

**CITY OF ST. JOSEPH WATER FILTRATION PLANT**

**OPERATIONAL REPORT**

**SEPTEMBER 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-SEPTEMBER 2015

Water demand in September was up by 12,587,237 gallons or 9.5% from last year. This is a continuation of a trend that began in August. This year 143,846,127 gallons were delivered which compares to 131,258,890 gallons delivered in September of 2014. The September 2015 pumpage ranked 23<sup>rd</sup> in the thirty year tabulation dating back to 1986.

### **GENERAL ACTIVITIES**

#### 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.

#### Fairplain Interconnects

The bids were opened at St. Joseph Charter Township Hall on April 30, 2015. Wightman & Associates recommended acceptance of the low bid submitted by John Boettcher Sewer & Excavating in the amount of \$76,124.00 for items 1,4,5, and 7. These items anticipated metering all locations (Woodward/Empire; Napier/Colfax; Nickerson/Colfax) and disconnecting the Elmside/Colfax interconnection. The St. Joseph Township engineer and City staff met with representatives from Benton Charter Township and the City of Benton Harbor and memoranda of understanding will be drafted. Tentative agreements are to meter the interconnect with the City of Benton Harbor and cut and cap the all connections with Benton Charter Township except for the one at Colfax and Nickerson. The MOU and amendment to the Water Service Agreement was approved by the St. Joseph City Commission on October 12, 2015. A preconstruction meeting is scheduled for October 22<sup>nd</sup>. The construction term will be one month.

#### Travel & Training

Greg Alimenti and Shawn Orlaske attended the Michigan Section AWWA Annual Conference and Exposition in Sault Ste. Marie, MI. Greg gave an extended version of the St. Joseph Shorewell & Intake Project that he had presented in Kalamazoo in April. He also served on a discussion panel on disinfection byproducts.

Al Arny, Josh Frazee and Kalvin Higbee attended a water compliance course in Grand Rapids.

#### Water Plant Operator

Ryan Patzer completed his training in September and has been issued a provisional license which is valid for one year. He will be taking his formal F-4 certification examination in May of 2016. He is doing well.

#### 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 is scheduled for the last week of October.

Given the difficulty anticipated in removing this material plant staff is engaged in a study of the feasibility of a permanently installed sludge pump that would be used to remove the material seasonally.

#### 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. General plans and reliability studies fall under Rule 1606 of the Safe Drinking Water Act (Public Act 399 as Amended).

#### Stage 2 DBP Non-Compliance Monitoring

Non-Compliance monitoring for TTHM's and HAA5's was done in late September. Elevated TTHM's were found at site #2 Lincoln Township Hall. Regularly scheduled compliance testing in early October yielded normal levels. Staff is

#### SOC Synthetic Organic Contaminants

Analyses for SOC's were done in the second and third quarters this year. No SOC's were detected in our tap water. These manufactured chemicals do not occur naturally, and are widely used on farmland throughout Michigan. The majority of SOC's are made up of pesticides, herbicides and insecticides, while others are used as plasticizers, wood preservatives, flame retardants, and solvents, and produced as by-products or waste materials. Some man-made chemicals are undetectable through sight and smell; however, certain aromatic chemicals, such as those in coal tar, have a very noticeable odor. Ground water systems located near agricultural areas are most at risk however rivers carry these contaminants to the lake where very low concentrations of them are found from time to time.

#### Intake Security

During the last week of September plant staff observed an articulated tug and barge anchored off of Lions Beach. On Saturday, staff noted that they had moved to a position just four hundred yards from the north water plant intake. Contact with the vessel was made and it was determined that it posed no immediate danger to the intake structures. The intake location is not marked on the marine chart for security purposes and the information is not public. In fact, MDEQ will not disclose the coordinates of any WTP intake under a FOIA request. Consideration is being given as to whether a no anchor zone should be established. The ship was anchored on the windward sheltered side of the lake as it waited to enter Buffington Harbor near Gary, Indiana where due to conditions it could not safely enter port.

#### Surfer in Distress

Jerrold Thomas spotted a surfer in trouble just off of the water plant on October 9<sup>th</sup>. He promptly called 911 which led to a successful rescue several hundred yards south of the plant.

### 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.

The water tower is also due for the installation of a corrosion protection system. This installation was planned for during construction of the tank in 2010. Cathodic protection as it is called will be attached in the interior on grommets welded into the tank when it was built. Corpro of Medina, OH has furnished a quote for this system. There are no other vendors that provide this equipment. An illustration of the system is shown below.

## Automatically Controlled T.A.S.C.<sup>®</sup> Rectifier with Submerged Anode (Permanode<sup>®</sup>) Suspension System for Tanks Subject to Icing Conditions

*NSF Standard 61*

### **Cathodic Protection System Components in Accordance with AWWA Standard D104 and NACE Standard RP0388**

- Titanium mixed metal oxide or platinized niobium impressed current bowl and riser anode assemblies
- Submerged anode support system
- Flotation buoys
- Permanent reference electrodes
- Steel anchors welded to side wall
- Conduit with associated wiring
- Automatically controlled T.A.S.C.<sup>®</sup> rectifier
- Pressure fitting and junction box
- Riser pipes 30-inches in diameter or larger



# Monthly Maintenance Notes

SEPTEMBER 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
9/2 & 9/3/15	Prepped and Painted Guard Poles at Lincoln and Royalton Towers
09/03/15	Installed New Batteries for Generator at the Cleveland BPS
09/03/15	Hach - PM service and calibration for TOC Machine
09/08/15	D.A. Dodd - Installed flapper valve assembly on reclaim basin overflow pipe
09/09/15	Installed New Batteries for Plant Generator and North Low Service Generators
9/8 & 9/9/15	Hach - PM service and calibration for all filter turbidimeters and particle counters
09/10/15	Installed New Control Board in CL17 Chlorine Analyzer at the Cleveland BPS.
09/14/15	Replaced GFI Outlets in Clarifier # 1 blow off room for sump pump
09/16/15	Replaced drive belt and cleaned desiccant wheel on Dehumidifier
09/21/15	D.A. Dodd - Installed flapper valve assembly on reservoir overflow pipe
09/22/15	ABCS - Reset Limit positions on filter # 9 effluent valve and replaced contact on switch for PLC to Controller Mode
09/30/15	Replaced GFI Outlet in Lab for Spec.

**DISTRIBUTION REPORT**

*For the Month of September 2015*

Activity		Number/Description	
Water Main Breaks		0	
MISS DIGS		382	
Delinquent Shut Off		20	10 in SJCTE, 10 SJCTW
Delinquent Shut Off (Broken Payment Plans)		1	
Hydrants (Repaired/Replaced)		7	4736 S. Cedar Trail (LCT) Replace, 7 repairs (LCT), 2 1/2" caps stuck, broken stem, brass spin, Drill/tap top nut Hard to turn, no water.
Valves		0	
Taps (1")		3	4431 Terra Lane (RCT) 4837 Pleasant Meadow (RCT) 2683 Franklin St. (LCT)
Cross Connection Control (Hydro Designs)		0	
Service Work (System Valves)		0	
Repair of Curb box/Shut-Off Valves		11	CITY-3 (replace curb box, No turn), SJCTE-2, RCT-1 SJCTE-5 (Repair to enable shut off)
Service Replacement		0	
Hydraulic Model-Flushing			
Water Quality Complaint(s)		0	
Hydrant Flushing to maintain water quality			
Hydrant Flushing (Stage 2 Rule)		29,800	City
Staff Education/Training		1	Al, Josh and Calvin. Small Water Compliance Training
Overtime-Total		17.5	(Including Sanitary and Storm)
Turn Off		6	(Note: For delinquent Shut off see above)
Turn On		8	
Finals		130	
<b>Meter Repair/Replacement</b>			
		Audit Meter	
		Verify Read	2
Meter Repair		Move Mxu Box	
Per detail		New Installation	11
Meter leaking	3	New Installation-Benton Harbor	
Stopped Meter	9	Replaced/various reasons	2
Faulty Register		Rockwell Replacement	
Frozen Meter		Mxu Replaced	5
Move Meter Inside		Sprinkler meter removed/line capped	
Hard to read	8	Removals/demo	1
Replace/Adding Sprinkler Meter		Curb box location	
Damage to Trt		Broken Remote	
New Plumbing	2	Noisy Meter	
New siding	1	Upgrade 5/8" to 3/4"	1
Meter sent out for testing		Meter Change/Benton Harbor	

**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**

**September 2015**

DISTRIBUTION:	
Total Gallons	143,846,127
Average Day	4,794,871
Maximum Day	6,482,276
Minimum Day	3,938,438

TREATMENT:	
Total Low Service	147,709,564
Wash Water Gals.	2,114,830
Wash Water %	1.38%
Plant Use Gals.	1,740,626
Plant Use %	1.19%

FILTRATION:		
Ave. Filter Run	105.0	hours
Ave. Filter Rate	2.00	g/sqft/min
Filter Eff. Index	146.6	
Ave. Loss of Head	5.0	feet
Plant Sewer Usage	1083	\$ 2,393.18

LABORATORY REPORT		
Average of	Raw	Tap
Chlorides mg/L	15.9	18.2
Fluoride mg/L	0.13	0.73
Alkalinity mg/L	110	97
Hardness mg/L	132	129
pH	8.2	7.3
Calcium mg/L	37	37
Magnesium mg/L	10	10
Turbidity NTU	2.47	0.03
Temperature °F	58	
Total Coliform		0.0
Chlorine Residual		mg/L Free
Mixing Basin		0.92
Applied		1.82
Tap		1.64
Distribution		1.04

TREATMENT CHEMICAL SUMMARY:					
	Applied mg/L	Total Lbs.	Cost	Inventory lbs.	Days Supply
		CHEMICAL			
Alum (Al <sup>+3</sup> )	1.83	2,246	\$7,397.88	96,117	1284
Chlorine (Cl <sub>2</sub> )	3.27	4,022	\$1,080.71	11,469	86
Fluoride (F <sub>2</sub> )	0.76	933	\$1,633.87	6,867	221

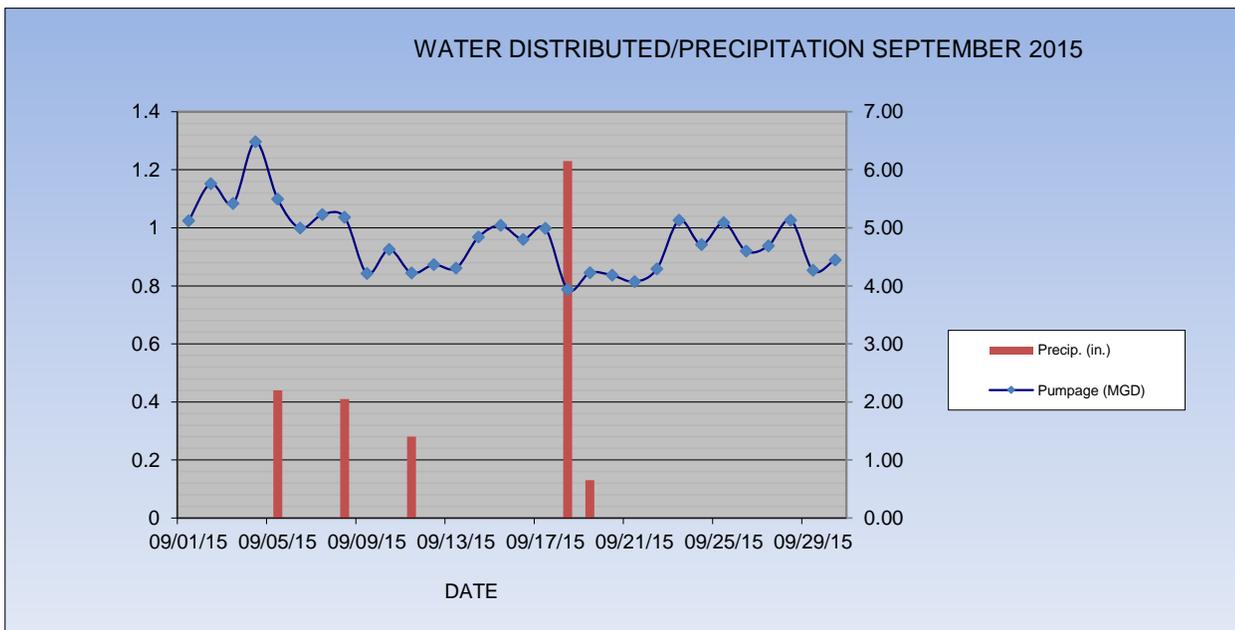
		REMARKS:			
Total Cost all Chemicals	\$10,112.46				
Chemical Cost per Mil. Gallon Treated	\$68.46				
Chemical Cost per Mil. Gallon Delivered	\$70.30				
PLANT UTILITIES SUMMARY		WEATHER CONDITIONS AT THE PLANT			
		Air Temp. °F			
Electric:		SJWW Weather Computer			
Total KWH	255,000	Rain Guage, Inches	2.49	Avg.	68.6
Total Power Cost	\$ 17,850.00	days it rained***	5	Max.	91.1
Power Cost per Million Gallon Treated	\$ 120.85	Wind Speed, Avg	5.8	Min.	45.8
Power Cost per Million Gallon Delivered	\$ 134.64	Wind Speed, Max	39	Lake Temp. °F	
Gallons Pumped per KWH	512	Wind Speed, Max	39	Avg.	58.4
Natural Gas:		Prevailing Wind Dir.	North	Max.	69.5
Metered Cubic Feet	6	Lake Level (USACE)	579.59	Min.	49.3
Natural Gas Cost	\$39.81				
Emergency Power Diesel Fuel Inv., Gals.	North 1500				
	South 300				

\*\*\*includes measure of melted snow  
visit the City of Saint Joseph's Home page at [www.sjcity.com](http://www.sjcity.com)  
e-mail comments to either: [operator@sjcity.com](mailto:operator@sjcity.com) or [galiment@sjcity.com](mailto:galiment@sjcity.com)

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

DATE	PUMPAGE (gallons)	PUMPAGE (MGD)	RAINFALL (in)	Day to Day Comparison 2015/2014	
				2015	2014
09/01/15	5,118,807	5.12	0	5,118,807	5,202,181
09/02/15	5,759,407	5.76	0	5,759,407	4,957,129
09/03/15	5,418,153	5.42	0	5,418,153	4,988,568
09/04/15	6,482,276	6.48	0	6,482,276	5,213,256
09/05/15	5,495,502	5.50	0.44	5,495,502	4,721,970
09/06/15	4,993,044	4.99	0	4,993,044	4,320,290
09/07/15	5,227,638	5.23	0	5,227,638	4,299,928
09/08/15	5,181,045	5.18	0.41	5,181,045	4,665,284
09/09/15	4,214,397	4.21	0	4,214,397	4,886,757
09/10/15	4,627,315	4.63	0	4,627,315	4,351,998
09/11/15	4,220,160	4.22	0.28	4,220,160	3,778,840
09/12/15	4,365,480	4.37	0	4,365,480	3,784,105
09/13/15	4,304,008	4.30	0	4,304,008	3,941,723
09/14/15	4,839,376	4.84	0	4,839,376	3,732,863
09/15/15	5,040,132	5.04	0	5,040,132	3,879,058
09/16/15	4,801,449	4.80	0	4,801,449	4,122,916
09/17/15	4,989,879	4.99	0	4,989,879	3,647,570
09/18/15	3,938,438	3.94	1.23	3,938,438	4,126,638
09/19/15	4,224,313	4.22	0.13	4,224,313	4,557,434
09/20/15	4,181,946	4.18	0	4,181,946	4,047,040
09/21/15	4,070,587	4.07	0	4,070,587	3,724,759
09/22/15	4,291,218	4.29	0	4,291,218	3,377,456
09/23/15	5,128,417	5.13	0	5,128,417	4,593,479
09/24/15	4,709,061	4.71	0	4,709,061	4,563,453
09/25/15	5,088,893	5.09	0	5,088,893	4,138,464
09/26/15	4,600,519	4.60	0	4,600,519	4,857,269
09/27/15	4,689,183	4.69	0	4,689,183	4,461,167
09/28/15	5,131,685	5.13	0	5,131,685	5,362,360
09/29/15	4,266,846	4.27	0	4,266,846	4,458,035
09/30/15	4,446,954	4.45	0	4,446,954	4,496,899
<b>TOTAL</b>	<b>143,846,127</b>	<b>143.85</b>	<b>2.49</b>	<b>143,846,127</b>	<b>131,258,890</b>

<b>Average Day</b>	<b>4,794,871</b>
<b>Maximum Day</b>	<b>6,482,276</b>
<b>Minimum Day</b>	<b>3,938,438</b>



CLEVELAND BOOSTER STATION

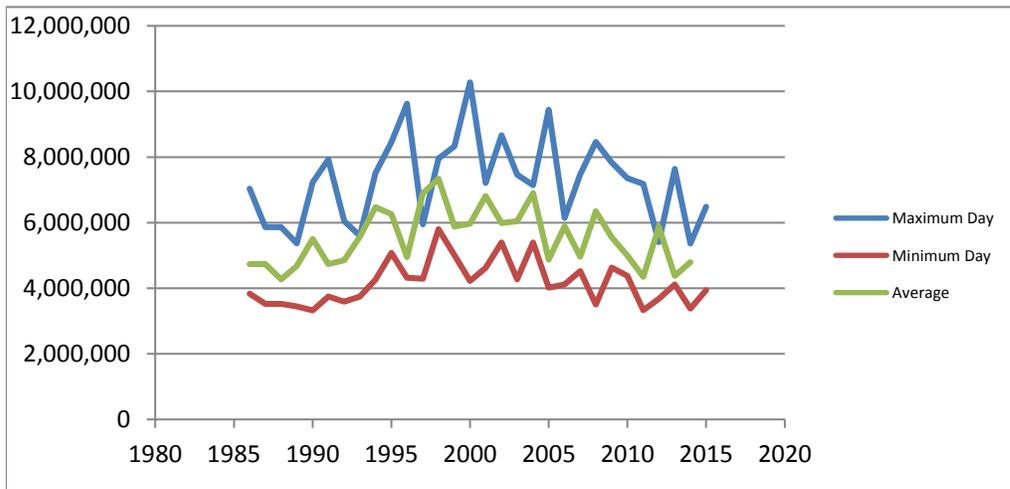
HILLTOP BOOSTER STATION

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-Sep	2.185	75	10.63	0.58	2.20	1.97	1.68	0.000	0	0.00	0.00	1.95	1.54	1.54	2.185
2-Sep	3.078	99	14.04	0.55	1.46	1.46	1.53	1.640	31	4.40	0.32	2.11	1.78	1.92	4.718
3-Sep	1.505	1	0.14	0.01	1.64	1.96	2.15	1.414	22	3.12	0.26	1.61	1.76	1.97	2.918
4-Sep	1.962	80	11.34	0.69	2.20	2.07	2.15	1.644	77	10.92	0.80	1.62	2.01	2.25	3.606
5-Sep	1.731	73	10.35	0.72				1.642	73	10.35	0.76				3.373
6-Sep	1.731	73	10.35	0.72				1.642	73	10.35	0.76				3.373
7-Sep	1.731	73	10.35	0.72				1.642	73	10.35	0.76				3.373
8-Sep	1.731	73	10.35	0.72	1.67	1.68	1.76	1.642	73	10.35	0.76	1.37	1.39	1.55	3.373
9-Sep	1.152	53	7.51	0.78	1.33	1.61	1.75	1.185	2	0.28	0.03	1.50	1.79	1.82	2.337
10-Sep	2.267	99	14.04	0.74	2.20	2.03		0.531	35	4.96	1.12	1.86	1.69	1.80	2.799
11-Sep	1.820	71	10.07	0.66	1.53	1.51	1.66	1.212	73	10.35	1.02	1.49	1.88	2.04	3.031
12-Sep	1.568	49	6.95	0.53				0.934	40	5.67	0.73				2.502
13-Sep	1.568	49	6.95	0.53				0.934	40	5.67	0.73				2.502
14-Sep	1.568	49	6.95	0.53	1.31	1.52	1.86	0.934	40	5.67	0.73	1.49	1.82	2.02	2.502
15-Sep	2.393	100	14.18	0.71	2.20	1.96	2.06	1.005	63	8.93	1.07	2.05	1.65	1.91	3.398
16-Sep	2.829	87	12.33	0.52	1.95	1.76	1.85	0.229	13	1.84	0.96	2.18	1.79	2.02	3.058
17-Sep	2.434	80	11.34	0.56	1.49	2.14	2.26	0.118	5	0.71	0.72	1.50	1.68	1.84	2.551
18-Sep	0.710	20	2.84	0.48	1.67	1.41	1.43	2.836	95	13.47	0.57	2.20	1.88	2.11	3.547
19-Sep	2.443	77	10.92	0.54				0.224	0	0.04	0.02				2.667
20-Sep	2.443	77	10.92	0.54				0.224	0	0.04	0.02				2.667
21-Sep	2.443	77	10.92	0.54	1.49	1.84	1.94	0.224	0	0.04	0.02	1.20	1.34	1.43	2.667
22-Sep	0.340	14	1.98	0.70	1.71	1.75	1.79	1.672	8	1.13	0.08	1.49	1.78	1.89	2.012
23-Sep	2.273	68	9.64	0.51	1.49	1.73	1.84	0.957	37	5.25	0.66	1.42	1.85	2.02	3.230
24-Sep	2.112	74	10.49	0.60	1.99	1.83	2.01	0.024	2	0.28	1.39	1.93	1.78	1.66	2.137
25-Sep	2.212	101	14.32	0.78	1.81	2.19	2.30	1.727	97	13.75	0.95	1.78	2.07	2.17	3.939
26-Sep	1.751	67	9.50	0.65				1.183	44	6.24	0.63				2.935
27-Sep	1.751	67	9.50	0.65				1.183	44	6.24	0.63				2.935
28-Sep	1.751	67	9.50	0.65	1.96	1.94	2.03	1.183	44	6.24	0.63	1.51	1.56	1.65	2.935
29-Sep	2.614	88	12.48	0.57	1.63	1.80	1.95	0.436	17	2.41	0.66	1.59	1.78	1.94	3.050
30-Sep	1.843	93	0.00	0.00	1.72	2.20	2.68	1.646	80	11.34	0.83	1.66	2.20	2.65	3.489
TOTAL	57.938	2,074	280.9					31.868	1,202	170.41					89.807
AVE DAY	1.931		9.4	0.58	1.7	1.8	1.9	1.0623		5.7	0.62	1.69	1.76	1.91	2.994
MAX	3.078		14.3	0.78	2.2	2.2	2.7	2.8364		13.8	1.39	2.2	2.2	2.65	4.718
MIN	0.340		0.0	0.00	1.3	1.4	1.4	0.0000		0.0	0.00	1.2	1.34	1.43	2.012
MONTHLY TOTALS:	Cleveland	Total MG Treated	57.938	SJCT EAST				Hilltop	Total MG Treated	31.868	Cleveland Pump Station:				56.095
		Untreated	56.095	Average Day					Untreated	31.868	Hilltop Pump Station:				31.868
Total Authority Flow:	95.0081		1.843	Month Total		5.819				0.000	TOTAL AUTHORITY (Trted.)				87.963

**ST. JOSEPH WATER PLANT PUMPAGE-WATER DELIVERED**  
**SEPTEMBER 2015**

Year	Average	Maximum Day	Minimum Day	Monthly Total
1986	5,272,460	7,033,200	3,832,200	158,173,800
1987	4,739,067	5,865,900	3,526,600	142,172,000
1988	4,739,067	5,865,900	3,526,600	142,172,000
1989	4,271,113	5,368,300	3,450,800	128,133,400
1990	4,676,653	7,229,900	3,325,000	140,299,600
1991	5,502,837	7,930,800	3,743,200	165,085,100
1992	4,733,427	6,050,100	3,590,400	142,002,800
1993	4,853,200	5,596,400	3,751,200	145,596,000
1994	5,568,387	7,512,800	4,264,800	167,051,600
1995	6,472,583	8,451,550	5,076,500	194,177,500
1996	6,259,632	9,624,850	4,321,200	187,788,950
1997	4,952,985	5,948,300	4,287,100	148,589,550
1998	6,902,892	7,962,050	5,800,250	207,086,750
1999	7,336,767	8,327,900	5,011,800	220,103,000
2000	5,881,432	10,278,600	4,218,550	176,442,950
2001	5,965,884	7,213,500	4,621,540	178,976,510
2002	6,816,819	8,670,050	5,394,500	204,504,580
2003	5,990,605	7,463,190	4,273,450	179,718,150
2004	6,050,319	7,144,670	5,396,500	181,509,570
2005	6,900,181	9,446,000	4,014,000	207,005,420
2006	4,875,917	6,143,500	4,117,750	146,277,500
2007	5,886,785	7,470,800	4,525,000	176,603,560
2008	4,955,846	8,465,750	3,500,570	148,675,370
2009	6,349,200	7,827,500	4,630,930	190,476,740
2010	5,552,512	7,354,162	4,381,232	166,575,350
2011	4,999,212	7,178,146	3,326,840	149,976,363
2012	4,344,215	5,408,899	3,676,975	130,326,456
2013	5,868,671	7,634,417	4,115,276	176,060,131
2014	4,375,296	5,362,360	3,377,456	131,258,890
2015	4,794,871	6,482,276	3,938,438	143,846,127

Ranking	Year	Monthly Total
1	1999	220,103,000
2	1998	207,086,750
3	2005	207,005,420
4	2002	204,504,580
5	1995	194,177,500
6	2009	190,476,740
7	1996	187,788,950
8	2004	181,509,570
9	2003	179,718,150
10	2001	178,976,510
11	2007	176,603,560
12	2000	176,442,950
13	2013	176,060,131
14	1994	167,051,600
15	2010	166,575,350
16	1991	165,085,100
17	1986	158,173,800
18	2011	149,976,363
19	2008	148,675,370
20	1997	148,589,550
21	2006	146,277,500
22	1993	145,596,000
<b>23</b>	<b>2015</b>	<b>143,846,127</b>
24	1987	142,172,000
25	1988	142,172,000
26	1992	142,002,800
27	1990	140,299,600
28	2014	131,258,890
29	2012	130,326,456
30	1989	128,133,400



**MONTHLY CLIMATOLOGICAL SUMMARY**

**September 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	77.1	67	81.6	7:00p	78	98	1953	71	6:30a	55	42	1970	0	12.1	0	5.2	18	12:00m	SE
2	79.2	67	91.1	5:30p	78	98	1953	74.8	7:30a	55	41	1994	0	14.2	0	6.6	23	8:30p	SSW
3	77.6	67	84.8	6:30p	78	94	1953	71.1	12:00m	55	40	1974	0	12.6	0	8.1	20	8:00p	SSW
4	72	67	78.4	12:30p	78	91	1964	69.1	12:00m	55	37	1997	0	7	0	4.8	15	5:30a	N
5	73.2	66	83.5	6:00p	77	92	1959	68.1	12:00p	54	40	1984	0	8.2	0.44	3.9	25	10:30a	SE
6	78.7	66	89.3	7:00p	77	96	1954	69.7	8:00a	54	37	1962	0	13.7	0	4.4	15	10:30a	SE
7	79.2	66	83.9	4:30p	77	96	1960	76.4	5:30a	54	36	1988	0	14.2	0	5.9	21	9:00a	SSE
8	75.1	66	82.9	12:00p	77	95	1960	70.3	12:00m	54	34	1951	0	10.1	0.41	9	38	4:00p	SW
9	70.6	65	73.7	6:30p	76	93	1955	65.3	11:00p	53	40	1951	0	5.6	0	8.1	19	2:30p	N
10	66.6	65	74.4	2:00p	76	93	1983	58.7	7:00a	53	39	1988	1.8	3.3	0	5.5	24	4:00p	E
11	62.9	65	68	2:30a	76	91	1952	58.4	1:00p	53	40	1958	2.6	0.5	0.28	9.8	39	8:00p	N
12	56.2	65	59.9	3:30p	76	92	1952	51.1	7:30a	53	33	1964	8.8	0	0	8.6	27	7:30p	N
13	58.1	64	65.3	6:00p	75	92	1962	50.3	6:30a	52	32	1985	6.9	0	0	4.4	13	12:30a	SSW
14	66.4	64	79.9	5:00p	75	92	1962	53.5	8:00a	52	33	1985	3.8	5.2	0	7.6	25	4:30p	SSW
15	71.4	64	83.9	6:30p	75	90	1991	61.9	7:30a	52	34	1966	0.4	6.9	0	5.2	19	12:30a	SE
16	70.9	63	83.3	7:00p	74	89	1948	61.1	8:30a	51	35	1986	0.5	6.5	0	5.4	17	11:00a	SE
17	73.9	63	85.7	5:30p	74	91	1955	63.1	8:00a	51	32	1990	0.2	9.1	0	7.1	23	5:00p	SSE
18	71.2	63	77	12:30a	74	90	1955	67.4	5:30a	51	36	1959	0	6.2	1.23	4.5	28	3:00a	SSW
19	65	62	70.7	3:30a	73	88	1978	57.8	12:00m	51	37	1981	1.1	1.1	0.13	15	39	9:30a	N
20	60.8	62	70.6	2:00p	73	88	1978	52.4	7:30a	50	36	1956	4.8	0.6	0	5.2	17	7:30p	ESE
21	60.9	62	71.5	12:30p	73	90	1970	51.7	8:00a	50	30	1991	4.9	0.8	0	3.3	13	6:00p	E
22	65.1	61	77.6	4:00p	72	87	1959	54	7:30a	50	34	1999	3.4	3.5	0	2.8	11	9:00a	SE
23	66.3	61	78.8	1:30p	72	86	1959	58	8:00a	49	31	1954	2	3.3	0	3.9	17	7:00p	E
24	66.4	61	79.6	2:30p	71	86	1960	55	8:00a	49	28	1989	2.3	3.7	0	3	16	5:00p	NNE
25	67.2	60	81.2	5:30p	71	86	1986	58.9	7:30a	49	29	1989	1.4	3.6	0	3.9	18	2:00p	NNE
26	68.4	60	80.5	4:30p	71	92	1998	59.3	5:00a	48	36	1962	1.7	5.1	0	2.3	15	4:00p	ENE
27	68.2	60	72.4	3:00p	70	92	1998	65.8	8:30a	48	23	1989	0	3.2	0	1.7	12	11:00a	ESE
28	70.7	59	75.4	6:00p	70	86	1952	67.8	8:30a	48	24	1991	0	5.7	0	3.2	13	11:30a	SE
29	64.5	59	71.9	5:30a	70	96	1953	55	12:00m	47	29	1991	2.7	2.2	0	8.3	37	12:00p	NNE
30	53	59	58.9	6:00p	69	93	1953	45.8	7:30a	47	27	1984	12	0	0	7.4	25	4:30p	NNE
AVE													2.0	5.6	0.1	5.8	21.4		SE
MAX	79.2	67	91.1			98		76.4		55	42		12	14.2	1.23	15.0	39.0		
MIN	53	59	58.9					45.8		47	23		0	0	0	1.7	11		
TOTAL															2.49				

Max Rain: 1.23 ON 09/18/15  
 Days of Rain: 5 (>.01 in) 5 (>.1 in)1 (>1 in)