

**ARNPRIOR  
WATER POLLUTION CONTROL CENTER  
SUMMARY REPORT  
2009**

PREPARED BY  
Mike Trumble  
Waterworks Supervisor

## **PRELIMINARY TREATMENT**

### **Screen Units**

There are two screening units, the automatic mechanical screen and the standby manual screen. Both screens have openings of 13 mm between bars and are enclosed with an odour enclosure where the air is discharged to the exterior atmosphere through a carbon filter. The screenings are then transferred onto a conveyer that empties into a container for disposal at the Arnprior landfill.

### **Grit Removal**

Grit removal is achieved by a pair of rectangular aerated spiral roll 90 m<sup>3</sup> tanks. Each tank has a grit screw conveyer which pushes settled grit into the grit hoppers. Grit is then pumped into a grit dewatering classifier unit where dense grit particles are separated from light organic solids.

## **PRIMARY TREATMENT**

### **Primary Sedimentation**

There are three rectangular primary clarifiers at the WPC: two with a surface overflow area of 142 m<sup>2</sup> and one with an overflow area of 154 m<sup>2</sup>. All units are equipped with chain and flight sludge collection and manual scum removal. Raw sludge is pumped from the primary clarifiers into the sludge holding tanks using plunger type positive displacement pumps.

## **SECONDARY TREATMENT**

### **Activated Sludge Treatment**

The activated sludge treatment process includes the one rectangular aeration tank and two separate rectangular secondary clarifiers, each made up of two units in parallel. The aeration tank has a volume of 1,303 m<sup>3</sup>, and is equipped with four inlet gates and one outlet slide plate for isolation. The secondary clarifiers have a surface area of 310 m<sup>2</sup> each. They are equipped with longitudinal and cross chain and flight collector mechanisms, which collect the activated sludge into a sump where it is returned to the aeration tank.

## **Phosphorous Removal**

The phosphorous control system consist of two 12,100 Litre indoor ferric chloride chemical storage tanks and two chemical feed pumps complete with calibration cylinders. The ferric chloride is added to either the aeration tank or preliminary discharge depending on operational requirements.

## **Chlorination System**

Disinfection of the plant discharge is done through the addition of Sodium Hypochlorite (NaOCl). The NaOCl is stored in a pair of 12,100 Litre tanks, and a bank of three variable speed metering pumps are used to deliver the chlorine to the chlorine contact chamber.

## **De-chlorination System**

The chlorinated water must be de-chlorinated before discharge into the Madawaska River. This is achieved through the addition of sodium bisulfate. The sodium bisulfate system is made up of one 1,336 Litre storage tank and a pair of feed pumps.

## **Sludge Dewatering**

There are two sludge dewatering systems at the WPCC. The primary unit is a Polymer system and Centrifuge capable of processing 7 Litres of sludge per second. The sludge from this unit is loaded onto a dump truck and delivered to the Arnprior landfill.

The backup system consists of a belt filter press unit, a flocculation tank, sludge screw conveyer and an automatic polymer delivery system. The dewatered sludge from this system is also delivered to the Arnprior landfill site.

## **Auxiliary Power**

The Arnprior WPCC is equipped with a 400 Kw diesel generator and automatic transfer switch. This generator will automatically start when a power outage occurs, and can supply power to run the entire plant.

## **Plant Performance Summary (4.3- a)**

The Arnprior pollution control plant has a non-compliance parameter limit of an annual average concentration of 25 mg/l of BOD<sub>5</sub>, 25 mg/l of suspended solids and a monthly average of 1 mg/l of total phosphorus. There is also a Monthly Geometric Mean Density (Geo-Mean) limit of 200 organisms per 100 ml. of E.Coli in the treatment plant effluent. The effluent results for 2009 were within these parameters.

COMPLIANCE DATA 2009							
MONTH	SUSPENDED SOLIDS		PHOSPHOROUS		B.O.D		E.COLI Geo-Mean
	Influent. mg/L	Effluent. mg/L	Influent. mg/L	Effluent. mg/L	Influent. mg/L	Effluent. mg/L	
JAN.	98.60	6.92	2.64	0.20	105.25	9.75	2.4
FEB.	125.40	6.78	3.05	0.20	166.75	10.75	1.7
MAR.	131.29	5.49	2.93	0.15	99.25	6.00	2.0
APR.	70.71	5.34	1.81	0.09	68.80	5.60	1.6
MAY	89.75	6.00	2.08	0.12	92.00	10.50	6.0
JUN.	84.88	6.73	2.05	0.16	70.00	19.00	10.0
JUL.	92.67	5.80	2.37	0.17	105.50	8.25	2.5
AUG.	95.00	8.00	2.38	0.23	101.75	14.75	3.0
SEPT.	96.11	4.17	2.45	0.19	103.00	12.40	4.0
OCT.	107.64	3.07	2.29	0.19	89.00	11.75	4.5
NOV.	68.57	4.80	3.60	0.15	74.41	7.04	2.5
DEC.	95.27	11.17	2.77	0.17	94.60	8.60	2.4
AVG	96.32	6.19	2.53	0.17	97.53	10.37	3.5
MAX	131.29	11.17	3.60	0.23	166.75	19.00	10.0
MIN	68.57	3.07	1.81	0.09	68.80	5.60	1.6

### **Monitoring Data Interpretation (4.3 b & c)**

The Total Suspended Solids in the raw and effluent wastewater is usually measured 3 times per week from a composite sample. The effluent reporting criteria is 25 mg/l and the plant target is 15 mg/l. The average monthly effluent TSS in 2009 was 6.19 mg/l and the monthly maximum average level was 11.17 mg/l in December. The TSS removal efficiency at the WPCC was 94% in 2009. Non-compliance with respect to plant effluent loading of Suspended Solids is 197.5 kg/d. The WPCC had an average daily effluent loading of 38.9 kg/d in 2009.

The Total Phosphorous (TP) in the raw and effluent wastewater is sampled and tested three times per week from composite samples. The reporting criteria is 1.0 mg/l and the plant target is 0.5 mg/l. The average monthly TP levels in 2009 was 0.17 mg/l with a monthly high average of 0.23 mg/l in August. The Total Phosphorous non-compliance loading rate is 7.9 kg/d and in 2009 the average daily TP loading rate was 1.06 kg/d.

Five day Biological Oxygen Demand (BOD<sub>5</sub>) is sampled once per week from a composite sample. The effluent reporting criteria is 25 mg/l and the plant target is 15 mg/l. The average monthly BOD<sub>5</sub> in 2009 was 10.37 mg/l with a monthly average high of 19.0 mg/l in June. The BOD<sub>5</sub> removal efficiency at the WPCC was 89 %. The BOD<sub>5</sub> non-compliance loading rate is 197.5 kg/d, and in 2009 the plant averaged an effluent loading rate of 65.1 kg/d.

### **Plant Flow Summary (4.3 b & c)**

The WPCC has a permit under the Certificate of Approval to discharge an effluent of 7,900 m<sup>3</sup>/d averaged over the year, and a peak hourly flow of 2,000 m<sup>3</sup>. The average daily flow in 2009 was 6,283 m<sup>3</sup> per day, or 79% of the C of A permitted flow. As indicated in the table below the average daily flow exceeded 7,900 m<sup>3</sup>/d in March and April, due to high rainfall. A summary of the 2009 plant flow is as follows:

<b>ARNPRIOR WPCC FLOW M<sup>3</sup></b>									
<b>Month</b>	<b>Maximum Daily Flow for Month m<sup>3</sup></b>	<b>Total Monthly Influent Flow m<sup>3</sup></b>	<b>Minimum Daily Flow for Month m<sup>3</sup></b>	<b>Total Monthly Effluent Flow m<sup>3</sup></b>	<b>Secondary Bypass m<sup>3</sup></b>	<b>Number of Secondary Bypass Events</b>	<b>Plant Bypass m<sup>3</sup></b>	<b>Number of Plant Bypass Events</b>	<b>Average Daily Flow m<sup>3</sup></b>
Jan	9,658	174,278	4,041	173,640	0	0	0	0	5,601
Feb	9,658	142,025	4,090	173,745	600	2	0	0	5,991
March	12,348	231,315	4,940	257,696	142	1	0	0	8,313
April	13,454	274,586	6,877	283,676	583	5	98	1	9,456
May	20,157	228,977	5,102	228,977	3,179	5	408	1	7,386
June	9,176	195,021	4,668	171,286	281	3	0	0	5,710
July	12,123	193,215	4,712	210,667	3,463	4	294	2	6,796
Aug	7,108	166,902	4,839	173,720	762	4	49	1	5,604
Sept	5,719	149,231	2,107	147,114	202	2	0	0	4,904
Oct	5,621	151,958	4,501	152,701	0	0	0	0	4,926
Nov	7,921	147,314	2,894	151,401	8	1	0	0	5,047
Dec	9,551	178,295	4,149	175,369	0	0	0	0	5,657
Avg	10,208	186,093	4,410	191,666	768		71		6,283
Max	20,157	274,586	6,877	283,676	3,463		408		9,456
Min	5,621	142,025	2,107	147,114	0		0		4,904
Total		2,233,117		2,299,992	9,220	27	849	5	

### **Plant Maintenance (4.3 d)**

The plant maintenance carried out is scheduled and tracked using a computerized maintenance system. A weekly maintenance schedule is printed out and the maintenance personnel initial for maintenance done. If any major repairs are required on any equipment, the operator fills out a work order detailing work required and parts needed.

A summary of major repairs or maintenance carried out in 2009 is as follows:

- A Carter reciprocating sludge pump was replaced.
- Two new Chlorine injection pumps were installed.

### **Operational Problems (4.3 e)**

There are many, day to day adjustments or repairs that the operators must carry out in addition to the major maintenance listed below.

Some operational problems that occurred in 2009 are as follows:

1. Due to occasional high levels of rain in 2009, and the infiltration of storm water in the sanitary sewer system, the secondary treatment system of the plant was occasionally hydraulically overloaded resulting in secondary treatment bypassing. These sudden high flow events also make process control difficult.

### **Proposed Alteration (4.3 f)**

1. There is a major upgrade to the WPCP that will take place this year, the project will include new digesters, a primary settling tank, an aerator and a secondary clarifier.

### **Sludge Processing (4.3 g, h)**

Combined primary and secondary waste activated sludge is collected from all three primary settling tanks, and pumped into the sludge holding tank. From the sludge holding tank it is conditioned and processed on the centrifuge or belt filter press. Sludge is dewatered to approximately 25% and loaded onto a truck and transferred to the Arnprior landfill and landfilled. There were 307 loads of sludge to the Arnprior landfill in 2009, with a total of approximately 355,898 kg dry weight of sludge. Sludge production in 2010 is expected to be slightly higher than 2009. A summary of the sludge processed is as follows:

<b>SUMMARY OF SLUDGE MANAGEMENT</b>							
<b>CENTRIFUGE OPERATION</b>							
<b>Month</b>	<b>Sludge To Storage m<sup>3</sup></b>	<b>Sludge To Filter m<sup>3</sup></b>	<b>Dewatering Hours</b>	<b>% Solids Avg.</b>	<b>Dry Solids (kg)</b>	<b>Avg. % Cake Solids Content</b>	<b>Sludge Hauled Loads</b>
Jan	1,166	1,150	73	2.08	23,920	24.93	24
Feb	1,067	1,097	77	2.25	24,683	23.86	27
Mar	1,444	1,348	91	2.25	30,330	25.58	25
Apr	1,335	1,374	99	2.49	34,178	25.48	25
May	1,157	1,122	90	3.70	41,514	23.90	26
Jun	1,209	1,374	106	3.25	44,655	25.07	25
Jul	1,294	1,592	106	1.83	29,187	23.90	24
Aug	1,489	1,318	81	1.98	26,031	26.78	21
Sep	1,308	1,268	82	1.98	25,082	26.66	28
Oct	1,321	1,414	91	2.03	28,666	27.54	35
Nov	1,501	1,388	93	1.86	25,817	24.13	27
Dec	1,111	1,101	75	1.98	21,837	24.54	20
Avg	1,284	1,295	89	2.31	29,658	25.20	26
Max	1,501	1,592	106	3.70	44,655	27.54	35
Min	1,067	1,097	73	1.83	21,837	23.86	20
Total	15,402	15,546	1,064		355,898		307

## Wastewater Profile

In addition to the above compliance sampling and analysis, the table below outlines the monthly average results of various characteristics of the raw and treated wastewater. These samples are taken with composite samplers and sent to a certified laboratory:

ARNPRIOR WATER POLLUTION CONTROL CENTER												
Month	Total Phosphorous mg/l		Ammonia mg/l		TKN mg/l		BOD mg/l		Nitrate mg/l		Nitrite mg/l	
	Raw	Effluent	Raw	Effluent	Raw	Effluent	Raw	Effluent	Raw	Effluent	Raw	Effluent
Jan	2.64	0.20	15.65	13.55	23.33	15.48	105.25	9.75	0.45	0.43	0.43	0.53
Feb	3.05	0.20	15.03	13.98	25.85	15.30	166.75	10.75	0.30	0.43	0.15	0.70
Mar	2.93	0.15	11.61	9.32	21.03	11.34	99.25	6.00	0.93	0.88	0.30	0.68
Apr	1.81	0.09	7.96	5.78	15.08	8.24	68.80	5.60	1.06	1.42	0.38	0.58
May	2.08	0.12	10.28	8.75	18.45	10.43	92.00	10.50	0.43	0.73	0.25	2.18
Jun	2.05	0.16	10.09	6.61	18.00	8.13	70.00	19.00	0.20	1.30	0.10	2.55
Jul	2.37	0.17	13.48	5.81	19.92	7.41	105.50	8.25	0.20	3.55	0.10	1.70
Aug	2.38	0.23	11.19	7.17	20.15	8.73	101.75	14.75	0.10	1.45	0.10	2.15
Sep	2.45	0.19	12.80	8.92	22.92	10.56	103.00	12.40	0.10	1.40	0.10	3.04
Oct	2.29	0.19	14.10	6.10	22.58	7.33	89.00	11.75	0.10	4.08	0.10	2.70
Nov	3.60	0.15	16.78	7.75	28.95	9.27	74.41	7.04	0.10	3.00	0.10	0.30
Dec	2.77	0.17	14.60	11.62	24.04	13.94	94.60	8.60	0.28	1.18	0.14	0.68
Average	2.53	0.17	12.80	8.78	21.69	10.51	97.53	10.37	0.35	1.65	0.19	1.48
Max	3.60	0.23	16.78	13.98	28.95	15.48	166.75	19.00	1.06	4.08	0.43	3.04
Min	1.81	0.09	7.96	5.78	15.08	7.33	68.80	5.60	0.10	0.43	0.10	0.30

### **Calibration (4.3 i)**

All flow meters were calibrated on site by a service contract, given to Endress + Hauser Canada Ltd., the manufacturer of the meters. A company representative applied a number of performance checks to the meters and all meters were within +/- 1% accurate.

### **Conclusion**

For inquiries regarding this report, please contact Mike Trumble at 623-4231 Ext. 246.

Respectfully submitted,

Mike Trumble  
Waterworks Supervisor