2015 Annual Report

Sioux Lookout Water Pollution Control Plant

Prepared for: The Corporation of the Municipality of Sioux Lookout

Prepared by: Northern Waterworks Incorporated

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1 Introduction

The Sioux Lookout Water Pollution Control Plant (WPCP) is obligated to meet the terms and conditions specified within Certificate of Approval Number 3-0250-92-006 (the Certificate). This Annual Report has been prepared in accordance with Condition 17 of the Certificate, and it shall summarize the system's performance over the previous calendar year (January 1 to December 31, 2015).

This Report is intended (1) to provide a performance record for future references, (2) to ensure that the Ministry of the Environment and Climate Change (MOECC) is made aware of problems as they arise, and (3) to provide a compliance record for the terms and conditions outlined in the Certificate. This report must contain, but shall not be limited to, the following information:

(a) A summary of all monitoring and compliance reports submitted in the reporting period, including an overview of the success and adequacy of the sewage treatment program (section 8);

(b) A comprehensive interpretation of all monitoring data and analytical data collected relative to the works during the reporting period and a comparison to the effluent quality and quantity criteria (sections 3.2 & 4);

(c) A summary of any effluent quality assurance or control measures undertaken during the reporting period (section 3.1);

(d) A summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works (section 6.1);

(e) A description of any operating problems encountered and corrective actions taken during the reporting period (section 7);

(f) A summary of any proposed alteration, extension or replacement in the process or operation of the Works to be completed over the next reporting period which may require approval under the *Ontario Water Resources Act* (section 6.3);

(g) A tabulation of the volume of sludge generated in the reporting period and an outline of anticipated volumes to be generated over the next reporting period (section 5.2);

(h) An outline of the sludge handling methods and disposal areas to be utilized over the next reporting period (section 5.1);

(i) An evaluation of the calibration and maintenance procedures conducted on all monitoring equipment (section 6.2); and,

(j) An evaluation for the need for modifications to the Works to improve performance and reliability and to minimize upsets and bypasses (section 6.4).

2 System Overview

The Sioux Lookout sewage works consist of sanitary sewers, sewage pumping stations and associated force-mains, and an extended aeration water pollution control plant. Sanitary sewers collect wastewater and direct it to multiple pumping stations located throughout the community, which in turn deliver the wastewater to the Robert Street Sewage Pumping Station. This pumping station includes an underground wet well and two variable speed submersible pumps for transferring wastewater via force-main to the Sioux Lookout WPCP for treatment.

Designed for the treatment and disposal of sewage, the Sioux Lookout WPCP has a hydraulic rated capacity of 2,840 m^3/day (average daily flow) with a peak flow rated capacity of 9,230 m^3/day, and it is comprised of a mechanical and stationary bar screen for the removal of large particles, a grit removal system, two circular treatment units each containing an aeration tank, clarifier, and aerobic digester, a chlorine contact chamber, and an outfall sewer discharging final effluent to Pelican Lake. The facility also includes a sludge dewatering system and a control building housing a laboratory, a gas chlorination system, an emergency diesel generator set, air supply equipment, control and metering systems, and piping, heating and ventilation systems. The Sioux Lookout WPCP is owned by the Corporation of the Municipality of Sioux Lookout and was operated by Northern Waterworks Incorporated (NWI) for the duration of the reporting period.

3 Water Quality

3.1 Monitoring Programs

Samples are collected by licenced operators and submitted to an accredited laboratory for analysis on a biweekly basis for influent and effluent parameters. Minimum requirements concerning the sampling and testing of raw sewage and final effluent parameters are contained within Condition 15 (Monitoring and Recording) of the Certificate. Additionally, the sampling program has been designed to comply with the federal *Wastewater Systems Effluent Regulations* (WSER). **Table 1** summarizes the sampling program employed at the Sioux Lookout WPCP during the reporting period.

Licenced operators also conduct in-house testing to determine the operational performance of the various stages of the treatment process and for quality assurance purposes as it concerns final effluent parameters. **Table 2** summarizes those parameters that were routinely tested for operational control or quality assurance purposes during the reporting period. This table is intended to provide a summary of effluent quality assurance measures undertaken in the reporting period as required by Condition 17(c) of the ECA. Typical control measures that may be implemented in response to test results include altering the rate of return activated sludge flow, affecting the volume of solids removed from the treatment process (i.e. waste activated sludge), modifying chlorine dosages to optimize disinfection, modifying the operation of air supply equipment, and conducting plant cleaning and maintenance.

Table 1: Sampling program summary

Parameter	Sample Type[1]
Influent Monitoring	
BOD5	Composite
Total Suspended Solids	Composite
Total Phosphorus	Composite
Total Kjeldahl Nitrogen	Composite
Chemical Oxygen Demand[2]	Composite
Volatile Organic Acids[2]	Composite
pH[2]	Grab
Field Temperature[2]	Grab
Effluent Monitoring	
BOD5	Composite
CBOD5[3]	Composite
Total Suspended Solids	Composite
Total Phosphorus	Composite
Total Kjeldahl Nitrogen	Composite
Total Ammonia Nitrogen	Composite
Nitrate	Composite
Nitrite	Composite
Orthophosphate, Dissolved[2]	Composite
Chemical Oxygen Demand[2]	Composite
Volatile Organic Acids[2]	Composite
pH	Grab
Field Temperature[2]	Grab
Field Total Residual Chlorine[4]	Grab
E. Coli	Grab

1. A composite sample is a sample that is collected over a time period of at least 24 consecutive hours. The sample consists of at least 24 discrete samples taken approximately one hour apart, with the volume of each sample being proportional to the sewage flow at the time the discrete sample is taken. A grab sample refers to an individual sample of sufficient size collected at a randomly selected time.
2. These parameters are not a component of the mandatory sampling program required by the Certificate.
3. The final effluent parameter CBOD5 is not a component of the mandatory sampling program required by the Certificate. However, effluent CBOD5 must be tested on a monthly basis in accordance with the federal *Wastewater Systems Effluent Regulations*.
4. Regulatory testing for effluent total residual chlorine (TRC) is achieved through the in-house testing program. TRC is typically tested on a daily basis, and is also tested in conjunction with E. Coli sample collection.

Table 2: Testing program summary[1]

Parameter
Influent Monitoring
Dissolved Oxygen
Temperature
Effluent Monitoring
Dissolved Oxygen
Temperature
Free Residual Chlorine
Total Residual Chlorine
Total Suspended Solids (per CTU[2])
Process Monitoring[3]
Aeration 30 Minute Sludge Settling
Aeration Dissolved Oxygen
Aeration pH
Aeration Total Suspended Solids
Return Activated Sludge TSS[2]
Clarifier Sludge Depth
Clarifier Dissolved Oxygen
Clarifier Temperature

1. Refers to all in-house tests conducted for purposes related to operational control and quality assurance. All samples collected for the in-house testing program are grab samples.
2. CTU = combined treatment unit; TSS = total suspended solids.
3. All process monitoring tests are conducted on each of the aeration tanks and secondary clarifiers associated with the two combined treatment units.

3.2 Monitoring Results

In accordance with Condition 17(a) of the Certificate, this report must provide a comprehensive interpretation of all monitoring and analytical data collected relative to the facility during the reporting period, complete with a comparison to the effluent quality criteria. **Table 3** summarizes effluent monitoring results and compares them to the relevant objectives and compliance limits for all regulated parameters. All individual sampling program results associated with influent and effluent monitoring are provided in **Table 4**.

Table 3: Effluent monitoring results summary and comparison with performance criteria[1]

Month	BOD5		TSS		TRC	E. Coli[4]
	MAC[2] (mg/L)	MAL[3] (kg/d)	MAC (mg/L)	MAL (kg/d)	MAC (mg/L)	MGMD (MPN/100 mL)
Objective	**10**	**28.4**	**10**	**28.4**	**0.50**	**150**
Limit	**25**	**71.0**	**25**	**71.0**	**1.20**	**200**
Jan	3.0	5.4	9.9	17.9	0.44	12
Feb	3.5	6.6	9.7	18.4	0.50	11
Mar	3.3	5.5	7.3	12.3	0.55	33
Apr	3.2	6.8	5.1	10.8	0.59	15
May	5.1	11.7	8.1	18.5	0.50	244
Jun	2.7	5.6	6.4	13.4	0.49	48
Jul	1.7	3.7	7.7	16.5	0.46	11
Aug	1.9	3.4	6.7	12.4	0.50	20
Sep	1.0	2.2	6.8	14.5	0.52	1
Oct	1.6	3.4	10.1	21.6	0.47	29
Nov	3.6	8.5	14.8	35.0	0.38	24
Dec	4.3	8.2	11.5	21.9	0.43	39

1. BOD5 = five-day total biochemical oxygen demand; TSS = total suspended solids; TRC = total residual chlorine; MAC = monthly average concentration; MAL = monthly average loading; MGMD = monthly geometric mean density.
2. Monthly average concentration is defined as the arithmetic mean of the daily concentrations of a contaminant in the effluent sampled or measured, or both, during a calendar month. For determinations related to monthly average concentrations, individual sample results that are below a lower detection limit are assigned a value of half the detection limit. For example, the lower detection limit for the parameter is BOD5 is 2.0 mg/L; any result reported as <2.0 mg/L for CBOD5 would be assigned a value of 1.0 mg/L for the purposes of determining monthly average concentrations.
3. Monthly average loading is defined as the value obtained by multiplying the month average concentration of a contaminant by the monthly average daily flow over the same calendar month.
4. For determinations related to monthly geometric mean densities, individual sample results that are below or above a detection or reportable limit are assigned a value equivalent to that limit. For example, any result for the parameter E. Coli reported as <1 MPN/100 mL would be assigned a value of 1 MPN/100 mL for the purposes of determining monthly geometric mean densities.

Effluent limits are summarized in Condition 12 (Non-Compliance) of the Certificate, and any exceedance constitutes non-compliance. Limits are expressed as monthly average concentrations and monthly average loadings for the parameters BOD5 and total suspended solids, as a monthly average concentration for the parameter total residual chlorine, and as a monthly geometric mean density for the parameter E. Coli.

Effluent results were below the compliance limits for the entire reporting period with the exception of an exceedance for the parameter E. Coli in May. Specifically, the monthly geometric mean density for May was 244 MPN/100 mL, which is greater than the effluent limit of 200 MPN/100 mL. In the absence of any problems with disinfection or excessive hydraulic loading, the exact cause of the exceedance remains unknown. The subsequent monthly geometric mean density result for E. Coli was 48 MPN/100 mL, and there were no other exceedances for the remainder of the reporting period.

Effluent objectives are summarized in Condition 11 of the Certificate, and the facility must be designed, constructed, and operated to achieved the effluent objectives. Objectives are set at more stringent values than compliance limits, and they expressed as monthly average concentrations and monthly average loadings for the parameters BOD5 and total suspended solids, as a monthly average concentration for the parameter total residual chlorine, and as a monthly geometric mean density for the parameter E. Coli.

Across all effluent parameters, there were eight (8) occasions when objectives were not achieved (compared to nineteen (19) such occasions in 2014). Specifically, the objective for monthly average concentration was not achieved in three (3) months and the objective for monthly average loading was not achieved in one (1) month for the parameter total suspended solids; the objective for monthly average concentration was not achieved in three (3) months for the parameter total residual chlorine; and the objective for monthly geometric mean density was not achieved in one (1) month for the parameter E. Coli (i.e. the compliance limit exceedance previously discussed).

Concerning the parameter total residual chlorine, the Sioux Lookout WPCP made operational changes in order to stabilize and maintain effluent TRC at a concentration below the objective. The operational changes appear to have been effective, and the number of failures to achieve the effluent objective has decreased from ten (10) to three (3) between 2014 and 2015.

Table 4: Influent and effluent monitoring results - 2015[1]

Sample Date	Influent Monitoring Results								Effluent Monitoring Results														
	BOD5 (mg/L)	TSS (mg/L)	Total P (mg/L)	TKN (mg/L)	COD (mg/L)	VOA (mg/L)	pH	Field Temp. (°C)	BOD5 (mg/L)	CBOD5 (mg/L)	TSS (mg/L)	Total P (mg/L)	OP (mg/L)	TKN (mg/L)	TAN (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	COD (mg/L)	VOA (mg/L)	EC (MPN/ 100 mL)	Field TRC	pH	Field Temp. (°C)
13-Jan	137	185	5.30	32.5	335	19	6.99	6.7	2.5	3.3	15.6	0.299	<0.0030	3.38	0.979	15.1	<0.010	45	<10	7	0.45	6.28	6.6
27-Jan	125	247	4.21	34.9	358	<10	7.00	6.2	3.5	4.3	4.2	0.182	0.0100	2.83	1.00	13.2	<0.050	23	<10	19	0.42	6.23	6.4
10-Feb	114	240	3.13	27.4	313	<10	7.05	5.4	<2.0	2.4	9.0	0.265	0.0206	3.40	1.59	12.4	<0.050	37	<10	5	0.44	6.59	5.8
24-Feb	107	221	4.08	24.0	292	<10	7.05	6.0	5.9	4.9	10.3	0.399	0.0412	7.30	5.79	6.32	0.074	54	<10	23	0.57	7.25	6.2
10-Mar	127	62	3.88	29.2	449	<10	6.97	5.7	5.5	4.1	11.5	0.146	0.0118	2.33	0.934	12.9	<0.050	33	<10	110	0.34	6.38	6.2
25-Mar	153	294	3.76	19.8	429	<10	7.06	6.1	<2.0	3.4	3.0	0.242	0.0191	8.36	7.88	7.28	<0.050	42	<10	10	0.32	7.36	6.1
07-Apr	144	230	2.74	22.8	434	12	6.98	6.0	4	4.5	3.2	0.255	0.0429	9.59	8.88	4.84	<0.050	47	<10	72	0.47	7.42	6.0
22-Apr	65	193	2.45	15.2	318	<10	7.15	6.7	2.4	2.8	7.0	0.199	0.0328	7.06	9.07	5.34	0.068	42	<10	3	0.70	7.60	6.7
05-May	108	231	2.97	23.3	386	17	7.07	7.9	5.3	2.5	8.1	0.267	0.0363	5.38	4.85	10.4	0.166	42	<10	30	0.40	7.27	8.0
20-May	34	38	0.907	10.7	127	<10	7.22	8.0	4.9	6.3	8.1	0.333	0.0588	3.00	1.26	7.53	0.102	39	<10	1990	0.64	7.54	8.2
02-Jun	153	171	3.07	27.9	616	35	7.04	9.6	2.6	<2.0	5.0	0.239	0.0676	1.74	0.097	14.1	<0.010	41	<10	32	0.51	7.01	10.4
16-Jun	165	232	4.10	23.6	434	24	7.23	11.7	2.7	<2.0	7.7	0.226	0.0348	1.42	0.189	14.3	<0.010	36	<10	72	0.50	7.36	12.7
02-Jul	170	341	5.61	25.5	144	58	6.82	13.7	<2.0	<2.0	7.9	0.143	0.0313	1.03	0.152	16.2	<0.050	38	<10	6	0.50	6.91	14.4
14-Jul	265	322	5.22	32.0	463	34	7.29	15.4	3.2	2.2	7.8	0.216	0.0483	1.47	0.170	15.7	0.011	35	<10	12	0.45	7.39	16.2
28-Jul	126	250	3.25	20.7	476	16	7.15	17.4	<2.0	2.7	7.4	0.240	0.0452	1.63	0.420	14.6	<0.050	39	<10	17	0.45	7.02	17.3
11-Aug	138	224	3.42	24.2	690	50	7.20	16.6	<2.0	<2.0	4.7	0.254	0.0574	1.55	0.117	19.3	<0.050	36	<10	43	0.47	7.24	17.8
25-Aug	208	294	4.44	27.0	510	36	7.24	16.9	2.7	<2.0	8.6	0.720	0.0631	2.68	0.130	20.8	0.018	47	<10	9	0.50	6.63	17.8
08-Sep	192	283	3.90	27.0	518	131	6.97	17.6	<2.0	<2.0	6.0	0.242	0.0398	1.46	0.167	14.0	<0.050	30	<10	1	0.43	6.90	18.4
22-Sep	222	650	5.16	11.2	610	46	6.97	17.3	<2.0	<2.0	7.5	0.310	0.0414	1.49	0.258	14.0	<0.050	39	<10	<1	0.47	6.69	18.1
06-Oct	218	232	8.30	33.6	700	48	7.41	17.0	2.2	<2.0	11.4	0.172	0.0614	1.18	0.121	15.7	<0.050	41	<10	30	0.45	7.10	17.0
20-Oct	101	141	2.52	20.7	290	18	7.26	15.1	<2.0	2.7	8.8	0.295	0.0376	1.30	0.139	15.2	<0.010	31	<10	29	0.42	6.51	14.7
04-Nov	70	135	2.04	20.1	240	<10	7.26	13.6	2.2	<2.0	18.0	0.425	0.0432	2.11	0.187	16.7	<0.050	36	<10	13	0.39	7.11	13.6
17-Nov	101	215	4.51	25.9	381	15	7.15	11.8	5.0	2.9	11.6	0.368	0.048	1.79	0.057	15.6	<0.050	41	<10	46	0.38	6.95	12.4
02-Dec	102	63.4	3.42	24.8	385	20	7.14	11.5	2.9	2.6	18.0	0.610	0.0608	2.17	0.172	16.8	<0.050	53	<10	35	0.36	6.91	10.2
15-Dec	93	96.6	1.66	19.6	226	16	7.18	10.0	3.5	<2.0	7.1	0.280	0.0604	1.83	0.147	<0.10	<0.050	41	<10	35	0.49	6.94	9.7
29-Dec	125	163	2.60	21.2	313	<10	7.14	6.5	6.5	2.8	9.5	0.264	0.0262	1.61	0.256	15.3	<0.050	39	<10	50	0.48	6.78	7.1

1. BOD5 = total biochemical oxygen demand; CBOD5 = carbonaceous biochemical oxygen demand; SS = suspended solids; TAN = total ammonia nitrogen; TKN = total Kjeldahl nitrogen; Total P = total phosphorus; OP = orthophosphate-dissolved (as P); COD = chemical oxygen demand; VOA = volatile organic acids; TRC = total residual chlorine; EC = Escherichia coli.

4 Flow Monitoring

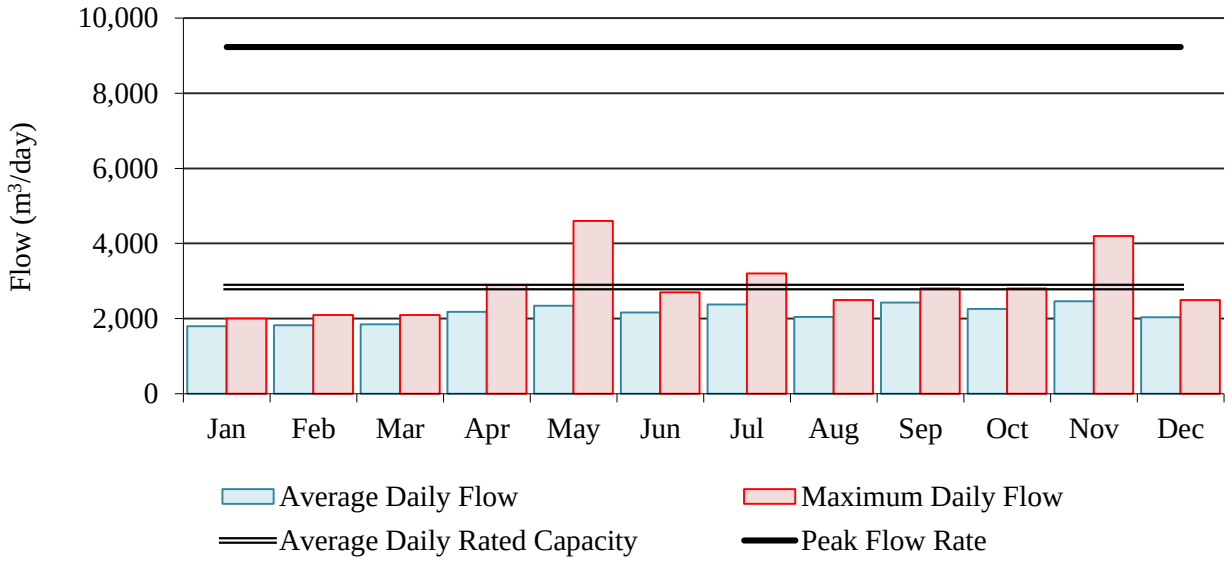
Condition 13(a) of the Certificate states that the sewage works have been approved to treat sewage at an average flow of 2,840 m^3/day, with a peak flow rate of 9,230 m^3/day. Condition 13(b) states that the introduction of sewage flows in excess of the peak flow rate is not approved under the Certificate. Additionally, Condition 13(c) states that the introduction of sewage flows in excess of the average daily flow for any consecutive period of time greater than one year is not approved.

Table 5 and **Figure 1** summarize influent flow monitoring results for each month in the reporting period. Throughout the reporting period, 784,000 m^3 of influent was introduced to the sewage works. On an average day in 2015, 2,148 m^3 of influent was introduced, representing 75.6% of the average daily rated capacity of the Sioux Lookout WPCP. The maximum amount of influent introduced to the facility on a given day in 2015 was 4,600 m^3, representing 49.8% of the peak flow rate of the facility.

Table 5: Influent wastewater flows - 2015

Month	Total Monthly Volume (m^3)	Average Daily Flow (m^3/day)	Maximum Daily Flow (m^3/day)
Jan	55,700	1,797	2,000
Feb	51,000	1,821	2,100
Mar	57,200	1,845	2,100
Apr	65,500	2,183	2,900
May	72,700	2,345	4,600
Jun	65,000	2,167	2,700
Jul	73,800	2,381	3,200
Aug	63,300	2,042	2,500
Sep	72,800	2,427	2,800
Oct	70,000	2,258	2,800
Nov	73,900	2,463	4,200
Dec	63,100	2,035	2,500
Total	784,000	---	---
Avg	65,333	2,148	---

Figure 1: Average and maximum daily influent wastewater flows - 2015



5 Solids Management

5.1 Solids Management Methods

In accordance with Condition 17(h) of the Certificate, this report must provide an outline of the sludge handling methods and disposal areas that will be utilized over the next reporting period. The amount of solids in the treatment process is controlled by directing activated sludge (i.e. waste activated sludge) to the respective aerobic digesters at the Sioux Lookout WPCP. Sludge is then transferred to a dewatering system for further processing, such that the solids are concentrated and much of the water present is removed and returned to the influent works. Dewatered sludge is then hauled by trailer to the Hidden Lake Landfill, where it is mixed with sand and used as cover for the site. Sludge management methods and disposal areas to be utilized over the next reporting period are not expected to change.

5.2 Solid Management Summary

In accordance with Condition 17(g) of the Certificate, this report must provide a tabulation of the volume of sludge generated in the reporting period, in addition to providing an outline of anticipated volumes to be generated over the next reporting period. A tabulation of the amount of sludge generated in the reporting period is provided in **Table 6**. Approximately 1,159 m^3 of dewatered solids were removed from the facility in 2015, which was the result of dewatering 5,778 m^3 of waste activated sludge. The amount of dewatered sludge generated and removed from the facility in 2016 is anticipated to be between 900 m^3 and 1,400 m^3.

Table 6: Solids management summary – 2015

Month	Waste Activated Sludge (m^3)			Dewatered Sludge	
	Volume Processed – CTU 1	Volume Processed – CTU 2	Volume Processed – Combined	Number of Trailer Hauls	Volume Generated and Removed (m^3)
Jan	292	408	700	33	112
Feb	314	272	586	39	132
Mar	287	392	679	43	145
Apr	182	243	425	38	128
May	179	202	381	27	91
Jun	279	222	501	29	98
Jul	192	236	428	26	88
Aug	228	168	396	20	68
Sep	202	207	409	19	64
Oct	186	208	394	24	81
Nov	167	271	438	19	64
Dec	228	213	441	26	88
Total	2,736	3,042	5,778	343	1,159

6 Maintenance Activities and Modifications

6.1 Planned Maintenance & Modifications

In accordance with Condition 17(d) of the ECA, this report must include a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works. The Sioux Lookout WPCP employs a planned maintenance program that ensures that the sewage works and related equipment that are installed or used to achieve compliance are properly operated and maintained. Licenced Operators perform routine maintenance on all equipment including pumps, air supply equipment, chemical feed systems, monitoring equipment, alarm systems, safety equipment, and other treatment components. Both routine and non-routine (i.e. emergency repairs) maintenance activities are conducted in accordance with manufacturers' instructions.

Additional significant planned inspection, maintenance, rehabilitation, renewal activities that occurred during the reporting period are summarized below. This summary also includes modifications that were undertaken during the reporting period. Maintenance associated with equipment failures is summarized in section 7.1.

- All lift stations were cleaned and inspected between June 10 and 11.
- The old gas chlorination system was replaced between July 13 and 15. Replacement with a new system allowed for improved flow-proportional dosing capability.
- Calibration verification for the influent and effluent flow measuring devices was conducted on August 19 by Synergy Controls Corporation.
- A new sludge pump was installed for CTU no. 1, and new sludge pump guide rails were installed in both CTU no. 1 and 2 between August 25 and 26.
- A basic PLC/SCADA system was installed by Automation Now on December 10, with the intent that automation systems may be expanded in the future.
- A soft starter for the blower no. 2 motor was installed on October 22 by IGL Electric.
- All relevant hoists and lifting devices were inspected on October 30 by Konecranes Canada Inc.

6.2 Monitoring Equipment Calibration and Maintenance

Condition 13(d) of the Certificate requires the installation, maintenance, and operation of a sufficient number of flow measurement devices. These devices must be calibrated at regular intervals not exceeding one year to ensure their accuracy within ± 5% of the full scale reading. Flow meters are required to measure a) the quantity of sewage being conveyed to and through the sewage treatment plant and b) the quantity of untreated sewage being bypassed to the disinfection facility. Flow monitoring equipment indicated in the Certificate includes one (1) 229 mm throat dimension Parshall flume at the influent works and one (1) V-notch weir for measuring plant effluent flow. Additional monitoring equipment includes a handheld colorimeter for measuring chlorine residuals and a portable meter used for determining pH, temperature and dissolved oxygen concentrations. A summary of planned calibration and maintenance activities conducted on monitoring equipment is provided in **Table 7**.

Table 7: Summary of monitoring equipment calibration and maintenance activities

Equipment	Calibration & Maintenance Activities
Flow Meter (Influent) Flow Meter (Effluent)	Daily inspection; annual calibration verification; calibration as required.
Handheld Colorimeter (Free and Total Chlorine)	Daily (weekdays) inspection; monthly quality assurance; calibration as required.
Portable Multi-Parameter Meter (Dissolved Oxygen, pH, Temperature)	Weekly (minimum) inspection; calibration and maintenance as required.

In accordance with Condition 17(i) of the Certificate, this report must include an evaluation of the calibration and maintenance procedures conducted on all monitoring equipment. Current planned calibration and maintenance procedures are considered to be adequate for all monitoring equipment.

6.3 Summary of Proposed Alterations, Extensions, or Replacements

In accordance with Condition 17(f) of the Certificate, this report must provide a summary of any proposed alteration, extension, or replacement in the process or operation of the works to be completed over the next reporting period which may require approval under the *Ontario Water Resources Act*.

There are no anticipated alterations, extensions, or replacements in the process or operation of the works to be completed over the next reporting period which may require approval under the *Ontario Water Resources Act*.

6.4 Modifications to Improve Performance and Reliability

In accordance with Condition 17(j) of the Certificate, this report must provide an evaluation for the need for modifications to the sewage works to improve performance and reliability and to minimize upsets and bypasses. For the purposes of this report, modifications intended to improve performance may include major and minor capital and operational projects planned for future reporting periods. Modifications that may improve the performance and reliability of the sewage treatment program include:

- Cleaning and inspection of both combined treatment units and the chlorine contact chamber. Dewatering and cleaning will remove sludge deposits so that structures and equipment such as the bubble diffusers and the clarifier rake can be inspected and serviced.

- Reconfiguration of the influent and effluent flow measuring devices to ensure that the units are installed according to manufacturer specifications; and,

- Repairs and maintenance to sludge dewatering equipment, including the replacement of the roller drive and roller drive motor associated with the sludge press and the inspection and servicing of the dedicated sludge trailer.

7 Operating Problems

In accordance with Condition 17(e) of the Certificate, this report must provide a description of any operating problems encountered and corrective actions taken during the reporting period. For the purposes of this report, operating problems may be indicated by equipment and process failures, by-passes, overflows, spills, and abnormal discharge events. Refer to section 3.2 (Monitoring Results) for more information concerning effluent objective and limit exceedances and any associated operating problems.

7.1 Equipment and Process Failures

Operating problems associated with significant equipment failures that occurred during the reporting period include the following:

- With the assistance of Municipality of Sioux Lookout personnel and vacuum truck, excessive foam that had accumulated within CTU no. 1 was removed on May 28.

- The digester pump associated with CTU no. 1 failed on October 6 and was replaced with a new pump.

7.2 Bypasses, Overflows, Spills and Abnormal Discharge Events

A by-pass refers to the diversion of sewage around one or more unit processes within the treatment facility, whereby diverted sewage flows are returned to the treatment facility upstream of the final effluent sampling location and are discharged to the environment through the plant outfall. By-passes are prohibited except in certain situations, and may be planned (i.e. for maintenance or research purposes) or unplanned (i.e. emergency situations or high flow conditions). A plant overflow means a discharge to the environment from the sewage treatment facility at a location other than the plant outfall or into the plant outfall downstream of the final effluent sampling location. Overflows are prohibited except in certain situations, and special reporting, sampling, and recording requirements apply in the event of an overflow. Spills are releases of pollutants into the natural environment from or out of a structure, vehicle or other container that is abnormal in quality or quantity in light of all the circumstances of the discharge. Abnormal discharge events include any other abnormal events not otherwise classified as a bypass, overflow, or spill.

There were no bypasses, overflows or spills during the reporting period for the Sioux Lookout WPCP. However, an abnormal discharge event involving the collapse of the outfall sewer occurred on November 10. Specifically, a section of the outfall pipe collapsed on private property and 48 m had to be replaced. The collapsed section was bypassed during the replacement process by transferring effluent between manholes using pumps and temporary lines, which successfully prevented effluent from crossing land to reach the outfall. Subsequent to the replacement, inspection of the outfall sewer with a camera indicated that another 30 m may be on the verge of collapse. This section is currently planned to be replaced in 2016.

8 Conclusion

In accordance with Condition 17(a) of the Certificate, this report must provide a summary of all monitoring and compliance reports submitted in the reporting period, including an overview of the success and adequacy of the sewage treatment program. All owners of mechanical sewage treatment plants are encouraged to submit Municipal Utility Monitoring Program forms to the Ministry of the Environment and Climate Change (MOECC). These forms summarize monitoring data and are completed for every calendar month. All such forms were completed and submitted to the MOECC for the entire reporting period.

Analytical and flow monitoring data suggest a successful and adequate sewage treatment program. With the exception of a single compliance limit exceedance, the Sioux Lookout WPCP was capable of consistently meeting all compliance limits for the final effluent parameters biochemical oxygen demand, total suspended solids, total residual chlorine, and E. Coli. Additionally, all flows to the sewage works in 2015 were below the maximum hydraulic capacity for the facility, and the annual average daily flow was below the rated capacity.

The stated goals of the sewage treatment program for 2015 were to (1) reduce effluent suspended solids concentrations to a point that is consistently below the effluent objective and (2) to maintain average monthly TRC concentrations at a level below the objective without compromising disinfection. Both goals were achieved, as effluent objective failures decreased from nineteen (19) incidents in 2014 to eight (8) incidents in 2015. The goals of the sewage treatment program for 2016 include (1) maintaining or improving system performance with respect to achieving the objectives for effluent total suspended solids and (2) stabilizing and reducing effluent TRC in order to reduce the number of objective failures.