



February 19, 2019

Mr. Andrew Hickey  
Water Security Agency  
101 - 111 Fairford Street E.  
Moose Jaw, SK S6H 7X9

Dear Mr. Hickey:

RE: 2018 Regina Wastewater Treatment Plant Annual Report

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In compliance with the City of Regina "Permit to Operate a Sewage Works" # 0050853-05-00 please find attached the Annual Report for 2018.

I trust this meets with your approval, should you have any questions please do not hesitate to contact me directly at 337-7211 or Kayla Gallant at 337-7213.

Yours truly,

A handwritten signature in blue ink, appearing to read "Joe Zimmer", with a long horizontal flourish extending to the right.

Joe Zimmer, P.Eng.  
Manager, Regina Operations  
EPCOR Water Services

# CITY OF REGINA WASTEWATER TREATMENT PLANT

## *ANNUAL OPERATING REPORT 2018*



February 19, 2019

Submitted to: Water Security Agency

Permit Number: 00050853-05-00



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## ***1 INTRODUCTION***

The Regina Wastewater Treatment Plant facility is located 5 km west of Courtney Street on Dewdney Avenue, and 3 km north of the city (land location SW 31-17-20W2). The facility accepts wastewater from the entire City of Regina, as well as waste from liquid waste haulers. The address is 100 Fleming Rd., Regina, Saskatchewan.

The facility is owned by the City of Regina, and is operated by EPCOR in accordance with the requirements of the Permit to Operate a Sewage Works, Permit #00050853-05-00. In accordance with requirements of the current Permit to Operate, Section 5.8, EPCOR is submitting this annual report for January 1 to December 31, 2018. A summary of all the analytical data required by the permit, permit excursions, and all record keeping information as required by section 4.1 of the permit are presented in this report.



## ***2 SUMMARY OF APPENDIX A MONITORING DATA & APPENDIX B PERMIT LIMITS***

### ***2.1 MONITORING DATA***

All analytical results required by the Permit to Operate are located in monthly operating reports submitted to the Water Security Agency. The monthly operating reports contain all of the monitoring data required by the permit, which include: sample locations, dates and volumes of effluent discharged, chemical usage, and information pertaining to the tests conducted. They also include a summary of any failure to collect samples or meet permit limits. These reports can be found in Appendix A of this report.

### ***2.2 SUMMARY OF MONITORING DATA AND PERMIT LIMITS***

In 2018 there were two months where permit limits were not achieved. In June, the average total suspended solids for the month was 20 mg/L, exceeding the monthly allowable average of 15 mg/L. In October, three permit limits were exceeded; the average total suspended solids for the month was 16 mg/L, exceeding the monthly average of 25 mg/L; the total suspended solids for the month was 16 mg/L, exceeding the monthly average of 15 mg/L; and there were two instances where the *E. coli* exceeded the maximum limit of 1000 MPN/100mL. The monthly final effluent summary in relation to permit limits is summarized in Table 1 below.

TABLE 1: TREATED WASTEWATER SUMMARY

2018												
Parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CBOD (mg/L) Monthly Average Shall not exceed 15	4	4	4	5	5	4	3	3	3	3	3	3
TSS (mg/L) Monthly Average Shall not exceed 15	14	13	11	13	14	20	14	10	11	16	11	9
<i>E. Coli</i> (MPN per 100mL) Monthly Geomean Shall not exceed 200	30	46	40	20	85	14	23	58	76	44	14	7
<i>E. Coli</i> (orgs. per 100mL) Number of Incidents Shall never exceed 1000	0	0	0	0	0	0	0	0	0	2	0	0
Total Phosphorus (mg/L) Monthly Average Shall not exceed 0.75	0.50	0.43	0.50	0.56	0.47	0.73	0.52	0.54	0.52	0.99	0.75	0.72
Total Ammonia Nitrogen (mg/L) Shall not exceed 4 (Apr - Nov) Shall not exceed 10 (Dec - Mar)	<1	<1	4	2	3	1	1	1	2	2	3	1
Total Nitrogen (mg/L) Shall not exceed 10 (Jun - Nov) Shall not exceed 14 (Dec - May)	11	10	14	12	13	8	9	9	10	10	10	13
Unionized Ammonia Nitrogen (mg/L) Number of Incidents Shall never exceed 1.25	0	0	0	0	0	0	0	0	0	0	0	0
Acute Lethality (pH stabilized)	NR	NR	Pass	NR	NR	Pass	NR	NR	Pass	NR	NR	Pass

NR: Not Required as per the Permit to Operate. When the WWTP effluent results have passed Lethality testing for 12 consecutive months, the frequency of testing is reduced to quarterly.

Note: The Permit to Operate has a total residual chlorine limit, but it is not measured at the plant as chlorine is not used for final effluent disinfection.

An annual summary of all of the receiving environment monitoring data can be found in Appendix B. With the exception of bacteria samples, Primary Influent (PI) and Final Effluent (FE) are a single day 24 hour composite sample; whereas Riske's (RIS), Sidmar (SID), Hungry Hollow (HH), Wascana above Qu'Appelle (WAQ), Qu'Appelle above Wascana (QAW), and Lumsden (LUM) are all a single grab sample. HH was collected with WSA approval in February as an alternate to SID, due to road restrictions and safety concerns.

Appendix A of the Permit to Operate also outlines the requirements for toxicity testing as well as the requirement for conducting annual calibration verifications on flow monitoring equipment. A summary of the 2018 toxicity results can be found in Table 2 and Table 3 below.

*TABLE 2: ACUTE TOXICITY RESULTS*

Sample Date	EPS 1/RM/13	EPS 1/RM/50	Was Sample Acutely lethal?
13-Mar-18	Single-Concentration	Yes	No
5-Jun-18	Single-Concentration	Yes	No
11-Sep-18	Single-Concentration	Yes	No
4-Dec-18	Single-Concentration	Yes	No

*TABLE 3: CHRONIC TOXICITY RESULTS*

Sample Date	Chronic Toxicity Test Method	Purpose	LC50 Result	IC25 Result
5-Jun-18	EPS1/RM/21	Reproduction and Survival	>100%	>100%
	EPS1/RM/22	Larval Growth and Survival	>100%	71.1%

The calibration report for the flow monitoring equipment is attached in Appendix C. The total flow discharged to the creek is the difference between flow meters FIT-610A and FIT-710D. The flow meters were found to be within acceptable limits.

### 3 RECORD KEEPING

#### 3.1 INFO COLLECTED FOR THE PERMIT

The Regina Wastewater Treatment Plant has the following certified staff:

TABLE 4: OPERATOR CERTIFICATIONS

Operator	Class	Level	Expiry
Joseph Zimmer	Wastewater Treatment	4	15-May-20
Shauna Karakochuk	Wastewater Treatment	4	15-Jun-19
Trevor Eyndhoven	Wastewater Treatment	3	15-Apr-20
Brennen Zimmer	Wastewater Treatment	3	15-May-19
Paul Kobayashi	Wastewater Treatment	2	15-Sep-20
	Water Treatment	1	15-Sep-20
	Water Distribution	1	15-Sep-20
Ryan Caldwell	Wastewater Treatment	2	15-Nov-19
Kayla Gallant	Wastewater Treatment	2	15-May-20
Aaron Swanson	Wastewater Treatment	1	15-Nov-20
Zack Holtz	Wastewater Treatment	1	15-Nov-20

Over the course of the year, EPCOR was in communication with the Water Security Agency for various items related to the permit to operate. A summary of the notable communications is in the following table.

TABLE 5: 2018 REGULATORY COMMUNICATIONS

Month	2018 Regulatory Communications
January	The Operations Manager and the City’s Representative conducted the annual compliance inspection with the Water Security Agency. Andrew Hickey, a new Environmental Project Officer, was brought to site as the new WSA contact.
February	The Water Security Agency inquired what environmental conditions might explain the elevated bacteriological counts that exist in the downstream creek testing. EPCOR reviewed the inquiry, and were able to determine that this is not a new phenomenon, and that literature suggests it may be due to regrowth, reactivation, runoff, livestock, and/or wildlife.  The Water Security Agency brought our attention to the Management of Greenhouse Gases Act, and the public consultation phase of developing regulations. EPCOR is reviewing the documents; however, they appear to be in line with current Federal reporting requirements.  The 2017 annual report was submitted to the Water Security Agency.
March	The Water Security Agency contacted EPCOR to modify the weekly ftp report; it was completed and communicated to the WSA on March 8, 2018.  Greg Holovach from the WSA forwarded the standard “CSA S900.1, Climate change adaptation for wastewater treatment plants” for Public Consultation. This was reviewed internally and we have no concerns.
April	N/A



## 2018 ANNUAL REGINA WASTEWATER TREATMENT PLANT REPORT

Month	2018 Regulatory Communications
May	<p>The Water Security Agency was informed that we were experiencing seasonal turnover in some of our lagoons; this was generating odours, and the City had received a few complaints during this time.</p> <p>The Water Security Agency was informed that the Regina Bypass Project reinstalled their pump in Wascana Creek a few yards downstream from our outfall. Their plan is to pump water from the creek down Fleming Road, East along the tracks and onto their project site to be used for compaction. This is a separate project, and is not connected to EPCOR or the City of Regina.</p>
June	<p>The plant received confirmation from the Water Security agency that it was acceptable to use Rhodamine Dye during the clarifier testing, and that a construction permit would not be required.</p> <p>During a telephone call on June 19, the Water Security Agency was informed that TSS for June would exceed the Permit to Operate. An email with the data was provided on June 20, 2018.</p>
July	<p>An interpretation of the chronic toxicity testing conducted on the Qu'Appelle River in Lumsden was provided to the City and the Water Security Agency. There was no failure.</p>
August	<p>The Annual Compliance inspection was set up with the Water Security Agency for September 5, 2018.</p>
September	<p>The Annual Compliance inspection was conducted by the Water Security Agency.</p>
October	<p>The Water Security Agency was notified of the October 3 upset condition.</p> <p>Effluent flows for the month of March were shared with the Water Security Agency to aid in them reconciling a hydrometric station downstream.</p> <p>The Water Security Agency Compliance Officer was contacted and informed of the ongoing operational challenges as a result of the October 3 toxic event. They did not need anything further from EPCOR at that time, but have requested a copy of the investigation report when it has been finalized.</p> <p>All monthly final effluent data to date was shared with the Water Security Agency. At this time they were also informed that the plant had deduced in the investigation of the October 3 event that a load of Zinc had triggered the following responses.</p> <ul style="list-style-type: none"> <li>• There were 2 days in which the density of <i>E. coli</i> exceeded 1000 MPN/100mL. We have investigated and confirmed that the UV system was achieving 3 log removal during this time and the UVT was high. The maintenance is also up to date, and the lamps are within the expected life. The system was essentially overloaded as 20 times the typical bacteria levels were coming out of the secondary clarifiers.</li> <li>• The total phosphorus permit will be above 0.75 mg/L in October, of which 43% of the allowable permit load was discharged in the same day (October 3) as the zinc entered the plant.</li> <li>• A monthly average of TSS 15 mg/L was almost impossible to achieve this month, and although we tried to meet it, it was highly unlikely that we would have less than 3.5 mg/L average for the remainder of the month in order to be below 15 mg/L.</li> <li>• Total Nitrogen results lag behind the rest due to the test method and scheduling; however, our estimates showed that obtaining permit compliance would be close.</li> </ul>
November	<p>The Water Security Agency worked with the laboratory to correct some sample information in their database which was missing station numbers.</p> <p>After receiving the October monthly report in which the plant exceeded the Permit limit of 1000 MPN/100mL on <i>E. coli</i> twice, the Water Security Agency asked some clarifying questions about the high counts before the event. An email response was provided.</p> <p>The Water Security Agency was notified of a power outage.</p>
December	<p>The Water Security Agency was notified of a brief power outage.</p>

### 3.2 SUMMARY OF SITE INSPECTIONS, MAINTENANCE, & FAILURE OF TREATMENT COMPONENTS

The plant utilizes a detailed Computerized Maintenance Management System for all preventative and corrective work on site. The system plans, documents actions taken, and tracks work related to inspections and maintenance of all assets. Inspections and maintenance is based on good industry practice and risks/criticality of the assets. Due to the size and complexity of the system, only those inspections and maintenance activities that are laid out in the Permit to Operate are available in this report. The plant Leadership Team conducts formally documented workplace inspections and observations on a regular basis. The table below is a summary of inspections and observations conducted throughout 2018.

TABLE 6: FORMAL OBSERVATIONS AND INSPECTIONS

Formal	2018
Workplace Observations	24
Workplace Inspections	68
<b>Total</b>	<b>92</b>

Table 7 presents the operational highlights in 2018. These highlight the challenges presented, and the efforts taken by plant operations to try and maintain the required level of treatment set out in the Permit to Operate. In 2018, the plant identified two known contaminants in the wastewater, vanadium and zinc, that posed additional challenges to the operations; however, there were other unexplainable events that challenged the plant. The table below also includes any failure of treatment components that lead to decreased effluent quality. The only failure of treatment components that lead to an Appendix B permit limit failure was in June, when two components failed simultaneously.

TABLE 7: 2018 OPERATIONAL HIGHLIGHTS

Month	Issues and Activities
January	<p>The end of December and into January brought extremely cold weather to Regina. The Wastewater treatment plant operated very well throughout this period with some minor issues due to frost on HVAC equipment and some clarifier icing. The operations crews were able to maintain an excellent level of treatment even though the 7-day average wastewater temperature dropped to 9.8 degrees Celsius.</p> <p>Shortly after Christmas, the biogas Boiler 101 experienced a failure of the control module. The maintenance staff and a local contractor worked throughout January to source parts and repair the boiler. During this time the boiler was out of service, and the plant was heated on natural gas.</p> <p>On January 3<sup>rd</sup>, all three bioreactors were converted to operating with their swing zones in an aerobic configuration. Total nitrogen and ammonia results were maintained well below the Permit to Operate limits in January.</p> <p>Polymer and PAC were added throughout the month of January to assist with achieving the TSS permit.</p>
February	<p>The plant staff worked with a contractor to clean struvite accumulation out of the centrate pipes. During this work, the centrate was diverted to the grit effluent channel and not the sidestream bioreactor.</p> <p>Each of the sedimentation tanks were drained to allow for sludge hopper valve replacements. This</p>

Month	Issues and Activities
	<p>temporarily changed some flows and loadings on the fermenters as a result.</p> <p>The plant saw an increase in Ammonia and TSS in the Final Effluent due to higher than normal blankets in the Secondary Clarifiers. Polymer and PAC were added throughout the month of February to assist with achieving the TSS permit and maintaining blanket levels.</p> <p>DAF performance throughout February was hard to maintain. It was identified that the suction piping of the polymer feed pumps was clogged with a stringy polymer solution. This was cleaned and the expected performance of the DAF system was regained.</p> <p>Due to the struvite and DAF performance issues in the month, the fermenter received a higher than normal loading because of solids in the DAF subnatant. The torque climbed and the mechanism eventually shut off to protect itself. The plan was to stop feeding it for a few days and then restart the mechanism.</p> <p>The monthly raw influent phosphorus loading increased from 404 kg/day in January to 448 kg/d in February. This primarily occurred over a three week period, and there may be a pattern of a three week high phosphorous period in the early spring; a similar observation was made in March 2017.</p>
March	<p>The sidestream experienced a failed nitrified mixed liquor pump on March 3. During inspection it was discovered that the pump faulted due to issues with the guide rails on the pump. The sidestream was removed from service and drained to allow for the repair of the guide rails. During this time the centrate was diverted to a combination of the grit effluent channel, and at times equalized into the mixed liquor splitter box.</p> <p>There was an unexplained increase in Ortho Phosphorus in the Final Effluent in the first week of March. An investigation was unable to determine the cause, and PAC was turned on to control phosphorus and TSS.</p> <p>Bioreactor C was removed from service and drained starting on March 12 in order to complete warranty work. With the expected increased loading on the bioreactors with one out of service, Polymer and PAC were added to control blankets in the Secondary Clarifiers and TSS in the final effluent. The plant experienced an expected increase in Ammonia in the Final Effluent due to the increased loading on the bioreactors during this time.</p> <p>Bioreactor A was removed from service on March 27 to also complete warranty work. During this period of time, flow was capped to the plant at 70MLD to allow for the work to be completed on the Bioreactor without the addition of Polymer or PAC. Work was suspended early on Bioreactor A due to a multiday high influent TKN loading. The work was not fully completed on either Bioreactor as inspections indicated that corrosion on the Victaulic fittings resulted in them needing to be replaced and the work therefore rescheduled.</p> <p>The fermenter was restarted early in March, but continued to experience intermittent issues with torque throughout the month. The team worked to resolve the issues, and the decision was made to begin to draining the fermenter starting in April to allow for the completion of warranty work, including pump sludge pump replacement.</p> <p>The plant experienced a significant increase in loading from February to March. The COD increased above the annual average day loading design, and the first quarter of 2018 was exceeding at 39,204 kg/day. Significant increases were also noted with both TSS and TKN; however, at the time they were not exceeding any design loadings.</p>
April	<p>The high influent TKN event from the end of March continued into the first week of April. The increase in Total Nitrogen in the Final Effluent continued from April 1-7. As a result of the elevated Total Nitrogen, the decision was made on April 13 to restore the second zone of the bioreactors to an anoxic condition.</p> <p>On April 10, flow was diverted to the lagoons to complete warranty work in the grit influent channel. A plan was executed to completely divert influent flow for an 8 hour period so that the workers could safely complete their tasks. The team restored flow to the plant without issue once the work was completed.</p> <p>The fermenter remained out of service during the month of April, and operations worked to drain the</p>

Month	Issues and Activities
	<p>fermenter to prepare for scheduled warranty work. Having the fermenter out of service created a few challenges as the team worked to balance sludge blankets in the primary sedimentation tanks to control the loading on the digesters. The fermenter was expected to remain out of service until warranty work could be completed in June.</p> <p>A warming trend and an extremely windy day on April 16 resulted in elevated TSS and Total Phosphorus levels in the Final Effluent due to frozen scum on the clarifier melting and splashing over the scum baffles.</p> <p>On April 17 and 18 there was an unknown upset condition which resulted in elevated Phosphorus in the Final Effluent. When the event was identified in the morning of April 18, the City was contacted, and the flow diverted the lagoons for storage and later treatment. Sampling and analysis was conducted both at the plant and in the collection system to determine when an appropriate time to bring flow back to the plant would be. Upon the influent being deemed acceptable, flow was brought back to the plant, and Polymer and PAC were turned on to control the Phosphorus and TSS. An investigation was conducted and sample analysis showed high levels of Vanadium in the influent.</p> <p>With the exception of TKN loading, the increase in loadings which were seen in March decreased back to baseline levels. The TKN loading over this period were the highest loading experienced in the influent at the new plant. The levels of TKN were at 3,592 kg/d, which exceeded the Average Annual Day Design Load in a single month for the first time.</p>
May	<p>The fermenter remained out of service during the month of May. Warranty work began on installing a new scum spraying system and preparing for the installation of new fermented sludge pumps. Operations continued to clean and remove the remaining solids.</p> <p>On May 4 the manual valve isolating the 3rd forcemain from the lagoon and valve chamber was opened as part of commissioning of the forcemain. As a result, valve GV1 was subject to the head pressure of the lagoon. It was not apparent until the EPCOR team began analyzing data to prepare this report, but GV1 was slowly passing water into the plant from the lagoons. This slow passing of water in the reverse direction of flow on the newly installed 3rd forcemain flow meter was not captured on SCADA and went unnoticed. In the month of May it was estimated that 120 ML of water was returned to the plant. The total flow and load was accurately captured on the Wastewater to Full Treatment flow meter and the influent composite sampler.</p> <p>Odour was identified to be coming from the lagoons the beginning of May. An investigation revealed the source of the odour to be floating ice/sludge as part of the spring turnover of lagoons 1N, 4E, and 4F. Measurements of the lagoon levels were taken and found to have greater than the 300 mm of water cap as specified in the contract. About a week after the odour was first identified, the ice melted, and the sludge once again returned to the bottom of the lagoon where it was no longer able to release odourous compounds. As an added precaution to avoid future odour complaints, an additional 24 inches of water cap was added to lagoon 1N.</p> <p>On May 7, the plant started to see the first signs of digester foaming. The pressures were managed by changing the mixing cycles and dropping the operating levels. On May 12 the plant experienced a multi-hour power outage from SaskPower. Almost immediately after the power went out, digester #1 began to foam which resulted in the pressure increasing within the digester. About an hour after the outage, the pressures began to increase in digesters #2 and #3. To reduce the overall risk to people and property, the pressure was manually relieved on the roof of digesters #1 and #2. EPCOR completed a review of engineering options to identify improvements that could be made to the system to alleviate future situations of this nature. A renewal project was started for upgrades to the system in 2019 as a result of this event.</p> <p>There were several episodic events of foaming in the month of May in which the sidestream bioreactor and the clarifier scum pits foamed up and overflowed; none of which were reportable. We were unable to identify the direct cause of the foaming events.</p> <p>On May 30, the new plant experienced its first high flow event while receiving full flow. The event had a sustained flow rate of 130 ML for 2.5 hours before slowly tapering off. Operations was able to optimize chemical dosages and RAS rates during this relatively short term event, which assisted greatly in the preparation of events which followed in June.</p>

Month	Issues and Activities
	<p>The TKN loading of the plant in May was 3758 kg/day; approaching the max monthly design load of the plant of 3800 kg/day.</p>
June	<p>The plant experienced significant rainfall in the late stages of May and into June. As of June 30, 2018, a total of 174mm of rain fell at the Wastewater Treatment Plant, compared to 139mm for all of 2017. A total of 145mm fell in a 16 day period between May 24 and June 8, 2018. The plant received and treated all flow in this time period with intermittent spikes in TSS and Total Phosphorus.</p> <p>On June 15, the plant experienced two simultaneous equipment failures. The plant was dosing chemical (PAC and poly) to maintain a stable clarifier blanket due to the high flow events. A polymer feed pump failed and the polymer make-up system plugged on the same day. This resulted in difficulty troubleshooting the problem, and prior to having both issues resolved, the plant experienced high TSS and Total Phosphorus which eventually led to exceeding the Permit to Operate for TSS. Once the issues had been resolved, steady performance was regained for the rest of the month. A detailed internal investigation into the exceedance was completed to ensure we understood the root causes to prevent such occurrences in the future.</p> <p>Throughout June, modifications were made to the clarifiers. These included slowing down the rake speed, increasing the floc well height, and adding baffles to the inside of the floc well. These modifications were in anticipation of CPE Service Inc. site visit on June 26-29 to perform tests on the clarifiers to look for areas which could be optimized.</p> <p>On June 30 the sidestream was removed from service to begin draining in preparation of cleaning the tank for planned maintenance that was scheduled to take place in July. During this period of time, centrate from the dewatering process was directed to the grit effluent channel.</p> <p>The fermenter remained out of service during the month of June. Operations cleaned the remaining solids from the tank, and construction continued on the new spray system and fermented sludge pumps. The system was expected to remain out of service until the end of July.</p>
July	<p>CPE Service Inc. completed their site visit and testing of the secondary clarifiers in June and July; further modifications were made to rake speed and floc well height to aid in optimizing performance. The plant experienced stable operation of the secondary clarifiers throughout the month of July. The feeding of Polymer and PAC continued for most of the month for TSS control, and to assist in the draining of Bioreactor C.</p> <p>The sidestream remained out of service in July for warranty work. The maintenance was completed, and the process placed back into service on July 27. The draining of Bioreactor C began on July 27 in preparation for cleaning the tank for warranty work that was scheduled to take place in August.</p> <p>The fermenter remained out of service during the month of July. Installation of the new fermented sludge pumps was completed, and commissioning began on the system. The system was expected to remain out of service in August as programming was completed.</p>
August	<p>Bioreactor C was out of service from July 27 until August 22. The initial cleaning of the bioreactor resulted in some decreased plant efficiency in the earlier part of the month; however, once cleaned, the plant responded and operated well on the remaining two bioreactors. The warranty work was completed safely and efficiently.</p> <p>EPCOR worked with the City and Stantec to perform hydraulic capacity testing of the new 1520 mm third force main. During this time, flow was restricted to the plant to back-up the collection system before being pumped at high rates to test the design and capacity of the newly installed force main. The test was a success, and the interface activities went smoothly.</p> <p>The fermenter remained out of service during the month of August. Installation of the new fermented sludge pumps was completed, and commissioning began on the system. The system was expected to be placed in service in September.</p>
September	<p>Bioreactor A was out of service from August 29 until September 9 for warranty work. Due to elevated Ammonia levels affecting Final Effluent quality, the decision was made to place the Bioreactor back into service without all of the warranty work being completed. The remaining warranty work on this</p>

Month	Issues and Activities
	<p>Bioreactor was scheduled to be completed in November.</p> <p>A RAS pump VFD failed in September. The pump and clarifier were still available for operation, but only at RAS pump speeds of 100%. The decision was made to remove the clarifier from service until the VFD was replaced. Once replaced, the clarifier was drained and then filled in the same day. This cycle of putting the system back in service resulted in a temporary negative impact of final effluent quality.</p> <p>EPCOR completed a dewatering polymer trial in September; we tested a polymer from an alternate supplier. The results of the trial were reviewed and additional testing is being planned for the future.</p> <p>The fermenter was placed into service on September 14 with warranty work complete. The newly installed fermented sludge pumps operated well and issues with plugging appear to have been addressed with the new style of pump.</p>
October	<p>Bioreactor B was removed from service on October 1 for warranty work. On October 3 the plant experienced an upset condition which resulted in the bioreactor being placed back in service on October 4. This was later attributed to influent contamination.</p> <p>Lab analysis revealed that the total phosphorus in the final effluent spiked to 9.35 mg/L on October 3 as a result of toxic influent; later determined to have a zinc concentration of 1.98 mg/L in the 24 hour composite sample. The composite sample consists of samples grabbed every 20 minutes for 24 hours. This indicated that the amount of zinc received by the plant was much higher than that captured as the duration of the event was not a full 24 hours, as deciphered by plant trends. The event caused forty percent of the entire month's allowable phosphorus load to be released in a single day. This was the result of the biology releasing their stored phosphorus and not up-taking it, as normally occurs. Polyaluminum chloride and polymer were added starting on October 3 for the remainder of the month in an attempt to have total phosphorus and TSS meet the effluent standards. On October 5 the Ortho phosphorous levels began to return to normal, and the event appeared to pass. The City was informed of the high total phosphorous levels, and that it would be difficult to overcome the monthly average requirement of 0.75 mg/L.</p> <p>On Saturday October 5, the Regina lab informed Operations Management that the effluent sample exceeded the E.coli permit with a value of 1840 MPN/100 ml. Operations then turned the standby UV channel on in automatic mode. On Sunday October 6 the Regina Lab reported yet another failure of 1840 MPN/100 ml from the sample collected on Saturday October 5. Operations then turned all four channels of the UV system up to 100% dose. In the days that followed Management performed an investigation of the UV System and identified that it was operating as designed, with 3 log removal and high UVT close to 60%.</p> <p>The process seemed to begin to recover, and the gravity of the situation was not fully realized as the lab results had not yet been returned. As a result, Bioreactor B was once again removed from service on October 11 to perform warranty work. At this time, the plant was achieving daily effluent quality which fell below the monthly effluent standards. The process did not respond well to a bioreactor being out of service, and the bioreactor was placed back in service on October 15.</p> <p>On October 12 the process began experiencing intermittent high suspended solids within the clarifiers. The challenges of high suspended solids lasted until October 20, and were persistent regardless of the number of bioreactors in service. The root cause was determined to be a combination of de-flocculation and a shift in bacteria as a result of the October 3 toxic event. More information on the above events can be found in the investigation report provided to the Water Security Agency on January 2, 2019.</p> <p>Other operational issues included intermittent plugging of the grit removal system through the month of October as a result of the McCarthy Boulevard Pumping Station operating its Alternate Pumping Station.</p>
November	<p>Power quality issues continued to be a problem in November. On many occasions a blower tripped off with a line under voltage alarm. A study was conducted on-site to trend and monitor the power at various locations within the plant to help in determining if there is an onsite corrective action that can be taken to limit the disruption caused by utility fluctuations.</p> <p>The power issues resulted in two upset conditions. The first occurred on November 21-22 when many pieces of equipment tripped off. It was not immediately identified that two bioreactor pumps were off due to the power outage and required manual reset. As a result, these pumps were not reset until the</p>

Month	Issues and Activities
	<p>following morning, resulting in high ortho phosphate in the final effluent. A second event occurred on November 30 when again power tripped equipment resulting the higher than normal ammonia and ortho phosphate in the final effluent. It should be noted that the flowmeters in the bioreactors are scheduled for replacement as part of the planned warranty work, which would alert operators to a similar event in the future.</p> <p>As a result of the October Toxic Event, the digesters and dewatering process continued to be a challenge in November. Operations worked very diligently and attentively at find the optimal polymer dosages and centrifuge feed rates to maintain a biosolids cake density greater than 21%. This required very high rates of polymer and the challenges continued into December.</p> <p>Maintaining the heat in the digesters proved to be a challenge in November. The sludge recirculation pumps which transfer sludge through the heat exchangers lost their ability to pump efficiently and towards the end of November lost their prime completely. This occurred on all three digesters within a one week period of time. Maintenance inspected the pumps, the heat exchangers, and the suction and discharge piping to ensure it was all free of blockage and not the cause. It was determined that the pumping issues were a result of a change in sludge rheology. This was confirmed by trending the pump amps which showed the change in pumping performance began shortly after the October 3 event. Reducing mixing energy in the digesters allowed the pumps to gain prime more often, although pumping issues continued into December.</p>
December	<p>As reported in the October Toxic Event Report, the digesters and dewatering process continued to be a challenge in December. Operations worked very diligently and attentively at find the optimal polymer dosages and centrifuge feed rates to maintain a biosolids cake density greater than 21%. A small improvement in cake density was achieved in December. This required very high rates of polymer.</p> <p>Maintaining the heat in the digesters continued to be a challenge in December. The sludge recirculation pumps which transfer sludge through the heat exchangers lost their ability to pump efficiently, and towards the end of November lost their prime completely. This occurred on all three digesters within a one week period of time. It was determined that the pumping issues were a result of a change in sludge rheology.</p> <p>The digester pump manufacturer was brought to site in December to review the issues being experienced; they were able to verify that it was not a mechanical problem. By modifying discharge valve positions, changing suction locations, adding air releases, and adding water to the suction of the pump, we were able to gain temperature in all 3 digesters; however, at the end of December they were not yet at setpoint.</p> <p>Meeting the total phosphorus permit in the final effluent for December proved to be an unexpected challenge. Chemical and flow equalization were both required to meet the permit. Upon completing an investigation, there was no known cause for the inability of the biology to remove the ortho-phosphate. This was not the first time the plant has been challenged to remove ortho-phosphate, and a more thorough investigation, including possible influent contamination, will be conducted in 2019.</p>

### 3.3 SUMMARY OF CHEMICAL USAGE

Throughout the year, polymer (ClearFloc CP1065) and Polyaluminium chloride (ClearPAC 180) was intermittently added to the secondary clarifiers to aid in clarification and control of total suspended solids and total phosphorus.

There were no changes to dewatering polymer in 2018, and the plant continued to dose Zetag 8185 in the DAF and Centrifuges. The chemicals used per month are summarized in Table 8.

TABLE 8: 2018 CHEMICAL USE

Month	Daily Average Effluent Discharge to Wascana Creek (ML)	Secondary Treatment		Other Treatment Components	
		Monthly Polymer Usage (kg)	Monthly PAC Usage (kg)	DAF Monthly Polymer Usage (kg)	Centrifuge Monthly Polymer Usage (kg)
January	69.91	950	32,719	800	4200
February	69.91	1,200	41,275	600	2800
March	73.06	3,425	65,987	675	3500
April	70.28	1,650	17,629	725	2800
May	72.54	3,387	39,363	625	3500
June	79.31	8,265	150,548	525	3500
July	72.16	2,879	59,145	675	3500
August	67.52	3,635	109,723	625	2800
September	66.22	2,836	74,475	525	2100
October	64.73	5,506	194,758	475	2800
November	67.33	1,636	61,330	550	2800
December	67.98	2,726	113,930	625	3500

### 3.4 RECORDS OF PUBLIC COMPLAINTS

In 2018 there was one odour complaint received from the City of Regina. The details are in Table 9 below.

TABLE 9: SUMMARY OF 2018 COMPLAINTS

Date	Complaint
May 7, 2018	Odour was identified to be coming from the lagoons the beginning of May. An investigation revealed the source of the odour to be floating ice/sludge as part of the spring turnover of lagoons 1N, 4E, and 4F. Measurements of the lagoon levels were taken, and were found to have greater than the 300 mm of water cap as specified in the contract. About a week after the odour was first identified, the ice melted, and the sludge once again returned to the bottom of the lagoon where it was no longer able to release odourous compounds. As an added precaution to avoid future odour complaints, an additional 24 inches of water cap was added to lagoon 1N.

### 3.5 RECORDS OF NOTIFICATIONS OF DOWNSTREAM USERS

In 2018 there was no direct communications with downstream users. A summary of all communications are detailed in Table 10 below.



*TABLE 10: SUMMARY OF 2018 DOWNSTREAM NOTIFICATIONS*

Date	Notification
<p style="text-align: center;"><b>May</b></p>	<p>The following was posted on the EPCOR Regina website: Operational Update:</p> <p><b>Odours in NW Regina</b></p> <p>Some homeowners in NW Regina may be detecting air odour related to wastewater treatment at this time. The odours are occurring due to high temperatures associated with this year's seasonal turnover from winter to spring. The unusual spike in temperatures the city of Regina has been experiencing during the normal seasonal turnover has led to more intense odours as the ice in the lagoons thaw, stirring up settled organics in the water. A strong westerly wind towards the City has transported these odours to your area.</p> <p>EPCOR is working hard to reduce the impact of the residuals in the lagoons at the wastewater treatment plant. Any concerned residents should contact us at 1-844-412-3458 to report odours. This will allow us to track the odours and the effectiveness of some of the modifications we're making at the plant to address them.</p>
<p style="text-align: center;"><b>June</b></p>	<p>The following was posted on the EPCOR Regina website:</p> <p>Our team will be performing tests July 28-29, 2018 to help optimize performance at the wastewater treatment plant. These tests will add dye to our secondary clarifiers, which may leave a slightly pink colour in the areas downstream of our plant. These tests have been approved by the Water Security Agency and will not have any impact on public health or the aquatic environment.</p> <p>Should you have any questions, please contact us at <a href="mailto:regina@epcor.com">regina@epcor.com</a> or 1 (844) 412-3458.</p>

## APPENDIX A

# City of Regina - Wastewater Treatment Plant

January 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN /100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage mg/L Wet
01	67.57	179	9		7.11	11.7	280	0.53	7.38	13.8	8.1	0.84	< 0.030	4.3	9.5	0.0
02	70.44	248	20		7.18	7.6	275	0.63	7.29	18.2	4.7	1.30	< 0.030	4.8	10.4	0.0
03	68.93	345	19	12	7.25	13.8	285	0.47	7.32	12.0	3.7	1.37	< 0.030	4.8	11.0	0.0
04	69.13	308	20		7.20	17.4	295	0.54	7.32	14.9	4.3	0.80	< 0.030	4.5	11.4	0.0
05	68.01	1373	67		7.57	13.2	280	0.68	7.44	18.2	5.6	0.63	< 0.030	4.3	10.6	0.0
06	69.03	1553	31		6.97	13.8	290	0.47	7.50	12.2	6.0	0.64	< 0.030	3.6	10.0	0.0
07	70.62	378	14		6.40	14.3	285	0.52	7.32	14.8	4.8	1.15	< 0.030	4.6	11.5	0.0
08	73.56	461	30		7.08	12.4	280	0.58	7.24	15.3	5.3	0.50	< 0.030	3.8	10.7	0.0
09	69.60	185	6	15	7.12	12.3	305	0.78	7.23	23.0	5.2	<0.30	< 0.030	4.1	11.7	0.0
10	67.83	1200	91		7.34	11.6	305	0.78	7.57	21.6	4.4	<0.30	< 0.030	3.9	12.3	0.0
11	68.45	214	12		7.31	11.3	305	0.69	7.46	16.7	3.4	<0.30	< 0.030	3.9	12.6	0.0
12	70.28	687	36		7.23	11.1	305	0.68	7.41	18.0	4.2	<0.30	< 0.030	3.9	11.9	0.0
13	71.43	225	10		7.43	13.1	310	0.54	7.47	18.8	4.5	<0.30	< 0.030	4.1	11.9	0.0
14	72.35	977	76		7.07	12.3	315	0.71	7.41	19.0	6.4	<0.30	< 0.030	4.4	11.7	0.0
15	72.03	308	25		7.43	10.6	305	0.45	7.46	13.8	5.4	<0.30	< 0.030	3.6	11.2	30.2
16	69.13	1160	101	117	8.20	10.4	315	0.23	7.39	7.5	3.1	<0.30	< 0.030	2.4	10.0	58.7
17	69.91	326	36		7.65	12.6	310	0.57	7.29	5.8	4.0	<0.30	< 0.030	2.7	11.1	58.7
18	70.24	345	34		7.41	10.8	320	0.20	7.26	4.7	2.1	<0.30	< 0.030	2.3	9.8	58.7
19	70.51	127	16		7.66	13.1	320	0.19	7.25	6.9	<2.0	<0.30	< 0.030	2.8	10.4	46.4
20	68.95	488	37		7.69	14.9	320	0.23	7.28	6.3	2.3	<0.30	< 0.030	2.7	10.1	35.2
21	71.32	344	30		7.62	15.8	330	0.24	7.17	7.2	3.1	<0.30	< 0.030	2.7	10.1	35.2
22	71.89	488	32		7.52	12.7	325	0.28	7.26	10.3	3.4	<0.30	< 0.030	2.6	10.0	25.9
23	70.29	291	22	16	7.54	13.2	315	0.30	7.32	9.1	3.5	<0.30	< 0.030	2.9	10.0	17.6
24	69.86	411	24		7.84	13.1	310	0.53	7.28	16.2	4.4	<0.30	< 0.030	3.2	10.4	5.0
25	69.69	1030	59		7.90	11.9	325	0.55	7.36	16.0	4.5	<0.30	< 0.030	3.1	9.8	0.0
26	70.24	3110	137		7.93	13.2	320	0.58	7.40	17.6	7.0	<0.30	< 0.030	3.1	9.1	0.0
27	69.98	365	20		8.04	13.5	315	0.56	7.11	15.8	4.4	<0.30	< 0.030	3.3	10.6	0.0
28	70.30	378	20		7.90	13.1	310	0.56	7.06	16.8	4.6	<0.30	< 0.030	3.5	9.8	0.0
29	69.43	548	33		7.51	13.6	330	0.74	7.36	23.0	5.1	0.61	< 0.030	3.5	9.8	0.0
30	68.65	690	51		7.47	11.7	330	0.37	7.15	13.2	4.5	<0.30	< 0.030	2.6	10.4	34.2
31	67.62	1540	84	82	7.79	10.6	290	0.18	7.19	7.4	3.1	<0.30	< 0.030	2.2	8.8	58.7
Sum	2167.30															
Avg	69.91				7.46	12.6	307	0.50	7.32	14	4	< 1	< 0.03	3.5	11	15.0
Min	67.57				6.40	7.6	275	0.18	7.06	4.7	<2.0	< 0.30	< 0.030	2.2	8.8	0.0
Max	73.56		137		8.20	17.4	330	0.78	7.57	23.0	8.1	1.37	< 0.030	4.8	12.6	58.7
Permit Limits			≤1000					≤0.75		≤15	≤15	≤ 10	≤ 1.24		≤ 14	

*E-Coli Geometric Mean = 30 MPN/100mL, Limit = 200 MPN/100mL*

**Plant Notes:**

N/A

**WSA Notes:**

January 30 - Kjeldahl nitrogen matrix spike failed, suspect matrix interference.

For the month of January 950 kg of polymer was used.

# Creek Monthly Report to Water Security Agency

January-09-18

Permit# 00050853-05-00

**Primary Influent (PI)**

*Riske's Crossing (RIS)*

*Sidmar Crossing (SID)*

*Qu'Appelle above the Wascana (QAW)*

*Final Effluent (FE)*

*Wascana above the Qu'Appelle (WAQ)*

*Lumsden (LUM)*

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids	12.0	23.0	14.6	15.6	10.2	19.4
Total Dissolved Solids	2140	1300	1450	1300	654	1100
Temperature (Field test)	1.2	12.3	3.2	1.4	1.8	0
Dissolved Oxygen (Field Test)	9.46	7.12	8.18	6.23	11.9	7.61
pH (Field Test for creek Samples)	7.26	7.23	6.93	7.16	7.48	7.94
pH at 15	7.78	7.23	7.85	7.86	8.2	7.8
Carbonaceous Biochemical Oxygen Demand	5.0	5.2	<2.0	<2.0	<2.0	<2.0
Total Phosphorus	0.24	0.78	0.27	0.19	0.06	0.14
Total Kjeldahl Nitrogen	4.1	4.1	3.4	2.6	0.8	2.2
Nitrate Nitrogen NO3-N	<0.13	7.19	2.43	4.06	<0.13	3.77
Ammonia Nitrogen NH3-N	2.47	<0.30	1.22	0.74	<0.30	<0.30
Un-ionized Ammonia	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen	4.2	11.7	6.5	6.8	0.9	6.3
Phenol Alkalinity*	0	0	0	0	4.42	0
Total Alkalinity*	365	174	202	180	238	221
Total Hardness*	659	403	446	408	325	404
Calcium*	139	81	90	83	61	78
Magnesium*	76	49	54	49	42	51
Carbonate*	0	0	0	0	5	0
Bicarbonate*	445	212	246	220	280	270
Conductivity at 25°C	3550	2170	2360	2070	1030	1910
Total Coliform	1550	185	2380	980	291	345
E-Coli	7	6	435	66	5	51
Enterococci	2	15	517	12	8	6
Chloride*	325	725	372	305	35	248
Sodium*	471	277	302	258	94	230
Sulfates*	420	400	400	258	250	370
Potassium*	25	20	21	21	7.9	18
Phenols*		0.0022				
Aluminum*		0.3				
Antimony*		0.0006				
Arsenic*		0.0010				
Barium*		0.043				
Beryllium*		<0.0001				
Boron*		0.26				
Cadmium*		0.00002				
Chromium*		0.0011				
Cobalt*		0.0006				
Copper*		0.02				
Iron*		0.220				
Lead*		0.0011				
Manganese*		0.22				
Mercury*		0.000005				
Molybdenum*		0.0140				
Nickel*		0.0031				
Selenium*		0.0081				
Silver*		<0.00005				
Strontium*		0.49				
Thallium*		<0.0002				
Uranium*		0.0011				
Vanadium*		0.0033				
Zinc*		0.048				

**Notes:**

- \* Tests conducted by an external accredited laboratory
- TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.
- Lumsden tested January 16 as ice conditions on January 9 were deemed unsafe.

**Primary Influent BOD results (mg/L):**

Jan 1 - 245; Jan 3 - 211; Jan 7 - 212; Jan 9 - 224; Jan 14 - 230; Jan 16 - 207; Jan 21 - 218; Jan 24 - 207; Jan 28 - 214; Jan 31 - 224

# City of Regina - Wastewater Treatment Plant

February 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN /100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage mg/L Wet
01	69.01	270	25		7.73	13.3	285	0.36	7.55	10.0	3.3	0.62	< 0.030	3.5	11.6	22.9
02	61.96	582	35		7.64	15.1	285	0.42	7.54	12.0	3.9	<0.30	< 0.030	3.4	11.6	0.0
03	69.66	387	31		7.55	14.4	290	0.52	7.32	14.2	3.8	0.88	< 0.030	3.9	11.8	0.0
04	70.34	548	36		8.08	13.2	295	0.55	7.34	16.0	4.7	<0.30	< 0.030	3.7	11.3	0.0
05	69.76	579	24		7.81	12.1	305	0.57	7.36	22.3	4.9	<0.30	< 0.030	2.9	8.4	0.0
06	67.35	285	58	32	7.97	13.6	290	0.52	7.36	17.2	3.7	<0.30	< 0.030	3.2	9.2	0.0
07	67.97	461	29		7.97	13.9	320	0.55	7.45	16.2	5.3	0.33	< 0.030	3.7	10.7	0.0
08	71.55	1120	84		7.73	13.9	320	0.65	7.45	19.3	4.7	0.62	< 0.030	4.3	12.1	0.0
09	67.86	770	118		7.30	8.3	325	0.71	7.29	20.6	6.3	<0.30	< 0.030	4.2	12.0	0.0
10	69.89	613	82		7.65	11.2	310	0.69	7.49	19.7	5.9	0.69	< 0.030	3.4	10.7	0.0
11	74.06	727	96		7.65	10.9	320	0.69	7.48	22.9	5.5	0.74	< 0.030	4.6	11.2	0.0
12	71.59	977	144		8.07	12.8	310	0.50	7.43	17.3	5.5	<0.30	< 0.030	3.4	9.6	15.6
13	71.43	1960	185	167	7.97	12.6	335	0.35	7.42	9.8	3.7	<0.30	< 0.030	2.8	7.8	34.8
14	69.59	579	62		7.28	14.3	335	0.36	7.35	11.8	5.0	<0.30	< 0.030	3.4	8.9	34.9
15	67.54	794	78	81	7.68	13.6	300	0.36	7.47	10.0	4.2	0.62	< 0.030	3.3	8.8	34.6
16	72.47	214	23		7.74	11.3	315	0.34	7.38	9.8	3.4	1.84	< 0.030	4.6	9.1	44.4
17	70.53	435	49		7.96	11.3	315	0.64	7.41	17.0	4.5	2.45	< 0.030	5.3	8.8	57.9
18	70.94	387	38		7.83	13.6	300	0.42	7.35	12.1	3.4	1.39	< 0.030	3.8	8.5	64.6
19	69.24	461	58		7.69	11.5	340	0.18	7.28	5.8	2.5	0.39	< 0.030	2.6	8.8	45.8
20	69.44	162	15		7.97	13.1	340	0.18	7.38	5.5	2.5	0.46	< 0.030	3.1	9.7	41.5
21	68.18	186	23	27	7.98	13.0	340	0.16	7.45	4.5	2.4	0.45	< 0.030	2.8	10.0	41.3
22	68.11	276	26		7.79	13.3	335	0.17	7.54	4.1	2.5	<0.30	< 0.030	2.6	9.7	40.7
23	69.36	225	33		7.79	14.0	340	0.22	7.28	6.1	2.8	0.83	< 0.030	3.1	10.0	40.9
24	71.05	193	17		7.79	12.9	325	0.22	7.36	5.9	3.4	0.81	< 0.030	3.5	10.7	41.7
25	72.27	276	36		7.58	14.8	325	0.34	7.61	9.4	4.6	1.31	< 0.030	4.1	10.5	13.1
26	70.81	517	56		7.76	11.3	310	0.48	7.57	13.0	5.4	<0.30	< 0.030	3.5	10.6	0.0
27	72.61	435	50		7.92	14.1	335	0.46	7.42	13.8	3.8	<0.30	< 0.030	3.4	10.1	0.0
28	72.81	687	61	33	7.39	14.1	325	0.53	7.65	12.2	3.7	<0.30	< 0.030	3.4	10.2	0.0
Sum	1957.42															
Avg	69.91				7.76	12.9	317	0.43	7.43	13	4	< 1	< 0.030	3.6	10	20.5
Min	61.96				7.28	8.3	285	0.16	7.28	4.1	2.4	< 0.30	< 0.030	2.6	7.8	0.0
Max	74.06		185		8.08	15.1	340	0.71	7.65	22.9	6.3	2.45	< 0.030	5.3	12.1	64.6
Permit Limits			≤1000					≤0.75		≤15	≤15	≤ 10	≤ 1.24		≤ 14	

*E-Coli Geometric Mean = 46 MPN/100mL, Limit = 200 MPN/100mL*

**Plant Notes:**

N/A

**WSA Notes:**

February 1, 18, 21 - CBOD is reported as qualified as the standard was out of range. All other quality control was within limits. For the month of February 1200 kg of polymer was used.

## Creek Monthly Report to Water Security Agency

February 13 & 15, 2018

Permit# 00050853-05-00

Riske's Crossing (RIS)

Hungry Hollow (HH)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	HH	WAQ	QAW	LUM
Suspended Solids		9.8	8.4	12.0	11.7	14.4
Total Dissolved Solids		1160	1180	1270	630	1110
Temperature (Field test)		12.6	2.6	0.2	0.1	0.6
Dissolved Oxygen (Field Test)		7.97	10.4	7.15	10.4	9.58
pH (Field Test for creek Samples)			7.66	7.19	7.48	7.63
pH at 15		7.42	7.34	7.40	7.90	7.50
Carbonaceous Biochemical Oxygen Demand		3.7	2.5	<2.0	<2.0	<2.0
Total Phosphorus		0.35	0.25	0.25	0.06	0.17
Total Kjeldahl Nitrogen		2.8	2.5	3.5	0.8	2.0
Nitrate Nitrogen NO3-N		4.76	5.60	6.24	<0.13	4.07
Ammonia Nitrogen NH3-N		<0.30	<0.30	0.99	<0.30	<0.30
Un-ionized Ammonia		<0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen		7.8	8.3	9.9	0.9	6.1
Phenol Alkalinity*		0	0	0	0	0
Total Alkalinity*		183	190	201	256	219
Total Hardness*		399	394	418	336	394
Calcium*		81	79	85	64	79
Magnesium*		48	48	50	43	48
Carbonate*		0	0	0	0	0
Bicarbonate*		223	232	245	312	267
Conductivity at 25°C		2020	1960	2130	1080	1810
Total Coliform		1960	3650	1850	328	549
E-Coli		185	687	238	21	60
Enterococci		167	82	11	5	10
Chloride*		330	299	310	40	223
Sodium*		246	240	252	95	209
Sulfates*		360	350	370	250	350
Potassium*		18	18	18	12	15
Phenols*		0.0032				
Aluminum*		0.17				
Antimony*		0.0006				
Arsenic*		0.0008				
Barium*		0.028				
Beryllium*		<0.0001				
Boron*		0.24				
Cadmium*		0.00002				
Chromium*		0.001				
Cobalt*		0.0004				
Copper*		0.0075				
Iron*		0.13				
Lead*		0.0006				
Manganese*		0.21				
Mercury*		0.000002				
Molybdenum*		0.015				
Nickel*		0.0032				
Selenium*		0.006				
Silver*		<0.00005				
Strontium*		0.5				
Thallium*		<0.0002				
Uranium*		0.0012				
Vanadium*		0.0027				
Zinc*		0.029				

**Notes:**

\* Tests conducted by an external accredited laboratory

• TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.

• Attempts were made to collect RIS but it was completely frozen. HH was tested instead of SID as it was not safe due to the number of trucks hauling. HH and FE data is representative of February 13, while the others were sampled February 15.

• At WAQ the DO and pH was unable to stabilize in the field so it was measured in the laboratory. At LUM the DO also would not stabilize so it was measured in the lab. This was likely due to the extreme cold temperatures.

**Primary Influent BOD results (mg/L):**

Feb 4 - 224; Feb 7 - 244; Feb 11 - 250; Feb 13 - 210; Feb 19 - 241; Feb 21 - 213; Feb 25 - 217; Feb 28 - 186

# City of Regina - Wastewater Treatment Plant

March 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN /100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage mg/L Wet
01	70.94	365	45		8.31	14.8	325	0.57	7.69	14.0	4.3	<0.30	< 0.030	3.4	10.6	0.0
02	71.73	517	42		8.31	14.4	340	0.76	7.44	17.0	5.9	<0.30	< 0.030	3.6	10.8	0.0
03	76.06	579	31		8.04	12.4	325	0.59	7.49	18.2	3.9	1.04	< 0.030	3.8	10.4	0.0
04	73.24	517	38		7.73	12.1	340	0.79	7.55	17.4	5.1	1.94	< 0.030	5.4	11.3	0.0
05	73.50	2410	110		7.56	14.6	325	0.78	7.46	15.8	4.6	1.16	< 0.030	4.5	10.1	0.0
06	73.42	1960	91		8.03	11.1	340	0.72	7.48	10.8	2.6	2.26	< 0.030	5.1	12.4	0.0
07	74.29	1730	68	82	7.44	12.0	325	0.84	7.40	10.4	6.5	1.91	< 0.030	5.2	13.2	0.0
08	75.67	579	54		7.65	12.5	300	1.11	7.42	11.0	2.8	2.08	< 0.030	4.8	12.1	0.0
09	75.96	1550	114		7.85	11.4	325	1.38	7.40	14.8	4.7	2.25	< 0.030	5.5	15.0	0.0
10	77.50	922	57		7.43	16.4	315	0.56	7.43	6.7	3.4	1.77	< 0.030	4.6	12.8	24.0
11	74.47	579	46		7.85	10.8	325	0.23	7.46	3.9	2.1	0.63	< 0.030	2.9	10.4	58.7
12	76.69	276	17		7.65	14.9	310	0.52	7.61	6.0	2.8	4.11	0.045	7.0	12.0	58.7
13	77.67	1630	129	47	7.50	10.6	350	0.37	7.49	10.4	4.4	5.59	0.047	9.4	13.8	58.7
14	75.50	37	4		8.18	15.3	345	0.33	7.62	11.4	4.6	4.76	0.054	7.7	12.7	58.7
15	74.52	613	64		7.64	14.8	355	0.41	7.59	15.0	5.1	5.54	0.058	9.6	14.4	68.7
16	71.19	727	69		7.82	14.1	355	0.20	7.35	6.0	3.0	6.50	0.039	9.5	15.6	88.1
17	70.99	225	23		7.28	14.9	350	0.45	7.39	11.4	4.0	6.60	0.044	10.1	16.5	89.4
18	73.84	308	33		7.90	16.6	375	0.19	7.60	4.1	2.8	5.99	0.064	9.2	15.6	96.0
19	73.10	147	22		7.07	16.8	355	0.15	7.41	5.6	3.2	6.11	0.043	9.4	15.1	69.1
20	72.35	210	25		7.69	15.6	365	0.16	7.54	3.9	3.7	6.76	0.063	10.0	15.3	58.7
21	70.03	228	47	22	7.57	14.6	365	0.13	7.51	5.8	3.7	4.46	0.039	7.2	14.5	54.0
22	68.30	921	99		7.79	17.6	365	0.23	7.50	11.2	4.3	3.39	< 0.030	6.3	13.5	38.9
23	74.54	219	28		7.79	17.4	365	0.26	7.36	8.2	3.7	3.12	< 0.030	5.8	14.2	26.7
24	78.84	687	46		7.70	16.3	370	0.31	7.53	10.1	5.1	3.48	0.032	6.3	13.9	7.0
25	81.56	365	26		7.53	16.9	395	0.39	7.53	10.6	4.3	2.17	< 0.030	5.0	11.0	0.0
26	80.28	770	55		7.56	16.3	390	0.45	7.58	11.8	4.8	2.65	< 0.030	6.1	13.8	0.0
27	70.30	461	35		7.81	15.4	350	0.51	7.69	15.2	3.8	2.81	0.037	7.0	14.5	0.0
28	70.24	225	26	38	7.48	12.8	290	0.44	7.48	11.8	4.8	4.63	0.038	9.0	16.0	0.0
29	67.35	387	26		7.42	12.2	285	0.54	7.45	15.0	3.9	8.57	0.065	14.1	20.8	0.0
30	60.40	291	24		6.74	15.7	270	0.50	7.61	15.0	4.1	4.90	0.054	12.2	18.3	0.0
31	60.43	365	30		6.84	11.1	265	0.48	7.58	17.0	3.5	4.56	0.047	15.9	21.8	13.6
Sum	2264.89															
Avg	73.06				7.65	14.3	337	0.50	7.50	11	4	4	0.039	7.3	14	28.0
Min	60.40				6.74	10.6	265	0.13	7.35	3.9	2.1	< 0.30	< 0.030	2.9	10.1	0.0
Max	81.56		129		8.31	17.6	395	1.38	7.69	18.2	6.5	8.57	0.065	15.9	21.8	96.0
Permit Limits			≤1000					≤0.75		≤15	≤15	≤ 10	≤ 1.24		≤ 14	

*E-Coli Geometric Mean = 40 MPN/100mL, Limit = 200 MPN/100mL*

**Plant Notes:**

March 28-31 - Flow was diverted to lagoon to allow for approved planned maintenance on the bioreactors.  
 March 29-31 – The plant experienced very high Kjeldahl Nitrogen loading which impacted the Total Nitrogen. An investigation is ongoing.

**WSA Notes:**

March 4, 6-10 - CBOD is reported as qualified as the standard or blank was out of range. All other quality control was within limits.  
 March 13 - Final Effluent passed acute lethality testing.  
 March - Bioreactors were taken out of service throughout March to perform warranty work, resulting in periods of slightly higher than normal Total Nitrogen. For the month of February 3425 kg of polymer was used.

## Creek Monthly Report to Water Security Agency

March-13-18

Permit# 00050853-05-00

Riske's Crossing (RIS)

Sidmar Crossing (SID)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids		10.4	7.5	58.3	79.6	13.3
Total Dissolved Solids		1260	1260	1790	1760	1090
Temperature (Field test)		10.6	5.2	1.8	2.3	1.7
Dissolved Oxygen (Field Test)		7.50	9.08	8.60	12.6	7.59
pH (Field Test for creek Samples)			7.20	6.94	7.51	7.00
pH at 15°C		7.49	7.32	7.13	7.49	7.50
Carbonaceous Biochemical Oxygen Demand		4.4	2.0	6.4	3.5	2.6
Total Phosphorus		0.37	0.65	0.90	0.16	0.65
Total Kjeldahl Nitrogen		9.4	10.1	5.1	2.2	3.3
Nitrate Nitrogen NO3-N		3.57	2.69	7.84	0.82	4.92
Ammonia Nitrogen NH3-N		5.59	7.23	1.47	<0.30	1.63
Un-ionized Ammonia		0.047	<0.030	<0.030	<0.030	<0.030
Total Nitrogen		13.8	13.4	13.2	3.0	8.4
Phenol Alkalinity*		<1	<1	<1	<1	<1
Total Alkalinity*		207	233	260	568	212
Total Hardness*		395	402	564	812	381
Calcium*		81	82	114	136	77
Magnesium*		47	48	68	115	46
Carbonate*		<1	<1	<1	<1	<1
Bicarbonate*		252	284	317	693	259
Conductivity at 25°C		2170	2120	2870	2460	1780
Total Coliform		1630	6490	2110	94	222
E-Coli		129	649	17	<1	16
Enterococci		47	19	179	2	1
Chloride*		340	330	425	90	235
Sodium*		250	248	333	250	196
Sulfates*		340	340	500	690	320
Potassium*		18	18	27	21	14
Phenols*		0.0046				
Aluminum*		0.16				
Antimony*		0.0005				
Arsenic*		0.0009				
Barium*		0.027				
Beryllium*		<0.0001				
Boron*		0.22				
Cadmium*		0.00001				
Chromium*		<0.0005				
Cobalt*		0.0005				
Copper*		0.014				
Iron*		0.15				
Lead*		0.0004				
Manganese*		0.20				
Mercury*		<0.000001				
Molybdenum*		0.014				
Nickel*		0.0038				
Selenium*		0.0064				
Silver*		<0.00005				
Strontium*		0.50				
Thallium*		<0.0002				
Uranium*		0.0011				
Vanadium*		0.0016				
Zinc*		0.033				

**Notes:**

- \* Tests conducted by an external accredited laboratory
- TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.
- Attempts were made to collect RIS but it was completely frozen.

**Primary Influent BOD results (mg/L):**

Mar 4 - 221; Mar 7 - 292; Mar 11 - 190; Mar 14 - 181; Mar 18 - 216; Mar 21 - 204; Mar 25 - 197; Mar 28 - 195  
 Mar 4 & 7 - BOD is reported as qualified as the standard or blank was out of range. All other quality control was within limits.



# City of Regina - Wastewater Treatment Plant

April 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN /100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage mg/L Wet
01	60.20	192	17		7.95	13.9	270	0.25	7.52	7.0	3.6	9.11	0.082	19.9	27.0	29.3
02	58.41	199	12		7.89	14.2	265	0.26	7.54	5.0	5.0	5.89	0.055	14.5	23.1	29.3
03	69.64	66	6		7.92	14.3	260	0.34	7.57	8.6	4.4	3.66	0.037	10.4	19.3	7.1
04	74.03	435	40	28	7.04	12.6	290	0.40	7.53	10.0	4.9	2.32	< 0.030	8.4	18.0	0.0
05	72.63	127	13		7.66	11.9	300	0.65	7.71	16.2	6.9	1.01	< 0.030	7.6	16.0	0.0
06	72.74	261	19		6.63	11.4	310	0.57	7.60	14.0	5.5	1.28	< 0.030	6.8	16.4	0.0
07	73.19	308	37		6.49	14.1	300	0.55	7.50	15.1	4.9	0.85	< 0.030	5.4	15.2	0.0
08	74.95	365	19		6.14	15.9	295	0.65	7.71	18.2	6.2	0.61	< 0.030	5.1	13.8	0.0
09	70.32	238	20		7.13	15.8	300	0.65	7.75	17.1	6.2	<0.30	< 0.030	4.1	13.3	0.0
10	41.08	1730	78	70	8.13	15.4	275	0.44	7.73	10.2	4.3	<0.30	< 0.030	2.8	10.2	0.0
11	67.12	236	26		7.97	17.0	280	0.57	7.71	13.6	5.4	<0.30	< 0.030	3.2	11.1	0.0
12	70.16	435	28		7.75	16.1	275	0.41	7.70	9.8	3.8	0.50	< 0.030	3.0	11.9	0.0
13	75.14	72	3		7.98	15.9	320	0.51	7.66	12.4	5.1	2.50	0.031	5.5	14.4	0.0
14	74.90	411	16		8.00	11.6	310	0.93	7.87	25.2	6.8	3.63	0.072	8.0	13.9	0.0
15	79.27	488	33		7.93	12.5	305	0.96	7.78	25.6	6.9	3.02	0.049	7.4	13.5	0.0
16	76.04	613	39		7.60	13.3	300	1.41	7.73	54.7	8.1	2.21	0.032	9.5	14.0	0.0
17	71.15	816	50	38	8.20	14.6	315	1.88	7.57	22.2	5.7	2.23	< 0.030	7.0	11.6	0.0
18	62.49	435	18		7.47	14.4	250	1.97	7.61	8.6	3.4	2.36	< 0.030	5.4	9.0	54.5
19	77.23	93	6		7.77	13.6	235	0.21	7.59	6.4	2.6	1.76	< 0.030	5.1	9.3	35.2
20	80.02	68	5		7.56	16.2	260	0.22	7.59	7.4	3.2	2.28	< 0.030	5.5	9.7	26.7
21	81.39	326	20		7.41	17.2	240	0.23	7.63	6.8	3.5	1.66	< 0.030	5.0	9.7	23.5
22	79.21	112	12		7.68	13.2	250	0.24	7.62	7.4	4.0	1.38	< 0.030	4.7	8.9	23.5
23	75.71	91	5		7.37	17.5	240	0.26	7.61	7.4	4.3	0.78	< 0.030	3.7	7.6	6.4
24	68.43	196	16	15	7.77	15.6	250	0.21	7.67	5.0	3.3	<0.30	< 0.030	2.4	7.2	0.0
25	67.09	579	64		7.68	15.0	250	0.24	7.69	6.7	3.0	<0.30	< 0.030	2.5	7.0	0.0
26	68.17	1540	69		7.80	16.1	240	0.27	7.73	7.2	3.2	<0.30	< 0.030	2.5	7.9	0.0
27	57.38	1050	56		7.80	13.9	240	0.24	7.73	4.4	2.3	<0.30	< 0.030	2.3	7.2	0.0
28	67.90	228	13		7.69	17.4	250	0.48	7.65	12.5	4.2	<0.30	< 0.030	3.6	9.3	0.0
29	69.89	613	46		7.43	17.8	275	0.48	7.68	13.0	5.2	0.63	< 0.030	4.0	8.6	0.0
30	72.69	365	48		7.11	16.9	280	0.45	7.59	11.2	4.5	0.65	< 0.030	4.1	7.7	0.0
Sum	2108.54															
Avg	70.28				7.57	14.8	274	0.56	7.65	13	5	2	0.035	6.0	12	7.9
Min	41.08				6.14	11.4	235	0.21	7.50	4.4	2.3	< 0.30	< 0.030	2.3	7.0	0.0
Max	81.39				8.20	17.8	320	1.97	7.87	54.7	8.1	9.11	0.082	19.9	27.0	54.5
Permit Limits			≤1000					≤0.75		≤15	≤15	≤ 4	≤ 1.24		≤ 14	

*E-Coli Geometric Mean = 20 MPN/100mL, Limit = 200 MPN/100mL*

**Plant Notes:**

- April 1-7 - High Total Nitrogen as a result of elevated nitrogen entering the plant beginning on March 29.
- April 16 - A warming trend and extremely windy day resulted in elevated Total Suspended Solids and Total Phosphorus numbers due to frozen scum on the clarifier melting and splashing over the scum baffles.
- April 17-18 - High Total Phosphorus leaving the plant as a result of an unknown upset condition.
- April 27 - Flow was diverted to the lagoons during a power outage.

**WSA Notes:**

April 29 - The ammonia matrix spike was out of range, suspect matrix interference is present. For the month of April 1650 kg of polymer was used.

## Creek Monthly Report to Water Security Agency

April 10 & 24, 2018

Permit# 00050853-05-00

Riske's Crossing (RIS)

Sidmar Crossing (SID)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids	22.8	10.2	18.4	276.0	18.2	11.4
Total Dissolved Solids	796	1220	1330	740	1230	1190
Temperature (Field test)	1.6	15.4	7.6	7.6	2.8	3.5
Dissolved Oxygen (Field Test)	10.2	8.13	7.79	9.17	13.0	12.20
pH (Field Test for creek Samples)	7.41		7.14	7.75	7.41	7.03
pH at 15°C	7.97	7.73	7.58	8.11	8.11	8.08
Carbonaceous Biochemical Oxygen Demand	5.7	4.3	2.2	5.3	4.7	2.1
Total Phosphorus	0.47	0.44	0.26	0.78	0.11	0.12
Total Kjeldahl Nitrogen	2.6	2.8	3.3	3.2	1.4	3.7
Nitrate Nitrogen NO3-N	0.32	6.8	6.91	1.86	<0.13	4.66
Ammonia Nitrogen NH3-N	0.84	<0.30	0.42	0.76	<0.30	0.34
Un-ionized Ammonia	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen	3.0	10.2	11.1	5.2	1.5	8.4
Phenol Alkalinity*	<1	<1	<1	<1	1	<1
Total Alkalinity*	212	275	289	206	362	280
Total Hardness*	316	363	386	304	535	374
Calcium*	64	73	79	64	99	71
Magnesium*	38	44	46	35	70	48
Carbonate*	<1	<1	<1	<1	1	<1
Bicarbonate*	259	336	352	251	439	342
Conductivity at 25°C	1280	58	2190	1240	1800	1920
Total Coliform	2760	1730	2420	3650	15	91
E-Coli	111	78	980	15	<1	3
Enterococci	32	70	49	55	4	4
Chloride*	157	278	312	140	84	233
Sodium*	134	266	299	127	191	250
Sulfates*	210	320	350	220	490	360
Potassium*	14	19	18	15	13	15
Phenols*		0.0034				
Aluminum*		0.11				
Antimony*		0.0007				
Arsenic*		0.0021				
Barium*		0.037				
Beryllium*		<0.0001				
Boron*		0.25				
Cadmium*		0.00002				
Chromium*		0.0042				
Cobalt*		0.0006				
Copper*		0.014				
Iron*		0.12				
Lead*		0.0006				
Manganese*		0.18				
Mercury*		0.000003				
Molybdenum*		0.101				
Nickel*		0.005				
Selenium*		0.0024				
Silver*		<0.00005				
Strontium*		0.46				
Thallium*		<0.0002				
Uranium*		0.0023				
Vanadium*		0.72				
Zinc*		0.0039				

**Notes:**

\* Tests conducted by an external accredited laboratory

• TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.

• SID, QAW, and LUM, FE were tested April 10, while RIS and WAQ were tested April 24.

**Primary Influent BOD results (mg/L):**

Apr 2 - 233; Apr 4 - 195; Apr 08 - 206; Apr 11 - 226; Apr 16 - 179; Apr 17 - 212; Apr 18 - 218; Apr 22 - 183; Apr 25 - 218; Apr 29 - 195

# City of Regina - Wastewater Treatment Plant

May 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN/100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage kg/day	Polymer Dosage kg/day
01	69.98	308	31	34	6.97	17.8	295	0.34	7.60	8.3	3.9	0.36	< 0.030	3.2	8.3	0	0
02	63.87	1120	140		7.50	18.3	270	0.44	7.70	12.0	4.0	<0.30	< 0.030	2.6	9.2	0	0
03	65.57	1630	236		7.40	16.3	260	0.56	7.48	16.8	4.5	0.39	< 0.030	3.4	10.5	0	0
04	74.48	520	93		7.39	19.7	265	0.44	7.57	10.6	4.3	2.72	< 0.030	5.7	12.8	0	0
05	79.48	391	33		7.33	15.8	285	0.51	7.56	13.4	4.5	3.45	0.034	7.2	14.9	0	0
06	79.86	551	93		7.28	15.7	290	0.48	7.50	12.4	4.8	2.88	< 0.030	6.3	12.3	0	0
07	75.15	472	59		7.22	16.3	295	0.65	7.47	16.6	8.3	1.58	< 0.030	5.7	11.1	0	0
08	71.94	428	63	78	6.47	19.9	275	0.57	7.43	14.8	5.1	1.70	< 0.030	4.6	10.4	0	0
09	75.53	1030	88		7.19	18.4	305	0.71	7.37	19.8	5.9	2.80	< 0.030	7.2	12.9	0	0
10	73.70	449	93		7.18	19.6	280	0.62	7.55	16.3	5.4	3.43	0.033	7.6	14.1	0	0
11	75.32	770	59		7.11	13.9	295	0.57	7.48	16.7	6.2	2.35	< 0.030	6.2	11.9	0	0
12	65.72	525	48		7.62	17.4	290	0.72	7.38	23.0	9.6	2.83	< 0.030	8.5	13.9	0	0
13	72.94	1450	131		7.46	15.5	290	0.86	7.42	21.8	8.3	5.55	0.040	12.3	17.8	0	0
14	68.37	1960	172		7.14	14.0	295	0.52	7.39	13.6	5.7	3.37	< 0.030	9.5	15.8	0	246
15	71.31	1370	93	70	7.24	16.4	295	0.46	7.57	13.6	3.6	4.44	0.045	9.4	18.2	0	199
16	76.79	261	26		7.28	22.3	275	0.50	7.46	13.0	5.3	4.86	0.038	8.4	16.7	0	211
17	76.42	821	76		7.35	21.2	275	0.59	7.58	16.2	4.8	5.97	0.061	10.7	17.0	0	211
18	71.33	496	58		6.97	14.2	285	0.28	7.54	9.4	4.0	6.31	0.059	9.6	17.2	1343	188
19	68.52	770	74		7.49	17.9	300	0.22	7.19	8.6	3.5	2.85	< 0.030	6.3	16.0	1797	141
20	67.50	727	51		7.40	16.3	285	0.22	7.30	8.2	4.2	1.53	< 0.030	4.5	14.5	1784	152
21	70.48	308	33		6.90	16.4	290	0.17	7.27	8.0	3.6	0.76	< 0.030	4.4	13.8	1835	141
22	70.26	921	119		7.14	16.4	285	0.26	7.42	16.6	2.8	2.16	< 0.030	5.4	11.4	1845	152
23	69.39	1370	153	61	7.16	16.3	290	0.33	7.49	10.2	3.4	3.47	< 0.030	7.8	12.4	1818	164
24	76.86	1450	219		7.21	20.1	275	0.27	7.49	9.0	3.3	4.84	0.040	7.9	12.4	3602	199
25	75.56	1540	192		7.14	16.6	310	0.39	7.44	13.2	4.4	5.30	0.040	8.4	12.5	2955	176
26	72.15	1730	122		7.26	21.4	300	0.40	7.45	12.8	4.0	3.70	< 0.030	6.8	11.8	3087	188
27	72.03	2090	186		6.70	10.7	290	0.43	7.41	13.2	4.2	2.88	< 0.030	5.9	10.7	3541	199
28	80.24	2240	326		7.31	19.4	300	0.59	7.29	16.8	4.5	2.48	< 0.030	5.8	9.8	2992	176
29	51.25	387	37		6.71	18.6	310	0.36	7.40	9.0	5.5	1.02	< 0.030	4.3	8.7	1912	129
30	84.71	615	61	22	7.17	21.8	285	0.93	7.24	24.2	5.3	3.00	< 0.030	6.8	11.9	4577	223
31	82.04	411	74		7.06	21.3	300	0.24	7.27	7.0	2.8	4.13	< 0.030	6.7	12.0	6274	293
Sum	2248.75																
Avg	72.54				7.19	17.6	288	0.47	7.44	14	5	3	0.034	6.7	13	1270	109
Min	51.25				6.47	10.7	260	0.17	7.19	7.0	2.8	< 0.30	< 0.030	2.6	8.3	0	0
Max	84.71		326		7.62	22.3	310	0.93	7.70	24.2	9.6	6.31	0.061	12.3	18.2	6274	293
Permit Limits			≤1000				≤0.75			≤15	≤15	≤ 4	≤ 1.24		≤ 14		

*E-Coli Geometric Mean = 85 MPN/100mL, Limit = 200 MPN/100mL*

**Plant Notes:**

May 12 - Flow was diverted to lagoons during a SaskPower power outage.  
 May 29 - Flow was diverted to the lagoons to perform planned maintenance in the grit influent channel.  
 May - Approximately 100ML of treated wastewater was added to the lagoons as a water cap.

**WSA Notes:**

May 4 - Total Coliform and E.coli analyzed past hold-time due to incubator malfunction. Data qualified.  
 May 21 - The ammonia matrix spike was out of range, suspect matrix interference is present.  
 May 24, 28-30 - CBOD is reported as qualified as the standard or blank were out of range. All other quality control was within the limits.  
 Chemical dosage has been changed from mg/L to kg/day.

\* The WSA comment May 24, 28-30 in this report was incomplete and has been amended. July 13, 2018

## Creek Monthly Report to Water Security Agency

May-08-18

Permit# 00050853-05-00

Riske's Crossing (RIS)

Sidmar Crossing (SID)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids	33.6	14.8	28.8	45.6	224	293
Total Dissolved Solids	733	1120	1030	1040	436	512
Temperature (Field test)	14.2	19.9	13.4	14.9	14.4	15.4
Dissolved Oxygen (Field Test)	11.4	6.47	9.42	11.6	8.6	8.77
pH (Field Test for creek Samples)	8.67		7.01	8.51	7.61	7.57
pH at 15°C	8.89	7.43	7.78	8.81	8.38	8.36
Carbonaceous Biochemical Oxygen Demand	8.5	5.1	4.7	10.4	<2.0	2.2
Total Phosphorus	0.28	0.57	0.34	0.34	0.29	0.35
Total Kjeldahl Nitrogen	2.1	4.6	4.7	2.8	0.8	1.1
Nitrate Nitrogen NO3-N	0.16	5.48	3.47	2.78	<0.13	0.24
Ammonia Nitrogen NH3-N	<0.30	1.70	1.81	<0.30	<0.30	<0.30
Un-ionized Ammonia	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen	2.3	10.4	8.5	5.6	0.9	1.4
Phenol Alkalinity*	<1	<1	<1	5	<1	<1
Total Alkalinity*	194	196	213	243	195	202
Total Hardness*	289	359	349	364	228	246
Calcium*	55	78	74	75	47	51
Magnesium*	37	40	40	43	27	29
Carbonate*	<1	<1	<1	6	<1	<1
Bicarbonate*	237	239	260	284	238	246
Conductivity at 25°C	1210	1880	1740	1700	704	830
Total Coliform	1300	428	11200	1300	579	517
E-Coli	16	63	1050	32	5	30
Enterococci	28	78	126	60	7	32
Chloride*	159	290	258	244	23	51
Sodium*	131	232	208	205	56	75
Sulfates*	210	300	280	280	150	160
Potassium*	16	18	16	17	7.6	8.6
Phenols*		0.0084				
Aluminum*		0.094				
Antimony*		0.0006				
Arsenic*		0.0011				
Barium*		0.042				
Beryllium*		<0.0001				
Boron*		0.24				
Cadmium*		0.00002				
Chromium*		0.001				
Cobalt*		0.0005				
Copper*		0.016				
Iron*		0.14				
Lead*		0.0005				
Manganese*		0.22				
Mercury*		0.000004				
Molybdenum*		0.035				
Nickel*		0.0037				
Selenium*		0.0014				
Silver*		<0.00005				
Strontium*		0.46				
Thallium*		<0.0002				
Uranium*		0.0013				
Vanadium*		0.12				
Zinc*		0.037				

**Notes:**

\* Tests conducted by an external accredited laboratory

• TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.

**Primary Influent BOD results (mg/L):**

May 2 - 255; May 6 - 185; May 9 - 238; May 13 - 201; May 16 - 219; May 21 - 203; May 23 - 262; May 27 - 176; May 30 - 202

# City of Regina - Wastewater Treatment Plant

June 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN /100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage kg/day	Polymer Dosage kg/day
01	106.74	291	58		7.06	18.3	270	1.60	7.22	44.4	7.5	8.07	0.036	11.6	15.2	11301	301
02	139.85	5480	977		6.26	17.1	260	0.47	7.17	14.0	3.3	5.35	< 0.030	7.5	10.8	12036	406
03	95.76	102	11		7.24	16.5	265	0.20	7.49	7.4	2.4	2.89	< 0.030	4.9	10.4	5877	359
04	87.56	687	64		7.25	14.9	285	0.19	7.52	7.4	3.0	1.85	< 0.030	3.1	8.4	9628	301
05	85.15	261	16	20	7.29	17.4	270	0.30	7.29	7.4	2.6	1.62	< 0.030	4.6	9.4	5211	267
06	82.76	365	40		7.20	17.5	270	0.16	7.21	6.0	<2.0	1.50	< 0.030	3.6	9.2	5083	325
07	83.08	236	15		7.30	19.3	275	1.81	7.44	55.2	7.0	2.16	< 0.030	6.2	11.0	3167	336
08	132.06	3080	276		6.73	21.9	225	0.72	7.45	20.4	4.8	4.04	0.031	6.1	8.8	9021	359
09	91.36	91	8		7.38	15.9	250	0.19	7.53	6.8	2.6	3.54	0.032	5.2	8.7	3456	290
10	85.18	545	101		6.40	19.2	270	1.26	7.51	34.6	6.5	3.95	0.035	7.8	10.0	3595	243
11	77.47	261	30		7.27	18.4	275	1.19	7.52	30.6	5.0	2.09	< 0.030	5.9	9.2	2575	232
12	78.62	3450	206	187	7.13	15.9	285	0.26	7.30	9.4	2.7	<0.30	< 0.030	2.4	7.3	3188	267
13	78.35	308	28		7.17	18.6	285	0.24	7.28	7.4	2.2	1.03	< 0.030	3.4	7.8	2798	197
14	69.84	365	28		6.92	22.6	275	0.20	7.42	6.0	2.2	<0.30	< 0.030	2.4	8.0	2143	151
15	66.52	22	2		7.18	18.9	275	2.26	7.44	58.0	7.3	<0.30	< 0.030	4.1	8.7	2043	243
16	58.67	93	8		7.19	22.6	290	7.48	7.44	184.0	15.2	<0.30	< 0.030	12.8	16.5	2317	336
17	69.45	50	3		7.49	23.4	270	0.16	7.49	4.4	<2.0	<0.30	< 0.030	1.7	6.7	2938	383
18	79.11	75	2		7.14	17.3	270	0.19	7.44	5.2	<2.0	<0.30	< 0.030	2.0	6.7	3148	325
19	77.12	276	19		6.54	20.3	285	0.27	7.34	10.6	2.2	<0.30	< 0.030	2.0	6.2	3054	371
20	74.86	345	14	11	6.95	22.3	315	0.15	7.42	6.6	<2.0	<0.30	< 0.030	1.9	6.8	4546	417
21	59.33	84	7		7.13	21.3	285	0.64	7.39	18.2	3.0	<0.30	< 0.030	2.4	6.1	5880	325
22	64.29	54	3		6.86	22.7	275	0.16	7.35	4.1	<2.0	<0.30	< 0.030	1.7	7.3	6436	348
23	68.20	179	10		7.11	22.3	270	0.22	7.58	5.6	<2.0	0.32	< 0.030	2.0	8.6	4050	220
24	71.10	39	1		6.48	24.7	270	0.27	7.45	8.0	2.3	<0.30	< 0.030	2.0	7.6	0	267
25	71.57	98	2		7.12	20.9	280	0.23	7.56	7.2	2.6	<0.30	< 0.030	2.1	6.6	4454	185
26	71.87	185	4		7.06	23.3	300	0.20	7.40	8.9	2.4	<0.30	< 0.030	2.0	5.9	7218	185
27	71.73	54	2	2	6.98	21.1	280	0.21	7.49	5.6	2.6	<0.30	< 0.030	2.0	6.3	7082	151
28	49.59	172	13		6.90	19.3	275	0.26	7.48	5.5	2.6	<0.30	< 0.030	2.0	4.6	4948	116
29	62.37	80	6		5.70	20.9	275	0.22	7.43	6.2	<2.0	<0.30	< 0.030	2.0	5.5	6312	197
30	69.83	96	5		7.07	19.8	280	0.27	7.56	8.0	2.5	<0.30	< 0.030	2.6	7.7	7043	162
Sum	2379.37																
Avg	79.31				6.98	19.8	275	0.73	7.42	20	4	1	0.030	4.0	8	5018	276
Min	49.59				5.70	14.9	225	0.15	7.17	4.1	<2.0	< 0.30	< 0.030	1.7	4.6	0	116
Max	139.85		977		7.49	24.7	315	7.48	7.58	184.0	15.2	8.07	0.036	12.8	16.5	12036	417
Permit Limits			≤1000				≤0.75			≤15	≤15	≤ 4	≤ 1.24		≤ 14		

**E-Coli Geometric Mean = 14 MPN/100mL, Limit = 200 MPN/100mL**

**Plant Notes:**

- June 2 - E.coli was elevated due to the UV system nearly running at 100% output on three channels due to high flows. A fourth UV channel was placed into service as a precaution.
- June 16 - Two failures on the chemical feed system results in an elevated day of Total Suspended Solids and Total Phosphorus. Flows were capped into the plant while repairs were made to the chemical feed system.
- June 21 - Flows were capped into the plant to perform modifications on a clarifier in advance of the June 28 & 29 testing.
- June 24 - PAC was turned off for one day and resumed the following day.
- June 28 & 29 - Flows were capped into the plant to allow for accurate clarifier optimization testing.

**WSA Notes:**

- June 5 - Final Effluent passed acute lethality testing.
- June - The June average total suspended solids was 20 mg/L, exceeding the permit limit of 15 mg/L.

## Creek Monthly Report to Water Security Agency

June-05-18

Permit# 00050853-05-00

Riske's Crossing (RIS)

Sidmar Crossing (SID)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids	72.0	7.4	38.4	219	168	261
Total Dissolved Solids	621	1140	767	632	612	603
Temperature (Field test)	17.3	17.4	17.0	16.9	16.5	18.5
Dissolved Oxygen (Field Test)	7.25	7.29	8.16	7.14	8.40	7.71
pH (Field Test for creek Samples)	8.25		7.66	7.54	8.02	7.85
pH at 15°C	8.39	7.29	8.25	8.18	8.38	8.21
Carbonaceous Biochemical Oxygen Demand	5.1	2.6	4.0	2.4	7.9	4.6
Total Phosphorus	0.40	0.30	0.33	0.48	0.24	0.37
Total Kjeldahl Nitrogen	2.3	4.6	2.7	2.1	1.0	1.3
Nitrate Nitrogen NO3-N	0.18	4.46	1.14	1.97	0.16	0.85
Ammonia Nitrogen NH3-N	<0.30	1.62	0.31	<0.30	<0.30	<0.30
Un-ionized Ammonia	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen	2.5	9.4	4.0	4.2	1.2	2.2
Phenol Alkalinity*	<1	<1	<1	<1	<1	<1
Total Alkalinity*	205	188	195	184	224	180
Total Hardness*	278	418	326	279	299	279
Calcium*	57	92	68	64	59	59
Magnesium*	33	46	38	29	37	32
Carbonate*	<1	<1	<1	<1	<1	<1
Bicarbonate*	250	229	238	224	273	220
Conductivity at 25°C	999	1870	1250	1020	960	960
Total Coliform	27600	261	5790	15500	1930	7270
E-Coli	517	16	140	291	62	138
Enterococci	980	20	127	93	261	125
Chloride*	94	260	141	100	40	65
Sodium*	93	198	121	94	84	83
Sulfates*	190	350	240	200	240	210
Potassium*	12	17	13	11	8.2	9.2
Phenols*		0.0097				
Aluminum*		0.16				
Antimony*		0.0006				
Arsenic*		0.001				
Barium*		0.027				
Beryllium*		<0.00001				
Boron*		0.26				
Cadmium*		0.00001				
Chromium*		0.0029				
Cobalt*		0.0004				
Copper*		0.0068				
Iron*		0.07				
Lead*		0.0019				
Manganese*		0.20				
Mercury*		0.000002				
Molybdenum*		0.025				
Nickel*		0.0035				
Selenium*		0.0032				
Silver*		<0.00005				
Strontium*		0.53				
Thallium*		<0.0002				
Uranium*		0.002				
Vanadium*		0.013				
Zinc*		0.041				

**Notes:**

- \* Tests conducted by an external accredited laboratory
- TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.
- June 5 - Lumsden was tested for chronic toxicity and the results were as follows:  
 Ceriodaphnia dubia: LC50 >100%, IC25 (Reproduc ion) >100%  
 Fathead Minnow: LC50 >100%, IC25(Growth from Biomass) 71.1%

**Primary Influent BOD results (mg/L):**

June 3 - 143; June 6 - 154; June 10 - 150; June 13 - 198; June 17 - 203; June 24 - 184; June 27 - 259

# City of Regina - Wastewater Treatment Plant

July 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN/100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage kg/day	Polymer Dosage kg/day
01	68.10	172	10		6.78	20.7	280	0.34	7.60	9.5	3.3	0.61	< 0.030	2.5	8.0	6871	193
02	67.74	179	8		7.07	21.2	280	0.32	7.46	9.3	2.4	<0.30	< 0.030	2.7	8.1	6839	181
03	69.30	165	11		7.00	21.6	275	0.31	7.46	10.4	2.0	<0.30	< 0.030	2.4	5.6	4628	136
04	71.58	179	13	3	6.74	20.1	280	0.57	7.45	16.0	3.7	<0.30	< 0.030	3.4	7.5	3476	57
05	74.14	135	12		5.87	18.9	275	0.56	7.39	15.6	5.2	1.60	< 0.030	5.3	10.7	1159	147
06	75.81	313	33		6.70	20.9	275	0.49	7.57	13.2	5.8	1.42	< 0.030	4.8	10.2	0	0
07	75.90	317	32		6.75	23.4	285	0.59	7.54	16.4	6.1	<0.30	< 0.030	3.6	8.9	0	0
08	74.78	391	34		6.87	24.0	275	0.46	7.45	11.8	4.7	<0.30	< 0.030	3.3	8.7	0	0
09	74.69	359	16		6.84	22.3	285	0.68	7.46	16.6	4.6	0.95	< 0.030	3.8	8.5	0	0
10	74.54	613	21	5	6.30	17.0	270	0.82	7.37	23.4	4.0	<0.30	< 0.030	2.8	7.2	0	0
11	73.87	196	15		6.80	20.8	280	0.95	7.47	24.8	2.8	<0.30	< 0.030	3.6	6.7	0	0
12	73.57	140	20		6.41	22.9	310	0.68	7.37	18.8	3.3	0.59	< 0.030	3.3	6.6	0	0
13	75.63	108	3		6.72	12.5	290	0.64	7.49	16.7	3.1	0.48	< 0.030	3.0	6.1	0	0
14	75.66	378	48		6.60	21.2	300	1.02	7.40	27.0	4.9	0.42	< 0.030	3.5	7.0	0	0
15	73.26	488	36		6.15	19.8	300	0.94	7.47	24.5	4.5	0.33	< 0.030	3.6	7.6	0	0
16	74.41	435	29		6.63	20.9	305	0.39	7.32	9.0	2.2	0.68	< 0.030	3.2	7.3	1354	57
17	73.34	196	18		6.38	24.1	300	0.32	7.45	7.8	<2.0	0.31	< 0.030	3.1	8.4	5263	170
18	72.07	291	40	16	6.65	22.8	290	0.24	7.47	7.7	<2.0	0.62	< 0.030	3.1	7.4	3827	136
19	61.46	308	31		6.65	22.3	255	0.26	7.38	5.5	<2.0	<0.30	< 0.030	2.3	6.3	1042	159
20	74.53	517	12		6.20	20.5	270	0.25	7.60	5.5	<2.0	0.84	< 0.030	2.8	6.7	1223	204
21	74.75	411	34		6.48	19.8	255	0.32	7.54	6.8	2.1	0.34	< 0.030	2.7	7.8	1222	204
22	72.58	326	26		6.90	19.9	255	0.24	7.52	5.6	<2.0	<0.30	< 0.030	2.1	7.6	1191	181
23	76.30	291	26		6.87	20.9	235	0.26	7.36	7.4	<2.0	<0.30	< 0.030	2.5	10.1	1217	193
24	74.30	276	22		6.87	22.8	260	0.27	7.35	8.0	2.0	<0.30	< 0.030	2.4	10.4	2740	170
25	67.00	2760	86	80	6.80	22.6	280	1.22	7.38	32.2	4.3	0.47	< 0.030	4.5	8.6	3939	159
26	69.12	727	52		7.25	22.1	285	0.32	7.33	8.4	2.7	1.24	< 0.030	4.3	8.8	1030	68
27	70.40	142	13		7.36	22.8	265	0.34	7.40	7.6	2.2	4.05	< 0.030	7.1	11.0	3381	147
28	75.30	649	72		7.07	23.3	255	0.33	7.40	8.8	3.4	6.75	0.046	10.1	13.8	3415	125
29	69.36	615	25		7.20	20.0	255	0.40	7.43	11.8	3.3	6.37	0.046	11.5	15.1	3278	125
30	67.41	449	20		7.00	19.4	265	0.62	7.50	18.6	3.5	5.51	0.047	8.4	11.8	2048	68
31	66.14	651	123		6.74	20.1	255	1.10	7.53	29.0	4.1	1.41	< 0.030	5.6	9.1	0	0
Sum	2237.04																
Avg	72.16				6.73	21.0	276	0.52	7.45	14	3	1	0.032	4.1	9	1908	93
Min	61.46				5.87	12.5	235	0.24	7.32	5.5	<2.0	< 0.30	< 0.030	2.1	5.6	0	0
Max	76.30		123		7.36	24.1	310	1.22	7.60	32.2	6.1	6.75	0.047	11.5	15.1	6871	204
Permit Limits			≤1000				≤0.75			≤15	≤15	≤ 4	≤ 1.24		≤ 10		

*E-Coli Geometric Mean = 23 MPN/100mL, Limit = 200 MPN/100mL*

**Plant Notes:**

July 19 - Flow was diverted to the lagoons during a 3.5 hour SaskPower outage.

**WSA Notes:**

July 27 - CBOD is reported as qualified as the standard was out of range. All other quality control was within limits.

# Creek Monthly Report to Water Security Agency

July-10-18

Permit# 00050853-05-00

Riske's Crossing (RIS)

Sidmar Crossing (SID)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids	45.0	23.4	8.2	55	38	58
Total Dissolved Solids	563	1150	1140	1040	640	935
Temperature (Field test)	23.4	17	22.7	23.1	23	22.6
Dissolved Oxygen (Field Test)	6.58	6.30	7.6	8.17	7.13	8.73
pH (Field Test for creek Samples)	8.11		7.01	8.09	7.91	7.95
pH at 15°C	8.47	7.37	7.5	8.59	8.06	8.39
Carbonaceous Biochemical Oxygen Demand	7.9	4	5.4	4.9	<2.0	2
Total Phosphorus	0.55	0.82	0.38	0.30	0.13	0.26
Total Kjeldahl Nitrogen	2.3	2.8	3.1	1.8	1.2	1.4
Nitrate Nitrogen NO3-N	0.47	4.12	3.50	1.55	<0.13	0.71
Ammonia Nitrogen NH3-N	<0.30	<0.30	0.73	<0.30	<0.30	<0.30
Un-ionized Ammonia	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen	2.8	7.2	7.2	3.4	1.3	2.2
Phenol Alkalinity*	<1	<1	<1	4	<1	<1
Total Alkalinity*	161	139	156	166	201	177
Total Hardness*	251	358	374	354	293	342
Calcium*	53	76	79	71	55	68
Magnesium*	29	41	43	43	38	42
Carbonate*	<1	<1	<1	5	<1	<1
Bicarbonate*	196	170	190	193	245	216
Conductivity at 25°C	873	1860	1850	1700	981	1510
Total Coliform	57900	613	8660	41000	10500	36500
E-Coli	488	21	225	649	138	1410
Enterococci	613	5	186	125	194	308
Chloride*	58	268	257	231	42	179
Sodium*	69	225	218	193	89	167
Sulfates*	180	360	360	320	240	310
Potassium*	9.3	18	17	17	9.8	15
Phenols*		0.0097				
Aluminum*		0.5				
Antimony*		0.0006				
Arsenic*		0.0014				
Barium*		0.026				
Beryllium*		<0.0001				
Boron*		0.26				
Cadmium*		0.00002				
Chromium*		0.0046				
Cobalt*		0.0005				
Copper*		0.02				
Iron*		0.27				
Lead*		0.0015				
Manganese*		0.24				
Mercury*		0.000005				
Molybdenum*		0.012				
Nickel*		0.0057				
Selenium*		0.0034				
Silver*		<0.00005				
Strontium*		0.46				
Thallium*		<0.0002				
Uranium*		0.0008				
Vanadium*		0.01				
Zinc*		0.029				

**Notes:**

\* Tests conducted by an external accredited laboratory

• TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.

**Primary Influent BOD results (mg/L):**

July 2 - 199; July 4 - 207; July 11 - 208; July 15 - 178; July 18 - 210; July 22 - 199; July 25 - 205; July 29 - 206



# City of Regina - Wastewater Treatment Plant

August 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN/100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage kg/day	Polymer Dosage kg/day
01	63.96	1230	222	135	6.57	21.3	250	1.49	7.61	40.0	5.0	2.86	0.031	9.0	13.2	0	0
02	63.05	582	119		6.61	21.7	250	2.09	7.43	23.3	4.4	3.07	< 0.030	8.1	12.8	1603	54
03	63.80	1030	138		6.64	22.4	255	0.86	7.55	21.6	2.7	2.32	< 0.030	6.8	11.4	3187	108
04	64.76	922	116		7.14	22.8	260	0.75	7.57	19.1	4.2	1.56	< 0.030	4.8	9.1	3173	119
05	65.98	2600	387		7.12	22.8	255	0.56	7.60	13.6	3.1	0.96	< 0.030	4.2	9.0	3237	119
06	66.72	1200	196		6.89	19.8	250	0.64	7.50	12.6	3.1	0.44	< 0.030	3.8	8.9	3304	108
07	67.43	651	101		6.80	20.6	250	0.57	7.43	14.4	3.0	<0.30	< 0.030	3.4	8.2	3323	151
08	72.06	1030	185		7.07	22.4	250	0.52	7.41	10.4	2.9	1.47	< 0.030	4.2	8.5	3458	173
09	75.02	977	130	45	6.72	23.9	250	0.40	7.61	5.9	2.6	1.38	< 0.030	4.0	8.7	3546	206
10	71.70	1120	78		6.80	24.9	250	0.37	7.39	6.0	2.6	<0.30	< 0.030	2.8	7.5	3505	216
11	70.29	548	58		6.70	25.3	250	0.48	7.54	8.2	2.9	<0.30	< 0.030	2.7	8.0	3427	227
12	68.64	402	56		6.71	21.5	245	0.49	7.49	9.6	2.6	<0.30	< 0.030	2.8	8.6	3431	216
13	71.07	770	69		6.89	19.4	250	0.56	7.30	7.6	2.2	<0.30	< 0.030	2.8	8.6	4969	227
14	73.88	196	40		6.79	19.4	250	0.78	7.60	7.2	2.9	0.47	< 0.030	3.0	9.0	2178	162
15	72.03	649	96	38	6.77	22.8	250	0.70	7.35	7.2	2.9	0.40	< 0.030	2.8	9.0	2643	108
16	71.78	649	58		7.06	23.7	225	0.65	7.42	6.0	2.8	0.54	< 0.030	2.8	7.7	2469	130
17	67.59	186	19		6.87	21.8	250	0.63	7.51	4.8	2.8	1.28	< 0.030	3.3	6.8	2432	119
18	66.70	248	29		7.05	24.8	260	0.57	7.49	6.4	2.9	1.22	< 0.030	3.3	7.2	2373	119
19	68.87	488	50		7.02	22.4	250	0.61	7.33	5.8	2.7	1.68	< 0.030	3.9	9.0	2407	119
20	69.87	7700	816		6.85	20.8	250	0.26	7.56	4.9	<2.0	2.21	< 0.030	4.3	9.0	4092	119
21	66.19	977	73	34	7.17	19.2	250	0.22	7.43	4.9	2.1	1.60	< 0.030	3.7	8.8	4708	130
22	52.54	1370	50		6.88	21.0	250	0.20	7.39	5.6	<2.0	1.03	< 0.030	3.4	9.3	3954	87
23	60.78	365	24		7.19	21.5	260	0.17	7.56	4.4	<2.0	0.57	< 0.030	2.7	9.2	3641	108
24	68.01	488	16		6.97	22.7	250	0.15	7.45	3.4	<2.0	0.48	< 0.030	2.5	7.4	4320	119
25	64.22	488	5		7.25	21.3	240	0.12	7.48	2.8	<2.0	0.70	< 0.030	2.2	8.8	4619	108
26	64.63	548	19		7.22	21.4	230	0.12	7.40	2.9	<2.0	0.58	< 0.030	2.8	9.7	4575	119
27	72.33	345	11		6.93	21.6	240	0.16	7.47	3.3	<2.0	<0.30	< 0.030	2.4	9.7	4856	119
28	62.05	130	4		7.23	19.6	240	0.24	7.47	6.0	2.2	<0.30	< 0.030	2.5	9.6	6001	43
29	67.00	548	86	32	7.00	17.1	250	0.40	7.41	11.6	3.6	1.49	< 0.030	4.3	10.7	0	0
30	66.79	435	12		7.21	20.8	225	0.44	7.60	9.6	3.7	3.42	0.037	6.2	11.3	0	0
31	73.34	6870	120		7.07	19.3	225	0.48	7.60	11.4	3.6	6.06	0.065	9.1	14.5	0	0
Sum	2093.06																
Avg	67.52				6.94	21.6	247	0.54	7.48	10	3	1	0.031	4.0	9	3078	117
Min	52.54				6.57	17.1	225	0.12	7.30	2.8	<2.0	< 0.30	< 0.030	2.2	6.8	0	0
Max	75.02		816		7.25	25.3	260	2.09	7.61	40.0	5.0	6.06	0.065	9.1	14.5	6001	227
Permit Limits			≤1000					≤0.75		≤15	≤15	≤ 4	≤ 1.24		≤ 10		

*E-Coli Geometric Mean = 58 MPN/100mL, Limit = 200 MPN/100mL*

**Plant Notes:**

Aug 13-14 - PAC reported as an estimate.

Aug 20 - The E.coli was investigated but a cause was not found.

Aug 22 - Flow was diverted to the lagoons during a 1 hour SaskPower outage. Flow was also capped to the plant to perform planned maintenance on a secondary clarifier and to fill a bioreactor.

**WSA Notes:**

Aug 13-15, 26, 29 - CBOD is reported as qualified as a standard was out of range due to probe changes. All other quality control was within limits.

## Creek Monthly Report to Water Security Agency

Aug-15-2018

Permit# 00050853-05-00

Riske's Crossing (RIS)

Sidmar Crossing (SID)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids	40.0	7.2	5.6	51	97	69
Total Dissolved Solids	559	1000	1010	999	575	972
Temperature (Field test)	19.9	22.8	20.8	20.6	20.3	21.8
Dissolved Oxygen (Field Test)	8.85	6.77	8.38	8.44	7.17	8.28
pH (Field Test for creek Samples)	8.75		7.02	8.29	7.41	7.53
pH at 15°C	8.90	7.35	7.79	8.65	8.34	8.51
Carbonaceous Biochemical Oxygen Demand	10.6	2.9	<2.0	4.2	3.2	4.0
Total Phosphorus	0.54	0.70	0.36	0.38	0.19	0.34
Total Kjeldahl Nitrogen	2.1	2.8	1.8	1.4	1.5	1.4
Nitrate Nitrogen NO3-N	<0.13	5.25	4.72	2.24	<0.13	1.74
Ammonia Nitrogen NH3-N	<0.30	0.40	<0.30	<0.30	<0.30	<0.30
Un-ionized Ammonia	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen	2.2	9.0	7.0	3.7	1.6	3.2
Phenol Alkalinity*	<1	<1	<1	<1	<1	2
Total Alkalinity*	173	136	133	151	199	182
Total Hardness*	269	346	339	357	275	365
Calcium*	55	71	70	74	51	74
Magnesium*	32	41	40	42	36	44
Carbonate*	<1	<1	<1	<1	<1	2
Bicarbonate*	211	166	162	184	243	217
Conductivity at 25°C	882	1720	1670	1670	898	1580
Total Coliform	15500	649	17300	43500	14100	24200
E-Coli	19	96	93	548	727	248
Enterococci	17	38	24	185	921	122
Chloride*	66	266	281	244	36	230
Sodium*	74	202	195	194	81	178
Sulfates*	180	320	310	300	210	300
Potassium*	12	18	19	17	7.7	16
Phenols*		0.0089				
Aluminum*		0.058				
Antimony*		0.0006				
Arsenic*		0.0011				
Barium*		0.025				
Beryllium*		<0.0001				
Boron*		0.27				
Cadmium*		0.00001				
Chromium*		<0.0005				
Cobalt*		0.0004				
Copper*		0.012				
Iron*		0.07				
Lead*		0.0016				
Manganese*		0.18				
Mercury*		0.000003				
Molybdenum*		0.0049				
Nickel*		0.0036				
Selenium*		0.0055				
Silver*		<0.00005				
Strontium*		0.44				
Thallium*		<0.0002				
Uranium*		0.0003				
Vanadium*		0.0033				
Zinc*		0.033				

**Notes:**

\* Tests conducted by an external accredited laboratory

• TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.

• BOD and CBOD on Aug 15, 26, and 29 are reported as qualified due to a standard being out of range. All other quality control was within limits.

**Primary Influent BOD results (mg/L):**

Aug 1 - 238; Aug 6 - 173; Aug 8 - 174; Aug 12 - 205; Aug 15 - 144; Aug 19 - 249; Aug 22 - 252; Aug 26 - 185; Aug 29 - 179

# City of Regina - Wastewater Treatment Plant

September 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN/100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage kg/day	Polymer Dosage kg/day
01	72.42	387	44		6.94	17.9	250	0.57	7.61	13.8	3.8	5.65	0.062	9.6	15.6	0	0
02	67.81	613	75		7.28	17.9	250	0.50	7.61	12.4	3.1	4.74	0.052	8.0	14.3	0	0
03	73.08	225	21		7.02	18.9	250	0.59	7.56	14.4	3.9	4.98	0.049	9.5	14.6	0	0
04	70.92	261	30	44	7.12	19.9	240	0.62	7.55	16.0	3.6	4.62	0.044	8.0	13.7	0	0
05	70.41	1160	125		6.93	19.2	250	0.65	7.59	14.8	3.6	5.42	0.060	9.8	15.4	0	0
06	65.87	461	55		6.90	16.8	250	0.82	7.46	19.4	3.6	2.99	<0.030	7.6	13.9	0	0
07	62.38	517	44		7.43	20.1	245	0.81	7.46	20.0	4.4	1.37	<0.030	5.2	12.4	948	0
08	63.18	435	27		6.94	19.3	225	0.46	7.62	10.8	2.8	0.81	<0.030	3.6	10.5	3037	70
09	54.94	461	30		7.03	19.0	225	0.39	7.38	8.4	2.6	<0.30	<0.030	2.7	10.0	2794	105
10	66.64	866	91		7.13	19.3	225	0.28	7.70	7.4	2.0	<0.30	<0.030	1.9	8.3	3229	117
11	66.54	1000	105		7.56	16.9	215	0.32	7.46	8.0	<2.0	<0.30	<0.030	2.1	7.1	3394	141
12	62.34	1100	161	76	7.36	16.9	250	0.28	7.40	5.6	<2.0	<0.30	<0.030	1.8	8.4	3378	129
13	62.42	613	68		8.33	17.9	240	0.33	7.54	4.6	<2.0	<0.30	<0.030	2.0	8.7	3347	129
14	65.88	727	84		7.44	17.3	250	0.45	7.32	5.6	<2.0	<0.30	<0.030	2.1	8.8	3364	129
15	67.81	387	81		7.23	19.4	265	0.33	7.32	6.9	2.4	<0.30	<0.030	2.0	8.3	3465	141
16	69.29	1100	137		7.84	17.5	240	0.22	7.39	7.1	<2.0	<0.30	<0.030	1.8	6.4	3500	152
17	69.70	1030	184		7.20	19.8	240	0.21	7.41	5.0	2.0	<0.30	<0.030	1.8	6.3	3502	141
18	69.12	326	41		7.15	19.1	240	0.20	7.52	4.6	2.5	<0.30	<0.030	2.0	6.4	3475	141
19	71.03	1630	210	72	7.23	17.9	235	0.30	7.43	5.3	2.2	0.89	<0.030	3.2	7.9	3537	141
20	70.92	310	22		7.11	18.1	235	0.23	7.48	5.2	2.2	0.36	<0.030	2.9	7.9	3532	129
21	70.68	387	62		7.17	17.6	225	0.24	7.51	5.1	2.0	0.55	<0.030	2.5	7.3	3513	141
22	65.95	727	65		7.33	19.4	210	0.28	7.41	6.6	<2.0	0.44	<0.030	2.5	7.9	3034	129
23	63.53	579	85		7.73	16.8	220	0.46	7.54	13.6	3.9	0.64	<0.030	3.4	8.6	2877	105
24	75.05	980	111		7.42	15.8	240	0.26	7.52	4.7	2.0	2.59	<0.030	5.0	9.0	3836	152
25	62.36	770	73		7.60	17.1	235	0.24	7.49	5.1	2.1	2.59	<0.030	5.1	9.2	3210	117
26	69.52	649	75	36	7.30	17.1	240	0.25	7.52	5.4	2.1	4.00	0.036	6.4	10.4	3004	117
27	69.20	517	55		7.31	20.8	240	0.80	7.56	13.5	3.6	4.24	0.042	7.3	10.1	922	47
28	57.06	920	161		7.45	17.3	235	3.95	7.55	50.0	9.3	1.59	<0.030	5.9	9.5	4299	164
29	56.14	3110	249		7.49	12.5	240	0.28	7.63	6.8	2.3	<0.30	<0.030	2.2	7.2	4127	141
30	54.55	2760	387		7.82	15.8	230	0.33	7.56	8.0	2.9	<0.30	<0.030	2.3	6.7	1152	59
Sum	1986.74																
Avg	66.22				7.33	18.0	238	0.52	7.50	10	3	2	0.035	4.3	10	2483	95
Min	54.55				6.90	12.5	210	0.20	7.32	4.6	<2.0	<0.30	<0.030	1.8	6.3	0	0
Max	75.05		387		8.33	20.8	265	3.95	7.70	50.0	9.3	5.65	0.062	9.8	15.6	4299	164
Permit Limits			≤1000					≤0.75		≤15	≤15	≤4	≤1.24		≤10		

**E-Coli Geometric Mean = 76 MPN/100mL, Limit = 200 MPN/100mL**

**Plant Notes:**

Sept 28 - The plant experienced an increase in phosphorus and TSS in the final effluent due to the draining and filling of secondary clarifier #2.

**WSA Notes:**

Sept 8 - CBOD is reported as qualified as a standard was out of range. All other quality control was within limits.  
 Sept 11 - Final Effluent passed acute lethality testing.

# Creek Monthly Report to Water Security Agency

Sept-19-2018

Permit# 00050853-05-00

*Riske's Crossing (RIS)*

*Sidmar Crossing (SID)*

*Qu'Appelle above the Wascana (QAW)*

*Final Effluent (FE)*

*Wascana above the Qu'Appelle (WAQ)*

*Lumsden (LUM)*

<b>Test description (mg/L)</b>	<b>RIS</b>	<b>FE</b>	<b>SID</b>	<b>WAQ</b>	<b>QAW</b>	<b>LUM</b>
Suspended Solids	56.0	5.3	10.4	28	58	52
Total Dissolved Solids	600	912	883	608	453	635
Temperature (Field test)	11.9	17.9	13.7	11.1	12	12.1
Dissolved Oxygen (Field Test)	9.88	7.23	7.1	10.20	9.38	9.90
pH (Field Test for creek Samples)	8.38		7.20	7.81	8.43	7.95
pH at 15°C	8.39	7.43	7.43	8.15	8.45	8.25
Carbonaceous Biochemical Oxygen Demand	13.0	2.2	2.6	2.5	<2.0	2.6
Total Phosphorus	0.30	0.30	0.21	0.22	0.15	0.22
Total Kjeldahl Nitrogen	2.6	3.2	2.2	1.5	0.9	1.5
Nitrate Nitrogen NO3-N	<0.13	4.33	3.13	1.12	<0.13	0.66
Ammonia Nitrogen NH3-N	<0.30	0.89	<0.30	<0.30	<0.30	<0.30
Un-ionized Ammonia	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen	2.7	7.9	5.7	2.6	1.0	2.2
Phenol Alkalinity*	3	<1	<1	<1	3	<1
Total Alkalinity*	174	147	152	138	158	166
Total Hardness*	304	323	328	245	213	252
Calcium*	64	67	69	52	36	50
Magnesium*	35	38	38	28	30	31
Carbonate*	4	<1	<1	<1	4	<1
Bicarbonate*	205	179	185	168	185	202
Conductivity at 25°C	960	1690	1480	987	732	1040
Total Coliform	14100	1630	27600	24200	4360	14100
E-Coli	488	210	308	687	77	579
Enterococci	387	72	89	214	101	178
Chloride*		248				
Sodium*		188				
Sulfates*		280				
Potassium*		18				
Phenols*		0.0064				
Aluminum*		0.075				
Antimony*		0.0005				
Arsenic*		0.0007				
Barium*		0.024				
Beryllium*		<0.0001				
Boron*		0.27				
Cadmium*		0.00001				
Chromium*		<0.0005				
Cobalt*		0.0003				
Copper*		0.012				
Iron*		0.057				
Lead*		0.0008				
Manganese*		0.19				
Mercury*		0.000001				
Molybdenum*		0.0076				
Nickel*		0.0034				
Selenium*		0.0044				
Silver*		<0.00005				
Strontium*		0.40				
Thallium*		<0.0002				
Uranium*		0.0004				
Vanadium*		0.0026				
Zinc*		0.028				

**Notes:**

- \* Tests conducted by an external accredited laboratory
- TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.

**Primary Influent BOD results (mg/L):**

Sep 3 - 192; Sep 5 - 165; Sep 9 - 197; Sep 13 - 207; Sep 16 - 220; Sep 19 - 206; Sep 23 - 193; Sep 26 - 206; Sep 30 - 223

# City of Regina - Wastewater Treatment Plant

October 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN /100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage kg/day	Polymer Dosage kg/day
01	56.80	3080	775		7.55	16.5	230	0.47	7.52	10.7	4.3	0.78	< 0.030	3.8	7.8	0	0
02	58.78	1520	114		7.31	16.6	245	0.53	7.42	13.8	5.1	2.30	< 0.030	5.3	9.1	0	0
03	64.64	1720	613	158	7.17	16.0	225	9.35	7.44	15.6	8.1	7.93	0.059	11.9	14.1	12	12
04	57.14	2040	613		7.15	16.9	230	1.48	7.34	11.5	4.4	7.62	0.045	11.4	14.9	96	116
05	64.55	7270	1840		7.00	16.8	235	0.28	7.51	5.7	3.2	2.23	< 0.030	4.6	8.7	63	128
06	66.19	6490	1840		7.43	18.3	245	0.53	7.31	8.6	3.4	2.27	< 0.030	4.1	6.4	55	151
07	63.39	344	17		7.25	15.9	245	0.29	7.34	7.4	2.7	0.83	< 0.030	2.9	5.9	67	162
08	63.14	304	17		7.37	16.5	260	0.31	7.15	8.0	2.1	0.73	< 0.030	3.4	6.5	68	174
09	62.46	870	44		7.42	16.2	275	0.29	7.51	6.9	2.1	0.39	< 0.030	2.5	5.6	68	185
10	62.51	517	33		7.27	17.4	270	0.35	7.43	8.1	2.3	2.10	< 0.030	4.7	8.5	68	162
11	64.73	649	45	16	7.23	15.9	280	0.44	7.25	10.6	2.8	4.56	< 0.030	7.6	11.0	69	185
12	65.94	461	39		6.91	15.0	260	1.21	7.52	32.0	5.1	6.31	0.056	11.1	13.5	69	185
13	64.40	821	91		7.25	16.8	250	1.44	7.59	36.0	5.0	3.35	0.035	9.0	11.9	68	174
14	63.96	205	16		7.49	18.7	255	1.88	7.57	43.6	5.8	4.14	0.042	9.0	10.8	67	174
15	59.09	1160	83		6.94	16.1	245	2.84	7.48	71.0	7.9	2.24	< 0.030	9.1	12.0	83	128
16	69.56	345	18		7.41	19.1	275	1.83	7.49	38.0	4.3	0.95	< 0.030	5.7	10.8	180	255
17	67.25	291	26	11	7.28	16.6	260	0.70	7.45	17.2	3.0	<0.30	< 0.030	3.7	9.0	182	267
18	62.60	38	4		7.48	16.8	260	1.28	7.49	28.4	4.6	<0.30	< 0.030	3.8	9.9	156	278
19	69.89	86	5		7.56	15.8	250	0.88	7.48	21.4	4.1	<0.30	< 0.030	3.0	11.6	124	255
20	65.22	109	6		7.12	15.4	290	1.13	7.47	26.8	4.6	<0.30	< 0.030	3.8	13.2	106	197
21	64.67	27	3		7.27	17.2	250	0.39	7.45	8.8	<2.0	<0.30	< 0.030	2.8	9.8	119	220
22	65.71	194	12		7.15	16.5	270	0.33	7.39	6.8	<2.0	<0.30	< 0.030	2.3	7.5	101	243
23	65.71	345	30		7.27	16.1	265	0.36	7.30	7.6	<2.0	<0.30	< 0.030	2.2	8.4	101	209
24	65.69	649	21	53	7.18	14.9	250	0.28	7.40	5.5	<2.0	<0.30	< 0.030	2.1	8.5	102	197
25	66.94	194	16		7.42	15.3	265	0.27	7.36	5.7	<2.0	<0.30	< 0.030	2.3	9.2	101	197
26	70.12	162	13		7.18	16.1	255	0.25	7.18	4.2	<2.0	<0.30	< 0.030	2.3	9.8	100	232
27	69.53	219	15		7.22	17.6	255	0.32	7.26	6.3	2.1	<0.30	< 0.030	1.8	9.6	99	209
28	68.77	192	29		7.24	15.9	250	0.32	7.36	6.4	2.1	<0.30	< 0.030	2.3	10.0	100	232
29	67.86	238	34		7.23	17.6	250	0.29	7.46	6.4	2.2	<0.30	< 0.030	2.3	8.8	100	197
30	68.30	579	80		7.05	15.6	265	0.27	7.27	5.3	2.1	<0.30	< 0.030	2.0	10.0	101	185
31	61.02	1030	248	63	7.12	16.1	250	0.22	7.53	4.0	<2.0	<0.30	< 0.030	2.0	8.3	106	197
Sum	2006.55																
Avg	64.73				7.26	16.5	255	0.99	7.41	16	3	2	0.033	4.7	10	88	178
Min	56.80				6.91	14.9	225	0.22	7.15	4.0	<2.0	< 0.30	< 0.030	1.8	5.6	0	0
Max	70.12		1840		7.56	19.1	290	9.35	7.59	71.0	8.1	7.93	0.059	11.9	14.9	182	278
Permit Limits			≤1000				≤0.75			≤15	≤15	≤ 4	≤ 1.24		≤ 10		

**E-Coli Geometric Mean = 44 MPN/100mL, Limit = 200 MPN/100mL**

**Plant Notes:**

October 3 - The plant influent composite sample had a zinc concentration of 1.98 mg/L. This loading of zinc caused a toxic biological upset condition within the plant that ultimately resulted in the exceedances of total phosphorus, e.coli, and total suspended solids.

**WSA Notes:**

October 1 & 2 - CBOD is reported as qualified as a standard was out of range. All other quality control was within limits.

October 5 & 6 - E.coli exceeded the maximum concentration limit of 1000 MPN.

October - In October the total phosphorus was 0.99 mg/L, exceeding the permit limit of 0.75 mg/L.

October - In October the total suspended solids was 16 mg/L, exceeding the permit limit of 15 mg/L.

## Creek Monthly Report to Water Security Agency

Oct-17-2018

Permit# 00050853-05-00

Riske's Crossing (RIS)

Sidmar Crossing (SID)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids	18.5	17.2	7.6	22	28	26
Total Dissolved Solids	433	987	888	733	450	619
Temperature (Field test)	9.4	16.6	11.6	9.2	9.3	9.9
Dissolved Oxygen (Field Test)	9.87	7.28	6.31	11.2	10.3	11.1
pH (Field Test for creek Samples)	7.87		7.25	7.88	8.15	8.15
pH at 15°C	8.00	7.45	7.31	8.01	8.49	8.19
Carbonaceous Biochemical Oxygen Demand	3.1	3.0	<2.0	<2.0	<2.0	7.1
Total Phosphorus	0.12	0.70	0.23	0.17	0.05	0.12
Total Kjeldahl Nitrogen	1.5	3.7	3.7	2.3	0.8	1.4
Nitrate Nitrogen NO3-N	0.25	5.14	3.27	2.89	0.22	1.44
Ammonia Nitrogen NH3-N	<0.30	<0.30	1.73	0.55	<0.30	<0.30
Un-ionized Ammonia	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen	1.8	9.0	7.2	5.3	1.0	2.9
Phenol Alkalinity*	<1	<1	<1	<1	4	3
Total Alkalinity*	144	147	154	156	178	167
Total Hardness*	223	348	333	304	229	270
Calcium*	50	72	71	66	39	54
Magnesium*	24	41	38	34	32	33
Carbonate*	<1	<1	<1	<1	5	4
Bicarbonate*	176	179	188	190	207	196
Conductivity at 25°C	713	1690	1530	1270	798	1040
Total Coliform	2490	291	11200	2380	2850	3260
E-Coli	84	26	194	29	15	19
Enterococci	62	11	33	17	12	14
Chloride*	49	250	205	358	29	95
Sodium*	53	186	160	127	74	99
Sulfates*	140	260	240	220	190	200
Potassium*	9.8	18	16	13	7.7	9.9
Phenols*		0.0099				
Aluminum*		0.29				
Antimony*		0.0005				
Arsenic*		0.0007				
Barium*		0.026				
Beryllium*		<0.0001				
Boron*		0.23				
Cadmium*		0.00003				
Chromium*		0.0006				
Cobalt*		0.0004				
Copper*		0.02				
Iron*		0.18				
Lead*		0.0007				
Manganese*		0.20				
Mercury*		<0.000001				
Molybdenum*		0.013				
Nickel*		0.0028				
Selenium*		0.0049				
Silver*		<0.00005				
Strontium*		0.46				
Thallium*		<0.0002				
Uranium*		0.0008				
Vanadium*		0.0021				
Zinc*		0.037				

**Notes:**

\* Tests conducted by an external accredited laboratory

• TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.

**Primary Influent BOD results (mg/L):**

Oct 3 - 222; Oct 8 - 200; Oct 10 - 191; Oct 14 - 214; Oct 17 - 212; Oct 21 - 210; Oct 24 - 193; Oct 28 - 180; Oct 31 - 168

# City of Regina - Wastewater Treatment Plant

November 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN /100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage kg/day	Polymer Dosage kg/day
01	66.79	1960	548		7.38	16.1	255	0.30	7.36	5	2.2	<0.30	< 0.030	2	3	4968	146
02	65.29	90	9		6.93	15.6	250	0.44	7.44	8	2.7	0.86	< 0.030	3	4	3630	123
03	64.65	420	16		7.02	16.4	260	0.38	7.47	8	2.8	1.44	< 0.030	3	8	3625	134
04	63.86	359	13		6.50	14.3	260	0.40	7.46	10	3.5	<0.30	< 0.030	2	8	3601	123
05	72.08	687	54		6.18	14.2	260	0.50	7.46	15	3.3	1.15	< 0.030	3	6	3871	146
06	68.67	196	12	11	6.35	9.8	250	0.44	7.37	12	2.6	1.22	< 0.030	3	5	1250	56
07	68.69	304	14		6.98	9.0	265	0.55	7.32	13	3.3	1.42	< 0.030	3	8	0	0
08	67.79	205	22		6.79	14.0	260	0.34	7.36	7	2.1	0.90	< 0.030	3	5	976	34
09	69.17	160	11		6.79	8.9	270	0.47	7.53	9	2.2	1.88	< 0.030	4	0	9.3	0
10	69.19	179	10		7.70	14.1	250	0.52	7.31	10	2.6	1.92	< 0.030	4	5	7.6	0
11	66.59	160	10		7.68	14.4	260	0.40	7.57	10	2.1	1.46	< 0.030	3	5	8.1	0
12	67.86	248	11		7.15	13.9	250	0.43	7.46	8	2.0	1.46	< 0.030	3	9	8.4	0
13	69.66	179	8		6.93	14.1	240	0.45	7.45	9	2.0	1.91	< 0.030	4	8	8.8	0
14	70.64	99	3	2	7.28	16.3	260	0.47	7.46	9	2.0	4.00	0.031	7	3	10.8	0
15	68.34	187	14		7.21	14.7	265	0.55	7.43	10	3.3	3.50	< 0.030	6	4	10.4	0
16	69.42	129	25		7.40	15.3	260	0.89	7.48	12	3.1	3.61	< 0.030	6	9	11.1	0
17	66.96	770	31		7.74	13.6	265	0.85	7.54	10	3.4	3.76	0.035	7	4	11.6	0
18	71.56	172	13		7.49	13.6	265	1.02	7.48	12	3.8	5.52	0.045	9	0	12.3	0
19	70.47	236	22		7.55	13.4	250	1.02	7.45	16	4.4	5.86	0.045	10	6	13.4	0
20	68.84	236	6		7.48	14.6	265	0.73	7.46	17	4.1	5.21	0.041	8	6	12.1	0
21	61.86	291	16		7.74	14.8	295	0.80	7.38	14	4.3	3.04	0.020	6	2	10.0	0
22	68.96	214	5	6	7.57	15.7	295	0.75	7.50	13	3.1	2.96	< 0.030	6	1	10.0	0
23	69.78	276	12		7.42	11.6	295	0.89	7.51	14	2.8	3.49	0.031	7	6	11.1	0
24	69.06	172	6		7.63	14.7	305	4.01	7.42	15	3.4	3.90	< 0.030	7	8	11.4	0
25	69.28	359	13		7.46	14.6	285	2.33	7.56	19	5.8	4.08	0.040	7	7	12.2	0
26	64.14	205	8		7.88	15.3	270	0.57	7.40	14	3.8	1.31	< 0.030	4	1	8.9	4792
27	64.73	1200	51		7.95	14.5	275	0.51	7.31	12	3.3	1.45	< 0.030	4	3	9.1	7085
28	65.13	21	1	3	7.55	15.1	260	0.31	7.47	8	2.5	1.92	< 0.030	4	5	9.6	7129
29	64.46	291	16		7.33	14.2	275	0.77	7.45	8	2.9	2.81	< 0.030	5	4	10.5	7588
30	56.11	308	29		7.19	14.4	260	0.50	7.47	6	2.8	3.27	< 0.030	6	4	13.0	12816
Sum	2020.04																
Avg	67.33				7.28	14.0	266	0.75	7.44	11	3	3	0.032	5	5	10	2044
Min	56.11				6.18	8.9	240	0.30	7.31	5	2.0	< 0.30	< 0.020	2	3	6.7	0
Max	72.08		548		7.95	16.4	305	4.01	7.57	19	5.8	5.86	0.045	10	6	13.4	12816
Permit Limits			≤1000				≤0.75		≤15	≤15	≤4		≤ 1.24		≤ 10		

*E-Coli Geometric Mean = 14 MPN/100mL, Limit = 200 MPN/100mL*

**Plant Notes:**

November 21-22 - There was a power outage from 10:15pm on Nov. 21 until 12:45am Nov. 22. As a result, final effluent flows were estimated.  
 November 24-25 - The plant experienced a power bump which impacted certain pieces of equipment. As a result there was a process upset resulting in high total phosphorus values.  
 November 30 - The plant experienced a power bump which impacted certain pieces of equipment. As a result flow was diverted to the lagoons for a short period of time.

**WSA Notes:**

November 5 & 6 - CBOD is reported as qualified as a standard was out of range. All other quality control was within limits.

# Creek Monthly Report to Water Security Agency

Nov-06-2018

Permit# 00050853-05-00

Riske's Crossing (RIS)

Sidmar Crossing (SID)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids	23.3	12.4	43.7	25.2	38.4	22.4
Total Dissolved Solids	681	923	913	945	526	859
Temperature (Field test)	2.1	9.8	3.6	1.7	0.1	2.5
Dissolved Oxygen (Field Test)	12.2	6.35	10.4	14.2	13.0	12.8
pH (Field Test for creek Samples)	8.37		7.28	7.97	8.02	7.83
pH at 15°C	8.35	7.37	7.70	8.25	8.31	8.19
Carbonaceous Biochemical Oxygen Demand	5.4	2.6	2.3	2.7	<2.0	3.8
Total Phosphorus	0.15	0.44	0.36	0.21	0.09	0.15
Total Kjeldahl Nitrogen	2.0	3.5	4.6	1.6	0.7	1.4
Nitrate Nitrogen NO3-N	0.043	0.166	0.240	0.037	0.016	0.030
Ammonia Nitrogen NH3-N	<0.30	1.22	2.46	<0.30	<0.30	<0.30
Un-ionized Ammonia	<0.030	0.030	<0.030	<0.030	<0.030	<0.030
Total Nitrogen	2.4	7.4	7.7	6.1	0.8	5.0
Phenol Alkalinity*	<1	<1	<1	<1	<1	<1
Total Alkalinity*	180	160	174	172	188	177
Total Hardness*	332	335	335	356	262	344
Calcium*	72	70	70	77	49	72
Magnesium*	37	39	39	40	34	40
Carbonate*	<1	<1	<1	<1	<1	<1
Bicarbonate*	220	195	212	210	229	216
Conductivity at 25°C	1080	1650	1580	1590	854	1460
Total Coliform	2910	196	19900	5170	12000	2060
E-Coli	54	12	1410	59	11	36
Enterococci	101	11	214	10	11	15
Chloride*	82	262	244	229	31	192
Sodium*	91	187	171	174	75	154
Sulfates*	250	250	240	270	200	260
Potassium*	10	18	18	17	6.9	15
Phenols*		0.01				
Aluminum*		0.11				
Antimony*		0.0005				
Arsenic*		0.0007				
Barium*		0.021				
Beryllium*		<0.0001				
Boron*		0.18				
Cadmium*		0.00001				
Chromium*		<0.0005				
Cobalt*		0.0003				
Copper*		0.013				
Iron*		0.072				
Lead*		0.001				
Manganese*		0.17				
Mercury*		0.000003				
Molybdenum*		0.014				
Nickel*		0.0024				
Selenium*		0.0031				
Silver*		<0.00005				
Strontium*		0.43				
Thallium*		<0.0002				
Uranium*		0.0007				
Vanadium*		0.0012				
Zinc*		0.05				

**Notes:**

\* Tests conducted by an external accredited laboratory

- TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.
- CBOD is reported as qualified as a standard was out of range. All other quality control was within limits.
- The FE TDS result is for sample date November 19, not November 6.
- Bacteria results at Sidmar are elevated likely as a result of the abundance of ducks swimming in the open water.

**Primary Influent BOD results (mg/L):**

Nov 4 - 209; Nov 7 - 165; Nov 12 - 224; Nov 14 - 190; Nov 18 - 208; Nov 21 - 223; Nov 25 - 206; Nov 28 - 223



# City of Regina - Wastewater Treatment Plant

December 2018

Final Effluent Results

Permit# 00050853-05-00

Date	Flow to Creek (ML)	Total Coliform	E. coli (MPN /100mL)	Enterococci	DO (Field Test) (mg/L)	Temp (Field Test) °C	Chloride (Field Test) (mg/L)	Total Phos. (mg/L)	pH@15±1 °C	TSS (mg/L)	CBOD (mg/L)	Ammonia Nitrogen (mg/L)	Unionized Ammonia @15±1°C (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (mg/L)	PAC Dosage kg/day	Polymer Dosage kg/day
01	69.86	108	8		7.31	14.6	265	0.64	7.35	8.9	3.4	2.52	< 0.030	5.0	10.5	4841	97
02	72.05	158	3		7.52	13.6	275	0.99	7.47	10.8	4.0	4.82	0.038	8.0	12.7	0	0
03	64.79	165	4		7.52	10.3	250	0.70	7.36	12.0	3.9	3.76	< 0.030	7.4	12.1	0	0
04	59.62	276	8	10	7.61	10.3	290	0.83	7.33	10.2	4.0	1.93	< 0.030	4.6	10.3	0	0
05	68.83	75	3		7.39	13.1	370	0.54	7.16	9.6	4.0	0.92	< 0.030	4.1	12.5	0	0
06	68.09	179	6		7.81	12.8	315	0.91	7.14	10.8	3.9	<0.30	< 0.030	3.3	12.8	0	0
07	72.02	108	14		7.77	13.6	320	1.53	7.22	12.4	3.8	0.73	< 0.030	4.2	13.4	0	0
08	71.83	93	6		7.74	13.0	290	1.81	7.21	11.6	3.1	0.82	< 0.030	4.4	13.9	0	0
09	71.28	206	8		7.59	13.4	275	1.85	7.09	13.2	4.4	0.76	< 0.030	4.4	13.5	0	0
10	71.76	308	9		7.20	14.3	275	2.39	7.07	18.8	4.8	0.53	< 0.030	4.6	14.0	311	0
11	66.17	291	20		7.61	12.5	285	1.59	7.07	16.6	3.2	<0.30	< 0.030	3.8	15.6	6311	108
12	65.53	127	26		7.19	14.9	300	0.90	7.12	8.0	4.2	<0.30	< 0.030	3.0	15.1	6321	119
13	70.99	411	49	38	7.35	14.9	300	0.40	6.91	5.4	2.1	1.24	< 0.030	3.6	14.9	8074	119
14	67.35	36	1		7.36	14.2	300	0.46	7.10	5.2	2.0	0.68	< 0.030	3.6	12.9	7527	119
15	67.40	58	6		7.33	15.5	300	0.54	7.21	6.0	2.6	1.32	< 0.030	3.9	13.7	5442	119
16	67.74	37	7		7.64	15.2	300	0.58	7.05	8.2	3.9	1.67	< 0.030	4.6	14.2	4208	108
17	64.11	387	33		7.60	13.1	290	0.57	7.04	10.0	2.6	0.73	< 0.030	3.4	12.4	3987	108
18	62.95	91	5		7.36	13.8	295	0.61	7.23	8.8	3.2	<0.30	< 0.030	3.2	12.7	0	108
19	68.11	140	19	12	7.47	14.6	300	0.57	7.24	9.8	3.6	1.54	< 0.030	4.7	13.9	2452	119
20	73.88	23	2		7.55	14.3	320	0.46	7.24	10.6	3.4	4.05	< 0.030	7.3	16.1	8301	130
21	70.08	77	5		7.35	14.6	300	0.34	7.35	6.0	3.1	2.79	< 0.030	5.7	15.3	9786	141
22	68.69	99	5		7.05	13.8	310	0.33	7.42	6.8	3.2	1.43	< 0.030	4.0	13.4	7948	173
23	68.01	25	4		7.41	12.4	295	0.29	7.28	6.4	3.3	0.38	< 0.030	2.7	11.8	4027	173
24	68.27	548	68		7.47	12.3	300	0.35	7.41	7.0	2.7	0.35	< 0.030	3.1	11.8	3201	97
25	68.56	172	8		7.55	12.5	320	0.33	7.34	6.4	2.7	1.56	< 0.030	4.2	12.4	4694	130
26	67.78	308	25		7.67	11.6	310	0.23	7.30	5.2	2.1	3.25	< 0.030	6.1	15.2	6391	173
27	66.89	71	6	4	7.79	9.6	270	0.24	7.27	5.5	2.4	2.54	< 0.030	5.3	14.8	6344	141
28	66.57	16	2		7.16	11.9	255	0.32	7.21	5.9	3.1	2.18	< 0.030	4.8	12.9	4280	119
29	66.28	55	3		7.60	11.4	270	0.30	7.06	6.3	3.3	1.00	< 0.030	4.1	13.5	3162	108
30	66.10	167	18		7.47	13.8	270	0.32	7.12	7.5	2.6	0.36	< 0.030	3.2	12.6	3158	108
31	65.63	135	2		7.54	10.6	250	0.28	7.09	7.0	2.7	0.49	< 0.030	3.0	12.3	3164	108
Sum	2107.23																
Avg	67.98				7.48	13.1	292	0.72	7.21	9	3	1	0.030	4.4	13	3675	88
Min	59.62				7.05	9.6	250	0.23	6.91	5.2	2.0	< 0.30	< 0.030	2.7	10.3	0	0
Max	73.88		68		7.81	15.5	370	2.39	7.47	18.8	4.8	4.82	0.038	8.0	16.1	9786	173
Permit Limits			≤1000				≤0.75			≤15	≤15	≤ 10	≤ 1.24		≤ 14		

*E-Coli Geometric Mean = 7 MPN/100mL, Limit = 200 MPN/100mL*

**Plant Notes:**

December 4 - A large power outage throughout Southern Saskatchewan resulted in a brief diversion to the lagoons.

**WSA Notes:**

December 4 - Final Effluent passed acute lethality testing.

December 26 - CBOD is reported as qualified as a standard was out of range. All other quality control was within limits.

## Creek Monthly Report to Water Security Agency

Dec-04-2018

Permit# 00050853-05-00

Riske's Crossing (RIS)

Sidmar Crossing (SID)

Qu'Appelle above the Wascana (QAW)

Final Effluent (FE)

Wascana above the Qu'Appelle (WAQ)

Lumsden (LUM)

Test description (mg/L)	RIS	FE	SID	WAQ	QAW	LUM
Suspended Solids	61.2	10.2	84.4	15.8	17.8	16.0
Total Dissolved Solids	1040	914	980	1040	559	984
Temperature (Field test)	1.4	10.3	6.0	1.8	1.4	1.3
Dissolved Oxygen (Field Test)	8.56	7.61	8.24	10.7	12.3	10.5
pH (Field Test for creek Samples)	7.40		7.31	6.97	7.65	7.13
pH at 15°C	7.59	7.33	7.52	7.69	7.95	7.72
Carbonaceous Biochemical Oxygen Demand	3.2	4.0	<2.0	<2.0	<2.0	<2.0
Total Phosphorus	0.43	0.83	0.67	0.25	0.17	0.30
Total Kjeldahl Nitrogen	3.1	4.6	6.3	3.6	0.7	3.3
Nitrate Nitrogen NO3-N	0.39	5.33	3.61	6.01	<0.13	3.54
Ammonia Nitrogen NH3-N	1.29	1.93	3.74	2.37	<0.30	2.07
Un-ionized Ammonia	<0.030	<0.030	0.033	0.031	<0.030	<0.030
Total Nitrogen	3.5	10.3	10.3	9.8	0.8	6.9
Phenol Alkalinity	0	0	0	0	0	0
Total Alkalinity	247	176	200	185	258	214
Total Hardness	450	339	375	371	335	375
Calcium	104	75	88	88	78	87
Magnesium	46	37	38	37	34	39
Carbonate	0	0	0	0	0	0
Bicarbonate	301	215	244	225	315	261
Conductivity at 25°C	1700	1710	1780	1780	1100	1660
Total Coliform	770	276	12000	921	649	1410
E-Coli	8	8	1730	18	11	6
Enterococci	16	10	410	18	12	17
Chloride*	211	267	272	273	43	227
Sodium*	166	200	194	198	103	180
Sulfates*	320	260	290	280	270	280
Potassium*	15	20	18	19	8.5	17
Phenols*		0.0076				
Aluminum*		0.084				
Antimony*		0.0006				
Arsenic*		0.0009				
Barium*		0.021				
Beryllium*		<0.0001				
Boron*		0.23				
Cadmium*		0.00002				
Chromium*		<0.0005				
Cobalt*		0.0004				
Copper*		0.016				
Iron*		0.079				
Lead*		0.0009				
Manganese*		0.21				
Mercury*		0.000006				
Molybdenum*		0.0088				
Nickel*		0.0029				
Selenium*		0.0018				
Silver*		<0.00005				
Strontium*		0.42				
Thallium*		<0.0002				
Uranium*		0.0005				
Vanadium*		0.001				
Zinc*		0.032				

**Notes:**

\* Tests conducted by an external accredited laboratory

• TC, Ecoli, and Enterococci results are in MPN/100 mL, Conductivity reported in µS/cm.

**Primary Influent BOD results (mg/L):**

Dec 2 - 220; Dec 5 - 204; Dec 9 - 215; Dec 12 - 219; Dec 16 - 216; Dec 18 - 189; Dec 23 - 218; Dec 26 - 210; Dec 30 - 206

December 26 - BOD is reported as qualified as a standard was out of range. All other quality control was within limits.

## **APPENDIX B**

**Total Suspended Solids (mg/L)**

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	12.0	23.0	14.6	15.6	10.2	19.4
February		8.4	8.4	12.0	11.7	14.4
March		10.4	7.5	58.3	79.6	13.3
April	22.8	10.2	18.4	276	18.2	11.4
May	33.6	14.8	28.8	45.6	224	293
June	72.0	7.4	38.4	219	168	261
July	45.0	23.4	8.2	54.7	38.4	58.0
August	40.0	7.2	5.6	50.8	97.0	68.8
September	56.0	5.3	10.4	27.6	58.0	52.0
October	18.5	17.2	7.6	22.4	27.6	25.6
November	23.3	12.4	43.7	25.2	38.4	22.4
December	61.2	10.2	84.4	15.8	17.8	16.0
<b>Avg</b>	<b>38.4</b>	<b>12.5</b>	<b>23.0</b>	<b>68.6</b>	<b>65.7</b>	<b>71.3</b>
Min	12.0	5.3	5.6	12.0	10.2	11.4
Max	72.0	23.4	84.4	276	224	293

**Total Dissolved Solids (mg/L)**

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar / HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	2140	1300	1450	1300	654	1100
February		1160	1180	1270	630	1110
March		1260	1260	1790	1760	1090
April	796	1220	1330	740	1230	1190
May	733	1120	1030	1040	436	512
June	621	1140	767	632	612	603
July	563	1150	1140	1040	640	935
August	559	1000	1010	999	575	972
September	600	912	883	608	453	635
October	433	987	888	733	450	619
November	681	923	913	945	526	859
December	1040	914	980	1040	559	984
<b>Avg</b>	<b>817</b>	<b>1091</b>	<b>1069</b>	<b>1011</b>	<b>710</b>	<b>884</b>
Min	433	912	767	608	436	512
Max	2140	1300	1450	1790	1760	1190

**Dissolved Oxygen - field (mg/L)**

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	9.46	7.12	8.18	6.23	11.9	7.61
February		7.97	10.4	7.15	10.4	9.58
March		7.50	9.08	8.60	12.6	7.59
April	10.2	8.13	7.79	9.17	13.0	12.2
May	11.4	6.47	9.42	11.6	8.56	8.77
June	7.25	7.29	8.16	7.14	8.40	7.71
July	6.58	6.30	7.60	8.17	7.13	8.73
August	8.85	6.77	8.38	8.44	7.17	8.28
September	9.88	7.23	7.10	10.2	9.38	9.90
October	9.87	7.28	6.31	11.2	10.3	11.1
November	12.2	6.35	10.4	14.2	13.0	12.8
December	8.56	7.61	8.24	10.7	12.3	10.5
<b>Avg</b>	<b>9.43</b>	<b>7.17</b>	<b>8.42</b>	<b>9.40</b>	<b>10.3</b>	<b>9.56</b>
Min	6.58	6.30	6.31	6.23	7.13	7.59
Max	12.2	8.13	10.4	14.2	13.0	12.8

*pH @ 15 degrees*

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	7.78	7.23	7.85	7.86	8.20	7.80
February		7.42	7.34	7.40	7.90	7.50
March		7.49	7.32	7.13	7.49	7.50
April	7.97	7.73	7.58	8.11	8.11	8.08
May	8.89	7.43	7.78	8.81	8.38	8.36
June	8.39	7.29	8.25	8.18	8.38	8.21
July	8.47	7.37	7.50	8.59	8.06	8.39
August	8.90	7.35	7.79	8.65	8.34	8.51
September	8.39	7.43	7.43	8.15	8.45	8.25
October	8.00	7.45	7.31	8.01	8.49	8.19
November	8.35	7.37	7.70	8.25	8.31	8.19
December	7.59	7.33	7.52	7.69	7.95	7.72
<b>Avg</b>	<b>8.27</b>	<b>7.41</b>	<b>7.61</b>	<b>8.07</b>	<b>8.17</b>	<b>8.06</b>
Min	7.59	7.23	7.31	7.13	7.49	7.50
Max	8.90	7.73	8.25	8.81	8.49	8.51

*pH (field test)*

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	7.26		6.93	7.16	7.48	7.94
February			7.66	7.19	7.48	7.63
March			7.20	6.94	7.51	7.00
April	7.41		7.14	7.75	7.41	7.03
May	8.67		7.01	8.51	7.61	7.57
June	8.25		7.66	7.54	8.02	7.85
July	8.11		7.01	8.09	7.91	7.95
August	8.75		7.02	8.29	7.41	7.53
September	8.38		7.20	7.81	8.43	7.95
October	7.87		7.25	7.88	8.15	8.15
November	8.37		7.28	7.97	8.02	7.83
December	7.40		7.31	6.97	7.65	7.13
<b>Avg</b>	<b>8.05</b>		<b>7.22</b>	<b>7.68</b>	<b>7.76</b>	<b>7.63</b>
Min	7.26		6.93	6.94	7.41	7.00
Max	8.75		7.66	8.51	8.43	8.15

*Temperature - field (°C)*

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	1.2	12.3	3.2	1.4	1.8	0.0
February		12.6	2.6	0.2	0.1	0.6
March		10.6	5.2	1.8	2.3	1.7
April	1.6	15.4	7.6	7.6	2.8	3.5
May	14.2	19.9	13.4	14.9	14.4	15.4
June	17.3	17.4	17.0	16.9	16.5	18.5
July	23.4	17.0	22.7	23.1	23.0	22.6
August	19.9	22.8	20.8	20.6	20.3	21.8
September	11.9	17.9	13.7	11.1	12.0	12.1
October	9.4	16.6	11.6	9.2	9.3	9.9
November	2.1	9.8	3.6	1.7	0.1	2.5
December	1.4	10.3	6.0	1.8	1.4	1.3
<b>Avg</b>	<b>10.2</b>	<b>15.2</b>	<b>10.6</b>	<b>9.2</b>	<b>8.7</b>	<b>9.2</b>
Min	1.2	9.8	2.6	0.2	0.1	0.0
Max	23.4	22.8	22.7	23.1	23.0	22.6

**Carbonaceous Biochemical Oxygen Demand (mg/L)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	5.0	5.2	<2.0	<2.0	<2.0	<2.0
February		3.7	2.5	<2.0	<2.0	<2.0
March		4.4	2.0	6.4	3.5	2.6
April	5.7	4.3	2.2	5.3	4.7	2.1
May	8.5	5.1	4.7	10.4	<2.0	2.2
June	5.1	2.6	4.0	2.4	7.9	4.6
July	7.9	4.0	5.4	4.9	<2.0	2.0
August	10.6	2.9	<2.0	4.2	3.2	4.0
September	13.0	2.2	2.6	2.5	<2.0	2.6
October	3.1	3.0	<2.0	<2.0	<2.0	7.1
November	5.4	2.6	2.3	2.7	<2.0	3.8
December	3.2	4.0	<2.0	<2.0	<2.0	<2.0
<b>Avg</b>	<b>6.8</b>	<b>3.7</b>	<b>2.8</b>	<b>3.9</b>	<b>2.9</b>	<b>3.1</b>
Min	3.1	2.2	<2.0	<2.0	<2.0	<2.0
Max	13.0	5.2	5.4	10.4	7.9	7.1

**Total Alkalinity (mg/L)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	365	174	202	180	238	221
February		183	190	201	256	219
March		207	233	260	568	212
April	212	275	289	206	362	280
May	194	196	213	243	195	202
June	205	188	195	184	224	180
July	161	139	156	166	201	177
August	173	136	133	151	199	182
September	174	147	152	138	158	166
October	144	147	154	156	178	167
November	180	160	174	172	188	177
December	247	176	200	185	258	214
<b>Avg</b>	<b>206</b>	<b>177</b>	<b>191</b>	<b>187</b>	<b>252</b>	<b>200</b>
Min	144	136	133	138	158	166
Max	365	275	289	260	568	280

**Phenol Alkalinity (mg/L)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	0	0	0	0	4	0
February		0	0	0	0	0
March		<1	<1	<1	<1	<1
April	<1	<1	<1	<1	1	<1
May	<1	<1	<1	5	<1	<1
June	<1	<1	<1	<1	<1	<1
July	<1	<1	<1	4	<1	<1
August	<1	<1	<1	<1	<1	2
September	3	<1	<1	<1	3	<1
October	<1	<1	<1	<1	4	3
November	<1	<1	<1	<1	<1	<1
December	0	0	0	0	0	0
<b>Avg</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>
Min	0	0	0	0	0	0
Max	3	<1	<1	5	4	3

### Calcium (mg/L)

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	139	81	90	83	61	78
February		81	79	85	64	79
March		81	82	114	136	77
April	64	73	79	64	99	71
May	55	78	74	75	47	51
June	57	92	68	64	59	59
July	53	76	79	71	55	68
August	55	71	70	74	51	74
September	64	67	69	52	36	50
October	50	72	71	66	39	54
November	72	70	70	77	49	72
December	104	75	88	88	78	87
<b>Avg</b>	<b>71</b>	<b>76</b>	<b>77</b>	<b>76</b>	<b>65</b>	<b>68</b>
Min	50	67	68	52	36	50
Max	139	92	90	114	136	87

### Magnesium (mg/L)

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	76	49	54	49	42	51
February		48	48	50	43	48
March		47	48	68	115	46
April	38	44	46	35	70	48
May	37	40	40	43	27	29
June	33	46	38	29	37	32
July	29	41	43	43	38	42
August	32	41	40	42	36	44
September	35	38	38	28	30	31
October	24	41	38	34	32	33
November	37	39	39	40	34	40
December	46	37	38	37	34	39
<b>Avg</b>	<b>39</b>	<b>43</b>	<b>43</b>	<b>42</b>	<b>45</b>	<b>40</b>
Min	24	37	38	28	27	29
Max	76	49	54	68	115	51

### Carbonate (mg/L)

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	0	0	0	0	5	0
February		0	0	0	0	0
March		<1	<1	<1	<1	<1
April	<1	<1	<1	<1	1	<1
May	<1	<1	<1	6	<1	<1
June	<1	<1	<1	<1	<1	<1
July	<1	<1	<1	5	<1	<1
August	<1	<1	<1	<1	<1	2
September	4	<1	<1	<1	4	<1
October	<1	<1	<1	<1	5	4
November	<1	<1	<1	<1	<1	<1
December	0	0	0	0	0	0
<b>Avg</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>
Min	0	0	0	0	0	0
Max	4	<1	<1	6	5	4

**Bicarbonate (mg/L)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	445	212	246	220	280	270
February		223	232	245	312	267
March		252	284	317	693	259
April	259	336	352	251	439	342
May	237	239	260	284	238	246
June	250	229	238	224	273	220
July	196	170	190	193	245	216
August	211	166	162	184	243	217
September	205	179	185	168	185	202
October	176	179	188	190	207	196
November	220	195	212	210	229	216
December	301	215	244	225	315	261
<b>Avg</b>	<b>250</b>	<b>216</b>	<b>233</b>	<b>226</b>	<b>305</b>	<b>243</b>
Min	176	166	162	168	185	196
Max	445	336	352	317	693	342

**Total Hardness (mg/L)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	659	403	446	408	325	404
February		399	394	418	336	394
March		395	402	564	812	381
April	316	363	386	304	535	374
May	289	359	349	364	228	246
June	278	418	326	279	299	279
July	251	358	374	354	293	342
August	269	346	339	357	275	365
September	304	323	328	245	213	252
October	223	348	333	304	229	270
November	332	335	335	356	262	344
December	450	339	375	371	335	375
<b>Avg</b>	<b>337</b>	<b>366</b>	<b>366</b>	<b>360</b>	<b>345</b>	<b>336</b>
Min	223	323	326	245	213	246
Max	659	418	446	564	812	404

**Conductivity ( $\mu$ S/cm)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	3550	2170	2360	2070	1030	1910
February		2020	1960	2130	1080	1810
March		2170	2120	2870	2460	1780
April	1280	2000	2190	1240	1800	1920
May	1210	1880	1740	1700	704	830
June	999	1870	1250	1020	960	960
July	873	1860	1850	1700	981	1510
August	882	1720	1670	1670	898	1580
September	960	1690	1480	987	732	1040
October	713	1690	1530	1270	798	1040
November	1080	1650	1580	1590	854	1460
December	1700	1710	1780	1780	1100	1660
<b>Avg</b>	<b>1325</b>	<b>1869</b>	<b>1793</b>	<b>1669</b>	<b>1116</b>	<b>1458</b>
Min	713	1650	1250	987	704	830
Max	3550	2170	2360	2870	2460	1920



**Total Coliform (MPN/100mL)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	1550	185	2380	980	291	345
February		1960	3650	1850	328	549
March		1630	6490	2110	94	222
April	2760	1730	2420	3650	15	91
May	1300	428	11200	1300	579	517
June	27600	261	5790	15500	1930	7270
July	57900	613	8660	41000	10500	36500
August	15500	649	17300	43500	14100	24200
September	14100	1630	27600	24200	4360	14100
October	2490	291	11200	2380	2850	3260
November	2910	196	19900	5170	12000	2060
December	770	276	12000	921	649	1410
<b>Avg</b>	<b>12688</b>	<b>821</b>	<b>10716</b>	<b>11880</b>	<b>3975</b>	<b>7544</b>
Min	770	185	2380	921	15	91
Max	57900	1960	27600	43500	14100	36500

**E-Coli (MPN/100mL)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	7	6	435	66	5	51
February		185	687	238	21	60
March		129	649	17	<1	16
April	111	78	980	15	<1	3
May	16	63	1050	32	5	30
June	517	16	140	291	62	138
July	488	21	225	649	138	1410
August	19	96	93	548	727	248
September	488	210	308	687	77	579
October	84	26	194	29	15	19
November	54	12	1410	59	11	36
December	8	8	1730	18	11	6
<b>Avg</b>	<b>179</b>	<b>71</b>	<b>658</b>	<b>221</b>	<b>90</b>	<b>216</b>
Min	7	6	93	15	<1	3
Max	517	210	1730	687	727	1410

**Enterococci (MPN/100ml)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	2	15	517	12	8	6
February		167	82	11	5	10
March		47	19	179	2	1
April	32	70	49	55	4	4
May	28	78	126	60	7	32
June	980	20	127	93	261	125
July	613	5	186	125	194	308
August	17	38	24	185	921	122
September	387	72	89	214	101	178
October	62	11	33	17	12	14
November	101	11	214	10	11	15
December	16	10	410	18	12	17
<b>Avg</b>	<b>224</b>	<b>45</b>	<b>156</b>	<b>82</b>	<b>128</b>	<b>69</b>
Min	2	5	19	10	2	1
Max	980	167	517	214	921	308

**Chloride (mg/L)**

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	725	325	372	305	35	248
February		330	299	310	40	223
March		340	330	425	90	235
April	157	278	312	140	84	233
May	159	290	258	244	23	51
June	94	260	141	100	40	65
July	58	268	257	231	42	179
August	66	266	281	244	36	230
September	60	248	193	94	26	82
October	49	250	205	358	29	95
November	82	262	244	229	31	192
December	211	267	272	273	43	227
<b>Avg</b>	<b>166</b>	<b>282</b>	<b>264</b>	<b>246</b>	<b>43</b>	<b>172</b>
Min	49	248	141	94	23	51
Max	725	340	372	425	90	248

**Sulfates (mg/L)**

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	420	400	400	390	250	370
February		360	350	370	250	350
March		340	340	500	690	320
April	210	320	350	220	490	360
May	210	300	280	280	150	160
June	190	350	240	200	240	210
July	180	360	360	320	240	310
August	180	320	310	300	210	300
September	220	280	270	190	170	200
October	140	260	240	220	190	200
November	250	250	240	270	200	260
December	320	260	290	280	270	280
<b>Avg</b>	<b>232</b>	<b>317</b>	<b>306</b>	<b>295</b>	<b>279</b>	<b>277</b>
Min	140	250	240	190	150	160
Max	420	400	400	500	690	370

**Total Kjeldahl Nitrogen (mg/L)**

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	4.1	4.1	3.4	2.6	0.8	2.2
February		2.8	2.5	3.5	0.8	2.0
March		9.4	10.1	5.1	2.2	3.3
April	2.6	2.8	3.3	3.2	1.4	3.7
May	2.1	4.6	4.7	2.8	0.8	1.1
June	2.3	4.6	2.7	2.1	1.0	1.3
July	2.3	2.8	3.1	1.8	1.2	1.4
August	2.1	2.8	1.8	1.4	1.5	1.4
September	2.6	3.2	2.2	1.5	0.9	1.5
October	1.5	3.7	3.7	2.3	0.8	1.4
November	2.0	3.5	4.6	1.6	0.7	1.4
December	3.1	4.6	6.3	3.6	0.7	3.3
<b>Avg</b>	<b>2.5</b>	<b>4.1</b>	<b>4.0</b>	<b>2.6</b>	<b>1.1</b>	<b>2.0</b>
Min	1.5	2.8	1.8	1.4	0.7	1.1
Max	4.1	9.4	10.1	5.1	2.2	3.7

### *Nitrate Nitrogen (mg/L)*

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	<0.13	7.19	2.43	4.06	<0.13	3.77
February		4.76	5.60	6.24	<0.13	4.07
March		3.57	2.69	7.84	0.82	4.92
April	0.32	6.80	6.91	1.86	<0.13	4.66
May	0.16	5.48	3.47	2.78	<0.13	0.24
June	0.18	4.46	1.14	1.97	0.16	0.85
July	0.47	4.12	3.50	1.55	<0.13	0.71
August	<0.13	5.25	4.72	2.24	<0.13	1.74
September	<0.13	4.33	3.13	1.12	<0.13	0.66
October	0.25	5.14	3.27	2.89	0.22	1.44
November	0.41	3.73	2.85	4.43	<0.13	3.52
December	0.39	5.33	3.61	6.01	<0.13	3.54
<b>Avg</b>	<b>0.26</b>	<b>5.01</b>	<b>3.61</b>	<b>3.58</b>	<b>0.20</b>	<b>2.51</b>
Min	<0.13	3.57	1.14	1.12	<0.13	<0.13
Max	0.47	7.2	6.91	7.84	0.82	4.92

### *Ammonia Nitrogen (mg/L)*

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	2.47	<0.30	1.22	0.74	<0.30	<0.30
February		<0.30	<0.30	0.99	<0.30	<0.30
March		5.59	7.23	1.47	<0.30	1.63
April	0.84	<0.30	0.42	0.76	<0.30	0.34
May	<0.30	1.70	1.81	<0.30	<0.30	<0.30
June	<0.30	1.62	0.31	<0.30	<0.30	<0.30
July	<0.30	<0.30	0.73	<0.30	<0.30	<0.30
August	<0.30	0.40	<0.30	<0.30	<0.30	<0.30
September	<0.30	0.89	<0.30	<0.30	<0.30	<0.30
October	<0.30	<0.30	1.73	0.55	<0.30	<0.30
November	<0.30	1.22	2.46	<0.30	<0.30	<0.30
December	1.29	1.93	3.74	2.37	<0.30	2.07
<b>Avg</b>	<b>0.67</b>	<b>1.24</b>	<b>1.71</b>	<b>0.72</b>	<b>&lt;0.30</b>	<b>0.56</b>
Min	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Max	2.47	5.59	7.23	2.37	<0.30	2.07

### *Un-ionized Ammonia (mg/L)*

<i>Month</i>	<i>Riskes</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
February		<0.030	<0.030	<0.030	<0.030	<0.030
March		0.047	<0.030	<0.030	<0.030	<0.030
April	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
May	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
June	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
July	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
August	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
September	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
October	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
November	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
December	<0.030	<0.030	0.033	0.031	<0.030	<0.030
<b>Avg</b>	<b>&lt;0.030</b>	<b>0.032</b>	<b>0.030</b>	<b>0.030</b>	<b>&lt;0.030</b>	<b>&lt;0.030</b>
Min	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Max	<0.030	0.047	0.033	0.031	<0.030	<0.030

**Total Nitrogen (mg/L)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	4.2	11.7	6.5	6.8	0.9	6.3
February		7.8	8.3	9.9	0.9	6.1
March		9.4	13.4	13.2	3.0	8.4
April	3.0	10.2	11.1	5.2	1.5	8.4
May	2.3	10.4	8.5	5.6	0.9	1.4
June	2.5	9.4	4.0	4.2	1.2	2.2
July	2.8	7.2	7.2	3.4	1.3	2.2
August	2.2	9.0	7.0	3.7	1.6	3.2
September	2.7	7.9	5.7	2.6	1.0	2.2
October	1.8	9.0	7.2	5.3	1.0	2.9
November	2.4	7.4	7.7	6.1	0.8	5.0
December	3.5	10.3	10.3	9.8	0.8	6.9
<b>Avg</b>	<b>2.7</b>	<b>9.1</b>	<b>8.1</b>	<b>6.3</b>	<b>1.2</b>	<b>4.6</b>
Min	1.8	7.2	4.0	2.6	0.8	1.4
Max	4.2	11.7	13.4	13.2	3.0	8.4

**Total Phosphorous (mg/L)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	0.24	0.78	0.27	0.19	0.06	0.14
February		0.35	0.25	0.25	0.06	0.17
March		0.37	0.65	0.90	0.16	0.65
April	0.47	0.44	0.26	0.78	0.11	0.12
May	0.28	0.57	0.34	0.34	0.29	0.35
June	0.40	0.30	0.33	0.48	0.24	0.37
July	0.55	0.82	0.38	0.30	0.13	0.26
August	0.54	0.70	0.36	0.38	0.19	0.34
September	0.30	0.30	0.21	0.22	0.15	0.22
October	0.12	0.70	0.23	0.17	0.05	0.12
November	0.15	0.44	0.36	0.21	0.09	0.15
December	0.43	0.83	0.67	0.25	0.17	0.30
<b>Avg</b>	<b>0.35</b>	<b>0.55</b>	<b>0.36</b>	<b>0.37</b>	<b>0.14</b>	<b>0.27</b>
Min	0.12	0.30	0.21	0.17	0.05	0.12
Max	0.55	0.83	0.67	0.90	0.29	0.65

**Potassium (mg/L)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	25	20	21	21	7.9	18
February		18	18	18	12	15
March		18	18	27	21	14
April	14	19	18	15	13	15
May	16	18	16	17	7.6	8.6
June	12	17	13	11	8.2	9.2
July	9.3	18	17	17	9.8	15
August	12	18	19	17	7.7	16
September	9.3	18	15	11	7.0	11
October	9.8	18	16	13	7.7	9.9
November	10	18	18	17	6.9	15
December	15	20	18	19	8.5	17
<b>Avg</b>	<b>13</b>	<b>18</b>	<b>17</b>	<b>17</b>	<b>10</b>	<b>14</b>
Min	9.3	17	13	11	6.9	8.6
Max	25	20	21	27	21	18

**Sodium (mg/L)**

<i>Month</i>	<i>Risques</i>	<i>Final Effluent</i>	<i>Sidmar or HH</i>	<i>WAQ</i>	<i>QAW</i>	<i>LUM</i>
January	471	277	302	258	94	230
February		246	240	252	95	209
March		250	248	333	250	196
April	134	266	299	127	191	250
May	131	232	208	205	56	75
June	93	198	121	94	84	83
July	69	225	218	193	89	167
August	74	202	195	194	81	178
September	78	188	159	95	68	97
October	53	186	160	127	74	99
November	91	187	171	174	75	154
December	166	200	194	198	103	180
<b>Avg</b>	<b>136</b>	<b>221</b>	<b>210</b>	<b>188</b>	<b>105</b>	<b>160</b>
Min	53	186	121	94	56	75
Max	471	277	302	333	250	250

**Biochemical Oxygen Demand (mg/L)**

<i>Month</i>	<i>Primary Influent (average/month)</i>
January	219
February	223
March	212
April	207
May	216
June	186
July	202
August	200
September	201
October	199
November	206
December	211
<b>Avg</b>	<b>207</b>
Min	186
Max	223

<i>Aluminum</i>	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.30
February	0.17
March	0.16
April	0.14
May	0.09
June	0.16
July	0.50
August	0.06
September	0.08
October	0.22
November	0.11
December	0.08

<i>Arsenic</i>	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.0010
February	0.0008
March	0.0009
April	0.0023
May	0.0011
June	0.0010
July	0.0014
August	0.0011
September	0.0007
October	0.0009
November	0.0007
December	0.0009

<i>Beryllium</i>	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	<0.0001
February	<0.0001
March	<0.0001
April	<0.0001
May	<0.0001
June	<0.0001
July	<0.0001
August	<0.0001
September	<0.0001
October	<0.0001
November	<0.0001
December	<0.0001

<i>Cadmium</i>	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.00002
February	0.00002
March	0.00001
April	0.00003
May	0.00002
June	0.00001
July	0.00002
August	0.00001
September	0.00001
October	0.00002
November	0.00001
December	0.00002

<i>Antimony</i>	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.0006
February	0.0006
March	0.0005
April	0.0008
May	0.0006
June	0.0006
July	0.0006
August	0.0006
September	0.0005
October	0.0005
November	0.0005
December	0.0006

<i>Barium</i>	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.043
February	0.028
March	0.027
April	0.038
May	0.042
June	0.027
July	0.026
August	0.025
September	0.024
October	0.023
November	0.021
December	0.021

<i>Boron</i>	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.26
February	0.24
March	0.22
April	0.25
May	0.24
June	0.26
July	0.26
August	0.27
September	0.27
October	0.24
November	0.18
December	0.23

<i>Chromium</i>	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.0011
February	0.001
March	<0.0005
April	0.00345
May	0.001
June	0.0029
July	0.0046
August	<0.0005
September	<0.0005
October	<0.00055
November	<0.0005
December	<0.0005

<b>Cobalt</b>	
	<b>mg /L</b>
<b>Month</b>	<b>FE</b>
January	0.0006
February	0.0004
March	0.0005
April	0.00065
May	0.0005
June	0.0004
July	0.0005
August	0.0004
September	0.0003
October	0.00045
November	0.0003
December	0.0004

<b>Copper</b>	
	<b>mg /L</b>
<b>Month</b>	<b>FE</b>
January	0.0190
February	0.0075
March	0.0140
April	0.0195
May	0.0160
June	0.0068
July	0.0200
August	0.0120
September	0.0120
October	0.0195
November	0.0130
December	0.0160

<b>Iron</b>	
	<b>mg /L</b>
<b>Month</b>	<b>FE</b>
January	0.220
February	0.130
March	0.150
April	0.155
May	0.140
June	0.070
July	0.270
August	0.070
September	0.057
October	0.145
November	0.072
December	0.079

<b>Lead</b>	
	<b>mg /L</b>
<b>Month</b>	<b>FE</b>
January	0.0110
February	0.0006
March	0.0004
April	0.0007
May	0.0005
June	0.0019
July	0.0015
August	0.0016
September	0.0008
October	0.0008
November	0.0010
December	0.0009

<b>Manganese</b>	
	<b>mg /L</b>
<b>Month</b>	<b>FE</b>
January	0.22
February	0.21
March	0.20
April	0.19
May	0.22
June	0.20
July	0.24
August	0.18
September	0.19
October	0.19
November	0.17
December	0.21

<b>Mercury</b>	
	<b>mg /L</b>
<b>Month</b>	<b>FE</b>
January	0.000005
February	0.000002
March	<0.000001
April	0.000003
May	0.000004
June	0.000002
July	0.000005
August	0.000003
September	0.000001
October	<0.000001
November	0.000003
December	0.000006

<b>Molybdenum</b>	
	<b>mg /L</b>
<b>Month</b>	<b>FE</b>
January	0.0140
February	0.0150
March	0.0140
April	0.1665
May	0.0350
June	0.0250
July	0.0120
August	0.0049
September	0.0076
October	0.0150
November	0.0140
December	0.0088

<b>Nickel</b>	
	<b>mg /L</b>
<b>Month</b>	<b>FE</b>
January	0.0031
February	0.0032
March	0.0038
April	0.0050
May	0.0037
June	0.0035
July	0.0057
August	0.0036
September	0.0034
October	0.0029
November	0.0024
December	0.0029

<i>Selenium</i>	
	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.0081
February	0.0060
March	0.0064
April	0.0022
May	0.0014
June	0.0032
July	0.0034
August	0.0055
September	0.0044
October	0.0046
November	0.0031
December	0.0018

<i>Silver</i>	
	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	<0.00005
February	<0.00005
March	<0.00005
April	0.00005
May	<0.00005
June	<0.00005
July	<0.00005
August	<0.00005
September	<0.00005
October	<0.00005
November	<0.00005
December	<0.00005

<i>Strontium</i>	
	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.49
February	0.50
March	0.50
April	0.44
May	0.46
June	0.53
July	0.46
August	0.44
September	0.40
October	0.43
November	0.43
December	0.42

<i>Thallium</i>	
	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	<0.0002
February	<0.0002
March	<0.0002
April	<0.0002
May	<0.0002
June	<0.0002
July	<0.0002
August	<0.0002
September	<0.0002
October	<0.0002
November	<0.0002
December	<0.0002

<i>Uranium</i>	
	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.0011
February	0.0012
March	0.0011
April	0.0026
May	0.0013
June	0.0020
July	0.0008
August	0.0003
September	0.0004
October	0.0007
November	0.0007
December	0.0005

<i>Vanadium</i>	
	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.0033
February	0.0027
March	0.0016
April	1.3600
May	0.1200
June	0.0130
July	0.0100
August	0.0033
September	0.0026
October	0.0022
November	0.0012
December	0.0010

<i>Zinc</i>	
	<i>mg /L</i>
<i>Month</i>	<i>FE</i>
January	0.048
February	0.029
March	0.033
April	0.045
May	0.037
June	0.041
July	0.029
August	0.033
September	0.028
October	0.033
November	0.050
December	0.032



## **APPENDIX C**

# Flowmeter Verification Certificate Transmitter + Sensor

Epcor Water Services Inc.

Customer

53W2H-ULGB5R32BAAA

Order code

PROMAG 53 W DN200

Device type

K4031616000

Serial number

V2.03.00

Software Version Transmitter

30.05.2018

Verification date

Regina Waste Water Treatment Plant

Plant

FIT-710D

Tag Name

1.0696 - 1.0696

K-Factor

-1

Zero point

V1.06.00

Software Version I/O-Module

13:51

Verification time

## Verification result Transmitter: Passed Verification result Sensor: Passed

Test item	Result	Applied Limits
Amplifier	Passed	Basis: 0.55 %
Current Output 1	Passed	0.05 mA
Pulse Output 1	Not tested	0 P
Test Sensor	Passed	

### FieldCheck Details

550670

Production number

1.07.08

Software Version

10/2017

Last Calibration Date

### Simubox Details

8767304

Production number

1.00.01

Software Version

10/2017

Last Calibration Date

Date

Operator's Sign

Inspector's Sign

### Overall results:

The achieved test results show that the instrument is completely functional, and the measuring results lie within +/- 1% of the original calibration.<sup>1)</sup>

The calibration of the Fieldcheck test system is fully traceable to national standards.

1) Prerequisite is an additional proof of electrode integrity with a high voltage test.

## FieldCheck - Result Tab Transmitter

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53W2H-ULGB5R32BAAA	Tag Name	FIT-710D
Device type	PROMAG 53 W DN200	K-Factor	1.0696 - 1.0696
Serial number	K4031616000	Zero point	-1
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	30.05.2018	Verification time	13:51

Verification Flow end value ( 100 % ): 125.664 l/s  
Flow speed 4.00 m/s

Passed / Failed	Test item	Simul. Signal	Limit Value	Deviation
	<b>Test Transmitter</b>			
✓	Amplifier	6.283 l/s (5%)	1.50 %	0.36 %
✓		31.416 l/s (25.0%)	0.70 %	0.04 %
✓		62.832 l/s (50.0%)	0.60 %	0.05 %
✓		125.664 l/s (100%)	0.55 %	0.01 %
✓	Current Output 1	4.000 mA (0%)	0.05 mA	0.003 mA
✓		4.800 mA (5%)	0.05 mA	0.004 mA
✓		8.000 mA (25.0%)	0.05 mA	-0.016 mA
✓		12.000 mA (50.0%)	0.05 mA	0.005 mA
✓		20.000 mA (100%)	0.05 mA	0.003 mA
—	Pulse Output 1	---	---	---
		<b>Start value</b>	<b>Limits range</b>	<b>Measured value</b>
	<b>Test Sensor</b>			
✓	Coil Curr. Rise	13.300 ms	0.000..27.625 ms	16.688 ms
✓	Coil Curr. Stability		---	---
✓	Electrode Integrity	mV	0.0..300.000 mV	26.350 mV

Legend of symbols

✓	✗	—	?	!
Passed	Failed	not tested	not testable	Attention

# FieldCheck: Parameters Transmitter

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53W2H-ULGB5R32BAAA	Tag Name	FIT-710D
Device type	PROMAG 53 W DN200	K-Factor	1.0696 - 1.0696
Serial number	K4031616000	Zero point	-1
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	30.05.2018	Verification time	13:51

<b>Curent Output</b>	<b>Assign</b>	<b>Current Range</b>	<b>Value 0_4mA</b>	<b>Value 20 mA</b>		
Terminal 26/27	VOLUME FLOW	4-20 mA activ	0.0 l/s	150.00 l/s		
<b>Pulse Output</b>	<b>Assign</b>	<b>Pulse Value</b>	<b>Output signal</b>	<b>Pulse width</b>		
Terminal 24/25	OFF	---	---	---		

Actual System Ident.

129.0

## FieldCheck - Result Tab Sensor

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53W2H-ULGB5R32BAAA	Tag Name	FIT-710D
Device type	PROMAG 53 W DN200	K-Factor	1.0696 - 1.0696
Serial number	K4031616000	Zero point	-1
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	30.05.2018	Verification time	13:51
Production number Sensor Testbox	8744307	SW Version Sensor Testbox	1.02.04
Last Functional Test date	02/2017		

Passed / Failed	Test item	Measured value	Limit Value
✓	Ref.-Electrode --> Ground Connection	0.29 Ohm	< 10.0 Ohm
✓	Magn. Coil resistance	123 Ohm	40 .. 300 Ohm
✓	Electrode 1 --> Electrode 2	81.5 Ohm	10 Ohm .. 40 kOhm
✓	Electrode 1 --> Ref.-Electrode	95.4 Ohm	10 Ohm .. 40 kOhm
✓	Electrode 2 --> Ref.-Electrode	79.1 Ohm	10 Ohm .. 40 kOhm
✓	EPD-Electrode --> Ref.-Electrode	96.5 Ohm	10 Ohm .. 40 kOhm
✓	Electrode Screen 1 --> Ref.-Electrode	29.3 MOhm	> 5 MOhm
✓	Electrode Screen 2 --> Ref.-Electrode	37.1 MOhm	> 5 MOhm
✓	EPD Electrode Screen --> Ref.-Electrode	46.0 MOhm	> 5 MOhm
✓	Electrode 1 --> Screen 1	88.1 MOhm	> 5 MOhm
✓	Electrode 2 --> Screen 2	> 100 MOhm	> 5 MOhm
✓	EPD-Electrode --> EPD-Screen	> 100 MOhm	> 5 MOhm
✓	Magn. Coil --> Ref. electrode	> 100 MOhm	> 5 MOhm
✓	HV Screen 1 --> Ref.-Electrode	175 MOhm	> 5 MOhm
✓	HV Screen 2 --> Ref.-Electrode	175 MOhm	> 5 MOhm
✓	HV EPD-Screen --> Ref.-Electrode	193 MOhm	> 5 MOhm
✓	HV Mag.-Coil --> Ref.-Electrode	> 500 MOhm	> 5 MOhm

Application Reference Data			
Magn. Coil resistance	123 Ohm	PROMAG 53 W DN200 Serial number: K4031616000 Tag Name: FIT-710D 30.05.2018 13:51	
Rise Time Coil current	16.7 ms		
Electrode 1 --> Electrode 2	81.5 Ohm		
Electrode 1 --> Ref.-Electrode	95.4 Ohm		
Electrode 2 --> Ref.-Electrode	79.1 Ohm		
EPD-Electrode --> Ref.-Electrode	96.5 Ohm		
potential Electrode 1 (test)	0.343 V		
potential Electrode 2 (test)	0.359 V		
potential Electrode 1 (syst)	0.346 V		
potential Electrode 2 (syst)	0.362 V		

### Legend of symbols

✓	✗	—	?	!
Passed	Failed	not tested	not testable	Attention

# Flowmeter Verification Certificate Transmitter + Sensor

Epcor Water Services Inc.  
 Customer  
 53W2H-ULGB5R32BAAA  
 Order code  
 PROMAG 53 W DN200  
 Device type  
 K4031616000  
 Serial number  
 V2.03.00  
 Software Version Transmitter  
 19.12.2018  
 Verification date

Regina Waste Water Treatment Plant  
 Plant  
 FIT-710D  
 Tag Name  
 1.0696 - 1.0696  
 K-Factor  
 -1  
 Zero point  
 V1.06.00  
 Software Version I/O-Module  
 12:28  
 Verification time

## Verification result Transmitter: Passed Verification result Sensor: Passed

Test item	Result	Applied Limits
Amplifier	Passed	Basis: 0.55 %
Current Output 1	Passed	0.05 mA
Pulse Output 1	Not tested	0 P
Test Sensor	Passed	

**FieldCheck Details**  
 550510  
 Production number  
 1.07.08  
 Software Version  
 02/2018  
 Last Calibration Date

**Simubox Details**  
 8753969  
 Production number  
 1.00.01  
 Software Version  
 02/2018  
 Last Calibration Date

Dec-19, 2018  
 Date

*Memo 7-1*  
 Operator's Sign

Inspector's Sign

**Overall results:**

The achieved test results show that the instrument is completely functional, and the measuring results lie within +/- 1% of the original calibration.<sup>1)</sup>

The calibration of the Fieldcheck test system is fully traceable to national standards.

1) Prerequisite is an additional proof of electrode integrity with a high voltage test.



## FieldCheck - Result Tab Transmitter

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53W2H-ULGB5R32BAAA	Tag Name	FIT-710D
Device type	PROMAG 53 W DN200	K-Factor	1.0696 - 1.0696
Serial number	K4031616000	Zero point	-1
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	19.12.2018	Verification time	12:28

Verification Flow end value ( 100 % ): 125.664 l/s  
Flow speed 4.00 m/s

Passed / Failed	Test item	Simul. Signal	Limit Value	Deviation
	<b>Test Transmitter</b>			
✓	Amplifier	6.283 l/s (5%)	1.50 %	0.81 %
✓		31.416 l/s (25.0%)	0.70 %	0.09 %
✓		62.832 l/s (50.0%)	0.60 %	0.08 %
✓		125.664 l/s (100%)	0.55 %	0.02 %
✓	Current Output 1	4.000 mA (0%)	0.05 mA	-0.002 mA
✓		4.800 mA (5%)	0.05 mA	-0.001 mA
✓		8.000 mA (25.0%)	0.05 mA	-0.015 mA
✓		12.000 mA (50.0%)	0.05 mA	-0.001 mA
✓		20.000 mA (100%)	0.05 mA	0.009 mA
—	Pulse Output 1	---	---	---
		<b>Start value</b>	<b>Limits range</b>	<b>Measured value</b>
	<b>Test Sensor</b>			
✓	Coil Curr. Rise	13.300 ms	0.000..27.625 ms	16.645 ms
✓	Coil Curr. Stability		---	---
✓	Electrode Integrity	mV	0.0..300.000 mV	230.565 mV

Legend of symbols

✓	✗	—	?	!
Passed	Failed	not tested	not testable	Attention

## FieldCheck: Parameters Transmitter

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53W2H-ULGB5R32BAAA	Tag Name	FIT-710D
Device type	PROMAG 53 W DN200	K-Factor	1.0696 - 1.0696
Serial number	K4031616000	Zero point	-1
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	19.12.2018	Verification time	12:28

<b>Curent Output</b>	<b>Assign</b>	<b>Current Range</b>	<b>Value 0_4mA</b>	<b>Value 20 mA</b>		
Terminal 26/27	VOLUME FLOW	4-20 mA activ	0.0 l/s	150.00 l/s		
<b>Pulse Output</b>	<b>Assign</b>	<b>Pulse Value</b>	<b>Output signal</b>	<b>Pulse width</b>		
Terminal 24/25	OFF	---	---	---		

Actual System Ident.

121.0

## FieldCheck - Result Tab Sensor

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53W2H-ULGB5R32BAAA	Tag Name	FIT-710D
Device type	PROMAG 53 W DN200	K-Factor	1.0696 - 1.0696
Serial number	K4031616000	Zero point	-1
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	19.12.2018	Verification time	12:28
Production number Sensor Testbox	8764765	SW Version Sensor Testbox	1.02.04
Last Functional Test date	12/2017		

Passed / Failed	Test item	Measured value	Limit Value
✓	Ref.-Electrode --> Ground Connection	0.36 Ohm	< 10.0 Ohm
✓	Magn. Coil resistance	120 Ohm	40 .. 300 Ohm
✓	Electrode 1 --> Electrode 2	188 Ohm	10 Ohm .. 40 kOhm
✓	Electrode 1 --> Ref.-Electrode	180 Ohm	10 Ohm .. 40 kOhm
✓	Electrode 2 --> Ref.-Electrode	180 Ohm	10 Ohm .. 40 kOhm
✓	EPD-Electrode --> Ref.-Electrode	127 Ohm	10 Ohm .. 40 kOhm
✓	Electrode Screen 1 --> Ref.-Electrode	> 100 MOhm	> 5 MOhm
✓	Electrode Screen 2 --> Ref.-Electrode	> 100 MOhm	> 5 MOhm
✓	EPD Electrode Screen --> Ref.-Electrode	> 100 MOhm	> 5 MOhm
✓	Electrode 1 --> Screen 1	> 100 MOhm	> 5 MOhm
✓	Electrode 2 --> Screen 2	> 100 MOhm	> 5 MOhm
✓	EPD-Electrode --> EPD-Screen	> 100 MOhm	> 5 MOhm
✓	Magn. Coil --> Ref. electrode	> 100 MOhm	> 5 MOhm
✓	HV Screen 1 --> Ref.-Electrode	> 500 MOhm	> 5 MOhm
✓	HV Screen 2 --> Ref.-Electrode	> 500 MOhm	> 5 MOhm
✓	HV EPD-Screen --> Ref.-Electrode	> 500 MOhm	> 5 MOhm
✓	HV Mag.-Coil --> Ref.-Electrode	> 500 MOhm	> 5 MOhm

Application Reference Data			
Magn. Coil resistance	120 Ohm	PROMAG 53 W DN200 Serial number: K4031616000 Tag Name: FIT-710D 19.12.2018 12:28	
Rise Time Coil current	16.6 ms		
Electrode 1 --> Electrode 2	188 Ohm		
Electrode 1 --> Ref.-Electrode	180 Ohm		
Electrode 2 --> Ref.-Electrode	180 Ohm		
EPD-Electrode --> Ref.-Electrode	127 Ohm		
potential Electrode 1 (test)	0.464 V		
potential Electrode 2 (test)	0.451 V		
potential Electrode 1 (syst)	0.464 V		
potential Electrode 2 (syst)	0.451 V		

### Legend of symbols

✓	✗	—	?	!
Passed	Failed	not tested	not testable	Attention

# Flowmeter Verification Certificate Transmitter + Sensor

Epcor Water Services Inc.

Customer

53LV0-UPGB1AK6AAAA

Order code

PROMAG 53 L 42INCH

Device type

K30A0219000

Serial number

V2.03.00

Software Version Transmitter

30.05.2018

Verification date

Regina Waste Water Treatment Plant

Plant

FIT-610A

Tag Name

1.5301 - 1.5301

K-Factor

3

Zero point

V1.06.00

Software Version I/O-Module

13:29

Verification time

## Verification result Transmitter: Passed

## Verification result Sensor: Passed

Test item	Result	Applied Limits
Amplifier	Passed	Basis: 0.55 %
Current Output 1	Passed	0.05 mA
Pulse Output 1	Not tested	0 P
Test Sensor	Passed	

### FieldCheck Details

550670

Production number

1.07.08

Software Version

10/2017

Last Calibration Date

### Simubox Details

8767304

Production number

1.00.01

Software Version

10/2017

Last Calibration Date

Date

Operator's Sign

Inspector's Sign

### **Overall results:**

The achieved test results show that the instrument is completely functional, and the measuring results lie within +/- 1% of the original calibration.<sup>1)</sup>

The calibration of the Fieldcheck test system is fully traceable to national standards.

1) Prerequisite is an additional proof of electrode integrity with a high voltage test.

## FieldCheck - Result Tab Transmitter

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53LV0-UPGB1AK6AAAA	Tag Name	FIT-610A
Device type	PROMAG 53 L 42INCH	K-Factor	1.5301 - 1.5301
Serial number	K30A0219000	Zero point	3
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	30.05.2018	Verification time	13:29

Verification Flow end value ( 100 % ): 299.255 MI/d  
Flow speed 4.00 m/s

Passed / Failed	Test item	Simul. Signal	Limit Value	Deviation
	<b>Test Transmitter</b>			
✓	Amplifier	14.963 MI/d (5%)	1.50 %	0.60 %
✓		74.814 MI/d (25.0%)	0.70 %	0.09 %
✓		149.628 MI/d (50.0%)	0.60 %	0.10 %
✓		299.255 MI/d (100%)	0.55 %	0.02 %
✓	Current Output 1	4.000 mA (0%)	0.05 mA	0.001 mA
✓		4.800 mA (5%)	0.05 mA	0.001 mA
✓		8.000 mA (25.0%)	0.05 mA	-0.015 mA
✓		12.000 mA (50.0%)	0.05 mA	0.003 mA
✓		20.000 mA (100%)	0.05 mA	0.001 mA
—	Pulse Output 1	---	---	---
		<b>Start value</b>	<b>Limits range</b>	<b>Measured value</b>
	<b>Test Sensor</b>			
✓	Coil Curr. Rise	68.000 ms	0.000..121.500 ms	82.128 ms
✓	Coil Curr. Stability		---	---
✓	Electrode Integrity	mV	0.0..300.000 mV	12.980 mV

Legend of symbols

✓	✗	—	?	!
Passed	Failed	not tested	not testable	Attention

## FieldCheck: Parameters Transmitter

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53LV0-UPGB1AK6AAAA	Tag Name	FIT-610A
Device type	PROMAG 53 L 42INCH	K-Factor	1.5301 - 1.5301
Serial number	K30A0219000	Zero point	3
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	30.05.2018	Verification time	13:29

<b>Curent Output</b>	<b>Assign</b>	<b>Current Range</b>	<b>Value 0_4mA</b>	<b>Value 20 mA</b>		
Terminal 26/27	VOLUME FLOW	4-20 mA activ	0.0 MI/d	250.00 MI/d		
<b>Pulse Output</b>	<b>Assign</b>	<b>Pulse Value</b>	<b>Output signal</b>	<b>Pulse width</b>		
Terminal 24/25	OFF	---	---	---		

Actual System Ident.

129.0

## FieldCheck - Result Tab Sensor

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53LV0-UPGB1AK6AAAA	Tag Name	FIT-610A
Device type	PROMAG 53 L 42INCH	K-Factor	1.5301 - 1.5301
Serial number	K30A0219000	Zero point	3
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	30.05.2018	Verification time	13:29
Production number Sensor Testbox	8744307	SW Version Sensor Testbox	1.02.04
Last Functional Test date	02/2017		

Passed / Failed	Test item	Measured value	Limit Value
✓	Ref.-Electrode --> Ground Connection	0.48 Ohm	< 10.0 Ohm
✓	Magn. Coil resistance	102 Ohm	40 .. 300 Ohm
✓	Electrode 1 --> Electrode 2	97.7 Ohm	10 Ohm .. 40 kOhm
✓	Electrode 1 --> Ref.-Electrode	98.9 Ohm	10 Ohm .. 40 kOhm
✓	Electrode 2 --> Ref.-Electrode	90.5 Ohm	10 Ohm .. 40 kOhm
✓	EPD-Electrode --> Ref.-Electrode	109 Ohm	10 Ohm .. 40 kOhm
✓	Electrode Screen 1 --> Ref.-Electrode	> 100 MOhm	> 5 MOhm
✓	Electrode Screen 2 --> Ref.-Electrode	> 100 MOhm	> 5 MOhm
✓	EPD Electrode Screen --> Ref.-Electrode	> 100 MOhm	> 5 MOhm
✓	Electrode 1 --> Screen 1	> 100 MOhm	> 5 MOhm
✓	Electrode 2 --> Screen 2	> 100 MOhm	> 5 MOhm
✓	EPD-Electrode --> EPD-Screen	> 100 MOhm	> 5 MOhm
✓	Magn. Coil --> Ref. electrode	> 100 MOhm	> 5 MOhm
—	HV Screen 1 --> Ref.-Electrode	-	> 5 MOhm
—	HV Screen 2 --> Ref.-Electrode	-	> 5 MOhm
—	HV EPD-Screen --> Ref.-Electrode	-	> 5 MOhm
—	HV Mag.-Coil --> Ref.-Electrode	-	> 5 MOhm

Application Reference Data			
Magn. Coil resistance	102 Ohm	PROMAG 53 L 42INCH Serial number: K30A0219000 Tag Name: FIT-610A 30.05.2018 13:29	
Rise Time Coil current	82.7 ms		
Electrode 1 --> Electrode 2	97.7 Ohm		
Electrode 1 --> Ref.-Electrode	98.9 Ohm		
Electrode 2 --> Ref.-Electrode	90.5 Ohm		
EPD-Electrode --> Ref.-Electrode	109 Ohm		
potential Electrode 1 (test)	0.318 V		
potential Electrode 2 (test)	0.435 V		
potential Electrode 1 (syst)	0.321 V		
potential Electrode 2 (syst)	0.438 V		

### Legend of symbols

✓	✗	—	?	!
Passed	Failed	not tested	not testable	Attention



# Flowmeter Verification Certificate Transmitter + Sensor

Epcor Water Services Inc.

Customer

53LV0-UPGB1AK6AAAA

Order code

PROMAG 53 L 42INCH

Device type

K30A0219000

Serial number

V2.03.00

Software Version Transmitter

19.12.2018

Verification date

Regina Waste Water Treatment Plant

Plant

FIT-610A

Tag Name

1.5301 - 1.5301

K-Factor

3

Zero point

V1.06.00

Software Version I/O-Module

12:07

Verification time

## Verification result Transmitter: Passed Verification result Sensor: Passed

Test item	Result	Applied Limits
Amplifier	Passed	Basis: 0.55 %
Current Output 1	Passed	0.05 mA
Pulse Output 1	Not tested	0 P
Test Sensor	Passed	

### FieldCheck Details

550510

Production number

1.07.08

Software Version

02/2018

Last Calibration Date

### Simubox Details

8753969

Production number

1.00.01

Software Version

02/2018

Last Calibration Date

Dec-19, 2018

Date

Operator's Sign

Inspector's Sign

### Overall results:

The achieved test results show that the instrument is completely functional, and the measuring results lie within +/- 1% of the original calibration.<sup>1)</sup>

The calibration of the Fieldcheck test system is fully traceable to national standards.

1) Prerequisite is an additional proof of electrode integrity with a high voltage test.

## FieldCheck - Result Tab Transmitter

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53LV0-UPGB1AK6AAAA	Tag Name	FIT-610A
Device type	PROMAG 53 L 42INCH	K-Factor	1.5301 - 1.5301
Serial number	K30A0219000	Zero point	3
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	19.12.2018	Verification time	12:07

Verification Flow end value ( 100 % ): 299.255 MI/d  
Flow speed 4.00 m/s

Passed / Failed	Test item	Simul. Signal	Limit Value	Deviation
	<b>Test Transmitter</b>			
✓	Amplifier	14.963 MI/d (5%)	1.50 %	0.84 %
✓		74.814 MI/d (25.0%)	0.70 %	0.06 %
✓		149.628 MI/d (50.0%)	0.60 %	0.06 %
✓		299.255 MI/d (100%)	0.55 %	0.03 %
✓	Current Output 1	4.000 mA (0%)	0.05 mA	-0.003 mA
✓		4.800 mA (5%)	0.05 mA	-0.003 mA
✓		8.000 mA (25.0%)	0.05 mA	-0.018 mA
✓		12.000 mA (50.0%)	0.05 mA	-0.004 mA
✓		20.000 mA (100%)	0.05 mA	0.005 mA
—	Pulse Output 1	---	---	---
		<b>Start value</b>	<b>Limits range</b>	<b>Measured value</b>
	<b>Test Sensor</b>			
✓	Coil Curr. Rise	68.000 ms	0.000..121.500 ms	81.891 ms
✓	Coil Curr. Stability		---	---
✓	Electrode Integrity	mV	0.0..300.000 mV	227.142 mV

Legend of symbols

✓	✗	—	?	!
Passed	Failed	not tested	not testable	Attention

# FieldCheck: Parameters Transmitter

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53LV0-UPGB1AK6AAAA	Tag Name	FIT-610A
Device type	PROMAG 53 L 42INCH	K-Factor	1.5301 - 1.5301
Serial number	K30A0219000	Zero point	3
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	19.12.2018	Verification time	12:07

<b>Curent Output</b>	<b>Assign</b>	<b>Current Range</b>	<b>Value 0_4mA</b>	<b>Value 20 mA</b>		
Terminal 26/27	VOLUME FLOW	4-20 mA activ	0.0 MI/d	250.00 MI/d		
<b>Pulse Output</b>	<b>Assign</b>	<b>Pulse Value</b>	<b>Output signal</b>	<b>Pulse width</b>		
Terminal 24/25	OFF	---	---	---		

Actual System Ident.

119.0

## FieldCheck - Result Tab Sensor

Customer	Epcor Water Services Inc.	Plant	Regina Waste Water Treatment Plant
Order code	53LV0-UPGB1AK6AAAA	Tag Name	FIT-610A
Device type	PROMAG 53 L 42INCH	K-Factor	1.5301 - 1.5301
Serial number	K30A0219000	Zero point	3
Software Version Transmitter	V2.03.00	Software Version I/O-Module	V1.06.00
Verification date	19.12.2018	Verification time	12:07
Production number Sensor Testbox	8764765	SW Version Sensor Testbox	1.02.04
Last Functional Test date	12/2017		

Passed / Failed	Test item	Measured value	Limit Value
✓	Ref.-Electrode --> Ground Connection	0.47 Ohm	< 10.0 Ohm
✓	Magn. Coil resistance	100 Ohm	40 .. 300 Ohm
✓	Electrode 1 --> Electrode 2	110 Ohm	10 Ohm .. 40 kOhm
✓	Electrode 1 --> Ref.-Electrode	114 Ohm	10 Ohm .. 40 kOhm
✓	Electrode 2 --> Ref.-Electrode	82.9 Ohm	10 Ohm .. 40 kOhm
✓	EPD-Electrode --> Ref.-Electrode	151 Ohm	10 Ohm .. 40 kOhm
✓	Electrode Screen 1 --> Ref.-Electrode	> 100 MOhm	> 5 MOhm
✓	Electrode Screen 2 --> Ref.-Electrode	> 100 MOhm	> 5 MOhm
✓	EPD Electrode Screen --> Ref.-Electrode	> 100 MOhm	> 5 MOhm
✓	Electrode 1 --> Screen 1	> 100 MOhm	> 5 MOhm
✓	Electrode 2 --> Screen 2	> 100 MOhm	> 5 MOhm
✓	EPD-Electrode --> EPD-Screen	> 100 MOhm	> 5 MOhm
✓	Magn. Coil --> Ref. electrode	> 100 MOhm	> 5 MOhm
✓	HV Screen 1 --> Ref.-Electrode	257 MOhm	> 5 MOhm
✓	HV Screen 2 --> Ref.-Electrode	243 MOhm	> 5 MOhm
✓	HV EPD-Screen --> Ref.-Electrode	251 MOhm	> 5 MOhm
✓	HV Mag.-Coil --> Ref.-Electrode	> 500 MOhm	> 5 MOhm

Application Reference Data			
Magn. Coil resistance	100 Ohm	PROMAG 53 L 42INCH Serial number: K30A0219000 Tag Name: FIT-610A 19.12.2018 12:07	
Rise Time Coil current	82.3 ms		
Electrode 1 --> Electrode 2	110 Ohm		
Electrode 1 --> Ref.-Electrode	114 Ohm		
Electrode 2 --> Ref.-Electrode	82.9 Ohm		
EPD-Electrode --> Ref.-Electrode	151 Ohm		
potential Electrode 1 (test)	0.347 V		
potential Electrode 2 (test)	0.454 V		
potential Electrode 1 (syst)	0.350 V		
potential Electrode 2 (syst)	0.454 V		

### Legend of symbols

✓	✗	—	?	!
Passed	Failed	not tested	not testable	Attention