

CITY OF ST. JOSEPH WATER FILTRATION PLANT
OPERATIONAL REPORT
MAY 2016



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-MAY 2016

Water demand in May was up by 878,647 gallons or just 0.7% from last year. This year 120,894,489 gallons were delivered which compares to 120,015,842 gallons delivered May of 2015. The May 2016 pumpage ranked 28th in the thirty year tabulation dating back to 1987.

GENERAL ACTIVITIES

Spring Intake Inspections/Repair

Now that the repair of the emergency riser on the south intake is complete staff will conduct a flow test to determine current capacity. This intake and low service pump station is rated at 16 MGD. One of the benefits of the higher lake level this year is that the intake and pump station should perform better. There is likely some sand remaining in the pipe that will be drawn into the wetwell during testing and removed with the assistance of hydraulic eductor by our maintenance staff. The south intake which was built in 1955 now serves as an emergency and maintenance back up to the north intake built in 2011.

An inspection of the north intake structures and emergency riser is planned for late June. Given past experience it is not likely that divers will be able to enter the 48" pipe inlets in the 'Y' due to sand accumulation. A pipe penetration dive will be done from the emergency riser at 1500' inward from the intake structures. The diver will swim out from the riser toward the intake to determine the level of sand accumulation. Last year 3-4" of sand was found at the riser.

Filtration Capacity Study/Phase 1 SCIP

Work on the filtration capacity study will begin in June and be complete by December 5, 2016. Dr. Alex Yavitch of Optimization Solutions will model high turbidity applied water based on filter performance data obtained by plant staff and CH2M Hill. This will enable the capacity assessment to be done without adversely affecting finished water quality. In addition, we have learned from Dr. Yavitch that high turbidity water produced under natural operating conditions cannot be artificially induced in the clarifiers

The filtration rate capacity study was identified in the Strategic Capital Improvement Plan (SCIP). This study will address hydraulic limitations in the filter piping and assess the feasibility of rerating filters 5-12 to handle the increased flow upon retirement of filters 1-4. A hydraulic study will also be done on the filter piping to determine whether it can handle the flow. 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. The DWRP project plan will include the City of St. Joseph distribution system and be submitted in late 2016 upon completion of the filter study. The bid review committee recommended CH2M Hill. The WSJOB and St. Joseph City Commission approved the recommendation. Filter trial runs will begin in June. The study will be complete by December 2016.

MDEQ Sanitary Survey City of St. Joseph WSSN 6310

MDEQ District Engineer Gary Wozniak completed his fifth site visit as part of the 2016 Sanitary Survey of the City of St. Joseph community water supply. The Southwest Michigan Sanitary Sewer & Water Authority was evaluated in 2015. The City of St. Joseph community water supply includes the water plant and city owned water distribution system including the water tower located on Cleveland road north of Hilltop. To date filter banks 1-4 and 9-12 have been test washed, a breach in the raw water intake screens has been identified and corrected and file forms have been updated. The sanitary survey is a triennial inspection required of all community water supplies under Michigan's Public Act 399 as Amended (Safe Drinking Water Act) which is authorized by the federal SDWA enacted in 1974.

Fluoride Overfeed Protection

Fluoride is added in the treatment process at the water plant for dental health. The MDEQ does not require the addition of fluoride but does regulate treatment due to the fact that fluoride is regulated under the Safe Drinking Water Act. MDEQ has published guidance for community water supplies to assure that fluoride is not overfed. In May, an additional safeguard was installed at the St. Joseph Water Plant. An interlock was added that functions to prevent fluoride feed in the event of a low service pump failure. The plant has been equipped since 1998 with anti-siphon valves, limited size day tank and a low service pump de-energize interlock as required by MDEQ.

The finished water fluoride concentration is maintained at 0.7 mg/L as recommended by the CDC. The water plant quality control laboratory conducts daily analysis of fluoride concentrations on the raw Lake Michigan water, plant tap and throughout the distribution system. An online fluoride analyzer is on order which will provide real time plant tap fluoride data as well. This instrument will also enable plant staff to conduct tracer studies on plant process flows.

The article below was reprinted from the CDC website.

Community Water Fluoridation

The safety and benefits of fluoride are [well documented](http://www.cdc.gov/fluoridation/safety/systematic.htm)(<http://www.cdc.gov/fluoridation/safety/systematic.htm>). For [70 years](http://www.cdc.gov/fluoridation/factsheets/70-years.htm)(<http://www.cdc.gov/fluoridation/factsheets/70-years.htm>), people in the United States have benefited from drinking water with fluoride, leading to better dental health.

Drinking fluoridated water keeps the teeth strong and reduced tooth decay by approximately 25% in children and adults. By preventing tooth decay, community water fluoridation has been shown to save money, both for families and the health care system.

Over the past several decades, there have been major improvements in the nation's oral health. Still, tooth decay remains one of the most common chronic diseases of childhood. Community water fluoridation has been identified as the most cost-effective method of delivering fluoride to all members of the community, regardless of age, educational attainment, or income level.

Nearly all water contains some fluoride, but usually not enough to help prevent tooth decay or cavities. Community water systems can add the right amount of fluoride to the local drinking water to prevent tooth decay.

Community water fluoridation is recommended by nearly all public health, medical, and dental organizations including the American Dental Association, American Academy of Pediatrics, US Public Health Service, and World Health Organization. Because of its contribution to the dramatic decline in tooth decay in the United States since the 1960s, the Centers for Disease Control and Prevention (CDC) named community water fluoridation one of [10 great public health achievements of the 20th century](#).

Community Water Fluoridation (2015, April 7). Retrieved from URL.

Lead & Copper Rule

Water Plant staff conducted a pipe material survey of the homes in our sample pool to verify that the plumbing in the homes is in compliance with the Lead & Copper Rule. Site visits were conducted and information was gathered regarding pipe material, water filters and softeners. (Samples taken downstream of filters and softeners are not permitted). Compliance sampling is done every three years and is due again in 2017.

The City of St. Joseph last sampled for Lead and Copper during the summer of 2014. We were notified by the MDEQ of our compliance with the Safe Drinking Water Act. Our results of 2.0 parts per billion (ppb) for Lead is considerably lower than the action level of 15 ppb for compliance with the SDWA.

In May, a materials evaluation of the remaining 159 meter pits in the system was done. Thirty four lead goosenecks were found. During the course of the summer these customers will be notified and asked to collect samples which will be sent to a certified laboratory to determine lead and copper concentrations. Customers will be notified of the results. In addition, MDEQ has requested that even non-compliance test results be sent to their Lansing office.

Travel & Training

Shawn Orlaske and Jeff Peden attended the Laboratory Practices Seminar in Lansing

Operating Certification Test Results

We are pleased to report that Jeff Peden passed the F-2 certification examination. Statewide only five the nineteen who took the test passed.

Monthly Maintenance Notes

MAY 2016

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
05/02/16	Chlorinated Woodbine Lodge water system
05/03/16	Installed New Guard on Upper Reservoir Overflow Pipe
05/06/16	Installed new drain valve control switch for filter # 7 on main control valve
05/09/16	Installed new chain for movable wing on Clarifier # 2 (The cable that was installed broke causing the wing not to go into the corners of the Clarifier)
05/09/16	UCC - Inspection / Repair of emergency riser for South Intake. Found that plate installed last fall was under sand (did not have proper equipment to remove sand) Inspected South Intake structure since they were on the lake.
05/10/16	UCC - Installed permanent repair to south intake emergency riser, added cover plate and welded in place
05/10/16	Replaced Turbidimeters for Clarifier # 2 & Clarifier # 3. Programmed replacement turbidimeters into SOM unit.
05/10/16	Johnson Insulation - Installed new insulation on boiler lines in 5 - 8 Filter room
05/16/17	Replaced rear bearing on Stober Drive for scrapper assembly on Clarifier #2, bearing froze up causing scrapper drive to shut down.
05/17/16	Cleaned South Low Service Wet Well, heavy sand build up (5 to 3 ft through out wet well) from emergency riser problems.
05/25/16	Cleaned out reservoir dechlorination building (Big Red)
5/26 to 5/31/16	Installed redundant interlock based on Raw Flow for Fluoride Feed pumps. If Raw Water flow drops to .5 mgd or below the Fluoride Feed pumps will shut down. (per DEQ recommendations)

**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**

MAY 2016

DISTRIBUTION:	
Total Gallons	120,894,489
Average Day	3,899,822
Maximum Day	5,973,686
Minimum Day	2,779,609

TREATMENT:	
Total Low Service	124,323,836
Wash Water Gals.	1,445,338
Wash Water %	1.16%
Plant Use Gals.	1,687,751
Plant Use %	1.42%

FILTRATION:		
Ave. Filter Run	79.2	hours
Ave. Filter Rate	2.15	g/sqft/min
Filter Eff. Index	440.5	
Ave. Loss of Head	1.3	feet
Plant Sewer Usage		
	1003	\$ 2,316.18

LABORATORY REPORT		
Average of	Raw	Tap
Chlorides mg/L	19.4	19.6
Fluoride mg/L	0.13	0.74
Alkalinity mg/L	117	102
Hardness mg/L	142	140
pH	8.1	7.4
Calcium mg/L	38	38
Magnesium mg/L	11	11
Turbidity NTU	2.09	0.03
Temperature °F	54	
Total Coliform		0.0
Chlorine Residual		
		mg/L Free
Mixing Basin		0.83
Applied		1.58
Tap		1.47
Distribution		1.00

TREATMENT CHEMICAL SUMMARY:					
	Applied mg/L	Total Lbs.	Cost	Inventory lbs.	Days Supply
		CHEMICAL			
Alum (Al ⁺³)	2.03	2,079	\$6,846.29	133,236	1987
Chlorine (Cl ₂)	2.95	3,058	\$821.68	8,235	83
Fluoride (F ₂)	0.75	781	\$1,367.89	21,004	834

			REMARKS:			
Total Cost all Chemicals		\$9,035.87				
Chemical Cost per Mil. Gallon Treated		\$72.68				
Chemical Cost per Mil. Gallon Delivered		\$74.74				
PLANT UTILITIES SUMMARY						
Electric:						
Total KWH		226,800	***includes measure of melted snow			
Total Power Cost		\$ 15,876.00	visit the City of Saint Joseph's Home page at www.sjcity.com			
Power Cost per Million Gallon Treated		\$ 127.70	e-mail comments to either: operator@sjcity.com or galimenti@sjcity.com			
Power Cost per Million Gallon Delivered		\$ 145.57	WEATHER CONDITIONS AT THE PLANT		Air Temp. °F	
Gallons Pumped per KWH		55	SJWW Weather Computer		Avg.	58.5
			Rain Guage, Inches	2.62	Max.	89.6
			days it rained***	13	Min.	40.5
Natural Gas:			Wind Speed, Avg	7.4	Lake Temp. °F	
Metered Cubic Feet		1607	Wind Speed, Max	48	Avg.	54.1
Natural Gas Cost		\$890.53	Prevailing Wind Dir.	North	Max	65.4
Emergency Power Diesel Fuel Inv., Gals.	North (3/4+)	600	Lake Level (USACE)	580.18	Min	50.3
	South (F)	2400				

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 ₂ PRE mg/l	Cl ₂ POST mg/l	Cl ₂ MON mg/l	FLOW MGD	FEED GAL	CHL LBS/DAY	CHLORINE APPLIED mg/l	Cl ₂ PRE mg/l	Cl ₂ POST mg/l	Cl ₂ MON mg/l	BOOSTER MGD	
1-May	0.000	0	0.00	0.00				2.149	89	12.62	0.70				2.149	
2-May	0.000	0	0.00	0.00	0.87	1.32	1.39	2.149	89	12.62	0.70	1.37	1.32	1.48	2.149	
3-May	1.910	91	12.90	0.81	2.20	1.86	2.21	0.000	0	0.00	0.00	1.19	1.28	1.36	1.910	
4-May	2.019	87	12.33	0.73	1.35	1.48	1.43	0.002	2	0.28	21.25	1.35	1.55	1.63	2.021	
5-May	1.529	66	9.36	0.73	1.17	1.14	1.28	0.000	0	0.00	0.00	1.10	1.16	1.23	1.529	
6-May	0.000	0	0.00	0.00	1.09	1.05	1.17	2.022	75	10.63	0.63	2.20	1.86	2.14	2.022	
7-May	1.412	63	8.93	0.76				0.725	24	3.40	0.56				2.137	
8-May	1.412	63	8.93	0.76				0.725	24	3.40	0.56				2.137	
9-May	1.412	63	8.93	0.76	1.94	1.69	1.92	0.725	24	3.40	0.56	1.52	1.57	1.77	2.137	
10-May	0.000	0	0.00	0.00	1.60	1.57	1.66	2.400	95	13.47	0.67	1.92	2.09	2.29	2.400	
11-May	1.963	104	14.75	0.90	1.91	1.78	1.95	0.000	0	0.00	0.00	1.67	1.71	1.77	1.963	
12-May	1.992	96	13.61	0.82	1.92	1.63	1.86	0.000	0	0.00	0.00	1.40	1.48	1.57	1.992	
13-May	0.000	0	0.00	0.00	1.58	1.51	1.62	2.098	86	12.19	0.70	2.05	1.79	2.08	2.098	
14-May	1.342	64	9.07	0.81				0.679	26	3.69	0.65				2.021	
15-May	1.342	64	9.07	0.81				0.679	26	3.69	0.65				2.021	
16-May	1.342	64	9.07	0.81	2.20	2.20	2.66	0.679	26	3.69	0.65	1.46	1.59	1.69	2.021	
17-May	0.000	0	0.00	0.00	2.20	1.98	2.24	2.317	86	12.19	0.63	1.56	1.46	1.56	2.317	
18-May	2.287	109	15.45	0.81	2.19	1.98	2.29	0.000	0	0.00	0.00	1.48	1.59	1.60	2.287	
19-May	0.000	0	0.00	0.00	2.04	1.83	1.97	2.490	99	14.04	0.68	1.95	1.73	1.90	2.490	
20-May	2.458	112	15.88	0.77	2.09	1.81	2.02	0.000	0	0.00	0.00	1.63	1.55	1.59	2.458	
21-May	1.416	67	9.50	0.80				1.505	52	7.37	0.59				2.921	
22-May	1.416	67	9.50	0.80				1.505	52	7.37	0.59				2.921	
23-May	1.416	67	9.50	0.80	1.35	1.58	1.67	1.505	52	7.37	0.59	1.34	1.99	2.12	2.921	
24-May	2.222	104	14.75	0.80	1.68	1.63	1.72	0.845	44	6.24	0.89	1.89	1.76	1.90	3.067	
25-May	0.128	6	0.85	0.80	1.29	1.62	1.71	3.335	106	15.03	0.54	2.03	1.85	1.97	3.462	
26-May	3.335	159	22.54	0.81	1.09	1.87	2.25	0.025	1	0.14	0.69	1.29	1.78	1.87	3.360	
27-May	2.400	111	15.74	0.79	2.04	1.65	1.85	1.217	71	10.07	0.99	2.20	2.00	2.25	3.617	
28-May	2.301	100	14.18	0.74				1.301	81	11.48	1.06				3.602	
29-May	2.301	100	14.18	0.74				1.301	81	11.48	1.06				3.602	
30-May	2.301	100	14.18	0.74				1.301	81	11.48	1.06				3.602	
31-May	2.301	100	14.18	0.74	2.20	2.04	2.23	1.301	81	11.48	1.06	1.16	1.26	1.28	3.602	
TOTAL	43.958	2,027	287.4					34.977	1,473	208.84					78.935	
AVE DAY	1.418		9.3	0.61	1.7	1.7	1.9	1.1283		6.7	1.25	1.61	1.64	1.76	2.546	
MAX	3.335		22.5	0.90	2.2	2.2	2.7	3.3346		15.0	21.25	2.2	2.09	2.29	3.617	
MIN	0.000		0.0	0.00	0.9	1.1	1.2	0.0000		0.0	0.00	1.1	1.16	1.23	1.529	
MONTHLY TOTALS:	Cleveland	Total MG Treated	43.958	SJCT EAST				Hilltop			Total MG Treated	34.977	Cleveland Pump Station:			43.958
		Untreated	0.000	Average Day			0.209				Untreated	0.000	Hilltop Pump Station:			34.977
Total Authority Flow:	81.0495			Month Total			6.476						TOTAL AUTHORITY (Trted.)			78.935

DISTRIBUTION REPORT

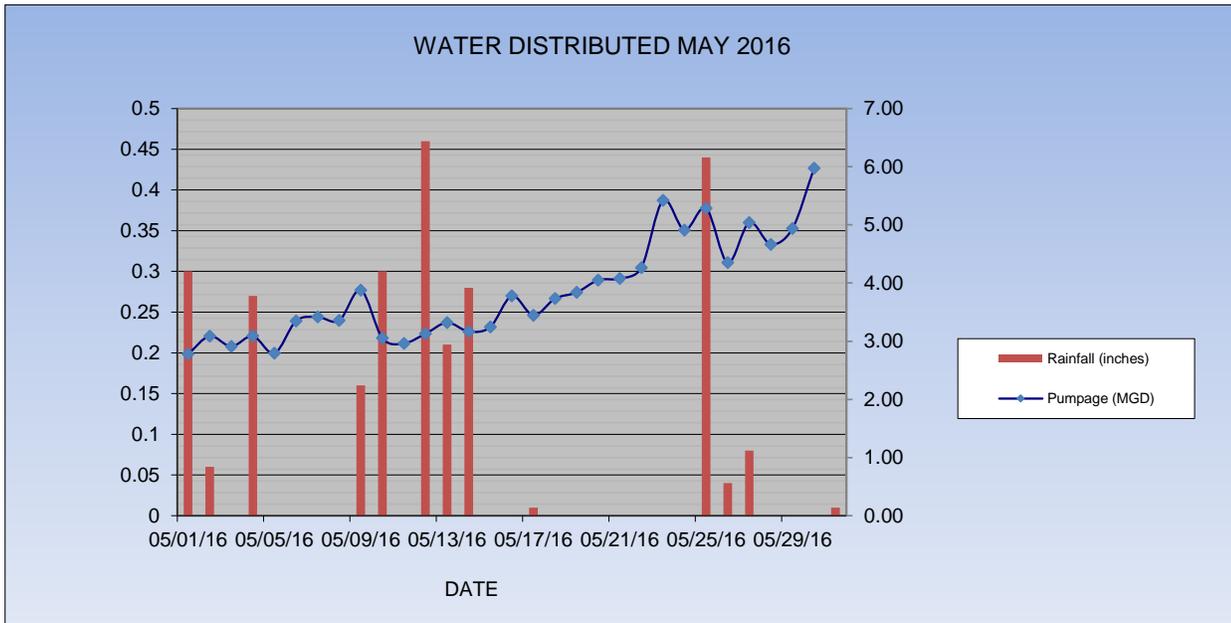
For the Month of May 2016

Activity		Number/Description	
Water Main Breaks		0	
MISS DIGS		393	
Delinquent Shut Off		17	10 (SJ), 7 (RCT)
Delinquent Shut Off (Broken Payment Plans)			
Hydrants (Repaired/Replaced)		1	Robbins & May Court (SJCTE) Replacement, hydrant missing
Valves		0	
Taps (1")		12	1664 Southfield Parkway (RCT) Request for City Water
			1712/1714 Peachtree Path New Construction
			1712/1714 Peachtree Path New Construction
			541 Dunewood (SJ) New Construction
			503 Dunewood (SJ) New Construction
			2425 Sundance Path (SJCT) Prop Sale/Prev Serv thru Another Adr.
			1774 Carlisle Drive (RCT) Request for City Water
			6755 Jerico Road (LCT) New Construction
			2320 West Rocky Weed Rd (LCT) Bad Well
			1704 Matthew Court (RCT) Request for City Water
			1215 Wolcott (SJ) Replace Lead Service
Cross Connection Control (Hydro Designs)		20	
Repair of Curb box/Shut-Off Valves		0	
Service Repair		0	
Service Replacements		3	608 State St. (SJ) Lead Service Repl. Util side
			1208 Mohawk Lane (SJ) Lead Service leaking, Util. side
			319 Winwood (SJ) Lead Service Repl. Util side, cust gal to PECS
Water Quality Complaint(s)		0	
Hydrant Flushing to maintain water quality		0	
Hydrant Flushing (Stage 2 Rule)		0	
Service line complaints (customer side)			
Staff Education/Training		1	Management training
Overtime-Total		87	(Including Sanitary and Storm)
Turn Off		6	(Note: For delinquent Shut off see above)
Turn On		12	
Finals		139	
Meter Repair/Replacement			
			Audit Meter
			Verify Read
			1
	Meter Repair		Move Mxu Box
	Per detail		New Installation
			21
	Meter leaking	9	New Installation-Benton Harbor
	Stopped Meter	13	Replaced/various reasons (e.g.downsize, defective)
			1
	Faulty Register		Rockwell Replacement
	Frozen Meter	1	Mxu Replaced
			1
	Move Meter Inside		Sprinkler meter removed/line capped
			1
	Hard to read	20	Removals/demo
	Replace/Adding Sprinkler Meter		Curb box location
	Damage to Meter	1	Broken Remote
	New Plumbing	1	Noisy Meter
	New siding		Upgrade 5/8" to 3/4" (upgrade to 1")
	Meter sent out for testing		Meter Change/Benton Harbor

**ST JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED/RAINFALL
MAY 2016**

DATE	PUMPAGE (gallons)	PUMPAGE (MGD)	Rainfall (in)	Day to Day Comparison 2016/2015	
				2016	2015
05/01/16	2,779,609	2.78	0.3	2,779,609	3,326,224
05/02/16	3,086,866	3.09	0.06	3,086,866	3,603,238
05/03/16	2,909,868	2.91	0	2,909,868	3,614,314
05/04/16	3,088,664	3.09	0.27	3,088,664	3,627,305
05/05/16	2,792,609	2.79	0	2,792,609	3,635,459
05/06/16	3,346,609	3.35	0	3,346,609	3,463,770
05/07/16	3,416,987	3.42	0	3,416,987	3,843,098
05/08/16	3,355,926	3.36	0	3,355,926	3,688,156
05/09/16	3,878,368	3.88	0.16	3,878,368	3,135,060
05/10/16	3,052,865	3.05	0.3	3,052,865	3,323,022
05/11/16	2,962,613	2.96	0	2,962,613	3,234,604
05/12/16	3,128,932	3.13	0.46	3,128,932	3,335,584
05/13/16	3,319,689	3.32	0.21	3,319,689	3,135,923
05/14/16	3,167,499	3.17	0.28	3,167,499	3,590,317
05/15/16	3,244,709	3.24	0	3,244,709	3,525,099
05/16/16	3,777,088	3.78	0	3,777,088	3,574,136
05/17/16	3,443,463	3.44	0.01	3,443,463	3,600,337
05/18/16	3,732,718	3.73	0	3,732,718	4,326,069
05/19/16	3,837,976	3.84	0	3,837,976	4,072,368
05/20/16	4,050,204	4.05	0	4,050,204	3,875,415
05/21/16	4,076,101	4.08	0	4,076,101	4,133,619
05/22/16	4,264,256	4.26	0	4,264,256	3,939,668
05/23/16	5,419,391	5.42	0	5,419,391	4,872,314
05/24/16	4,910,682	4.91	0	4,910,682	4,573,229
05/25/16	5,284,647	5.28	0.44	5,284,647	4,559,244
05/26/16	4,350,021	4.35	0.04	4,350,021	4,751,290
05/27/16	5,039,358	5.04	0.08	5,039,358	4,004,453
05/28/16	4,664,340	4.66	0	4,664,340	4,874,146
05/29/16	4,937,429	4.94	0	4,937,429	5,033,117
05/30/16	5,973,686	5.97	0	5,973,686	3,931,840
05/31/16	5,601,317	5.60	0.01	5,601,317	3,813,424
TOTAL	120,894,489	115.29	2.62	120,894,489	120,015,842

Average Day	3,727,931
Maximum Day	5,419,391
Minimum Day	2,779,609

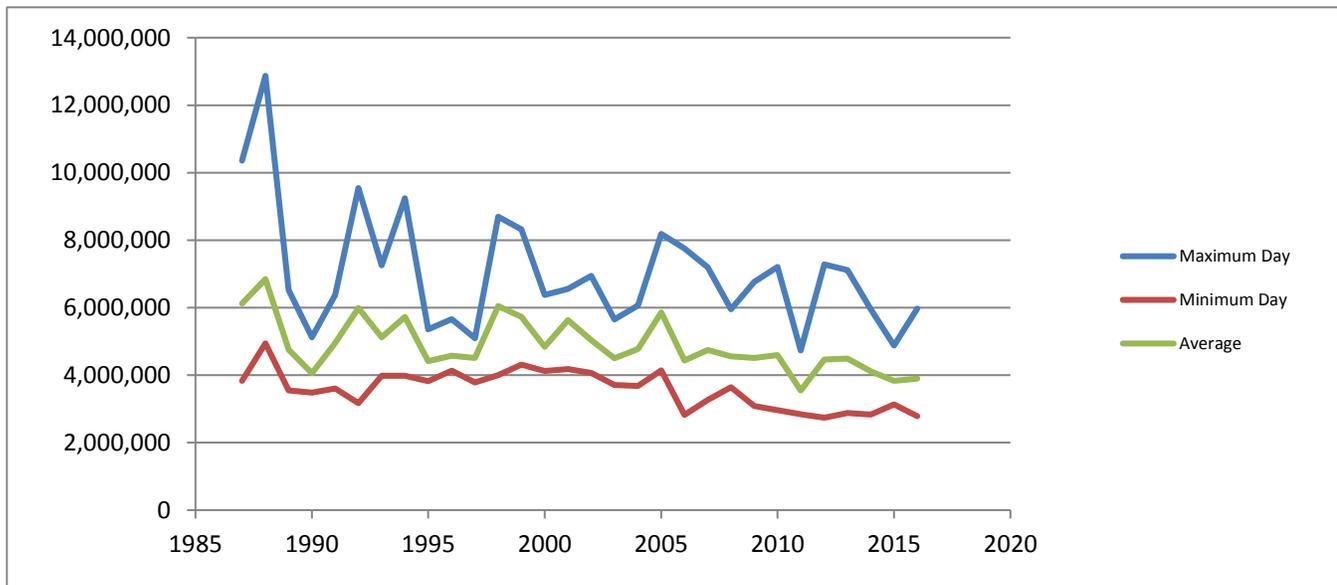


ST JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED

MAY 2016

Year	Average	Maximum Day	Minimum Day	Monthly Total
1987	6,124,184	10,353,600	3,834,000	189,849,700
1988	6,845,745	12,870,400	4,940,900	212,218,100
1989	4,755,961	6,516,400	3,543,800	147,434,800
1990	4,056,606	5,126,500	3,481,200	125,754,800
1991	4,951,545	6,376,200	3,603,700	153,497,900
1992	5,986,790	9,542,900	3,172,600	185,590,500
1993	5,125,539	7,254,700	3,981,000	158,891,700
1994	5,725,045	9,246,500	3,979,600	177,476,400
1995	4,415,565	5,361,200	3,822,400	136,882,500
1996	4,573,452	5,658,000	4,136,000	141,777,000
1997	4,510,768	5,092,100	3,779,700	139,833,800
1998	6,048,352	8,692,600	3,999,500	187,498,900
1999	5,722,849	8,319,100	4,309,900	177,408,307
2000	4,836,010	6,376,100	4,118,250	149,916,300
2001	5,634,882	6,553,750	4,176,030	174,681,340
2002	5,038,950	6,937,050	4,063,900	156,207,450
2003	4,496,300	5,648,500	3,709,610	139,385,290
2004	4,776,464	6,061,080	3,682,780	148,070,370
2005	5,855,014	8,182,500	4,142,130	181,505,420
2006	4,429,722	7,748,000	2,824,250	137,321,390
2007	4,742,185	7,192,750	3,267,390	147,007,740
2008	4,551,589	5,950,750	3,642,770	141,099,260
2009	4,508,448	6,759,230	3,083,300	139,761,901
2010	4,593,824	7,207,765	2,960,557	142,408,530
2011	3,543,478	4,730,395	2,839,172	110,258,444
2012	4,457,338	7,282,740	2,737,559	138,177,494
2013	4,492,914	7,113,301	2,877,192	139,280,351
2014	4,114,542	5,947,118	2,833,465	127,550,790
2015	3,829,909	4,874,146	3,135,060	120,015,842
2016	3,899,822	5,973,686	2,779,609	120,894,489

Rank	Year	Monthly Total
1	1988	212,218,100
2	1987	189,849,700
3	1998	187,498,900
4	1992	185,590,500
5	2005	181,505,420
6	1994	177,476,400
7	1999	177,408,307
8	2001	174,681,340
9	1993	158,891,700
10	2002	156,207,450
11	1991	153,497,900
12	2000	149,916,300
13	2004	148,070,370
14	1989	147,434,800
15	2007	147,007,740
16	2010	142,408,530
17	1996	141,777,000
18	2008	141,099,260
19	1997	139,833,800
20	2009	139,761,901
21	2003	139,385,290
22	2013	139,280,351
23	2012	138,177,494
24	2006	137,321,390
25	1995	136,882,500
26	2014	127,550,790
27	1990	125,754,800
28	2016	120,894,489
29	2015	120,015,842
30	2011	110,258,444



MONTHLY CLIMATOLOGICAL SUMMARY

May

2016

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	50.3	54	54.3	5:00p	65	86	1951	48.1	12:00m	42	27	1979	14.7	0	0.3	4.7	20	11:00p	NE
2	47.2	54	52	11:00a	65	87	1959	44.9	6:30a	42	25	1990	17.8	0	0.06	6.8	19	6:00a	NNE
3	51.7	54	62.1	10:00p	65	87	1955	43.3	2:30a	43	29	1971	13.3	0	0	5.9	21	12:00m	SSW
4	45.9	55	60.2	1:00a	66	87	1949	40.5	6:30p	43	30	1961	19.1	0	0.27	27.2	48	4:30p	N
5	44.9	55	47.9	8:00p	66	88	1949	42.6	2:00p	43	30	1971	20.1	0	0	13.6	44	12:30a	N
6	56.5	55	75	7:30p	66	89	1959	42.7	6:30a	44	25	1989	10	1.5	0	4.8	17	12:00m	SSW
7	54.5	56	67.8	3:30a	67	85	1965	46.9	1:00p	44	26	1992	10.6	0.1	0	11.6	31	6:30p	N
8	53.9	56	67.8	7:00p	67	85	1965	44.6	6:30a	44	25	1989	11.1	0	0	4.5	15	9:30a	SW
9	54.4	56	59.6	6:00p	68	89	1993	48.6	5:00a	44	25	1955	10.6	0	0.16	3.3	23	11:30a	ESE
10	55.6	57	62.3	5:30p	68	86	1993	50.6	1:30a	45	29	1966	9.4	0	0.3	4.8	25	7:00a	E
11	59.3	57	66.9	9:30p	68	87	1992	54.3	7:30a	45	28	1949	5.7	0.1	0	2.9	14	5:00a	E
12	59.1	58	65.5	9:30a	69	89	1956	53.3	12:00m	45	30	1951	5.9	0	0.46	5.3	20	11:00p	SSW
13	54.3	58	62.4	5:30p	69	88	1956	49.7	8:00a	46	26	1996	10.7	0	0.21	9.8	25	7:30a	W
14	45.1	58	52.6	12:30a	69	92	1982	42.7	8:00a	46	32	1996	19.9	0	0.28	20.1	42	1:00a	WNW
15	45.6	59	51.5	11:30p	70	90	1982	41.7	1:00p	46	33	1992	19.4	0	0	12.4	28	4:00a	WNW
16	54.6	59	60.2	5:30p	70	89	1977	46.6	7:00a	47	28	1984	10.4	0	0	13.1	32	9:00a	SSW
17	51.2	59	55	12:30a	70	93	1962	48.8	8:30a	47	30	1973	13.8	0	0.01	10	22	1:00a	SW
18	53.6	60	64.4	12:00p	71	92	1962	48.9	4:30a	47	32	1952	11.4	0	0	5.8	20	12:00p	N
19	54.7	60	63.5	2:00p	71	93	1975	45.3	6:00a	48	35	1948	10.3	0	0	4	13	7:30p	E
20	59.3	60	72.5	2:30p	72	91	1975	51.8	7:00a	48	33	1997	6.4	0.6	0	3.7	18	3:30p	NNE
21	57.9	61	66.5	5:00p	72	90	1977	54	12:00m	48	31	1954	7.1	0	0	3.9	15	6:30p	N
22	57.1	61	65.4	4:30p	72	90	1977	50	6:30a	49	32	1997	7.9	0	0	4.6	15	6:00p	N
23	65.2	61	77.1	8:00p	73	90	1964	53.4	1:00a	49	32	1990	3.6	3.8	0	2.7	14	11:00a	E
24	73.3	62	89.6	6:30p	73	88	1981	61.2	6:00a	50	34	1948	0.4	8.8	0	5.7	23	12:00m	SE
25	74.5	62	88.7	6:30p	73	87	1950	62.3	11:30p	50	27	1992	0.2	9.6	0.44	5.9	34	8:30p	S
26	71.7	62	80.6	7:30p	74	89	1985	63.9	12:30a	50	26	1988	0	6.7	0.04	4.6	21	1:00p	SSW
27	73.1	63	85.8	5:00p	74	88	1978	66.9	7:00p	51	24	1992	0	8.1	0.08	5	31	6:30p	SSE
28	75.7	63	84.1	7:30p	74	90	1978	70.3	3:30a	51	26	1992	0	10.7	0	7.2	25	3:00p	SSE
29	70.2	63	75.5	12:30a	75	91	1991	66.4	12:00m	51	32	1992	0	5.2	0	7.1	22	9:00a	SSW
30	70.2	64	79.9	5:00p	75	91	1987	63.9	7:30a	52	32	1990	0	5.3	0	4.9	16	1:30a	SW
31	73.4	64	88.7	5:30p	75	89	1988	63.5	7:00a	52	31	1990	0	8.4	0.01	4.1	38	6:30p	ENE
AVE	58.5	58.9	67.9		70								8.7	2.2	0.1	7.4	24.2		N
MAX	75.7	64	89.6			93		70.3		52	35		20.1	10.7	0.46	27.2	48.0		
MIN	44.9	54	47.9					40.5		42	24		0	0	0	2.7	13		
TOTAL															2.62				

Max Rain: 0.46 ON 05/12/16
 Days of Rain: 11 (>.01 in)8 (>.1 in) 0 (>1 in)