

STAFF REPORT: ENGINEERING AND PUBLIC WORKS DEPARTMENT



REPORT TO: Infrastructure and Recreation Committee
MEETING DATE: March 19, 2013
REPORT NO.: EPW.13.017
SUBJECT: 2012 Annual Performance Report – Thornbury Wastewater Treatment Plant
PREPARED BY: Rob Fleming, Wastewater Supervisor

A. Recommendations

THAT Council receive Staff Report EPW.13.017 entitled “2012 Annual Performance Report – Thornbury Wastewater Treatment Plant” for their information.

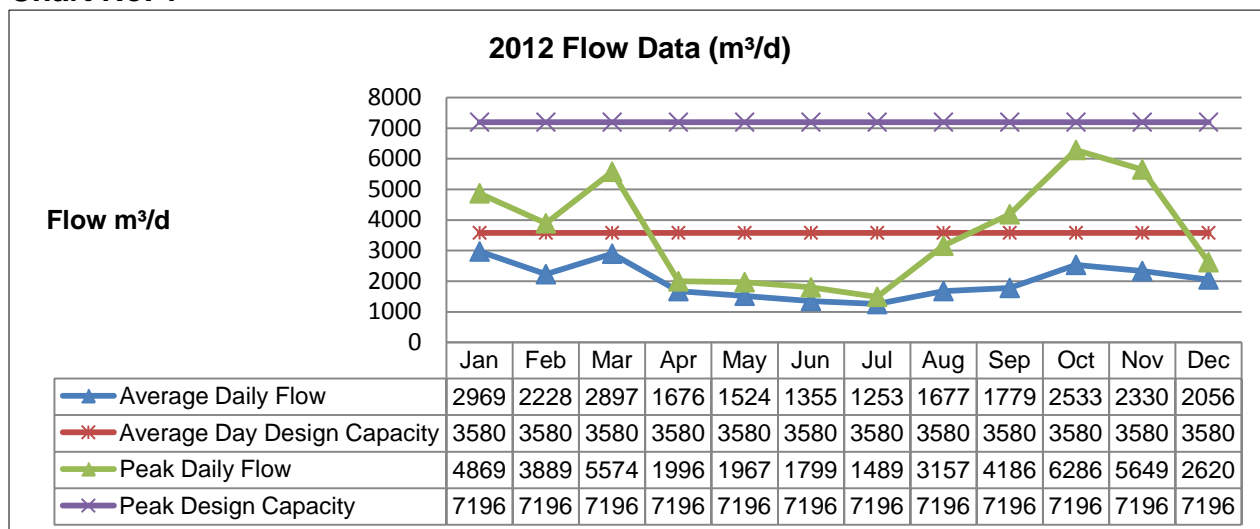
B. Background

In accordance with the Certificate of Approval issued for the Thornbury Wastewater Treatment Plant (WWTP), the Owner is required to prepare and submit a performance report to the Ministry of the Environment (MOE), Owen Sound District Office, on an annual basis.

The Thornbury WWTP is a modification of the extended aeration treatment process. In 1993 the plant was expanded to a mechanical facility utilizing the “Sutton Concept” for sludge disposal. The plant design included provision for phosphorus removal facilities and U.V. disinfection with continued use of existing outfall to the Beaver River on a continuous basis. The Thornbury WWTP is currently rated at 3,580 m³/d operating under Certificate of Approval # 6870-7YRLAR.

The 2012 monthly flow data in comparison to the peak design capacity is provided in Chart No. 1 below:

Chart No. 1



* Average Daily Flow is used to measure when the Thornbury WWTP has reached Design Capacity.

The facility did not experience any by-pass spill or abnormal discharge event during the reporting period. Therefore, there were no serious operational problems encountered during this period.

The facility was not inspected by Ministry of the Environment Officials in 2012.

The Town continues to successfully operate its Wastewater System in accordance with regulatory requirements and as noted in the attached report, the 2012 operating year was successful with no immediate problems encountered.

The Thornbury WWTP is operating at 56% average day design capacity, down from 65% during the 2011 operating year, due to a dry summer in 2012. The Town is obligated to expand the Thornbury WWTP when it reaches 80% design capacity, as required by the MOE.

C. The Blue Mountains' Strategic Plan

The acceptance of this Report by Council furthers the Town Strategic Plan Goal # 6 "Providing a Strong, Well-Managed Municipal Government."

D. Environmental Impacts

The preparation of this report ensures the Wastewater Treatment Plant operations run efficiently and adequately to guarantee the protection of water resources.

E. Financial Impact

None

F. In Consultation With

None

G. Attached

1. Thornbury Wastewater Treatment Plant – 2012 Annual Performance Report

Respectfully submitted,

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2012 Annual Performance Report Thornbury Wastewater Treatment Plant

Prepared by Wastewater Operations Staff

Contents

Executive Summary.....	3
Facility Information.....	4
1.0 Monitoring and Compliance.....	5
2.0 Interpretation of Monitoring Data and Analytical Data.....	5
3.0 Effluent Quality Control Measures.....	8
4.0 Sampling.....	8
5.0 Maintenance Summary.....	9
6.0 Operating Problems and Corrective Actions.....	9
7.0 Proposed Alterations, Extensions, and Replacements for 2013.....	9
8.0 Volume of Sludge generated in 2012 / Anticipated Volumes in 2013.....	10
9.0 Sludge Handling Methods and Disposal Areas to be used in 2013.....	10
10.0 Summary of Complaints received in 2013.....	10
11.0. Evaluation of Calibration and Maintenance Conducted on Monitoring Equip.....	10

Executive Summary

This report has been prepared as required by the Certificate of Approval No. 6870-7YRLAR, Section 11 issued to the Thornbury Wastewater Treatment Plant.

Section 11 requires the Owner to prepare and submit a performance report to the District Manager on an annual basis by March 31 for the preceding calendar year.

All of the requirements listed in Section 11 have been met and will be further explored throughout the report. The Town continues to successfully operate its Wastewater System in accordance with all regulatory requirements.

Facility Information

The Thornbury Wastewater Treatment Plant is a modification of the extended aeration treatment process. The original plant was a lagoon system constructed in 1975.

In 1993 the plant was expanded to a mechanical facility utilizing the “Sutton Concept” for sludge disposal. The plant design included provision for phosphorus removal facilities and U.V. disinfection with continued use of existing outfall to the Beaver River on a continuous basis.

The Sutton process was developed in the early 1980’s following a research project which involved installing a package treatment facility in line with active lagoons.

The system provides nitrification and denitrification for the control of ammonia and hydrogen sulphide in waste stabilization lagoon effluents. A highly nitrified effluent is obtained from an extended aeration activated sludge process which provides a high sludge age and high solids level in the aeration cells (low F/Mv ratio).

The high concentration of nitrates in the secondary effluent, prevents the reduction of sulphates to hydrogen sulphide in the lagoon.

The Thornbury Wastewater Treatment Plant is currently rated at 3,580 m³/d operating under Certificate of Approval # 6870-7YRLAR.



1.0 Monitoring and Compliance

The facility shall ensure that at all times the sewage works and related equipment and appurtenances which are installed or used to achieve compliance are properly operated and maintained.

2.0 Interpretation of Monitoring Data and Analytical Data

A comprehensive interpretation of all monitoring data and analytical data collected during the reporting period, and in comparison to the effluent quality and quantity criteria, is outlined below:

Capacity Assessment

Table No. 1

Year	2012	2011	2010	2009	2008
Average Day Flow (m ³ /d)	2,030	2,452	2,028	2,136	2,558
Average Design Capacity (m ³ /d)	3,580	3,580	3,580	3,580	3,580
% of capacity (based on average daily flows)	56%	68%	56%	59%	71%
Peak Day Flow (m ³ /d)	6,286	7,178	7,366	7,695	8,652
Peak Design Capacity	7,196	7,196	7,196	7,196	7,196
Raw Sewage Total Flow (m ³)	741,100	895,257	742,400	776,868	935,790

Chart No. 1

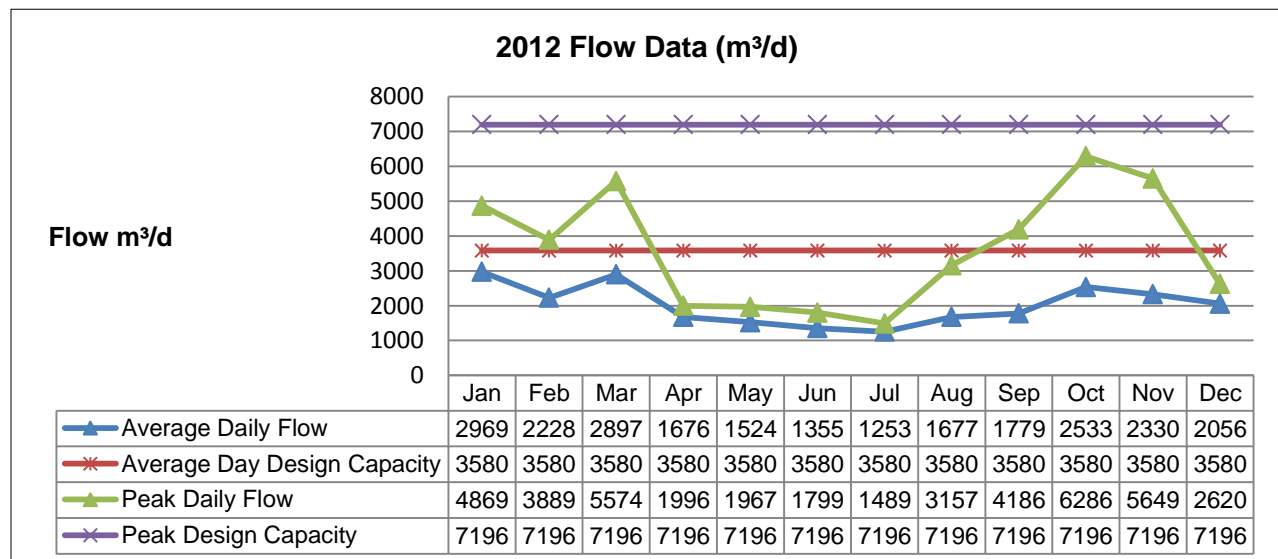
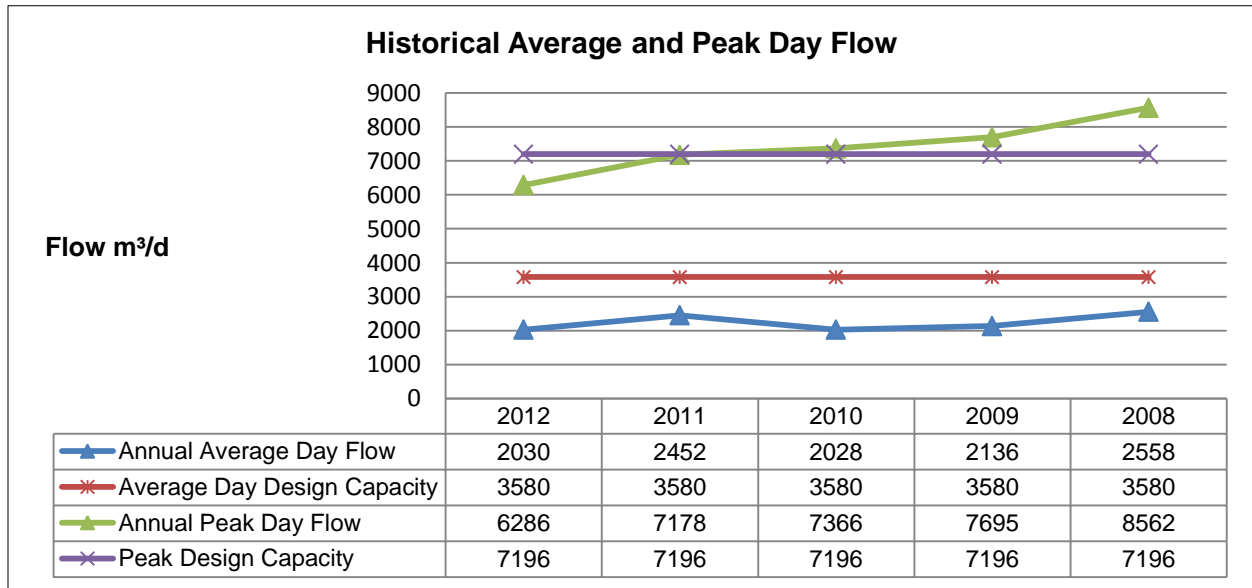


Chart No. 2



2012 Raw Sewage Loading Objectives (kg/d)

Table No. 2

Influent Parameter	Design (kg/d)	Annual Average Loading (kg/d)	% of Design	Was Design Exceeded?
CBOD	537	173	32%	No
Total Suspended Solids	651	205	31%	No
Total Phosphorus	25	2.4	9.6%	No
Total Kjeldahl Nitrogen	86	24	28%	No

2012 Effluent Objectives

Certificate of Approval Number 6870-7YRLAR establishes the following effluent limits:

Table No. 3

Effluent Parameter	Concentration Objective (mg/L)	Concentration Achieved (mg/L)	Was Objective Met?
CBOD	5	2.6	Yes
Total Suspended Solids	5	4.3	Yes
Total Phosphorus	0.3	0.12	Yes
Ammonia Freezing	3	0.27	Yes
Ammonia Non-Freezing	1	0.1	Yes
E.Coli	100	8.4 (Geometric Mean)	Yes

pH was maintained at 8.1 which is compliant with the range of 6.5 to 9.0 inclusive, at all times.

2012 Plant Performance

Table No. 4

Effluent Parameter	Annual Average Loading (kg/d)	Design Objective (kg/d)	Was Design Exceeded?
CBOD	6.4	18	No
Total Suspended Solids	10.5	18	No
Total Phosphorus	0.29	1.1	No
Ammonia Freezing ¹	0.66	11	No
Ammonia Non-Freezing ²	0.24	3.6	No

¹ Freezing Period – November 01 – March 31 each year

² Non-Freezing Period – April 01 – October 31 each year

Table No. 5

Parameter	Maximum Month Average Effluent Concentration (mg/L)			Maximum Month Average Effluent Loading (kg/d)			Was Effluent Parameter Limit Met?
	Achieved	Parameter Limit Non-Freezing	Parameter Limit Freezing	Achieved	Parameter Limit Non-Freezing	Parameter Limit Freezing	
CBOD	5	10	15	10	36	54	Yes
Suspended Solids	7.0	15	20	10	54	72	Yes
Total Phosphorus	0.24	0.5	0.8	0.58	1.8	2.9	Yes
Ammonia Freezing	0.5	5		1.5	18		Yes
Ammonia Non-Freezing	0.1	2		0.14	7.2		Yes

3.0 Effluent Quality Control Measures

Effluent quality assurance is controlled by monthly effluent concentrations and waste loading calculations which are submitted to the Owen Sound Office of the Ministry of the Environment.

As indicated by the effluent concentration and waste loading chart, the Thornbury Wastewater Treatment Plant continues to experience a high degree of removal efficiency, and as a result, this facility was operated well within its Certificate of Approval design objective.

Table No. 6

Effluent Parameter	% Removal Efficiency (Annual Average)	% Removal Criteria	Comment
CBOD	96%	Not Applicable	High Efficiency Achieved
Suspended Solids	95%	Not Applicable	High Efficiency Achieved
Total Phosphorus	88%	Not Applicable	High Efficiency Achieved
TKN	98%	Not Applicable	High Efficiency Achieved

4.0 Sampling

The influent and effluent samples are taken with an automated composite sampler. The composite samplers are located at the plant head-works and effluent channel after U.V.

Bi-weekly, effluent and influent samples are analyzed for CBOD, Suspended Solids, Total Phosphorus and Total Ammonia. Lakefield Laboratory is used for chemical analysis.

For quality assurance purposes, the operator will split-sample. This means a sample is collected and split into two portions. One portion is sent to the lab for analyses while one portion is analyzed in-house. The results are compared and the precision of the in-house analysis is evaluated.

While the Certificate of Approval requires monthly sampling for raw sewage parameters, operations have increased sampling to bi-weekly for increased risk assessment

5.0 Maintenance Summary

During 2012, a total of 564 preventative maintenance work orders were performed. A breakdown is listed below:

Monthly preventative maintenance – 310

Semi-annual –25

Annual – 18

Corrective – 5

Operational - 216

Highlights of some operational expenditures are as follows:

- Rebuilt pump # 1 and # 2 at Elgin SLS
- Safety railing installed around Clarifier # 2
- Replaced fine bubble diffusers in Aeration Tank # 1

6.0 Operating Problems and Corrective Actions

The facility did not experience any by-pass spill or abnormal discharge event during the reporting period. Therefore, there were no serious operational problems encountered during this period.

The facility was not inspected by Ministry of the Environment Officials in 2012.

7.0 Proposed Alterations, Extensions, and Replacements for 2013

No major modifications and improvements are proposed during the next reporting period which may require approval under the Ontario Water Resources Act.

8.0 Volume of Sludge generated in 2012 / Anticipated Volumes in 2013

Sludge disposal incorporates the “Sutton concept” whereas a high sludge age and solids level combined with increased concentration of nitrates in the secondary effluent, prevents the reduction of sulphates to hydrogen sulphide in the lagoon.

9.0 Sludge Handling Methods and Disposal Areas to be used in 2013

The Sutton process digested sludge will be monitored and if it is determined that the sludge requires removal, then it will be removed by Wessuc Inc. in 2013. Land application of biosolids is now performed under Ontario Regulation 267/03, NASM Plan 20348.

10.0. Summary of Complaints received in 2012

A record of complaints is maintained and there were no complaints received in 2012.

11.0. Evaluation of Calibration and Maintenance Conducted on Monitoring Equipment

The Owner shall install and maintain a continuous flow measuring device, to measure the flow rate and quantity of septage added to the Works for co-treatment, with an accuracy to within plus or minus fifteen percent ($\pm 15\%$) of the actual flow rate for the entire design range of flow measuring device, and record the flow rate and volume added at a daily frequency.

Calibration of the monitoring equipment was completed in 2012 and is attached for reference as Appendix A.

ACI Instrumentation Ltd.	Town of Blue Mountain -2012 Thornbury W.P.C.P	14 Gornley Industrial Ave. Gormely, ON L0H 1G0 Tel: (905) 888-0063
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Location	Thornbury WPCP	Manufacturer	Kent
Process	RAS Flow	Model:	Clearspan P105M/51/00
Calibration Date:	Feb. 14 2012	Serial #	C/25990/6/1
Technician	V.Nowik	Tag:	FIR-2

Input			Output (Chart)			
Type:	made		Type or EGU:	%		
Min:	4.00		Min:	0.00		
Max:	20.00		Max:	100.00		
			Before Calibration		After Calibration	
Cal. Input made	Input %	Chart Pen	Chart Pen	% Error	Chart Pen	% Error
4.00	0.00%	0.00	0.00	0.00%	0.00	0.00%
8.00	25.00%	25.00	25.00	0.00%	25.00	0.00%
12.00	50.00%	50.00	50.00	0.00%	50.00	0.00%
16.00	75.00%	75.00	75.00	0.00%	75.00	0.00%
20.00	100.00%	100.00	100.00	0.00%	100.00	0.00%

Calibration Equipment			
Type:		DMM	Calibration performed as per manufacturers recommended equipment and procedure. <i>O. Nowik</i>
Manufacturer:		Fluke	
Model:		787 ProcessMeter	
Serial No.:		8249038	
Last Cal. Date:		Jan. 2012	

Comments: Verification Results : PASSED

ACI Instrumentation Ltd.	Town of Blue Mountain -2012 Thornbury W.P.C.P	14 Gormley Industrial Ave. Gormely, ON L0H 1G0 Tel: (905) 888-0063
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Location	Thornbury WPCP	Manufacturer	ABB Kent/Taylor
Process	Effluent Flow	Model:	PX105/12/21
Calibration Date:	Feb. 14 2012	Serial #	C/26784/3/2
Technician	V.Nowik	Tag:	FIR-1(Pen #1, Red)

Input			Output (Chart)			
Type:	madc		Type or EGU:	%		
Min:	4.00		Min:	0.00		
Max:	20.00		Max:	100.00		
			Before Calibration		After Calibration	
Cal. Input made	Input %	Chart Pen	Chart Pen	%Error	Chart Pen	%Error
4.00	0.00%	0.00	0.00	0.00%	0.00	0.00%
8.00	25.00%	25.00	25.00	0.00%	25.00	0.00%
12.00	50.00%	50.00	50.00	0.00%	50.00	0.00%
16.00	75.00%	75.00	75.00	0.00%	75.00	0.00%
20.00	100.00%	100.00	100.00	0.00%	100.00	0.00%

Calibration Equipment			
Type:		DMM	Calibration performed as per manufacturers recommended equipment and procedure. <i>G. Nowik</i>
Manufacturer:		Fluke	
Model:		787 ProcessMeter	
Serial No.:		8249038	
Last Cal. Date:		Jan. 2012	

Comments: Verification Results : PASSED

ACI Instrumentation Ltd.	Town of Blue Mountain -2012 Thornbury W.P.C.P	14 Gonnely Industrial Ave. Gonnely, ON L0H 1G0 Tel: (905) 888-0063
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Location	Thornbury WPCP	Manufacturer	Milltronics
Process	Effluent Flow	Model:	MultiRanger Plus
Calibration Date:	Feb. 14 2012	Serial #	105-23
Technician	V.Nowik	Tag:	FIT-01

Input			Output (Signal)		Output (Process)	
Type:	Head (cm)		Type or EGU:	mA	CM/D	
Min:	0.00		Min:	4.00	0.00	
Max:	29.84		Max:	20.00	1400.00	
Exponent	1.50					
Range Unit	CM/D					
Empty Distance	112.80					
			Before Calibration		After Calibration	
Cal. Input cm	Calculated Flow	Calculated O/P	Output (mA)	%Error	Output (mA)	%Error
0.00	0.00	4.00	4.00	0.00%	4.00	0.00%
12.30	370.50	8.23	8.23	-0.03%	8.23	-0.03%
18.60	688.97	11.87	11.87	-0.02%	11.87	-0.02%
25.00	1073.59	16.27	16.32	0.31%	16.32	0.31%
29.30	1362.17	19.57	19.62	0.33%	19.62	0.33%

Calibration Equipment			
Type:	Spare Sensor	DMM	Calibration performed as per manufacturers recommended equipment and procedure. <i>O. Nowik</i>
Manufacturer:	Milltronics	Fluke	
Model:	ST25	787 ProcessMeter	
Serial No.:	83329	8249038	
Last Cal. Date:		Jan. 2012	

Comments: Check Zero and Span. P97 = 211=3.993 made, P98=3455=19.945 made. Adjust P98 to 3465=20.008 made

Verification Results : PASSED

ACI Instrumentation Ltd.	Town of Blue Mountain -2012 Thornbury W.P.C.P	14 Gornley Industrial Ave. Gornley, ON L0H 1G0 Tel: (905) 888-0063
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Location	Thornbury WPCP	Manufacturer	Milltronics
Process	Influent Flow	Model:	MultiRanger Plus
Calibration Date:	Feb. 14 2012	Serial #	23-Oct
Technician	V.Nowik	Tag:	FIT-02

Input			Output (Signal)		Output (Process)	
Type:	Head (cm)		Type or EGU:	mA	CM/D	
Min:	0.00		Min:	4.00	0.00	
Max:	45.40		Max:	20.00	9566.00	
Exponent	1.58					
Range Unit	CM/D					
Empty Distance	81.92					
			Before Calibration		After Calibration	
Cal. Input cm	Calculated Flow	Calculated O/P	Output (mA)	%Error	Output (mA)	%Error
0.00	0.00	4.00	4.03	0.19%	4.03	0.75%
19.08	2431.62	8.07	8.17	0.64%	8.17	0.64%
28.50	4583.92	11.67	11.97	1.89%	11.97	1.89%
37.46	7060.24	15.81	16.04	1.44%	16.04	1.44%
44.50	9268.11	19.50	19.78	1.74%	19.78	1.74%

Calibration Equipment			
Type:	Spare Sensor	DMM	Calibration performed as per manufacturers recommended equipment and procedure. <i>V. Nowik</i>
Manufacturer:	Milltronics	Fluke	
Model:	ST25	787 ProcessMeter	
Serial No.:	83329	8249038	
Last Cal. Date:		Jan. 2012	

Comments: Check Zero and Span. P97 = 227=4.03 made, P98=3499=20.03 made.

Verification Results : PASSED

ACI Instrumentation Ltd.	Town of Blue Mountain -2012 Thornbury W.P.C.P	14 Gormley Industrial Ave. Gormely, ON L0H 1G0 Tel: (905) 888-0063
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Location	Thornbury WPCP	Manufacturer	Milltronics
Process	RAS Flow	Model:	MultiRanger Plus
Calibration Date:	Feb. 14 2012	Serial #	133-23
Technician	V.Nowik	Tag:	FIT-03

Input			Output		(Signal)	(Process)
Type:	Head (cm)		Type or EGU:	mA	CM/D	
Min:	0.00		Min:	4.00	0.00	
Max:	46.99		Max:	20.00	1000.00	
Exponent	1.55					
Range Unit	CM/D					
Empty Distance	101.10					
			Before Calibration		After Calibration	
Cal. Input cm	Calculated Flow	Calculated O/P	Output (mA)	%Error	Output (mA)	%Error
0.00	0.00	4.00	4.00	0.00%	4.00	0.00%
18.80	241.73	7.87	7.89	0.14%	7.89	0.14%
29.50	485.98	11.78	11.78	0.03%	11.78	0.03%
39.40	761.05	16.18	16.16	-0.10%	16.16	-0.10%
46.90	997.03	19.95	19.96	0.05%	19.96	0.05%

Calibration Equipment			
Type:	Spare Sensor	DMM	Calibration performed as per manufacturers recommended equipment and procedure. <i>V. Nowik</i>
Manufacturer:	Milltronics	Fluke	
Model:	ST25	787 ProcessMeter	
Serial No.:	83329	8249038	
Last Cal. Date:		Jan. 2012	

Comments: Check Zero and Span. P97 = 218=4.00 madc, P98=3465=20.02 madc.
Verification Results : PASSED

ACI Instrumentation Ltd.	Town of Blue Mountain -2012 Thornbury W.P.C.P	14 Gornley Industrial Ave. Gornley, ON L0H 1G0 Tel: (905) 888-0063
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Location	Thornbury WPCP	Manufacturer	ABB Kent/Taylor
Process	Influent Flow	Model:	PX105/12/21
Calibration Date:	Feb. 14 2012	Serial #	C/26784/3/2
Technician	V.Nowik	Tag:	FIR-1 Pen #2, Green)

Input			Output (Chart)			
Type:	madc		Type or EGU:	%		
Min:	4.00		Min:	0.00		
Max:	20.00		Max:	100.00		
			Before Calibration		After Calibration	
Cal. Input madc	Input %	Chart Pen	Chart Pen	%Error	Chart Pen	%Error
4.00	0.00%	0.00	0.00	0.00%	0.00	0.00%
8.00	25.00%	25.00	25.00	0.00%	25.00	0.00%
12.00	50.00%	50.00	50.00	0.00%	50.00	0.00%
16.00	75.00%	75.00	75.00	0.00%	75.00	0.00%
20.00	100.00%	100.00	100.00	0.00%	100.00	0.00%

Calibration Equipment			
Type:		DMM	Calibration performed as per manufacturers recommended equipment and procedure. <i>V. Nowik</i>
Manufacturer:		Fluke	
Model:		787 ProcessMeter	
Serial No.:		8249038	
Last Cal. Date:		Jan. 2012	

Comments: Verification Results : PASSED