

# Town of Petrolia Water Pollution Control Plant



**Managed, Operated, and Maintained by**



**2013 Annual Report of Operations**

March 2014

Gary Johnson, Environmental Officer - Sarnia Office

Ontario Ministry of the Environment  
1094 London Road,  
Sarnia, Ontario.  
N7S 1P1

Dear Mr. Johnson,

On behalf of the Corporation of the Town of Petrolia, in Lambton County, CH2M HILL is pleased to submit to you the annual operating report for the Town of Petrolia Water Pollution Control Plant. Please feel free to contact the undersigned if you have any questions regarding this report.

Respectfully submitted,

**CH2M HILL**

James Wight  
Project Manager

cc: Joe Adams, Director of Operations, Town of Petrolia  
Cameron Walsh, Regional Manager CH2M HILL

## **Introduction**

The Town of Petrolia Water Pollution Control Plant (WPCP) is located at 546 Maude St in Petrolia, Lambton County, and was constructed in 1978 to replace the existing Lagoon (2) treatment system.

The original (1978) plant included an extended mechanical aeration process complete with secondary clarification, phosphorous removal, continuous polishing and disinfection. Sludge is aerobically digested and up until 1997 was thickened and trucked off site for disposal and later land applied. Since 1997 sludge has been sent to one of the lagoons for treatment.

Upgrades to the treatment plant have included UV disinfection in 1995, VFD on the pumps at the main lift station in 1996, replacement of the manual bar screen with an automatic step screen in 1999, and replacement of the filter media in May of 2010. The plant had a design capacity of 3800 m<sup>3</sup>/day and is currently treating on average 2446 m<sup>3</sup>/day since 2002. The WPCP is a tertiary extended aeration plant with two large lagoons, one used to store digested sludge, and the other to use as a backup system in the event the plant requires maintenance. The plant consists of grit removal, mechanical aeration, supplemental jet aeration, clarification, sand filtration, and ultraviolet disinfection. The collection system consists of 11 pumping stations. An amendment to the C of A was applied for in 2002 and approved by the MOE Approvals Branch to have the plant re-rated from 3180m<sup>3</sup> to 3800m<sup>3</sup> based on the installation of two 30hp Jet Aspirators in the aeration tanks. Another amendment to the C of A was applied for in 2008 and 2010 and approved by the MOE to clarify lagoon discharge criteria and to conduct a pilot test for the co-treatment of landfill leachate up to 25m<sup>3</sup>/day.

## **Monitory and Compliance Reports**

The Petrolia WPCP is a class 3 facility certificate number 2372. Reports submitted to the regional environmental officer are the R1 and R2 Municipal Utility Monitoring Program reports for mechanical plants and have been included in this report. S1 and S2 lagoon reports were never submitted in the past and staff have been asked to submit them but the data required for 2013 was not available and so these reports will be generated and submitted for the year 2014. These reports are submitted quarterly to the Sarnia office of the Ontario Ministry of the Environment.

Table 1. Environmental Compliance Approval

ECA (formerly C of A) Number	Date of Issue
5819-7EZY7	August 29, 2008
Last Amendment	November 10, 2010



Table 2. Effluent Limits and Objectives for ECA

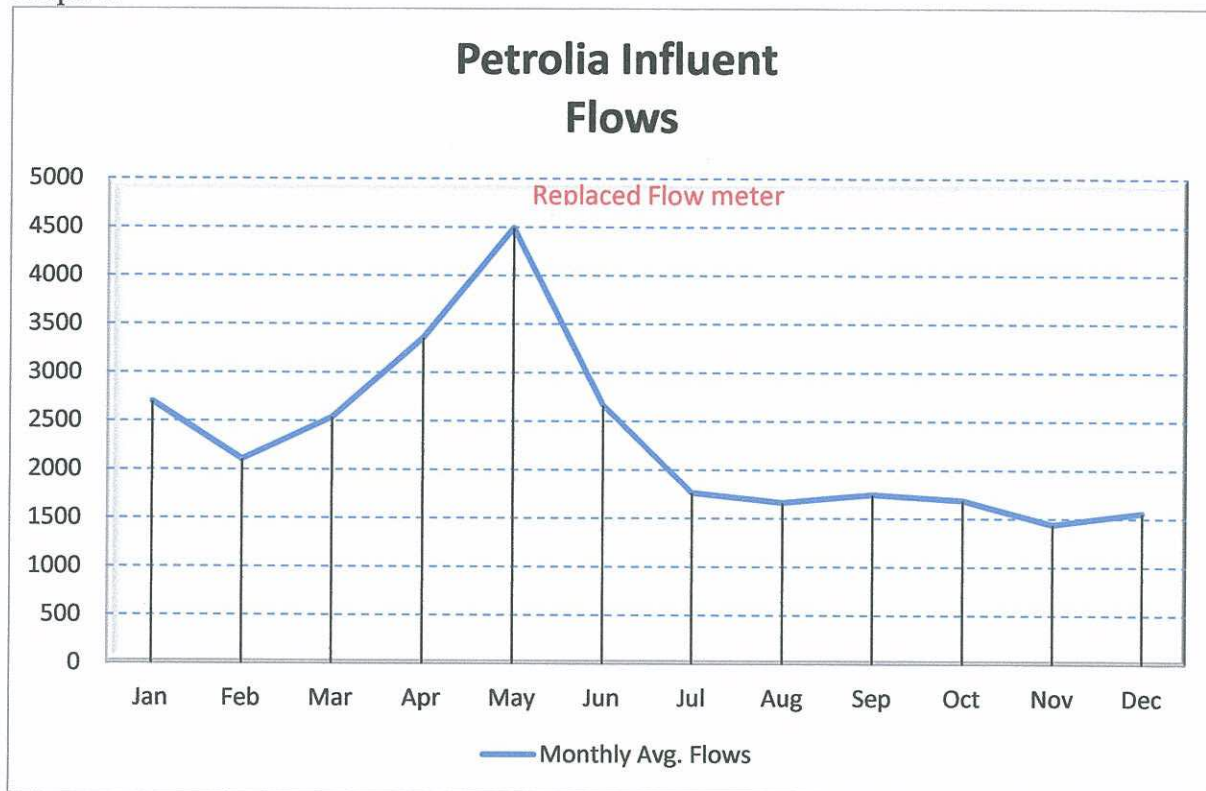
Effluent Parameter	Concentration	Waste Loading
CBOD <sub>5</sub>	10.0 mg/L	38.0 kg/day
Total Suspended Solids	10.0 mg/L	38.0 kg/day
Total Phosphorus	1.0 mg/L	3.8 kg/day
Total Ammonia Nitrogen (May 1 – Nov. 30)	3.0 mg/L	11.4 kg/day
Total Ammonia Nitrogen (Dec 1 – Apr 30)	7.0 mg/L	26.6 kg/day
E. Coli (Apr 1 – Nov 30)	200 organisms/100 mL	
pH of the effluent maintained between 6-9.5 at all times		

## **Monitoring Data Interpretation**

Table 3. Influent Monthly Flows

	Total	Avg	Max
Jan	81036	2701.2	5996
Feb	59022	2107.929	4123
Mar	78,751	2,540	3,894
Apr	47048.57	3360.612	6403.68
May	139204.5	4496.28	12495.69
Jun	80071.45	2669.048	4666.55
Jul	54735.57	1765.664	2222.4
Aug	51611.45	1664.885	2314.48
Sep	52417.58	1747.253	3875.01
Oct	52347.43	1688.627	2918.43
Nov	43273.44	1442.448	2716.28
Dec	48358.61	1559.955	12713.6

Graph 1.



The existing influent flow meter was damaged during a lightning storm in April and was replaced with surge protection.

Table 4. Average Monthly Influent Loading

		Average Influent Loading				Average Monthly Loading			
						BOD	TSS	TP	NH3
	m3/day	mg/L	mg/L	mg/L	mg/L	kg/Day			
Jan	2701.2	140.80	126.00	28.80	4.22	380.33	340.35	77.79	11.40
Feb	2107.929	162.00	161.50	31.53	5.50	341.48	340.43	66.45	11.59
Mar	2583.71	156.25	172.50	31.65	4.73	403.70	445.69	81.77	12.21
Apr	3660.655	122.00	145.50	24.00	4.23	446.60	532.63	87.86	15.47
May	4482.531	139.20	176.80	33.16	5.76	623.97	792.51	148.64	25.82
Jun	2454.067	129.50	120.25	36.23	4.57	317.80	295.10	88.90	11.21
Jul	1772.456	133.80	118.40	33.66	4.56	237.15	209.86	59.66	8.09
Aug	1646.042	152.00	236.00	40.58	5.70	250.20	388.47	66.79	9.38
Sep	1744.042	159.00	151.50	33.28	5.39	277.30	264.22	58.03	9.40
Oct	1705.733	164.40	172.00	31.00	5.58	280.42	293.39	52.88	9.52
Nov	1763.51	165.50	120.00	29.75	4.02	291.86	211.62	52.46	7.09
Dec	1229.587	166.80	153.33	33.72	4.00	205.10	188.54	41.46	4.92



Graph 2. Influent Concentrations

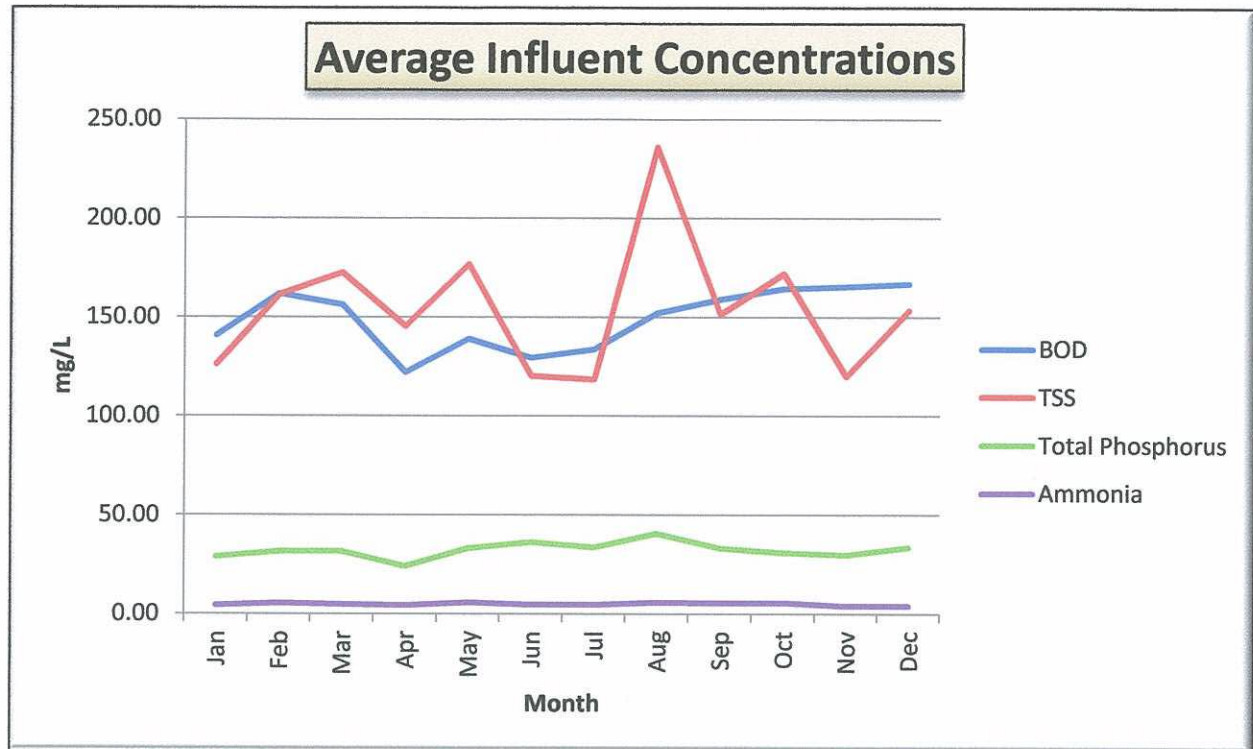


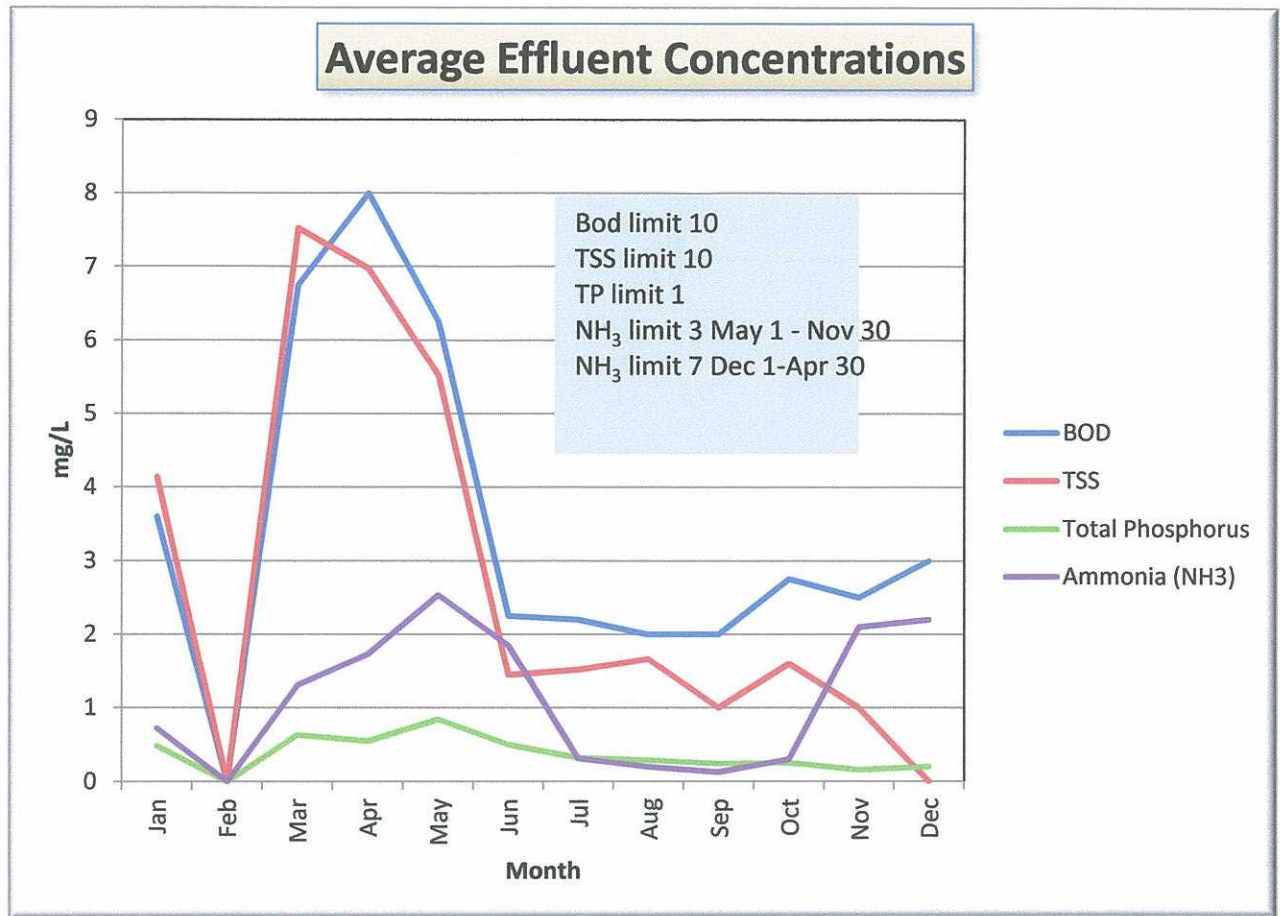
Table 5. Average Monthly Effluent Loading

		Average Effluent Concentration						Average Monthly Loading			
Influent Flows		BOD	TSS	TP	NH3	E.coli	pH	BOD	TSS	TP	NH3
	m <sup>3</sup> /day	mg/L	mg/L	mg/L	mg/L	#/100 mL		kg/Day			
Jan	2701.2	3.6	4.14	0.48	0.72	7	7.07	9.72	11.18	1.31	1.96
Feb *	2107.929	na	na	na	na	na	na	na	na	na	na
Mar	2583.71	6.75	7.525	0.63	1.31	30	6.91	17.44	19.44	1.63	3.38
Apr	3660.655	8	6.975	0.55	1.73	10	7.11	29.29	25.53	2.01	6.33
May	4482.531	6.25	5.525	0.85	2.53	4	7.35	28.02	24.77	3.79	11.35
Jun	2454.067	2.25	1.45	0.50	1.85	6	7.76	5.52	3.56	1.23	4.54
Jul	1772.456	2.2	1.52	0.32	0.31	2	7.41	3.90	2.69	0.57	0.56
Aug	1646.042	2	1.67	0.29	0.20	2	7.35	3.29	2.74	0.48	0.32
Sep	1744.042	2	1	0.24	0.12	2	6.95	3.49	1.74	0.42	0.21
Oct	1705.733	2.75	1.6	0.26	0.30	2	6.86	4.69	2.73	0.43	0.52
Nov	1763.51	2.5	1	0.16	2.10	5	7.01	4.41	1.76	0.27	3.70
Dec	1193.326	3	0	0.20	2.20	na	7.22	3.58	0.00	0.24	2.63

Denotes: Sand filter down for repairs and therefore no effluent sample taken.

December E coli analysis not available as the sand filter was out of service and 1 sample for the month was taken but the courier did not deliver the samples in time so the sample was deemed unreliable.

Graph 3. Effluent Concentrations



### Effluent Summary

The effluent results for 2013 for the Petrolia WPCP remained 100% within compliance, as can be seen in Graph 2. The polishing filter had many breakdowns in 2013 and was completely out of service for the month of February, during which, all effluent was diverted to the lagoons. Most of the filter equipment is original and will be updated in 2014. In October–December, the aeration system was taken out of service for repairs and only the West aeration tank was put back in service. During this time period all effluent was diverted to the lagoons until ammonia levels were within compliance. The East aeration tank will be cleaned out, repaired and put back in service in the spring of 2014. Effluent samples were tested for BOD in 2013, staff have been aware that all effluent samples are to be tested for CBOD in 2014.

## Lagoon Discharge

In Accordance with the ECA for Petrolia, the lagoons can be discharged to Bear Creek on a seasonal basis. In 2013 the west lagoon was discharged in the spring (March 19-April 24) and again in the autumn (October 30 – November 8) and the sample results are listed in table 6 below. The spring discharge was released early as the lagoon was nearing capacity and so testing showed within compliance parameters and was given permission to discharge from the local MOE officer. Some of the East lagoon was also transferred to the West lagoon in October prior to the West discharge. Discharge flows were not recorded in 2013, they will however be recorded in 2014 by measuring the lagoon depths before and after discharge events.

Table 6. Lagoon Discharge results

LAGOON SEASONAL DISCHARGE RESULTS								
Sample Date	BOD	TSS	Total P	TKN	NH3	Nitrite	Nitrate	E.coli
9-Mar	13	10	0.69	6.4	5.3	0.47	1.55	7200
27-Mar	13	7	0.69		4.5	0.41	1.44	24
3-Apr	9	14	0.81		4.4	0.18	0.87	28
10-Apr	6	12	0.86		4.6	0.06	0.39	22
24-Apr	6	40	0.43	6.7	6.2	0.03	0.12	46
30-Oct	11	20	0.42	2.3	0.2	0.07	0.15	6
6-Nov	14	20	0.47	1.6	0.54	0.002	1.4	<2

Denotes: The autumn discharge only shows 2 samples due to the second sample being above compliance and so discharging had been stopped.



## Maintenance

CH2MHILL uses a computerized maintenance management system (CMMS) to track all preventive and corrective maintenance activities. Preventive maintenance activities are carried out on a regularly scheduled basis to ensure optimal performance and readiness of all critical plant equipment. ESA (Electrical Safety Authority) performed an annual electrical inspection of the plant and pump stations. The fire extinguishers had their annual inspection. TPM performed their annual inspection of the hoists and lifting devices. Calibration of plant flow meters are performed by Pierce Services and the calibration reports are attached.

Table 7. Monthly Major Repairs

January	<ol style="list-style-type: none"> <li>1. Ongoing repairs to the filter</li> <li>2. South Clarifier top arm frozen, taken out of service for repairs</li> </ol>
February	<ol style="list-style-type: none"> <li>1. Alum lines frozen</li> <li>2. Filter repairs ongoing.</li> </ol>
March	<ol style="list-style-type: none"> <li>1. Installed check valve at Greenfield pump station</li> <li>2. Changed UV lights out.</li> <li>3. East Aspirator taken out of service.</li> <li>4. RAS pump #1 taken out for repairs</li> </ol>
April	<ol style="list-style-type: none"> <li>1. Ongoing repairs to the filter</li> <li>2. Influent flow meter damaged during a storm. Replaced with new.</li> <li>3. Ongoing issues with Garfield Pump Station. Replaced floats.</li> <li>4. Ongoing issues with Progress Pump Station.</li> <li>5. North clarifier taken out of service. Gear box repairs.</li> <li>6. New alum immersion heater installed.</li> </ol>
May	<ol style="list-style-type: none"> <li>1. Ongoing repairs to the filter</li> <li>2. Replaced main breaker at Barrats Lane Pump Station</li> </ol>
June	<ol style="list-style-type: none"> <li>1. Ongoing repairs to the filter</li> <li>2. Replacing the VFD at Main Pump Station</li> </ol>
July	<ol style="list-style-type: none"> <li>1. Milltronics unit replaced at Garfield Pump Station</li> <li>2. Ongoing repairs to the filter</li> <li>3. Removed West Aspirator for repairs</li> <li>4. RAS pump #1 check valve removed for repairs.</li> <li>5. Ongoing issues at Progress Pump Station</li> </ol>
August	<ol style="list-style-type: none"> <li>1. Issues at VanderWal Pump Station</li> <li>2. Ongoing issues at Progress Pump Station</li> <li>3. Ongoing repairs to the filter.</li> <li>4. Raw sampler sent out for repairs.</li> <li>5. New check valve installed on RAS pump #2.</li> </ol>
September	<ol style="list-style-type: none"> <li>1. East Aspirator removed for repair</li> <li>2. Ongoing repairs to the filter.</li> </ol>
October	<ol style="list-style-type: none"> <li>1. RAS pump #2 removed for repairs.</li> <li>2. East Aspirator removed for repairs.</li> <li>3. Step screen removed for repairs.</li> <li>4. Draining East Aeration tank for cleaning and repairs.</li> </ol>
November	<ol style="list-style-type: none"> <li>1. Installed shed over Step Screen.</li> <li>2. Pump #2 taken out of service to replace check valve.</li> <li>3. Pump #1 at Garden Pump Station removed for repairs.</li> </ol>

	<ol style="list-style-type: none"> <li>4. RAS pump #1 removed for repairs.</li> <li>5. Country View pump station handed over to CH2MHILL for operations and maintenance.</li> </ol>
December	<ol style="list-style-type: none"> <li>1. Installed new mud valve in West Aeration Tank.</li> <li>2. Ongoing issues with dot matrix printer and Sensaphone dialer.</li> <li>3. Annual calibration of flow meters at the plant performed.</li> <li>4. Ongoing issues with Country View Pump Station.</li> <li>5. Alum line frozen between tank and pumps</li> </ol>

## Sludge Handling

Waste activated sludge (WAS) is stored in aerobic digesters and digested for approximately 7 days or more before being transferred to the sludge storage lagoon. No sludge has ever been removed from the lagoons. A copy of the sludge analysis is included with this report.

Table 8. Sludge Wasting and Lagoon sludge Loading

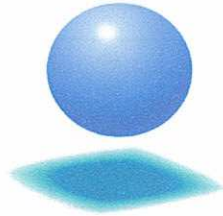
	Sludge Wasted m <sup>3</sup>	Sludge Storage m <sup>3</sup>
January		32
February	19	66
March	559	368
April	173.63	430.41
May	628.93	593.26
June	200.17	115.55
July	705.99	363.69
August	406.64	125.37
September	672.12	181.89
October	763.37	523.61
November	408.8	734.41
December	274.68	82.68
Total	4812.33	3616.87
Sludge loading (TSS=6840mg/L)	32916.3372	24739.3908

## **Pumping Stations**

Pump Stations are checked on a weekly basis, and have alarm monitoring 24 hours per day. One pump station has a backup generator on standby. All other pump stations are equipped with a terminal plug and transfer switch in the event they require a portable generator. The Main Lift station can be bypassed directly to the Plant's on site Lagoons. The generator, located at Barrett's Lane, had its annual service performed by Alberts Generator.

<b>Pumping Station</b>	<b>Major Work Performed</b>
Main	VFD replaced
Country View	O&M taken over near the end of the year
Garfield	Milltronics and stop float replaced
Ella	Inlet Manhole raised
First Ave	No significant work done
Greenfield	Pump #1 check valve replaced
Glenview	No significant work done
Garden	Pump #2 impeller and seals replaced
Waterville	No significant work done
VanderWal	No significant work done
Progress	Foam issue under investigation
Barratts Lane	Replaced main breaker





**CH2MHILL®**

Michele Vandenheuvel  
Water Inspector  
Safe Drinking Water Branch  
Ministry of the Environment  
1094 London Road - Sarnia,  
ON N7S 1P1

Dear Michelle:

This letter is to confirm that as of Monday, June 23<sup>rd</sup> 2014, the Petrolia Waste Water Treatment Plant has finished discharging the portion of the West Lagoon, in order to complete the repairs needed, in accordance to your approval stated in the letter (File: SI-LA-PE-442).

The discharging period lasted from June 5-23, 2014 (18 days) and approximately 34096.23 m<sup>3</sup> was discharged into Bear Creek. Total final effluent (flow through the regular process) leaving the Petrolia Waste Water Treatment Plant during this period was 13199.59 m<sup>3</sup> and therefore the total effluent that entered Bear Creek during the period was 48099.69m<sup>3</sup>. During the discharge period samples were taken twice per week from the West Lagoon discharge, the plant Final Effluent and both Upstream and Downstream of the lagoon discharge point in Bear Creek.

The following Table shows the analysis of all samples taken.

## Farr, Ian/PET

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**From:** Wight, James/KWO  
**Sent:** Tuesday, April 01, 2014 10:27 AM  
**To:** Johnson, Gary (ENE); Bechard, Marc (ENE); Vandenheuvel, Michele (ENE)  
**Cc:** Walsh, Cameron/KWO; Farr, Ian/PET  
**Subject:** Petrolia discharge

Gary:

To follow up on my telephone message, the following are the results of the pre-discharge sample taken yesterday:

1. TSS – 0 mg/L
2. Ammonia – 5.99 mg/L
3. Total Phosphorus – 2.61 mg/L
4. Nitrite – 0.059 mg/L
5. Nitrate – 0.059 mg/L
6. pH – 7.23
7. Temp – 9.14

I have started discharging to the creek based on these results, the lagoon level was 60 cm from the concrete deck and will take another sample tomorrow and perform the same analysis, and send a sample to our accredited lab for BOD and Alkalinity analysis.

Kind Regards,

*James Wight*

CH2MHILL OM BG  
Project Manager  
Petrolia WWTP and Oil Springs  
Tel: (519) 882-3137  
Cell: (519) 381-3211

**Ministry of  
the Environment**

Safe Drinking Water  
Branch

Sarnia/Windsor District  
1094 London Rd  
Sarnia ON N7S 1P1

**Ministère de  
l'Environnement**

Direction du contrôle de la qualité de  
l'eau potable

District de Sarnia et de Windsor  
1094, chemin London  
Sarnia (Ontario) N7S 1P1



Direct Line 519-383-3782

File: SI-LA-PE-442  
Petrolia WPCP

June 5, 2014

Mr. Joe Adams  
Director of Operations  
The Corporation of the Town of Petrolia  
411 Greenfield Street,  
Petrolia, ON  
N0N 1R0

Dear Mr. Adams

**RE: Petrolia Water Pollution Control Plant (#110000579)  
Request for late discharge of the West Lagoon to Bear Creek**

This letter is to confirm receipt of a request dated June 4, 2014 from James Wight of CH2MHill to permit an emergency discharge of a portion of the West Lagoon. The purpose is to repair a valve/discharge pipe that was damaged over the past winter. In order to complete this 1-2 day repair, the West Lagoon level needs to be reduced. The request has been reviewed along with the water quality data for pre-discharge samples from the West Lagoon contents and Bear Creek water samples upstream and downstream of the lagoon outfall structure. The Ministry agrees with the proposed discharge of the West Lagoon to permit the necessary repair to be made.

Certificate of Approval Number 5819-7EZNY7, condition 4(1)(b) states that any by-pass of sewage from any portion of the works is prohibited, except where the *District Manager* (now Water Compliance Supervisor) agrees that it is necessary for the purpose of carrying out essential maintenance and the *District Manager* (now Water Compliance Supervisor) has given prior written acknowledgment of the by-pass.

Moreover, condition 7(7) specifies that effluent from the West Lagoon shall only be discharged in spring (April 1 to May 31) and fall (October 1 to November 30). In addition, Condition 7(9) requires the owner to control the volumes of the effluent discharged from West Lagoon during any discharge event such that the Works comply with the Monthly Average Loading limits stipulated in Table 2 of condition 6(1). Works as defined in the Certificate of Approval, includes the Water Pollution Control Plant, and the East and West Lagoons.



In accordance with Condition 4(1)(b) of the Certificate of Approval, this letter constitutes written acknowledgement by the District Manager (now Water Compliance Supervisor) that the controlled discharge/by-pass is necessary on a temporary basis. In granting this acknowledgment, the Corporation of the Town of Petrolia and CH2MHill shall adhere to the following:

1. The proposed West Lagoon discharge shall commence no later than June 5, 2014.
2. The proposed West Lagoon discharge shall terminate not later than July 4, 2014.
3. During the West Lagoon discharge event, effluent samples from the West Lagoon shall be collected from the outlet structure of lagoon twice per week and analysed for the parameters listed in Table 5 of condition 8 (4), and in accordance with the protocols outlined in condition 8(5).
4. During the West Lagoon discharge event, water samples of Bear Creek shall be collected both upstream and downstream of the lagoon outfall structure. The Bear Creek samples shall be collected twice per week, on the same day as the West Lagoon effluent samples, and shall be analysed for the same parameters as the lagoon effluent parameters.
5. pH and temperature shall be measured and recorded for all West Lagoon effluent and Bear Creek samples collected.
6. If monitoring results or visual observation indicate the potential for adverse impacts to Bear Creek, the owner and operating authority shall immediately notify the Ministry of the Environment SDWB Sarnia/Windsor District and shall cease the discharge of effluent.
7. Within 45 days of terminating the West Lagoon discharge, acknowledged under this letter, a report must be submitted to the Ministry of the Environment SDWB Sarnia/Windsor District summarizing the results of the monitoring program carried out during the temporary discharge period.

If you have any questions and/or concerns please contact Michele Vandenneuvel at (519) 383-3782.

Yours truly,



Gary Johnson  
Water Compliance Supervisor,  
Safe Drinking Water Branch  
Sarnia/Windsor District

c: Manny Baron, CAO, Town of Petrolia  
James Wight, CH2MHill  
Scott Abernethy, Surface Water Group Leader, MOE London  
Michele Vandenneuvel, MOE Sarnia