

CITY OF ST. JOSEPH WATER FILTRATION PLANT
OPERATIONAL REPORT
OCTOBER 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-OCTOBER 2016

Water demand in October was down by 12,920,839 gallons or 11.7% from last year. This year 97,302,764 gallons were delivered which compares to 110,223,603 gallons delivered in October of 2015. The October 2016 pumpage ranked 29th in the thirty year tabulation dating back to 1987.

GENERAL ACTIVITIES

Filtration Capacity Study/Phase 1 SCIP

Both phases of the Filtration Capacity Study are now complete. . In October test filters in filter banks 5-8 and 9-12 were operated at 3.3 gpm/sq.ft. and 4.4 gpm/sq.ft respectively. These filters are currently rated at 2.0 gpm/sq.ft. Plant staff and CH2M Hill were very pleased with the extended filter runs that were achieved during this phase. Filter runs of 90 hours were obtained on filter #10 and 160 hours on filter #8 on two runs per filter. The filter runs were terminated based on the target head loss being reached while turbidity which is a measure of water quality remained excellent.

While the rate study was underway, CH2M engineers completed the on-site portion of the hydraulic assessment. As projected in the SCIP and confirmed in the assessment staff observed first hand the hydraulic limitations in the influent piping in filter gallery 5-8. During high water demand filter levels in the test filters dropped to very low levels when two or more filters were operating simultaneously. In fact, this condition produced excessive turbulence which presented a problem since it could have caused shearing of the floc particles. For purposes of the study filters in filter bank 9-12 were placed into service and test filters in 5-8 were reduced in number to a single filter during the tests. In terms of future planning we now know and have confirmed that the influent piping will have to be upsized.

The final report is expected in early December.

Intake Inspections/Repair

Solomon diving was hired in September to clean the intake structures and connecting pipe of the North intake. They found 30” of sand in the pipe which increased to four feet in the structures. This information confirmed what Underwater Construction had documented earlier in the summer. Solomon reported that the material consisted of a fine light sand layer of approximately 12-15” in thickness on top and a moderately dense heavy sand/clay on the bottom of the pipe. They were able to pump the light sand out within a matter of hours. The heavy sand took the better part of a day for each leg of the structure. They found no reduction of sand as they proceeded inside the pipe and in fact reported 24” at the pipe wye some 70 feet in. We do however know from the inspection done by Underwater that this level drops to 3”-4” at the emergency riser some 1500’ inside the pipe.

Solomon pressure washed the inside and outside of the intake structures and removed all of the zebra mussels, driftwood and sand. They reported the presence of two loose anchor bolt on the bottom of the south structure and north structures. These will be difficult to tighten since the nuts are buried under the floor of the structure. There

are six anchor bolts on each structure that anchor them to the subframes. Divers also restored chlorine feed to the diffuser rings by drilling 5/16" holes on the inside of assemblies.

In consultation with FTC&H modifications to the intakes to reduce the uptake of sand are under study. Among the options under consideration are radial sand deflectors, extension of the structures vertically, and conversion from side of intake to top of intake influent flow. Solomon Divers and Underwater Construction have provided and continue to provide valuable insight as the study proceeds. FTC&H is the design and construction engineer of record for the north intake which was built in 2010 and placed into service in 2011.

Long Term 2 Enhanced Surface Water Rule

The purpose of Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) is to reduce illness linked with the contaminant Cryptosporidium and other pathogenic microorganisms in drinking water. The LT2ESWTR will supplement existing regulations by targeting additional Cryptosporidium treatment requirements to higher risk systems. Current regulations require filtered water systems to reduce source water Cryptosporidium levels by 2-log (99 percent). Recent data on Cryptosporidium infectivity and occurrence indicate that this treatment requirement is sufficient for most systems, but additional treatment is necessary for certain higher risk systems. The City of St. Joseph is subject to this rule and tested for Cryptosporidium in 2009 and 2010 in its raw water. One count was found in 24 samples taken over a two year period which qualified as low risk. In October of this year the City began a second two year testing period. In spite of the low risk results obtained from the first round of testing and the expected similar results in this phase SJWTP capital improvements were programmed in the 2014 SCIP to further enhance treatment.

St. Joseph Township Interconnect Metering Project

The *cut and caps* at the Elmside and Elvern locations are complete as well as the installation of the meter and pit at Colfax & Nickerson. The contractor, John Boettcher Sewer & Excavating of Mishawaka, IN set the pit and meter at Woodward and Empire on October 6th and 7th. The distribution system valves on the St. Joseph and Benton Harbor sides were successfully closed effectively isolating the meter pit for connection during the week October 17th. A conflict with a nearby gas main was identified during excavation and further construction has been suspended pending resolution.

MDEQ Certification Examinations

Mark took the MDEQ F-2 examination in November and Rory will be taking it in May.

Travel & Training

Staff attended CMMS training for the recently purchased *Cityworks* software. Greg Alimenti attended an AWWA Leadership Retreat in Gun Lake.

Water Plant Tour-Upton 8th Grade

The Upton Middle School 8th grade toured the water plant. The kids were divided into groups and tours were given over the course of two days by plant staff. A total of 220 children toured the plant.

Water Plant Tour-Berrien Springs Parent Partnership

Home schooled children and their parents toured the plant. The group of 90 was divided into two smaller groups who were given tours over the course of one day.

Hilltop Booster Station Pipe Recoat

All of the foam pipe insulation installed shortly after construction of the Authority pump stations in 2007 was removed from the pipe in the Hilltop Booster Station. The pipe surface corrosion which had resulted from entrapment of water under the foam was removed and commercial grade two part paint applied by plant staff per manufacturers specifications. Cleveland Booster Station was completed in 2015. This work was estimated in the 2014 SCIP at \$10,000 per station. A photo is attached.



Photo showing recently painted interior piping and pumps at the Hilltop Booster Station.

Monthly Maintenance Notes

October 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
10/3 & 10/4/16	Soloman Diving - Cleaning North Crib and pipe on North L.S Intake
10/04/16	Installed new sample pump for filters 1-4
10/05/16	Flametamer - Annual inspection of fire extinguishers
10/05/16	Hach - Quarterly service and calibration on all filter turbidimeters and TOC machine.
10/3 to 10/10/16	Installed new water lines, drain lines and wiring for Clarifiers # 2 & # 3 C117's both units now online.
10/10 to 10/11/16	DA Dodd - Removed old steam supply lines in lower maintenance shop and installed new steam supply lines to old lab for new radiator heater
10/12/16	Cummins Bridgeway - Full service and inspection on Plant and Low Service Generators
10/13/16	Mead & White - Installed new motor starters for Reclaim pumps in Panel P7
10/13/16	Cummins Bridgeway - Full service and inspection on Hilltop and Cleveland BPS Generators
10/13/16	Kone - Quarterly inspection and service of freight elevator
10/14/16	Hendrix Builders - Installed New Entry Door on reservoir dechlorination building
10/14 & 10/17/16	Installed Swan Fluoride analyzer in garage and plumbed in water supply for analyzer
10/17/16	Hach - Annual Service and calibration for Particle Counters
10/18/16	Rebuilt check valve for Reclaim Pump # 2
10/18/16	Southwest Transport - Grouted in man hole and installed Dechlorination bracket for Reclaim Out Fall
10/5 to 10/19	Painted all influent and effluent piping and pumps at Hilltop BPS
10/25/16	Soloman Diving -Finished cleaning North Crib and pipe on North L.S Intake. Opened up holes in diffuser rings on both North and South Cribs
10/26/16	West Michigan - Monthly Service and calibration on SCADA software, calibrated 16" H.S flow meter and working on Raw Water flow meters.
10/26/16	Johnny on the Spot - cleaned the inside of all plant windows.
10/27/16	Installed new "No Trespassing" signs on perimeter fence
10/28/16	Serviced Generators at Lincoln and Royalton Towers, changed oil, oil filters, air filters and checked batteries

DISTRIBUTION REPORT

For the Month of October 2016

Activity	Number/Description
Water Main Breaks	4
MISS DIGS	328
Delinquent Shut Off	18 LCT
Delinquent Shut Off (Broken Payment Plans)	0
Hydrants (Repaired/Replaced)	1 LCT (freezing frozen cap)
	4 RCT (free frozen caps)
	1 Napier & Niles (SJ) Replacement
Valve Turning	3 3 at Napier/Colfax Interconnect
Valves	
Taps (1")	3 6146 Longhorn Trail (LCT) (1") New construction
	2854 Lakegrove Path (LCT) (1") New construction
Cross Connection Control (Hydro Designs)	
Repair of Curb box/Shut-Off Valves	
Service Repair	1 Copper service on utility side leaking 5968 Clearbrook Drive (LCT)
Service Replacements	1 2502 Morton Ave (SJ) (replaced lead service)
Meter pit/service replacement	
Water Quality Complaint(s)	2
Hydrant flushing to maintain water quality	2 Jakeway (SJTE), Stevensville Baroda Road (Stevensville) (LCT)
Hydrant Flushing (Stage 2 Rule)	
Service line complaints (customer side)	
Staff Education/Training	CMMS Cityworks software training, Teambuilding
Overtime-Total	90.5 (Including Sanitary and Storm)
Turn Off	17 (Note: For delinquent Shut off see above)
Turn On	6
Finals	109
Meter Repair/Replacement	
	Audit Meter
	Verify Read
	1
Meter Repair	Move Mxu Box
Per detail	New Installation
	8
Meter leaking	6 New Installation-Benton Harbor
Stopped Meter	4 Replaced/various reasons (e.g.downsize, defective)
Faulty Register	Rockwell Replacement
Frozen Meter	Mxu Replaced
	4
Move Meter Inside	Sprinkler meter removed/line capped
	1
Hard to read	8 Removals/demo
	2
Replace/Adding Sprinkler Meter	Curb box location
	1
Damage to Meter	Broken Remote
New Plumbing	1 Noisy Meter
New siding	Upgrade 5/8" to 3/4" (upgrade to 1")
	1
Meter sent out for testing	Meter Change/Benton Harbor

CITY OF ST. JOSEPH WATER MAIN BREAK REPORT

For the Month/Year of: October 2016

#	Date	Location	Main Size	Gallons Lost	Break Type	Valves Turned	City Twp	Labor	Remarks
1	10/3/2016	809 Lester Ave	6		Hole	2	SJ	22.0	Clay, Cathodic, 3" hole
2	10/16/2016	5285 St. Joseph Avenue	10	6,000	Circumferential	5	LCT	30.0	Circumferential Crack, sandy, 5.5 ft. deep, no cathodic
3	10/20/2016	2727 S. Lake Shore Dr.	10	24,000	Crack	4	SJ	36.0	Sandy, 5.0 ft deep, no cathodic
4	10/24/2016	Pontiac Dr/Cayuga Ave	6	9,000	Circumferential	6	SJCT	20.0	Sandy, 6.0 ft deep, no cathodic
	TOTALS			39,000		17		108.0	

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 2016

DISTRIBUTION:	
Total Gallons	97,302,764
Average Day	3,138,799
Maximum Day	3,908,893
Minimum Day	2,087,211

TREATMENT:	
Total Low Service	100,014,002
Wash Water Gals.	1,380,635
Wash Water %	1.28%
Plant Use Gals.	1,778,480
Plant Use %	1.81%

FILTRATION:		
Ave. Filter Run	57.4	hours
Ave. Filter Rate	2.48	g/sqft/min
Filter Eff. Index	254.2	
Ave. Loss of Head	2.0	feet
Plant Sewer Useage	675	\$ 1,617.68

LABRATORY REPORT		
Average of	Raw	Tap
Chlorides mg/L	18.0	19.4
Fluoride mg/L	0.13	0.71
Alkalinity mg/L	121	104
Hardness mg/L	148	144
pH	8.2	7.4
Calcium mg/L	43	42
Magnesium mg/L	11	10
Turbidity NTU	1.03	0.03
Temperature °F	63	
Total Coliform		0.0
Chlorine Residual		mg/L Free
Mixing Basin		0.83
Applied		1.79
Tap		1.51
Distribution		0.73

TREATMENT CHEMICAL SUMMARY:					
	Applied mg/L	Total Lbs.	Cost	Inventory lbs.	Days Supply
		CHEMICAL			
Alum (Al ⁺³)	1.96	1,631	\$5,370.09	5,779	77
Chlorine (Cl ₂)	3.42	2,840	\$763.11	6,377	70
Fluoride (F ₂)	0.75	621	\$1,088.58	37,565	356

		REMARKS:			
Total Cost all Chemicals	\$7,221.78				
Chemical Cost per Mil. Gallon Treated	\$72.21				
Chemical Cost per Mil. Gallon Delivered	\$74.22				
PLANT UTILITIES SUMMARY					
Electric:					
Total KWH	236,103	***includes measure of melted snow			
Total Power Cost	\$ 13,734.00	visit the City of Saint Joseph's Home page at www.sjcity.com			
Power Cost per Million Gallon Treated	\$ 137.32	e-mail comments to either: operator@sjcity.com or galimenti@sjcity.com			
Power Cost per Million Gallon Delivered	\$ 151.47	WEATHER CONDITIONS AT THE PLANT		Air Temp. °F	
Gallons Pumped per KWH	412	SJWW Weather Computer		Avg.	58.2
		Rain Guage, Inches	3.01	Max.	81.8
		days it rained***	11	Min.	39.3
Natural Gas:		Wind Speed, Avg	7	Lake Temp. °F	
Metered Cubic Feet	0	Wind Speed, Max	45	Avg.	63.0
Natural Gas Cost	\$36.74	Prevailing Wind Dir.	North	Max	67.8
Emergency Power Diesel Fuel Inv., Gals.	North 800	Lake Level (USACE)	579.63	Min	52.0
	South 2400				

CLEVELAND BOOSTER STATION

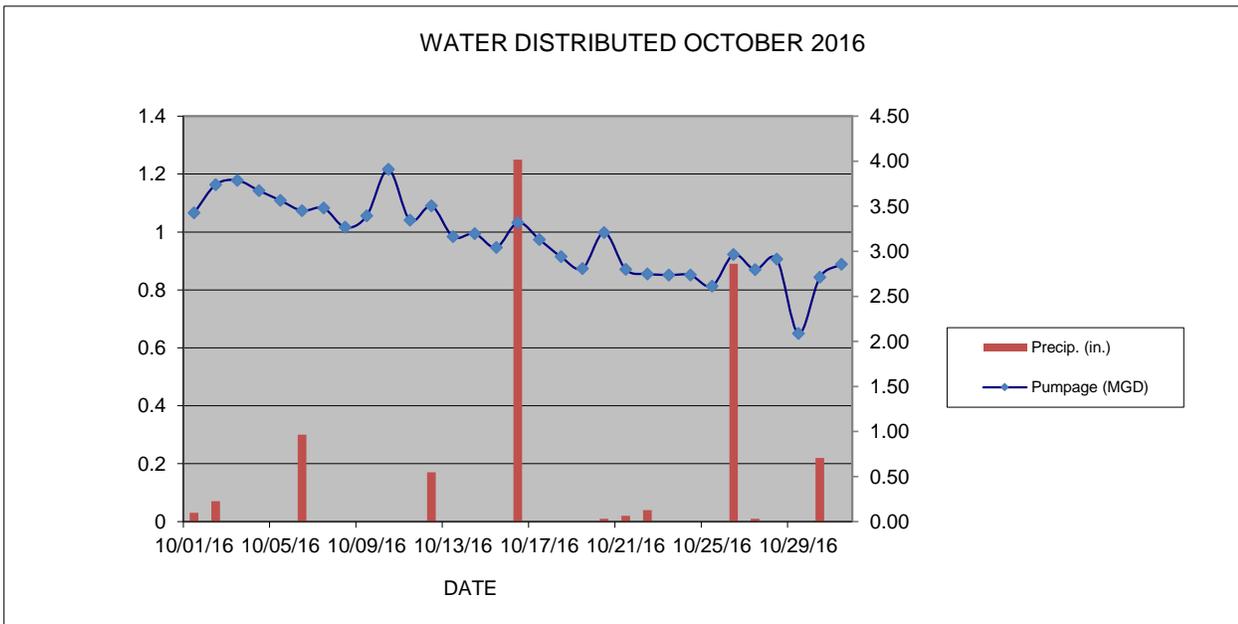
HILLTOP BOOSTER STATION

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-Oct	2.194	96	13.61	0.74				0.000	0	0.00	0.00				2.194
2-Oct	2.194	96	13.61	0.74				0.000	0	0.00	0.00				2.194
3-Oct	2.194	96	13.61	0.74	2.20	2.20	2.69	0.000	0	0.00	0.00	0.62	1.10	1.05	2.194
4-Oct	2.164	97	13.75	0.76	1.89	1.65	1.92	0.000	0	0.00	0.00	0.70	1.13	1.02	2.164
5-Oct	2.322	98	13.89	0.72	2.09	1.78	1.90	0.000	3	0.43	0.00	0.65	0.65	0.69	2.322
6-Oct	2.066	83	11.77	0.68	1.99	1.71	1.82	0.000	0	0.00	0.00	0.55	0.61	0.59	2.066
7-Oct	2.104	93	13.19	0.75	1.98	1.76	1.99	0.000	0	0.00	0.00	0.78	0.71	0.83	2.104
8-Oct	2.345	103	14.60	0.75				0.000	0	0.00	0.00				2.345
9-Oct	2.345	103	14.60	0.75				0.000	0	0.00	0.00				2.345
10-Oct	2.345	103	14.60	0.75	1.29	1.31	1.34	0.000	0	0.00	0.00	0.41	0.35	0.46	2.345
11-Oct	2.456	124	17.58	0.86	1.46	1.44	1.57	0.000	0	0.00	0.00	0.83	0.51	0.98	2.456
12-Oct	2.872	136	19.28	0.81	1.19	1.54	1.71	0.000	0	0.00	0.00	0.21	0.37	0.39	2.872
13-Oct	1.671	92	13.04	0.94	1.43	1.77	1.82	0.000	0	0.00	0.00	0.55	0.41	0.60	1.671
14-Oct	2.460	134	19.00	0.93	1.30	1.87	2.07	0.000	0	0.00	0.00	0.51	0.51	0.59	2.460
15-Oct	2.249	118	16.73	0.89				0.000	0	0.00	0.00				2.249
16-Oct	2.249	118	16.73	0.89				0.000	0	0.00	0.00				2.249
17-Oct	2.249	118	16.73	0.89	2.20	2.11	2.31	0.000	0	0.00	0.00	0.08	1.07	0.98	2.249
18-Oct	2.077	121	17.16	0.99	1.85	1.68	1.82	0.000	0	0.00	0.00	0.03	1.20	1.05	2.077
19-Oct	2.365	140	19.85	1.01	1.28	1.88	2.03	0.000	0	0.00	0.00	0.06	0.96	1.26	2.365
20-Oct	2.246	125	17.72	0.95	1.77	1.77	1.91	0.000	0	0.00	0.00	0.00	1.53	1.05	2.246
21-Oct	1.833	120	17.01	1.11	1.41	1.89	2.16	0.014	0	0.00	0.00	0.99	1.47	1.50	1.847
22-Oct	1.197	72	10.21	1.02				0.551	30	4.25	0.93				1.748
23-Oct	1.197	72	10.21	1.02				0.551	30	4.25	0.93				1.748
24-Oct	1.197	72	10.21	1.02	1.21	1.90	2.11	0.551	30	4.25	0.93	1.85	2.17	2.03	1.748
25-Oct	2.039	110	15.60	0.92	1.76	1.54	1.77	0.000	0	0.00	0.00	1.51	1.63	1.56	2.039
26-Oct	0.178	8	1.13	0.76	1.21	1.55	1.64	1.933	37	5.25	0.33	1.88	1.57	1.64	2.112
27-Oct	1.814	95	13.47	0.89	1.82	1.45	1.56	0.000	0	0.00	0.00	2.05	1.31	1.32	1.814
28-Oct	1.985	167	23.68	1.43	2.20	1.10	2.60	0.362	6	0.85	0.28	1.30	1.53	1.59	2.347
29-Oct	0.639	60	8.51	1.60				1.246	30	4.25	0.41				1.885
30-Oct	0.639	60	8.51	1.60				1.246	30	4.25	0.41				1.885
31-Oct	0.639	60	8.51	1.60	1.87	1.84	1.93	1.246	30	4.25	0.41	1.86	1.55	1.75	1.885
TOTAL	58.523	3,090	438.1					7.701	226	32.04					66.224
AVE DAY	1.888		14.1	0.95	1.7	1.7	1.9	0.2484		1.0	0.15	0.83	1.06	1.09	2.136
MAX	2.872		23.7	1.60	2.2	2.2	2.7	1.9334		5.2	0.93	2.05	2.17	2.03	2.872
MIN	0.178		1.1	0.68	1.2	1.1	1.3	0.0000		0.0	0.00	0	0.35	0.39	1.671
MONTHLY TOTALS:	Cleveland	Total MG Treated	58.523	SJCT EAST				Hilltop	Total MG Treated	7.701	Cleveland Pump Station:				55.523
		Untreated	0.000	Average Day		0.169			Untreated	0.000	Hilltop Pump Station:				7.701
Total Authority Flow:	69.036			Month Total		5.244					TOTAL AUTHORITY (Trted.)				63.224

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

DATE	PUMPAGE (gallons)	PUMPAGE (MGD)	Rainfall (in)*	October 2015
10/01/16	3,425,896	3.43	0.03	4,515,732
10/02/16	3,739,120	3.74	0.07	4,457,065
10/03/16	3,787,372	3.79	0	4,009,510
10/04/16	3,673,826	3.67	0	3,523,256
10/05/16	3,564,329	3.56	0	4,093,641
10/06/16	3,450,597	3.45	0.3	3,967,126
10/07/16	3,479,795	3.48	0	3,821,245
10/08/16	3,265,999	3.27	0	3,913,940
10/09/16	3,394,083	3.39	0	4,093,119
10/10/16	3,908,893	3.91	0	3,652,681
10/11/16	3,344,193	3.34	0	3,768,856
10/12/16	3,503,754	3.50	0.17	4,246,436
10/13/16	3,161,045	3.16	0	3,572,497
10/14/16	3,196,688	3.20	0	3,726,568
10/15/16	3,042,783	3.04	0	3,561,354
10/16/16	3,318,938	3.32	1.25	3,577,147
10/17/16	3,130,620	3.13	0	3,625,290
10/18/16	2,939,628	2.94	0	3,250,622
10/19/16	2,809,344	2.81	0	4,015,084
10/20/16	3,208,065	3.21	0.01	3,429,230
10/21/16	2,798,179	2.80	0.02	3,647,501
10/22/16	2,749,243	2.75	0.04	3,374,563
10/23/16	2,736,832	2.74	0	3,328,549
10/24/16	2,735,718	2.74	0	2,871,890
10/25/16	2,613,069	2.61	0	3,072,764
10/26/16	2,962,889	2.96	0.89	3,071,739
10/27/16	2,794,689	2.79	0.01	2,967,305
10/28/16	2,912,295	2.91	0	2,702,783
10/29/16	2,087,211	2.09	0	2,752,720
10/30/16	2,712,081	2.71	0.22	2,955,729
10/31/16	2,855,591	2.86	0	2,657,661
TOTAL	97,302,764	97.30	3.01	110,223,603

Average Day	3,138,799
Maximum Day	3,908,893
Minimum Day	2,087,211

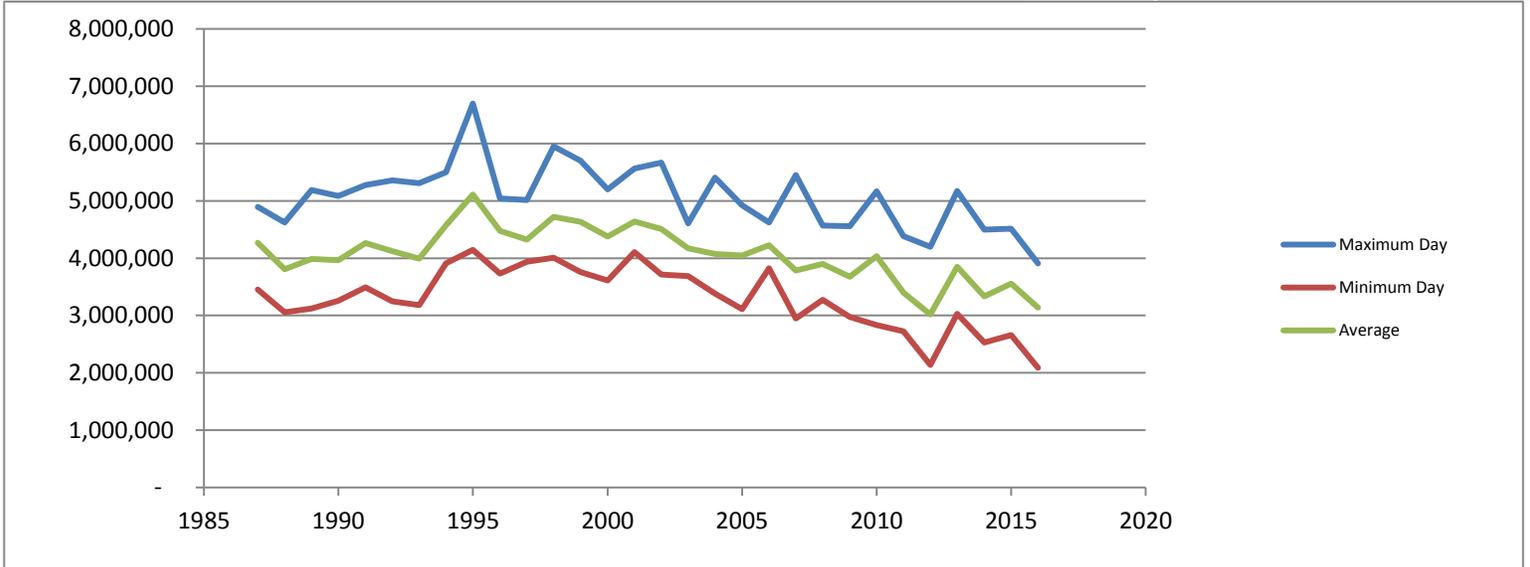


ST. JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED

OCTOBER 2016

Year	Average	Maximum Day	Minimum Day	Monthly Total
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
2016	3,138,799	3,908,893	2,087,211	97,302,764

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	2004	126,234,560
16	2005	125,496,050
17	2010	125,144,029
18	1993	123,714,400
19	1989	123,577,200
20	1990	122,988,400
21	2008	120,822,920
22	2013	119,298,259
23	1988	118,009,800
24	2007	117,271,870
25	2009	113,939,560
26	2015	110,223,603
27	2011	105,403,683
28	2014	103,378,929
29	2016	97,302,764
30	2012	93,566,332



MONTHLY CLIMATOLOGICAL SUMMARY

October

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	59	58	64.1	6:30p	69	87	1971	54.8	5:00a	47	26	1984	6	0	0.03	2.9	13	2:00p	NNE
2	57.4	58	62.4	2:00p	68	86	1971	50.7	4:30a	46	28	1981	7.6	0	0.07	2.9	12	4:30p	SE
3	61.2	57	64.1	12:00p	68	84	1953	58.8	3:30a	46	28	1974	3.8	0	0	1.4	8	3:30p	S
4	66.3	57	77.4	5:00p	68	86	1951	58.1	1:30a	46	27	1989	2.4	3.7	0	2.5	16	4:30p	E
5	70	57	80.9	2:00p	67	85	1990	62.3	3:30a	45	25	1993	0.5	5.5	0	5	22	3:00p	SSE
6	67.6	56	73.1	5:30p	67	85	1963	62.4	7:30a	45	28	1988	0.4	3	0.3	2.9	13	4:00p	SE
7	65.5	56	75.6	11:30a	66	85	1963	59.1	12:00m	44	26	1988	1.8	2.3	0	10.2	29	3:00p	SE
8	55.8	56	59.6	5:30p	66	85	1949	49.4	11:30p	44	23	1989	9.2	0	0	12.3	32	4:30a	WNW
9	54.8	55	65.5	5:30p	66	82	1949	45.5	8:30a	44	19	1989	10.2	0	0	3.1	15	6:00p	E
10	57.4	55	70.2	4:30p	65	85	1949	46.5	8:00a	43	23	1956	8.5	0.9	0	2.6	16	11:00a	E
11	63.9	54	73.2	3:00p	65	85	1962	56.9	9:00a	43	26	1993	2.9	1.8	0	4.1	16	1:00p	SE
12	62.3	54	71.6	12:30p	64	84	1962	54.8	12:00m	43	23	1990	3.5	0.9	0.17	11.8	44	7:00p	SE
13	52.6	54	58	6:00p	64	85	1975	45	12:00m	42	20	1993	12.4	0	0	9.3	34	2:30a	NNW
14	53.1	53	66.8	4:30p	63	84	1962	41.1	8:00a	42	24	1993	12	0.2	0	3.6	17	3:00p	SSE
15	62	53	72.1	4:00p	63	85	1962	51.4	5:30a	42	31	1983	5	2	0	7.5	27	11:00p	SSE
16	66.4	53	71	12:30a	63	85	1963	63.4	8:00a	42	24	1991	0.2	1.7	1.25	7.3	28	2:00a	S
17	73.5	52	81.8	5:30p	62	84	1963	65.4	12:30a	41	24	1982	0	8.5	0	9.2	38	10:30p	S
18	67.5	52	76.5	12:30a	62	82	1950	57	12:00m	41	25	1990	1.3	3.7	0	12.3	45	12:30a	SSW
19	60.3	51	69.5	1:30p	61	82	1953	52.9	5:00a	41	23	1972	4.9	0.2	0.01	3.7	16	5:00p	SE
20	57.2	51	60.4	12:00p	61	81	1953	54	12:00m	40	23	1988	7.8	0	0.02	10.1	41	8:30p	N
21	50.2	51	54	12:30a	60	83	1953	45	8:00a	40	21	1952	14.8	0	0.04	12.5	32	10:00p	N
22	48.3	50	54.8	4:30p	60	85	1953	41.4	9:00a	40	21	1989	16.7	0	0	4.4	20	2:00p	ESE
23	58.8	50	66.7	2:00p	60	83	1963	47.4	8:30a	39	20	1990	6.2	0	0	12.6	30	11:00p	SW
24	53	50	58.6	12:30a	59	80	1963	45.9	12:00m	39	22	1982	12	0	0	16	32	9:30a	N
25	47.4	49	56.4	2:30p	59	80	1963	39.3	6:30a	39	22	1987	17.6	0	0	2.5	14	3:30p	E
26	45.6	49	49.3	1:30a	58	80	1963	43.3	11:00p	39	19	1990	19.4	0	0.89	4.1	23	2:30p	E
27	48.6	49	51.4	9:30p	58	80	1963	43.6	12:30a	38	21	1976	16.4	0	0.01	10.6	31	10:00a	N
28	53.7	48	63.1	12:00m	57	76	1989	43.6	9:00a	38	27	1951	11.3	0	0	6.2	28	9:30p	SSE
29	62.2	48	65.6	3:30a	57	78	1999	57.5	12:00m	38	18	1990	2.9	0	0	10.5	41	1:00a	SSW
30	53.4	48	57.7	12:30a	56	81	1950	49.8	11:00p	38	15	1988	11.6	0	0.22	8.9	27	4:00p	NNE
31	50.4	47	57.8	4:30p	56	82	1950	40.2	8:30a	37	15	1988	14.6	0	0	3.4	18	1:30p	SSE
AVE	58.2	52.6											7.9	1.1	0.1	7.0	25.1		SSE
MAX	73.5	58	81.8			87		65.4		47	31		19.4	8.5	1.25	16.0	45.0		
MIN	45.6	47	49.3					39.3		37	15		0	0	0	1.4	8		
TOTAL															3.01				

Max Rain: 1.25 ON 10/16/16
 Days of Rain: 9 (>.01 in) 5 (>.1 in)1 (>1 in)