



MERRICKVILLE SEWAGE TREATMENT PLANT

2011 Annual Report

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**Ontario Clean Water Agency
Agence Ontarienne Des Eaux**

Merrickville Sewage Treatment Plant Annual Report 2011

System Description

The former Merrickville Sewage Treatment Plant is an extended aeration wastewater treatment plant with phosphorus removal. The new Merrickville STP was brought into service in mid-Dec. 2011. The new plant combines an ISAM (Integrated Surge Anoxic Mix) treatment with SBR (Sequence Batch Reactor) aeration.

There are two sewage pumping station located within the Village of Merrickville. The main sewage pumping station is located on Main Street east. A second pumping station is located north of the Rideau Canal however this station is not in service.

Sampling

Composite samples are collected for the raw and final effluent samples.

Monthly, effluent and influent samples are analyzed for BOD₅, Suspended Solids, Total Phosphorus and Total Ammonia (ammonia plus ammonium). Weekly samples are collected and analyzed for suspended solids, phosphorus and e. coli. Caduceon Labs in Kingston is used for chemical analysis.

Sludge samples are typically collected twice monthly.

(a) A summary and interpretation of all monitoring data and a comparison to the effluent limits outing in Condition 7, including an overview of the success and adequacy of the Works

Monitoring and Compliance Reporting

Flows

Average Day Flow:

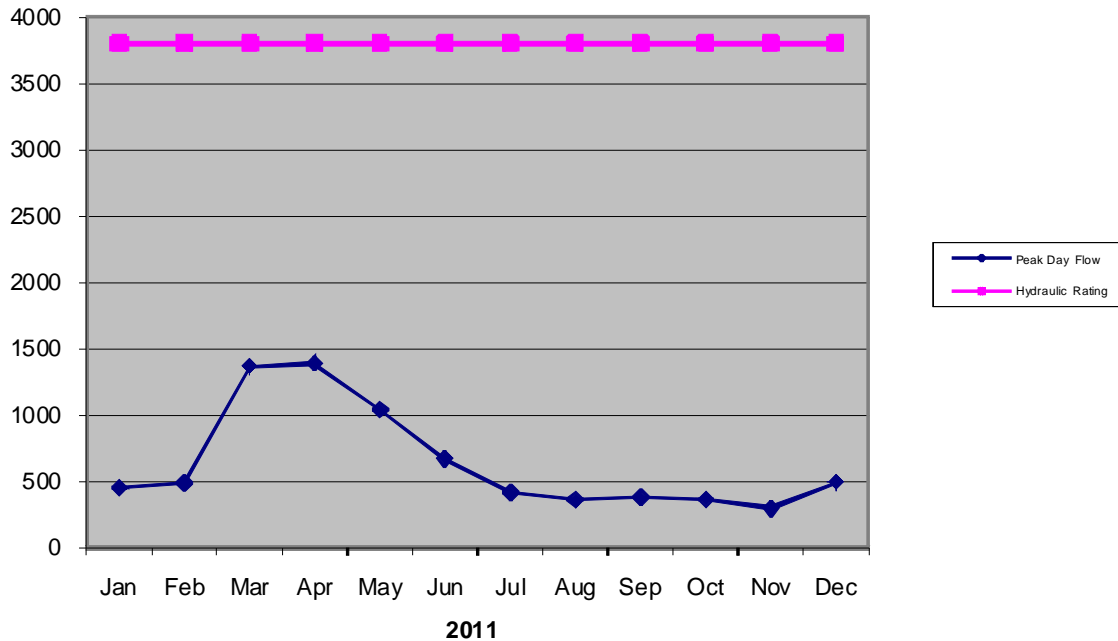
Limit set by the certificate of approval for the annual average day flow is 800 m³/d. The 2011 annual average day flow was 488 m³/d.

Peak Flow

Limit set by the certificate of approval is 3800 m³/d. The 2011 peak day flow was 1390 m³/d occurring during the spring run-off.

Peak Month Flow

Month Peak Day Flow (m3/d)



Interpretation of Data

Plant Performance:

Certificate of Approval Number 1121-7YRQLF (issued Jan 18 2010) establishes the following **effluent limits**:

	Maximum Effluent Concentration	Comment
cBOD	25 mg/L	Month Average of all samples taken.
Suspended Solids	25 mg/L	Month Average of all samples taken.
Total Phosphorus	1.0 mg/L	Month Average of all samples taken.
Total Chlorine Residual	0.5 mg/L	Month Average of all samples taken.
*E. coli	200 organism per 100 mL	Month Geometric Mean Density

*The parameter of e. coli is assumed since the CofA does not specify the organism.

A review of 2011 data indicates the Merrickville STP had a treatment of:

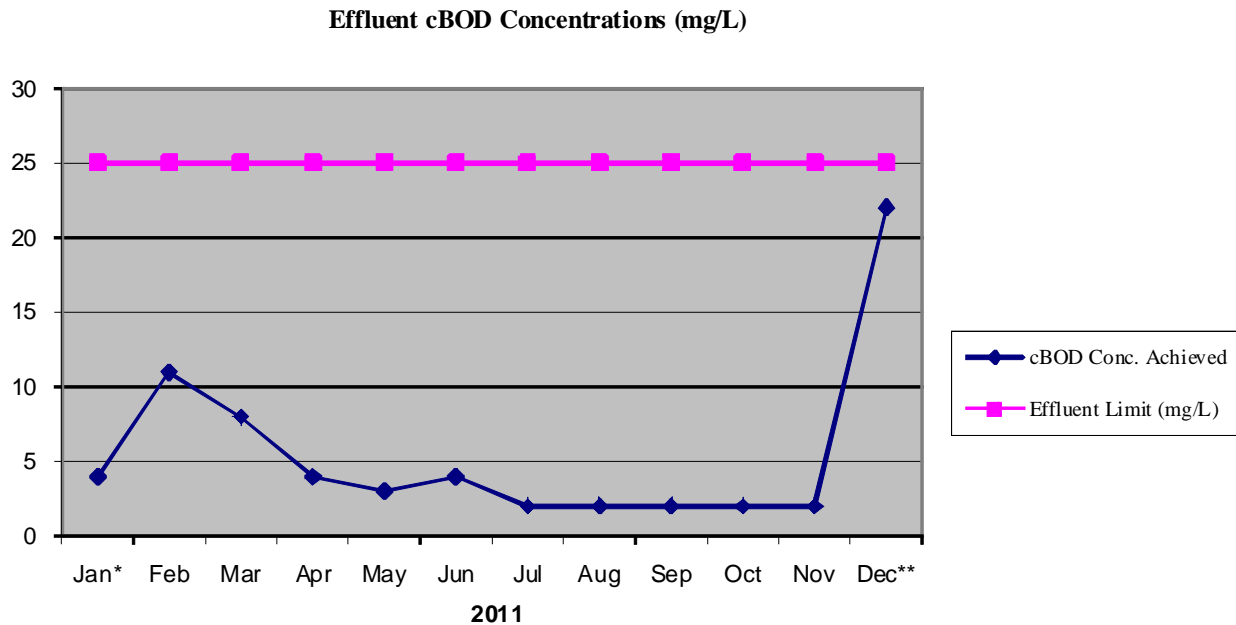
Parameter	Maximum Month Average Effluent Concentration	Was Effluent Compliance Limit Met?
*BOD	4.0 mg/L	YES
*cBOD	11.0	YES
Suspended Solids	35.0 mg/L	No

Total Phosphorus	0.62 mg/L	YES
Total Chlorine Residual	mg/L	YES
E. coli	397	No

*Sampling for cBOD commenced in Feb 2011

The effluent concentration achieved for carbonaceous Biochemical Oxygen Demand, Suspended Solids, Total Phosphorus and Total Ammonia are as follows:

BOD / cBOD



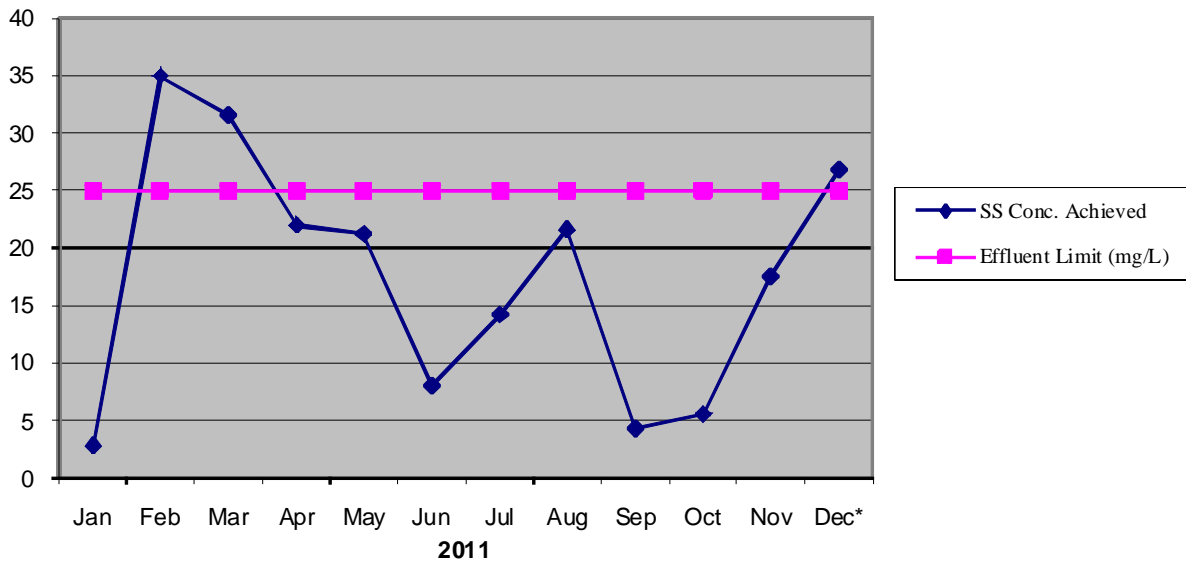
*Jan 2011: result is BOD

**Dec 2011: results are an average of results from the old STP and the new STP.

Typically, one sample per month is analyzed for cBOD. The facility met the month average requirement of 25 mg/L for BOD removal.

Suspended Solids

Effluent Suspended Solids Concentrations (mg/L)

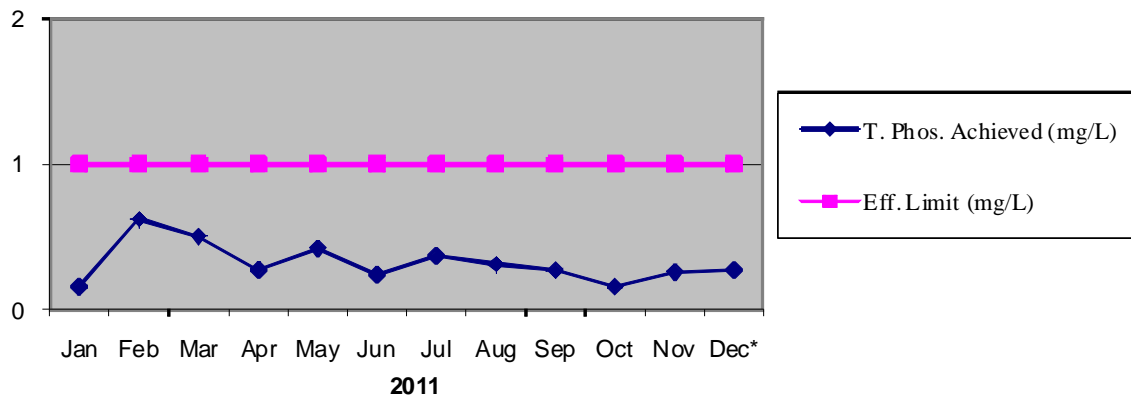


*Dec 2011: results are an average of results from the old STP and the new STP.

Typically, suspended solids are analyzed weekly. The facility met the month average requirement of 25 mg/L. The facility failed to meet the compliance limits of 25 mg/L (month average) in Feb, Mar and Dec.

Total Phosphorus

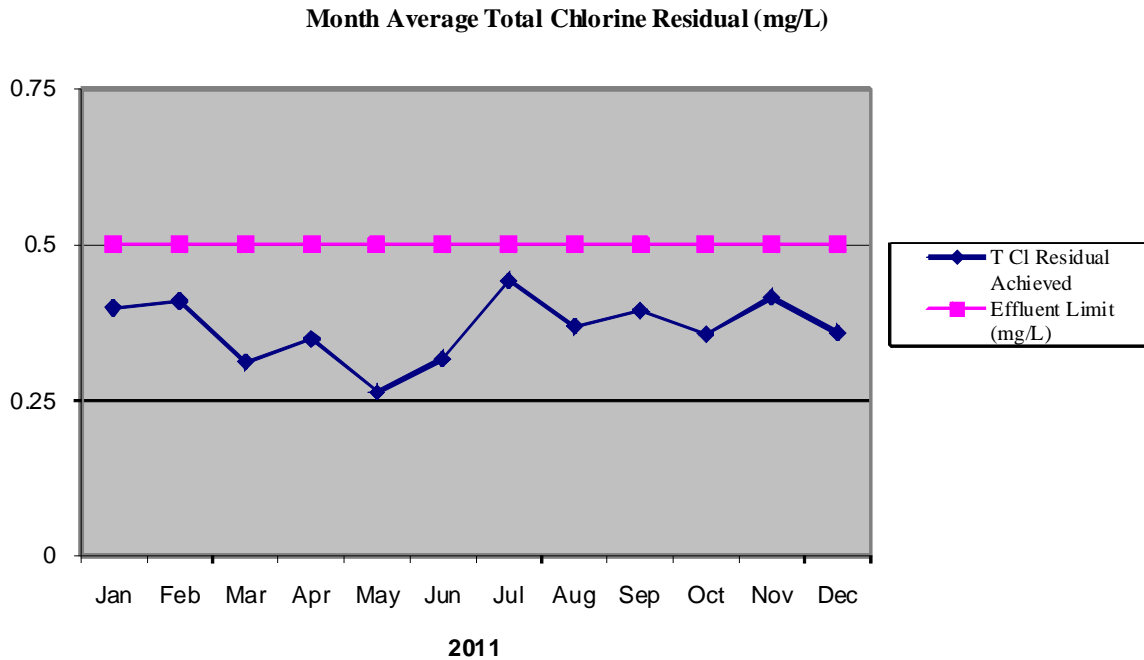
Total Phosphorus (mg/L)



*Dec 2011: results are an average of results from the old STP and the new STP.

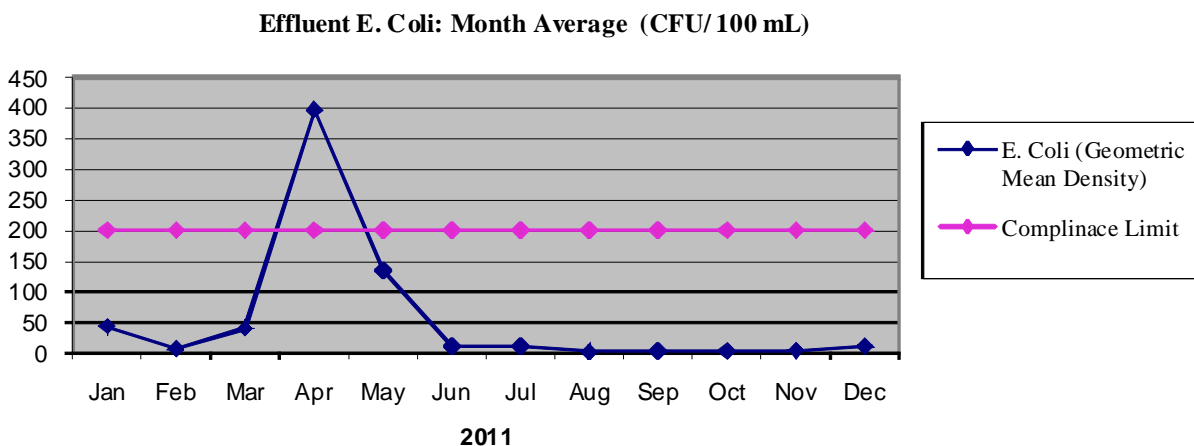
The facility met the month average requirement of 1.0 mg/L for total phosphorus.

Effluent Total Chlorine Residual



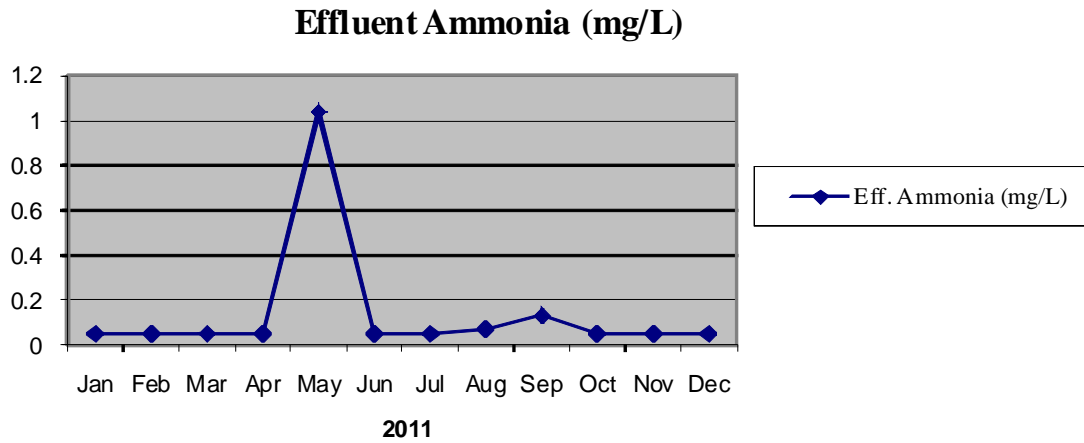
The facility met the month average requirement of 0.5 mg/L for total chlorine residual. The maximum month average was in July – 0.44 mg/L. For detail please refer to the attached report.

Effluent E. coli Bacteriological Analysis



The facility did not meet the compliance requirements for E. coli.

Effluent Ammonia



Please note: there is no ammonia effluent limit for the Merrickville WWTF.

Attached you will also find OCWA's Performance Assessment Report. The report summarizes the year's sample results for various parameters.

(b) A description of any operating problems encountered and corrective action taken;

The Merrickville sewage treatment plant had the following exceedances:

Feb., Mar. & Dec. 2011: Suspended Solids month averages greater than 25 mg/L

Apr. 2011: E. coli exceedance month geometric mean density greater than 200 cts per 100 mL.

Dec. 2011: a forcemain leak caused a raw sewage spill at the sewage pumping station.

As required, the exceedances were reported to the Ministry of Environment.

(c) A summary of all maintenance carried out on any major structure, equipment apparatus, mechanism or thing forming part of the Works;

Maintenance Summary

During 2011 a total of 58 Work Orders were completed at the Merrickville Wastewater Treatment and Collection Facility. A breakdown of this total is listed below;

Corrective	1
Preventative	24
Capital	4
Operational	29

Highlights of the some of the capital expenditures during the year are summarized below.

With the ongoing replacement of the existing Wastewater Treatment Facility most of the capital projects were completed within the wastewater collection system. These projects include;

- Underwater condition inspection/assessment of the final effluent discharge line and diffuser system located in the Rideau River,
- Purchase of lab equipment needed for the operation of the new treatment plant/process,
- Repairs to the existing wet-well bypass valve on the forcemain to the treatment facility to allow for upgrade work to be completed by the contractor,
- Minor repairs to the emergency backup power supply,
- Purchase and supply of a new flow meter at the new facility as part of the upgrades,

(d) A summary of any effluent quality assurance or control measures undertaken in the reporting period;

Quality Control & Compliance With Provincial Regulations

OCWA uses internal compliance auditing techniques by teams from within the organization but not from within the facility work team. OCWA operates the Merrickville Sewage Treatment Plant in accordance with provincial regulations. Here is how we do it:

- Use of Accredited Labs. Analytical tests to monitor your water quality are conducted by a laboratory audited by the Canadian Association for Environmental Analytical Laboratories (CAEAL) and accredited by the Standards Council of Canada (SCC). Accreditation ensures that the laboratory has acceptable laboratory protocols and test methods in place. It also requires the laboratory to provide evidence and assurances of the proficiency of the analyst(s) performing the test methods.
- Operation by Licensed Operators. The Water Pollution Control plant is operated and maintained by the Ontario Clean Water Agency's competent and licensed staff. The mandatory licensing program for operators of drinking water facilities is regulated under the Ontario Water Resources Act (OWRA) Regulation 129/04. Licensing means that an individual meets the education and experience requirements and has successfully passed the certification exam.
- Sampling and Analytical requirements. OCWA follows a sampling and analysis schedule required by the Certificate of Approval.
- Adherence to Ministry Guidelines and Procedures. To ensure the protection of the Public's health and operational excellence, OCWA adheres to the guidelines and procedures developed by the Ministry of Environment

(e) A summary of the calibration and maintenance carried out on all effluent monitoring equipment;

Calibration of the influent flow meter was performed in 2011. Please see 'Instrument Calibration Report' attached.

(f) A description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6;

Effluent objectives are not yet in effect.

(g) A tabulation of the volume of sludge generated in the reporting period an outline of anticipated volumes to be generated in the next report period and a summary of the location to where the sludge was disposed;

In 2011, 848.8 m³ of digested sludge was removed from the Merrickville STP. Of the 848.8 m³, 273.8 m³ was hauled to the Smiths Falls WWTF for further processing while 575.0 m³ was applied to agricultural land (Soil conditioning site certificate No. S-4515-32).

Please see the attached the Biosolids Quality Report – pages 1 & 2

No increase in biosolids production is expected in 2012.

(h) A summary of any complaints received during the reporting period and any steps taken to address the complaints;

There were no complaints received during this reporting period.

(i) A summary of all By-pass spill or abnormal discharge events;

There were no (zero) overflow events at this facility during this reporting period. As noted earlier in this report, there was a raw sewage spill reported in Dec 2011. The spill was a result of a leak in the forcemain that runs between the sewage pumping station and the treatment facility.

(j) Any other information the District Manager requires from time to time;

No other information was requested at the time this report was completed.

List of Attachments:

Total Chlorine Residual Report
Performance Assessment Report
Biosolids Quality Report pages 1 & 2
Meter Calibration Report

END



**Ontario Clean Water Agency
Monthly Process Data Report**

Municipality: [1162] - Merrickville Woford WWT
 Facility: [110001729-IA] - Merrickville Woford WWT
 Works: Class 2 Wastewater Collection, Class 2 Wastewater Treatment
 Receiver: Rideau River

Period: 01/01/2011 to 12/31/2011
 Serviced Population: 1,200
 Total Design Capacity(m³/day): 0

	Jan/2011	Feb/2011	Mar/2011	Apr/2011	May/2011	Jun/2011	Jul/2011	Aug/2011	Sep/2011	Oct/2011	Nov/2011	Dec/2011	<-- Summary -->
Disinfection\Disinfection - Disinfection													
Chlorine used (kg)													
Avg	0.872	0.796	1.032	1.374	1.4	1.131	1.23	0.968	0.976	0.923	0.9	0.872	1.047
Chlorine dosage (mg/L)													
Avg	2.469	2.449	1.168	1.7	1.708	2.436	3.331	3.111	3.129	3.407	3.747	2.204	2.583
Total Chlorine Res. (mg/L)													
Avg	0.399	0.41	0.312	0.348	0.263	0.316	0.442	0.369	0.393	0.356	0.415	0.358	0.369

Note: ? Calculation not verifiable. At least one result reported as < and at least one result reported >.



Ontario Clean Water Agency Performance Assessment Report Wastewater/Lagoon

From 01/01/2011 to 12/31/2011

Facility: [1162] - Merrickville Wolford WWT
Works: [110001729-IA] - Merrickville Wolford WWT

	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	11/2011	12/2011	<-- Total -->	<-- Avg. -->	<-- Max. -->	<-- Criteria-->
Flow:																
Raw: Total Flow 1000 m3	11.178	9.671	27.919	29.79	25.727	14.207	11.135	9.936	9.406	8.618	7.281	7.418	172.286			
Raw: Avg. Day Flow 1000 m3/day	0.361	0.345	0.901	0.993	0.83	0.474	0.359	0.321	0.314	0.278	0.243	0.39		0.488		
Raw: Max. Day Flow 1000 m3/day	0.453	0.488	1.37	1.39	1.039	0.673	0.414	0.36	0.378	0.367	0.3	0.497			1.39	
Eff: Total Flow 1000 m3	11.178	9.671	27.919	29.79	25.727	14.207	11.135	9.936	9.406	8.618	7.281	7.418	172.286			
Eff: Avg. Day Flow 1000 m3/day	0.361	0.345	0.901	0.993	0.83	0.474	0.359	0.321	0.314	0.278	0.243	0.239		0.472		
Eff: Max. Day Flow 1000 m3/day	0.453	0.488	1.37	1.39	1.039	0.673	0.414	0.36	0.378	0.367	0.3	0.497			1.39	
Biochemical O2 Demand:																
Raw: Avg. BOD5 (mg/L)	114.0													114.0	114.0	
Raw: Number of Samples BOD5	1.0												1.0			
Eff: Avg. BOD5 (mg/L)	4.0											36.0		20.0	36.0	25.0
Eff: Number of Samples BOD5	1.0											1.0	2.0			
BOD Loading (kg/d)	1.442											8.614		5.028	8.614	0
BOD5 Percent Removal	96.491														96.491	
Carbonaceous Biochemical Oxygen Demand:																
Raw: Avg. CBOD5 (mg/L)		54.0	36.0	42.0	48.0	66.0	162.0	276.0	84.0	120.0	144.0	120.0		104.727	276.0	
Raw: Number of Samples CBOD5		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	11.0			
Eff: Avg. CBOD5 (mg/L)		11.0	8.0	4.0	3.0	4.0	2.0	2.0	2.0	2.0	2.0	22.0		5.636	42.0	25.0
Eff: Number of Samples CBOD5		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	12.0			
CBOD5 Loading (kg/d)		3.799	7.205	3.972	2.49	1.894	0.718	0.641	0.627	0.556	0.485	5.264		2.514	7.205	
CBOD5 Percent Removal		79.63	77.778	90.476	93.75	93.939	98.765	99.275	97.619	98.333	98.611	81.667			99.275	
Suspended Solids:																
Raw: Avg. SS (mg/L)	150.4	158.5	149.0	176.5	116.8	225.25	293.5	294.2	97.0	92.4	151.5	62.5		163.963	480.0	
Raw: Number of Samples SS	5.0	4.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	5.0	4.0	2.0	50.0			

- Note: 1. The Total, Average, Max and Criteria summaries are not included in the wastewater XML files submitted to the MOE.
2. The annual average concentrations are calculated by taking the arithmetic mean of the monthly average concentration in the effluent calculated for any particular calendar year.

Parameters List: OCWA PDC - MEWS

CBOD5 - Carbonaceous Biochemical Oxygen Demand 5 Day; BOD5 - Biochemical Oxygen Demand, 5 Day, Total Demand; Suspended Solids - Residue, Particulate; NH3 + NH4 as N - Ammonium + Ammonia, Total Unfil. React. ; Total Phosphorus - Phosphorus, Unfiltered Total
TKN - Nitrogen, Total Kjeldahl Unf. Tot; Nitrate as N - Nitrate, Unfiltered Reactive; Nitrite as N - Nitrite, Unfiltered Reactive; E coli - Escherichia Coli MF

Legend:

Tag group:

DIS-Disinfection, EFF-Effluent, RAW-Raw Sewage



Ontario Clean Water Agency Performance Assessment Report Wastewater/Lagoon

From 01/01/2011 to 12/31/2011

Facility: [1162] - Merrickville Wolford WWT
Works: [110001729-IA] - Merrickville Wolford WWT

	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	11/2011	12/2011	<-- Total -->	<-- Avg. -->	<-- Max. -->	<-- Criteria-->
Suspended Solids:																
Eff: Avg. SS (mg/L)	12.8	35.0	31.556	22.0	21.2	8.0	14.25	21.571	4.25	5.6	17.5	26.8		18.377	80.0	25.0
Eff: Number of Samples SS	5.0	4.0	9.0	4.0	5.0	4.0	4.0	7.0	4.0	5.0	4.0	5.0	60.0			
SS Loading (kg/d)	4.615	12.089	28.419	21.846	17.594	3.789	5.119	6.914	1.333	1.557	4.247	6.413		9.495	28.419	0
SS Percent Removal	91.489	77.918	78.822	87.535	81.849	96.448	95.145	92.668	95.619	93.939	88.449	57.12			96.448	
Phosphorus:																
Raw: Avg. Phos (mg/L)	3.22	3.475	1.4	2.938	2.04	4.55	6.75	5.78	3.525	4.02	6.2	4.5		4.033	12.5	
Raw: Number of Samples Phos	5.0	4.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	5.0	4.0	2.0	50.0			
Eff: Avg. Phos (mg/L)	0.158	0.623	0.507	0.278	0.426	0.245	0.37	0.313	0.27	0.162	0.263	0.273		0.324	1.56	1.0
Eff: Number of Samples Phos	5.0	4.0	9.0	4.0	5.0	4.0	4.0	7.0	4.0	5.0	4.0	4.0	59.0			
Phos. Loading (kg/d)	0.057	0.215	0.456	0.276	0.354	0.116	0.133	0.1	0.085	0.045	0.064	0.065		0.164	0.456	0
Total Phos Percent Removal	95.093	82.086	63.81	90.553	79.118	94.615	94.519	94.587	92.34	95.97	95.766	93.944			95.97	
Nitrogen Series:																
Eff: Avg. NH3 + NH4 (mg/L)	< 0.05	< 0.05	< 0.05	< 0.05	1.04	< 0.05	< 0.05	0.07	0.13	< 0.05	< 0.05	< 0.05		< 0.141	1.04	2.0
Eff: Number of Samples NH3 + NH4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	12.0			
NH3 + NH4 Loading (kg/d)	< 0.018	< 0.017	< 0.045	< 0.05	0.863	< 0.024	< 0.018	0.022	0.041	< 0.014	< 0.012	< 0.012		< 0.095	0.863	0
Raw: Avg. TKN (mg/L)	16.6	20.4	10.3	9.25	11.0	19.1	30.0	31.0	29.0	41.5	38.0	40.5		24.721	41.5	
Raw: # of SamplesTKN	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	13.0			
Eff: Avg. TKN (mg/L)	0.8	3.5	0.8	1.95	1.8	1.1	1.0	1.1	0.8	0.8	0.9	1.3		1.321	3.5	
Eff: # of SamplesTKN	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	13.0			
Disinfection:																
Eff: Geometric Mean E. Coli per 100 ml	< 43.734	< 6.999	40.546	396.966	< 134.588	< 11.781	< 11.219	< 2.0	< 2.991	< 3.711	< 4.757	< 10.954		? 14.676	< 396.966	200.0
Eff: Number of Samples E. Coli per 100 ml	5.0	4.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	5.0	4.0	4.0				
Chlorine Used (kg)	27.036	22.3	31.999	41.209	43.41	33.942	38.126	30.001	29.275	28.602	27.013	16.571	369.484			

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Legend:

Tag group:

DIS-Disinfection, EFF-Effluent, RAW-Raw Sewage



Ontario Clean Water Agency

Biosolids Quality Report - Liquid

Digester Type: AEROBIC

Metals and Criteria

Facility: [1162] - Merrickville Wolford WWT
Works: [110001729-IA] - Merrickville Wolford WWT
Period: 01/01/2011 to 12/31/2011

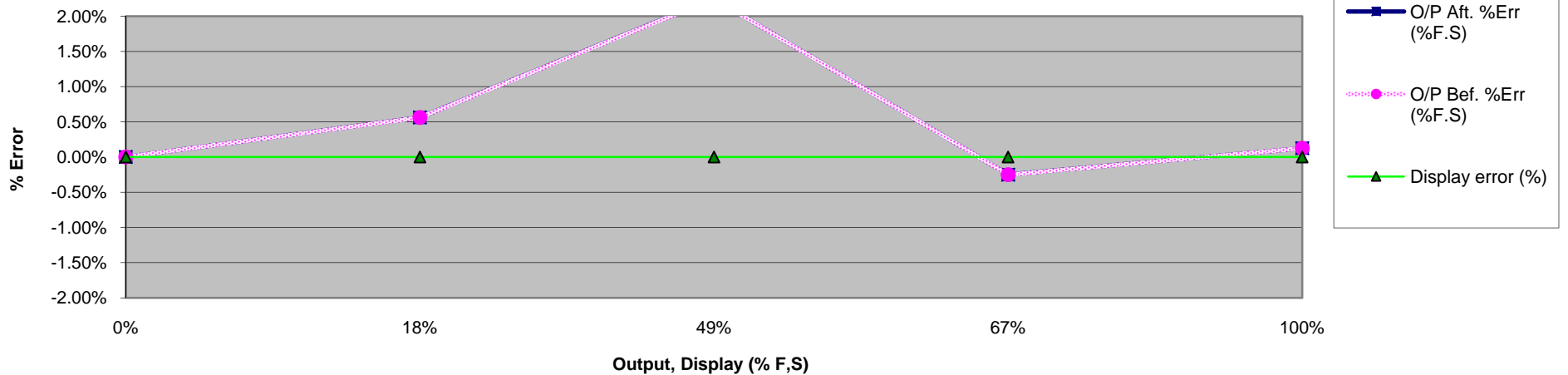
Month	Arsenic (mg/L)	Cadmium (mg/L)	Cobalt (mg/L)	Chromium (mg/L)	Copper (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Lead (mg/L)	Selenium (mg/L)	Zinc (mg/L)
JAN 2011	0.1	0.03	0.567	1.913	6.287	0.011	0.065	0.65	1.0	0.1	7.25
FEB 2011	0.1	0.03	0.615	2.915	11.25	0.011	0.12	0.94	1.45	0.1	10.18
MAR 2011	0.1	0.03	0.08	0.71	3.48	0.003	0.05	0.225	0.35	0.1	3.835
APR 2011	0.1	0.03	0.23	1.835	7.875	0.031	0.05	0.53	1.1	0.1	8.545
MAY 2011	0.1	0.03	0.42	1.935	7.43	0.011	0.09	0.54	1.4	0.1	7.96
JUN 2011	0.1	0.03	0.4	1.47	7.06	0.019	0.09	0.44	1.3	0.1	8.775
JUL 2011	0.08	0.03	0.37	1.305	7.1	0.005	0.095	0.46	1.2	0.1	9.63
AUG 2011	0.1	0.03	0.285	0.925	4.97	0.005	0.07	0.34	0.9	0.1	6.965
SEP 2011	0.1	0.03	0.31	1.27	8.01	0.011	0.065	0.57	0.55	0.1	8.865
OCT 2011	0.1	0.03	0.095	0.155	1.17	0.002	0.05	0.12	0.2	0.15	1.915
NOV 2011	0.1	0.04	0.035	0.5	2.285	0.003	0.06	0.17	0.5	0.1	2.89
DEC 2011	0.04	0.03	0.13	0.61	2.89	0.002	0.05	0.22	0.5	0.1	3.68
Average	0.096	0.031	0.313	1.35	5.959	0.01	0.072	0.452	0.892	0.104	6.856
Max. Permissible Metal Concentrations (mg/kg of Solids)	170	34	340	2800	1700	11	94	420	1100	34	4200
Metal Concentrations in Sludge (mg/kg)	5.767	1.855	18.83	81.213	358.574	0.584	4.328	27.179	53.657	6.268	412.582

Calibration / Inspection Check

Project: <u>Merrickville WWTP</u>	Description: <u>METER FLOW SEWAGE PLANT</u>	Technician: <u>Tom K.</u> Signature: _____ Date: <u>15/4/2011</u>
Equipment ID:	Make: <u>MILL</u>	
Model# : <u>Multiranger Plus</u>	Type: <u>OCM</u>	
Serial# : <u>169126</u>	Project Org.: <u>1162</u>	
V-notch: <u>90 degr "</u>	Work Order Ref.:	
Cal. FS: <u>2134.0 m3/d</u>	Range:	
Customer FS: <u>liter/s</u>	Sensor Factors: <u>0-20.0 cm</u>	

No.	V. Setting (m/sec)	P(psi)	Head (cm)	Head (m/w.c)	Flow (m^3/D)	CAL. Standard	Display Before	Display After	Display error (%)	O/P. Theo (mAdc)	O/P. Before CAL.(mAdc)	O/P. After CAL.(mAdc)	O/P Bef. %Err (%F.S)	O/P Aft. %Err (%F.S)
1			0.00		0.00					4.00	4.00	4.00	0.00%	0.00%
2			10.00		377.00					6.83	6.92	6.92	0.56%	0.56%
3			15.00		1039.00					11.79	12.15	12.15	2.25%	2.25%
4			17.00		1420.70					14.65	14.61	14.61	-0.25%	-0.25%
5			20.00		2132.90					19.99	20.01	20.01	0.13%	0.13%

Calibration Characteristic



Comments: