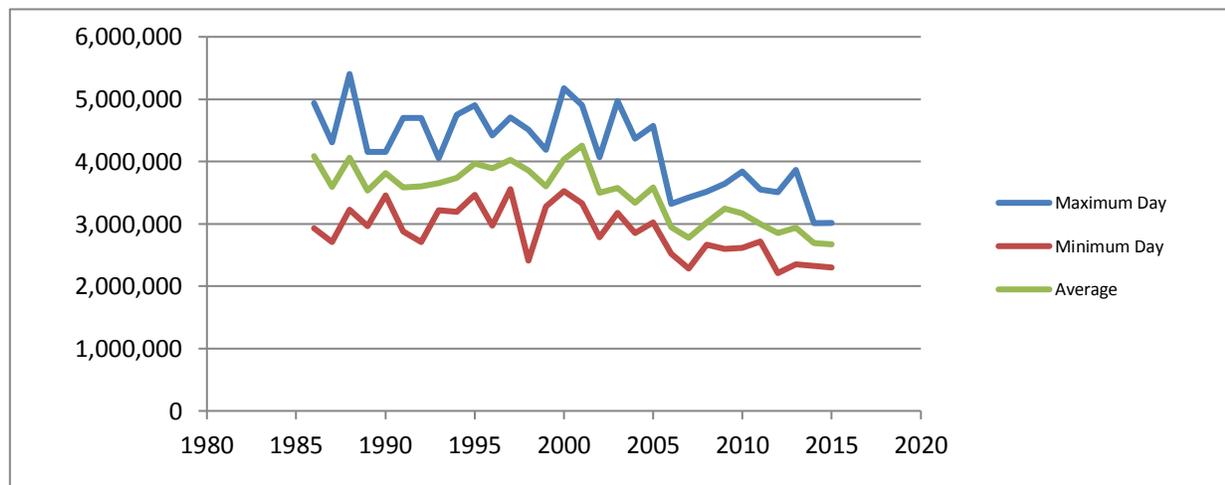


# ST. JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED

DECEMBER 2015

Year	Average	Maximum Day	Minimum Day	Monthly Total
1986	4,084,652	4,941,100	2,931,300	126,624,200
1987	3,595,226	4,307,900	2,705,600	111,452,000
1988	4,061,816	5,403,700	3,227,600	125,916,300
1989	3,536,365	4,156,700	2,966,100	109,627,300
1990	3,815,197	4,155,000	3,458,500	118,271,100
1991	3,584,742	4,698,900	2,881,600	111,127,000
1992	3,604,145	4,697,900	2,707,000	111,728,500
1993	3,649,910	4,052,000	3,221,800	113,147,200
1994	3,739,719	4,750,500	3,193,200	115,931,300
1995	3,969,689	4,899,100	3,467,500	123,060,350
1996	3,893,145	4,417,200	2,975,000	120,687,500
1997	4,025,112	4,708,312	3,556,450	124,778,465
1998	3,859,366	4,511,600	2,406,900	119,640,350
1999	3,601,361	4,188,000	3,274,250	111,642,200
2000	4,039,689	5,178,750	3,522,250	125,230,350
2001	4,255,176	4,900,750	3,332,150	131,910,460
2002	3,503,753	4,065,320	2,784,250	108,616,350
2003	3,572,010	4,968,500	3,173,330	110,732,300
2004	3,337,135	4,366,530	2,854,720	103,451,190
2005	3,586,517	4,568,990	3,019,540	111,182,030
2006	2,943,999	3,317,500	2,518,250	91,263,960
2007	2,780,751	3,419,750	2,282,500	86,203,290
2008	3,024,696	3,512,500	2,665,250	93,765,590
2009	3,245,040	3,645,380	2,597,500	100,595,250
2010	3,164,423	3,842,357	2,616,310	98,097,104
2011	2,998,625	3,551,236	2,713,726	92,957,376
2012	2,857,076	3,509,647	2,210,467	88,569,344
2013	2,936,685	3,868,776	2,350,219	91,037,225
2014	2,689,395	3,011,321	2,325,798	83,371,249
2015	2,671,864	3,011,349	2,300,241	82,827,795

Rank	Year	Monthly Total
1	2001	131,910,460
2	1986	126,624,200
3	1988	125,916,300
4	2000	125,230,350
5	1997	124,778,465
6	1995	123,060,350
7	1996	120,687,500
8	1998	119,640,350
9	1990	118,271,100
10	1994	115,931,300
11	1993	113,147,200
12	1992	111,728,500
13	1999	111,642,200
14	1987	111,452,000
15	2005	111,182,030
16	1991	111,127,000
17	2003	110,732,300
18	1989	109,627,300
19	2002	108,616,350
20	2004	103,451,190
21	2009	100,595,250
22	2010	98,097,104
23	2008	93,765,590
24	2011	92,957,376
25	2006	91,263,960
26	2013	91,037,225
27	2012	88,569,344
28	2007	86,203,290
29	2014	83,371,249
<b>30</b>	<b>2015</b>	<b>82,827,795</b>



MONTHLY CLIMATOLOGICAL SUMMARY

DECEMBER 2015

NAME: sjwwweather

St. Joseph Water Plant - 1701 Lions Park Drive - St. Joseph, MI

DAY	MEAN TEMP	NORM MEAN TEMP	HIGH TEMP	TIME	NORM HIGH TEMP	REC HIGH TEMP	YEAR	LOW TEMP	TIME	NORM LOW TEMP	REC LOW TEMP	YEAR	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	42.8	35	45.7	1:00p	42	69	1970	37.4	12:00m	27	11	1964	22.2	0	0.12	11.1	35	11:30a	SW
2	37.4	35	40.7	12:00m	42	69	1982	35	10:30a	27	1	1976	27.6	0	0.07	14.5	38	10:00p	SSE
3	40.1	35	41.5	11:00a	41	67	1982	38.2	7:30p	27	-2	1976	24.9	0	0	17.6	35	12:30a	WNW
4	40	34	44.5	4:30p	41	64	1970	35.6	9:30p	26	10	1978	25	0	0	14.5	30	2:00a	SW
5	36.4	34	46.1	4:30p	41	65	1982	31	8:30a	26	5	1991	28.6	0	0	3.2	15	9:00p	SSE
6	40.3	33	52.1	2:00p	40	61	1951	32.8	7:30a	26	11	1954	24.7	0	0	4.9	17	4:00p	SE
7	40.8	33	42.8	2:30p	40	58	1951	35.3	3:00a	25	7	1950	24.2	0	0	4.1	18	5:00a	SSE
8	42.2	33	48.2	12:00m	39	60	1991	37.4	2:30a	25	2	1977	22.8	0	0	5.7	21	11:30p	SSE
9	47.6	32	48.7	7:00p	39	62	1991	46.4	1:30p	24	3	1989	17.4	0	0	9.6	24	10:00a	SSW
10	50.6	32	59.7	1:30p	38	64	1971	42.2	2:30a	24	4	1978	14.4	0	0	14.1	47	7:00p	SSE
11	48.4	31	51.7	12:00m	38	63	1949	46.6	9:00a	24	3	1978	16.6	0	0	10.7	28	12:30a	SW
12	56.6	31	61.3	12:00m	37	62	1949	51.7	12:30a	23	-4	1958	8.4	0	0.01	4.3	17	11:00a	SE
13	61.4	30	63.5	4:00a	37	65	1975	58.3	9:30p	23	-4	1958	3.6	0	0.44	6.2	21	12:30p	SSE
14	53.5	30	61.6	6:30a	37	65	1975	46.3	12:00m	23	3	1958	11.5	0	0.18	15	39	11:00a	SW
15	42.5	30	46.5	12:30a	36	62	1971	40.9	6:30p	22	-5	1989	22.5	0	0.01	10.2	31	1:00a	N
16	45.4	29	51.4	7:00p	36	64	1984	41.3	12:00m	22	-6	1989	19.6	0	0.03	10.5	40	7:00p	SSE
17	36.8	29	41.6	12:30a	35	59	1984	34.5	12:30p	21	-8	1989	28.2	0	0	20.8	37	7:30a	W
18	33.4	28	36.9	1:00a	35	53	1957	30.3	1:30p	21	-2	1989	31.6	0	0	23.8	47	12:30p	W
19	30.8	28	35	9:30p	34	55	1957	26.9	8:00a	21	0	1983	34.2	0	0	20.2	40	4:30a	WNW
20	40.4	28	49.5	3:00p	34	58	1949	26.9	1:30a	20	-5	1983	24.6	0	0	9.3	32	10:00p	S
21	46.4	27	50.8	2:00p	33	60	1949	43.3	4:30a	20	-3	1989	18.6	0	0.82	9.6	36	3:00a	SSW
22	42.2	27	44.9	12:30a	33	58	1957	39	9:00p	19	-4	1989	22.8	0	0	7.1	26	9:00a	WSW
23	53.6	26	61.8	3:00p	33	61	2015	41.5	12:30a	19	-15	1989	11.4	0	0.47	8.3	43	11:00p	SSE
24	42.5	26	54.5	12:30a	32	58	1982	39.7	11:30a	19	-7	1989	22.5	0	0	17.9	60	1:00a	SW
25	41.3	26	44.9	4:00a	32	66	1982	34	12:00m	18	-5	1983	23.7	0	0	9.1	22	4:30a	N
26	40.9	25	45.1	5:00p	31	58	1982	33.9	12:30a	18	-2	1983	24.1	0	0.11	3.6	24	12:30p	E
27	39.7	25	44	12:30a	31	56	1959	35	12:00m	18	-2	1990	25.3	0	0.18	13.2	33	6:00a	NNE
28	32.8	24	36.6	12:00m	30	65	1984	29.8	11:00a	17	1	1950	32.2	0	0.01	6.8	30	6:30p	ENE
29	37.8	24	42.9	3:30a	30	64	1984	35.3	11:00p	17	-2	1961	27.2	0	0.82	21.3	44	5:00a	WSW
30	33	24	35.6	12:30a	29	58	1965	31	12:00p	16	-7	1983	32	0	0	10.8	27	7:30p	SSE
31	31.7	24	33.1	8:30a	29	70	1875	30.4	11:30p	16	-15	1976	33.3	0	0	18.9	37	10:30p	WSW
AVE													22.8	0.0	0.1	11.5	32.1		SSE
MAX	61.4	35	63.5			70		58.3		27	11		34.2	0	0.82	23.8	60.0		
MIN	30.8	24	33.1					26.9		16	-15		3.6	0	0	3.2	15		
TOTAL															3.27				

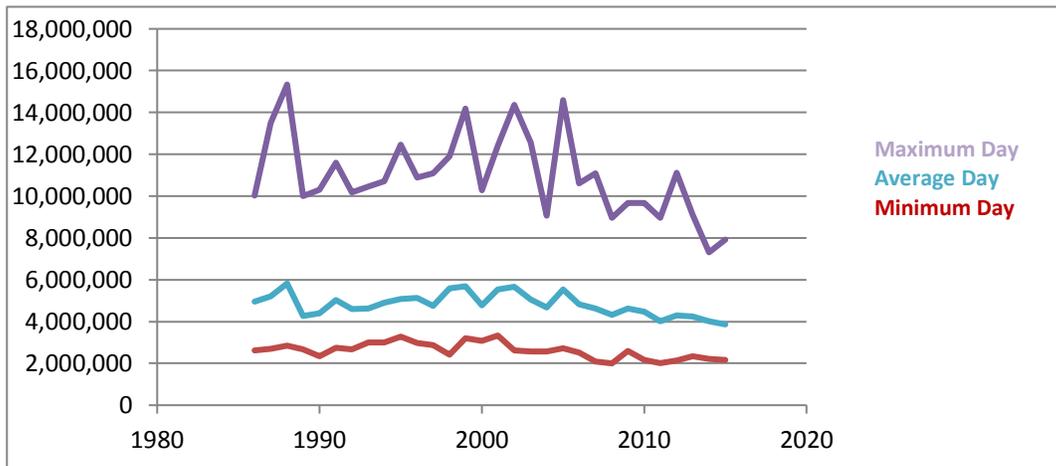
Max Rain: 0.82 ON 12/21/15  
 Days of Rain: 10 (>.01 in)8 (>.1 in) 0 (>1 in)

# ST. JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED

1986-2015

Year	Average	Maximum Day	Minimum Day	Annual Total
1986	4,944,147	10,037,900	2,620,300	1,804,613,639
1987	5,198,074	13,500,700	2,705,600	1,897,296,858
1988	5,823,641	15,336,400	2,837,900	2,125,628,903
1989	4,259,834	9,996,000	2,660,300	1,554,839,481
1990	4,403,369	10,296,200	2,333,200	1,607,229,648
1991	5,031,299	11,597,100	2,751,300	1,836,424,148
1992	4,587,137	10,167,700	2,667,100	1,674,304,977
1993	4,635,205	10,468,500	2,990,500	1,691,849,850
1994	4,893,381	10,718,900	3,009,000	1,786,084,050
1995	5,091,298	12,455,700	3,278,300	1,858,323,851
1996	5,124,403	10,895,700	2,975,000	1,870,407,175
1997	4,739,065	11,098,600	2,861,500	1,729,758,765
1998	5,584,828	11,894,800	2,406,900	2,038,462,370
1999	5,681,534	14,182,550	3,193,000	2,073,760,057
2000	4,775,003	10,278,600	3,070,300	1,742,876,050
2001	5,531,941	12,404,900	3,332,150	2,019,158,360
2002	5,659,914	14,369,900	2,626,010	2,065,868,650
2003	5,057,352	12,554,770	2,580,250	1,845,933,310
2004	4,661,961	9,064,000	2,580,250	1,701,615,720
2005	5,524,280	14,599,440	2,713,320	2,016,362,270
2006	4,825,869	10,615,250	2,518,250	1,761,442,345
2007	4,632,929	11,088,240	2,094,500	1,691,019,010
2008	4,325,219	8,951,090	1,999,500	1,578,704,980
2009	4,620,301	9,659,870	2,597,500	1,686,409,841
2010	4,465,426	9,661,039	2,170,172	1,629,880,626
2011	4,016,055	8,965,640	2,015,000	1,465,859,952
2012	4,301,485	11,115,883	2,138,902	1,570,042,021
2013	4,242,750	9,103,735	2,350,219	1,548,603,585
2014	4,023,414	7,310,516	2,225,326	1,468,546,049
2015	3,864,060	7,928,690	2,170,000	1,410,381,802

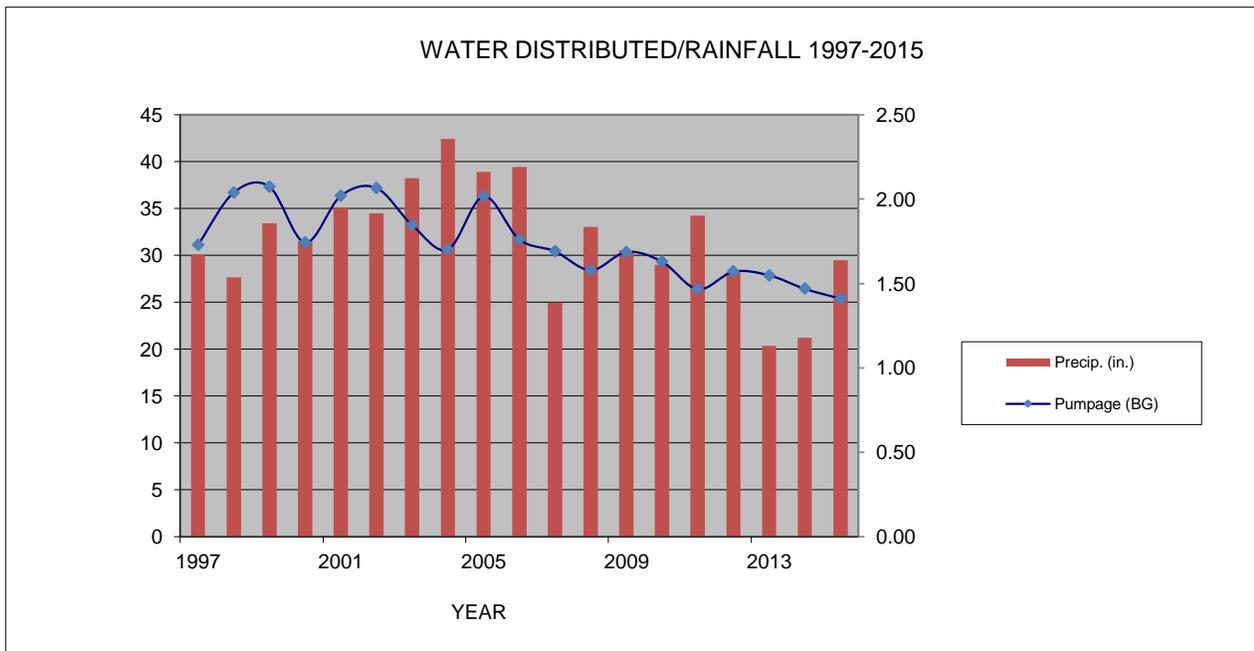
Rank	Year	Total
1	1988	2,125,628,903
2	1999	2,073,760,057
3	2002	2,065,868,650
4	1998	2,038,462,370
5	2001	2,019,158,360
6	2005	2,016,362,270
7	1987	1,897,296,858
8	1996	1,870,407,175
9	1995	1,858,323,851
10	2003	1,845,933,310
11	1991	1,836,424,148
12	1986	1,804,613,639
13	1994	1,786,084,050
14	2006	1,761,442,345
15	2000	1,742,876,050
16	1997	1,729,758,765
17	2004	1,701,615,720
18	1993	1,691,849,850
19	2007	1,691,019,010
20	2009	1,686,409,841
21	1992	1,674,304,977
22	2010	1,629,880,626
23	1990	1,607,229,648
24	2008	1,578,704,980
25	2012	1,570,042,021
26	1989	1,554,839,481
27	2013	1,548,603,585
28	2014	1,468,546,049
29	2011	1,465,859,952
30	2015	1,410,381,802



**ST JOSEPH WATER PLANT PUMPAGE-WATER DISTRIBUTED/RAINFALL  
1997-2015**

YEAR	PUMPAGE (gallons)	PUMPAGE (MGD)	RAINFALL (in)*
1997	1,729,758,765	1.73	30.11
1998	2,038,462,370	2.04	27.65
1999	2,073,760,057	2.07	33.41
2000	1,742,876,050	1.74	31.55
2001	2,019,158,360	2.02	35.12
2002	2,065,868,650	2.07	34.47
2003	1,845,933,310	1.85	38.22
2004	1,701,615,720	1.70	42.42
2005	2,016,362,270	2.02	38.91
2006	1,761,442,345	1.76	39.45
2007	1,691,019,010	1.69	24.97
2008	1,578,704,980	1.58	33.02
2009	1,686,409,841	1.69	30.52
2010	1,629,880,626	1.63	29.02
2011	1,465,859,952	1.47	34.25
2012	1,570,042,021	1.57	28.19
2013	1,548,603,585	1.55	20.33
2014	1,468,546,049	1.47	21.21
2015	1,410,381,802	1.41	29.50
<b>TOTAL</b>	<b>33,044,685,762</b>	<b>33.04</b>	<b>602.32</b>

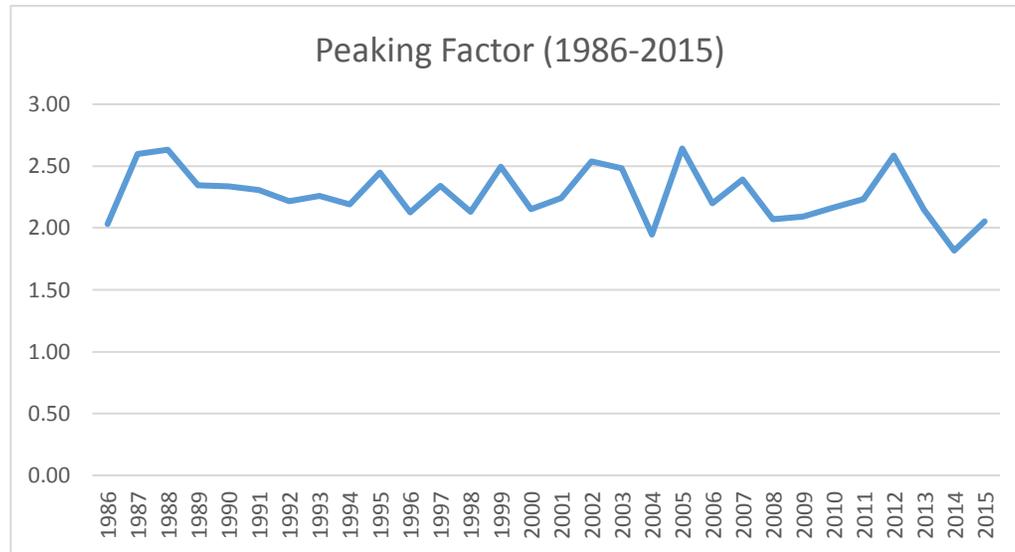
<b>Average</b>	<b>1,739,193,987</b>
<b>Maximum</b>	<b>2,073,760,057</b>
<b>Minimum</b>	<b>1,410,381,802</b>



## WATER DISTRIBUTED PEAKING FACTOR 1986-2015

St. Joseph, MI

Year	ADD	MDD	Peaking Factor
1986	4,944,147	10,037,900	2.03
1987	5,198,074	13,500,700	2.60
1988	5,823,641	15,336,400	2.63
1989	4,259,834	9,996,000	2.35
1990	4,403,369	10,296,200	2.34
1991	5,031,299	11,597,100	2.30
1992	4,587,137	10,167,700	2.22
1993	4,635,205	10,468,500	2.26
1994	4,893,381	10,718,900	2.19
1995	5,091,298	12,455,700	2.45
1996	5,124,403	10,895,700	2.13
1997	4,739,065	11,098,600	2.34
1998	5,584,828	11,894,800	2.13
1999	5,681,534	14,182,550	2.50
2000	4,775,003	10,278,600	2.15
2001	5,531,941	12,404,900	2.24
2002	5,659,914	14,369,900	2.54
2003	5,057,352	12,554,770	2.48
2004	4,661,961	9,064,000	1.94
2005	5,524,280	14,599,440	2.64
2006	4,825,869	10,615,250	2.20
2007	4,632,929	11,088,240	2.39
2008	4,325,219	8,951,090	2.07
2009	4,620,301	9,659,870	2.09
2010	4,465,426	9,661,039	2.16
2011	4,016,055	8,965,640	2.23
2012	4,301,485	11,115,883	2.58
2013	4,242,750	9,103,735	2.15
2014	4,023,414	7,310,516	1.82
2015	3,864,060	7,928,690	2.05



Average Day Demand (ADD)-The total volume of water delivered to the system over a year divided by 365 days.

Maximum Day Demand (MDD)-The largest volume of water delivered to the system in a single day.

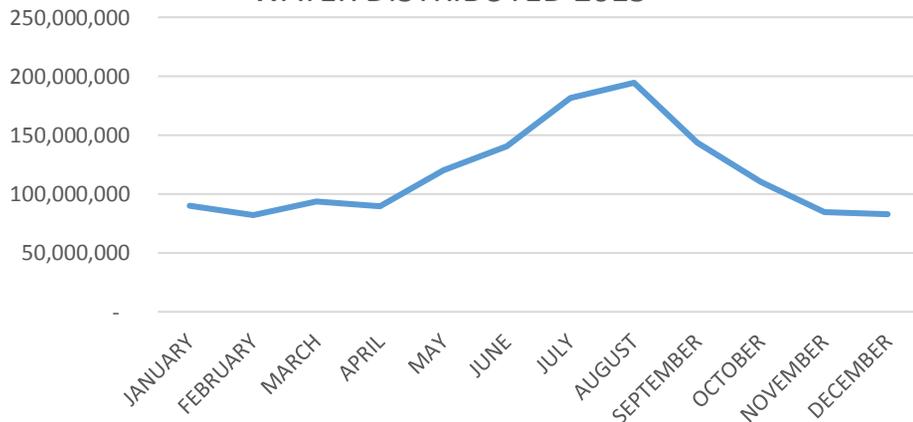
Peaking Factor-The peaking factor is the ratio of the maximum day demand to the average daily flow.

# TREATED WATER, DISTRIBUTED WATER AND FILTRATION

For the Year 2015

	DISTRIBUTION TOTAL	DISTRIBUTION AVE DAY	TREATMENT TOTAL	WASH WATER	WASH %	PLANT USE	PLANT %	AVE FILT RUN	AVE FILTER RATE	FILTER EFF. INDEX	AVE LOSS OF HEAD
JANUARY	89,867,686	2,898,958	92,958,324	1,081,745	1.19	1,619,619	1.75	64.7	2.01	331.0	1.10
FEBRUARY	82,083,932	2,931,569	84,538,679	1,229,092	1.44	1,485,255	1.76	75.4	1.77	310.7	1.30
MARCH	93,751,947	3,024,256	96,636,834	1,309,590	1.33	1,622,429	1.68	75.3	1.89	384.1	1.00
APRIL	89,504,069	2,983,469	92,059,717	1,002,137	1.10	1,557,940	1.70	67.9	1.94	821.7	0.60
MAY	120,015,842	3,871,479	123,351,605	1,448,924	1.21	1,759,409	1.46	87.5	1.93	572.7	1.10
JUNE	140,497,782	4,683,259	144,097,460	1,793,465	1.26	1,733,146	1.22	103.6	1.98	174.2	4.70
JULY	181,689,860	5,860,963	185,972,360	2,389,456	1.30	1,802,023	0.99	123.6	2.07	197.9	3.70
AUGUST	194,430,530	6,271,953	198,997,257	2,634,342	1.33	1,823,158	0.94	128.9	2.14	165.9	4.50
SEPTEMBER	143,846,127	4,794,871	147,709,564	2,114,830	1.38	1,740,626	1.19	105.0	2.00	146.6	5.00
OCTOBER	110,223,603	3,555,600	113,553,284	1,759,756	1.51	1,793,115	1.61	83.3	1.93	218.4	3.60
NOVEMBER	84,642,630	2,821,421	87,401,130	1,109,284	1.20	1,696,098	1.96	67.7	1.85	425.1	1.00
DECEMBER	82,827,795	2,671,864	85,563,715	1,028,083	1.21	1,752,725	2.05	64.2	1.86	291.0	1.30
AVERAGE	117,781,817	3,864,139	121,069,994	1,575,059	1.29	1,698,795	1.53	87.3	1.95	336.6	2.41
MAXIMUM	194,430,530	6,271,953	198,997,257	2,634,342	1.51	1,823,158	2.05	128.9	2.14	821.7	5.00
MINIMUM	82,083,932	2,671,864	84,538,679	1,002,137	1.10	1,485,255	0.94	64.2	1.77	146.6	0.60
TOTAL	1,413,381,803		1,452,839,929	18,900,704	15.46	20,385,543					

WATER DISTRIBUTED 2015



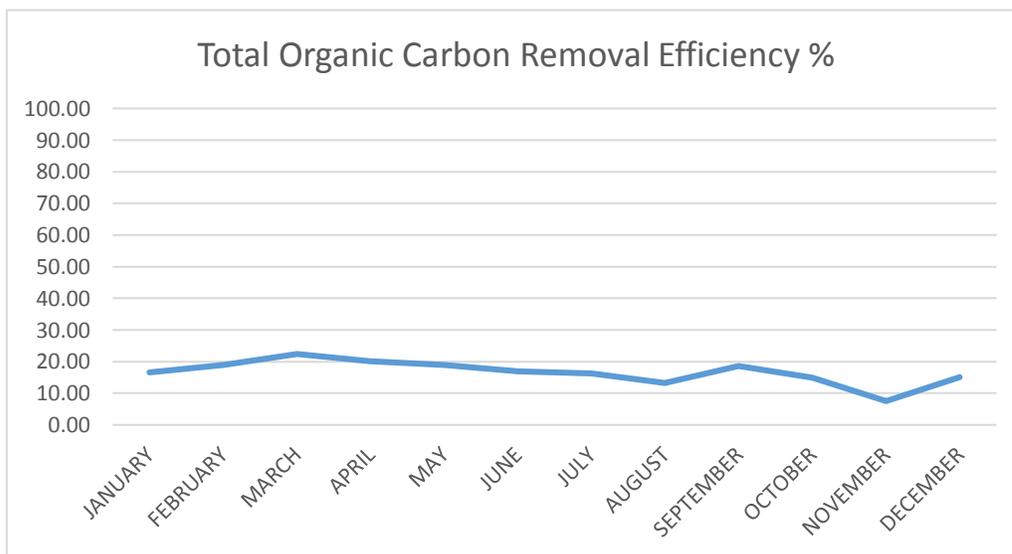
	TOC Compliance							
	Treated	Source	Formula		Req. TOC	Actual	Alternative	Compl. Perf.
	Tap	Tap	Ratio	Alka- linity	Removal	Ratio/ Remov	Criteria Complied Y/N	
January 2015	1.45	2.28	36.4	118	25	1.46	N(Removal)	1.46
February	1.27	1.61	21.1	127	15	1.41	N(Removal)	1.41
March	1.20	1.44	16.7	129	15	1.11	N(Removal)	1.11
April	1.15	1.48	22.3	118	25	0.89	Yes	1.00
May	1.33	1.71	22.2	123	15	1.48	N(Removal)	1.48
June	1.26	1.50	16.0	109	25	0.64	Yes	1.00
July	1.23	1.67	26.3	110	25	1.05	N(Removal)	1.05
August	1.34	1.60	16.3	108	25	0.65	Yes	1.00
September	1.22	1.55	21.3	108	25	0.85	Yes	1.00
October	1.23	1.58	22.2	109	25	0.89	Yes	1.00
November	1.21	1.56	22.4	113	25	0.90	Yes	1.00
December	1.27	1.46	13.0	111	25	0.52	Yes	1.00
Quarter Avg.								
Annual Avg.	1.26	1.62						1.13

## TOC AND UV254

RAW, FILTER CONFLUENCE AND REMOVAL EFFICIENCIES

FOR THE YEAR 2015

	UV RAW	UV FILTER	UV REM %	TOC RAW	TOC FILTER	TOC REM %
JANUARY	0.025	0.015	40	2.83	2.36	16.63
FEBRUARY	0.026	0.015	42	2.35	1.90	18.88
MARCH	0.033	0.018	45	2.13	1.65	22.40
APRIL	0.024	0.015	38	1.85	1.48	20.18
MAY	0.023	0.015	35	1.97	1.60	18.93
JUNE	0.020	0.015	25	1.90	1.58	16.85
JULY	0.023	0.015	35	2.00	1.67	16.17
AUGUST	0.029	0.019	34	2.47	2.15	13.18
SEPTEMBER	0.021	0.015	29	1.87	1.52	18.62
OCTOBER	0.022	0.015	32	2.22	1.89	14.84
NOVEMBER	0.024	0.015	38	2.23	2.07	7.52
DECEMBER	0.024	0.015	38	2.72	2.31	15.05
AVERAGE	0.025	0.016	36	2.211	1.848	16.60
MAXIMUM	0.033	0.019	45	2.827	2.357	22.40
MINIMUM	0.020	0.015	25	1.848	1.475	7.52



## STAGE 2 D/DBPR MONITORING-HALOACETIC ACIDS

December 2015 Report

WSSN 6310

DBP 1

Date	03/11/15
Site	Blossomland
Dibromoacetic acid	<1
Dichloroacetic acid	7.3
Monobromoacetic acid	<1
Monochloroacetic acid	<2
Trichloroacetic acid	7.2
Total HAA5	14.5

Date	06/11/15
Site	Blossomland
Dibromoacetic acid	<1
Dichloroacetic acid	13
Monobromoacetic acid	<1
Monochloroacetic acid	<2
Trichloroacetic acid	11
Total HAA5	24

Date	09/16/15
Site	Blossomland
Dibromoacetic acid	<1
Dichloroacetic acid	8.1
Monobromoacetic acid	<1
Monochloroacetic acid	<2
Trichloroacetic acid	12
Total HAA5	20.1

Date	12/09/15
Site	Blossomland
Dibromoacetic acid	<1
Dichloroacetic acid	9.4
Monobromoacetic acid	<1
Monochloroacetic acid	<2
Trichloroacetic acid	18
Total HAA5	27.4

RAA

22 µg/l

## STAGE 2 D/DBPR MONITORING-TTHM

December 2015

WSSN 6310

DBP 1

Date	03/11/15
Site	Blossomland
Bromodichloromethane	7.3
Bromoform	<0.5
Chloroform	9.5
Dibromochloromethane	3.8
Total Trihalomethanes	20.6

Date	06/11/15
Site	Blossomland
Bromodichloromethane	8.1
Bromoform	<0.5
Chloroform	16
Dibromochloromethane	3.1
Total Trihalomethanes	27.2

Date	09/16/15
Site	Blossomland
Bromodichloromethane	9.8
Bromoform	<0.5
Chloroform	18
Dibromochloromethane	3.5
Total Trihalomethanes	31.3

Date	12/09/15
Site	Blossomland
Bromodichloromethane	11
Bromoform	<0.5
Chloroform	25
Dibromochloromethane	3.4
Total Trihalomethanes	39.4

RAA

30 µg/l

STAGE 2 D/DBPR MONITORING-HALOACETIC ACIDS

OCTOBER 2015

WSSN 3726

Date	01/16/15	01/16/15
Site	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
Dibromoacetic acid	<1	<1
Dichloroacetic acid	5.1	15
Monobromoacetic acid	<1	<1
Monochloroacetic acid	<2	<2
Trichloroacetic acid	4.2	13
<i>Total HAA5</i>	9.3	28.0

Date	04/08/15	04/08/15
Site	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
Dibromoacetic acid	<1	<1
Dichloroacetic acid	9.3	19
Monobromoacetic acid	<1	<1
Monochloroacetic acid	<2	<2
Trichloroacetic acid	9.4	21
<i>Total HAA5</i>	18.7	40.0

Date	07/17/15	07/17/15
Site	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
Dibromoacetic acid	1.1	1.1
Dichloroacetic acid	14	17
Monobromoacetic acid	<1	<1
Monochloroacetic acid	<2	2.5
Trichloroacetic acid	8.6	12
<i>Total HAA5</i>	23.7	32.6

Date	10/07/15	10/07/15
Site	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
Dibromoacetic acid	2	1.2
Dichloroacetic acid	13	16
Monobromoacetic acid	<1	<1
Monochloroacetic acid	<2	<2
Trichloroacetic acid	10	14
<i>Total HAA5</i>	25	31.2

	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
<b>RAA (ppb)</b>	<b>19.2</b>	<b>33.0</b>

STAGE 2 D/DBPR MONITORING-TTHM

OCTOBER 2015

WSSN 3726

Date	01/16/15	01/16/16
Site	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
Bromodichloromethane	5.6	10
Bromoform	<0.5	<0.5
Chloroform	6.2	24
Dibromochloromethane	3.1	3.4
<i>Total Trihalomethanes</i>	14.9	37.4

Date	04/08/15	04/08/15
Site	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
Bromodichloromethane	6.6	8.9
Bromoform	<0.5	<0.5
Chloroform	10	23
Dibromochloromethane	2.4	2.5
<i>Total Trihalomethanes</i>	19	34.4

Date	07/17/15	07/17/15
Site	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
Bromodichloromethane	9.3	10
Bromoform	<0.5	<0.5
Chloroform	20	31
Dibromochloromethane	3.7	4
<i>Total Trihalomethanes</i>	33	45

Date	10/07/15	10/07/15
Site	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
Bromodichloromethane	7.3	8.6
Bromoform	<0.5	<0.5
Chloroform	16	27
Dibromochloromethane	2.8	3.2
<i>Total Trihalomethanes</i>	26.1	38.8

	Lincoln Twp Hall (DBP-1)	Dane (DBP-2)
<b>RAA (ppb)</b>	<b>23.3</b>	<b>38.9</b>

# ST. JOSEPH WATER QUALITY 2015

## TAP WATER-Water Plant Tap and Distribution System

	Hardness	Alkalinity	NCH	pH	Calcium	Magnesium	Turbidity	TDS	Conductivity	Total Coliform	Chlorine Tap	Distribution
JANUARY	149	105	44	7.3	42	11	0.04			0	1.81	1.34
FEBRUARY	156	111	45	7.3	44	11	0.04			0	1.80	1.41
MARCH	149	107	42	7.3	42	11	0.04			0	1.75	1.36
APRIL	142	103	39	7.3	38	12	0.03			0	1.68	1.20
MAY	142	101	41	7.4	39	11	0.03			0	1.53	1.06
JUNE	130	94	36	7.3	35	10	0.03			0	1.49	0.99
JULY	131	96	35	7.4	36	10	0.03			0	1.59	1.05
AUGUST	140	103	37	7.3	38	11	0.03			0	1.57	1.09
SEPTEMBER	129	97	32	7.3	37	10	0.03			0	1.64	1.04
OCTOBER	136	99	37	7.4	38	10	0.03			0	1.63	1.03
NOVEMBER	139	103	36	7.4	41	9	0.03			0	1.62	0.93
DECEMBER	143	106	37	7.4	40	11	0.03			0	1.60	1.00
Average	141	102	38	7.3	39	11	0.03	221	346	0	1.64	1.13
Maximum	156	111	45	7.4	44	12	0.04	290	377	0	1.81	1.41
Minimum	129	94	32	7.3	35	9	0.03	196	320	0	1.49	0.93

## RAW WATER-Lake Michigan Intake

	Hardness	Alkalinity	NCH	pH	Calcium	Magnesium	Turbidity	TDS	Conductivity
JANUARY	153	121	32	8.1	43	12	1.97		
FEBRUARY	158	127	31	8.1	42	13	1.98		
MARCH	153	124	29	8.1	42	11	0.79		
APRIL	147	119	28	8.1	38	12	0.76		
MAY	146	116	30	8.2	40	12	2.13		
JUNE	132	109	23	8.2	36	10	2.13		
JULY	132	110	22	8.2	36	10	4.91		
AUGUST	142	117	25	8.3	39	10	4.19		
SEPTEMBER	132	110	22	8.2	37	10	2.47		
OCTOBER	138	114	24	8.1	38	10	1.64		
NOVEMBER	143	119	24	8.1	42	10	4.47		
DECEMBER	144	119	25	8.1	40	11	1.32		
Average	143	117	26	8.2	39	11	2.40	240	351
Maximum	158	127	32	8.3	43	13	4.91	359	540
Minimum	132	109	22	8.1	36	10	0.76	192	271

# ST. JOSEPH RIVER WATER QUALITY 2015

DATE	pH	Total Hardness	Total Alkalinity	Calcium Hardness	Magnesium Hardness	TDS	Conductivity	Turbidity NTU	UV254	Nitrates	Total Coliform	E. coli
1/2/2015	8.2	292	228	94	14	392	586	3.16	0.123	1.7	727	18.9
3/13/2015	8.0	186	206	72	1	394	592	5.27	0.123	1.4		
3/20/2015	8.0	214	164	56	18	299	449	4.81	0.196	0.9		
4/10/2015	8.1	276	200	70	24	367	552	14.7	0.135	2.1	>2419.6	152.9
4/17/2015	8.2	266	220	58	30	383	575	2.87	0.140	1.2		
4/24/2015	8.3	272	220	52	34.5	369	553	2.54	0.130	1.1		
5/1/2015	8.3	266	217	72	21	393	588	2.34	0.127	1.2	235.9	14.5
5/15/2015	8.3	279	220	74	23	405	605	2.09	0.160	1.1		
5/22/2015	8.3	296	230	85	20	416	624	5.86				
5/29/2015	8.5	256	221	72	18	415	617	4.73	0.108	1.4		
6/5/2015	8.1	242	198	54	26	360	540	3.18	0.184	2.0	1732.9	55.6
6/12/2015	8.1	238	208	67	17	383	575	2.55	0.178	1.9		
6/19/2015	8.4	252	193	63	23	351	528	3.11	0.222	2.0		
6/26/2015	8.1	252	206	58	26	450	675	2.39	0.257	1.2		
7/10/2015	8.1	270	226	65	26	388	583	2.18	0.198	0.6		
7/17/2015	8.0	234	185	63	18	334	501	3.02	0.241	2.3		
7/24/2015	8.0	250	208	74	16	360	530	6.54	0.261	1.1	>2419.6	40.4
7/31/2015	8.2	220	227	72	10	383	576	2	0.239	1.4		
8/7/2015	8.2	274	223	65	27	388	581	2.04	0.186	0.9		
8/14/2015	8.3	282	225	74	24	402	598	2.41	0.158	0.8	40.4	
8/21/2015	8.2	278	222	70	25	403	605	1.94	0.125	1.7		
8/28/2015	8.1	262	225	70	21	401	603	1.68	0.135	0.6		
9/4/2015	8.2	270	234	79	17	412	613	2.12	0.141	0.7		
9/11/2015	8.2	286	231	78	22	414	617				>2419.6	101.4
9/18/2015	8.1	271	227	70	23	395	594	2.01	0.108	0.4		
10/2/2015	8.1	288	222	75	10	402	602	1.73	0.107	1.6	1732.9	55.6
10/9/2015	8.1	256	225	72	18	420	630	1.33	0.116	2.0		
10/16/2015	8.1	284	234	64	30	424	636	1.69	0.093	1.4		
10/23/2015	8.2	300	234	98	13	435	642	5.55	0.097	1.4		
11/6/2015	8.1	266	227	72	21	415	623	2.56	0.121	1.9	1986.3	127.4
11/20/2015	8.1	304	244	74	29	406	608	1.92	0.090	2.0		
12/11/2015	8.1	280	230	75	22	398	597	2.41	0.126	2.6		
Average	8.2	264	218	71	21	392	587	3.31	0.154	1.4	NA	70.8
Max	8.5	304	244	98	35	450	675	14.70	0.261	2.6	>2419.6	152.9
Min	8.0	186	164	52	1	299	449	1.33	0.090	0.4	40.4	14.5

# TREATMENT CHEMICAL SUMMARY

For the Year 2015

	ALUM (mg/l)	Total Lbs.	Cost	CHLORINE (mg/l)	Total Lbs.	Cost	FLUORIDE (mg/l)	Total Lbs.	Cost	ALL CHEMICALS Total Cost	CHEM COST (per MG)
JANUARY	1.90	1,471	\$ 4,281.00	2.9	2,259	\$ 587.34	0.88	683	\$ 2,048.01	\$ 6,916.35	\$ 74.41
FEBRUARY	2.04	1,439	\$ 4,187.86	3.0	2,089	\$ 543.14	1.1	772	\$ 2,315.34	\$ 7,046.34	\$ 83.35
MARCH	1.97	1,590	\$ 4,626.14	3.0	2,389	\$ 621.14	0.93	747	\$ 2,240.10	\$ 7,487.38	\$ 77.48
APRIL	1.84	1,409	\$ 4,098.90	2.9	2,212	\$ 575.12	1.12	857	\$ 2,571.84	\$ 7,245.86	\$ 78.71
MAY	1.78	1,837	\$ 5,345.52	3.1	3,206	\$ 833.56	1.12	1,158	\$ 3,474.72	\$ 9,653.80	\$ 78.26
JUNE	1.81	2,158	\$ 6,278.85	3.1	3,741	\$ 972.66	0.8	962	\$ 2,885.91	\$ 10,137.42	\$ 70.35
JULY	1.70	2,629	\$ 7,650.73	3.2	4,940	\$ 1,284.40	0.75	1,164	\$ 3,492.96	\$ 12,428.09	\$ 66.83
AUGUST	1.75	2,898	\$ 9,544.13	3.7	6,052	\$ 1,626.17	0.75	1,237	\$ 2,166.51	\$ 13,336.81	\$ 67.02
SEPTEMBER	1.83	2,246	\$ 7,397.88	3.3	4,022	\$ 1,080.71	0.76	933	\$ 1,633.87	\$ 10,112.46	\$ 68.46
OCTOBER	1.78	1,692	\$ 5,570.86	3.1	2,951	\$ 792.93	0.73	689	\$ 1,206.43	\$ 7,570.22	\$ 66.67
NOVEMBER	1.77	1,288	\$ 4,241.57	3.2	2,347	\$ 630.64	0.72	523	\$ 915.48	\$ 5,787.69	\$ 66.22
DECEMBER	1.62	1,152	\$ 3,795.26	2.9	2,075	\$ 557.55	0.72	517	\$ 905.16	\$ 5,257.97	\$ 64.45
AVERAGE	1.82	1,817	\$ 5,584.89	3.1	3,190	\$ 842.11	0.865	854	\$ 2,154.69	\$ 8,581.70	\$ 71.85
MAXIMUM	2.04	2,898	\$ 9,544.13	3.7	6,052	\$ 1,626.17	1.12	1,237	\$ 3,492.96	\$ 13,336.81	\$ 83.35
MINIMUM	1.62	1,152	\$ 3,795.26	2.9	2,075	\$ 543.14	0.72	517	\$ 905.16	\$ 5,257.97	\$ 64.45
TOTAL		21,809	\$ 67,018.70		38,283	\$ 10,105.36		10,242	\$ 25,856.33	\$ 102,980.39	\$ 862.21