

Water Treatment Plant Year-end Report for 2020

Water demand

The total influent volume of water drawn from the Assiniboine River for treatment was approximately 15.73% higher in 2020 than in 2019. 2019 had an influent volume of 6,953,623 m³, as compared to 8,047,701 m³ in 2020.

Total treated water volume increased by 23.22% from 6,295,959 m³ in 2019 as compared to 7,758,072 m³ in 2020.

The volume of water used internally for the treatment process in 2020 was 229,472 m³.

This water is used in the process production for mixing chemicals, dilution of chemicals for pumping purposes, and flushing pipes after sludge removal from process systems.

Raw Water Quality

The raw water quality for the past year has had lower turbidity and hardness in 2020 than what has been seen in recent years. The average raw water hardness for the winter months; January, February, March, October, November and December 2020, was 449 ppm. The raw water hardness average for the other six months was 338 ppm. The treated water average hardness was 213 ppm and 174 ppm for the respective periods. The 2020 yearly average hardness for Raw Water was 394 ppm and Treated Water was 193 ppm.

Turbidity peaks were coincident with the spring runoff, flooding and the draining of the Assiniboine River impoundment area in the fall. The Actiflo clarifier was able to reduce the high levels of turbidity to minimize the impact on the downstream treatment process. Removal of sand and silt from the north side of the river impoundment area was scheduled for early 2020.

Operator overtime and shift changes were required during the spring runoff to service equipment around the clock to ensure water production continued. The problems with the River impoundment area are being addressed by the Province and they are removing the silt and sand from the south side of the impoundment area. This will provide temporary reprieve from the excessive overtime requirements and pump damage as they plan to remove more sediment over the next few years.

Distribution System Water Quality

Distribution testing for 2020 was done on a weekly basis for Total Coliforms and Escherichia Coli. All Drinking Water Regulation treatment parameters were met.

On March 8, 2019, Health Canada set new regulatory guideline for lead in potable water.

The new Canadian Drinking Water Quality Guideline maximum acceptable concentration (MAC) for total lead was lowered from 0.010 mg/L, set in 1992, to 0.005mg/L. This is based on a sample of water taken at the consumer's tap.

Metals sampling and testing was conducted on quarterly basis for the assessment of lead concentrations found in some household service lines. The samples were sent to an independent lab and all results were forwarded, by the lab, to the Manitoba Sustainable Development Office of Drinking Water Officer for our area. The practice of running cold water for 2 to 3 minutes, following extended periods of non-use, and before consuming, is recommended for all homes with lead services.

More information may be obtained from the City's web page.

Water Quality Monitoring and Analyses

The 2020 annual audit report from the Office of Manitoba Sustainable Development, as prepared by the Drinking Water Officer for the Portage la Prairie area, was submitted to the City on January 15, 2021. Manitoba Sustainable Development and the City of Portage la Prairie will continue implementing testing changes at the Water Treatment Plant to enhance the water quality and will continue to work jointly with the local Drinking Water Officer.

The attached graphs for the Hardness show the Raw Water was lower than the seasonal trend from April to June. Lower hardness levels were prevalent during the year and the effluent hardness rose accordingly. The low levels of hardness are shown during the spring runoff also.

The attached graph for the Turbidity shows the Raw Water peaks in the spring during run off and again in the fall during the river reservoir maintenance drain down for service work on the Dam. The effluent turbidity follows the yearly trend also. There were several peak turbidity events that followed rainfall entering the river flow.

The graph for the effluent pH shows some peaks above 8.5 due to over-feed of sodium hydroxide. The raw water pH tends to follow seasonal trends for highs and lows and the effluent pH is adjusted with Sodium Hydroxide to maintain positive Langlier Index to prevent metal corrosion and metals from leaching into the water from too low of a pH.

Fluoride graphs shows a consistent feed throughout the year. The test results are from the morning sample and represent the reading in the effluent water at that time and not as a daily average. Cost of chemical testing negates the continuous sampling over a 24-hour timeline. The average level of Fluoride feed is 0.79 mg/L. A concentration of 0.70 mg/l has been deemed optimum by Health Canada.

Chlorine feed graph shows higher free chlorine concentration in June and July due to component failure. The feed unit was put on manual while the feed controller was sent out to be repaired. The effluent chlorine levels are higher as it enters the distribution system. Weekly sampling of the distribution areas for chlorine residual was done and samples sent to an independent lab for analyses and reporting to the Drinking Water Officer and Water

Plant Management. All samples were shown to be free of Total Coliform and Escherichia Coli.

In 2020, the Tri-halomethane (THM) regulation requirements were met. The taste and odor are removed by the granular activated carbon but shows higher levels of other total organic carbon (TOC) that could react with chlorine to form THM'S. The graphs tend to show a problem that might be in the chemistry of the raw water that could affect the Granular Activated Carbon (GAC) by shortening the effective life of the product. The effective removal of THM-forming compounds is limited. The expected life rating of the GAC media life is well below the original anticipated three years, but the replacement of the GAC media annually, or more frequently, would be cost prohibitive. Monitoring of the raw and treated water will continue to detect problems within the raw water that would cause this. Further studies with chemical treatment alternatives have continue in 2020 to help find a solution for the elevated THM's.

With Phase one upgrades complete water quality, distribution pressure and chemical dosing has enhanced due to the upgrades which included the following:

Pre-treatment jet flash mixing/enhance coagulation was added for removal of Total Organic Carbon and Dissolved Inorganic Carbons. By reducing the disinfection by-products in the raw water.

New Magnetic flowmeters replaced the existing insertion probe meters. Allowing for further accuracy for in chemical dosing into the softing clarifiers, reducing chemical usage. Sodium Hydroxide was added to the softing clarifiers for non-carbonite hardness removal. Lower the overall hardness removal in the softing clarifiers.

Ozone quenching system installation is to address the ozone off gassing after the ozone chamber. Allow for a higher concentration of ozone gas to be applied in the contract chambers for pathogen removal.

Chlorination modification included, relocating chlorine dosing injection point for disinfection and contact time in the treated reservoir. Allowing for even dispersal of the chlorine residual in the finished water before entering the distribution system. Since the relocation of the injection point the chlorine demand has decreased.

McKay Reservoir flow control upgrades. Two new motors and variable frequency drive were added with modification to the Supervisory Control and Data Acquisition Program. Allowing for better control on the overall water distribution system. Maintaining a constant pressure in the system and directional flow control of the system. Also reducing water main breaks within the distribution system.

The Water Treatment Functional Design Upgrades is being coordinated by AECOM Engineering, Manitoba Water Service Board and the City of Portage la Prairie Water Treatment Plant Staff.

The City of Portage la Prairie and Manitoba Water Services Board entered into an agreement for the Phase Two (A) Water Treatment Upgrades on November 5, 2018.

Phase Two (A) of the Water Treatment Functional Design Upgrade planning was in progress, with the first meeting being held at the Water Treatment Plant on September 7, 2017. Final tender documents for the upgrades were completed March 30, 2018 and construction tender was issued in May 2018.

Award of Phase Two A was awarded to Trotter and Morton Industrial Contracting Inc. on November 5, 2018, with a completion date of August 31, 2019. Completion date was extended to November 30, 2019 due to equipment supply delivery. Certain upgrades were not completed in 2019 and were carried over into 2020/2021 which include: Lime Batching Alterations and the Makeup water System for chemical batch tanks.

Phase Two (A) upgrades include the following: Raw Water Flow Control, Pre-treatment Screening System, Lime Batching Alteration, Ozone Contactor Upgrades, Makeup water System for Chemical Batch Tanks, City Distribution Pumps, PLC Upgrades, WTP & McKay Reservoir SCDA System Upgrade, Flow-paced Sodium Hydroxide Addition, Compound Loop Control for Chlorination, Dissolved ozone Probe with Transmitter, Online UV 254 Analyzer and GAC Flow Control.

Phase Two (B) upgrades include the following: New Backup Generator, Air -Scouring System for Pre-Treatment process and New Ozonation System.

Phase Two (B) was split into two contracts one for the backup generators and the other for installation of the ozonation system and air-scouring system.

Backup generator was tendered in January 2020 and was awarded to Trotter and Morton Industrial Contracting Inc. With completion date of March 31,2021.

Air – Scouring and Ozonation system installation was tendered November 2020 and was awarded to ABCO Supply & Service Ltd. With completion date of March 31,2021

Phase Three of the water plant upgrades included a 15 Million-Liters-Day Water Treatment Plant Expansion Functional Design.

Major Maintenance

Replacement of service water line to diversion

Water plant air compressor replace.

Dual Media Filter repair

Water plant air dryer replace.

Replaced recirculation pump liner and impeller.

Two chlorine vacuum regulators replaced.

Ozone generator #4003 has been taken out of service for replacement.

Three new raw water pumps were installed at the raw water pumping station.

Two Poplar Bluff pumps repaired.

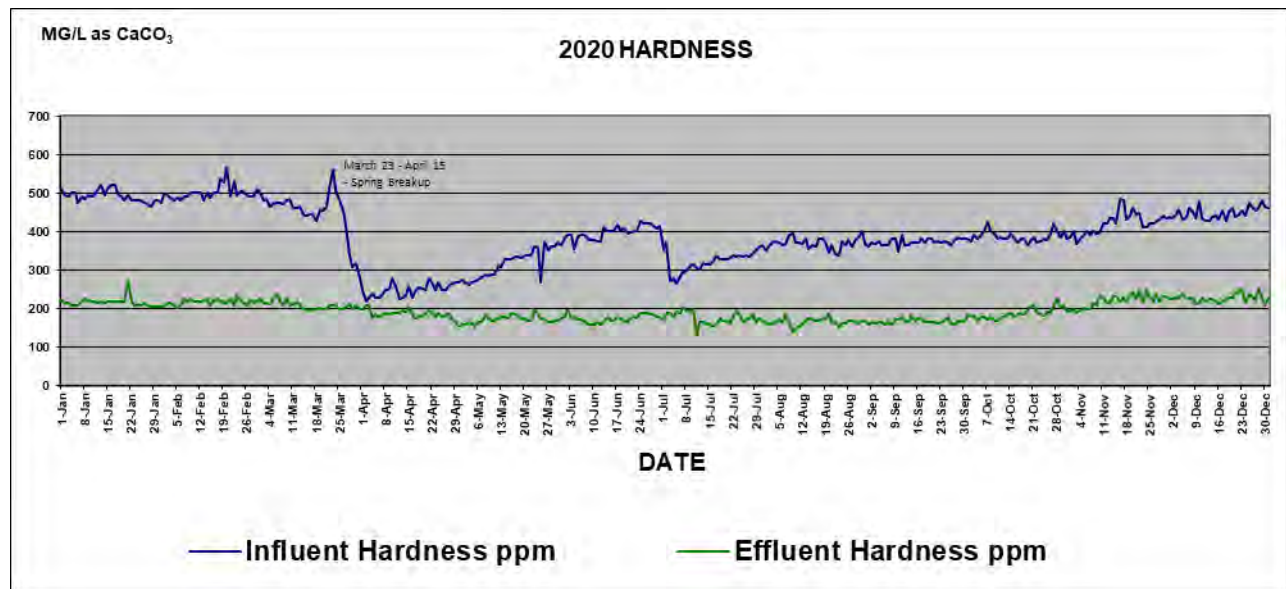
Lime sludge pond waste residual removal.

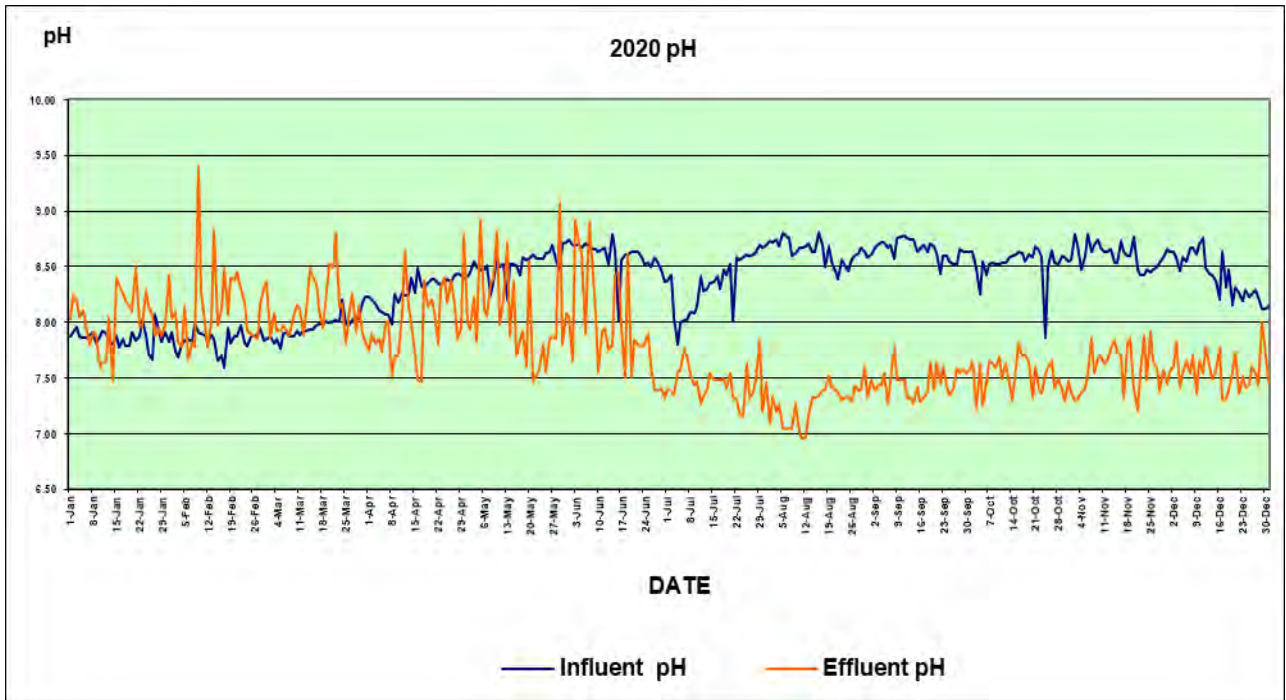
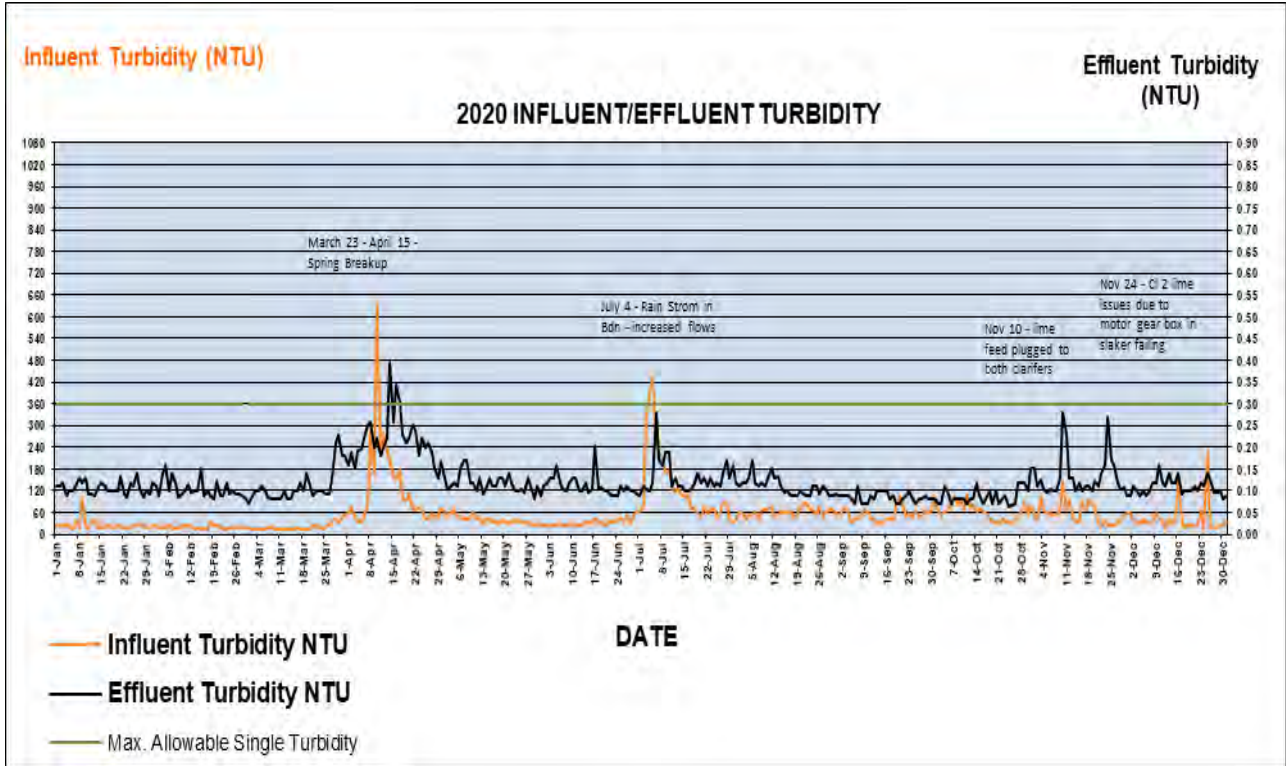
Ongoing Water Quality Studies will result in optimizing the treatment process to treat the raw water to continue to have a safe, reliable product for our consumers.

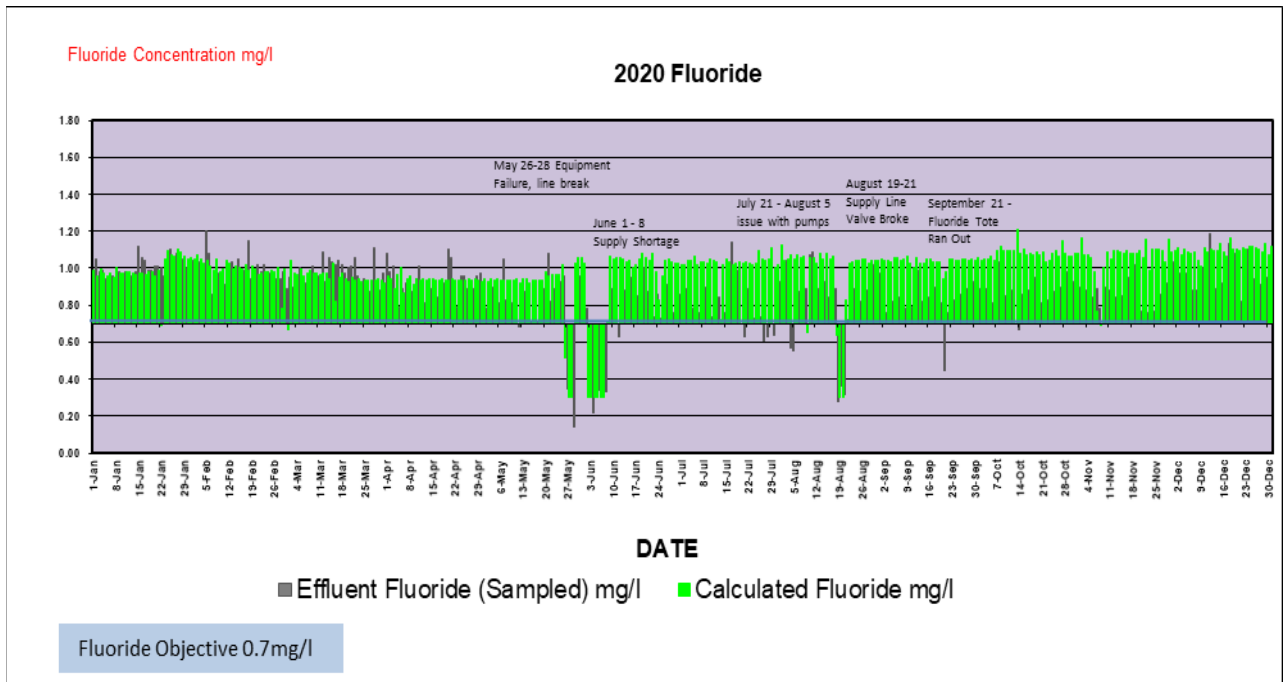
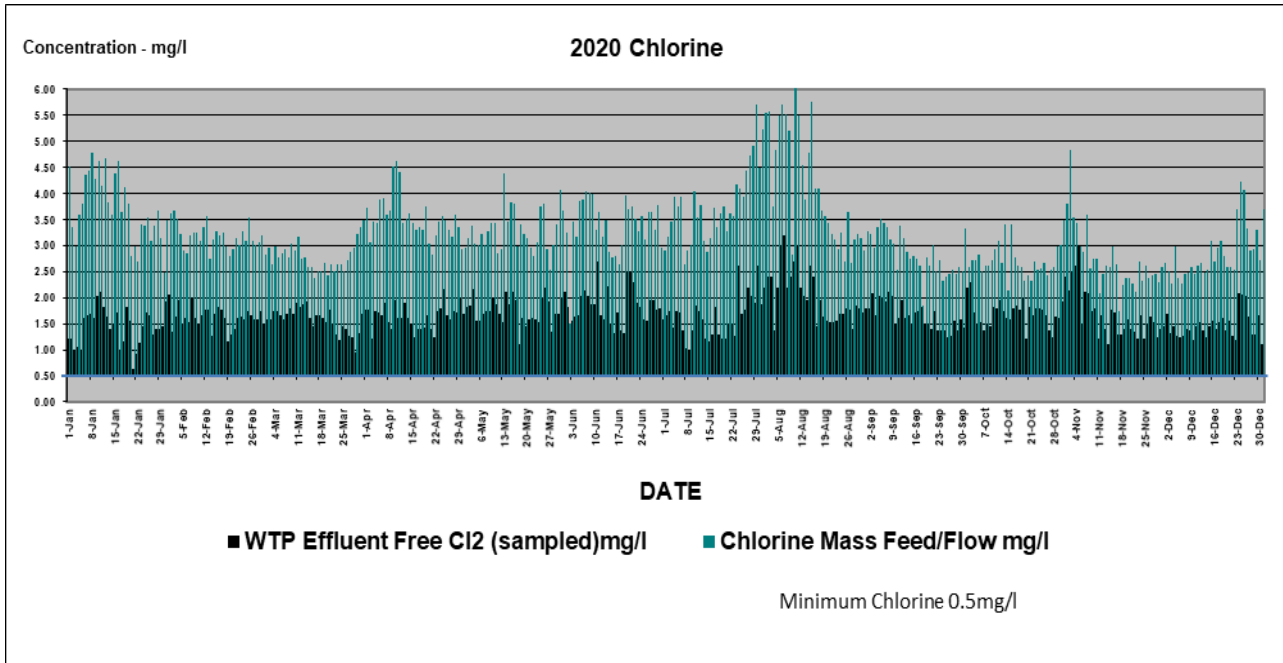
The plant was kept in operation during maintenance work and plant shutdowns were done in a manner to keep the consumers supplied with water.

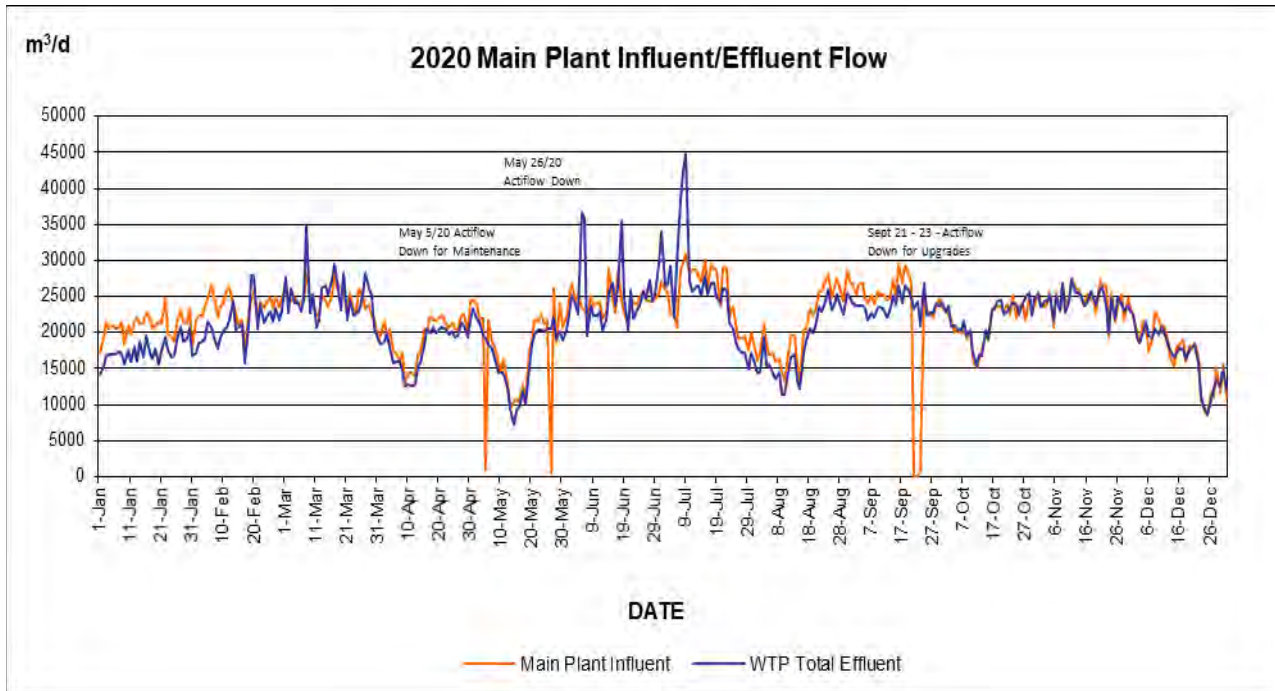
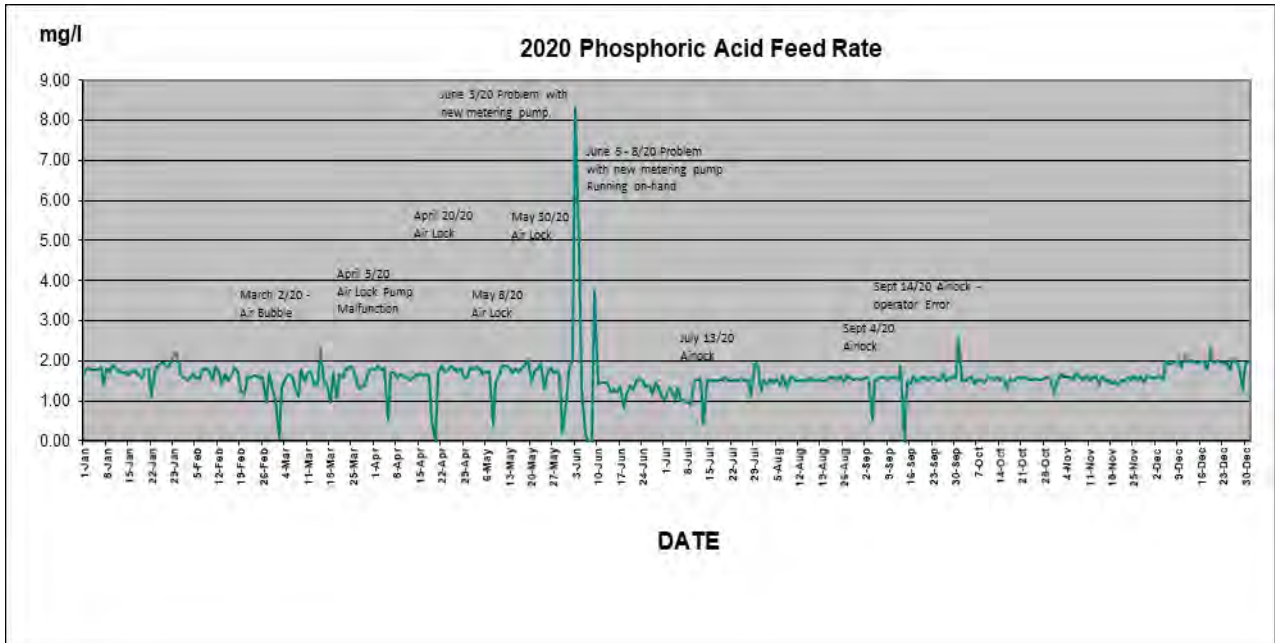
Operating staff will continue to abide by all Government operational requirements and work with the local Drinking Water Officer to ensure the best quality of water for all persons.

City of Portage la Prairie Water Treatment Plant - 2020 Annual Data Summary										
	Influent Hardness ppm	Effluent Hardness ppm	Influent Turbidity NTU	Effluent Turbidity NTU	Influent pH	Effluent pH	WTP Effluent Free Cl ₂ (sampled)mg/l	W.T.P. Effluent Fluoride (Sampled) mg/l	WTP Reservoir Influent Flow m3	Reservoir Effluent less process water m3
TOTAL ANNUAL									8,165,670	7,758,072
AVERAGE	394	193	56.24	0.12	8.36	7.76	1.67	0.88	22,311	21,197
PEAK DAY	568	272	631.00	0.40	8.80	9.40	3.20	1.20	33,200	44,678
90th PERCENTILE	492	225	94.25	0.17	8.69	8.35	2.10	1.03		
MEDIAN	385	190	41.15	0.11	8.48	7.70	1.64	0.89		
WINTER AVG	449	213								
SUMMER AVG	338	174								

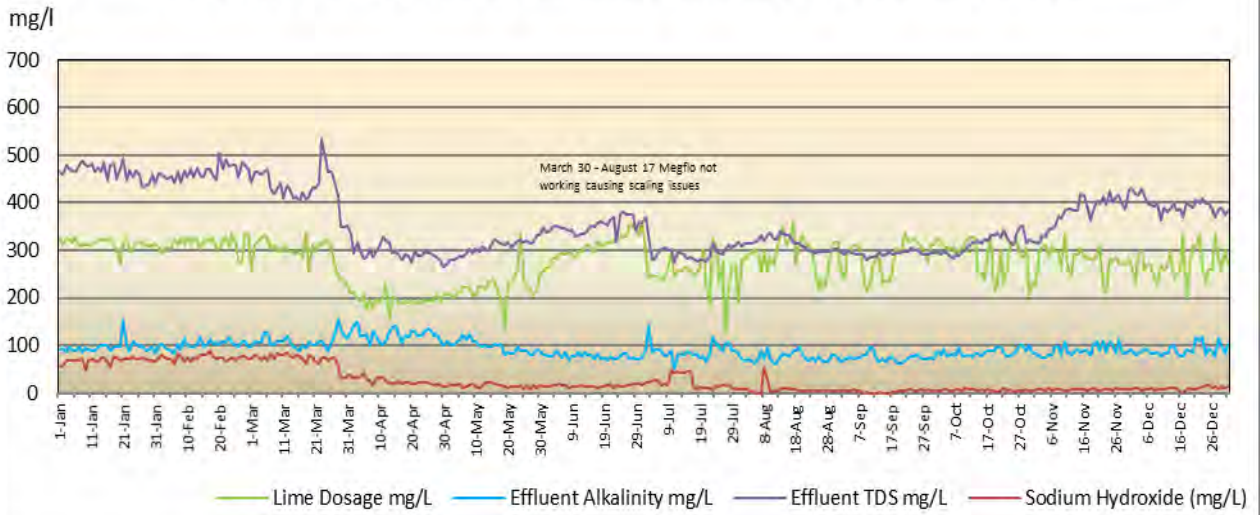








2020 Lime Dosage, Effluent Alkalinity, Effluent TDS, Sodium Hydroxide



2020 Langelier Index & Ryznar Index

