

City of St. Johns Wastewater Treatment Facility 2010 Annual Report



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Operational Statistics

Wastewater Facility – Post Construction

With combined efforts from City staff and commissioners, C2AE Consultants, R.S. Technical Services and Davis Construction, the recently completed construction and updates are meeting all expectations. Beginning with a very practical approach and incorporating creative ideas to maximize efficiencies, yet minimize construction costs, the operation of the wastewater facility has become much more reliable.

In addition to the new equipment, geo-thermo heating and additional wet-weather flow storage, we continue to advance our Scada capabilities.

Characteristics

The Wastewater Facility's effluent is discharged into the St. Johns Big Ditch, a tributary of Hayworth Creek, which flows to the Maple River. Authorization to discharge is granted under the National Pollutant Discharge Elimination System (NPDES), Permit Number MI0026468. Discharge into the receiving stream is in accordance with the effluent limits, monitoring requirement, and other conditions set forth in this Permit. Our current permit was re-issued on September 1, 2009 and shall expire on October 1, 2013.

On March 18, 2011, we submitted a written request to MDNRE officials to further reduce the frequency of analyses for both low-level mercury and available cyanide. If approved, we shall create an annual savings of approximately \$ 3,000.00 in out-side laboratory cost.

Monthly Operating Reports

For the year of 2010, the operating reports indicated that two (2) violations were submitted to MDNRE officials. Both violations were for the parameter of available cyanide, in which our permitted levels are 5.2 ug/l or (parts per billion). With assistance from Trace Laboratories, our investigations resulted in finding hydrogen sulfide interference that caused false positive results. We initiated a change in the sampling procedure for available cyanide and have since reported zero (0) violations. Wastewater personnel continually maintain/regulate the Industrial Pretreatment Program and monitor the chemical feed rates, thus reducing the chance of permit violations within our control.

Sanitary Sewer Overflows

Sanitary Sewer Overflows (S.S.O.)

In accordance with our discharge permit, each sanitary sewer overflow (SSO) is reported to Michigan Department of Natural Resources & Environment (MDNRE) officials. In 2010, we unfortunately implemented bypassing of untreated wastewater on one occasion, being May 13, 2010. An estimated total of 397,500 gallons of highly diluted wastewater was diverted from the Townsend Road Lift Station wet-well into the Steel & Walbridge Detention Pond. This emergency measure is only performed to protect our resident's homes and/or businesses from potential sewage water damage. Weather events such as melting snow and rain are typically the direct cause.

Corrective Actions

As required, City staff submitted an Inflow & Infiltration Reduction Plan to MDNRE officials in early 2010. This plan outlines our commitment to address known problems in our sanitary collection system and ultimately reduce/eliminate SSO's within our control

As part of the I & I Reduction Plan, flow monitoring equipment was installed by Fishbeck, Thompson, Carr & Huber, Inc. in March 2010 and still remains in the collection system. Initial reports provided enough support to relocate the flow meters to further identify the main source of these additional flows.

Financial and Engineering Assistance

We have been notified from various engineering firms that there may be a potential grant opportunity in the near future. This 90% forgiveness grant would enable the City of St. Johns to implement the necessary study of the entire sanitary system and portions of our storm system.

City staff met with representatives from C2AE Engineering and discussed our goals and timeframes within the I & I Plan. We also discussed how this grant opportunity would further broaden our scope of investigations. In short, we shall remain proactive by accumulating the necessary information, prior to the application process for this funding.

Laboratory

Laboratory Practices

Laboratory analysis is performed every day of the year on various parameters. A complete analysis on each stage (4) of the process is analyzed. The results are recorded and submitted to MDEQ each month. At this time we are utilizing an electronic filing system for Monthly Operating Report submittal.

Removal Efficiency

To show the operational performance for the Wastewater Facility for 2010, the following indicates the overall removal efficiency. In accordance to our NPDES Permit, the maximum daily limits are adjusted seasonally for some of the parameters below.

Parameter	Permitted Max. Daily Limit	Reported Daily Average	Overall % Removed
Biological Oxygen Demand	14 mg/l	3.49 mg/l	98.3
Suspended Solids	25 mg/l	6.35 mg/l	95.1
Volatile Solids	Report	3.10 mg/l	95.2
Total Phosphorus	.75 mg/l	0.61 mg/l	85.8
Ammonia Nitrogen	4.0 mg/l	0.16 mg/l	98.9

Annual Laboratory Operating Cost

Based on invoice totals for 2010, the operating cost for our laboratory supplies and equipment totaled \$ 6,521.17. This cost includes the various chemicals, supplies and equipment repairs and or/replacement to perform the required analytical testing for our facility and the communities we provide laboratory services. The revenue created in 2010 totaled \$ 11,229.00, exceeding the operating expense by \$ 4,707.83.

Annual Laboratory Revenue

Wastewater personnel analyzed lagoon samples from neighboring communities and wash waters from a local business seasonally. Invoices are created using prices in accordance to the St. Johns Fee & Rate Schedule.

The following chart summarizes annual revenues according to the services that we provided.

2006	2007	2008	2009	2010
\$ 5,325.08	\$ 7,458.12	\$ 12,239.05	\$ 15,001.00	\$11,229.00

Maintenance

Maintenance Program

Maintenance is performed on a daily basis, which starts with equipment inspections and hour meter readings. There are a total of eleven buildings at the wastewater plant and five lift stations, throughout the City from which wastewater personnel collect daily operational readings. This data is used for scheduled maintenance tasks including oil changes and lubrication of equipment. Also, by inspecting all buildings and equipment within them, the overall operation is noted each day to insure proper performance and conditions.

Supervisory Control and Data Acquisition (SCADA System)

The Scada System has proven to be a great improvement to our daily operations. It provides both a single point to monitor/record plant functions and various options in pump and level controls.

With the recent sanitary sewer agreement between the City of St. Johns and Bingham Township, we now have the ability to view the operations of their lift stations on our scada system. We also send our weather station information back to their scada system.

We recently installed a program that allows selected individuals to connect from their remote internet locations and implement changes to our plant operations. Protected by a series of passwords, we have the means to alternate pumps, adjust pumping set-points, increase chemical feed rates and view/acknowledge alarms. Representatives from R.S. Technical Services may also install requested updates/programs and troubleshoot problems from remote locations, eliminating the travel/mileage cost.

Industrial Pretreatment Program

Program Objective

This program is a requirement of the Michigan Department of Natural Resources and Environment. In short, we must identify/regulate potential sources of pollutants from commercial wastewater dischargers before entering the City of St. Johns Wastewater Treatment Facility. On a scheduled basis, state officials visit our facility to review/inspect our program files. We are also required to submit an annual report to narrate annual correspondence and compliance issues.

Program Review

We currently have only (2) two companies that are under the guidelines of sanitary discharge permit. The permits identify parameter limits, monitoring schedules and reporting frequencies for each individual company. They also identify procedures for non-compliance issues. Through continuous monitoring, correspondence and compliance records of local industries, our program will continue to meet and/or exceed the requirements.

Bio-Solids Program

Bio-Solids Statistics

Suspended Solids, when concentrated, is referred to as bio-solids. Bio-solids are removed through settling in the primary clarifiers and are treated in the anaerobic digestion stage. We then store the digested bio-solids in both the secondary digester and the bio-solids storage tank.



Bio-Solids Program - 2010

Bio-Tech Agronomics, Inc. transported and applied 645,000 gallons of bio-solids from our facility to property owned by Barks Farms. Additional expenses for the 2010 program included management fees as approved. A total of \$ 27,000.00 is budgeted each fiscal year to support our Bio-Solids Program.

The total cost to Bio-Tech Agronomics, Inc. for 2010 was **\$20,915.00**. The annual Bio-Solids Application Fee of \$ 400.00 and generation fee of \$10.74/dry ton @ 194 dry tons of bio-solids, to the State of Michigan totaled **\$2,483.56**. The total cost for the 2010 Bio-Solids Program was **\$23,398.56**.

Bio-Solids Program Change

Due to continuous changes in regulations and reporting methods, we have extended the contract with Bio-Tech Agronomics to include management services. They will have a representative perform sampling of our bio-solids and selected fields, generate loading rates, assist with field selection and generate all reporting for the bio-solids program.

The minimal cost involved assures complete compliance with Michigan Department of Natural Resources and Environment regulations as Bio-Tech Agronomics submit all applications for approval and generate annual reporting information.

Annual Chemical Usage

<u>CHEMICAL</u>	<u>USAGE</u>	<u>CURRENT COST</u>	<u>2009 COST</u>	
CHLORINE - Cl ₂	4,724 lbs.	\$ 0.58/lb	\$3,160.00	
COAGULANT - FeCl ₃	48,893 lbs.	\$ 0.75/lb	\$15,038.29	
POLYMER - P-840	1,956	\$ 2.72/lb	\$6,401.14	
SULFUR DIOXIDE - SO ₂	5,877	\$ 0.90/lb	\$5,580.00	
<u>AVERAGE DAY/YEAR</u>	<u>CHLORINE</u> <u>lbs.</u>	<u>FERROUS</u> <u>CHLORIDE</u> <u>lbs.</u>	<u>POLYMER</u> <u>lbs.</u>	<u>SULFUR</u> <u>DIOXIDE</u> <u>lbs.</u>
2010	12.9	134	5.39	16.1
2009	21.6	154	5.30	14.2

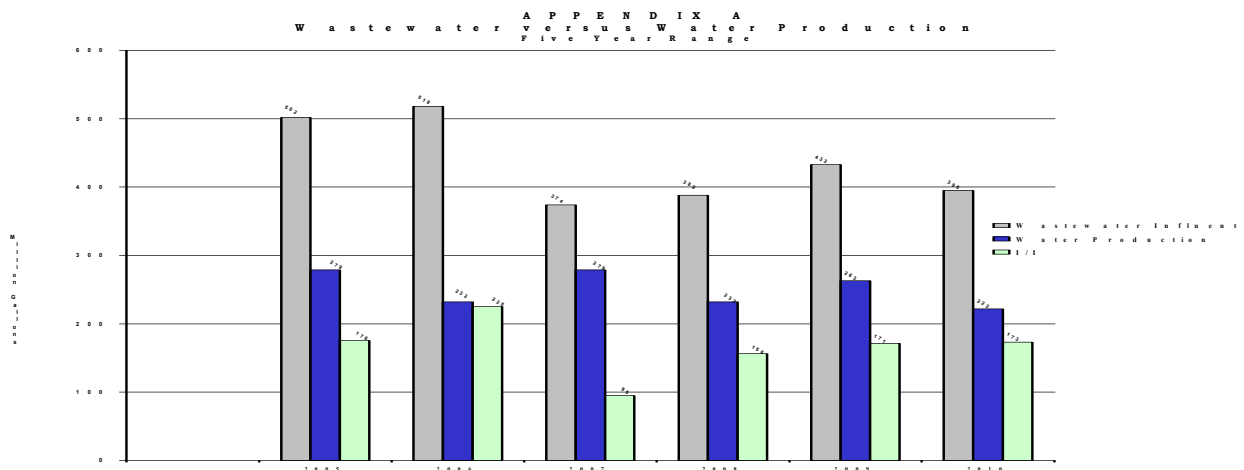
The table above shows our 2010 annual chemical cost, including the increasing delivery charges. We continuously monitor our chemical usage and implement adjustments as applicable.

In August 2010, we updated the chlorine feed system. The updates included an increase in safety and the ability to feed chlorine in accordance to the actual flow (compare average day above).

Utility Usage/Cost

Utility usage is significant for the Wastewater Treatment Facility. As mentioned in past reports, energy conservation practices are an everyday event. Efforts by the facility operators will continue to strive to reduce utility consumption.

The chart below indicates the level of resources necessary for daily operations.



Inflow/Infiltration

Hydraulic Loading

The chart below shows the relationship between Wastewater Facility's influent flows, City Water Plant production and precipitation in 2010.

<u>MONTH</u>	<u>INFLUENT FLOW - MG</u>	<u>CITY WATER PRODUCED - MG</u>	<u>WATER PRODUCTION - MG</u>	<u>WATER PRODUCTION - %</u>	<u>PRECIP. INCHES</u>
JANUARY	33.959	16.344	17.615	52%	0.410
FEBRUARY	30.343	14.479	15.864	52%	1.510
MARCH	43.928	15.755	28.173	64%	0.740
APRIL	41.087	15.899	25.188	61%	2.832
MAY	44.545	19.945	24.600	55%	4.672
JUNE	32.007	19.999	12.008	38%	3.300
JULY	28.435	24.420	4.015	14%	2.292
AUGUST	27.067	24.510	2.557	9%	0.276
SEPTEMBER	31.835	18.032	13.803	43%	2.805
OCTOBER	27.356	17.917	9.439	35%	2.762
NOVEMBER	27.107	17.169	9.938	37%	2.194
DECEMBER	27.813	17.567	10.246	37%	1.482
Total 2010	395.482	222.036	173.446	44%	25.275
Total 2009	433.433	262.664	170.769	39%	34.34
Total 2008	388.264	232.016	156.248	40%	41.27
Total 2007	373.965	279.000	94.965	25%	32.07

System Accuracy

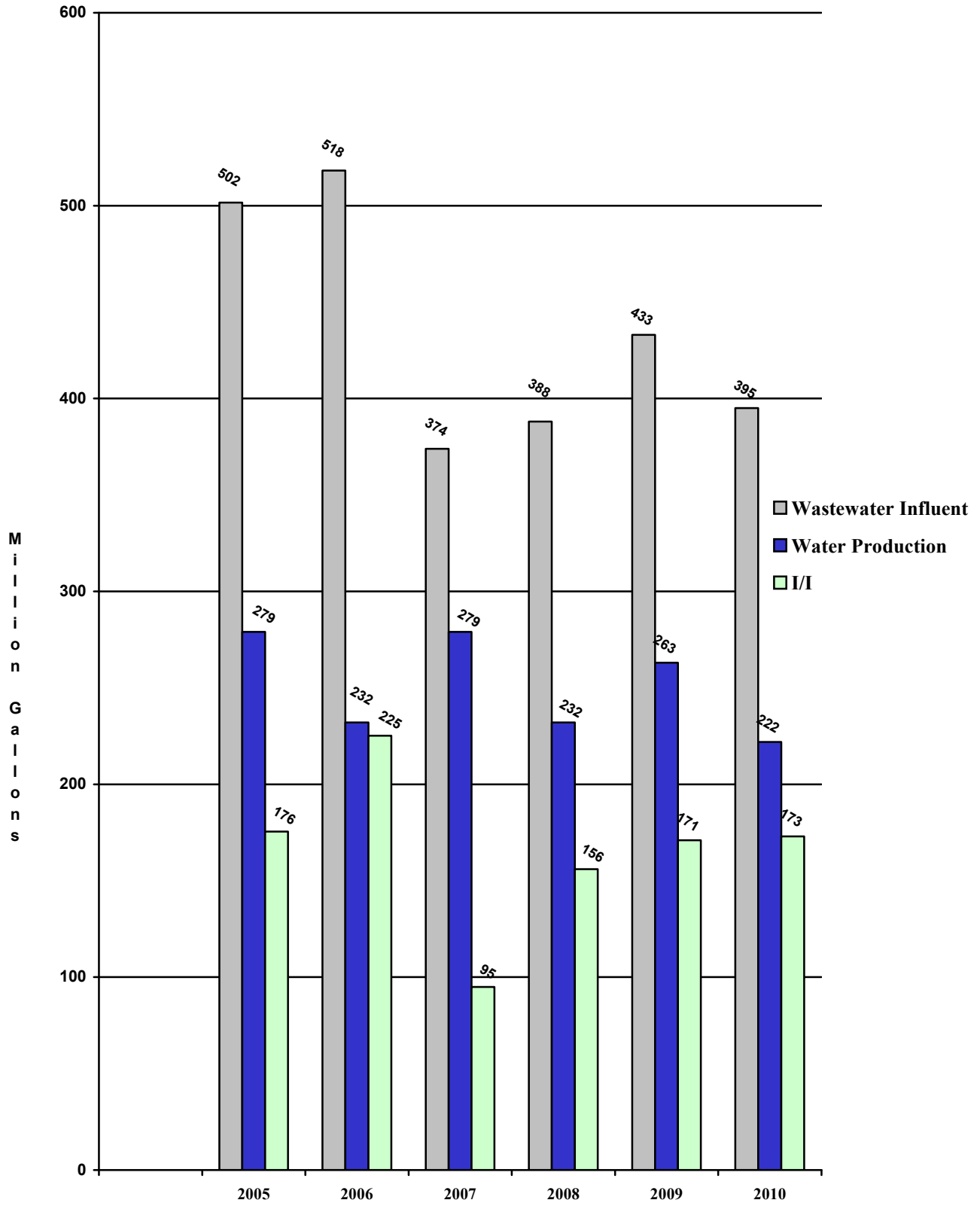
A good indication of the interrelationships of the various parameters affecting facility influent flow can be seen in the chart above. Weather events play a very important role, significantly influencing flow conditions and other facility processes. By comparing the wastewater influent flow to the City's water production in 2010, the Wastewater Treatment Facility treated 173,446,000 gallons more wastewater than was produced by the water system; this is essentially inflow and infiltration (I/I).

Beginning in 2010, the wastewater flows from Bingham Township would have to be deducted from the I & I to be more accurate. With the many variables to provide truly accurate numbers for 2010, I would estimate the township's sanitary flows to be approximately 2 million gallons/month.

APPENDIX A

Wastewater versus Water Production

Five Year Range



Collection System

Storm and Sanitary Systems

The Wastewater Collection System consists of five lift stations and over 45 miles of pipe. The largest lift station is located at Townsend Road, which serves the area south of Sturgis Street. The four smaller lift stations serve the Industrial Park, Astwood Mews and Johnella Estates subdivisions and the Clinton Commons Care Facility.

The Storm Drainage System consists of over 42 miles of pipe, five regional detention basins and numerous site-specific detention basins.

The Wastewater Facility's personnel are responsible for routine cleaning/maintenance on both systems.

Sewer System Maintenance

In 2010, wastewater personnel will concentrate on sanitary sewer system cleaning. The material/debris collected must de-water in the drying beds before transporting to the landfill. Like in previous years, this may be an anticipated project postponed due to priority scheduling with other departments.

Public Relations

Wastewater Facility Tours

Throughout the year the wastewater facility conducts plant tours for local students, teachers and parents. The high school and college students gather information pertaining to their chemistry and biology classes and then prepare for a review on the wastewater facility's different processes.

Citizens/Customer Service

Wastewater personnel also respond to residential/business "request for service" pertaining to sewer backups/odors. Some of these requests are after business hours or on the weekends. In this case, the on-call personnel from the Public Services are required to respond.

Even when dealing with difficult situations, the personnel use a very positive and professional approach. We always respond in a timely manner and offer suggestions when it is determined that the problem is their responsibility to correct. With every request received, the City's Vac-Con unit is used in the jetting/cleaning of the sewer main. All reports are filed and saved for future reference.

When applicable, we conduct follow-up phone calls to the residents whom called with a request for service. We answer any additional questions and concerns remaining. Mostly, they indicate their appreciation for the timely and professional service provided by City personnel.

2010 Highlights

- Laboratory services for neighboring communities created additional revenue totaling \$11,229.00.
- We entered into a rental agreement with the Village of Ovid for utilizing their televising equipment. This is far less expensive from contracting the services.
- Renovated the chlorine system to provide addition safety and control the feed rates according to the flow rates. Transferring from a pressure to a vacuum system has greatly increased the safety for the operators and surrounding area.
- Collection system monitoring in the Townsend Road Lift Station service area has produced positive results.

2011 Goals

- We have submitted a detailed plan to staff from the Michigan Department of Natural Resources and Environment to eliminate and/or reduce inflow and infiltration in the Townsend Road Lift Station area. To remain in compliance, the Department of Public Services will have to work together to complete the tasks as outlined.
- Storm sewer maintenance including catch basin cleaning as scheduling allows.
- Implement communication updates by installing wireless communication from all the lift stations, directly to the wastewater facility's SCADA System.
- Maintain a great working relationship with Bingham Township officials/staff and all recent/future sanitary sewer customers.