

**CITY OF ST. JOSEPH WATER FILTRATION PLANT**  
**OPERATIONAL REPORT**  
**OCTOBER 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-OCTOBER 2015

Water demand in October was up by 6,844,674 gallons or 6.6% from last year. This is a continuation of a trend that began in August. This year 110,223,603 gallons were delivered which compares to 103,378,929 gallons delivered October of 2014. The October 2015 pumpage ranked 27<sup>th</sup> in the thirty year tabulation dating back to 1986.

### **GENERAL ACTIVITIES**

#### 2015 EPA Drinking Water Infrastructure Needs Survey

The City of St. Joseph participated in the 2015 Drinking Water Infrastructure Needs Survey. Projected capital planning information detailing the needs at the water plant and in the distribution system was gathered from the Water Plant Strategic Capital Improvement Plan and distribution system Reliability Study and submitted to EPA. The 1996 Safe Drinking Water Act Amendments mandated that EPA conduct an assessment of the nation's public water systems' infrastructure needs every four years (St. Joseph participated in 2011 as well) and use the findings to allocate Drinking Water State Revolving Fund (DWSRF) capitalization grants to states. The DWSRF was established to help public water systems obtain financing for improvements necessary to protect public health and comply with drinking water regulations. From 1997 to 2011 states loaned \$21.7 billion to water systems for 9,188 projects. The St. Joseph water tower, intake, and E&P projects were funded through DWSRF.

#### SWMRSS&WA Sanitary Survey

MDEQ District Engineer Gary Wozniak met with plant staff and SWMRSS&WA contract engineer Mary Nykamp of Wightman & Associates. Site visits were made to both Hilltop and Cleveland Booster stations as well as the Royalton and Lincoln Township Water Towers. The final report was received on October 14<sup>th</sup>. No deficiencies were noted. There were five recommendations made including the following: Update the General Plan and Reliability Study, continue to analyze water loss, initiate use of a hygrometer to ensure dosage accuracy at the booster stations, color-code the chlorine feed lines per AWWA standards and update the Emergency Response Plan to reflect current contact information. To date the chlorine line lines at the booster stations have been painted, a hygrometer has been ordered and the draft ERP is under staff review.

#### Intake Operation

Plant staff switched from the north intake to the south in anticipation of the storm force winds forecasted for the second week of November. This was done in order to minimize sand uptake in the north intake during storm events as recommended by Guy Meadows of Michigan Technological University last fall. Initial attempts to flow the older south intake were unsuccessful due to probable sand in the intake structures. Plant staff successfully backflushed the sand on November 11<sup>th</sup> and restored service. This intake became blocked again as storm force winds in excess of 50 knots and the resultant high waves and strong currents brought in heavy loads of plant material (leaves, branches, seaweed and sea grass). Plant staff cleared the material from the traveling screen and were able to get the station going again. It is noteworthy that the south intake which had been out of service since June 22<sup>nd</sup> had accumulated enough sand to prevent flow over the course of the last several months. Operating

procedures will be modified to include a bi-monthly maintenance flow test to assure that this intake will be available in the event of an emergency with the north intake. The south intake serves as an emergency back up and provides a water source to enable the backflushing of frazil ice or sand in the north.

#### Fairplain Interconnects

The Fairplain interconnect project has been postponed until Spring 2016

#### Travel & Training

Greg Alimenti attended the monthly West Michigan Supervisors meeting in South Haven.

Water Plant staff attended a one day course entitled, A Certified Operators Guide to the Safe Drinking Water Act.

#### Reclaim Basin Maintenance Cleaning

The reclaim basin at the water plant provides temporary storage for filter backwash water. This water is returned to the treatment train via the 30" raw water influent line at a controlled rate.

On average backwash usage runs 1.5% to 2.5% of total flow. This 200,000 gallon basin is located under filters 9-12 in the 1974 section of the plant. Backwash water is typically very low in suspended solids content.

Nonetheless, over the last several years sediment has accumulated close to 25 yards of material on the floor of the basin.

Competitive quotes were received for the removal of the material which would be temporarily stored at the water plant until it could be picked up by Public Works. In addition chemical analysis was done by Merritt Laboratories to assure that it could be safely placed in landfill. The maintenance cleaning was completed during the last week of October.

Given the difficulty experienced with removing this material plant staff installed a permanent sludge pump in the basin sump pit that will function to remove material seasonally. Annual cleaning will result in improved reclaim water quality. Staff also performed visual inspection of the concrete walls and floor of the basin and found no issues.

#### 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 will be submitted on time to MDEQ in December. Wightman & Associates is updated the Authority plan. General plans and reliability studies fall under Rule 1606 of the Safe Drinking Water Act (Public Act 399 as Amended).

#### Filtration Efficiency

Lake turnover and seasonal temperature changes have had an effect this year on filtration run times at the plant. This is manifested by way of air binding in the rapid sand filters.

In late September and early August plant staff reported markedly increased head loss which necessitated more frequent backwashes. Typically a filter will yield 120 hours or more of run time before needing a backwash. Recently, filter runs had dropped to as low as 40 hours. As of the second week of October filter runs had returned to near normal levels.

#### City Water Tower Mixer and Cathodic Protection

The City-owned water tower located on Cleveland Avenue North of Hilltop Road was built in 2010 to replace a fifty year old tank which had reached the end of its service life and was no longer optimally located to provide service to the system which was expanding to the south. The water tower serves a vital role in the City of St. Joseph water distribution system by providing a means to manage pressure, provide fire protection and serve as an emergency water supply.

An inspection conducted in May of 2015 revealed abrasion damage to the painted surface of the riser tube on the interior of the tank. The damage according Dixon Engineering was likely caused by ice. Competitive quotes were sought by City staff for a suitable mixer that would prevent icing. Due to limitations of access into the tank and a limited number of vendors only one proposal responsive to tank specifications was considered. Environmental Sales of Southfield, MI will furnish a GS-12 Gridbee submersible mixing system. Dixon Engineering will install and inspect the unit and complete the MDEQ permit.

Corrosion control equipment furnished by Corpro of Medina, OH was also installed while the tank was empty. The tank was taken out of service on October 30<sup>th</sup> and placed back on line on November 9<sup>th</sup>.

#### School Tours

The Water Plant hosted 280 eighth graders from Upton Middle School in October. Plant staff divided the group into smaller separately led groups that received tours of the plant and were given hands on training in the laboratory. There has been a resurgence in interest by the schools in the water plant in the last few years. Upcoming tours are scheduled with Lakeshore, Lake Michigan Catholic and Trinity Lutheran Schools.

# Monthly Maintenance Notes

October 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
10/06/15	Cummins Bridgeway - Full Service and Inspection per service agreement on Cleveland and Hilltop BPS Generators
10/07/15	Cummins Bridgeway - Full Service and Inspection per service agreement on Plant and Low Service Generators
10/09/15	Ro-Tork - Installed new resolver in # 9 Effluent valve to eliminate problems with valve losing its open and closed limits. Also reset all Rotork valves to stop on limit detection instead of factory torque setting of 100%. Valves now stop on open and closed limit detection with about 25% of torque on the valve. (Filter to waste and all filter effluent valves.
10/9 to 10/12/15	Drained and Cleaned Clarifier # 1
10/13/15	Changed Oil in Dodge Gear Drive on Clarifier # 1
10/14 & 10/15/15	Painted Deck on Clarifier # 1
10/19/15	Filled Clarifier # 1 (back in service)
10/19/15	Installed New Dewatering pump in Reclaim basin for cleaning
10/20/15	Mead & White - Installed motor starter and hooked up new Dewatering pump for Reclaim basin
10/26/15	Installed New Monitor in conference area
10/26/15	Drained and prepped Reclaim basin for cleaning
10/27/15	Northern A-1 - Cleaned debris from Reclaim Basin
10/28/15	Rewired chemical dosing pump for south steam boiler
10/29/15	Isolated City Tower and Drained for Cathodic protection and mixer installation

**DISTRIBUTION REPORT**

*For the Month of October 2015*

Activity		Number/Description	
Water Main Breaks		2	
MISS DIGS		396	
Delinquent Shut Off		14	LCT
Delinquent Shut Off (Broken Payment Plans)			
Hydrants (Repaired/Replaced)		1	North Bluffwood (SJCT), Hit by truck, breakaway flange Replaced on Division (Midway & Guard), leaking badly
Valves		0	
Taps (1")		6	527 Dunewood Drive (City) New Construction 2285 Forrest Hills Lane (SJCT) New Const 1618 Prairie Drive (RCT) New Const 6189 Laura Lane (LCT) New Const 1665 Fox Ridge Trail (RCT) New Const 6394 Stevensville Baroda Rd (LCT) Bad well
Cross Connection Control (Hydro Designs)		37	
Service Work (System Valves)		0	
Repair of Curb box/Shut-Off Valves		0	
Service Repair		2	2513 Willa Drive, 5984 Racine Drive, 1900 S. State (City)
Service Replacement		0	
Water Quality Complaint(s)		0	
Hydrant Flushing to maintain water quality		0	
Hydrant Flushing (Stage 2 Rule)		86,465	Authority
City Tower Drain for Mixer/Cathodic Installation		240,000	
Staff Education/Training		0	
Overtime-Total		67	(Including Sanitary and Storm)
Turn Off		16	(Note: For delinquent Shut off see above)
Turn On		6	
Finals		134	
<b>Meter Repair/Replacement</b>			
			Audit Meter
			Verify Read 5
Meter Repair			Move Mxu Box
Per detail			New Installation 5
Meter leaking		5	New Installation-Benton Harbor
Stopped Meter		11	Replaced/various reasons (1 downsize, 1 defective) 2
Faulty Register			Rockwell Replacement
Frozen Meter		1	Mxu Replaced 2
Move Meter Inside			Sprinkler meter removed/line capped
Hard to read		13	Removals/demo 2
Replace/Adding Sprinkler Meter			Curb box location
Damage to Trt			Broken Remote
New Plumbing		1	Noisy Meter 1
New siding		1	Upgrade 5/8" to 3/4" (upgrade to 1") 1
Meter sent out for testing		1	Meter Change/Benton Harbor

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

**For the Month/Year of: October 2015**

#	Date	Location	Main Size	Gallons Lost	Break Type	Valves Turned	City Twp	Labor	Remarks
1	10/15/2015	1592 North Riviera Drive	6	3,000	Crack	3	LCT	15.0	4.5 ft soil cover, wet sandy, Cast iron
2	10/31/2015	Wayne & Ship	10	350,000	Crack, hole	5	City	52.0	8 ft longitudinal crack & hole, loamy sand/clay at bottom of hole, Cast iron. 5 ft soil cover.
TOTALS				353,000		5		67.0	

**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**

**October 2015**

DISTRIBUTION:	
Total Gallons	110,223,603
Average Day	3,555,600
Maximum Day	4,515,732
Minimum Day	2,657,661

TREATMENT:	
Total Low Service	113,553,284
Wash Water Gals.	1,759,756
Wash Water %	1.51%
Plant Use Gals.	1,793,115
Plant Use %	1.61%

FILTRATION:		
Ave. Filter Run	83.3	hours
Ave. Filter Rate	1.93	g/sqft/min
Filter Eff. Index	218.4	
Ave. Loss of Head	3.6	feet
Plant Sewer Usage		

956 ccf      \$2,113.09

TREATMENT CHEMICAL SUMMARY:					
	Applied mg/L	Total Lbs.	Cost	Inventory lbs.	Days Supply
		CHEMICAL			
Alum (Al <sup>+3</sup> )	1.78	1,692	\$5,570.86	99,243	1819
Chlorine (Cl <sub>2</sub> )	3.13	2,951	\$792.93	6,408	67
Fluoride (F <sub>2</sub> )	0.73	689	\$1,206.43	3,231	145

LABRATORY REPORT		
Average of	Raw	Tap
Chlorides mg/L	19.1	19.8
Fluoride mg/L	0.10	0.72
Alkalinity mg/L	114	99
Hardness mg/L	138	136
pH	8.1	7.4
Calcium mg/L	38	38
Magnesium mg/L	10	10
Turbidity NTU	1.64	0.03
Temperature °F	56	
Total Coliform		0.0
Chlorine Residual		mg/L Free
Mixing Basin		0.93
Applied		1.62
Tap		1.63
Distribution		1.03

		REMARKS:			
Total Cost all Chemicals	\$7,570.22				
Chemical Cost per Mil. Gallon Treated	\$66.67				
Chemical Cost per Mil. Gallon Delivered	\$68.68				
<b>PLANT UTILITIES SUMMARY</b>					
Electric:					
Total KWH	231,600	***includes measure of melted snow			
Total Power Cost	\$ 16,212.00	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	\$ 142.77	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	\$ 157.57	<b>WEATHER CONDITIONS AT THE PLANT</b> Air Temp. °F			
Gallons Pumped per KWH	438	SJWW Weather Computer		Avg.	54.6
		Rain Guage, Inches	1.46	Max.	74.8
		days it rained***	8	Min.	383
		Wind Speed, Avg	9.3	Lake Temp. °F	
		Wind Speed, Max	54	Avg.	55.7
Natural Gas Cost	\$36.74	Prevailing Wind Dir.	NNE	Max	60.1
Emergency Power Diesel Fuel Inv., Gals.	North 1500	Lake Level (USACE)	549.2	Min	47.5
	South 300				

SOUTHWEST MICHIGAN REGIONAL SANITARY SEWER & WATER AUTHORITY  
CLEVELAND BOOSTER STATION

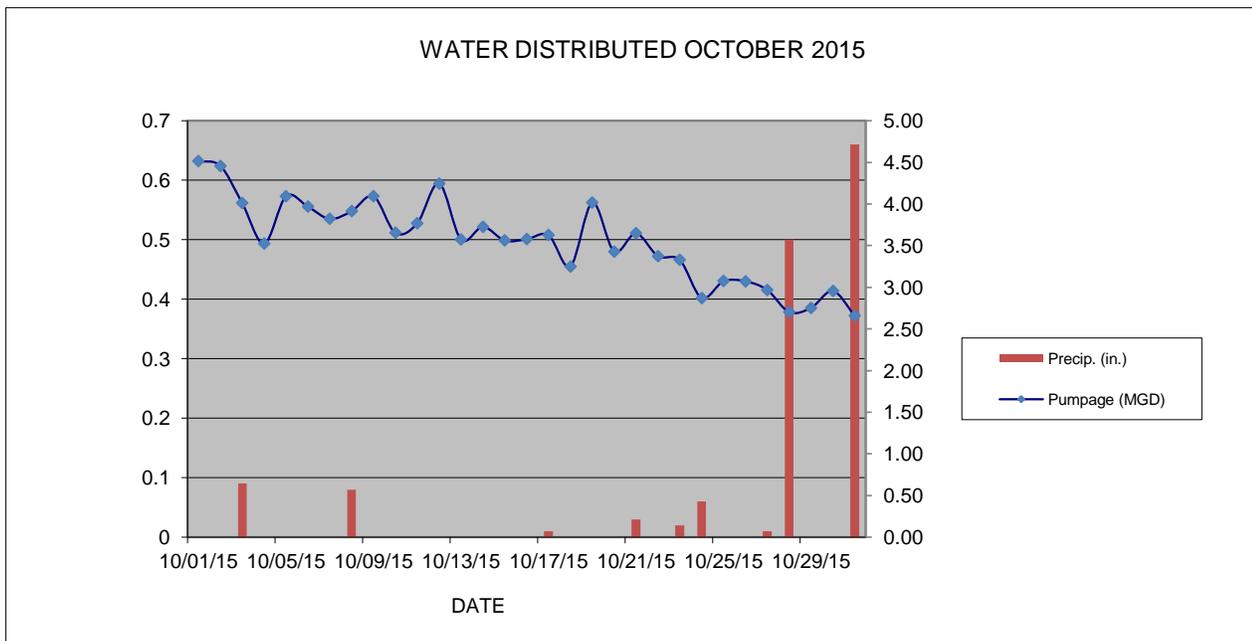
HILLTOP BOOSTER STATION

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-Oct	1.972	46	6.52	0.40	2.20	1.76	1.99	0.003	0	0.00	0.00	2.20	2.17	2.50	1.975
2-Oct	2.133	52	7.37	0.41	1.67	2.07	2.19	0.000	0	0.00	0.00	2.14	1.87	2.61	2.133
3-Oct	2.486	73	10.35	0.50				0.007	0	0.05	0.77				2.493
4-Oct	2.486	73	10.35	0.50				0.007	0	0.05	0.77				2.493
5-Oct	2.486	73	10.35	0.50	1.47	1.58	1.63	0.007	0	0.05	0.77	1.01	0.94	1.03	2.493
6-Oct	0.255	4	0.57	0.27	1.41	1.64	1.80	2.009	60	8.51	0.51	2.20	2.05	2.61	2.263
7-Oct	2.266	79	11.20	0.59	1.38	1.75	1.94	0.453	22	3.12	0.83	1.40	1.79	2.08	2.719
8-Oct	2.195	88	12.48	0.68	1.52	1.97	2.18	0.475	14	1.98	0.50	2.20	1.81	1.94	2.671
9-Oct	2.627	82	11.63	0.53	1.45	1.81	1.92	0.000	0	0.00	0.00	2.11	1.68	1.76	2.627
10-Oct	1.407	54	7.66	0.65				0.700	14	1.98	0.34				2.107
11-Oct	1.407	54	7.66	0.65				0.700	14	1.98	0.34				2.107
12-Oct	1.407	54	7.66	0.65	1.62	1.71	1.76	0.700	14	1.98	0.34	2.11	1.33	1.38	2.107
13-Oct	0.000	0	0.00	0.00	1.41	1.47	1.54	2.263	23	3.26	0.17	1.76	1.43	1.60	2.263
14-Oct	2.132	80	11.34	0.64	1.62	1.62	1.64	0.000	1	0.14	0.00	1.26	1.33	1.38	2.132
15-Oct	0.000	0	0.00	0.00	1.38	1.46	1.48	2.442	23	3.26	0.16	1.58	1.51	1.66	2.442
16-Oct	1.635	54	7.66	0.56	1.41	1.62	1.68	0.901	25	3.54	0.47	1.39	1.81	2.06	2.536
17-Oct	1.330	51	7.23	0.65				0.714	27	3.83	0.64				2.044
18-Oct	1.330	51	7.23	0.65				0.714	27	3.83	0.64				2.044
19-Oct	1.330	51	7.23	0.65	1.80	1.74	1.86	0.714	27	3.83	0.64	1.55	1.71	1.86	2.044
20-Oct	0.001	0	0.00	0.00	1.36	1.57	1.62	2.288	55	7.80	0.41	2.20	1.66	1.92	2.289
21-Oct	2.108	70	9.92	0.56	1.91	1.73	1.80	0.000	0	0.00	0.00	1.88	1.41	1.59	2.108
22-Oct	0.000	0	0.00	0.00	1.31	1.55	1.61	2.216	44	6.24	0.34	2.09	1.81	1.93	2.216
23-Oct	1.980	65	9.22	0.56	2.04	2.20	2.32	0.001	1	0.14	28.33	1.29	1.55	1.71	1.981
24-Oct	0.623	22	3.12	0.60				1.298	18	2.55	0.24				1.921
25-Oct	0.623	22	3.12	0.60				1.298	18	2.55	0.24				1.921
26-Oct	0.623	22	3.12	0.60	1.56	1.61	1.66	1.298	18	2.55	0.24	1.94	1.61	1.73	1.921
27-Oct	1.995	65	9.22	0.55	1.90	1.75	1.92	0.000	0	0.00	0.00	1.36	1.38	1.50	1.995
28-Oct	0.000	0	0.00	0.00	1.59	1.57	1.61	1.893	24	3.40	0.22	1.61	1.55	1.70	1.893
29-Oct	1.564	60	8.51	0.65	2.10	1.88	2.02	0.000	0	0.00	0.00	1.31	1.38	1.46	1.564
30-Oct	1.722	70	3.54	0.25	1.65	1.64	1.72	0.083	2	0.28	0.41	1.65	1.60	2.01	1.805
31-Oct	0.555	25	204.16	44.12				0.942	20	2.84	0.36				1.497
TOTAL	42.676	1,440	398.4					24.126	492	69.75					66.802
AVE DAY	1.377		12.9	1.87	1.6	1.7	1.8	0.7783		2.3	1.25	1.74	1.61	1.82	2.155
MAX	2.627		204.2	44.12	2.2	2.2	2.3	2.4416		8.5	28.33	2.2	2.17	2.61	2.719
MIN	0.000		0.0	0.00	1.3	1.5	1.5	0.0000		0.0	0.00	1.01	0.94	1.03	1.497
MONTHLY TOTALS:	Cleveland	Total MG Treated	42.676	SJCT EAST				Hilltop	Total MG Treated	24.126	Cleveland Pump Station:			42.676	
		Untreated	0.000	Average Day			0.1869		Untreated	0.003	Hilltop Pump Station:				
Total Authority Flow:	72.1908			Month Total			5.796			24.123	TOTAL AUTHORITY (Trted.)			42.676	

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

DATE	PUMPAGE (gallons)	PUMPAGE (MGD)	Rainfall (in)*	October 2014
10/01/15	4,515,732	4.52	0	4,189,440
10/02/15	4,457,065	4.46	0	3,781,059
10/03/15	4,009,510	4.01	0.09	3,476,965
10/04/15	3,523,256	3.52	0	3,120,513
10/05/15	4,093,641	4.09	0	3,253,029
10/06/15	3,967,126	3.97	0	3,853,510
10/07/15	3,821,245	3.82	0	3,536,309
10/08/15	3,913,940	3.91	0.08	3,339,848
10/09/15	4,093,119	4.09	0	3,509,652
10/10/15	3,652,681	3.65	0	3,675,750
10/11/15	3,768,856	3.77	0	3,284,792
10/12/15	4,246,436	4.25	0	3,221,809
10/13/15	3,572,497	3.57	0	3,174,834
10/14/15	3,726,568	3.73	0	3,755,388
10/15/15	3,561,354	3.56	0	3,211,403
10/16/15	3,577,147	3.58	0	2,786,843
10/17/15	3,625,290	3.63	0.01	3,154,230
10/18/15	3,250,622	3.25	0	3,010,306
10/19/15	4,015,084	4.02	0	3,214,644
10/20/15	3,429,230	3.43	0	3,373,373
10/21/15	3,647,501	3.65	0.03	3,290,460
10/22/15	3,374,563	3.37	0	3,297,841
10/23/15	3,328,549	3.33	0.02	3,293,598
10/24/15	2,871,890	2.87	0.06	2,828,848
10/25/15	3,072,764	3.07	0	2,794,786
10/26/15	3,071,739	3.07	0	2,812,832
10/27/15	2,967,305	2.97	0.01	3,776,846
10/28/15	2,702,783	2.70	0.5	4,495,857
10/29/15	2,752,720	2.75	0	3,290,348
10/30/15	2,955,729	2.96	0	3,044,929
10/31/15	2,657,661	2.66	0.66	2,528,888
<b>TOTAL</b>	<b>110,223,603</b>	<b>110.22</b>	<b>1.46</b>	<b>103,378,929</b>

<b>Average Day</b>	<b>3,555,600</b>
<b>Maximum Day</b>	<b>4,515,732</b>
<b>Minimum Day</b>	<b>2,657,661</b>

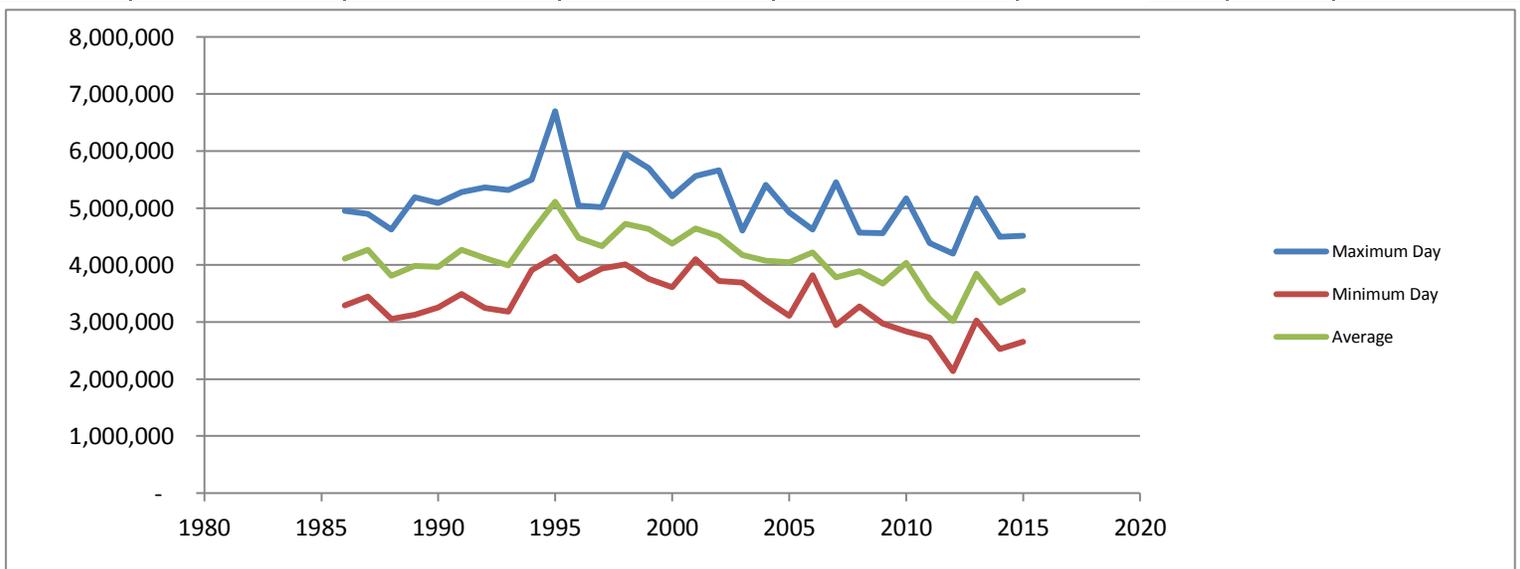


# ST. JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED

OCTOBER 2015

Year	Average	Maximum Day	Minimum Day	Monthly Total
1986	4,109,139	4,952,700	3,291,100	127,383,300
1987	4,267,894	4,892,900	3,450,900	132,304,700
1988	3,806,768	4,622,500	3,055,200	118,009,800
1989	3,986,361	5,189,800	3,123,200	123,577,200
1990	3,967,368	5,085,400	3,255,300	122,988,400
1991	4,262,319	5,274,700	3,494,000	132,131,900
1992	4,120,694	5,359,000	3,246,700	127,741,500
1993	3,990,787	5,311,000	3,183,200	123,714,400
1994	4,576,481	5,498,000	3,908,500	141,870,900
1995	5,110,329	6,697,750	4,145,750	158,420,200
1996	4,478,248	5,044,400	3,730,375	138,825,675
1997	4,326,223	5,014,100	3,937,500	134,112,900
1998	4,722,913	5,953,000	4,009,200	146,410,300
1999	4,635,503	5,700,000	3,756,700	143,700,600
2000	4,377,215	5,202,250	3,609,500	135,693,650
2001	4,641,072	5,563,000	4,106,500	143,873,240
2002	4,507,228	5,665,250	3,717,250	139,724,080
2003	4,172,994	4,605,040	3,688,250	129,362,820
2004	4,072,083	5,407,660	3,381,750	126,234,560
2005	4,048,260	4,924,500	3,111,000	125,496,050
2006	4,223,672	4,622,024	3,821,251	130,993,825
2007	3,782,964	5,451,500	2,945,000	117,271,870
2008	3,897,484	4,568,000	3,274,890	120,822,920
2009	3,675,142	4,557,250	2,976,750	113,939,560
2010	4,036,904	5,166,249	2,832,295	125,144,029
2011	3,400,119	4,384,390	2,727,365	105,403,683
2012	3,018,269	4,199,562	2,138,902	93,566,332
2013	3,848,340	5,171,412	3,030,222	119,298,259
2014	3,334,804	4,495,857	2,528,888	103,378,929
2015	3,555,600	4,515,732	2,657,661	110,223,603

Rank	Year	Monthly Total
1	1995	158,420,200
2	1998	146,410,300
3	2001	143,873,240
4	1999	143,700,600
5	1994	141,870,900
6	2002	139,724,080
7	1996	138,825,675
8	2000	135,693,650
9	1997	134,112,900
10	1987	132,304,700
11	1991	132,131,900
12	2006	130,993,825
13	2003	129,362,820
14	1992	127,741,500
15	1986	127,383,300
16	2004	126,234,560
17	2005	125,496,050
18	2010	125,144,029
19	1993	123,714,400
20	1989	123,577,200
21	1990	122,988,400
22	2008	120,822,920
23	2013	119,298,259
24	1988	118,009,800
25	2007	117,271,870
26	2009	113,939,560
<b>27</b>	<b>2015</b>	<b>110,223,603</b>
28	2011	105,403,683
29	2014	103,378,929
30	2012	93,566,332



	TOC Compliance							
	Treated	Source	Formula		Req. TOC	Actual	Alternative	Compl. Perf.
	Tap	Tap	Ratio	Alka- linity	Removal	Ratio/ Remov	Criteria Complied Y/N	
November	1.12	1.48	24.3	114	25	0.97	Yes	1.00
December	1.23	3.84	68.0	192	15	4.53	N(Removal)	4.53
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 2015	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
Quarter Avg.								
Annual Avg.	1.25	1.81						1.46

**MONTHLY CLIMATOLOGICAL SUMMARY**

**October**

**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	51.3	58	<b>60.4</b>	2:00p	69	87	1971	<b>43.8</b>	8:00a	47	26	1984	13.7	0	<b>0</b>	<b>6.5</b>	<b>23</b>	6:30p	NE
2	52.8	58	<b>64</b>	4:30p	68	86	1971	<b>44.9</b>	6:00a	46	28	1981	12.2	0	<b>0</b>	<b>6</b>	<b>24</b>	9:30p	NNE
3	49.4	57	<b>55.6</b>	2:30p	68	84	1953	<b>45.3</b>	8:30p	46	28	1974	15.6	0	<b>0.09</b>	<b>5.7</b>	<b>23</b>	8:00a	NE
4	50.6	57	<b>58.4</b>	3:00p	68	86	1951	<b>46.4</b>	12:30a	46	27	1989	14.4	0	<b>0</b>	<b>3.9</b>	<b>17</b>	1:00a	NNE
5	52.1	57	<b>54.7</b>	5:00p	67	85	1990	<b>49.3</b>	8:30a	45	25	1993	12.9	0	<b>0</b>	<b>3.1</b>	<b>12</b>	8:30p	NNE
6	54.5	56	<b>64.3</b>	6:30p	67	85	1963	<b>49.8</b>	5:30a	45	28	1988	10.5	0	<b>0</b>	<b>1.9</b>	<b>10</b>	2:30a	NNE
7	57.4	56	<b>64</b>	2:00p	66	85	1963	<b>50.1</b>	12:00m	44	26	1988	7.6	0	<b>0</b>	<b>5.1</b>	<b>17</b>	4:00p	S
8	61.1	56	<b>72.2</b>	1:00p	66	85	1949	<b>49.6</b>	1:30a	44	23	1989	5.8	1.9	<b>0.08</b>	<b>6.2</b>	<b>20</b>	11:00p	SSW
9	56.9	55	<b>64.1</b>	12:30a	66	82	1949	<b>53</b>	12:00m	44	19	1989	8.1	0	<b>0</b>	<b>15.3</b>	<b>35</b>	6:00p	N
10	54.2	55	<b>61.5</b>	5:30p	65	85	1949	<b>45.1</b>	8:00a	43	23	1956	10.8	0	<b>0</b>	<b>5.1</b>	<b>21</b>	11:30p	E
11	63.3	54	<b>74.8</b>	6:30p	65	85	1962	<b>55.9</b>	8:30a	43	26	1993	3.5	1.8	<b>0</b>	<b>11.3</b>	<b>28</b>	11:00a	SSW
12	63.3	54	<b>68.8</b>	6:30p	64	84	1962	<b>59.8</b>	12:00m	43	23	1990	1.9	0.3	<b>0</b>	<b>12.1</b>	<b>35</b>	11:30p	SSE
13	55.4	54	<b>59.8</b>	12:30a	64	85	1975	<b>53.9</b>	2:00p	42	20	1993	9.6	0	<b>0</b>	<b>19.1</b>	<b>37</b>	2:00a	WNW
14	54.4	53	<b>58.6</b>	3:30p	63	84	1962	<b>50.1</b>	10:30p	42	24	1993	10.6	0	<b>0</b>	<b>11.1</b>	<b>29</b>	12:30a	N
15	58.5	53	<b>63</b>	6:30p	63	85	1962	<b>51.3</b>	12:30a	42	31	1983	6.5	0	<b>0</b>	<b>18</b>	<b>53</b>	6:30p	SW
16	52	53	<b>57.5</b>	12:30a	63	85	1963	<b>45.9</b>	12:00m	42	24	1991	13	0	<b>0</b>	<b>15.3</b>	<b>31</b>	1:00p	NW
17	44.8	52	<b>49.2</b>	6:30p	62	84	1963	<b>40.4</b>	11:30p	41	24	1982	20.2	0	<b>0.01</b>	<b>9</b>	<b>34</b>	11:00a	N
18	49.3	52	<b>57.2</b>	6:30p	62	82	1950	<b>38.3</b>	2:00a	41	25	1990	15.7	0	<b>0</b>	<b>6.4</b>	<b>28</b>	4:00a	NW
19	56.7	51	<b>70.3</b>	5:30p	61	82	1953	<b>42.8</b>	2:00a	41	23	1972	9.1	0.8	<b>0</b>	<b>11.9</b>	<b>38</b>	1:30p	SSW
20	64.1	51	<b>70.3</b>	6:00p	61	81	1953	<b>59.8</b>	9:00a	40	23	1988	1.8	1	<b>0</b>	<b>8.9</b>	<b>33</b>	10:00a	SSW
21	63.1	51	<b>71.7</b>	2:00p	60	83	1953	<b>56.5</b>	4:00a	40	21	1952	3.2	1.2	<b>0.03</b>	<b>8</b>	<b>34</b>	1:30a	SSW
22	56.8	50	<b>65.4</b>	12:30a	60	85	1953	<b>49.4</b>	12:00m	40	21	1989	8.2	0	<b>0</b>	<b>9.8</b>	<b>22</b>	8:30a	N
23	54	50	<b>61.1</b>	11:00p	60	83	1963	<b>45.8</b>	5:30a	39	20	1990	11	0	<b>0.02</b>	<b>3.9</b>	<b>21</b>	10:30p	E
24	60.3	50	<b>68.6</b>	1:00p	59	80	1963	<b>54.7</b>	11:30p	39	22	1982	5	0.4	<b>0.06</b>	<b>12.7</b>	<b>35</b>	5:00p	SE
25	54.2	49	<b>59.6</b>	12:00p	59	80	1963	<b>45.6</b>	12:00m	39	22	1987	10.8	0	<b>0</b>	<b>9.4</b>	<b>32</b>	2:00a	WNW
26	50.5	49	<b>63.8</b>	3:00p	58	80	1963	<b>41.6</b>	8:30a	39	19	1990	14.5	0	<b>0</b>	<b>3</b>	<b>14</b>	3:30p	E
27	54.4	49	<b>61.8</b>	3:00p	58	80	1963	<b>47.9</b>	9:00a	38	21	1976	10.6	0	<b>0.01</b>	<b>3.9</b>	<b>22</b>	1:30p	E
28	53.5	48	<b>58.3</b>	12:30p	57	76	1989	<b>46.2</b>	11:30p	38	27	1951	11.5	0	<b>0.5</b>	<b>15.5</b>	<b>50</b>	9:30p	SW
29	46.3	48	<b>50</b>	12:00m	57	78	1999	<b>42.7</b>	8:30a	38	18	1990	18.7	0	<b>0</b>	<b>27.7</b>	<b>54</b>	8:00a	WSW
30	49.9	48	<b>55.8</b>	6:00p	56	81	1950	<b>45.6</b>	7:00a	38	15	1988	15.1	0	<b>0</b>	<b>5.3</b>	<b>20</b>	1:00a	SE
31	48.2	47	<b>54</b>	12:00m	56	82	1950	<b>45.5</b>	1:00p	37	15	1988	16.8	0	<b>0.66</b>	<b>7.4</b>	<b>28</b>	9:00p	SSE
AVE													<b>10.6</b>	<b>0.2</b>	<b>0.0</b>	<b>9.3</b>	<b>28.4</b>		NNE
MAX	<b>64.1</b>	<b>58</b>	<b>74.8</b>			<b>87</b>		<b>59.8</b>		<b>47</b>	<b>31</b>		<b>20.2</b>	<b>1.9</b>	<b>0.66</b>	<b>27.7</b>	<b>54.0</b>		
MIN	<b>44.8</b>	<b>47</b>	<b>49.2</b>					<b>38.3</b>		<b>37</b>	<b>15</b>		<b>1.8</b>	<b>0</b>	<b>0</b>	<b>1.9</b>	<b>10</b>		
TOTAL															<b>1.46</b>				

Max Rain: 0.66 ON 10/31/15  
 Days of Rain: 7 (>.01 in) 2 (>.1 in) 0 (>1 in)