

**CITY OF ST. JOSEPH WATER FILTRATION PLANT**  
**OPERATIONAL REPORT**  
**DECEMBER 2014**



**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 2014

Water demand in December was down by 7,665,976 gallons or 9.1% from last year. This year 83,371,249 gallons were delivered which compares to 91,037,225 gallons delivered in December of 2013. Also apparent in December is a decrease in average day consumption that began in 1995 and parallels a similar trend observed during the Fall months. The 2014 pumpage ranks 30<sup>th</sup> in the 30 year tabulation dating back to 1985.

### **GENERAL ACTIVITIES**

#### *Strategic Capital Improvement Plan*

The SCIP project is complete. The report will be presented to the Water Services Joint Operating Board on January 21, 2015 and to the City Commission during their March study session. Both boards received the executive summary in December. The St. Joseph SCIP is timely since we learned in October that the Michigan Department of Environmental Quality will be requiring all water supplies to submit capital improvement plans by January 1, 2016.

#### *Water Plant Security*

Installation of the security system is nearly complete. Two weather rated high resolution cameras were received on January 14<sup>th</sup> and will be installed once a service date can be scheduled with the vendor. Plant staff and Mead & White began running conduit and cable in August and worked with Simplex Grinnell and Double K Enterprises to install the card readers, cameras and monitoring equipment. The system is now on line and operating.

#### *Process Chlorination*

In light of the elevated disinfection byproducts results obtained in September and October plant staff is working to reduce their formation by shifting chlorination in the process. One of the treatment strategies available to reduce DBP's is the reduction of chlorine feed in the clarifiers prior to sedimentation. By reducing the chlorine dose in the wetwell and proportionately increasing it in the applied prior to filtration we hope to achieve lower DBP formation. In consultation with MDEQ and CH2M Hill and upon close review of treatment records we initiated this process in early December and took a conservative approach by establishing a setpoint on the applied water feed and adjusting the chlorine dose to the raw water as needed. This approach has resulted in an effective shift of dose from approximately 90/10 to 50/50 (Raw/Applied). Plant staff is also monitoring chlorine contact time to assure optimum disinfection.

#### *Shoreline Protection*

Lake Michigan is up 35 inches since its record low in November of 2012. Staff is closely monitoring the condition of the shoreline protection for the facility. The City of St. Joseph has always been diligent in protecting the water plant from shoreline erosion. Shore protection was fortified in 1929, 1952, 1974 and most recently 2008. In 2008, the USACE and the City participated in a \$600,000 Section 14 Project to replace 325 ft. of rip rap extending from the northerly boundary of the plant south. The protection consisted of a geotextile fabric layer followed by a layer of small mattress stone. On top of the mattress zone large granite rock weighing from 4,000-6,000 lbs. per piece was placed by means of a heavy excavator. The stone was trucked in from a quarry in Wisconsin and the contractor was Luedke Marine of Frankfort, MI. A section of the stone was moved temporarily to facilitate construction of the shorewell in 2011.

USACE returned to inspect the project to assure that the reconstructed shore protection met USACE standards. The City is required to perform annual inspections. In spite of the size of the rock, its cumulative weight and the engineered design, it is expected to degrade over time. In light of this eventual reality and the fact that the protection for the remainder of the facility dates back to the 1970's replacement has been funded in the SCIP. In light of the heavy October storms, we requested a courtesy inspection by USACE which was conducted on December 16<sup>th</sup>. USACE engineers discovered three areas of minor damage. They recommended that the replacement of the geotextile fabric, bedding stone and armor stone in the affected areas. Undamaged rock may be reused. They estimated two truckloads of rock would be needed. Staff contacted the quarry that supplied the 2008 stone and received a quote of \$1,700 per truck load. A local contractor could be used to place the stone and the City could provide engineering in house. The project would cost in the range of \$15,000 to \$20,000 by my estimate and would be done in the Spring weather permitting. The USACE written report was received on January 15<sup>th</sup>.

#### *Cross Connection Control Inspections*

Hydro Designs completed 20 inspections in the City during the week of November 17<sup>th</sup>. The total number of contract inspections completed during the year was 311. There are currently 22 accounts that are in non-compliance. The majority of these involve backflow prevention devices that have not been tested by a licensed plumber and the remainder require correction of the plumbing/device. These customers were notified by mail and will be called. If they do not comply they will be shut off. Seven shut off notices were sent in December. One remains in shut off status as of January 14<sup>th</sup>. The three year contract with Hydro Designs will be brought before the City Commission in January for renewal.

#### *D/DBPR Stage 2 October Authority Monitoring*

Laboratory analysis of the October sample taken on the 15<sup>th</sup> revealed a HAA5 result of 105 ppb. This posed a concern since the running annual average must not exceed 60 ppb. A second sample was taken on October 31<sup>st</sup> in which a result of 38 ppb was found. Given the low levels of HAA5 found throughout the year we expect to remain in compliance. Nonetheless, plant staff is actively exploring measures to improve HAA5 reduction through treatment, on-line laboratory analysis and diligent flushing of the distribution system. The City has undertaken unidirectional flushing this fall in the City service area and will resume in the spring. The Authority quarterly samples were taken on January 14<sup>th</sup>.

#### *Microscopy/Monitor*

This year we obtained a low power microscope and monitor interface which enables staff to observe and identify microscopic matter, particularly algae in the plant raw water. Shawn and I were impressed with the microscope on board the Grand Valley State University research vessel and brought the idea back to St. Joseph in July. Ironically the blue green algae story on Lake Erie broke in early August underlining the importance of knowing from a biological standpoint what is in our raw water. Nonetheless, we have been somewhat disappointed as budding microbiologists in what we have found in our raw water.

#### *Water Plant Operator*

The open operator position was posted internally in December and will be advertised during the week of January 12<sup>th</sup>.

#### *Lake Michigan Ice Cover*

Despite what was for us in Southwest Michigan was a somewhat mild Fall, ice cover on Lake Michigan set a record in November for the earliest formation since records began in 1970. As of January 15<sup>th</sup> ice cover on the lake was 26.2%. We have experienced no frazil ice problems with the new intake constructed in 2011. Stay tuned.

**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 2014**

DISTRIBUTION:	
Total Gallons	83,371,249
Average Day	2,689,395
Maximum Day	3,011,321
Minimum Day	2,325,798

TREATMENT:	
Total Low Service	86,136,405
Wash Water Gals.	1,131,895
Wash Water %	1.29%
Plant Use Gals.	1,616,552
Plant Use %	1.88%

FILTRATION:		
Ave. Filter Run	68.1	hours
Ave. Filter Rate	1.76	g/sqft/min
Filter Eff. Index	342.7	
Ave. Loss of Head	1.0	feet
Plant Sewer Usage 905 \$ 2,000		

LABORATORY REPORT		
Average of	Raw	Tap
Chlorides mg/L	19.7	19.8
Fluoride mg/L	0.16	0.90
Alkalinity mg/L	121	106
Hardness mg/L	149	147
pH	8.1	7.3
Calcium mg/L	42	41
Magnesium mg/L	10	9
Turbidity NTU	1.23	0.03
Temperature °F	40	
Total Coliform		0.0
Chlorine Residual mg/L Free		
Mixing Basin		1.05
Applied		1.68
Tap		1.76
Distribution		1.15

TREATMENT CHEMICAL SUMMARY:					
	Applied mg/L	Total Lbs.	Cost	Inventory lbs.	Days Supply
		CHEMICAL			
Alum (Al <sup>+3</sup> )	1.81	1,297	\$3,773.86	5,324	127
Chlorine (Cl <sub>2</sub> )	3.24	2,324	\$604.24	10,535	141
Fluoride (F <sub>2</sub> )	0.62	448	\$1,343.49	2,601	180

			REMARKS:			
Total Cost all Chemicals		\$5,721.59				
Chemical Cost per Mil. Gallon Treated		\$66.42				
Chemical Cost per Mil. Gallon Delivered		\$68.63				
PLANT UTILITIES SUMMARY						
Electric:						
Total KWH		5,440	***includes measure of melted snow			
Total Power Cost		\$426.06	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		\$152.36	e-mail comments to either: <a href="mailto:operator@sjcity.com">operator@sjcity.com</a> or <a href="mailto:alimenti@sjcity.com">alimenti@sjcity.com</a>			
Power Cost per Million Gallon Delivered		\$183.14	WEATHER CONDITIONS AT THE PLANT		Air Temp. °F	
Gallons Pumped per KWH		15326	SJWW Weather Computer		Avg.	36
			Rain Guage, Inches	1.1	Max.	49.7
			days it rained***	12	Min.	18.5
Natural Gas:			Wind Speed, Avg	9.3	Lake Temp. °F	
Metered Cubic Feet		7663	Wind Speed, Max	53	Avg.	39.6
Natural Gas Cost		\$6,044.10	Prevailing Wind Dir.	SSE	Max	42.2
Emergency Power Diesel Fuel-South Plant	Full	2400	Lake Level (USACE)	579.07	Min	37.8
Emergency Power Diesel Fuel-North Plant	3/4 Full	620				

# Monthly Maintenance Notes

DECEMBER 2014

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 Maintenance at Plant, Booster Stations and Towers
12/05/14	Repaired Limit switch on Filter 10 RH surface wash valve to allow backwash cycle to complete in automatic mode
12/8 & 12/9/14	Cleaned unit heaters in Clarifier 2 & 3 room, tunnels and garage area's
12/15/14	Cleaned Fluoride Day Tank
12/16/14	Cummins Bridgeway - Service call for North Low Service Generator, Generator failed to start during normal exercise time, FSO alarm same as what was repaired in Oct. Jeff from Cummins replace ECM (engine control module) the unit removed looked to be burned. Generator back in service
12/18/14	Replace conduit for both pump motors at Hilltop BPS, Existing conduit fittings were broken, replaced with correct Liquid Tight fittings and conduit.
12/29/14	D.A. Dodd - Rebuilt Hot Water Circulation Pump # 2 for North Boiler

**DISTRIBUTION REPORT**

*For the Month of December 2014*

Activity	Number	Description
Water Main Breaks	4	
MISS DIGS	136	
Delinquent Shut Off	27	17 (SJCTW), 10 (SJCTE)
Delinquent Shut Off (Broken Payment Plans)	2	
Hydrants (Repaired/Replaced)	10	RCT-Minor repairs (gaskets, frozen caps)
Valves	1	5615 Ridge Rd (4"), Repaired broken valve-would not close
Taps (1")	5	4843 South Cedar Trail (LCT) Bad well
		4490 Chapparel Rd (RCT) Bad well
		2641 Heritage Way (LCT) New const
		5540 Golden Crest LCT) Bad well
		983 Miners Road (RCT) Bad well
Cross Connection Control (Hydro Designs)		
Service Work (system valves)		
Water Service Repairs	0	
Repair of Curb box/Shut-Off Valves	17	Curb box repairs in SJCTE
Water Quality Complaint(s)	0	
Unidirectional Flushing Program (City)		
Hydrant Flushing to maintain water quality		
Hydrant Flushing (Stage 2 City-December)	30,858	
Staff Education/Training	0	
Overtime-Total	133	(Including Sanitary and Storm)
Turn Off	15	(Note: This number does not include delinquent Shut off)
Turn On	5	
Finals	79	
Meter Repair		
Meter Repair/Replacement	37	Verify Read 3
Per detail	4	New Installation 11
Meter leaking	4	New Installation-Benton Harbor
Stopped Meter	15	Replaced/various reasons
Faulty Register		Rockwell Replacement
Frozen Meter	2	Mxu Replaced
Move Meter Inside	1	Sprinkler meter removed/line capped
Hard to read	8	Removals 2
Replace/Adding Sprinkler Meter		Curb box location 1
Damage to Trt		Broken Remote
New Plumbing	2	Noisy Meter
New siding	1	Upgrade 5/8" to 3/4"
Meter sent out for testing		Meter Change/Benton Harbor

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

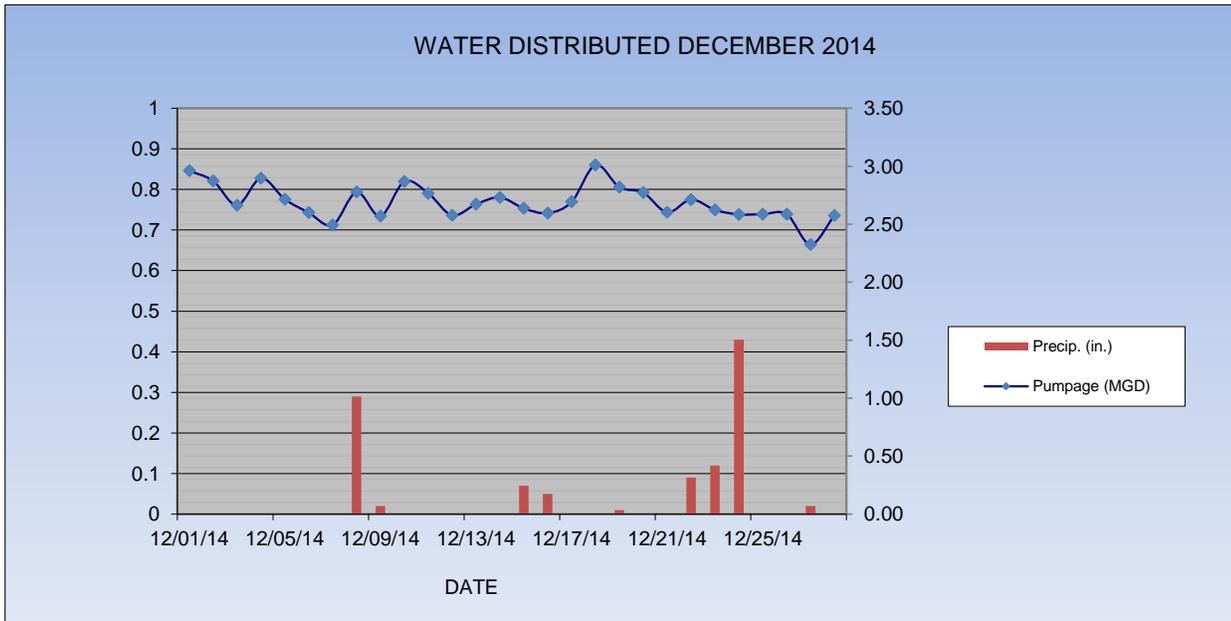
*For the Month/Year of: December 2014*

#	Date	Location	Main Size	Gallons Lost	Break Type	Valves Turned	City Twp	Labor	Remarks
1	12/8/2014	2847 Niles Rd	6"	3,000			RCT	25	Main was pitted. Pavement 10" thick. Depth 6'
2	12/13/2014	2618 S. State (Petrie and Botham)	10"	36,000	hole		City	25	Tennis ball size hole
3	12/24/2014	796 Miller (Kim St. and Kevin St.)	6"	5,000	Circumferential		SJCT	NA	6" crack
4	12/25/2014	5624 Ridge Road (Kirk and Oak)	6"	5,000			LCT	NA	
5									
6									
		Total Gallons Lost		49,000					

**ST JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED/RAINFALL  
DECEMBER 2014**

DATE	PUMPAGE (gallons)	PUMPAGE (MGD)	Rainfall (in)	Day to Day Comparison 2014/2013	
				2014	2013
12/01/14	2,961,242	2.96	0	2,961,242	3,181,605
12/02/14	2,873,099	2.87	0	2,873,099	3,868,776
12/03/14	2,663,551	2.66	0	2,663,551	2,548,169
12/04/14	2,897,054	2.90	0	2,897,054	3,130,691
12/05/14	2,714,932	2.71	0	2,714,932	2,973,908
12/06/14	2,599,374	2.60	0	2,599,374	2,507,881
12/07/14	2,493,255	2.49	0	2,493,255	2,350,219
12/08/14	2,776,475	2.78	0.29	2,776,475	2,375,474
12/09/14	2,569,010	2.57	0.02	2,569,010	2,828,617
12/10/14	2,868,152	2.87	0	2,868,152	2,746,407
12/11/14	2,766,942	2.77	0	2,766,942	2,664,899
12/12/14	2,576,713	2.58	0	2,576,713	2,845,951
12/13/14	2,672,155	2.67	0	2,672,155	2,925,231
12/14/14	2,731,229	2.73	0	2,731,229	2,614,989
12/15/14	2,636,886	2.64	0.07	2,636,886	2,662,775
12/16/14	2,595,791	2.60	0.05	2,595,791	2,970,099
12/17/14	2,692,379	2.69	0	2,692,379	3,022,337
12/18/14	3,011,321	3.01	0	3,011,321	3,210,451
12/19/14	2,819,148	2.82	0.01	2,819,148	3,253,743
12/20/14	2,772,318	2.77	0	2,772,318	3,095,114
12/21/14	2,601,819	2.60	0	2,601,819	3,130,633
12/22/14	2,713,023	2.71	0.09	2,713,023	2,628,738
12/23/14	2,623,544	2.62	0.12	2,623,544	2,926,038
12/24/14	2,584,704	2.58	0.43	2,584,704	3,388,700
12/25/14	2,585,813	2.59	0	2,585,813	2,718,105
12/26/14	2,586,864	2.59	0	2,586,864	2,957,920
12/27/14	2,325,798	2.33	0.02	2,325,798	3,296,914
12/28/14	2,575,646	2.58	0	2,575,646	2,783,810
12/29/14	2,703,664	2.70	0	2,703,664	3,275,095
12/30/14	2,714,955	2.71	0	2,714,955	2,714,138
12/31/14	2,664,391	2.66	0	2,664,391	3,439,798
<b>TOTAL</b>	<b>83,371,249</b>	<b>83.37</b>	<b>1.10</b>	<b>83,371,249</b>	<b>91,037,225</b>

<b>Average Day</b>	<b>2,689,395</b>
<b>Maximum Day</b>	<b>3,011,321</b>
<b>Minimum Day</b>	<b>2,325,798</b>

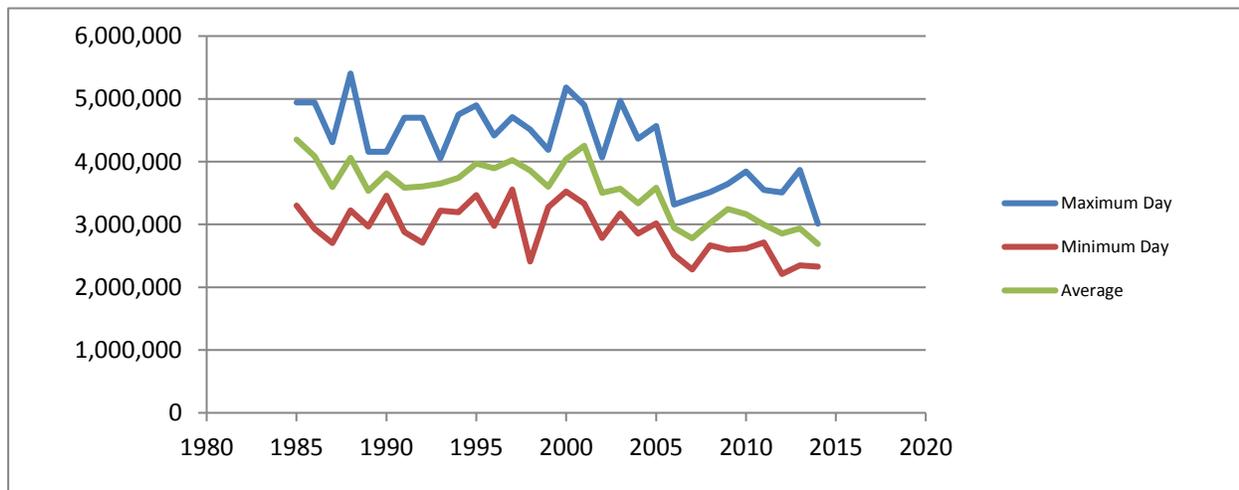


# ST. JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED

DECEMBER 2014

Year	Average	Maximum Day	Minimum Day	Monthly Total
1985	4,351,994	4,941,900	3,301,500	134,911,800
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

Rank	Year	Monthly Total
1	1985	134,911,800
2	2001	131,910,460
3	1986	126,624,200
4	1988	125,916,300
5	2000	125,230,350
6	1997	124,778,465
7	1995	123,060,350
8	1996	120,687,500
9	1998	119,640,350
10	1990	118,271,100
11	1994	115,931,300
12	1993	113,147,200
13	1992	111,728,500
14	1999	111,642,200
15	1987	111,452,000
16	2005	111,182,030
17	1991	111,127,000
18	2003	110,732,300
19	1989	109,627,300
20	2002	108,616,350
21	2004	103,451,190
22	2009	100,595,250
23	2010	98,097,104
24	2008	93,765,590
25	2011	92,957,376
26	2006	91,263,960
27	2013	91,037,225
28	2012	88,569,344
29	2007	86,203,290
30	2014	83,371,249



## CLEVELAND BOOSTER STATION

## HILLTOP BOOSTER STATION

## BOTH

DATE	MGD TREATED	FEED METER GAL	CHL LBS/DAY	CHLORINE APPLIED mg/l	Cl <sub>2</sub> RES PRE mg/l	Cl <sub>2</sub> RES POST mg/l	Cl <sub>2</sub> RES MON mg/l	MGD TREATED	FEED METER GAL	CHL LBS/DAY	CHLORINE APPLIED mg/l	Cl <sub>2</sub> RES PRE mg/l	Cl <sub>2</sub> RES POST mg/l	Cl <sub>2</sub> RES MON mg/l	MGD TREATED BOTH
1-Dec	0.878	46	6.52	0.89	1.23	1.27	1.29	0.841	5	0.71	0.10	1.49	1.60	1.58	1.718
2-Dec	1.583	86	12.19	0.92	1.85	1.62	1.81	0.000	3	0.43	0.00	1.31	1.28	1.47	1.583
3-Dec	1.652	89	12.62	0.92	1.49	1.53	1.57	0.000	0	0.00	0.00	1.54	1.17	1.57	1.652
4-Dec	0.000	0	0.00	0.00	1.33	1.31	1.41	1.723	43	6.10	0.42	1.98	1.65	1.71	1.723
5-Dec	1.697	90	12.76	0.90	1.91	1.65	1.78	0.000	0	0.00	0.00	1.39	1.41	1.54	1.697
6-Dec	0.554	29	4.11	0.89				1.103	15	2.13	0.23				1.656
7-Dec	0.554	29	4.11	0.89				1.103	15	2.13	0.23				1.656
8-Dec	0.554	29	4.11	0.89	1.61	1.57	1.70	1.103	15	2.13	0.23	1.76	1.57	1.83	1.656
9-Dec	1.550	80	11.34	0.88	2.17	1.86	2.00	0.000	0	0.00	0.00	1.51	1.55	1.67	1.550
10-Dec	0.000	0	0.00	0.00	1.91	1.66	1.86	1.519	44	6.24	0.49	2.20	1.81	2.01	1.519
11-Dec	1.818	98	13.89	0.92	1.71	1.68	1.76	0.000	0	0.00	0.00	1.90	1.75	1.88	1.818
12-Dec	1.581	89	12.62	0.96	1.86	1.65	1.79	0.000	0	0.00	0.00	1.68	1.61	1.76	1.581
13-Dec	0.524	30	4.25	0.97				1.113	23	3.26	0.35				1.637
14-Dec	0.524	30	4.25	0.97				1.113	23	3.26	0.35				1.637
15-Dec	0.524	30	4.25	0.97	1.61	1.70	1.75	1.113	23	3.26	0.35	1.96	2.16	2.14	1.637
16-Dec	1.636	90	12.76	0.94	2.13	1.87	2.01	0.000	0	0.00	0.00	1.65	1.71	1.91	1.636
17-Dec	0.000	0	0.00	0.00	1.88	1.83	1.91	1.579	29	4.11	0.31	2.20	1.88	2.01	1.579
18-Dec	1.586	87	12.33	0.93	2.20	2.08	2.17	0.000	0	0.00	0.00	1.73	1.61	1.78	1.586
19-Dec	1.803	99	14.04	0.93	1.91	1.79	1.86	0.000	0	0.00	0.00	1.59	1.55	1.65	1.803
20-Dec	1.119	61	8.65	0.93				0.569	11	1.56	0.33				1.687
21-Dec	1.119	61	8.65	0.93				0.569	11	1.56	0.33				1.687
22-Dec	1.119	61	8.65	0.93	2.19	2.14	2.18	0.569	11	1.56	0.33	1.60	1.67	1.82	1.687
23-Dec	0.000	0	0.00	0.00	2.14	1.94	2.07	1.689	40	5.67	0.40	1.85	1.61	1.80	1.689
24-Dec	1.030	58	8.22	0.96				0.548	14	1.98	0.43				1.578
25-Dec	1.030	58	8.22	0.96				0.548	14	1.98	0.43				1.578
26-Dec	1.030	58	8.22	0.96	1.92	1.86	1.96	0.548	14	1.98	0.43	1.60	1.52	1.65	1.578
27-Dec	0.551	17	2.41	0.52				1.079	18	2.55	0.28				1.630
28-Dec	0.551	17	2.41	0.52				1.079	18	2.55	0.28				1.630
29-Dec	0.551	17	2.41	0.52	1.93	2.00	2.11	1.079	18	2.55	0.28	1.85	1.79	2.00	1.630
30-Dec	1.639	130	18.43	1.35	2.18	2.15	2.04	0.000	0	0.00	0.00	1.73	1.62	1.87	1.639
31-Dec	0.577	32	4.54	0.94				1.060	15	2.13	0.24				1.637
TOTAL	29.331	1,601	226.99					21.645	422	59.83					50.976
AVE DAY	0.946		7.32	0.78	1.86	1.76	1.85	0.6982		1.930	0.22	1.73	1.63	1.78	1.644
MAX	1.818		18.43	1.35	2.20	2.15	2.18	1.7229		6.238	0.49	2.20	2.16	2.14	1.818
MIN	0.000		0	0.00	1.23	1.27	1.29	0.0000		0	0.00	1.31	1.17	1.47	1.519
MONTHLY TOTALS:	Cleveland	Total MG Treated	29.331	SJCT-EAST	29.331	TOTAL MONTH	5.358	Hilltop	Total MG Treated	21.645	Cleveland Pump Station:	29.331			
Total Authority Flow:	56.139	Untreated	0.000	AVE DAY	0.017			Untreated	0.000	Hilltop Pump Station:	21.645	TOTAL AUTHORITY (Trted.)	50.976		

MONTHLY CLIMATOLOGICAL SUMMARY

DECEMBER 2014

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	28.6	35	<b>36.8</b>	1:00a	42	69	1970	<b>24.8</b>	10:00p	27	11	1964	34.2	0	<b>0</b>	<b>17</b>	<b>36</b>	7:00a	N
2	29.1	35	<b>33.7</b>	2:00p	42	69	1982	<b>23.6</b>	5:00a	27	1	1976	36.3	0	<b>0</b>	<b>4.6</b>	<b>27</b>	12:00m	ENE
3	35	35	<b>36.7</b>	7:00p	41	67	1982	<b>33.5</b>	1:00a	27	-2	1976	29.9	0	<b>0</b>	<b>19.6</b>	<b>37</b>	1:00a	W
4	33.7	34	<b>34.9</b>	1:00a	41	64	1970	<b>31.3</b>	10:00a	26	10	1978	31.9	0	<b>0</b>	<b>3.3</b>	<b>20</b>	1:00a	ENE
5	36.2	34	<b>37.9</b>	8:00p	41	65	1982	<b>34.5</b>	1:00a	26	5	1991	28.8	0	<b>0</b>	<b>1.8</b>	<b>11</b>	4:00a	SSE
6	38.2	33	<b>39.3</b>	4:00p	40	61	1951	<b>35.1</b>	12:00m	26	11	1954	27.8	0	<b>0</b>	<b>7.7</b>	<b>28</b>	4:00p	NNE
7	34.5	33	<b>37.1</b>	4:00p	40	58	1951	<b>31.6</b>	7:00a	25	7	1950	30.7	0	<b>0</b>	<b>2.2</b>	<b>15</b>	12:00m	ESE
8	35.8	33	<b>38.6</b>	12:00m	39	60	1991	<b>34.4</b>	5:00a	25	2	1977	28.5	0	<b>0.29</b>	<b>4.9</b>	<b>18</b>	12:00m	S
9	38.5	32	<b>39.9</b>	1:00p	39	62	1991	<b>36.4</b>	12:00m	24	3	1989	26.8	0	<b>0.02</b>	<b>11.8</b>	<b>30</b>	5:00p	NNE
10	35.1	32	<b>36.5</b>	1:00a	38	64	1971	<b>34</b>	3:00p	24	4	1978	29.8	0	<b>0</b>	<b>7.5</b>	<b>22</b>	6:00p	NNE
11	34.1	31	<b>36</b>	4:00a	38	63	1949	<b>32.3</b>	9:00a	24	3	1978	30.9	0	<b>0</b>	<b>13.1</b>	<b>26</b>	5:00a	W
12	35	31	<b>37.7</b>	12:00m	37	62	1949	<b>33.3</b>	1:00p	23	-4	1958	29.5	0	<b>0</b>	<b>13.2</b>	<b>31</b>	11:00p	W
13	39.9	30	<b>43.9</b>	10:00p	37	65	1975	<b>37</b>	3:00a	23	-4	1958	24.5	0	<b>0</b>	<b>11.1</b>	<b>30</b>	5:00a	WSW
14	45.1	30	<b>49.7</b>	2:00p	37	65	1975	<b>42.2</b>	4:00a	23	3	1958	19	0	<b>0</b>	<b>6.7</b>	<b>17</b>	12:00p	SW
15	46.6	30	<b>48.9</b>	5:00p	36	62	1971	<b>45.2</b>	11:00p	22	-5	1989	17.9	0	<b>0.07</b>	<b>4.2</b>	<b>20</b>	8:00p	S
16	42.8	29	<b>45.8</b>	1:00a	36	64	1984	<b>37.1</b>	11:00p	22	-6	1989	23.6	0	<b>0.05</b>	<b>11.5</b>	<b>39</b>	12:00m	NW
17	32.7	29	<b>37.3</b>	1:00a	35	59	1984	<b>31.4</b>	10:00a	21	-8	1989	30.7	0	<b>0</b>	<b>20.2</b>	<b>38</b>	2:00a	NW
18	31.6	28	<b>33.9</b>	11:00p	35	53	1957	<b>30.7</b>	2:00p	21	-2	1989	32.7	0	<b>0</b>	<b>9.5</b>	<b>24</b>	8:00p	W
19	33.9	28	<b>34.8</b>	7:00p	34	55	1957	<b>32.4</b>	8:00a	21	0	1983	31.4	0	<b>0.01</b>	<b>4.8</b>	<b>20</b>	6:00a	NNE
20	34.2	28	<b>35.1</b>	1:00p	34	58	1949	<b>33</b>	4:00a	20	-5	1983	31	0	<b>0</b>	<b>4.5</b>	<b>20</b>	2:00p	SSE
21	35	27	<b>37.3</b>	5:00p	33	60	1949	<b>33.4</b>	8:00a	20	-3	1989	29.6	0	<b>0</b>	<b>3.5</b>	<b>15</b>	1:00p	SSE
22	35.4	27	<b>39.2</b>	12:00m	33	58	1957	<b>32.7</b>	8:00a	19	-4	1989	29	0	<b>0.09</b>	<b>3.7</b>	<b>18</b>	10:00p	ESE
23	44.1	26	<b>48.1</b>	4:00p	33	57	1982	<b>39.1</b>	1:00a	19	-15	1989	21.4	0	<b>0.12</b>	<b>4.6</b>	<b>19</b>	11:00a	SSE
24	41.8	26	<b>45.6</b>	1:00a	32	58	1982	<b>38.9</b>	7:00p	19	-7	1989	22.8	0	<b>0.43</b>	<b>7.5</b>	<b>30</b>	12:00m	NNE
25	38.4	26	<b>39.8</b>	5:00p	32	66	1982	<b>36.9</b>	11:00a	18	-5	1983	26.6	0	<b>0</b>	<b>16.5</b>	<b>37</b>	11:00a	S
26	42.4	25	<b>48.2</b>	12:00m	31	58	1982	<b>37.4</b>	8:00a	18	-2	1983	22.2	0	<b>0</b>	<b>6.3</b>	<b>20</b>	12:00p	SSE
27	43.9	25	<b>47.9</b>	2:00p	31	56	1959	<b>38.2</b>	9:00p	18	-2	1990	21.9	0	<b>0.02</b>	<b>12.6</b>	<b>47</b>	4:00p	SSW
28	35.7	24	<b>38.6</b>	1:00a	30	65	1984	<b>34</b>	1:00p	17	1	1950	28.7	0	<b>0</b>	<b>10.7</b>	<b>27</b>	4:00a	NW
29	32.2	24	<b>35</b>	4:00a	30	64	1984	<b>29.4</b>	11:00p	17	-2	1961	32.8	0	<b>0</b>	<b>8.2</b>	<b>24</b>	10:00p	NNE
30	26.2	24	<b>29.6</b>	1:00a	29	58	1965	<b>22.9</b>	12:00m	16	-7	1983	38.8	0	<b>0</b>	<b>11.3</b>	<b>31</b>	9:00p	NW
31	21.8	24	<b>25.9</b>	11:00p	29	70	1875	<b>18.5</b>	1:00p	16	-15	1976	42.8	0	<b>0</b>	<b>25.5</b>	<b>53</b>	9:00p	WSW
AVE	36.0												<b>28.8</b>	<b>0.0</b>	<b>0.0</b>	<b>9.3</b>	<b>26.8</b>		SSE
MAX	46.6	35	49.7			<b>70</b>		<b>45.2</b>		<b>27</b>	<b>11</b>		<b>42.8</b>	<b>0</b>	<b>0.43</b>	25.5	53.0		
MIN	21.8	<b>24</b>	<b>25.9</b>					<b>18.5</b>		<b>16</b>	<b>-15</b>		<b>17.9</b>	<b>0</b>	<b>0</b>	<b>1.8</b>	<b>11</b>		
TOTAL															<b>1.1</b>				

Max Rain: 0.43 ON 12/24/14  
 Days of Rain: 8 (>.01 in) 3 (>.1 in) 0 (>1 in)