Report to Council

To: Waterworks Committee

From: Administration

File #: DOP-CC-15

Date: March 23, 2020

Re: Water Pollution Control Facility 2019 Annual Report

For Information Only

Wastewater Treatment Division 2019 Annual Report

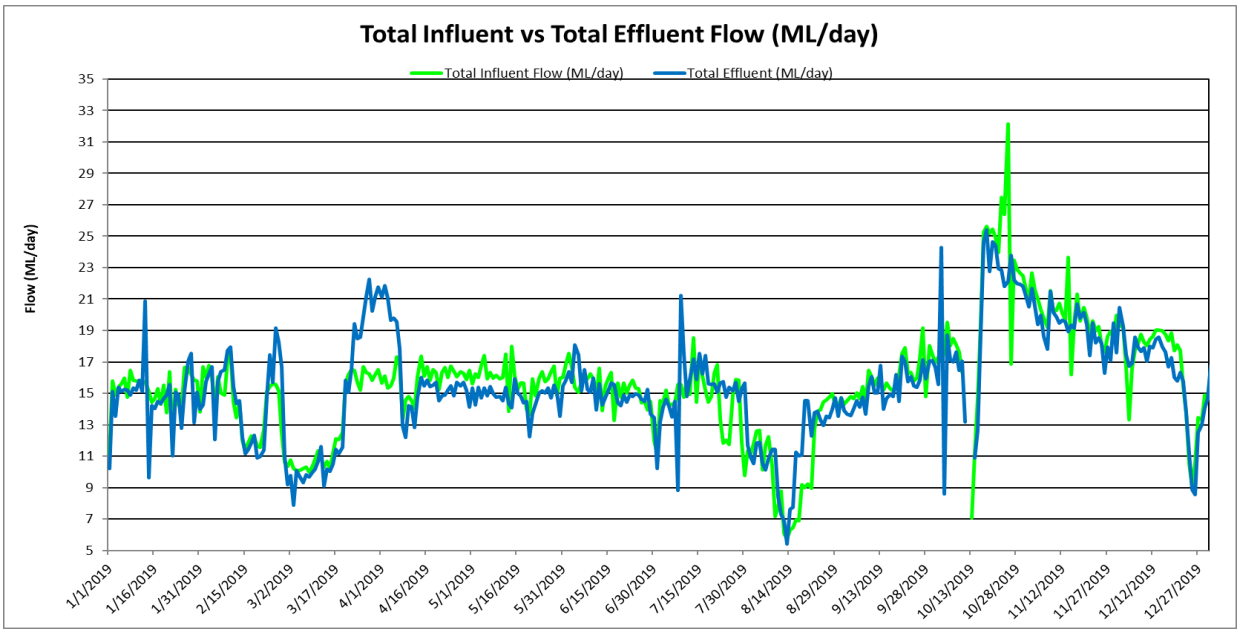
Introduction

The Water Pollution Control Facility (WPCF) is a wastewater treatment plant that is owned and operated by the City of Portage la Prairie. Wastewater is received from three main sources- the domestic wastewater from the City of Portage la Prairie and Southport, the pre-treated wastewater from Poplar Bluff Industrial Park and the full-strength industrial wastewater from McMillan Industrial Park. This water is transferred to the WPCF via 15 lift stations located around the municipality as well as the industrial parks.

The industrial water is combined with the domestic (residential/commercial wastewater) in a common lift station and is pumped into one of the four Sequencing Batch Reactors (SBRs). Through cycles of aeration, mix and settle, the wastewater is treated through the activity of specialized bacteria that remove the organic waste in the water. The treated water is then disinfected via Ultra-Violet exposure and then discharged to the Assiniboine River.

The biological activity required for treatment produces residual solids that accumulate in the SBRs. A calculated volume of these solids must be removed each day. These solids are thickened, then anaerobically digested for stabilization. Stabilized solids are referred to as Biosolids. Biosolids are stored and then land applied each spring and fall to agricultural land as a soil supplement.

In 2019, the WPCF received an average of 15,450,000 L of wastewater each day, for a total volume of 5,608,978,000 L or 5.6 billion liters. This is an increase of 391,450,000 L received in 2018. The max daily flow recorded was 32,142,000 L and the minimum daily flow was 5,737,000 L. Additionally, 952 051 kg of solids (952 dry tonnes) was processed from the secondary system and just over 260 tonnes of solids were land applied to agricultural land.



The incoming flow is 44% domestic and commercial wastewater and 56% from industrial sources. Similarly, over 90% of the loading (Total Suspended Solids, Biological Oxygen Demand, Total Phosphorous, and Total Nitrogen) received at the WPCF is from industrial sources.

Environment Act License Compliance

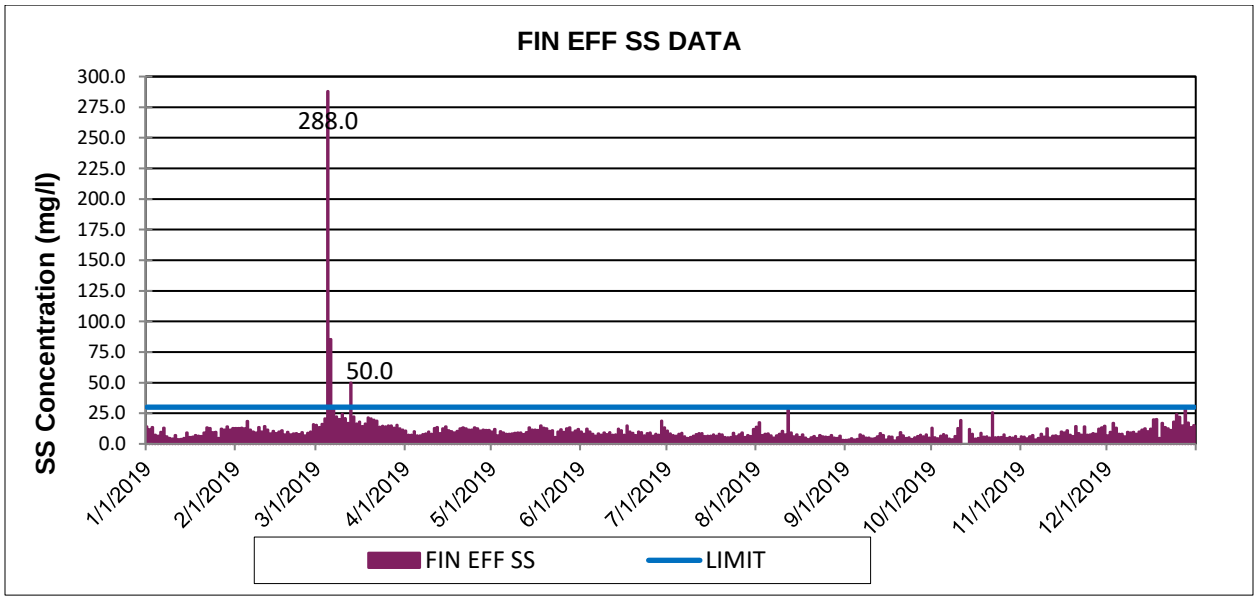
The WCPF operates under Environment Act License #2543 R, which is issued by the Province of Manitoba Department of Sustainable Development. In addition to outlining requirements for treatment processes, sampling and reporting, it also provides maximum limits on the total amount of Suspended Solids, Biological Oxygen Demand, and Ammonia the facility can discharge in the treated wastewater each day and a monthly geometric mean for fecal bacteria. The facility is also required to test for toxicity on a monthly and quarterly basis. Any exceedance is reported to Manitoba Sustainable Development within 24 hours of the limit being surpassed.

Total Suspended Solids

Total Suspended Solids (TSS) is the amount of particulate matter that is suspended in the water that is released from the WPCF. This is to not exceed 30 mg/L per day. The average daily TSS discharged in 2019 was 10.8 mg/L and there were three occurrences where this limit was exceeded for a 99.2% compliance rating. As demonstrated by the chart, on remaining days, the discharged solids were well below the allowable limit.

March 5 & 6- The influent valve for Basin #3 malfunctioned and took too long to close and failed off. This caused the basin process to decant water too early in the cycle. The basin was taken offline to allow for repair of the valve actuator, however, there was a carryover of solids in the sample on March 6 before the problem was detected.

March 13- Operators cleaned the EQ basin which resulted in accumulated solids to be washed through the system.



Biological Oxygen Demand

Biological Oxygen Demand (BOD) is an indicator of the amount of dissolved oxygen need by the remaining biological organisms in the effluent to break down organic matter once it reaches the river. The Environmental License permits a maximum daily discharge of 30 mg/L. There was

one exceedance of this parameter for 99.02 % compliance and the average daily discharge amount was 3.9 mg/L.

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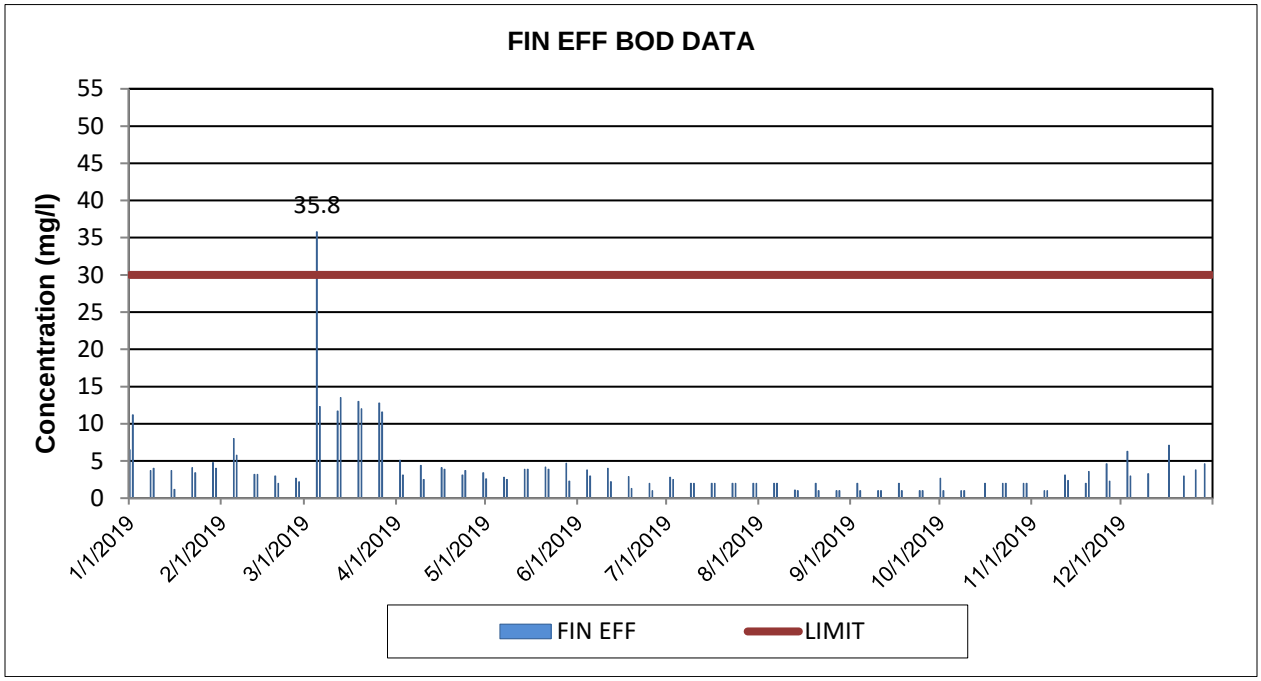


Ammonia

Ammonia is a pollutant that may be toxic to aquatic life depending on the concentration. The allowable daily load of ammonia that can be discharged to the Assiniboine River changes each month. There were no incidents of ammonia exceedance and the daily average is significantly less than the allowable limits, regardless of the monthly limit. The chart below indicates the discharge limit for each month compared to average daily amount that was recorded.

Month	Limit (kg/day)	Daily average by month (kg/day)
January	673	11.33
February	560.1	5.92
March	589.3	63.6
April	1068.2	4.86
May	691.8	4.35
June	264.6	4.55
July	213.2	4.62
August	19.6	3.65
September	134.4	5.97
October	286.4	6.99
November	448	5.62
December	646.4	7.89
Daily Average		**10.92**

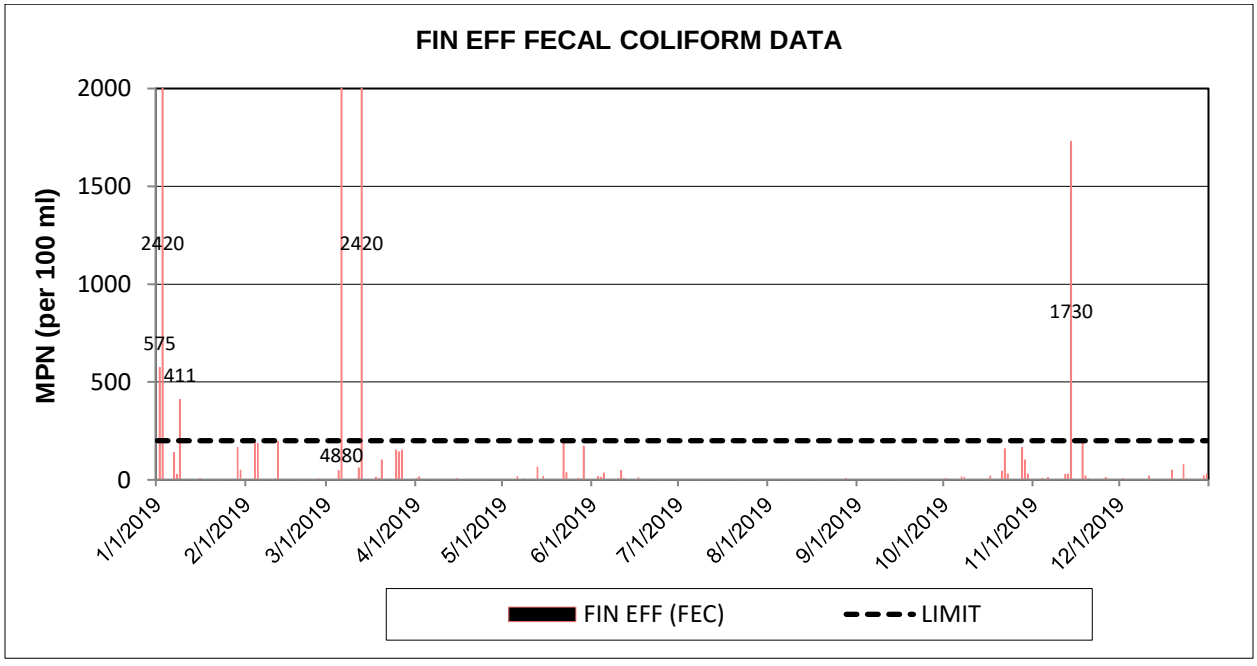
Toxicity

In addition to ammonia testing for toxicity, samples are submitted for toxicity verification through lethality testing. Daphnia toxicity occurs monthly and trout is quarterly. These tests are reported as pass fail. WPCF had no failures of toxicity in 2019.

Month	Toxicity Test	Pass/Fail
January	Trout	Pass
February	Daphnia	Pass
March	Daphnia	Pass
April	Trout	Pass
May	Daphnia	Pass
June	Daphnia	Pass
July	Trout	Pass
August	Daphnia	Pass
September	Daphnia	Pass
October	Trout	Pass
November	Daphnia	Pass
December	Daphnia	Pass

Coliforms

Fecal Coliform is a measurement of the amount of fecal coliform organisms within 100 mL of effluent. There is not a daily discharge limit but rather limit on the monthly geometric mean that must not exceed 200 CFU/100mL. Samples must be submitted three times per week and must be sampled on consecutive days. There were individual days were the results were reported above the limit, but the monthly geometric mean limit was not exceeded. These daily events do not need to be reported.



Although four reportable exceedances occurred early in 2019, these are attributable to a single mechanical failure and not a reflection of process or treatment performance.

Biosolids

The land application of biosolids is a beneficial reuse of nutrients and metals contained in the residual solids' material generated as part of the wastewater treatment process as fertilizer for local farmland. Excess Waste Activated Sludge (WAS) is removed from the SBR basins to maintain a proper amount of WAS within each basin. WAS is thickened and anaerobically digested, then stored in the Biosolids Storage Tanks (BSTs) or in the Bulk Volume Fermenter (BVF) until it can be applied to agricultural land. Land application occurs in the fall, once fields are available after harvest.

The application of biosolids is permitted under a separate Environment Act License, #1907. This license requires that all solids material be stabilized through anaerobic digestion for thirty days at 20°C prior to land application. The mixing system in the anaerobic digester has not been functioning for a few years. Material continues to build up in the tank, reducing the overall capacity and reducing the retention time in the digester, meaning the 30 days cannot be obtained. A suspension of the clause in the license that requires the time and temperature was requested and approved. This approval was supported as pathogenic kill and material stabilization has still been obtained within the system due to long storage times.

In 2019, 256.27 dry tonnes was applied to agricultural land within the RM of Portage la Prairie to land owned by two different farmers. A separate land application report was prepared and submitted to the Province of Manitoba as required by license.

Odour

A main source of odour is from the BVF. The gas collection system does not operate properly and causes gas to become trapped under the cover and vents out of sample ports, instead of travelling to the sides to be flared off. With the commissioning of the new Low Rate Anaerobic Reactor in the fall of 2019, the BVF was converted to a sludge storage tank and odour producing gas emissions should be minimal going forward.

Pumping Stations

The City of Portage la Prairie operates and maintains pumping stations throughout the city. These stations collect and pump wastewater to the treatment facility. All pump stations functioned as expected throughout the year with minor mechanical repairs and regular maintenance required. In 2019, three additional pumping stations were added to the Portage Collection System including the new station at Poplar Bluff, the return of operational control of the station at McMillan Industrial Park, and the addition of the station in the new South East subdivision. Effective August 1, the existing Poplar Bluff lift station was turned over to Simplot Foods for ownership and operational responsibility. With the addition and removal of these stations, a total of fourteen lift stations are under the care and control of the City of Portage la Prairie.

Reporting
In addition to reporting license compliance, City Administration strives to maintain regular communication with local and provincial representatives. In January, local representatives were notified of electrical shutdowns required for tie-ins of new equipment. In December, the new flare system was not functioning properly. This required the biogas by-pass valve to be opened and allow gas to be vented to atmosphere. Ongoing communication with Environment officers occurred.

Reporting is a major component of the WPCF. There are several reports that are required by various partners throughout the year. All reports were submitted on-time, as required. This year also required quarterly construction updates to be sent to the Province of Manitoba. These are as follows;

Monthly- final effluent report to Manitoba Sustainable Development; summary reports and exceedance letters, as required, to industrial partners; groundwater sample results to McCain Foods and Manitoba Sustainable Development.

Quarterly- Wastewater Systems Effluent Report to the Government of Canada, Nutrient Reduction updates to Manitoba Sustainable Development; Construction and finance reports to Manitoba Strategic Infrastructure Secretariat.

Annual- Annual WPCF Summary Report to Portage la Prairie City Council; National Pollutant Control report to Environment Canada; Biosolids Report to Manitoba Sustainable Development; Total Phosphorous report to Manitoba Sustainable Development.

Staffing
The Province of Manitoba requires operators and pumping station maintenance staff to be certified according to the classification of the facility. The Water Pollution Control Facility is deemed as Class 4 and the collection system is classified as Class 2. All operators must continue to work toward obtaining the same level of certification as the facilities they operate, through ongoing education and examination as well as on the job experience. Staff must also continually participate in ongoing education to maintain their certification levels.

Until July, WPCF was staffed by a Manager (level 4), an operations supervisor (level 3), three operators (1 at level 4 and 2 at level 1), and a lab technician. One level 1 operator resigned and in August, the City hired 2 additional operators as Operators-In-Training and the other level 1 operator successfully obtained their level 2 certification in November. The Collection System was staffed by two lift station maintenance persons that both have level 2. They are supervised by a foreman having level 2 certification.

Nutrient Reduction Compliance
The Water Quality Standards, Objectives and Guidelines regulation requires any wastewater facility that discharges into Lake Winnipeg to reduce nutrients from the effluent by January 1, 2016. The limits imposed were l mg/L of Phosphorous and 15 mg/L of Nitrogen. To meet these limits, the facility will require a new treatment processes to be added as well as supplemental systems to be incorporated with the existing treatment stream. There are also several areas of the

facility that are deteriorating, some lack efficiency and other components have been identified that lack redundancy and therefore the ability to properly maintain.

After the completion of the functional design in 2015, the total capital cost was estimated at $106 M. A business case analysis was conducted to determine if a Private-Public Partnership (P3) would be most economical to fund this project and the evaluation indicated that a complete Design, Build, Finance, Operate & Maintain model through P3 would result in the highest Value for Money. City Council approved this recommendation. It was necessary for the City of Portage la Prairie to apply for an extension to the phosphorous compliance deadline until January 1, 2018, to allow for the PPP model to be implemented once funding was secured. This extension was granted. A letter of request for an extension to the Phosphorous compliance deadline was submitted to Manitoba Sustainable Development on July 10, 2017 asking for a new compliance date of January 1, 2021 and there has been no response received regarding this request.

Early in 2017, Roquette announced it would be building a processing facility in the RM of Portage la Prairie. This development had a significant impact on the future incoming loads to the WPCF. A second major impact to the design was the announcement by Simplot Foods Canada that they were going to expand their production facility and construct their own wastewater treatment facility, meaning none of their industrial wastewater would be sent to WPCF. They would continue to send domestic flow. These two changes to the incoming wastewater were updated on the functional design which also affected the capital and future operating costs. A refresh of the functional design business case was conducted and resubmitted for grant funding consideration early in 2019. The new capital cost estimate is determined to be $115 M.

In August, the City received confirmation of funding from the federal and provincial governments for 73% of project costs. A project manager was secured early in 2019 and the Request for Qualifications will be issued to the private sector to begin the selection process of a PPP proponent. Submissions will be evaluated, and the most qualified bidders will be requested to submit proposals for the overall project. This process can take up to 18 months to select a final contractor. The contractor will then require two years to build and a further six months to completely commission the facility. Regulatory compliance is anticipated for January 2024. Administration continues to submit quarterly reports to keep the provincial department aware of the ongoing changes and progress.

Federal Funding Announcement at WPCF

Industrial Compliance
Each industry has daily peak amounts of flow, total suspended solids, chemical oxygen demand (COD), and total Kjeldahl nitrogen (TKN) that it can discharge to the WPCF after pre-treatment, as well as monthly average limits.

Prior to August, McCain was the operator of the BVF and received notification of exceedances of TSS 42 times and 34 times for COD. Nutri-Pea exceeded its current limits almost daily but once the new ISA is in place, there should be regular compliance. Roquette is still not discharging and has had no recorded effluent.

The Simplot BVF had recorded exceedance of peak limit 37 times for TSS, 28 occurrences for COD and 1 occurrence for TKN. Simplot's new wastewater treatment facility will be operational in February 2020 and the WPCF will no longer receive and treat industrial wastewater from this facility.

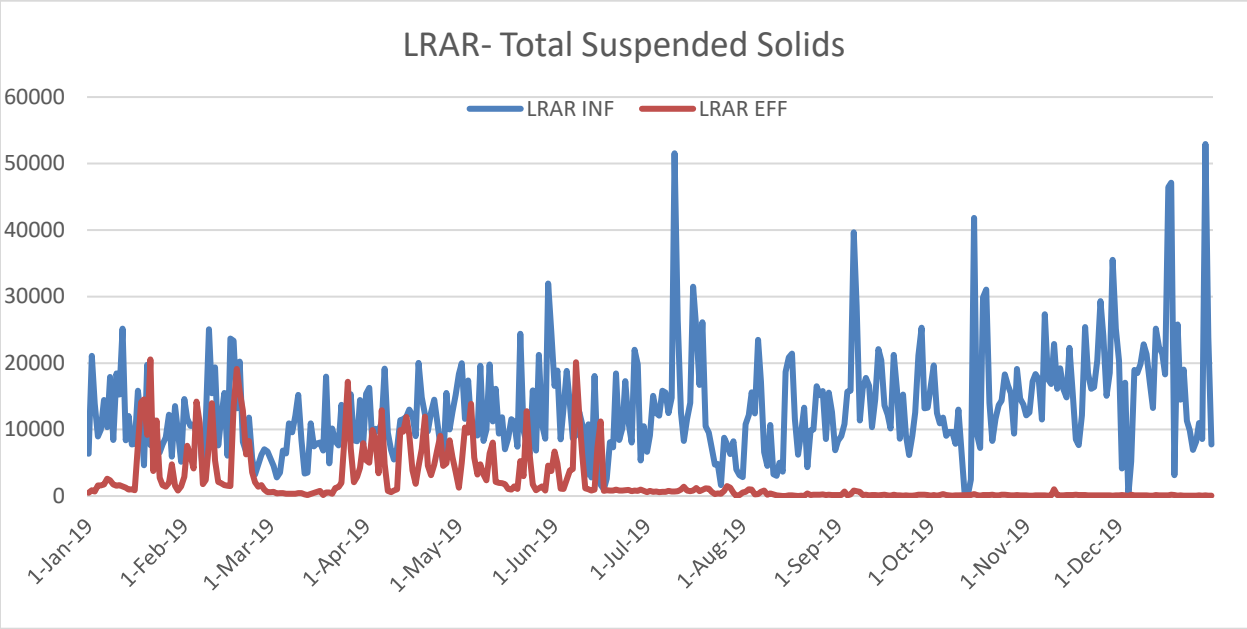
<u>Low Rate Anaerobic Reactor, Poplar Bluff Lift Station, South East Lift Station</u>
To properly treat the wastewater that Roquette will be producing once online, a new Low Rate Anaerobic Reactor (LRAR) and pumping station were required. A LRAR was planned with the nutrient reduction upgrade however, due to delays in funding for that project, this construction was advanced ahead of the overall project and was referred to as Phase 1. Funding for Phase 1 was provided in full by the Province of Manitoba and the Government of Canada for a total contribution of $28,750,000.

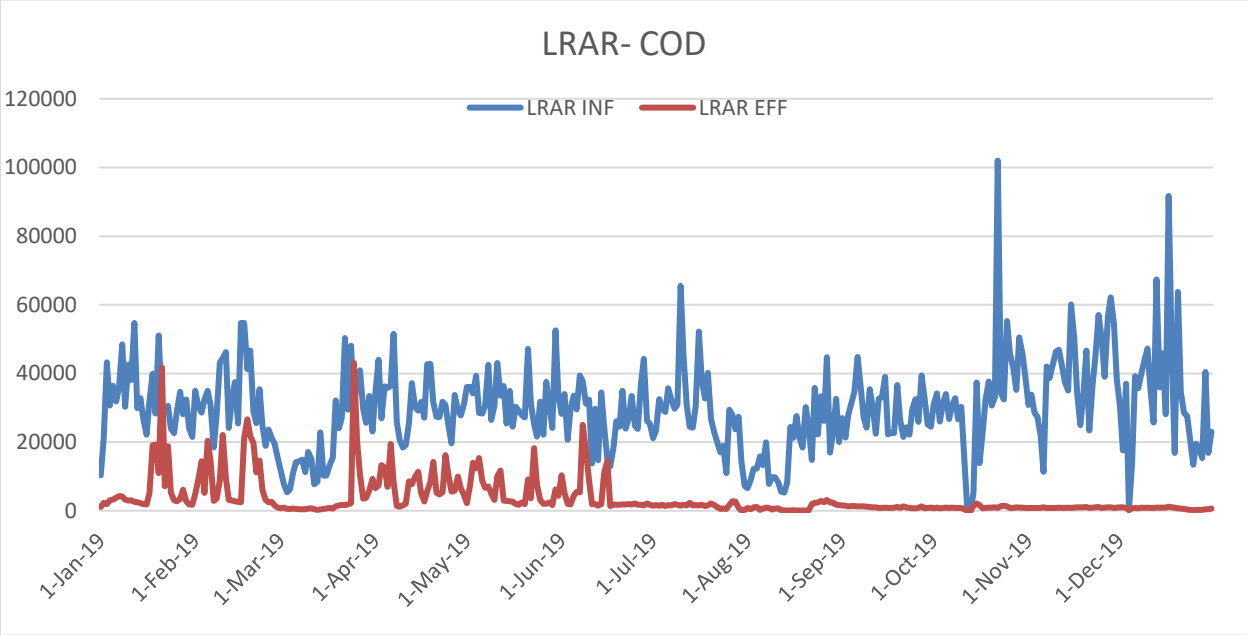
Low Rate Anaerobic Reactor
The Low Rate Anaerobic Reactor was scheduled for completion for the end February 2019. Due to delays, construction was not completed until July 2019 and commissioning was completed by October. All industrial flow has been flowing to the LRAR for pre-treatment since August and removal efficiency has exceeded 95%. The City and Contractor are still working through deficiency items, but these do not impact treatment.

New LRAR and Burn Out Basin

New Pre-treatment Building

The LRAR has been in service for pre-treatment since August. The removal efficiency has exceeded 95% for TSS and COD. This has significantly reduced the amount of sludge build up in the SBRs which in turn has decreased the number of days that solids need to be removed. This decrease means that the Gravity Belt Thickeners are only ran 2-3 days per week, reducing hydro demand as well as polymer usage. There will also be a significant decrease in secondary biosolids removal required in the fall. The following two charts demonstrates the increase in efficiency since the new pre-treatment system was brought online.





Poplar Bluff Pumping Station

The Poplar Bluff Pumping Station was completed in June 2019. Although it has not been needed until late 2019, the pumping station is performing as intended with minor warranty items to address.

Poplar Bluff Lift Station- Exterior

Poplar Bluff Lift Station- Interior

South East Lift Station

A new lift station was constructed in the south east area of Portage la Prairie to service a new apartment complex on Queen Ave as well as for future housing development. The station was put in service September 1. There have been no issues or concerns arising from this new asset.

Industrial Services Agreements and Changes to Collection System

The City maintains service agreements with each of its major industrial partners. Due to significant changes to the pre-treatment system, it has been necessary to update these agreements. The LRAR has a larger capacity, therefore the discharge limits from each industry need to be changed. All partners have been working diligently on updating the Industrial Services Agreements and should be finalized early in 2020. A new ISA for Roquette is also being completed as they have not been a partner to previous agreements. City Administration is working closely with Roquette staff to ensure full comprehension of the agreement.

For the last 25 years, the existing Bulk Volume Fermenter (BVF) as well as the McMillan Industrial Park Lift Station and force main, were operated by McCain Foods and governed by an operating agreement between McCain, Nutri-Pea and the City of Portage la Prairie. With the construction and operation of the new LRAR (same as BVF), the City will retain ownership and operating responsibility for all these systems (LRAR, BVF, McMillan Lift Station, Force main), effectively dissolving the operating agreement.

Simplot Foods has completed construction of their own wastewater treatment facility and will begin treating and discharging their industrial wastewater to the river early in 2020. With this change, the ownership as well as the operation and maintenance of Poplar Bluff Lift Station 1 as well as the south force main (up to the point of Simplot river piping) has been transferred to Simplot. Once Simplot is discharging to the river, the ISA will be considered void. Simplot will continue to send sanitary wastewater to the City via the new Poplar Bluff Lift Station 2 and north force main.

A Notice of Alteration to address these changes has been submitted to Manitoba Sustainable Development and a new license will be issued in 2020. New ISAs will need to be developed to address the Nutrient Removal upgrades. Negotiations with the 3 current industrial partners will begin in mid-2020.

City-wide Power Outage

From October 11-13, the entire city and surrounding area of Portage la Prairie lost all power. This impacted the Water Treatment Plant, Reservoir, Wastewater Treatment and all lift stations. Staff, with the assistance of several contractors, worked diligently around the clock to keeping pumps running, generators working, and septage hauling trucks moving to ensure minimal sewer backup was experience to residents. During this time, 4.5 ML of wastewater was held at the WPCF until power resumed to allow for treatment. No potable water loss or untreated wastewater discharge was experienced during this time.

Summary

In 2019, the WPCF treated and discharged over 5.6 Billion Litres of wastewater to the Assiniboine River. The facility operated well below license requirements throughout most of the year, reporting a compliance rating of 99%. All utility staff should be commended for their ongoing efforts to protect people and the environment through superior wastewater treatment.